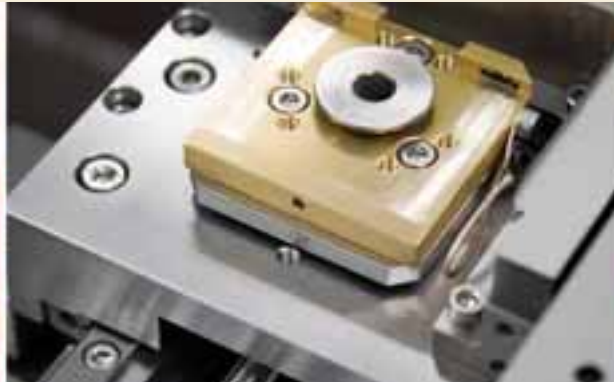


# SPIE Photonics West

Conferences + Courses: 19-24 January 2008  
Biomedical Optics Exhibition: 19-20 January 2008  
Photonics West Exhibition: 22-24 January 2008  
San Jose Convention Center  
San Jose, California USA

2008  
Technical  
Program

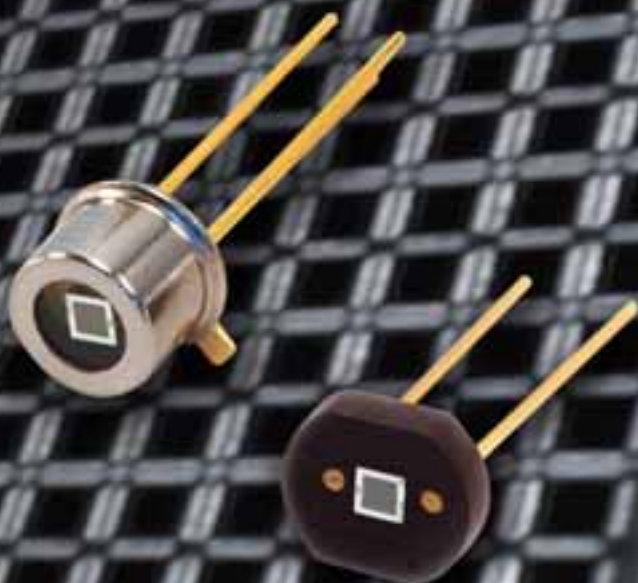
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### Special Events

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### Photonics West • Biomedical Optics

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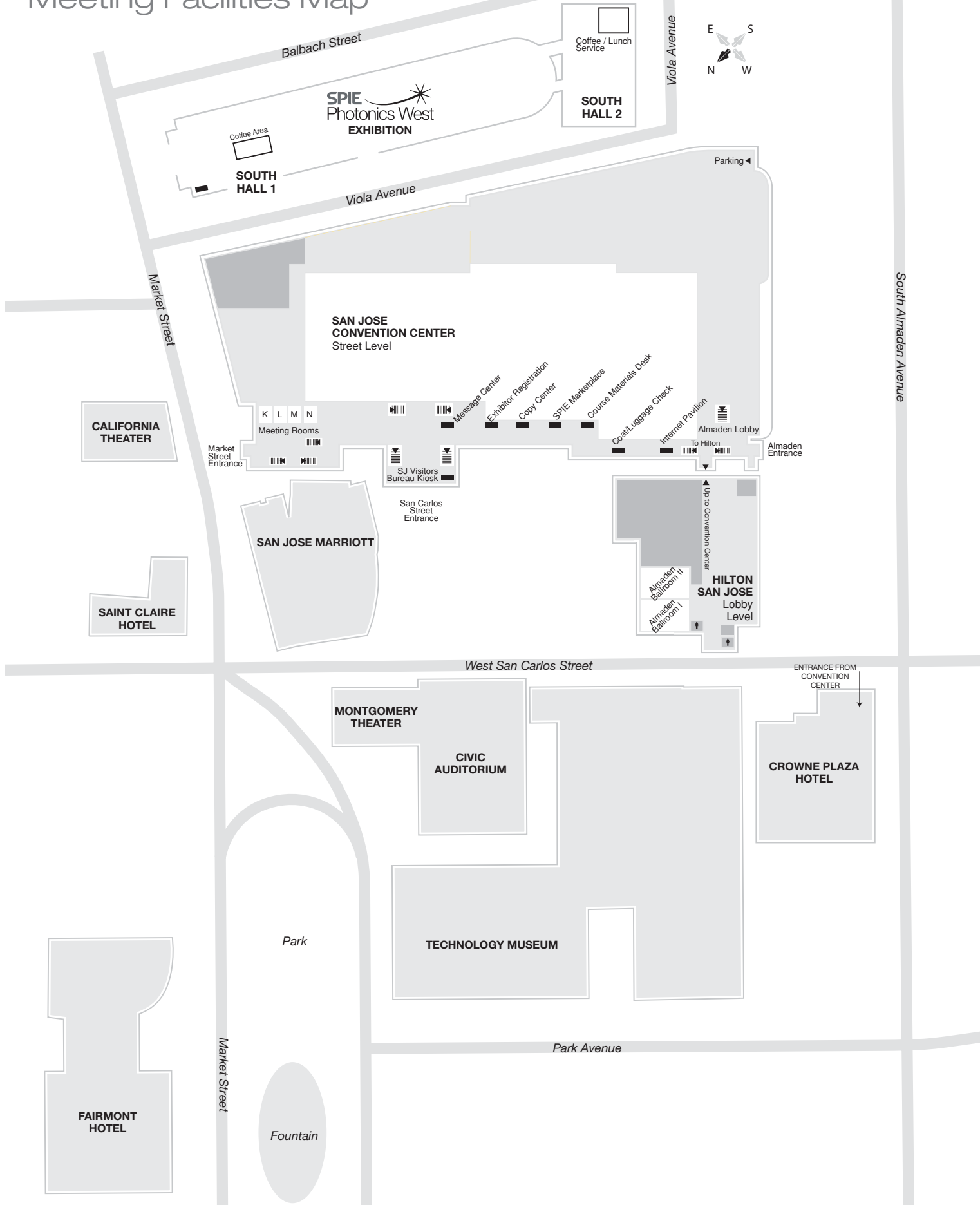
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*SPIE would like to express its deepest appreciation to the symposium chairs, conference chairs, program committees, and session chairs who have so generously given of their time and advice to make this symposium possible.*

*The symposium, like our other conferences and activities, would not be possible without the dedicated contribution of our participants and members. This program is based on commitments received up to the time of publication and is subject to change without notice.*

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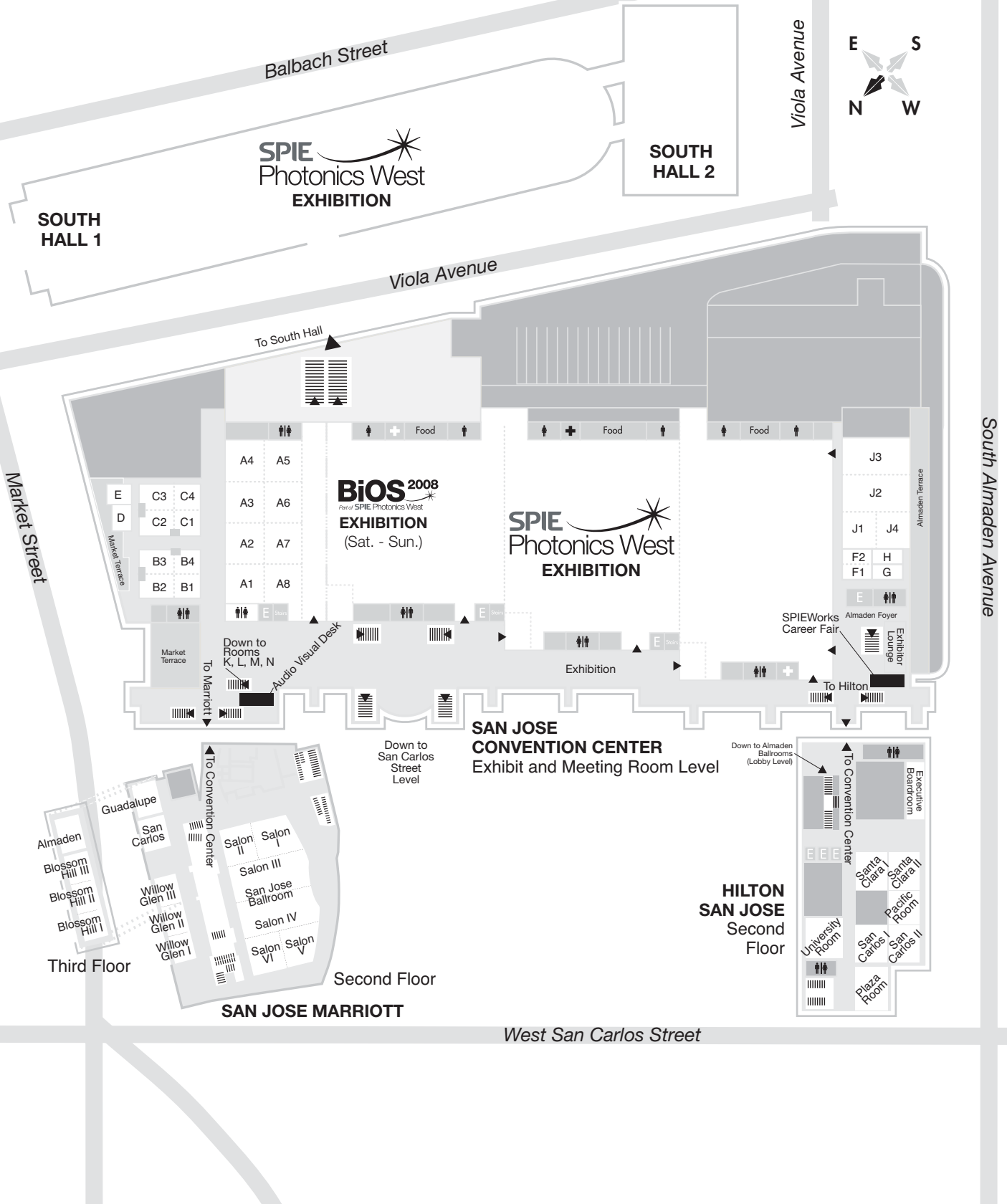


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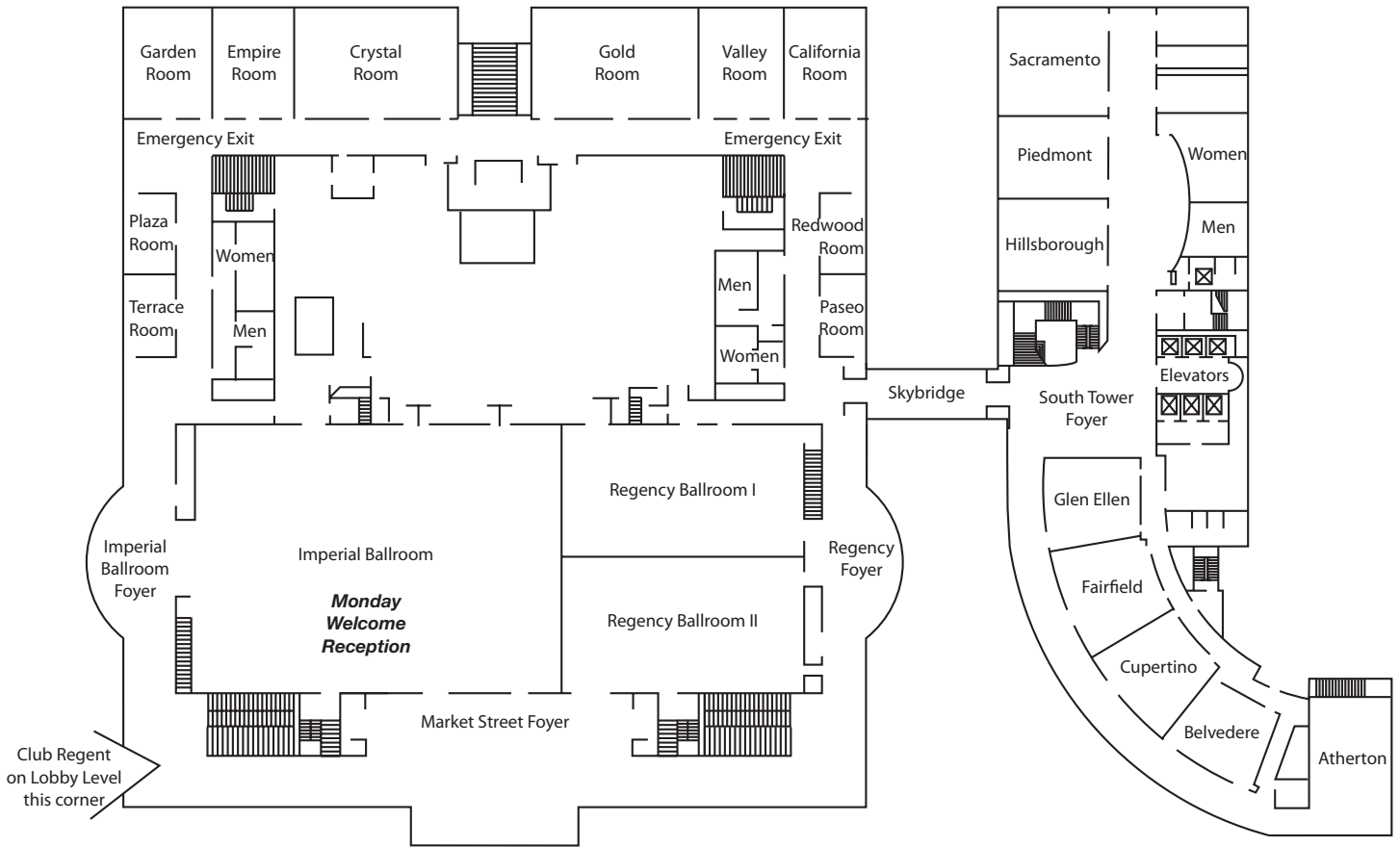
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# Fairmont Map

## Ballroom Level (2nd Floor)



## Technical Program Room Lists



### Biomedical Optics



**James Fujimoto**, Massachusetts Institute of Technology



**R. Rox Anderson, M.D.**, Wellman Center for Photomedicine, Massachusetts General Hospital and Harvard School of Medicine

### Key

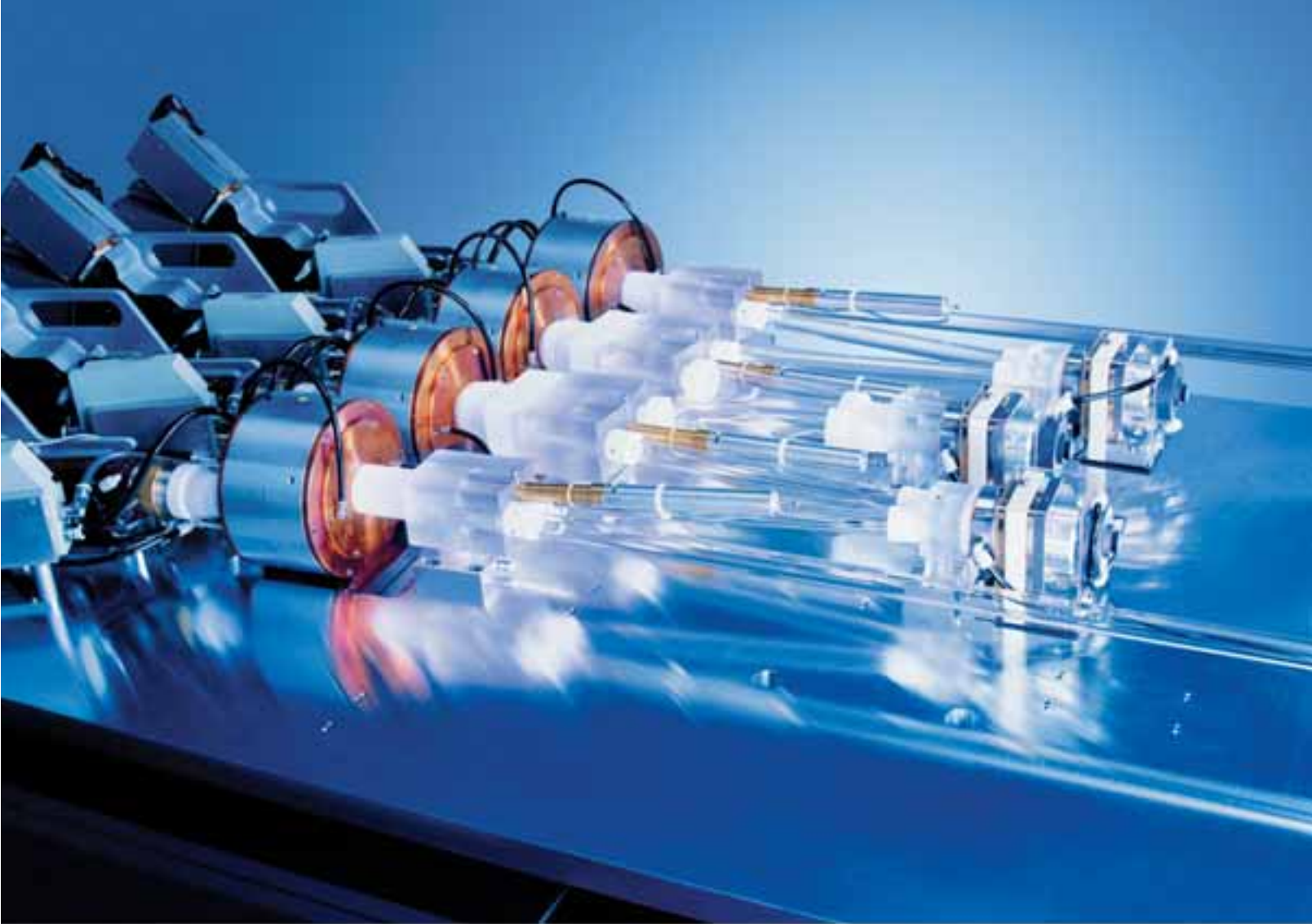
- CC = Convention Center
- M = Marriott
- H = Hilton
- F = Fairmont
- SC = St. Claire

### Photonic Therapeutics and Diagnostics

Program Chair: **Reza S. Malek**, Mayo Clinic

- 6842A **Photonics in Dermatology and Plastic Surgery** (Kollias/Choi/Zeng) CC-A3 . . . . . 57
- 6842B **Urology: Diagnostics, Therapeutics, Robotics, Minimally Invasive, and Photodynamic Therapy** (Malek) . . . . . 59
- 6842C **Advanced Technology and Instrumentation in Otolaryngology: Lasers, Optics, Radio Frequency, and Related Technology** (Wong/Ilgner) . . . . . 60
- 6842D **Diagnostic and Therapeutic Applications of Light in Cardiology** (Gregory/Tearney) . . . . . 62
- 6842E **Optical Techniques in Neurosurgery, Brain Imaging, and Neurobiology** (Hirschberg/Madsen) . . . . . 63
- 6843 **Lasers in Dentistry XIV** (Rechmann/Fried) CC-C1 . . . . . 64
- 6844A **Ophthalmic Technologies XVIII** . . . . . CC-A7/A8 . . . . . 66
- 6844B **Laser and Noncoherent Light Ocular Effects** (Stuck/Belkin) . . . . . 70
- 6845 **Optical Methods for Tumor Treatment and Detection: Mechanisms and Techniques in Photodynamic Therapy XVII** (Kessel) . . . . . 71
- 6846 **Mechanisms for Low-Light Therapy III** . . . . . CC-B4 . . . . . 73





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# Technical Program Room Lists

## Biomedical Optics continued

### Clinical Technologies and Systems

Program Chairs: **Tuan Vo-Dinh**, Duke Univ.;  
**Anita Mahadevan-Jansen**, Vanderbilt Univ.

|       |  |                                 |
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| 6847  | <b>Coherence Domain Optical Methods and Optical Coherence Tomography in Biomedicine XII</b> ( <i>Izatt/Fujimoto/Tuchin</i> ) | M-SJ Ballroom . 74<br>Salon III |
| 6848  | <b>Advanced Biomedical and Clinical Diagnostic Systems VI</b> ( <i>Vo-Dinh/Grundfest/Benaron/Cohn</i> )                      | CC-A3 . . . . . 79              |
| 6849  | <b>Design and Quality for Biomedical Technologies</b> ( <i>Raghavachari/Liang</i> )  | CC-C4 . . . . . 82              |
| 6850  | <b>Multimodal Biomedical Imaging III</b> ( <i>Azar/Intes</i> )   | CC-B2 . . . . . 84              |
| 6851  | <b>Endoscopic Microscopy III</b> ( <i>Tearney/Wang</i> )   | CC-K . . . . . 86               |
| 6852  | <b>Optical Fibers and Sensors for Medical Diagnostics and Treatment Applications VIII</b> ( <i>Gannot</i> )                  | CC-B3 . . . . . 88              |
| 6853A | <b>Biomedical Vibrational Spectroscopy V: Advances in Research and Industry</b> ( <i>Mahadevan-Jansen/Petrich</i> )          | CC-A1 . . . . . 90              |
| 6853B | <b>Optical Biopsy VII</b> ( <i>Alfano/Katz</i> )   | CC-L . . . . . 92               |

### Tissue Optics, Laser-Tissue Interaction, and Tissue Engineering

Program Chairs: **Steven L. Jacques**, Oregon Health and Science Univ.; **William P. Roach**, Air Force Research Lab.

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| 6854 | <b>Optical Interactions with Tissue and Cells XIX</b> ( <i>Jacques/Roach</i> )   | CC-C1 . . . . . 93           |
| 6855 | <b>Complex Dynamics and Fluctuations in Biomedical Photonics V</b> ( <i>Tuchin/Wang</i> )  | CC-B4 . . . . . 96           |
| 6856 | <b>Photons Plus Ultrasound: Imaging and Sensing 2008: The Ninth Conference on Biomedical Thermoacoustics, Optoacoustics, and Acousto-optics</b> ( <i>Oraevsky/Wang</i> ) | CC-A4 . . . . . 98           |
| 6857 | <b>Biophotonics and Immune Responses III</b> ( <i>Chen</i> )   | CC-L . . . . . 102           |
| 6858 | <b>Optics in Tissue Engineering and Regenerative Medicine II</b> ( <i>Kirkpatrick/Wang</i> )   | M-SJ Ballroom 104<br>Salon 1 |
| 6870 | <b>Design and Performance Validation of Phantoms Used in Conjunction with Optical Measurements of Tissue</b> ( <i>Nordstrom</i> )  | CC-L . . . . . 133           |

### Biomedical Spectroscopy, Microscopy, and Imaging

Program Chairs: **Ammasi Periasamy**, Univ. of Virginia;  
**Daniel L. Farkas**, Cedars-Sinai Medical Ctr.

|      |  |                               |
|------|--|-------------------------------|
| 6859 | <b>Imaging, Manipulation, and Analysis of Biomolecules, Cells, and Tissues VI</b> ( <i>Farkas/Nicolau/Leif</i> )                   | CC-A5 . . . . . 106           |
| 6860 | <b>Multiphoton Microscopy in the Biomedical Sciences VIII</b> ( <i>Periasamy/So</i> )  | M-SJ Ballroom 110<br>Salon IV |
| 6861 | <b>Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XV</b> ( <i>Conchello/Cogswell/Wilson</i> ) | M-SJ Ballroom 114<br>Salon IV |
| 6862 | <b>Single Molecule Spectroscopy and Imaging</b> ( <i>Enderlein/Gryczynski/Erdmann</i> )  | CC-C4 . . . . . 116           |
| 6863 | <b>Optical Diagnostics and Sensing VIII</b> ( <i>Coté/Priezzhev</i> )  | CC-C2 . . . . . 119           |
| 6864 | <b>Biomedical Applications of Light Scattering II</b> ( <i>Wax/Backman</i> )   | CC-A6 . . . . . 121           |

### Nano/Biophotonics

Program Chairs: **Paras N. Prasad**, Univ. at Buffalo;  
**Dan V. Nicolau**, The Univ. of Liverpool (United Kingdom)

|      |  |                     |
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| 6865 | <b>Nanoscale Imaging, Sensing, and Actuation for Biomedical Applications V</b> ( <i>Cartwright/Nicolau</i> )       | CC-M . . . . . 123  |
| 6866 | <b>Colloidal Quantum Dots for Biomedical Applications III</b> ( <i>Osirski/Jovin/Yamamoto</i> )                    | CC-A5 . . . . . 125 |
| 6867 | <b>Molecular Probes for Biomedical Applications II</b> ( <i>Achilefu/Bornhop/Raghavachari</i> )                    | CC-C2 . . . . . 127 |
| 6868 | <b>Small Animal Whole-Body Optical Imaging Based on Genetically Engineered Probes</b> ( <i>Savitsky/Campbell</i> ) | CC-L . . . . . 129  |
| 6869 | <b>Plasmonics in Biology and Medicine V</b> ( <i>Vo-Dinh/Lakowicz</i> )  | CC-B2 . . . . . 131 |

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# Technical Program Room Lists

## LASE<sup>2008</sup>

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### Lasers and Applications in Science and Engineering

2008 Symposium Chairs



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The Aerospace  
Corp. (USA)



**Friedrich G. Bachmann**,  
ROFIN-SINAR Laser  
GmbH (Germany)

2008 Symposium Co-Chairs



**Don Harter**,  
IMRA Corp. USA



**Peter Herman**,  
Univ. of Toronto  
(Canada)

### Laser Source Engineering

Program Chair: **Gregory J. Quarles**, VLOC

- 6871 **Solid State Lasers XVII: Technology and Devices** (Clarkson/Hodgson/Shori) . . H-Almaden II. . 138
- 6872 **Laser Resonators and Beam Control XI** (Kudryashov/Paxton/Ilichenko) . . . . . CC-F1 . . . . . 143
- 6873 **Fiber Lasers V: Technology, Systems, and Applications** (Broeng/Headley) . . . . . CC-J2 . . . . . 145
- 6874 **High Energy/Average Power Lasers and Intense Beam Applications III** (Davis/Heaven/Schriempf)

### Nonlinear Optics

Program Chair: **Peter E. Powers**, Univ. of Dayton

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- 6894 **Gallium Nitride Materials and Devices III** (Morkoç/Litton) . . . . . CC-A6 . . . . . 204
- 6895 **Zinc Oxide Materials and Devices III** (Teherani/Litton) . . . . . CC-C2 . . . . . 208
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### Laser Communication and Propagation

Program Chair: **Steve Mecherle**, Innocept Inc.

- 6877 **Free-Space Laser Communication Technologies XX** (Mecherle) . . . . . CC-L . . . . . 157
- 6878 **Atmospheric Propagation of Electromagnetic Waves II** (Korotkova) . . . . . CC-L . . . . . 158

### Laser Micro-/Nanoengineering and Applications

Program Chairs: **Henry Helvajian**, The Aerospace Corp.;  
**James S. Horwitz**, U.S. Dept. of Energy

- 6879A **Laser Applications in Microelectronic and Optoelectronic Manufacturing XIII** (Holmes/Meunier/Arnold/Niino) . . . . . CC-J4 . . . . . 159
- 6879B **Synthesis and Photonics of Nanoscale Materials VI** (Geohegan/ Träger/Dubowski) . . . . . H-Santa Clara I 163
- 6880 **Laser-Based Micro- and Nano-Packaging and Assembly (LBMP-V)** (Pfleger/Lu/Washio) . . . . . CC-J1 . . . . . 164
- 6881 **Commercial and Biomedical Applications of Ultrafast Lasers VIII** (Neev/Nolte/Heisterkamp/Schaffer)

## MOEMS/ MEMS<sup>2008</sup>

Part of SPIE Photonics West

### Micro & Nanofabrication

2008 Symposium Chair



**Albert K. Henning**,  
NanoInk, Inc.

2008 Symposium Co-Chair



**Thomas J. Suleski**,  
University of  
North Carolina at  
Charlotte

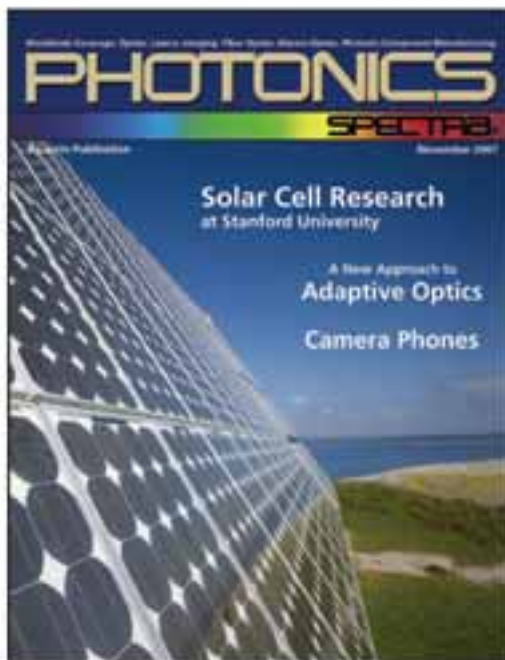
### Micro/Nanofabrication

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- 6883 **Advanced Fabrication Technologies for Micro/Nano-Optics & Photonics** (Suleski/Schoenfeld/Wang)

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- 6885 **MEMS/MOEMS Components and Their Applications V Special Focus Topics: Transducers at the Micro-Nano Interface** (Tadigadapa/Parviz/Henning) . . . . . H-Plaza . . . . . 179
- 6886 **Microfluidics, BioMEMS, and Medical Microsystems VI** (Wang/Vauchier)
- 6887 **MOEMS and Miniaturized Systems VII** (Dickensheets/Schenk) . . . . . H-University . . 183
- 6888 **MEMS Adaptive Optics II** . . . . . CC-F1/F2 . . . . . 185

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# Technical Program Room Lists

## OPTO 2008

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### Integrated Optoelectronic Devices



**Symposium Chair:**  
**Ali Adibi**, Georgia  
Institute of Technology



**Symposium Co-Chair:**  
**James G. Grote**, Air  
Force Research Lab.

### Optoelectronic Materials and Devices

*Program Chair:* **James G. Grote**, Air Force Research Lab.

- 6889 **Physics and Simulation of Optoelectronic Devices XVI** (Osirski/Henneberger/Edamatsu) . . . . . CC-K Mon am 190  
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- 6890 **Optical Components and Materials V** (Digonnet/Jiang/Glesener/Dries) . . . . . CC-E . . . . . 193
- 6891 **Organic Photonic Materials and Ultrafast Phenomena in Semiconductors and Nanostructure Materials XII** (Song/Tsen) . . . . . M-SJ Ballroom 196  
6892 . . . . . M-SJ Ballroom 199  
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- 6893 **Terahertz Technology and Applications** (Linden/Sadwick) . . . . . CC-B3 . . . . . 203
- 6894 **Gallium Nitride Materials and Devices III** (Morkoç/Litton) . . . . . CC-A6 . . . . . 204
- 6895 **Zinc Oxide Materials and Devices III** (Teherani/Litton) . . . . . CC-C2 . . . . . 208

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*Program Chair:* **Yakov Sidorin**, Photineer Technology Group

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### Semiconductor Lasers and LEDs

*Program Chair:* **E. Fred Schubert**, Rensselaer Polytechnic Institute

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CC-C4 T-Th
- 6894 **Gallium Nitride Materials and Devices III** (Morkoç/Litton) . . . . . CC-A6 . . . . . 204
- 6895 **Zinc Oxide Materials and Devices III** (Teherani/Litton) . . . . . CC-C2 . . . . . 208

### Displays and Holography

*Program Chair:* **Liang-Chy Chien**, Kent State Univ.

- 6911 **Emerging Liquid Crystal Technologies III** (Chien) . . . . . CC-C2 . . . . . 245
- 6912 **Practical Holography XXII: Materials and Applications** (Bjelkhagen/Kostuk) . . . . . M-SJ Ballroom 248  
Salon II

#### Key

- CC = Convention Center  
M = Marriott  
H = Hilton  
F = Fiarмонт  
SC = St. Claire



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# Special Events Daily Schedule

| <b>Saturday</b><br>19 January  | <b>Sunday</b><br>20 January   | <b>Monday</b><br>21 January  |
|--|---|--|
|    |   | <b>Student Chapter Breakfast</b> , 7:30 to 8:30 am, p. 18  |
|  |   | <i>Workshop: Laser Safety Made Easy</i> (WS866), 8:30 am to 12:30 pm, p. 32                          |
|  |   | <b>MOEMS-MEMS Plenary Session</b> , 9:00 am to Noon, p. 26   |
|  |   | <b>Fellows Luncheon</b> , Noon to 1:30 pm, p. 17   |
|  |   | <i>Workshop: Optimizing Your Resume</i> (WS777), 1:30 to 3:30 pm, p. 35                              |
|  |   | <i>Workshop: Understanding Laser Beam Performance Specifications</i> (WS847), 1:30 to 5:30 pm, p. 32 |
|  |   | <b>Women in Optics Presentation and Reception</b> , 4:30 to 6:00 pm, p. 17                           |
| <p style="text-align: center;"><b>Biomedical Optics Exhibition</b><br/>                     San Jose Convention Center, Exhibition Hall 1<br/>                     1:00 to 5:00 pm</p> | <p style="text-align: center;">10:00 am to 4:00 pm</p>  | <b>Early Career Social</b> , 5:00 to 6:00 pm, p. 20  |
| <b>BiOS Hot Topics</b> , 7:00 to 9:30 pm, p. 23  | <i>Workshop: Hands-On Optics: Making an Impact with Light (HOO): Terrific Telescopes Workshop</i> (WS852), 9:30 am to 12:30 pm, p. 20 | <b>BiOS Interactive Poster Sessions</b> , Civic Auditorium, 5:30 to 7:00 pm, p. 17                   |
|  | <b>Lunch with the Experts—A BiOS Student Networking Event</b> , 12:30 to 1:30 pm, p. 18   | <b>All-Symposium Welcome Reception</b> , 6:30 to 8 pm, p. 17   |
|  | <b>Professional Development Speaker Series</b> ( <i>Open to All Attendees</i> ), 1:30 to 5:00 pm, p. 18                               | <b>SPIE Members Reception</b> , ( <i>For SPIE Members Only</i> ), 6:30 to 8:00 pm, p. 17             |
|  | <i>Sunday Night Hot Topic Workshop: Nanotechnology and Medicine</i> , 6:00 to 7:00 pm, p. 23  | <i>Panel: Progress and Prospects in Microfluidics</i> , 8:00 to 9:30 pm, p. 27                       |
|  |   | <b>“No Ties” Student Social</b> , 8:00 to 10:00 pm, p. 18  |



# Special Events Daily Schedule

| Tuesday   | Wednesday  | Thursday  |
|---|--|---|
| 22 January  | 23 January   | 24 January  |
|    |  |   |
| <b>Photronics West Exhibition</b><br><i>San Jose Convention Center, Exhibition Halls 1-3, Exhibition Foyer and South Hall</i> |  |   |
| 10:00 am to 5:00 pm   | 10:00 am to 5:00 pm  | 10:00 am to 4:00 pm   |
| <br><b>SPIE Works</b><br>11:00 am to 3:00 pm | <b>Career Fair</b><br>11:00 am to 3:00 pm  | <i>Executive Panel Session: China: Competitor, Customer or Conundrum?</i><br>9:15 to 9:45 am, p. 31                       |
| <b>OPTO Plenary Session</b> , 8:30 to 10:00 am, p. 28   | <i>Workshop: Basic Optics for Non-Optics Personnel</i> (WS609), 8:30 to 11:00 am, p. 33  | <i>PRODUCT TUTORIAL: Crosslight Software Tutorial on Optoelectronic Device Simulation</i> (PT001), 1:30 to 5:30 pm, p. 35 |
| <i>Workshop: Intellectual Property Issues in High-Tech Business</i> (WS412), 8:30 am to 12:30 pm, p. 34                       | <i>Workshop: The Craft of Scientific Presentations</i> (WS667), 8:30 am to 12:30 pm, p. 34   | <i>LASE Conf. 6871: Solid State Lasers XVII: Technology and Devices: Student Award Ceremony</i> , 6:00 to 6:10 pm, p. 25  |
| <i>Industry Perspectives: Optical Components for Telecom Applications</i> , 10:15 to 10:50 am, p. 30                          | <i>Workshop: Creating a New Technology Venture</i> (WS867), 8:30 am to 5:30 pm, p. 33<br><b>LASE Plenary</b> , 10:30 am to 12:30 pm, p. 24 | <i>LASE Conf. 6873: Fiber Lasers V: Technology, Systems, and Applications: Student Award Ceremony</i> , 4:50 pm, p. 25    |
| <i>Industry Perspective: OPTICS: The Foundation of Telco's Transition to Multimedia Provider</i> , 10:50 to 11:25 am, p. 30   | <i>Executive Panel Session: Market Direction and Implications for the World of Photonics</i> , 1:30 to 2:45 pm, p. 31                      |   |
| <b>Student Lunch with the Experts—A Networking Event</b> , 12:30 to 1:30 pm, p. 19  | <i>Industry Forum: Latest Developments in Broadband Access Communication Technologies</i> , 3:30 to 5:30 pm, p. 30                         |   |
| <i>Industry Perspective: Broadband Access Communication Technologies Technical Workshop</i> , 1:30 to 3:30 pm, p. 30          | <i>Workshop: The Craft of Scientific Writing</i> (WS668), 1:30 to 5:30 pm, p. 35   |   |
| <i>Workshop: How to Start a Small High Tech Business Almost Anywhere</i> (WS756), 1:30 to 5:30 pm, p. 34                      | <i>Workshop: Essential Skills for Engineering Project Leaders</i> (WS846), 1:30 to 5:30 pm, p. 34  |   |
| <b>Women in Optics Presentation and Reception</b> , 4:30 to 6:00 pm, p. 17  | <i>Workshop: Strategies and Tactics for High Tech Sales Success</i> (WS826), 1:30 to 5:30 pm, p. 33  |   |
| <b>LASE and MOEMS/MEMS Interactive Poster Sessions</b> , Civic Auditorium, 6:00 to 7:30 pm, p. 17                             | <b>OPTO Interactive Poster Session</b> , Civic Auditorium, 6:00 to 7:30 pm, p. 17  |   |
| <i>Technical Event: IBOS—International Optics Society</i> , 7:30 to 9:00 pm, p. 23  |  |   |
| <i>Technical Event: Laser Communications</i> , 7:30 to 9:00 pm, p. 25   |  |   |
| <i>Technical Event: Holography</i> , 7:30 to 9:00 pm, p. 29   |  |   |

3D imaging Abstracts Academic Access adaptive optics Alerts Archival Atmospheric propagation Authoritative Availability Beam control BibTeX Biomedical Imaging biophotonics BIOS Bookmarking Citation Clinical technologies Collaboration Collections Connected CrossRef Diagnostics Displays e-First EndNote Experts Fast Findability GaN Global Google Scholar Holography Impact Factor Industry Innovation INSPEC Interdisciplinary Intuitive IP Journals LASE Laser Communication Laser Micro-/Nanoengineering and Applications Laser Sources Laser-Tissue Interaction LCD LEDs Letters Materials Medline MEMS Metrology Microfabrication Microscopy MOEMS Multimedia MySPIE Nanobiophotonics Nanofabrication Nanophotonics Nanotechnology Networking Nonlinear Optics Not-for-Profit OCT OLEDs ophthalmology OPTO Optoelectronics photonic crystals Photonic Integration Photonic Therapeutics plasmonics Portico Prior Art Publish Quantum dots Quantum Optics Refereed Reference Linking RefWorks Relevance resonators RSS Scitation Scitopia.org Searchability Semiconductor Lasers Seminal Silicon Photonics Spectroscopy Technology Transfer THz Timeliness Tissue Optics Tools Trends Ultrafast Ultrasound VCSELs Vetted Yahoo! ZnO

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Digital Library

[SPIEDigitalLibrary.org](http://SPIEDigitalLibrary.org)



## Women and Optics Presentation and Reception

Fairmont Hotel, California Room

Tuesday 22 January . . . . . 4:30 to 6:00 pm

Join us for an evening of networking and inspiration. Connect with others in our industry while enjoying wine and cheese refreshments.

## Advances in Novel Optical Materials: Function Drives Form



**Dr. Kathleen Richardson**

Dr. Kathleen Richardson is currently Professor and Director, of the School of Materials Science and Engineering at Clemson University, Clemson, SC. She joined the Clemson team in January 2005, following her previous post as Associate Professor of Optics, Chemistry and Mechanical, Materials and Aerospace Engineering at the University of Central Florida's, CREOL/FPCE, College of Optics and Photonics, where she was for 12 years.

Following a leave of absence at SCHOTT North America, Regional R&D in Duryea PA, where she served as manager of their Materials Development and Technologies groups since January 2002, Dr. Richardson returned to UCF to continue her research and academic training activities which include numerous domestic and international programs associated with undergraduate and graduate activities.

Dr. Richardson currently runs the Glass Processing and Characterization Laboratory (GPCL) within the Center for Optical Materials Science Engineering and Technology (COMSET) at Clemson where her team carries out synthesis and characterization of novel glass and glass ceramic materials for optical applications. Her research programs examine the role of structure/property relationships in a range of glass and ceramic media and in addition to supervising research programs in infrared glasses for use in integrated optics applications, her group also has industrial and government supported research programs evaluating materials for molded optics, the use of non-oxide glasses in chem-bio planar sensors, and in nano-composites for advanced detection applications. She has authored more than 85 refereed publications, proceedings and book chapters, and has organized and chaired numerous domestic and international meetings within her discipline.



*Inspiring the Next Generation*

## SPIE 2008 Women in Optics Daily Planner

**Pick up your free copy at Photonics West!**

The SPIE Women in Optics monthly planner is a valuable resource for young women interested in entering the field of optics. This piece features stories and pictures from women making a difference through their work and contributing to the field of optics

## All-Symposium Welcome Reception

Fairmont Hotel, Imperial Ballroom

Monday 21 January. . . . . 6:30 to 8:00 pm

All attendees are invited to relax, socialize, and enjoy refreshments at the Fairmont Hotel, Imperial Ballroom. Please remember to wear your conference registration badges. Dress is casual.

*New*

## SPIE Members Reception

*(For SPIE Members Only)*

California Theatre  
345 S. First Street

Monday 21 January. . . . . 6:30 to 8:00 pm

All SPIE Members are invited to this reception in their honor. Come relax and talk with your colleagues. Refreshments will be served. **Please note: this reception is limited to SPIE Members only.** Membership cards or invitations will be requested at the entrance. If you join SPIE on-site, please bring your registration receipt. Dress is casual or business attire.

## Fellows Luncheon

Fairmont Hotel, Gold Room

Monday 21 January. . . . . Noon to 1:30 pm

All Fellows of SPIE are invited to join your colleagues for an SPIE hosted luncheon. The new SPIE Fellows attending Photonics West will be introduced and recognized. Please join us for this informal gathering and a chance to interact with other Fellows. Fellows planning to attend are asked to RSVP to Brent Johnson (brentj@spie.org).



## Interactive Poster Sessions

Civic Auditorium

Monday 21 January. . . . . 5:30 to 7:00 pm

**For BIOS conferences**

Tuesday 22 January . . . . . 6:00 to 7:30 pm

**For LASE, and MOEMS/MEMS conferences**

Wednesday 23 January. . . . . 6:00 to 7:30 pm

**For OPTO conferences**

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

**Poster Authors:** See p. 294 and individual conference pages for poster set-up instructions.

# Events for Students



## Lunch with the Experts— A BiOS Student Networking Event

Marriott Hotel, San Jose Ballroom Salon III

Sunday 20 January . . . . . 12:30 to 1:30 pm

Seating Limited.  
Tickets Required.

Enjoy a casual meal with colleagues at this engaging networking opportunity, hosted by SPIE Student Services. This event features experts willing to share their experience and wisdom on career paths in biomedical optics. Lunch is complimentary to all students. Ticket included with badge.

## Professional Development Speaker Series

Fairmont Hotel, Hillsborough Room

Sunday 20 January . . . . . 1:30 to 5:00 pm

Open to all attendees.

Be successful outside the laboratory and tune up your professional skills with these workshops! Students and Early Career Professionals are especially encouraged to attend this series of talks covering a range of topics you won't find in your school's course catalog.

1:40 to 2:30 pm

### Giving Effective Conference Talks



**Dr. Richard Youngworth**,  
Ball Aerospace

Conference talks are one of the primary ways scientific information is conveyed, and a good talk can significantly promote both you and your research. Learn best practices for presentations and presentation slides from a seasoned and engaging talk-giver.

**Richard Youngworth** is an optical engineer at Ball Aerospace & Technologies Corp. in Boulder, Colorado. He has a B.S. in electrical engineering from the University of Colorado at Boulder and earned his Ph.D. in Optics at the University of Rochester by researching tolerance analysis of optical systems.

2:30 to 3:20 pm

### Getting Better Results from Your Proposal Writing



**Prof. Alexander Heisterkamp**,  
Laser Zentrum Hannover e.V.

Proposal writing is a fine art, blending both science and persuasion. Find out how to get better results from your proposal writing efforts with this set of skills and tips.

After a postdoc working on nanosurgery with femtosecond lasers, **Alex Heisterkamp** joined the Laser Zentrum Hannover e.V. as a researcher and professor. He is now head of the Biophotonics Group.

3:20 to 4:00 pm

### Networking in Science: Verbal and Nonverbal Skills that Get You Noticed



**Dirk Fabian**, SPIE

Making connections is vital to success in any field, but scientists and engineers face some special challenges. This hands-on workshop will show how two tools—the elevator talk and the professional portfolio—can get your name and work noticed the right way.

**Dirk Fabian** is Student Services Coordinator for SPIE and works on community development for the Society.

4:00 to 4:40 pm

### Introduction to Patents



**Dr. Nick Ulman**, NUPAT LLC

What are patents good for and how do I get one? Is my invention patentable? Answers to these and other common questions posed by inventors will be provided. Special emphasis will be placed on how to maximize efficiency when interacting with patent practitioners.

**Nick Ulman** received his PhD in physics from the Massachusetts Institute of Technology where he performed research on femtosecond lasers and their application to solid state physics. He was a research associate in the Ginzton Lab at Stanford University and subsequently founded a biotech company. He now runs NUPAT LLC, a patent agency in Palo Alto, California.

## Student Chapter Breakfast

St. Claire, Grande Ballroom

By Invitation Only.

Monday 21 January . . . . . 7:30 to 8:30 am

Join your fellow Chapter Members for a casual breakfast and social. Share ideas for activities and the future direction of the chapter program.

## “No Ties” Student Social

Monday 21 January . . . . . 8:00 to 10:00 pm

Smoke Tiki Lounge

Student Conference Attendees Only.

Relax and hang out with new friends and peers while enjoying the atmosphere of a great off-site venue. No ties required but please bring your conference badge and photo ID – this is a licensed event (21 and older).



### Smoke Tiki Lounge

152 Post Street

From the Convention Center:

Turn right onto W San Carlos St..

Turn left onto S Market St. (by the park).

Continue past W San Fernando St.

Turn left onto Post Street.

Walk one block; the Smoke Tiki Lounge will be on your left.

## Student Lunch with the Experts—A Networking Event

Tuesday 22 January . . . . . 12:30 to 1:30 pm

*Advance Sign-up Required.  
Seating Limited.*

Join us for a casual meal with colleagues at this engaging networking opportunity. This event features experts willing to share their experience and wisdom on career paths in optics and photonics, and an awards presentation for the Newport Spectra-Physics travel grant winners. Lunch is complimentary to all students; attendee bios can be viewed at the Marketplace.

Advance sign-up in the Marketplace by 5:00 pm Monday is required. Location available upon sign-up.

*Sponsored by:*



### Newport and Spectra-Physics Research Excellence Travel Awards

The Newport Spectra-Physics Research Excellence Travel Awards Program provides financial support for university students to attend the two largest SPIE meetings in order to present their research. These travel grants are open to any student who has an accepted paper for presentation at Photonics West or Optics+Photonics. Recipients will be selected based on both the quality of the original research described in the submitted paper(s) and financial need.

#### ***Congratulations to these Photonics West award winners:***

- Taeyoung Choi**, University of Arizona
- Eric Diebold**, Harvard University
- Juejun Hu**, Massachusetts Institute of Technology
- Toufic Jabbour**, University of Central Florida
- Chih-wen “Wendy” Kan**, University of Texas at Austin
- Matthew Lew**, California Institute of Technology
- Yuting Lin**, University of California, Irvine
- Supraja Murali**, University of Central Florida
- Jaesook Park**, University of Texas at Austin
- Narasimhan Rajaram**, University of Texas at Austin
- Tina Shih**, Harvard University
- Leo Siiman**, University of Central Florida
- Mingzhen Tang**, University of North Carolina at Charlotte
- Nitin Uppal**, University of Texas at Arlington
- Hongying Zhu**, University of Missouri, Columbia

For application information for this and other SPIE travel grants visit Scholarships and Grants online at [spie.org/scholarships](http://spie.org/scholarships).

## Optimizing Your Resume

WS777

**Free for Students!**

**Course level: Introductory**

**CEU .20 \$50/\$100 USD**

**Monday 21 January, 1:30 – 3:30pm**

*You must register to attend.*

Today’s job market pits you against hundreds, if not thousands, of candidates who have approximately the same credentials as you do. How do you stand out in the crowd? This workshop, which concentrates on students and recent graduates, will review a number of strategies, tips, and tools that you can use to increase the impact of your resume and cover letter. We’ll examine ways to translate your educational experience into a format that is attractive to potential employers, and how to create tailored versions of your job search materials for multiple targets. The process of creating your resume will be discussed, with a focus on both layout/formatting and writing style. We’ll also look at cover letters, lists of references, and other materials used in your job search.

#### Intended Audience

This material is intended primarily for students, recent graduates, and early-career professionals who want to improve the quality and effectiveness of their job search materials.

#### Instructor

**John Cain** is a former professional resume writer, and has written more than 500 resumes and cover letters for multiple industries and professions, focusing primarily on technical fields. He currently develops technical education programs for SPIE.

*Note: This workshop is free to SPIE students, but you must register to attend.*

## The Craft of Scientific Presentations: A Workshop on Technical Presentations

WS667

**Free for Students!**

**Course level: Introductory**

**CEU .35 \$75 / \$125 USD**

**Wednesday 23 January, 8:30 am to 12:30 pm**

*You must register to attend.*

This course provides attendees with an overview of what distinguishes the best scientific presentations. The course introduces a new design for presentation slides that is both more memorable and persuasive from what is typically shown at conferences.

*See p. 34 for full workshop description.*

## The Craft of Scientific Writing: A Workshop on Technical Writing

WS668

**Free for Students!**

**Course level: Introductory**

**CEU .35 \$75 / \$125 USD**

**Wednesday 23 January, 1:30 to 5:30 pm**

*You must register to attend.*

This course provides an overview on writing a scientific paper. The course focuses on the structure, language, and illustration of scientific papers.

*See p. 35 for full workshop description.*

# Events for Early Career Professionals



## **Hands-On Optics: Making an Impact with Light (HOO): Terrific Telescopes Workshop**

WS852

**Course Level: Introductory**

**CEU: .3 \$10 / \$20 USD**

**Sunday 20 January, 9:30 am to 12:30 pm**

This workshop will train attendees on the use of Terrific Telescopes, a hands-on activity kit intended to engage and enrich the math/science learning experience for students in the middle grades. It was developed as part of HOO, a four year program funded by a \$1.7 million dollar grant from the U.S. National Science Foundation (NSF) to design and implement a science enrichment program for children ages 11 to 14 years old.

### INTENDED AUDIENCE

Optics professionals, university students, and pre-college teachers.

### INSTRUCTORS

**Constance E. Walker** earned her Ph.D. in Astronomy from the University of Arizona and is Senior Science Education Specialist and Astronomer at the National Optical Astronomy Observatory in Tucson, AZ. She is part of a team responsible for the development and implementation of programs and workshops that train and partner pre-college teachers and community educators with professional and amateur astronomers. These programs involve students and their families in hands-on, inquiry-based activities in astronomy and science. She was instrumental in developing six modules plus the Terrific Telescope kit for Hands-On Optics.

**Robert T. Sparks** earned an M.S. in Physics from Michigan State University and is a Science Education Specialist at the National Optical Astronomy Observatory in Tucson, AZ. He taught high school physics, math and astronomy for 11 years before joining the HOO Team. He has been revising the HOO modules, planning and delivering HOO professional development workshops, and working on the development of new modules.

## **Early Career Social**

*Fairmont Hotel, Hillsborough Room*

Monday 21 January . . . . . 5:00 to 6:00 pm

Meet distinguished SPIE contributors for a casual pre-dinner social. This event promises one on one networking opportunities with some of SPIE's volunteers from committees and leadership.

## **Essential Skills for Engineering Project Leaders**

WS846

**Course Level: Introductory**

**CEU .35 \$265 / \$315 USD**

**Wednesday 23 January, 1:30 to 5:30 pm**

This workshop teaches skills needed to lead technical projects, drive innovation, and influence others. Attendees learn the difference between leadership and management, and how to develop specific leadership skills that are important to technical professionals who lead projects or need assistance from others to get things done. Participants engage in exercises that assess their individual leadership abilities and provide guidance for further skill development.

### INTENDED AUDIENCE

This material is intended for early-career technical professionals who can benefit from improving leadership skills.

### INSTRUCTOR

**Gary C. Hinkle** is President and founder of Auxilium, Inc. His experience includes a broad variety of management and staff assignments with small, medium, and large companies involved in the development and manufacturing of high-tech products. Gary led several high-profile projects including the development of a U.S. Army vehicle maintenance system, and he directed the development of 9-1-1 systems used in the majority of Public Safety Answering Points in the U.S. He also served as engineering manager for the world's best selling oscilloscope product line at Tektronix. His design and management experience spans the electronics, mechanical and software engineering disciplines.

**Note:** Course price includes a comprehensive workbook and email/phone follow-up with the instructor after the workshop to assist with implementation.

## **Volunteer for SPIE Committees**

*Visit the SPIE Booth at the evening poster sessions for more information and forms. Bring your resume or CV.*

Interested in becoming more involved with SPIE conferences? Talk with SPIE staff and learn more about volunteer opportunities in conferences and governance. Show us your interest by filling out a committee volunteer form (available on-site); we'll send it to conference chairs for consideration.

# Events for Early Career Professionals

Attend the SPIEWorks Career Fair!



Exhibition Level, Convention Center, Almaden Concourse near the Hilton Hotel Entrance

Tuesday 22 January . . . . . 11:00 am to 3:00 pm

Wednesday 23 January . . . . . 11:00 am to 3:00 pm



Top employers are coming together to interview and hire engineers and scientists like you. The SPIEWorks Career Fair at Photonics West is a great place to:

- Get 'face to face' time with employers and interview on the spot
- Learn more about the jobs available in our industry
- Network!

**Free Admission; Registration Required.**

*Whether you are looking for a better job, re-entering the workforce or just starting your career, the SPIEWorks Career Fair is the place to start!*

In addition to the onsite recruitment activities listed above, SPIEWorks offers you online services to help you with your search for employment before, during, and after the conference. Visit [spieworks.com](http://spieworks.com) to post your resume, view jobs, or sign-up for "Job Alerts."

**Free Services for Employers**

- Stop by the SPIEWorks booth in the Career Fair and gain access to our proprietary resume database at no charge.
- Post jobs for free. That's right, there's no charge to post jobs to the Photonics West Career Fair. Go to [spieworks.com](http://spieworks.com), create an account and sign-in to post jobs online. Your free job(s) will be live 21 - 27 January.

For information on future recruiting events contact Dave Baggenstos at +1 360 715 3705 or email [sales@spieworks.com](mailto:sales@spieworks.com)

The SPIE logo, consisting of a white shield-like shape with a smaller white shield inside, followed by the letters "SPIE" in a bold, sans-serif font.

## Launch Your Career

### SPIE Early Career Professional Program

[spie.org/ecp](http://spie.org/ecp)

A black and white photograph of a space shuttle on a launch pad, with a large, cratered moon in the background.



# SPIE Works

[spieworks.com](http://spieworks.com)

## Attend the SPIE Works Career Fair!

TWO DAYS ONLY · FREE ADMISSION · REGISTRATION REQUIRED

Top employers are coming together to interview and hire talented engineers and scientists like you! The SPIE Works Career Fair at SPIE Photonics West is a great way to:

- Get “face to face” time with employers and interview on the spot
- Learn more about the jobs available in our industry
- Network!

Whether you are looking for a better job, re-entering the workforce or just beginning your career, the SPIE Works Career Fair is a great place to start!

*Exhibition Level, Convention Center  
Almaden Concourse near the Hilton  
Hotel Entrance*

**Tuesday 22 January**  
11:00 am to 3:00 pm

**Wednesday 23 January**  
11:00 am to 3:00 pm





**BiOS Hot Topics**

Convention Center, J1/J4

Saturday 19 January . . . . . 7:00 to 9:30 pm

**Welcome and Introduction:**



**James Fujimoto,**  
Massachusetts Institute of Technology,  
BiOS 2008 Symposium Chair



**R. Rox Anderson,** Wellman Ctr. for  
Photomedicine, Massachusetts General  
Hospital and Harvard School of Medicine,  
BiOS 2008 Symposium Chair



*Hot Topics Moderator:*  
**Sergio Fantini,** Tufts Univ.



**Progress in Therapeutic  
Lasers**  
**R. Rox Anderson,**  
Wellman Ctr. for Photomedicine



**Imaging and Treatment  
of Cancer Using Gold  
Nanoparticles**  
**Rebekah Drezek,**  
Rice Univ.



**Monitoring and Predicting  
Chemotherapy using Diffuse  
Optics**  
**Bruce Tromberg,**  
Beckman Laser Institute and Medical Clinic



**Photoacoustic Microscopy  
and Computed Tomography**  
**Lihong Wang,**  
Washington Univ. in St. Louis



**Real-time Quantitative  
Microscopy on the Nanometer  
Scale**  
**David Piston,**  
Vanderbilt Univ.



**Probing Pancreatic Disease  
using Tissue Optical  
Spectroscopy**  
**Mary-Ann Mycek,**  
Univ. of Michigan



**Multidimensional  
Fluorescence Imaging**  
**Paul French,**  
Imperial College (UK)



**Single-Molecule Superresolution  
Imaging and Trapping**  
**W. E. Moerner,**  
Stanford Univ.



**Spectroscopy for Diagnostics  
and Interstitial Photodynamic  
Treatment Control**  
**Stefan Andersson-Engels,**  
Lund Univ.

**Sunday Night Hot Topic Workshop**

Marriott Hotel, San Jose Ballroom III

Sunday 20 January . . . . . 6:00 to 7:00 pm

**Nanotechnology and Medicine**



*Moderators:*  
**Bruce Tromberg,**  
Beckman Laser Institute and Medical Clinic



**Rebekah Drezek,**  
Rice Univ.

Come join the in-depth discussion of the pros, cons, and the future of the role of nanotechnology in the diagnostics and therapeutics involved in disease management. Panel members will speak to the benefits and possible advantages of this technology as well as the known and perceived concerns.

*Panelists include:*

- Tuan Vo-Dinh,** Duke Univ.
- Adam Wax,** Duke Univ.

*Technical Event*

**IBOS—International Biomedical Optics Society**

Farimont Hotel, Crystal Room

Tuesday 22 January . . . . . 7:30 to 9:00 pm

*Chairs:* **Lihong Wang,** Washington Univ.;  
**Jennifer Kehlet Barton,** The Univ. of Arizona

Biomedical optics is a major growth area in modern medicine. The International Biomedical Optics Society is a nonprofit interdisciplinary group that provides a unique channel for communications among physicians and clinicians employing optics in medicine and the scientists and engineers who provide foundations for advancements in this field. The BiOS symposium, where IBOS meets, is the premier annual international forum for discussions and announcements of technical/clinical and educational/ pedagogical developments in the use of lasers, optical fibers, spectroscopic diagnostic techniques, and related areas of optical medicine.

The 2008 IBOS meeting will feature tutorials by two renowned experts in biomedical optics.

**Tutorial: Multiphoton Microscopy, Peter So,** Massachusetts Institute of Technology

**Tutorial: Diffuse Optical Tomography, Brian Pogue,** Dartmouth Univ.

All registered participants are encouraged to attend this evening session. Attendees are requested to wear their conference badges.

### LASE Plenary Session

Civic Auditorium, Montgomery Theater

Wednesday 23 January . . . . . 10:30 am to 12:30 pm

10:30 to 11:10 am

#### Laser Processing and Chemistry: Applications in Nanopatterning, Material Synthesis and Biotechnology



**Dieter Bäuerle,**  
Johannes Kepler Univ. Linz (Austria)

The talk gives an overview on recent experimental and theoretical investigations with special emphasis on results obtained by the Linz group. In particular, submicron- and nano-patterning of surfaces by means of nearfield optical techniques (SNOM) and by 2D-lattices of microlenses formed by self-organization processes are presented. Subsequently, the fabrication of organic and inorganic thin films and the synthesis of composites by pulsed-laser deposition (PLD) are discussed.

Finally, recent results on the modification of material surfaces, and in particular of PTFE (Teflon), with applications in biotechnology and medicine, will be presented.

**Professor Dieter Bäuerle** received his Ph.D. from the University of Stuttgart, Germany, and spent two years as a postdoctoral appointee at Cornell University. After several years at Philips Research he became a professor in Germany and later in Austria, where he is now the Head of the Department of Applied Physics at the Johannes-Kepler-University, Linz. Professor Bäuerle is among the world-leading scientists in the field of laser-material interactions. He pioneered the field of laser-chemical processing and wrote the first book on this topic in 1986 with two subsequent editions. He has published more than 450 papers in international journals, holds 40 patents, and is an author/editor of 12 books. He has served on many international committees and as co-editor of several scientific journals.

Prof. Bäuerle is a cofounder of INNSITEC Lasertechnology Inc. (2002) and a founder of GAP Inc. (2003). He has received numerous awards. He is a Christian Doppler Senior Fellow and holds Honorary Doctor and Honorary Professor degrees. Professor Bäuerle was a Russell S. Springer Professor at the University of California in Berkeley 2006/2007. He is a member of the Austrian, German, and European Physical Society and the New York Academy of Sciences.

11:10 to 11:50 am

#### The Long Journey from Idea to Industrial Success



**Holger Schlueter,**  
TRUMPF Inc.

It is amazing how long it can take from the first ideas to the industrial success of a laser technology. We will highlight this experience by following three laser technologies in which TRUMPF participated. The first case study focuses on my own personal history with TRUMPF being closely related to the diffusion cooled coaxial CO<sub>2</sub> laser geometry. The second case study shall highlight some stations along the very successful thin disk laser story, with its humble beginnings at the IfSW in Stuttgart almost 15 years ago. Thirdly I want to highlight how long it took and how many different organizations were involved in making high power diode lasers the method of choice for solid state laser pumping.

**Holger Schlueter** is the vice president, laser for TRUMPF Inc., the Farmington, Connecticut-based, North American subsidiary of the TRUMPF Group, a German company that is currently a \$2.00 billion manufacturer and world market and technology leader in lasers and laser systems for manufacturing technology.

Dr. Schlueter oversees all laser-related manufacturing, sales, service, research & development organizations for TRUMPF Inc. He has worked with high-power lasers for industrial applications since 1993 and holds several patents in the field of laser resonators and laser applications.

Before becoming vice president, laser, Dr. Schlueter was vice president and general manager of TRUMPF Photonics Inc., a manufacturer of high-power diode laser sources near Princeton, New Jersey. Previously, he was director of laser production and development for TRUMPF Inc. and director of technology for TRUMPF Photonics.

11:50 am to 12:30 pm

#### Building Coherence in Collaboration: a Case Study with the World's Most Powerful, Tunable Laser



**H. Fred Dylla,**  
American Institute of Physics

A kilowatt class free electron laser (FEL) was built and put into operation at Jefferson Lab (Newport News, VA) in 1998 as a result of a unique public-private partnership that brought together \$80M of funding and an initial user group of ~ 100 scientists from the industrial, academic, and defense communities. The FEL has been used over the last decade for applications in the fields of materials processing, materials science, biophysics and chemistry. In 2006, 14.2 kilowatts of cw operation was achieved at a wavelength of 1.6 microns. The development and continual enhancement of this very useful tool, is due to a productive, ever-evolving tripartite collaboration, ([www.jlab.org/FEL/](http://www.jlab.org/FEL/)).

In my new role as Executive Director of the American Institute of Physics, I am fortunate to continue the Institute's history of fostering connections and creating strong ties among corporate, academic, and government leaders. It is through such collaborations involving all sectors that the discipline of physics is advanced-and science can be translated to innovation and product.

**Dr. Fred Dylla** is the Chief Executive Officer and Executive Director of the American Institute of Physics (AIP) in College Park, Maryland.

Dr. Dylla was employed from 1990 to February 2007 at the Thomas Jefferson National Accelerator Facility (Jefferson Lab), where he retired as the Free Electron Laser (FEL) Division Associate Director and the Chief Technology Officer.



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Dr. Dylla held an Adjunct Professorship in Physics and Applied Science at the College of William and Mary in Williamsburg, Virginia from 1990-2006. The author of over 190 publications in archival journals and books, Dr. Dylla received his B.S., M.S. and Ph.D. in physics from the Massachusetts Institute of Technology.

From 1975-1990, he held various research and management positions at Princeton University's Plasma Physics Laboratory, including responsibility for the design and operations of the vacuum systems, gas injection systems, and vacuum diagnostic for the large tokamaks at Princeton. He developed glow discharge conditioning procedures that are widely used in fusion, accelerator and materials processing systems. He was president of Princeton Scientific Consultants from 1981-1990, a firm specializing in ultrahigh vacuum and plasma technology.

Dr. Dylla is the Past-President of the American Vacuum Society (now "AVS"), where he was elected a Fellow in 1998 and was awarded a lifetime Honorary Membership in 2003. He is a member of all ten AIP Member Societies. He is a Fellow of the American Physical Society (APS), and a founding member of the APS Forum on Industrial and Applied Physics.

### Technical Event

## Laser Communications

Fairmont Hotel, Atherton Room

Tuesday 22 January ..... 7:30 to 9:00 pm

Chair: **Dr. Olga Korotkova**, Univ. of Miami

The technical group on Laser Communications will hold its annual meeting in conjunction with the Free-Space Laser Communication Technologies XX conference. All professionals involved in applications of free-space laser communications and supporting technologies are invited to participate in an open discussion on a variety of topics related to the challenges and advancement of the field. Members and visitors are invited to bring suggestions for discussion topics.

### Solid State Lasers XVII: Technology and Devices (Conf. 6871)

#### Best Student Presentation Award

Hilton Hotel, Almaden II Room

Thursday 24 January • 6:00 to 6:10 pm

Session Chair: **Norman Hodgson**, Coherent, Inc.

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See p. 142 for details.

### Fiber Lasers V: Technology, Systems, and Applications (Conf. 6873)

#### Best Student Presentation Award

Convention Center, J2

Thursday 24 January • 4:50 pm

Prizes donated by



See p. 148 for details.

### MOEMS-MEMS Plenary Session

Convention Center, A7/A8

Monday 21 January . . . . . 9:00 am to Noon

9:00 to 9:10 am

#### Welcome and opening remarks

9:10 to 10:00 am

#### MEMS Reliability – Coming of Age



**Michael Douglass,**  
Texas Instruments Inc.

In today's high volume semiconductor world, one could easily take reliability for granted. As the MOEMS/MEMS industry continues to establish itself as a viable alternative to conventional manufacturing in the macro world, reliability remains of high concern. There are several emerging opportunities right now in which MOEMS/MEMS is gaining a foothold. Markets such as mobile media, consumer electronics, biomedical devices, and homeland security are all showing great interest in microfabricated products. At the same time, these markets are among the most demanding when it comes to reliability assurance. To be successful, each company developing a MOEMS/MEMS device must consider reliability on an equal footing with cost, performance and manufacturability. What can this evolving industry learn from the successful development of DLP® technology, air bag accelerometers and ink jet printers? We will discuss some basic reliability principles which any MOEMS/MEMS device development must use. Examples from the commercially successful and highly reliable Digital Micromirror Device will complement the discussion.

**Mike Douglass** is a distinguished member of the technical staff at Texas Instruments. He has been a reliability engineer with TI since 1979 and has worked on a variety of programs ranging from defense systems to commercial navigation equipment. In 1992, he joined the Digital Light Processing® program to support reliability development of the Digital Micromirror Device (DMD) and DLP® technology. Mike received the Bachelor of Science degree in electrical engineering from the University of Connecticut (1979) and an MBA from the University of Dallas (1985).

He is a Senior Member of the IEEE Reliability Society, a member of SPIE and is a registered professional engineer in the state of Texas.

10:20 to 11:10 am

#### Optically Transduced MEMS/NEMS Resonators



**Harold Craighead,** Director,  
Nanobiotechnology Ctr., Cornell Univ.

Optical approaches provide robust and relatively non-invasive methods for excitation and detection of the motion of micro and nanomechanical structures. We have shown that modulated laser beams can excite and detect resonant motion of remarkably narrow or thin beams, fibers, and membranes. The approach can also be used to scan individual elements of arrays of structures. This can also be used for accessing encapsulated mechanical objects and devices in fluid, a feature of utility for sensor applications. We recently showed that optical methods can be used efficient for excitation, direct control and measurement of in-plane motion of cantilever-type nanomechanical oscillators.<sup>5</sup> The quality factor of a particular in-plane harmonic was consistently higher than the transverse mode. The increased dissipation of the out of plane mode was attributed to material and acoustic loss mechanisms. The in-plane mode was used to demonstrate vibrational detachment of sub-micron polystyrene spheres on the oscillator surface. In contrast, the out of plane motion, even in the strong non-linear impact regime, was insufficient for the removal of bound polystyrene spheres. Our results suggest that optical excitation of in-plane mechanical modes provide a mechanism for controlled removal of particles bound on the surface of nanomechanical oscillators. A variety of sensing applications are being explored that utilize the resonant frequency changes that can be sensitively measured in this general class of devices.\*

**Harold Craighead** received his Bachelor of Science Degree in Physics, with High Honors, from the University of Maryland, College Park in 1974. He received his Ph.D. in Physics from Cornell University in 1980. His thesis work involved an experimental study of the optical properties and solar energy applications of metal particle composites. From 1979 until 1984 he was a Member of Technical Staff in the Device Physics Research Department at Bell Laboratories. In 1984 he joined Bellcore where he formed and managed the Quantum Structures research group. Dr. Craighead joined the faculty of Cornell University as a Professor in the School of Applied and Engineering Physics in 1989. From 1989 until 1995 he was Director of the National Nanofabrication Facility at Cornell University. Dr. Craighead was Director of the School of Applied and Engineering Physics from 1998 to 2000 and the founding Director of the Nanobiotechnology Center from 2000 to 2001. He served as Interim Dean of the College of Engineering from 2001 to 2002 after which he returned to the Nanobiotechnology Center as Co-Director. He has been a pioneer in nanofabrication methods and the application of engineered nanosystems for research and device applications. Throughout his career he has contributed to numerous scientific journals with over 280 published papers. Dr. Craighead's recent research activity includes the use of nanofabricated devices for biological applications. His research continues to involve the study and development of new methods for nanostructure formation, integrated fluidic/optical devices, nanoelectromechanical systems and single molecule analysis.

\*Abstract references available on-line.

11:10 am to Noon

## High-Resolution Displays, One Pixel at a Time



**Randy Sprague,**  
Microvision, Inc.

The beauty of MEMS technology is that it allows one to consider system architectures not practical in the macro world. No where is that more true than in the design of MEMS based displays. Due to their inherent small mass, MEMS devices can be made to move at frequencies dramatically above their full size mechanical counterparts. This fact makes it possible to create a display based on scanning a single laser beam very fast in a two dimensional raster pattern to make an image, much like a CRT scans an electron beam. By modulating the intensity and color balance of this laser beam synchronous to the motion of the scanning mirror, beautiful full color images can be produced by an incredibly small display engine.

The result is a much simpler MEMS structure with all the benefits that entails: higher yields, higher reliability, smaller size, and lower cost. With this greatly simplified projection architecture, it is then possible to construct a wide variety of displays from a common projection engine. These displays include very tiny personal projectors for mobile devices, Head-Up Displays (HUDS) for vehicles, wearable near-eye displays, and soft-configurable instrumentation displays. This paper will discuss the technical challenges of making such an unconventional display engine, and how these challenges have been addressed.

**Randy Sprague** after leading engineering teams in the development of complex micro-processor systems for 17 years, Mr. Sprague entered the field of MEMS when he took on the leadership of AlliedSignal's inertial MEMS guidance computer. It wasn't long before he became more interested in this new MEMS component technology than he was in the rest of the computer. In the six years he spent leading the development of MEMS gyros and accelerometers for AlliedSignal, and later L3 Communications, Mr. Sprague became well versed in the design of high performance MEMS inertial sensors. He was recruited into the optical cross connect frenzy during the "telecom bubble" days. There he lead a design team responsible for controlling a massive 1000 X 1000 MEMS optical cross connect switch. Overcoming the many challenges of such a complex MEMS system provided the necessary knowledge base for optical MEMS development. Mr. Sprague then joined Microvision to lead their MEMS scanner and photonic component development teams. He has been with Microvision for over five years and now holds the position of Chief Engineer. He is the principal inventor of Microvision's unique bi-axial scanning mirror and was the main technical champion behind their current projection engine that is at the heart of Microvision's numerous emerging display products. Mr. Sprague received his BSEE from Washington State University in 1978. He has been awarded 14 patents and has 25 published patent applications pending, almost all in the fields of inertial and optical MEMS.

Panel Discussion on:

## Progress and Prospects in Microfluidics

Fairmont Hotel, Gold Room

Monday 21 January. . . . . 8:00 to 9:30 pm

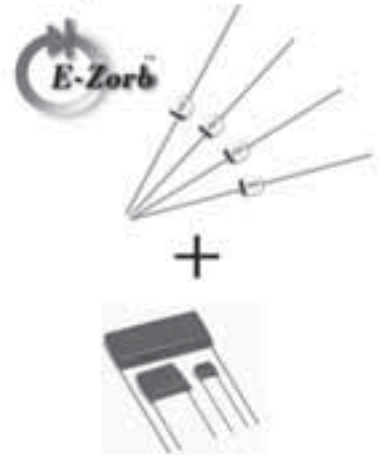
Moderators: **Albert K. Henning**, NanoInk, Inc.; **WanJun Wang**, Louisiana State Univ.

Panelists: **Steven A. Soper**, Louisiana State University; **Michele Palmieri**, STMicroelectronics (Italy); **Robert Haushalter**, Parallel Synthesis Technologies, Inc.; **Rolfe C. Anderson**, Trillium Precision Surgical, Inc.

In the past decade, microfluidics has rapidly emerged and become main stream. Some of the microfluidic products have become commercially available with many more to come in the near future. Most microfluidic devices today are made of glass and polymer materials. The main reason for this trend is that the biomedical researchers and analytical chemists have been using these materials for many years and accumulated enough know-how and knowledge. As a matter of fact, this rapid development of microfluidics has been driven by compelling applications in analytical chemistry and biomedical sciences, with enormous potential in developing new technologies and reducing costs. Recent years have seen a number of microfluidic chips brought to market, including those by Agilent and Fluidigm. One little-addressed aspect of microfluidics, however, is on-chip synthesis of microfluidics with optical detection techniques. Another important trend in the recent years is the integration of nanosensing technologies with the MEMS technologies for enhanced system performances. This panel discussion will provide an overview of microfluidics over the past decade, with particular emphasis on progress related to the integration of optical detection and nanosensing technologies in microfluidic systems.

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### OPTO 2008 Plenary Session

Convention Center, A7/A8

Tuesday 22 January ..... 8:30 to 10:00 am

8:30 to 8:40 am

#### Introduction and Opening Remarks

8:40 to 9:20 am

#### Nanophotonics: from Photonic Crystals to Plasmonics



**Eli Yablonovitch,**  
Univ. of California/Berkeley

Engineering design is sometimes inspired by Nature. The natural world is filled with crystals, periodic structures that interact with electron waves. Drawing on this analogy, photonic crystals are artificial, multi-dimensional, periodic structures that are intended for electromagnetic waves, instead. Such nano-photonic structures are now being designed and patterned into Silicon-on-Insulator (SOI) to provide for commercial nano-photonic integration, as a component part of conventional CMOS circuits.

Further optical frequency miniaturization will take us toward nanoplasmonics, metallic-wired electrical circuits, running at optical frequencies.

**Eli Yablonovitch** graduated with the Ph.D. degree in Applied Physics from Harvard University in 1972. He worked for two years at Bell Telephone Laboratories, and then became a professor of Applied Physics at Harvard. In 1979 he joined Exxon to do research on photovoltaic solar energy. Then in 1984, he joined Bell Communications Research, where he was a Distinguished Member of Staff, and also Director of Solid-State Physics Research. In 1992 he joined the University of California, Los Angeles. Then in 2007 he became Professor of Electrical Engineering and Computer Sciences at UC Berkeley.

Prof. Yablonovitch's work has covered a broad variety of topics: nonlinear optics, laser-plasma interaction, infrared laser chemistry, photovoltaic energy conversion, strained-quantum-well lasers, and chemical modification of semiconductor surfaces. Currently his main interests are in optoelectronics, high speed optical communications, high efficiency light-emitting diodes and nano-cavity lasers, photonic crystals at optical and microwave frequencies, quantum computing and quantum communication.

Yablonovitch was a Founder of the W/PECS series of Photonic Crystal International Workshops that began in 1999. (PECS VIII will be held in Australia in 2009.)

He is a Fellow of the Institute of Electrical and Electronic Engineers, the Optical Society of America, and the American Physical Society. Yablonovitch is a Life Member of Eta Kappa Nu, and a Member of the National Academy of Engineering and the National Academy of Sciences. He has been awarded the Adolf Lomb Medal, the W. Streifer Scientific Achievement Award, the R.W. Wood Prize, and the Julius Springer Prize.

9:20 to 10:00 am

#### Organic "Plastic" Optoelectronic Devices



**Niyazi Serdar Sariciftci,** Johannes Kepler Univ. Linz (Austria)

Recent developments on conjugated polymer based photovoltaic diodes and photoactive organic field effect transistors (photOFETs) are discussed. The photophysics of such devices is based on the photoinduced charge transfer from donor type semiconducting conjugated polymers onto acceptor type conjugated polymers or acceptor molecules such as Buckminsterfullerene, C<sub>60</sub>. Potentially interesting applications include sensitization of the photoconductivity and photovoltaic phenomena as well as photoresponsive organic field effect transistors (photOFETs). Furthermore, organic polymeric/inorganic nanoparticle based "hybrid" solar cells will be discussed. This talk gives an overview of materials' aspect, charge-transport, and device physics of organic diodes and field-effect transistors.

Furthermore, due to the compatibility of carbon/hydrogen based organic semiconductors with organic biomolecules and living cells there can be a great opportunity to integrate such organic semiconductor devices (biOFETs) with the living organisms. In general the largely independent bio/lifesciences and information technology of today, can be thus bridged in an advanced cybernetic approach using organic semiconductor devices embedded in bio-lifesciences. This field of organic electronic devices is proposed to be an important mission of organic semiconductor devices

- 1) "Photoinduced Electron Transfer from a Conducting Polymer to Buckminsterfullerene" N. S. Sariciftci, L. Smilowitz, A. J. Heeger and F. Wudl, *Science* Vol. 258, 1474 (1992).
- 2) "Semiconducting Polymer - Buckminsterfullerene Heterojunctions: Diodes, Photodiodes and Photovoltaic Cells", N. S. Sariciftci, D. Braun, C. Zhang, V. Srdanov, A. J. Heeger and F. Wudl, *Appl. Phys. Lett.* Vol. 62 (6), 585 (1993).
- 3) "Plastic Solar Cells" Christoph J. Brabec, N. Serdar Sariciftci, Jan Kees Hummelen, *Advanced Functional Materials*, Vol. 11 No: 1, pp.15-26 (2001)
- 4) "Bio-Organic Semiconductor Field Effect Transistors based on DNA Gate Dielectric" Th. B. Singh, N. S. Sariciftci, J. Grote, F. Hopkins, *Journal of Applied Physics*, Vol 100, 24514 (2006).
- 5) "Organic Photovoltaics Concepts and Realization", edited by C. Brabec, V. Dyakonov, J. Parisi and N.S. Sariciftci (eds.), Springer-Verlag, Germany, 2003.
- 6) "Organic Photovoltaics", edited by S.-S. Sun and N.S. Sariciftci, Taylor & Francis, Florida, USA, 2005.
- 7) "Progress in Plastic Electronics Devices", B. Singh, N.S. Sariciftci, *Annual Review of Materials Research* Vol. 36 (2006), 199-230

**Prof. Sariciftci** is Ordinarius Professor for physical Chemistry and the Founding Director (Vorstand) of the Linzer Institut für organische Solarzellen (LIOS) at the Johannes Kepler University of Linz/Austria. He studied at the University of Vienna (Austria) and graduated as PhD in physics in 1989. After two years postdoctoral study at the University of Stuttgart (Germany) he joined the Institute for Polymers and Organic Solids at the University of California, USA, by Prof. Alan J. HEEGER, Nobel laureate 2000 for Chemistry. His major contributions are in the fields of photoinduced optical, magnetic resonance and transport phenomena in semiconducting and metallic polymers. He is the inventor of conjugated polymer solar cells. Prof. Sariciftci published over 400 publications, 4 books and educated several academic and industrial scientists. He also initiated three spin off companies for organic optoelectronics. He is recipient of several prizes and is Fellow of the Royal Society of Chemistry (FRSC).

Technical Event

## Holography Technical Event

Fairmont Hotel, Hillsborough Room

Tuesday 22 January .....7:30 to 9:00 pm

Chair: **Hans I. Bjelkhagen**, OpTIC (United Kingdom)

In 1948 Dennis Gabor realized that the wavefront emanating from each point of a scene could be recorded by causing it to interfere with a background wave, converting phase difference into an intensity difference. The wavefront could be reconstructed by illuminating the recorded information with coherent light. Gabor termed this process holography, or whole record.

The Holography Technical Event is involved with the whole record of research, engineering, and applications in holographic optical elements, nondestructive testing, computer-generated holography, materials and processing, commercial and artistic applications of holography, and standardization issues.

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# Industry Perspectives on the Telecom Market

Gain insight about trends and opportunities in the telecom industry in these lively sessions. Free to all registered attendees.

## Optical Components for Telecom Applications

Convention Center · A7/A8  
Tuesday 22 January  
10:15 to 10:50 am

**Speaker: Daryl Inniss**, VP and Practice Leader, Communications Components, Ovum RHK

Optical component suppliers are happily supplying system vendors engaged in the network build-out to support IP and video services. Come hear how growth is affecting carrier metro, long-haul and access networks, MSOs, and enterprise deployments. Component vendors should not miss this chance to learn about growing opportunities and the battle for market share. Daryl will share his business insight and perspectives gleaned from his current role as VP and Practice Leader, Communications Components, Ovum RHK and previous 15 years in the optoelectronics industry.



**Daryl Inniss** has over 15 years of experience in the optoelectronics industry. He is responsible for components research including industry food chain analysis, forecasting and analyzing market dynamics. Before joining Ovum RHK, Daryl worked for JDS Uniphase as Technical Manager for Raman Amplifier Development. Previously, he spent 11 years at Bell Laboratories/Lucent, conducting research on optical fibers, fiber lasers and high-power fiber amplifiers. Daryl was awarded a Ph.D. in Chemistry from UCLA and an AB in Chemistry from Princeton University.

## OPTICS: The Foundation of Telco's Transition to Multimedia Provider

Convention Center · A7/A8  
Tuesday 22 January  
10:50 to 11:25 am

**Speaker: Steve Rago**, Principal Analyst, Broadband, Digital Home and IPTV, iSuppli

Telcos are in a transition from Voice service providers to multi-media service providers. The foundation for this transformation is Broadband communications with the emphasis on FTTx (Fiber To The Home/premises). The service all Telco's want to offer is IPTV (Internet Protocol television) including High Definition TV. IPTV with HDTV will require major injections of Optics in the Network.

Optical communications is undergoing resurgence, not only in the USA, but globally—and the driver is the transformation of the Telephone company. In this talk, Rago will discuss:

- The role optics will play and the resulting market opportunities.
- Which broadband access technologies are experiencing the fastest growth?
- What factors are promoting or inhibiting the growth of broadband?
- What's up with wireless broadband, i.e. WiMax?



**Steve Rago** is Principal Analyst where he leads the Broadband and Digital Home and IPTV Practices at iSuppli. Some of Rago latest reports include: "Broadband Landscape: Preparing for Next Generation Services", "Broadband Next Big Step, Fiber to the Home" and "Everybody's Doing the 'Telco TV'".

Steve Rago came to iSuppli with twenty plus years in the communications industry including fourteen years in semiconductors. Prior to joining iSuppli, Rago served as the Senior Marketing Manager for Agere Systems, where he was responsible for growing the DSL central-office IC businesses. He was previously the Business and Marketing Manager for the communications segment within Motorola Semiconductor. Rago has also served Fujitsu/GTE Business Systems, Harris Digital Telephone Systems, and ITT Courier data communications systems in a variety of product planning, marketing and engineering posts. Rago earned a BS in Mathematics at Maryville College and an MS in Mathematics at Farleigh Dickinson University, magna cum laude.

## NEW for SPIE Photonics West 2008

### Broadband Access Communication Technologies

Convention Center · A7/A8

#### Technical Workshop

Tuesday 22 January · 1:30 to 3:30 pm

#### Industry Forum

Wednesday 23 January · 3:30 to 5:30 pm

**Organizing Chairs: Raj Jain**, Washington Univ. in St. Louis; **Benjamin B. Dingel**, Nasfine Photonics, Inc.; **Katsutoshi Tsukamoto**, Osaka Univ. (Japan); **Shlomo Ovdia**, Entropic Communications

In order to satisfy the growing demand of end-customers for fast Internet access, new multimedia services, and rapid interactive applications, all telecommunications networks operators are under intense pressure to solve the "last-mile connection" problem. This problem is not only the need for (1) huge broadband in one direction but also for (2) high speed two-way connectivity, and (3) mobile access as opposed to traditional fixed access.

Major existing access technologies based on fiber (FTTH), cable modem (CATV), copper (xDSL), wireless (WLL), Radio-over-Fiber (RoF), and satellites (SAT) are rapidly evolving to partially answer these needs. New emerging access technologies such as 100G EPON, Power line transport (PL), and Radio-over-FSO, are actively being researched and developed since they offer huge broadband potential, affordable price, and mobility.

This program has the following opportunities to provide critical market information and to expand your knowledge of this hot technology. The Technical Workshop and Industry Forum will bring together experts, researchers, engineers and business leaders from both academia and industry to exchange ideas, share experiences, and report original works about all aspects of broadband access communication technologies. Round out the experience by taking a related short course(s) taught by qualified experts in the broadband access, optical communications and components fields.

#### Technical Workshop

Convention Center · A7/A8  
Tuesday 22 January  
1:30 to 3:30 pm

The Technical Workshop will cover technical breakthroughs, access evolution and trends, and challenges in different access technologies such as Optical-, Wireless-, RoF-, and Satellite-based technologies.

#### Industry Forum on Latest Developments in Broadband Access Communication Technologies

Convention Center · A7/A8  
Wednesday 23 January  
3:30 to 5:30 pm

The Industry Forum will highlight issues of general interest related to industry developments, economic issues, market dynamics, regulation and standards, deployment, or trends in broadband access technologies.

#### Register for these related courses

See Course Daily Schedule List on pages 45-52.

Courses are priced separately.

SC879 **Next Generation Wireless Technologies** (Raj Jain, Washington Univ. of St. Louis)

SC880 **Optical Communication Systems** (Chris Xu, Cornell Univ.)

SC881 **Semiconductor Optical Amplifiers: Design and Applications** (Niloy Dutta, Univ. of Connecticut)

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# Executive Panel Sessions

Come hear leaders in the industry discuss challenges and opportunities.  
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## Market Direction and Implications for the World of Photonics

Convention Center · A7/A8  
Wednesday 23 January · 1:30 to 2:45 pm

Don't miss this FREE SESSION open to all exhibition visitors, exhibitors and technical conference attendees. Hear top executives with a global perspective share their views on the opportunities, challenges, innovations and new applications that are changing the market. This is key information for people developing and implementing technical and business strategy.

### Executive Panel

In this lively discussion, visionary business leaders representing different aspects of the marketplace will share their insight regarding trends and opportunities in optics and photonics. With the extraordinary experience and resources these experienced executives in technology development, global sales, marketing and manufacturing, you are sure to learn new things about the direction of the industry and priorities for your business.

**Moderator: Stephen J. Eglash,**



President & CEO, Cyrium Technologies

Steve is President and CEO of Cyrium Technologies, a solar energy startup company developing high-efficiency solar cells for concentrator photovoltaic applications. Previously, he was a venture capitalist at Worldview Technology Partners where he emphasized investments in semiconductors, displays, lighting, and energy. Steve was also Vice President at SDL (JDSU) where he managed efforts in telecommunications, printing, optical amplifiers, and industrial lasers. He began his career as a research scientist at MIT Lincoln Laboratory.

Steve recently completed a special assignment with the National Renewable Energy Laboratory and the U.S. Department of Energy where he led a solar energy strategic planning project. Steve is a frequent speaker at conferences such as the Photonics Market Opportunities Forum at SPIE's Photonics West. He is the two-time chairman of the OSA's Executive Forum at the Optical Fiber Conference. Steve is also involved in humanitarian projects such as the Tech Museum Awards for Technology Benefiting Humanity and the Global Social Benefit Incubator at Santa Clara University.

Steve received a Ph.D. and M.S. from Stanford University and a B.S. from the University of California at Berkeley, all in Electrical Engineering

### Panel Members:

|                         |  |
|-------------------------|--|
| <b>Bookham</b>          | <b>Steve Turley</b> , Chief Commercial Officer                             |
| <b>CVI/Melles Griot</b> | <b>Stuart Schoenmann</b> , President and CEO                               |
| <b>Edmund Optics</b>    | <b>Robert Edmund</b> , CEO and Chairman of the Board                       |
| <b>Newport</b>          | <b>Randy Heyler</b> , Sr. Director, Strategic Marketing                    |
| <b>Hamamatsu</b>        | <b>Ken Kaufmann</b> , New Technology Development Executive                 |
| <b>TRUMPF</b>           | <b>Holger Schlueter</b> , Vice President, Laser Production and Development |
| <b>Coherent</b>         | <b>Mark Sobey</b> , Senior Vice President, Specialty Laser Systems         |



## China: Competitor, Customer or Conundrum?

Convention Center · A7/A8  
Thursday 24 January · 9:15 to 9:45 am

**Speakers:**

**Adonis Mak**, Publisher, Laser Focus World China, Lightwave China and the FTTH China Conference

**Jeremy Chang**, Managing Director, Edmund Optics, China

Ignoring China is unwise, if not impossible in the realms of R&D and selling. This 30 minute presentation, directly following the Photonics West exhibitor breakfast—but open to all conference and exhibition attendees—will provide you with new insight and perspectives regarding market opportunity and manufacturing realities in China. Each presenter will talk for 15 minutes, followed by open-ended question and answer period until the Photonics West Exhibition Floor opens at 10:00 a.m.

Given the decades of first-hand experience and extensive travel throughout China these experienced business people bring to the forum, you're sure to learn something new to help clarify the question: Competitor, Customer or Conundrum?



**Adonis Mak** and his organization, ACT International, manages the day-to-day business operations of several publications including Laser Focus World China, Lightwave China, and Solid State Technology

China, in addition to the FTTH China conference series. He has writers, editors, and sales people working across China, and both Chinese and "Western" advertisers, giving him a perspective on what optics & photonics products are selling inside China.



**Jeremy Chang** is Managing Director, Edmund Optics, China, where he manages optics manufacturing operations with teams in Shenzhen and Shanghai. An experienced executive, he has managed joint ventures among US, Hong Kong, and China companies and local government officials. Chang previously worked for Concord Camera Company as the director of new product & optical development (2001-2004) and for Kodak Haking Optical Company as the general manager (1994-2001).

# Workshops



Learn new technical skills and enhance your career with these workshops from SPIE.

**Registration is required.**  
See SPIE Cashier to Register.

## Laser Safety Made Easy

WS866

NEW

**Course level: Introductory**  
**CEU .35 \$315 / \$365 USD**  
**Monday 8:30 am to 12:30 pm**

The course starts with a review of laser safety basics—Laser Hazard Classification (including new ANSI-IEC classification and an update of the latest version of ANSI Z136.1-2007 'Safe Use of Lasers'), biological effects, and eyewear issues. This is followed by a review of several laser accidents in research settings, with a focus on identifying and resolving problem areas. The course concludes with a discussion of effective methods to evaluate laser hazards, along with proven solutions to make one's time in the laser lab safer and easier.

### LEARNING OUTCOMES

This course will enable you to:

- explain the basics of laser safety
- draw lessons learned from a number of incidents
- evaluate laser use situations and develop appropriate controls, both administrative and engineering

### INTENDED AUDIENCE

This material is intended for anyone working in a laser lab, in particular those who have some responsibility to maintain a laser safe working environment.

### INSTRUCTOR

**Kenneth Barat** is Certified Laser Safety Officer / Laser Safety Officer for Lawrence Berkeley National Laboratory.

## Understanding Laser Beam Performance Specifications

WS847

**Course level: Introductory**  
**CEU .35 \$315 / \$365 USD**  
**Monday 1:30 to 5:30 pm**

This workshop will provide attendees with a basic understanding of laser beam performance specifications. Topics to be covered include Beam Pointing Stability, Polarization Ratio, RMS Noise, Peak-to-Peak Noise, Pulse Duration and Duty Cycle, Peak Power, Average Power, Pulse Repetition Rate, and M2. These specifications constitute the critical parameters that determine whether or not a laser, or laser system, will do the intended job.

### LEARNING OUTCOMES

This course will enable you to:

- understand laser performance parameters/specifications for any type of laser/laser system
- select the right laser/laser system for any application with certainty
- intelligently engage your clients or customers using proper laser terminology
- build stronger relationships with clients/customers
- obtain the technical knowledge and confidence to enhance your job performance and rise above the competition, inside and outside your company

### INTENDED AUDIENCE

Sales/marketing personnel will find the course quite beneficial to precisely grasp clients' requirements and specifications. Engineers, technicians and other support staff may also find this course useful as they strive to meet client needs as directed by sales/marketing.

### INSTRUCTOR

**Sydney Sukuta** is currently a Laser Technology professor at San Jose City College. He also has industry experience working for some of the world's leading laser manufacturers in Silicon Valley.

COURSE PRICE INCLUDES two weeks of follow-up email and phone consultations.



## Basic Optics for Non-Optics Personnel

WS609

**Course level: Introductory**  
**CEU .20 \$125 / \$175 USD**  
**Wednesday 8:30 to 11:00 am**

This course will provide the technical manager, sales engineering, marketing staff, or other non-optics personnel with a basic understanding of the terms, specifications, and measurements used in optical technology to facilitate effective communication with optics professionals on a functional level. Topics to be covered include basic concepts such as interference, diffraction, polarization and aberrations, definitions relating to color and optical quality, and an overview of the basic measures of optical performance such as MTF and wavefront error. The material will be presented with a minimal amount of math, rather emphasizing working concepts, definitions, rules of thumb, and visual interpretation of specifications. Specific applications will include defining basic imaging needs such as magnification and depth-of-field, understanding MTF curves and interferograms, and interpreting radiometric terms.

### LEARNING OUTCOMES

This course will enable you to:

- read and understand optical system descriptions and papers
- ask the right questions about optical component performance
- describe basic optical specifications for lenses, filters, and other components
- select the right off-the-shelf lenses, filters, and beam directing optics
- interpret optical data such as interferogram, MTF and aberration reports

### INTENDED AUDIENCE

This course is intended for the non-optical professional who needs to understand basic optics and interface with optics professionals.

### INSTRUCTOR

**Kevin Harding** has been active in the optics industry for over 25 years, and has taught machine vision and optical inspection methods for over 20 years in over 70 workshops and tutorials, including engineering workshops on machine vision, metrology, NDT, and interferometry used by vendors and system houses to train their own engineers.

## Creating a New Technology Venture

WS867

**NEW**

**Course level: Introductory**  
**CEU .65 \$520 / \$620 USD**  
**Wednesday 8:30 am to 5:30 pm**

This course will explore the entrepreneurial process of creating a new technology venture. An entrepreneur must have the personality, the technical skills, and the business acumen to create a successful venture. Identifying and evaluating an opportunity which is aligned with the entrepreneur's skills and goals and provides a significant return to the venture's stakeholders is key to successfully launching a new technology venture. This course will place emphasis on identifying market problems, evaluating technical solutions, developing product concepts and business models, building an entrepreneurial team, developing a business plan, establishing goals and milestones, funding the venture, and launching and growing the venture. Key issues such as protecting intellectual property, acquiring technology through technology transfer, identifying disruptive vs. sustaining technologies, and crossing the chasm - moving from early adopters of the technology to the mass market, will also be examined.

### LEARNING OUTCOMES

This course will enable you to:

- identify specific personality traits, skills, and goals necessary to become a successful entrepreneur
- identify and evaluate opportunities that can lead to the successful launch of a new technology venture
- describe intellectual property and understand its value in building and launching a successful new venture
- discuss business models that are used to successfully launch a technology venture
- describe the key elements of a successful business plan and investor presentation
- compare and evaluate funding sources for a new technology venture

### INTENDED AUDIENCE

This course is designed for engineers, scientists, managers and executives interested in creating or joining a new technology venture.

### INSTRUCTOR

**Dennis Pape** is President of AlphaLaunch, a consulting firm that provides technology assessment, market assessment, competitive assessment, business concept generation, and business plan and investor presentation development services.

## Strategies and Tactics for High-Tech Sales Success

WS826

**Course level: Introductory**  
**CEU .35 \$315 / \$365 USD**  
**Wednesday 1:30 to 5:30 pm**

This course introduces proven strategies and tactics for high-tech sales success. Participants will gain a strong understanding and appreciation of the purchase process as seen through the eyes of their customers. Attendees will learn how to align their sales process with how their customers wish to make purchase decisions. The workshop is hands-on, with interactive exercises and worksheets that attendees will complete using their own products and services as a guide.

### LEARNING OUTCOMES

This course will enable you to:

- use "Active Listening Skills" to develop rapport with your customers
- demonstrate your technical competence and understanding of the customer's needs
- gain access to key technical and financial decision makers
- maintain positive sales momentum throughout the sales cycle
- identify and delineate between qualified and unqualified prospects

### INTENDED AUDIENCE

Anyone who is involved with the sales, marketing and support of highly technical products and services will benefit from this course. (This includes pre and post-sales engineers and customer support representatives.)

### INSTRUCTOR

**Greg Johnson** is the founder of Honorable Selling Inc., a high-tech sales training and consulting business. He holds a BS in Physics and an MS in Geophysics and has over 19 years experience in sales, sales management and sales training within the high-tech and software industries.

**COURSE PRICE INCLUDES** a workbook containing worksheets, templates and sections from the instructor's upcoming sales-training book. While several exercises will be completed during the course, these additional resources will help attendees effectively utilize the techniques and tactics introduced during the course.



# Workshops

## How to Start a Small High Tech Business Almost Anywhere

WS756

**Course level: Introductory**  
**CEU .35 \$315 / \$365 USD**  
**Tuesday 1:30 to 5:30 pm**

This course focuses on the elements that can minimize investment capital and the time needed to set up a viable and vibrant small business with growth potential. For individuals contemplating or engaged in starting a small business, understanding the process can literally be the difference between success and failure.

It is possible to set up such an entity within a large company, where one or a handful of individuals can grow new ideas and technology into high tech products that can have a significant impact on the competitiveness of the company.

The course provides an overview of the skills necessary to operate a successful high tech business within a large organization, and points out how these skills can form the basis for developing small high tech businesses as spin-offs or standalone entities. It also addresses the steps needed to start a small high tech business, even under less-than-ideal conditions.

Elements to be considered include: motivation; start up planning; types of organizations that can be operated; and the set up of structures that will greatly aid success. Crucial topics such as consulting, small business contracts, subcontracts, intellectual property, licensing, product development, long term planning, and mergers/acquisitions will be reviewed.

### LEARNING OUTCOMES

This course will enable you to:

- identify specific skills that can have high payoff for individuals establishing high tech operations, and discuss ways to hone these skills
- describe the advantages and pitfalls associated with operating a small high tech business
- list the series of steps necessary for starting a small high tech business (i.e., decision to leave a job, vision for the new company, funding, the type of organization to be formed, a strategic and tactical plan, an operational plan, marketing)
- discuss intellectual property and how to minimize the cost of acquiring and developing an effective patent base, as well as how to offset some costs by licensing/joint ventures
- study examples of small companies that establish leverage to develop relationships with other organizations
- outline some of the issues that a small business may face during a merger or acquisition

### INTENDED AUDIENCE

Engineers, scientists, technicians and managers in both large and small organizations can benefit from this course. People from large organizations will benefit from developing skills that can make their own organizations more cost effective and efficient, as well as understanding the advantages and disadvantages of having small businesses as partners.

### INSTRUCTOR

**Eric Udd** is President of Columbia Gorge Research, LLC.

## Intellectual Property Issues in High-Tech Business

WS412

**Course level: Introductory**  
**CEU .35 \$315 / \$365 USD**  
**Tuesday 8:30 am to 12:30 pm**

Intellectual property (IP), in the form of copyrights, trademarks, trade secrets, ideas and patents, is of critical importance in high-tech business. In today's economy, IP is an asset that high-tech companies seek to leverage to add to their bottom line, whether through licensing or lawsuits. For many high-tech companies, IP represents their most valuable asset. Not surprisingly, the typical high-tech company's level of technical sophistication far outweighs its level of IP sophistication; yet both are needed to ultimately be successful in the high-tech marketplace. It is therefore imperative that employees of a high-tech company know the fundamentals of IP and understand their role in the IP-related aspects of a high-tech business. The aim of this course is to provide the audience with an overview of the numerous IP issues related to high-tech business. Topics covered include: the basic forms of IP, developing an IP strategy, IP licensing, litigation issues, IP insurance, IP management, directed development and generation of IP, and patent mapping.

### LEARNING OUTCOMES

This course will enable you to:

- understand the basic forms of IP
- understand the role of IP in a company
- intelligently manage IP in a company
- develop an IP strategy that suits your business
- work intelligently with attorneys
- optimize the value of your company's IP
- properly generate, develop and leverage IP
- properly identify and document existing and future IP
- understand your role in your company's IP process.

### INTENDED AUDIENCE

This course is designed for technicians, engineers, scientists, managers and executives involved in high-tech business.

### INSTRUCTOR

**Joseph Gortych** is a registered patent attorney and is president of his own IP law and consulting firm based in Sarasota, Florida.

## Essential Skills for Engineering Project Leaders

WS846

**Course Level: Introductory**  
**CEU .35 \$315 / \$365 USD**  
**Wednesday 1:30 to 5:30 pm**

This workshop teaches skills needed to lead technical projects, drive innovation, and influence others. Attendees learn the difference between leadership and management, and how to develop specific leadership skills that are important to technical professionals who lead projects or need assistance from others to get things done. Participants engage in exercises that assess their individual leadership abilities and provide guidance for further skill development.

### INTENDED AUDIENCE

This material is intended for early-career technical professionals who can benefit from improving leadership skills.

### INSTRUCTOR

**Gary C. Hinkle** is President and founder of Auxilium, Inc. His experience includes a broad variety of management and staff assignments with small, medium, and large companies involved in the development and manufacturing of high-tech products.

**COURSE PRICE INCLUDES** a comprehensive workbook and email/phone follow-up with the instructor after the workshop to assist with implementation.

## The Craft of Scientific Presentations: A Workshop on Technical Presentations

WS667

**Course level: Introductory**  
**CEU .35 \$125 / \$175 USD**  
**Wednesday 8:30 am to 12:30 pm**

This course provides attendees with an overview of what distinguishes the best scientific presentations. The course introduces a new design for presentation slides that is both more memorable and persuasive from what is typically shown at conferences.

### LEARNING OUTCOMES

This course will enable you to:

- account for the audience, purpose, and occasion in a presentation,
- logically structure the introduction, middle, and ending of a scientific presentation,
- create a memorable and persuasive set of presentation slides, and
- deliver a presentation with more confidence.

### INTENDED AUDIENCE

This material is intended for anyone who needs to present scientific research. Those who either have not yet presented or have made several presentations will find this course valuable.

### INSTRUCTOR

**Michael Alley** teaches writing and speaking to engineering students at Penn State.

**COURSE PRICE INCLUDES** the text *The Craft of Scientific Presentations* by the instructor. This workshop is free to SPIE Student Members. You must register to attend.

**Registration is required.**  
See SPIE Cashier to Register.

## The Craft of Scientific Writing: A Workshop on Technical Writing

WS668

**Course level: Introductory**  
**CEU .35 \$125 / \$175 USD**  
**Wednesday 1:30 to 5:30 pm**

This course provides an overview on writing a scientific paper. The course focuses on the structure, language, and illustration of scientific papers.

### LEARNING OUTCOMES

This course will enable you to:

- account for the audience, purpose, and occasion in a scientific paper,
- logically structure the introduction, middle, and ending of a scientific paper,
- understand how to make your language clear, energetic, and fluid, and
- avoid the most common mechanical errors in scientific writing.

### INTENDED AUDIENCE

This material is intended for anyone who needs to write about scientific research. Those who either have not yet written a paper or have written several papers will find this course valuable.

### INSTRUCTOR

**Michael Alley** teaches writing and speaking to engineering students at Penn State.

**COURSE PRICE INCLUDES** the text *The Craft of Scientific Writing* by the instructor. This workshop is free to SPIE Student Members. You must register to attend.

## Optimizing Your Resume

WS777

**Course level: Introductory**  
**CEU .20 \$100 / \$150 USD**  
**Monday 1:30 to 3:30 pm**

Today's job market pits you against hundreds, if not thousands, of candidates who have approximately the same credentials as you do. How do you stand out in the crowd? This workshop, which concentrates on students and recent graduates, will review a number of strategies, tips, and tools that you can use to increase the impact of your resume and cover letter. We'll examine ways to translate your educational experience into a format that is attractive to potential employers, and how to create tailored versions of your job search materials for multiple targets. The process of creating your resume will be discussed, with a focus on both layout/formatting and writing style. We'll also look at cover letters, lists of references, and other materials used in your job search.

### LEARNING OUTCOMES

This course will enable you to:

- translate your educational and work experience into a focused and effective resume
- avoid common mistakes and misconceptions
- learn how HR and hiring managers typically review resumes
- tailor your resume and cover letter for multiple job targets
- choose an effective layout and format to ensure maximum impact

### INTENDED AUDIENCE

This material is intended primarily for students, recent graduates, and early-career professionals who want to improve the quality and effectiveness of their job search materials.

### INSTRUCTOR

**John Cain** is a former professional resume writer, and has written more than 500 resumes and cover letters for multiple industries and professions, focusing primarily on technical fields.



## Hands-On Optics (HOO)— Making an Impact with Light: Terrific Telescopes Workshop

WS852

**Course Level: Introductory**  
**CEU: .3 \$60/ \$70 USD**  
**Sunday 9:30 am to 12:30 pm**

This workshop will train attendees on the use of Terrific Telescopes, a hands-on activity kit intended to engage and enrich the math/science learning experience for students in the middle grades. It was developed as part of HOO, a four year program funded by a \$1.7 million dollar grant from the U.S. National Science Foundation (NSF) to design and implement a science enrichment program for children ages 11 to 14 years old.

### INTENDED AUDIENCE

Optics professionals, university students, and pre-college teachers.

### INSTRUCTOR

**Robert T. Sparks** earned an M.S. in Physics from Michigan State University and is a Science Education Specialist at the National Optical Astronomy Observatory in Tucson, AZ.

## New Product Tutorial

### Crosslight Software Tutorial on Optoelectronic Device Simulation

PT001 • Thursday 1:30 to 5:30 pm

**To register for the tutorial and receive a free Crosslight Software software training license, please e-mail your contact information to [piprek@nusod.org](mailto:piprek@nusod.org). More information on the tutorial is available at: <http://www.nusod.org/crosslight08pw.html>.**

The tutorial gives an introduction to high-end simulation tools for electronic and optoelectronic devices (APSYS, LASTIP, PICS3D by Crosslight Software Inc., see [www.crosslight.com](http://www.crosslight.com)). These software packages combine electrical, thermal, optical, and quantum-mechanical models in two or three dimensions. They can be applied to a large variety of semiconductor devices such as laser diodes, light-emitting diodes, solar cells, photodetectors, modulators, amplifiers, and transistors. The tutorial explains and demonstrates the basic operation of these software tools. Model options and material parameters are discussed, and strategies for obtaining realistic simulation results are outlined. Deep insight into micro- and nano-scale physical processes is provided using realistic device examples.

### INTENDED AUDIENCE

Students, device engineers, and researchers who are interested in using advanced simulation software for designing and analyzing modern optoelectronic devices.

### INSTRUCTOR

**Joachim Piprek** has been using Crosslight Software tools for more than 10 years in design and analysis of practical devices. He has published three books on semiconductor device simulation, co-chairs the annual conference on Numerical Simulation of Optoelectronic Devices, and gives device simulation courses at universities and companies worldwide. Dr. Piprek is currently president of the NUSOD Institute ([www.nusod.org](http://www.nusod.org)).



# Start your year at the world's hottest technology marketplace

TWO ROBUST EXHIBITIONS • OVER 1,100 EXHIBITORS

## SPIE Photonics West

Tuesday 22 January . . . . .10:00 am to 5:00 pm  
Wednesday 23 January . . .10:00 am to 5:00 pm  
Thursday 24 January . . . . .10:00 am to 4:00 pm

SPIE Photonics West is the most important North American exhibition on optics, lasers, biomedical optics, optoelectronic components, and imaging technologies. Located at the center of the world's hottest technology market, Silicon Valley, Photonics West is a can't-miss exhibition.

Start your year at Photonics West, see the latest innovations from 1,100 companies from around the globe. Network with over 17,000 innovators and product developers, the most highly qualified audience of any technical exhibition in the industry.

## **BIOS** <sup>2008</sup> *Part of* SPIE Photonics West

Saturday 19 January . . . . .1:00 to 5:00 pm  
Sunday 20 January . . . . .10:00 am to 4:00 pm

The BIOS exhibition provides the ideal venue for interacting with the early adopters of the newest biomedical technologies, as well as a launch pad for new applications and technologies in diagnostics, therapeutics, and instrumentation.

The 150-company exhibition coincides with the BIOS symposium, which draws more than 1,500 attendees to the 1,200 presentations on clinical, translational, and fundamental research and development in the field of biomedical optics.

# Product Demonstrations — Demo Area I — Hall 1

See new applications in action at the Product Demonstrations.

|          | Tuesday<br>22 January  | Wednesday<br>23 January   | Thursday<br>24 January   |
|----------|--|---|--|
| 10:30 am | <b>Advances in High Power Semiconductor Lasers</b><br>Paul Rudy, QPC Lasers, Inc.                            | <b>High power fibre coupled QWI modules</b><br>Prof. John Marsh PhD, Intense Ltd.                               | <b>Semrock Optical Filters: Performance and Value</b><br>Dr. Turan Erdogan, Semrock, Inc.                                      |
| 11:30 am | <b>Advanced Optical Systems - Design and Manufacturing</b><br>Dr. Rainer Schuhmann, Berliner Glas KGaA       | <b>Diffractive Optics for Beamshaping</b><br>Thierry Berthou, Silios Technologies                               | <b>Application Solutions for the Nonlinear Spectroscopist</b><br>Dr. Michael Karavitis, Newport Corp.                          |
| 12:30 pm | <b>Advances in Spectral Imaging Instrumentation</b><br>David Bannon, Headwall Photonics                      | <b>Diode Pumped Ultrafast Lasers-Scientific to OEM Applications</b><br>Dr. Heinz Huber, High Q Laser (US), Inc. | <b>OEM Miniature Raman Systems</b><br>Dave Goodwin, HORIBA Jobin Yvon, Inc.  |
| 1:30 pm  | <b>3D CAD Environment - Simulation Tool for Optical Propagation</b><br>Dan Herrmann, RSoft Design Group      | <b>Programmable High Energy Lasers</b><br>Michael LaHa, Continuum   | <b>QWI Enabled Single Mode Diodes</b><br>Prof. John Marsh PhD, Intense Ltd.  |
| 2:30 pm  | <b>Amplified Piezo Actuators for Optics, Laser &amp; Optronics</b><br>Thomas Maillard, Cedrat Technologies   | <b>OEM Miniature CCD Spectrometers</b><br>Dave Goodwin, HORIBA Jobin Yvon, Inc.                                 | <b>Calcium Fluoride and Fused Silica for High Performance Laser Applications</b><br>Stephan Strohm, SCHOTT North America, Inc. |
| 3:30 pm  | <b>New advancements in TracePro Illumination Design Software</b><br>Jim Zambuto, Lambda Research Corporation | <b>SC8000: Mega-Pixel Science-Grade Infrared Camera</b><br>Dave Bursell, FLIR Systems, Inc.                     | <b>Entrance into the IR Material Market</b><br>Ed Hart, SCHOTT North America, Inc.   |
| 4:30 pm  | <b>Labsphere Solutions for your Application</b><br>Labsphere Experts, Labsphere, Inc.                        | <b>Aspheric Measurement in 2 Seconds</b><br>Piotr Szwaykowski, ESDI   |   |

# Product Demonstrations — Demo Area II — Hall 3

|          | Tuesday<br>22 January  | Wednesday<br>23 January  | Thursday<br>24 January  |
|----------|--|--|---|
| 10:30 am | <b>High-brightness QCW Array</b><br>Robert Walker, Lasertel, Inc.  | <b>Multi-Pixel Photon Counter (MPPC)</b><br>Earl Hergert, Hamamatsu Corp.  | <b>515nm CW DPSS Laser</b><br>Elizabeth Illy, Cobolt AB   |
| 11:30 am | <b>Reliable Power for Materials Processing</b><br>Frank Gaebler, Coherent Inc.                               | <b>High Speed, High Sensitivity InGaAs SWIR Imaging</b><br>Doug Malchow and Marc Hansen, Sensors Unlimited, Inc., part of Goodrich Corporation | <b>INNOSLAB Lasers: Their Unique Features and Applications</b><br>Dr. Keming Du, EdgeWave GmbH  |
| 12:30 pm | <b>Micro-Green Laser for Laser Projection Display</b><br>Hally Huang, Photop Technologies, Inc.              | <b>Transparently Combining AFM/SPM Systems with Micro Raman</b><br>Prof. Aaron Lewis, Nanonics Imaging Ltd.                                    | <b>iXFiber Portfolio</b><br>Benoit Cadier, iXFiber  |
| 1:30 pm  | <b>AvaSpec-2048x14 High Sensitivity Miniature Spectrometer</b><br>Benno Oderkerk, Avantes, Inc.              | <b>High power fiber laser sub-assemblies</b><br>Thomas Nikolajsen, Crystal Fibre A/S   | <b>Fiber Optic Length Meter</b><br>Omur Sezerman, OZ Optics Limited   |
| 2:30 pm  | <b>High Performance Infrared Imaging for Demanding Applications</b><br>Chris Alicandro, Electrophysics Corp. | <b>High Speed Imaging - Photron's Fastcam SA-1</b><br>Andrew Bridges, Photron, Inc.  | <b>Wyvern™: Regeneratively Amplified Laser with 100kHz, 20μJ, Sub-50fs Pulses</b><br>Dr. Sterling Backus, Kapteyn-Murnane Laboratories Inc. |
| 3:30 pm  | <b>Laser presentation: Phazzler/Dazzler</b><br>Pascal Tournois, FASTLITE                                     | <b>KALEO: Lens Quality Diagnostic System</b><br>Raphaël Serra, PHASICS SA  |    |
| 4:30 pm  | <b>Latest Ultra-High Performance UV/Vis/NIR Spectrophotometer</b><br>Bill Sweet, PerkinElmer                 | <b>Chameleon. Ready To Image.</b><br>David Armstrong, Coherent Inc.  |   |

## Promotional Partners

Advanced Imaging

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EDP Sciences

Electro Optics Magazine

Laser Focus World

Laser Focus World Japan

Laser Institute of America

Optics.org—Optics & Laser Europe

OptoIndex

The Optronics Co., Ltd.

Photonics Spectra - Laurin Publishing

Photonics Tech Briefs

Photonics.com

Photoniconline.com

Physics Today

R&D Magazine

Spectroscopy Magazine

Webcom Communications



# Product Demonstrations — Demo Area III — South Hall 1

|          | Tuesday   | Wednesday   | Thursday   |
|----------|---|---|--|
|          | 22 January  | 23 January  | 24 January   |
| 10:30 am | <b>New IK-HD1 High Definition 3CCD Camera</b><br>Vince Giovinco & Gary Pitre, Toshiba Imaging Systems Division (Irvine, CA) | <b>High Power Fiber Laser Reflector</b><br>Daniel Mailloux, Teraxion Inc.                           | <b>SPMArray: Position Sensitive/ Multi-Anode High Gain APD</b><br>Joseph O'Keeffe, SensL         |
| 11:30 am | <b>New Low Light Cameras Using Back-Thinned CMOS</b><br>Dr. Bruce True, Intevac, Inc.                                       | <b>Spectral Metal, Real World Applications</b><br>Bob Crase, Deposition Sciences, Inc.              | <b>The ReportR-The World's First Palm Sized Raman Instrument</b><br>Dr. Keith Carron, Intevac    |
| 12:30 pm | <b>Extremely Fast CCD Camera for High Throughput</b><br>Dave Northup, Adimec  | <b>High Power Laser Modules Offered In Small Form Factor Packages</b><br>Gary Sousa, Sheumann Inc.  | <b>Flourescence Free Raman Spectroscopy With the DiscoverR 1064</b><br>Dr. Keith Carron, Intevac |
| 1:30 pm  | <b>Microspectrometer for Plastic Waste Selection</b><br>Dr. Michael Scholles, Fraunhofer IPMS                               | <b>Solar Cell Simulation</b><br>Ricardo Borges, Synopsys, Inc.                                      |  |
| 2:30 pm  | <b>Compact EC-QCLs for Molecular Detection and Imaging</b><br>Eric Takeuchi, Daylight Solutions, Inc.                       | <b>What could YOU do with a motor this small?</b><br>Dan Viggiano III, New Scale Technologies       |  |
| 3:30 pm  | <b>LED Illumination Extends from VIS to UV and IR</b><br>Randall Wilcox, Lightspeed Technologies                            | <b>A New Approach for Performing Acoustooptic Modulation</b><br>Pete Wasilousky, Harris Corporation |             |
| 4:30 pm  | <b>COMSOL Multiphysics Intro and Live Demo</b><br>COMSOL, Inc.  | <b>Monolithic, Low Scatter 6061-T6 Aluminum Mirrors</b><br>Stan Reggie, Engineered Surface Finishes |  |

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- ▶ Earn CEUs for your continuing education

# Daily Course Schedule

| Saturday   | Sunday  | Monday   | Tuesday  | Wednesday   | Thursday |
|--|---|--|--|---|----------|
| <b>Biomedical Spectroscopy, Microscopy, and Imaging</b>  |   |  |  |   |          |
| <p>SC819 <b>Multiphoton Microscopy (MM) - Basics, Technology Development, and Applications</b> (Periasamy, So) 8:30 am to 5:30 pm, \$520 / \$620</p> |   | <p>SC859 <b>Single Molecule NEW Spectroscopy and Imaging</b> (Koberling, Enderlein) 8:30 am to 12:30 pm, \$315 / \$365</p> | <p>SC868 <b>Optical Design for Biomedical Imaging</b> (Liang) 8:30 am to 12:30 pm, \$315 / \$365</p> <p>SC865 <b>Microscope NEW Design</b> (Seward) 1:30 to 5:30 pm, \$315 / \$365</p>   |   |          |
| <b>Clinical Technologies and Systems</b>   |   |  |  |   |          |
|  | <p>SC312 <b>Principles and Applications of Optical Coherence Tomography</b> (Fujimoto) 1:30 to 5:30 pm, \$315 / \$365</p> |  |  |   |          |
| <b>Communication Technologies</b>  |   |  |  |   |          |
|  |   |  | <p>SC879 <b>Next Generation NEW Wireless Technologies: High Throughput WiFi, WiMAX, and UWB</b> (Jain) 8:30 am to 5:30 pm, \$520 / \$620</p> <p>SC880 <b>Optical NEW Communication Systems</b> (Xu) 8:30 am to 12:30 pm, \$315 / \$365</p> <p>SC881 <b>Semiconductor NEW Optical Amplifiers-Design and Applications</b> (Dutta) 1:30 to 5:30 pm, \$370 / \$420</p> |   |          |
| <p><b>Registration is required.</b><br/>See SPIE Cashier to Register.</p>  |   |  |  |   |          |
| <b>MOEMS/MEMS Devices, Applications, and Reliability</b>   |   |  |  |   |          |
|  |   |  | <p>SC660 <b>Nanotribology and Nanomechanics</b> (Bhushan) 8:30 am to 5:30 pm, \$610 / \$710</p>  |   |          |
| <b>Displays and Holography</b>   |   |  |  |   |          |
|  |   |  | <p>SC821 <b>Holographic Techniques for Advanced Photonic Systems</b> (Kostuk) 8:30 am to 12:30 pm, \$315 / \$365</p>   | <p>SC790 <b>Liquid NEW Crystals: From Fundamentals to Applications</b> (Smalyukh) 8:30 am to 5:30 pm, \$520 / \$620</p> |          |



| Saturday   | Sunday  | Monday   | Tuesday  | Wednesday   | Thursday |
|--|---|--|--|---|----------|
| <b>Laser Communication and Propagation</b>   |   |  |  |   |          |
|  |   |  | <p>SC188 <b>Laser Beam Propagation for Applications in Laser Communications, Laser Radar, and Active Imaging</b> (Phillips, Andrews) 8:30 am to 5:30 pm, \$640 / \$740</p> <p>SC880 <b>NEW Optical Communication Systems (Xu)</b> 8:30 am to 12:30 pm, \$315 / \$365</p> |   |          |
| <b>Laser Micro-/Nanoengineering and Applications</b>   |   |  |  |   |          |
|  |   | <p>SC743 <b>Micromachining with Femtosecond Lasers</b> (Nolte, Schaffer) 1:30 to 5:30 pm, \$315 / \$365</p>      | <p>SC689 <b>Introduction to MicroMachining Using Lasers</b> (Schaeffer) 8:30 am to 12:30 pm, \$315 / \$365</p>   | <p>SC699 <b>Polymer Microfabrication</b> (Becker) 8:30 am to 5:30 pm, \$520 / \$620</p>                       |          |
|  |   |  | <p>SC869 <b>NEW Process Fundamentals of Industrial Laser Welding</b> (Havrilla) 8:30 am to 5:30 pm, \$520 / \$620</p>  |   |          |
| <b>Laser Source Engineering</b>  |   |  |  |   |          |
| <p>SC752 <b>Solid State Laser Technology</b> (Hodgson) 8:30 am to 5:30 pm, \$630 / \$730</p> | <p>SC744 <b>Ultrafast Fiber Lasers</b> (Fermann) 8:30 am to 12:30 pm, \$315 / \$365</p>           | <p>SC861 <b>NEW The Basics of Physics and Engineering of Lasers</b> (Kalisky) 1:30 to 5:30 pm, \$315 / \$365</p> | <p>SC818 <b>Laser Beam Quality</b> (Paschotta) 8:30 am to 12:30 pm, \$315 / \$365</p>  | <p>SC860 <b>NEW Resonator Design for Solid State Lasers</b> (Paschotta) 8:30 am to 5:30 pm, \$520 / \$620</p> |          |
|  | <p>SC748 <b>High-Power Fiber Sources</b> (Nilsson) 1:30 to 5:30 pm, \$315 / \$365</p>             |  | <p>SC869 <b>NEW Process Fundamentals of Industrial Laser Welding</b> (Havrilla) 8:30 am to 5:30 pm, \$520 / \$620</p>  |   |          |
|  | <p>SC746 <b>Introduction to Ultrafast Technology</b> (Trebino) 1:30 to 5:30 pm, \$315 / \$365</p> |  |  |   |          |

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# Daily Course Schedule

| Saturday                                | Sunday   | Monday  | Tuesday  | Wednesday   | Thursday  |
|---|--|---|--|---|---|
| <b>MOEMS-MEMS Micro/Nanofabrication</b> |  |   |  |   |   |
|   |  | <p>SC743 <b>Micromachining with Femtosecond Lasers</b> (Nolte, Schaffer) 1:30 to 5:30 pm, \$315 / \$365</p> | <p>SC689 <b>Introduction to MicroMachining Using Lasers</b> (Schaeffer) 8:30 am to 12:30 pm, \$315 / \$365</p> <p>FC</p> | <p>SC386 <b>Advanced Thermal Management Materials for Optoelectronic and MEMS/ MOEMS Packaging</b> (Zweber) 8:30 am to 5:30 pm, \$520 / \$620</p> |   |
|   |  |   | <p>SC532 <b>Micro- and Nanofluidics-Technology and Applications</b> (Gaertner) 1:30 to 5:30 pm, \$315 / \$365</p>        | <p>SC699 <b>Polymer Microfabrication</b> (Becker) 8:30 am to 5:30 pm, \$520 / \$620</p>   |   |
| <b>Nano/Biophotonics</b>                |  |   |  |   |   |
|   | <p>SC309 <b>Fluorescent Markers: Usage and Optical System Optimization</b> (Levi) 8:30 am to 12:30 pm, \$315 / \$365</p> | <p>SC463 <b>Biophotonics</b> (Prasad) 8:30 am to 5:30 pm, \$590 / \$690</p> <p>FC</p>                       |  | <p>SC790 <b>Liquid Crystals: From Fundamentals to Applications</b> (Smalyukh) 8:30 am to 5:30 pm, \$520 / \$620</p>                               | <p>SC727 <b>Nanoplasmonics</b> (Stockman) 8:30 am to 5:30 pm, \$520 / \$620</p> |
|   | <p>SC461 <b>Bio-Optical Detection Systems</b> (Levi) 1:30 to 5:30 pm, \$315 / \$365</p>                                  |   |  |   |   |
|   | <p>SC742 <b>Nano-Photonics: Physics and Techniques</b> (Scherer) 1:30 to 5:30 pm, \$315 / \$365</p> <p>FC</p>            |   | <p><b>Registration is required.</b><br/>See SPIE Cashier to Register.</p>  |   |   |
| <b>Nanotechnologies in Photonics</b>    |  |   |  |   |   |
|   |  |   |  | <p>SC608 <b>Photonic Crystals: A Crash Course, from Bandgaps to Fibers</b> (Johnson) 8:30 am to 12:30 pm, \$315 / \$365</p>                       |   |
| <b>Nonlinear Optics</b>                 |  |   |  |   |   |
|   | <p>SC047 <b>Introduction to Nonlinear Optics</b> (Fisher) 8:30 am to 5:30 pm, \$520 / \$620</p> <p>FC</p>                |   |  | <p>SC790 <b>Liquid Crystals: From Fundamentals to Applications</b> (Smalyukh) 8:30 am to 5:30 pm, \$520 / \$620</p>                               |   |

| Saturday                                    | Sunday | Monday  | Tuesday   | Wednesday   | Thursday  |
|---|--------|---|---|---|---|
| <b>Optoelectronic Materials and Devices</b> |        |   |   |   |   |
|   |        | <b>SC864 NEW</b> <b>Introduction to Optical Simulation Using the Finite-Difference Frequency-Domain Method (Rumpf)</b> 1:30 to 5:30 pm, \$315 / \$365 | <b>SC880 NEW</b> <b>Optical Communication Systems (Xu)</b> 8:30 am to 12:30 pm, \$315 / \$365 | <b>SC228</b> <b>Fiber Laser Sources and Amplifiers for Lightwave System Applications (Digonnet)</b> 8:30 am to 5:30 pm, \$520 / \$620 | <b>SC822</b> <b>Principles of GaN-based Devices (Piprek)</b> 8:30 am to 12:30 pm, \$425 / \$475 |
|   |        |   |   | <b>SC790 NEW</b> <b>Liquid Crystals: From Fundamentals to Applications (Smalyukh)</b> 8:30 am to 5:30 pm, \$520 / 620                 |   |
|   |        |   |   | <b>SC547 FC</b> <b>Terahertz Wave Technology and Applications (Zhang)</b> 1:30 to 5:30 pm, \$315 / \$365                              |   |

## Optics and Optical Engineering

|   |  |   |   |   |
|---|--|---|---|---|
| <b>SC212 FC</b> <b>Modern Optical Testing (Wyant)</b> 8:30 am to 12:30 pm, \$315 / \$365  | <b>SC156 FC</b> <b>Basic Optics for Engineers (Ducharme)</b> 8:30 am to 5:30 pm, \$555 / \$655                               | <b>SC720</b> <b>Cost-Conscious Tolerancing of Optical Systems (Youngworth)</b> 8:30 am to 12:30 pm, \$315 / \$365 | <b>SC552</b> <b>Aspheric Optics: Design, Fabrication, and Test (Fischer)</b> 8:30 am to 12:30 pm, \$390 / \$440 | <b>SC690</b> <b>Geometrical Optics (Greivenkamp)</b> 8:30 am to 5:30 pm, \$620 / \$720  |
| <b>SC402 FC</b> <b>Understanding Lasers, Fiber Optics, and Photonics Components (Ezekiel)</b> 8:30 am to 5:30 pm, \$520 / \$620 | <b>SC001 FC</b> <b>Optical System Design: Layout Principles and Practice (Greivenkamp)</b> 8:30 am to 5:30 pm, \$620 / \$720 | <b>SC011</b> <b>Design of Efficient Illumination Systems (Cassarly)</b> 1:30 to 5:30 pm, \$315 / \$365            |   | <b>SC825</b> <b>Imaging Performance Evaluation for Digital Cameras, Cell-phone Cameras and Scanners (Burns, Williams)</b> 8:30 am to 5:30 pm, \$520 / \$620 |
|   | <b>SC702 FC</b> <b>Optics and Optical Quality of the Human Eye (Roorda)</b> 8:30 am to 12:30 pm, \$315 / \$365               |   |   |   |
|   | <b>SC206 FC</b> <b>Polarized Light: A Practical Hands-on Introduction (Fisher)</b> 8:30 am to 5:30 pm, \$520 / \$620         |   |   |   |
|   | <b>SC017 FC</b> <b>Principles of Fourier Optics and Diffraction (Gaskill)</b> 8:30 am to 5:30 pm, \$625 / \$725              |   |   |   |
|   | <b>SC384</b> <b>The Design of Plastic Optical Systems (Schaub)</b> 8:30 am to 12:30 pm, \$265 / \$365, p. 235                |   |   |   |
|   | <b>SC321 FC</b> <b>Thin Film Optical Coatings (Macleod)</b> 8:30 am to 5:30 pm, \$520 / \$620                                |   |   |   |
|   | <b>SC003 FC</b> <b>Practical Optical System Design - EXPANDED 2-Day Format (Fischer)</b> 8:30 am to 5:30 pm, \$983 / \$1285  |   |   |   |

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# Daily Course Schedule

| Saturday                                     | Sunday   | Monday  | Tuesday  | Wednesday  | Thursday  |
|--|--|---|--|--|---|
| <b>Optomechanics</b>                         |  |   |  |  |   |
|  | <p>SC220 <b>Optical Alignment Mechanisms</b><br/>(Guyer) 8:30 am to 12:30 pm, \$315 / \$365</p>                    |   | <p>SC781 <b>Optomechanical Analysis</b><br/>(Hatheway) 8:30 am to 5:30 pm, \$520 / \$620</p> <p>SC015 <b>Structural Adhesives for Optical Bonding</b><br/>(Daly) 1:30 to 5:30 pm, \$315 / \$365</p> <p>SC010 <b>Introduction to Optical Alignment Techniques—2 DAY COURSE</b><br/>(Ruda) 8:30 am to 5:30 pm, \$950 / \$1180</p>  |  |   |
| <b>Photonic Integration</b>                  |  |   |  |  |   |
|  | <p>SC817 <b>Silicon Photonics</b><br/>(Michel, Saini) 1:30 to 5:30 pm, \$315 / \$365</p>                           |   |  |  |   |
| <b>Photonic Therapeutics and Diagnostics</b> |  |   |  |  |   |
|  |  | <p>FC SC702 <b>Optics and Optical Quality of the Human Eye</b><br/>(Roorda) 8:30 am to 12:30 pm, \$315 / \$365</p>  |  |  |   |
| <b>Semiconductor Lasers and LEDs</b>         |  |   |  |  |   |
|  | <p>SC877 <b>NEW Introduction to High Power Diode Laser Technology</b><br/>(Roh) 1:30 to 5:30 pm, \$315 / \$365</p> | <p>FC SC052 <b>Light-Emitting Diodes</b><br/>(Schubert) 8:30 am to 12:30 pm, \$375 / \$425</p> <p>SC657 <b>Accurate Measurement of LED Optical Properties</b><br/>(Tirpak) 1:30 to 5:30 pm, \$315 / \$365</p> | <p>SC869 <b>NEW Process Fundamentals of Industrial Laser Welding</b><br/>(Havrilla) 8:30 am to 5:30 pm, \$520 / \$620</p> <p>SC011 <b>Design of Efficient Illumination Systems</b><br/>(Cassarly) 1:30 to 5:30 pm, \$315 / \$365</p> <p>SC881 <b>NEW Semiconductor Optical Amplifiers-Design and Applications</b><br/>(Dutta) 1:30 to 5:30 pm, \$370 / \$420</p> <p>SC053 <b>Testing and Reliability of Semiconductor Lasers</b><br/>(Wang) 1:30 to 5:30 pm, \$315 / \$365</p> | <p>FC SC448 <b>Diode Lasers: How to Select the Best Laser for Your Application</b><br/>(Linden) 1:30 to 5:30 pm, \$315 / \$365</p> | <p>SC822 <b>Principles of GaN-based Devices</b><br/>(Piprek) 8:30 am to 12:30 pm, \$425 / \$475</p> |

# Daily Course Schedule

| Saturday   | Sunday   | Monday   | Tuesday  | Wednesday  | Thursday |
|--|--|--|--|--|----------|
| <b>Standards</b>   |  |  |  |  |          |
|  |  |  | <p>SC863 <b>NEW</b> <b>Understanding ISO-10110: The Optics Drawing Standard</b> (Aikens) 8:30 am to 5:30 pm, \$695 / \$795</p> | <p>SC700 <b>FC</b> <b>Understanding Scratch and Dig Specifications</b> (Aikens) 8:30 am to 12:30 pm, \$365 / \$415</p>                         |          |
|  |  |  |  | <p>SC862 <b>NEW</b> <b>Updated US and International Laser Product Certification Requirements</b> (Stoev) 8:30 am to 5:30 pm, \$520 / \$620</p> |          |
| <b>Tissue Optics, Laser-Tissue Engineering, and Tissue Engineering</b>   |  |  |  |  |          |
| <p>SC824 <b>Diffuse Light Transport in Tissue and Diffuse Tomography Reconstruction using MATLAB</b> (Dehghani, Pogue) 8:30 am to 5:30 pm, \$520 / \$620</p>   | <p>SC029 <b>FC</b> <b>Tissue Optics</b> (Jacques) 1:30 to 5:30 pm, \$315 / \$365</p> | <p>SC858 <b>NEW</b> <b>Tissue Analysis using Optical Elastography</b> (Kirkpatrick) 8:30 am to 12:30 pm, \$315 / \$365</p> | <p><b>Registration is required.</b><br/>See SPIE Cashier to Register.</p>  |  |          |
| <p>SC768 <b>Optoacoustic Systems for Medical Imaging: From Principles to Clinical Applications</b> (Oraevsky) 1:30 to 5:30 pm, \$315 / \$365</p>   |  |  |  |  |          |
| <b>Industry Workshops: Basic Optics</b>  |  |  |  |  |          |
|  |  | <p>WS866 <b>NEW</b> <b>Laser Safety Made Easy</b> (Barat) 8:30 am to 12:30 pm, \$315 / \$365</p>                           |  | <p>WS609 <b>Basic Optics for Non-Optics Personnel</b> (Harding) 8:30 to 11:00 am, \$80 / \$175</p>   |          |
|  |  | <p>WS847 <b>Understanding Laser Beam Performance Specifications</b> (Sukuta) 1:30 to 5:30 pm, \$315 / \$365</p>            |  |  |          |
| <p><i>Legend for Education Products:</i><br/>           Price = SPIE Member / Non-Member<br/>           SC000 = Course Number<br/>           WS000 = Workshop Number<br/>           FC = Foundation Course</p> |  |  |  |  |          |

# Daily Course Schedule

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| <b>Industry Workshops: Business &amp; Intellectual Property</b>           |   |   |   |   |          |
|   |   |   | <p>WS412 <b>Intellectual Property Issues in High-Tech Business</b> (<i>Gortych</i>) 8:30 am to 12:30 pm, \$315 / \$365</p> <p>WS756 <b>How to Start a Small High Tech Business Almost Anywhere</b> (<i>Udaj</i>) 1:30 to 5:30 pm, \$315 / \$365</p> | <p>WS867 <b>Creating a New <i>NEW</i> Technology Venture</b> (<i>Pape</i>) 8:30 am to 5:30 pm, \$520 / \$620</p> <p>WS826 <b>Strategies and Tactics for High-Tech Sales Success</b> (<i>Johnson</i>) 1:30 to 5:30 pm, \$315 / \$365</p>   |          |
| <b>Professional Development</b>   |   |   |   |   |          |
|   | <p>WS852 <b>Hands-On Optics: Making an Impact with Light (HOO): Terrific Telescopes Work</b> (<i>Sparks, Walker</i>) 9:30 am to 12:30 pm, \$60 / \$70</p> | <p>WS777 <b>Optimizing Your Resume</b> (<i>Cain</i>) 1:30 to 3:30 pm, \$100 / \$150</p> |   | <p>WS667 <b>The Craft of Scientific Presentations: A Workshop on Technical Presentations</b> (<i>Alley</i>) 8:30 am to 12:30 pm, \$125 / \$175</p> <p>WS846 <b>Essential Skills for Engineering Project Leaders</b> (<i>Hinkle</i>) 1:30 to 5:30 pm, \$315 / \$365</p> <p>WS668 <b>The Craft of Scientific Writing: A Workshop on Technical Writing</b> (<i>Alley</i>) 1:30 to 5:30 pm, \$125 / \$175</p> |          |
| <p><b>Registration is required.</b><br/>See SPIE Cashier to Register.</p> |   |   |   |   |          |

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- Haishan Zeng**, British Columbia Cancer Agency (Canada)

# BIOS 2008

Part of **SPIE Photonics West**

## Biomedical Optics

**Conference + Courses:** 19–24 January 2008

**BiOS Exhibition:** January 19–20 2008

**Photonics West Exhibition:** January 22–24 2008

San Jose Convention Center · San Jose, California USA



### Symposium Chairs:



**James Fujimoto**,  
Massachusetts Institute  
of Technology



**R. Rox Anderson, M.D.**,  
Wellman Center for  
Photomedicine, Massachusetts  
General Hospital and Harvard  
School of Medicine

### Photonic Therapeutics and Diagnostics

*Program Chair:* **Reza S. Malek**, Mayo Clinic

### Clinical Technologies and Systems

*Program Chairs:* **Tuan Vo-Dinh**, Duke Univ.;  
**Anita Mahadevan-Jansen**, Vanderbilt Univ.

### Tissue Optics, Laser-Tissue Interaction, and Tissue Engineering

*Program Chairs:* **Steven L. Jacques**, Oregon Health and Science Univ.;  
**William P. Roach**, Air Force Research Lab.

### Biomedical Spectroscopy, Microscopy, and Imaging

*Program Chairs:* **Ammasi Periasamy**, Univ. of Virginia;  
**Daniel L. Farkas**, Cedars-Sinai Medical Ctr.

### Nano/Biophotonics

*Program Chairs:* **Paras N. Prasad**, Univ. at Buffalo;  
**Dan V. Nicolau**, The Univ. of Liverpool (United Kingdom)

# Daily Conference Schedule

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## Biomedical Optics Special Events

|  |   |
|--|---|
| <b>Biomedical Optics Exhibition</b><br><i>San Jose Convention Center, Exhibition Hall 1</i><br>1:00 to 5:00 pm   10:00 am to 4:00 pm | <i>Technical Event: IBOS—International Optics Society, 7:30 to 9:00 pm, p. 23</i> |
| <b>BiOS Hot Topics,</b><br>7:00 to 9:30 pm pm,<br>p. 23  |   |
| <i>Sunday Night Hot Topic Workshop: Nanotechnology and Medicine, 6:00 to 7:00 pm, p. 23</i>  |   |

## Photonic Therapeutics and Diagnostics

Program Chair: **Reza S. Malek**, Mayo Clinic

|   |  |
|---|--|
| 6844A <b>Ophthalmic Technologies XVIII</b> ( <i>Manns, Söderberg, Ho</i> ) p. 66  |  |
| 6842A <b>Photonics in Dermatology and Plastic Surgery</b> ( <i>Kollias, Choi, Zeng</i> ) p. 57  | 6844B <b>Laser and Noncoherent Light Ocular Effects</b> ( <i>Stuck, Belkin</i> ) p. 70     |
| 6842B <b>Urology: Diagnostics, Therapeutics, Robotics, Minimally Invasive, and Photodynamic Therapy</b> ( <i>Malek</i> ) p. 59                                | 6846 <b>Mechanisms for Low-Light Therapy III</b> ( <i>Hamblin, Waynant, Anders</i> ) p. 73 |
| 6842C <b>Advanced Technology and Instrumentation in Otolaryngology: Lasers, Optics, Radio Frequency, and Related Technology</b> ( <i>Wong, Ilgner</i> ) p. 60 | 6843 <b>Lasers in Dentistry XIV</b> ( <i>Rechmann, Fried</i> ) p. 64                       |
| 6842D <b>Diagnostic and Therapeutic Applications of Light in Cardiology</b> ( <i>Gregory, Tearney</i> ) p. 62   |  |
| 6842E <b>Optical Techniques in Neurosurgery, Brain Imaging, and Neurobiology</b> ( <i>Hirschberg, Madsen</i> ) p. 63  |  |
| 6845 <b>Optical Methods for Tumor Treatment and Detection: Mechanisms and Techniques in Photodynamic Therapy XVII</b> ( <i>Kessel</i> ) p. 71                 |  |

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*See pages 45–52 for course daily schedule.*



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### Clinical Technologies and Systems

Program Chairs: Tuan Vo-Dinh, Duke Univ.; Anita Mahadevan-Jansen, Vanderbilt Univ.

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| 6850 <b>Multimodal Biomedical Imaging III</b> (Azar, Intes) p. 84 |  | 6847 <b>Coherence Domain Optical Methods and Optical Coherence Tomography in Biomedicine XII</b> (Izatt, Fujimoto, Tuchin) p. 74 |
|   | 6848 <b>Advanced Biomedical and Clinical Diagnostic Systems VI</b> (Vo-Dinh, Grundfest, Benaron, Cohn) p. 79 | 6853B <b>Optical Biopsy VII</b> (Alfano, Katz) p. 92   |
|   | 6851 <b>Endoscopic Microscopy III</b> (Tearney, Wang) p. 86  | 6849 <b>Design and Quality for Biomedical Technologies</b> (Raghavachari, Liang) p. 82   |

### Tissue Optics, Laser-Tissue Interaction, and Tissue Engineering

Program Chairs: Steven L. Jacques, Oregon Health and Science Univ.; William P. Roach, Air Force Research Lab.

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| 6855 <b>Complex Dynamics and Fluctuations in Biomedical Photonics V</b> (Tuchin, Wang) p. 96  | 6858 <b>Optics in Tissue Engineering and Regenerative Medicine II</b> (Kirkpatrick, Wang) p. 104 | 6857 <b>Biophotonics and Immune Responses III</b> (Chen) p. 102                   |
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### Biomedical Spectroscopy, Microscopy, and Imaging

Program Chairs: Ammasi Periasamy, Univ. of Virginia; Daniel L. Farkas, Cedars-Sinai Medical Ctr.

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|  |   | 6859 <b>Imaging, Manipulation, and Analysis of Biomolecules, Cells, and Tissues VI</b> (Farkas, Nicolau, Leif) p. 106                   |
|  | 6860 <b>Multiphoton Microscopy in the Biomedical Sciences VIII</b> (Periasamy, So) p. 110 | 6861 <b>Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XV</b> (Conchello, Cogswell, Wilson) p. 114 |
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| <b>Nano/Biophotonics</b>  |  |            |   |  |            |
| <i>Program Chairs: Paras N. Prasad, Univ. at Buffalo; Dan V. Nicolau, The Univ. of Liverpool (United Kingdom)</i> |  |            |   |  |            |
| 6866  | Colloidal Quantum Dots for Biomedical Applications III (Osinski, Jovin, Yamamoto) p. 125 |            | 6865  | Nanoscale Imaging, Sensing, and Actuation for Biomedical Applications V (Cartwright, Nicolau) p. 123       |            |
|   |  |            | 6867  | Molecular Probes for Biomedical Applications II (Achilefu, Bornhop, Raghavachari) p. 127                   |            |
|   |  |            | 6868  | Small Animal Whole-Body Optical Imaging Based on Genetically Engineered Probes (Savitsky, Campbell) p. 129 |            |
|   |  | 6869       | Plasmonics in Biology and Medicine V (Vo-Dinh, Lakowicz) p. 131 |  |            |

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# Photonics in Dermatology and Plastic Surgery

Conference Chairs: **Nikiforos Kollias**, Johnson & Johnson CPPW; **Bernard Choi**, Beckman Laser Institute and Medical Clinic; **Haishan Zeng**, British Columbia Cancer Agency (Canada)

## Saturday 19 January

### SESSION 1

Room: Conv. Ctr. A3 ..... Sat. 8:30 to 10:00 am

#### Skin Imaging I: Multiphoton Microscopy and OCT

Session Chair: **Bernard Choi**,  
Beckman Laser Institute and Medical Clinic

8:30 am: **Monitoring laser-tissue interaction by non-linear optics**, Tsung-Hua Tsai, Far Eastern Memorial Hospital (Taiwan) and Taipei Medical Univ. (Taiwan); Jin-Ning Lee, Chiao-Ying Lin, Jr-Ting Hsu, Chun-Chin Wang, Ming-Gu Lin, National Taiwan Univ. (Taiwan); Hsin-Yuan Tan, Chang Gung Memorial Hospital (Taiwan); Shiou-Hwa Jee, National Taiwan Univ. (Taiwan); Sung-Jan Lin, National Taiwan Univ. Hospital (Taiwan) ..... [6842A-01]

8:45 am: **Investigation of the mechanism of transdermal penetration enhancer- a comparison of multiphoton microscopy and electron microscopy**, Sung-Jan Lin, National Taiwan Univ. Hospital (Taiwan); Jin-Ning Lee, Chiao-Ying Lin, National Taiwan Univ. (Taiwan); Chih-Chieh Chan, National Taiwan Univ. Hospital (Taiwan); Ming-Gu Lin, Chun-Chin Wang, National Taiwan Univ. (Taiwan); Shiou-Hwa Jee, National Taiwan Univ. Hospital (Taiwan); Chen-Yuan Dong, National Taiwan Univ. (Taiwan) ..... [6842A-02]

9:00 am: **Characterization of thermal damage in dermis by the use of multiphoton and second harmonic generation microscopy**, Ming-Gu Lin, Wei-Liang Chen, Wen Lo, National Taiwan Univ. (Taiwan); Tsung-Hua Tsai, Far Eastern Memorial Hospital (Taiwan); Shiou-Hwa Jee, Sung-Jan Lin, National Taiwan Univ. Hospital (Taiwan); Chen-Yuan Dong, National Taiwan Univ. (Taiwan) ..... [6842A-03]

9:15 am: **Non-invasive analysis/diagnosis of human normal and melanoma skin tissues with two-photon FLIM in vivo**, Iris Riemann, Alexander Ehlers, Fraunhofer-Institut für Biomedizinische Technik (Germany); Enrico Dimitrow, Martin Kaatz, Friedrich-Schiller-Univ. Jena (Germany); Martin Stark, Fraunhofer-Institut für Biomedizinische Technik (Germany); Karsten König, JenLab GmbH (Germany) ..... [6842A-04]

9:30 am: **Two-photon absorption and transient photothermal imaging of pigments in tissues**, Tong Ye, Duke Univ.; Dan Fu, Princeton Univ.; Thomas E. Matthews, Gunay Yurtsever, Lian Hong, John D. Simon, Warren S. Warren, Duke Univ. .... [6842A-05]

9:45 am: **The evaluation of the photo aging of the human skin by three-dimensional polarization sensitive spectral domain optical coherence tomography**, Arata Miyazawa, Univ. of Tsukuba (Japan); Shingo Sakai, Masayuki Matsumoto, Noriaki Nakagawa, Kanebo Cosmetics Inc. (Japan); Masahiro Yamanari, Yoshiaki Yasuno, Univ. of Tsukuba (Japan) .... [6842A-06]

Coffee Break ..... 10:00 to 10:30 am

### SESSION 2

Room: Conv. Ctr. A3 ..... Sat. 10:30 to 11:45 am

#### Skin Spectroscopy and Spectral Imaging

Session Chair: **Haishan Zeng**,  
The BC Cancer Research Ctr. (Canada)

10:30 am: **UV-A fluorescence of sunscreens applied to skin and possible energy transfer to skin components**, Rajagopal Krishnan, The Univ. of Alabama at Birmingham and Univ. of California/San Francisco; Thomas M. Nordlund, The Univ. of Alabama at Birmingham. .... [6842A-07]

10:45 am: **Quantitative analysis of skin chemicals using rapid near-infrared Raman spectroscopy**, Jianhua Zhao, Haishan Zeng, The BC Cancer Research Ctr. (Canada); Zhiwei Huang, National Univ. of Singapore (Singapore); David I. McLean M.D., Harvey Lui M.D., The Univ. of British Columbia (Canada) ..... [6842A-08]

11:00 am: **Chromophore mapping in human skin with multispectral dermoscopy**, Jesse M. Weissman, Thomas M. Hancewicz, Yumo Zhang, Unilever Research & Development ..... [6842A-09]

11:15 am: **Evaluation of laser treatment response of vascular skin disorders in relation to skin properties using multi-spectral imaging**, Rowland de Roode, Herke J. Noordmans, Alex I. Rem, Sharon Couwenberg, Rudolf M. Verdaasdonk, Univ. Medisch Ctr. Utrecht (Netherlands) ..... [6842A-10]

11:30 am: **Detection of Blood Oxygen Level by Noninvasive Passive Spectral Imaging of Skin**, Neelam Gupta, Army Research Lab.; Jessica C. Ramella-Roman, The Catholic Univ. of America. .... [6842A-11]

Lunch/Exhibition Break ..... 11:45 am to 12:45 pm

### SESSION 3

Room: Conv. Ctr. A3 ..... Sat. 12:45 to 2:00 pm

#### Skin Imaging II: Speckle Imaging and IR Imaging

Session Chair: **Nikiforos Kollias**, Johnson & Johnson CPPW

12:45 pm: **Noninvasive blood flow imaging for real-time feedback during laser therapy of port wine stain birthmarks**, Yu-Chih Huang, J. Stuart Nelson M.D., Bernard Choi, Univ. of California/Irvine ..... [6842A-12]

1:00 pm: **Contrast enhancement of laser speckle skin image using an optical clearing agent**, Taeyoon Son, Jinhee Yoon, Yong-Heum Lee, Kiwoon Kwon, Byungjo Jung, Yonsei Univ. (South Korea) ..... [6842A-13]

1:15 pm: **Optical elastography for evaluating the incremental elastic and viscoelastic properties of skin in vivo**, Sean J. Kirkpatrick, Donald D. Duncan, Oregon Health & Science Univ.; Eduardo C. Ruvalo, Jr., Nikiforos Kollias, Johnson & Johnson CPPW ..... [6842A-14]

1:30 pm: **Infrared imaging of arterial blood flow on arteria radialis**, Jeehyun Kim, Mansik Jeon, Kyungpook National Univ. (South Korea); Daehwan Youn, Changsu Na, Dongshin Univ. (South Korea) ..... [6842A-15]

1:45 pm: **A fiberoptic LDF to monitor vascular dynamics of urticarial demographism in pressure-tested patients before and after treatment with antihistamines**, Natalja Skrebova Eikje, Waseda Univ. (Japan) [6842A-16]

### SESSION 4

Room: Conv. Ctr. A3 ..... Sat. 2:00 to 3:00 pm

#### Skin Imaging III: Polarization Imaging

Session Chair: **Bernard Choi**,  
Beckman Laser Institute and Medical Clinic

2:00 pm: **Polarized light camera to guide surgical excision of skin cancers**, Steven L. Jacques, Ravikant Samatham, Kenneth Lee M.D., Oregon Health & Science Univ. .... [6842A-17]

2:15 pm: **Polarized fluorescence for skin cancer diagnostic with a multi-aperture camera**, Haripriya Kandimalla, Scott A. Mathews, Jessica C. Ramella-Roman, The Catholic Univ. of America ..... [6842A-18]

2:30 pm: **Multimodal dye-enhanced polarization imaging for intraoperative delineation of melanoma**, Anna N. Yaroslavsky, Munir Al-Arashi, Sonali Mukherjee, Zeina Tannous, Harvard Medical School ..... [6842A-19]

2:45 pm: **Multi-modal digital color imaging system for facial skin lesion analysis**, Youngwoo Bae, Byungkwan Han, Youn-Heum Lee, Byungjo Jung, Yonsei Univ. (South Korea) ..... [6842A-20]

Coffee Break ..... 3:00 to 3:30 pm

# Conference 6842A

## SESSION 5

Room: Conv. Ctr. A3 ..... Sat. 3:30 to 4:45 pm

### Skin Therapy

Session Chair: **Haishan Zeng**,  
The BC Cancer Research Ctr. (Canada)

3:30 pm: **Selective elimination of fungal infections within and below surfaces using a femtosecond laser**, Aaron Lewis, Zacharia Manevitch, Dmitry Lev, Mila Palchan, Malka Hochberg, David Enk, Nanonics Imaging Ltd. (Israel) ..... [6842A-21]

3:45 pm: **Low energy laser and flap ischemia**, Dhaval Bhavsar M.D., Reena Eshwar M.D., Bruce Potenza M.D., Mayer Tenenhaus M.D., Univ. of California/San Diego ..... [6842A-22]

4:00 pm: **Laser preconditioning enhances dermal wound repair**, Gerald J. Wilimink, Vanderbilt Univ.; Terry Carter, Hawkins Middle School; Jeffrey M. Davidson, E. Duco Jansen, Vanderbilt Univ. .... [6842A-23]

4:15 pm: **Laser heating of oral and skin tumor of small animals**, Georgy S. Terentyuk, The First Veterinary Clinic (Russia); Vasilii A. Chervanev, Voronezh Agrarian Univ. (Russia); Garif G. Akchurin, Irina L. Maksimova, Saratov State Univ. (Russia) ..... [6842A-24]

4:30 pm: **Titrate aminolevulinic acid solutions for injected photodynamic therapy (ALA-PDT)**, Fernanda H. Sakamoto M.D., Apostolos G. Doukas, William A. Farinelli, Zeina Tannous M.D., Massachusetts General Hospital; Mario Mariano, Univ. Federal de São Paulo (Brazil); Richard R. Anderson M.D., Massachusetts General Hospital ..... [6842A-25]

### BIOS Hot Topics

Convention Center J1-J4

Saturday 19 January • 7:00 to 9:30 pm

See p. 23 for details.

# Urology: Diagnostics, Therapeutics, Robotics, Minimally Invasive, and Photodynamic Therapy

Conference Chair: **Reza S. Malek**, Mayo Clinic

Program Committee: **Nathaniel M. Fried**, The Univ. of North Carolina at Charlotte;

**Matthew T. Gettman**, Mayo Clinic College of Medicine; **Patrice Jichlinski**, Ctr. Hospitalier Univ. Vaudois (Switzerland); **Bodo E. Knudsen**, The Ohio State Univ.; **Ed Koullick**, American Medical Systems; **James C. Ulchaker**, The Cleveland Clinic Foundation; **Rudolf M. Verdaasdonk**, Univ. Medisch Ctr. Utrecht (Netherlands)

## Saturday 19 January

### SESSION 6

Room: Conv. Ctr. C3 ..... Sat. 8:30 to 10:10 am

#### Nanotechniques, Cryosurgery, and Robotics

Session Chair: **Matthew T. Gettman**, Mayo Clinic;  
**Ed Koullick**, American Medical Systems

8:30 am: **Tumor necrosis factor (TNF- $\alpha$ ) coated gold nanodrug (CYT-6091) enhancement of cryosurgery**, Raghav Goel, Univ. of Minnesota; Giulio F. Paciotti, Cytimmune Sciences Inc.; James E. Coad M.D., West Virginia Univ.; John C. Bischof, Univ. of Minnesota. .... [6842B-26]

8:50 am: **Use of gold nanoshells to mediate heating induced perfusion changes in prostate tumors**, Anil Shetty, Andrew M. Elliott, The Univ. of Texas M.D. Anderson Cancer Ctr.; Jon A. Schwartz, James Wang, Nanospectra Biosciences, Inc.; Emilio Esparza-Coss, Sherry Klumpp, Brian Taylor, John D. Hazle, Jason Stafford, The Univ. of Texas M.D. Anderson Cancer Ctr.[6842B-27]

9:10 am: **Validation of a dual reporter system for in vivo heat-mediated HSP70 expression in prostate tumors**, Anil Shetty, Amer Najjar, Andrew M. Elliott, Adam Springer, Jason Stafford, Juri Gelovani, John D. Hazle, The Univ. of Texas M.D. Anderson Cancer Ctr. .... [6842B-28]

9:30 am: **Trehalose as a cryoprotective agent for use during prostate cryoablation**, Tania Schroeder, Suranjan Roychowdhury, Ed Koullick, American Medical Systems. .... [6842B-29]

9:50 am: **A comparative study of complications and outcomes associated with radical retropubic prostatectomy and robot assisted radical prostatectomy**, Matthew T. Gettman M.D., Mayo Clinic. .... [6842B-30]

Coffee Break ..... 10:10 to 10:40 am

### SESSION 7

Room: Conv. Ctr. C3 ..... Sat. 10:40 am to 12:20 pm

#### Applications of Light

Session Chair: **Patrice Jichlinski**, Ctr. Hospitalier Univ. Vaudois (Switzerland); **Nathaniel M. Fried**, The Univ. of North Carolina at Charlotte

10:40 am: **Comparison of treatment modalities for partial nephrectomies without ischemic period: laser, Hydro-Jet and RF**, Tjeerd de Boorder, Arto Boeken Kruger, John H. G. M. Klaessens, Matthijs C. M. Grimbergen, Rudolf M. Verdaasdonk, Univ. Medisch Ctr. Utrecht (Netherlands) .... [6842B-31]

11:00 am: **Comparative study on laser tissue ablation between PV and HPS lasers**, Hyun Wook Kang, David Jebens, Gerald Mitchell, Ed Koullick, American Medical Systems. .... [6842B-32]

11:20 am: **Holmium:YAG versus thulium fiber laser vaporization of prostate tissue**, Andrew L. Casperson, Robert A. Barton, Nicholas J. Scott, Nathaniel M. Fried, The Univ. of North Carolina at Charlotte. .... [6842B-33]

11:40 am: **Mid-term follow-up results of holmium laser enucleation of the prostate (HoLEP) as compared to TURP**, Rainer M. Kuntz M.D., Karin Lehrich, Sascha Ahyai, Auguste-Victoria-Hospital (Germany) .... [6842B-34]

12:00 pm: **Long-term follow-up of holmium laser enucleation of the prostate (HoLEP) as compared with open prostatectomy (OP)**, Rainer M. Kuntz M.D., Karin Lehrich, Sascha Ahyai, Auguste-Victoria-Hospital (Germany) .... [6842B-35]

Lunch/Exhibition Break ..... 12:20 to 1:20 pm

### SESSION 8

Room: Conv. Ctr. C3 ..... Sat. 1:20 to 3:00 pm

#### Fibers, Optics, and Lithotripsy

Session Chair: **Ed Koullick**, American Medical Systems;  
**Rudolf M. Verdaasdonk**, Univ. Medisch Ctr. Utrecht (Netherlands)

1:20 pm: **Intraoperative power measurement of laser fibers during photoselective vaporization of the prostate (PVP) using the 80W KTP Greenlight laser**, Hans-Helge Seifert, Thomas Hermanns, Markus Fatzer, Martin Baumgartner, Univ. Hospital Zürich (Switzerland); Markus W. Sigrist, ETH Zürich (Switzerland); Tullio Sulser, Univ. Hospital Zürich (Switzerland)[6842B-36]

1:40 pm: **Germanium oxide fibers for erbium:YAG and erbium:YSGG contact laser tissue ablation in endourology**, Nicholas J. Scott, Robert A. Barton, Andrew L. Casperson, The Univ. of North Carolina at Charlotte; Alexei Tchapyjnikov, Kenneth H. Levin, Danh C. Tran, Infrared Fiber Systems, Inc.; Nathaniel M. Fried, The Univ. of North Carolina at Charlotte ..... [6842B-37]

2:00 pm: **Optical stimulation of the cavernous nerves in the rat prostate**, Nathaniel M. Fried, The Univ. of North Carolina at Charlotte; Gwen A. Lagoda, Arthur L. Burnett M.D., Johns Hopkins Univ. .... [6842B-38]

2:20 pm: **Optimal pneumatic frequency for the Lithoclast Ultra(r) in a cystolitholapaxy model**, Michael K. Louie, Univ. of California, Irvine Healthcare; Greg J. Lowe, Bodo E. Knudsen, The Ohio State Univ. .... [6842B-39]

2:40 pm: **Comparison of the Lithoclast Ultra(r) And Cyberwand(r) in a cystolitholapaxy model**, Michael K. Louie, Univ. of California, Irvine Healthcare; Greg J. Lowe, Bodo E. Knudsen, The Ohio State Univ. .... [6842B-40]

Coffee Break ..... 3:00 to 3:30 pm

### SESSION 9

Room: Conv. Ctr. C3 ..... Sat. 3:30 to 5:00 pm

#### New Techniques, Imaging, and Fluorescence

Session Chair: **Bodo E. Knudsen**, The Ohio State Univ.;  
**Nathaniel M. Fried**, The Univ. of North Carolina at Charlotte

3:30 pm: **Evaluating the bladder as a portal for natural orifice surgery**, Matthew T. Gettman M.D., Mayo Clinic ..... [6842B-41]

3:50 pm: **Overview of techniques in optical imaging and diagnosis of bladder cancer**, Matthijs C. M. Grimbergen, Univ. Medisch Ctr. Utrecht (Netherlands); Maurice C. G. Aalders, Ton G. C. van Leeuwen, Univ. van Amsterdam (Netherlands) .... [6842B-42]

4:10 pm: **Detection of early bladder carcinoma by fluorescence cystoscopy with Hexvix(r): improvement of the specificity by microcystoscopy (Invited Paper)**, Blaise Lovisa, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Daniela Aymon, Patrice Jichlinski, Ctr. Hospitalier Univ. Vaudois (Switzerland); Hubert van den Bergh, Georges A. Wagnières, Ecole Polytechnique Fédérale de Lausanne (Switzerland) .... [6842B-43]

4:40 pm: **Intracellular uptake and intraspheroidal distribution of hypericin and hydrophilic analogues using E-cadherin transfected T-24 human bladder cancer cells**, Peter A. de Witte, Katholieke Univ. Leuven (Belgium) .... [6842B-44]

### BIOS Hot Topics

Convention Center J1-J4

Saturday 19 January · 7:00 to 9:30 pm

See p. 23 for details.

# Advanced Technology and Instrumentation in Otolaryngology: Lasers, Optics, Radio Frequency, and Related Technology

Conference Chair: **Brian Jet-Fei Wong**, Univ. of California/Irvine; **Justus F. R. Ilgner**, Univ. Hospital Aachen (Germany)

Program Committee: **James Burns**, Massachusetts General Hospital; **Holger Lubatschowksi**, Laser Zentrum Hannover e.V. (Germany); **Udayan K. Shah**, Nemours/Alfred I. duPont Hospital for Children

## Saturday 19 January

### SESSION 10

Room: Conv. Ctr. B1 ..... Sat. 8:30 to 10:10 am

#### Imaging and Surgery for the Middle Ear and Cochlea

Session Chair: **Justus F. R. Ilgner**, Univ. Hospital Aachen (Germany)

8:30 am: **Cochlear anatomy using micro computed tomography (micro CT) imaging**, Nam Keun Kim, Yong-Jin Yoon, Charles R. Steele, Sunil Puria, Stanford Univ. .... [6842C-45]

8:45 am: **Electrografting of nano-polymer layers for biomodification of titanium middle ear prosthesis**, Justus F. R. Ilgner M.D., Univ. Hospital Aachen (Germany); S. Gabriel, Univ. de Liège (Belgium); Martin Westhofen M.D., Univ. Hospital Aachen (Germany). .... [6842C-46]

9:00 am: **Stapes Model using High-Resolution  $\mu$ CT**, Jong Dae Baek, Minyong Shin, Charles R. Steele, Sunil Puria, Stanford Univ. .... [6842C-47]

DISCUSSION ..... 9:15 to 9:20 am

9:20 am: **Cry-TEM and SHG Imaging of Collagen Fiber Layer Orientations in the Tympanic Membrane**, Ryan P. Jackson, Stanford Univ.; William Triffo, Univ. of California/Berkeley; Cara A. Chlebicki, Beckman Laser Institute and Medical Clinic; Tatiana B. Krasieva, Univ. of California/Irvine; Manfred Auer, Univ. of California/Berkeley; Sunil Puria, Stanford Univ. .... [6842C-48]

9:35 am: **Erbium:ZBLAN Fibre Laser for Stapedotomy**, Ryan G. McCaughey, Brian J. Wong M.D., Univ. of California/Irvine. .... [6842C-49]

9:50 am: **Optical coherence tomography as a guide for cochlear implant surgery? (Invited Paper)**, H. W. Pau, T. Just, Univ. Rostock (Germany); Eva Lankenau, Gereon Huettmann, Univ. zu Lübeck (Germany) . . . . [6842C-50]

DISCUSSION ..... 10:05 to 10:10 am

Coffee Break ..... 10:10 to 10:30 am

### SESSION 11

Room: Conv. Ctr. B1 ..... Sat. 10:30 am to 12:20 pm

#### Laryngeal Surgery and Optical Coherence Tomography

Session Chair: **Holger Lubatschowksi**, Laser Zentrum Hannover e.V. (Germany)

10:30 am: **pK technology for tonsillectomy**, Udayan K. Shah M.D., Nemours/Alfred I. duPont Hospital for Children . . . . . [6842C-73]

10:45 am: **Innovative laser based approaches to laryngeal cancer: what an engineer and physicist needs to know**, James Burns, Massachusetts General Hospital . . . . . [6842C-52]

11:00 am: **Office-based laryngoscopy for characterization of human vocal cords using optical coherence tomography**, Kathrin Alexandrov, Medizinische Hochschule Hannover (Germany); Henning Wisweh, Laser Zentrum Hannover e.V. (Germany) and Hannover Medical School (MHH) (Germany); Anne-Kristin Klockow, Siim Sepman, Holger Lubatschowksi, Laser Zentrum Hannover e.V. (Germany) . . . . . [6842C-53]

DISCUSSION ..... 11:15 to 11:20 am

11:20 am: **Endoscopic imaging of the human vocal cords using polarization-sensitive optical coherence tomography**, Ki H. Kim, Gopi N. Maguluri, Milen S. Shishkov, James Burns, James B. Kobler, Steven M. Zeitels, Johannes F. de Boer, Massachusetts General Hospital. . . . . [6842C-54]

11:35 am: **Current applications of flexible fiberoptic OCT: from the clinic to the ICU**, Majestic Tam, A. Sepehr, James M. Ridgway, William B. Armstrong, Zhongping Chen, Brian J. Wong M.D., Univ. of California/Irvine . . . . . [6842C-55]

11:50 am: **OCT of the head, neck, and airway using the Niris system**, Pedram Ghasri, A. Foulad, Chao Li, Majestic Tam, Jorge Perez, Zhongping Chen, William B. Armstrong, Brian J. Wong M.D., Univ. of California/Irvine . . . . . [6842C-56]

DISCUSSION ..... 12:10 to 12:20 pm

Lunch/Exhibition Break. . . . . 12:20 to 1:20 pm

### SESSION 12

Room: Conv. Ctr. B1 ..... Sat. 1:20 to 2:30 pm

#### The Airway and Optical Coherence Tomography

Session Chair: **James Burns**, Massachusetts General Hospital

1:20 pm: **Comprehensive volumetric microscopy of the pulmonary airways using optical frequency domain imaging**, Melissa J. Suter, Benjamin J. Vakoc, Brett E. Bouma, Guillermo J. Tearney, Massachusetts General Hospital . . . . . [6842C-57]

1:35 pm: **Anatomical optical coherence tomography - a safe and effective tool for quantitative long-term monitoring of upper airway size and shape (Invited Paper)**, David D. Sampson, Julian J. Armstrong, Sven Becker, Robert A. McLaughlin, Matthew S. Leigh, The Univ. of Western Australia (Australia); Jennifer H. Walsh, David R. Hillman M.D., Sir Charles Gairdner Hospital (Australia); Peter R. Eastwood, Sir Charles Gairdner Hospital (Australia) and The Univ. of Western Australia (Australia) . . . . . [6842C-58]

2:05 pm: **Significance of optical coherence tomography in the assessment of laryngeal lesions**, Marcel Kraft, Kantonsspital Aarau (Switzerland); Susanne von Gerlach, Justus-Liebig-Univ. Giessen (Germany); Kathrin Lueerssen M.D., Hanover Medical School (Germany); Holger Lubatschowksi, Laser Zentrum Hannover e.V. (Germany); Hiltrud Glanz, Christoph Arens, Justus-Liebig-Univ. Giessen (Germany) . . . . . [6842C-59]

DISCUSSION ..... 2:20 to 2:25 pm

### SESSION 13

Room: Conv. Ctr. A2 ..... Sat. 2:25 to 3:10 pm

#### Photodynamic Therapy

Session Chair: **Brian Jet-Fei Wong**, Univ. of California/Irvine

2:25 pm: **Photodynamic therapy and the treatment of head and neck malignancies (Invited Paper)**, Merrill A. Biel, Univ. of Minnesota. . . . . [6842C-60]

2:55 pm: **Photodynamic therapy of experimental otitis media with effusion**, Chung-Ku Rhee M.D., Dankook Univ. (South Korea); Ruifeng Ge, Qingdao Municipal Hospital (China); Jin-Chul Ahn, Phil-Sang Chung M.D., Dankook Univ. (South Korea). . . . . [6842C-61]

DISCUSSION ..... 3:10 to 3:15 pm

Coffee Break ..... 3:15 to 3:30 pm

**SESSION 14**

**Room: Conv. Ctr. B1 . . . . . Sat. 3:30 to 4:20 pm**

**New Imaging and Diagnostic Technologies**

*Session Chair: Justus F. R. Ilgner, Univ. Hospital Aachen (Germany)*

3:30 pm: **Quantitative Assessment of Superficial Tissues using Modulated Imaging (Invited Paper)**, Anthony J. Durkin, Jae Gwan Kim, Beckman Laser Institute and Medical Clinic; David J. Cuccia, Modulated Imaging, Inc. . . . . [6842C-62]

3:45 pm: **Raman spectroscopy for the detection of laryngeal cancer**, Seng K. Teh, Wei Zheng, National Univ. of Singapore (Singapore); David Jacqueline-Hwang M.D., Singapore General Hospital (Singapore); Zhi W. Huang, National Univ. of Singapore (Singapore) . . . . . [6842C-63]

4:00 pm: **Spectrally encoded confocal microscopy through a handheld probe for the study of pediatric vocal fold development in vivo**, Caroline Boudoux, Ecole Polytechnique de Montréal (Canada) and Wellman Ctr. for Photomedicine; Brett E. Bouma, Dvir Yelin, Milen S. Shishkov, Christopher J. Hartnick, Guillermo J. Tearney, Harvard Medical School . . . . . [6842C-64]

**DISCUSSION . . . . . 4:15 to 4:20 pm**

**SESSION 15**

**Room: Conv. Ctr. B1 . . . . . Sat. 4:20 to 6:15 pm**

**Surgical Applications and New Technologies**

*Session Chair: Udayan K. Shah, Nemours/Alfred I. duPont Hospital for Children*

4:20 pm: **Optical stimulation of the facial nerve - a surgical tool? (Invited Paper)**, Claus-Peter Richter, Northwestern Univ.; Ingo U. Teudt, Univ. Medical Ctr. Hamburg-Eppendorf (Germany); Adam Nevel, Agnella D. Izzo, Joseph T. Walsh, Jr., Northwestern Univ. . . . . [6842C-65]

4:35 pm: **Numerical Model of Needle-Based Cartilage Electro-Mechanical Reshaping**, Dimitry E. Protsenko, Brian J. Wong M.D., Univ. of California/Irvine . . . . . [6842C-66]

4:50 pm: **Calculations of the temperature field during laser septochondrocorrection**, Olga I. Baum, Emil N. Sobol, Natalia N. Vorobieva, Andrey I. Kondyurin, Institute of Laser and Information Technologies (Russia) . . . . . [6842C-67]

5:05 pm: **Nonablative laser induced thermal damage of rabbit trachea using a 1540 nm near-infrared laser**, Yongseok Chae, Beckman Laser Institute and Medical Clinic; Paul K. Holden M.D., Univ. of California/Irvine; Cara A. Chlebicki, Beckman Laser Institute and Medical Clinic; Brian J. Wong M.D., Univ. of California/Irvine and Beckman Laser Institute and Medical Clinic . . . [6842C-68]

**DISCUSSION . . . . . 5:20 to 5:25 pm**

5:25 pm: **Coblation for adenoidectomy**, Udayan K. Shah M.D., Nemours/Alfred I. duPont Hospital for Children . . . . . [6842C-70]

5:40 pm: **Coagulative and ablative characteristics of a novel diode LASER system (1470nm) for endonasal applications**, Christian S. Betz, Miriam Havel, Philip Janda, Andreas Leunig, Ronald Sroka, Ludwig-Maximilians-Univ. München (Germany) . . . . . [6842C-71]

5:55 pm: **Long-term results of Nd:YAG laser submucosal turbinate reduction in contact mode**, Jonas J. H.Park, Martin Westhofen M.D., Justus F. R. Ilgner M.D., Univ. Hospital Aachen (Germany) . . . . . [6842C-72]

**DISCUSSION . . . . . 6:10 to 6:15 pm**

**BIOS Hot Topics**

*Convention Center J1-J4*

**Saturday 19 January • 7:00 to 9:30 pm**

*See p. 23 for details.*



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# Diagnostic and Therapeutic Applications of Light in Cardiology

Conference Chair: **Kenton W. Gregory**, Oregon Medical Laser Ctr.; **Guillermo J. Tearney**, Massachusetts General Hospital

**Saturday 19 January**

## SESSION 16

Room: conv. Ctr. A4 ..... Sat. 8:30 to 10:10 am

### Optical Coherence Tomography

Session Chair: **Evelyn Regar**,

Univ. Medisch Ctr. Rotterdam (Netherlands)

8:30 am: **Dual beam Doppler SDOCT system for zebrafish cardiac study**, Nicusor V. Iftimia, Daniel Hammer, Mircea Mujat, Anthony A. Ferrante, Danthu Vu, Randy Leiter, R. Daniel Ferguson, Physical Sciences Inc. .... [6842D-74]

8:50 am: **Clinical experience with intracoronary optical coherence tomography (OCT) for plaque characterization**, E. Regar, N. Gonzalo, W. J. van der Giessen, P. J. de Jaegere, Patrick W. Serruys, Erasmus Univ. Medical Ctr. (Netherlands) ..... [6842D-75]

9:10 am: **Quantitative analysis on optical properties of human atherosclerosis by using polarization-sensitive optical coherence tomography**, Wen-Chuan Kuo, Ming-Wei Hsiung, National Taiwan Normal Univ. (Taiwan); Jeou-Jong Shyu, Nai-Kuan Chou, National Taiwan Univ. (Taiwan); Po-Nien Yang, National Taiwan Normal Univ. (Taiwan) ..... [6842D-76]

9:30 am: **Intracoronary optical coherence tomography (OCT) for the assessment of biodegradable stents**, E. Regar, N. Gonzalo, W. J. van der Giessen, N. Bruining, G. Sianos, Patrick W. Serruys, Erasmus Univ. Medical Ctr. (Netherlands) ..... [6842D-77]

9:50 am: **Comprehensive optical frequency domain imaging of the coronary arteries in vivo**, Melissa J. Suter, Seok H. Yun, Milen S. Shishkov, Benjamin J. Vakoc, Adrien E. Desjardins, Wang Y. Oh, Ik-Kyung Jang M.D., Massachusetts General Hospital; Sergio Waxman M.D., Lahey Clinic Medical Ctr.; Guillermo J. Tearney M.D., Brett E. Bouma, Massachusetts General Hospital ... [6842D-78]

Coffee Break ..... 10:10 to 10:40 am

## SESSION 17

Room: conv. Ctr. A4 ..... Sat. 10:40 am to 12:20 pm

### Spectroscopy

Session Chair: **Laura Marcu**, Univ. of California/Davis

10:40 am: **Tissue diagnostic system combining time-resolved fluorescence spectroscopy and ultrasound imaging for localization and characterization of atherosclerotic plaques**, Yang Sun, Jesung Park, Douglas N. Stephens, Univ. of California/Davis; Javier A. Jo, Texas A&M Univ.; Lei Sun, Jonathan M. Cannata, Qifa Zhou, Kirk K. Shung, Univ. of Southern California; Laura Marcu, Univ. of California/Davis ..... [6842D-79]

11:00 am: **Biochemical assay of human artery tissue via a single optical fiber with high wavenumber Raman shifted light**, Jonathan Nazemi, James F. Brennan III, Prescient Medical, Inc. .... [6842D-80]

11:20 am: **Differentiation of matrix metalloproteinase expression levels by fluorescence lifetime spectroscopy: a study in human carotid atherosclerotic plaques**, Jennifer E. Phipps, Univ. of California/Davis; Javier A. Jo, Texas A&M Univ.; Michael C. Fishbein, Univ. of California/Los Angeles; Thanassis Papaioannou, Cedars-Sinai Medical Ctr.; Qiying Fang, McMaster Univ. (Canada); J. Dennis Baker, Univ. of California/Los Angeles; Laura Marcu, Univ. of California/Davis. .... [6842D-81]

11:40 am: **Miniaturized Raman catheter for evaluating plaque composition**, Alexandra H. Chau, Jason T. Motz, Joseph A. Gardecki, Massachusetts Institute of Technology; Brett E. Bouma, Guillermo J. Tearney M.D., Massachusetts General Hospital ..... [6842D-82]

12:00 pm: **Optical mechanisms for detection of lipid-rich atherosclerotic plaques by near-infrared spectroscopy**, Edward L. Hull, Craig M. Gardner, Vianna J. Muller, Christopher V. Salvato, Jay D. Caplan, InfraRedx, Inc. .... [6842D-83]

Lunch/Exhibition Break ..... 12:20 to 1:20 pm

## SESSION 18

Room: conv. Ctr. A4 ..... Sat. 1:20 to 3:00 pm

### Novel Techniques for Plaque Characterization

Session Chair: **Guillermo J. Tearney**, Massachusetts General Hospital

1:20 pm: **Optical fiber bundle based laser speckle imaging: optimum bundle parameters for intracoronary atherosclerotic plaque diagnosis**, Amneet Gulati, Massachusetts General Hospital; Seemantini K. Nadkarni, Harvard Medical School; Brett E. Bouma, Guillermo J. Tearney, Massachusetts General Hospital ..... [6842D-84]

1:40 pm: **Clinical multimodal spectroscopy for detecting vulnerable atherosclerotic plaque**, Obrad R. Scepanovic, Kate L. Bechtel, Massachusetts Institute of Technology; Maryann Fitzmaurice M.D., Case Western Reserve Univ.; Arnold Miller, MetroWest Medical Ctr.; Luis H. Galindo, Zoya I. Volynskaya, Ramachandra R. Dasari, Michael S. Feld, Massachusetts Institute of Technology ..... [6842D-85]

2:00 pm: **Optical coherence tomography and Raman spectroscopy investigation atherosclerotic plaques in a Watanabe rabbit model**, Mark D. Hewko, Lin-P'ing Choo-Smith, National Research Council Canada (Canada); Tarek Kashour, Farrukh Hussain, St. Boniface General Hospital (Canada); Elicia M. Kohlenberg, Alex Ko, Marc L. Dufour, Guy Lamouche, Michael G. Sowa, National Research Council Canada (Canada) ..... [6842D-87]

2:20 pm: **Determining strain in vessel layers using optical coherence tomography**, John A. Becker, Muhammad Al-Kaisi, Taner Akkin, Univ. of Minnesota ..... [6842D-88]

2:40 pm: **Laser speckle imaging using optical fiber bundles: implications for the intravascular characterization of atherosclerotic plaque**, Seemantini K. Nadkarni, Harvard Medical School; Amneet Gulati, Brett E. Bouma, Guillermo J. Tearney, Massachusetts General Hospital ..... [6842D-89]

Coffee Break ..... 3:00 to 3:30 pm

## SESSION 19

Room: conv. Ctr. A4 ..... Sat. 3:30 to 4:10 pm

### Optical Monitoring and Therapy

Session Chair: **Kenton W. Gregory**, Oregon Medical Laser Ctr.

3:30 pm: **Optical guidance for RF ablation treatment of heart arrhythmia**, Stavros G. Demos, Lawrence Livermore National Lab.; Shiva Sharareh, Biosense Webster, Inc. .... [6842D-91]

3:50 pm: **Development of novel short-term heating angioplasty: effective dilatation characteristics based on dynamics of thermal denaturation in artery wall**, Natsumi Shimazaki, Eriko Nakatani, Tsunenori Arai, Keio Univ. (Japan). .... [6842D-92]

### BiOS Hot Topics

Convention Center J1-J4

Saturday 19 January · 7:00 to 9:30 pm

See p. 23 for details.



# Optical Techniques in Neurosurgery, Brain Imaging, and Neurobiology

Conference Chair: **Henry Hirschberg**, Univ. of California/Irvine; **Steen J. Madsen**, Univ. of Nevada/Las Vegas

## Saturday 19 January

### SESSION 20

Room: Conv. Ctr. C2 ..... Sat. 8:30 to 10:10 am

#### Intraoperative Monitoring

Session Chair: **Henry Hirschberg**, Univ. of California/Irvine

8:30 am: **Replacing the surgical microscope (Presentation Only)**, Henry Hirschberg M.D., Univ. of California/Irvine and Univ. of Nevada/Las Vegas. .... [6842E-94]

8:50 am: **Sound and volumetric workflow feedback during image guided neurosurgery**, Herke J. Noordmans, Peter A. Woerdeman, Peter W. A. Willems, Jan W. Berkelbach van der Sprenkel, Univ. Medisch Ctr. Utrecht (Netherlands). .... [6842E-95]

9:10 am: **Intraoperative functional brain imaging using laser Doppler**, Theo Lasser, Dimitri Van De Ville, Erica J. Martin-Williams, Antonio Lopez, Pablo Dosil-Rosende, Rainer Leitgeb, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Christoph Hauger, Carl Zeiss AG (Germany); Andrea Szelenyi, Elke Hattingen, Rudiger Gerlach, Andreas Raabe, Johann Wolfgang Goethe- Univ. Frankfurt am Main (Germany). .... [6842E-96]

9:30 am: **Intra-operative delineation of primary brain tumors by time-resolved fluorescence spectroscopy**, Pramod V. Butte, Adam Mamelak, Serguei Bannykh, Cedars-Sinai Medical Ctr.; Javier A. Jo, Texas A&M Univ.; Keith L. Black M.D., Cedars-Sinai Medical Ctr.; Laura Marcu, Univ. of California/ Davis. .... [6842E-97]

9:50 am: **Time-dependent diffuse reflectance spectroscopy for in vivo characterization of pediatric epileptogenic brain lesions**, Sanghoon Oh, Miami Children's Hospital and Florida International Univ.; John Ragheb M.D., Sanjiv Bhatia M.D., David Sandberg M.D., Miami Children's Hospital; Bradley Fernald, Wei-Chiang Lin, Florida International Univ. and Miami Children's Hospital. .... [6842E-98]

Coffee Break ..... 10:00 to 10:40 am

### SESSION 21

Room: Conv. Ctr. C2 ..... Sat. 10:40 am to 12:00 pm

#### Therapy

Session Chair: **Steen J. Madsen**, Univ. of Nevada/Las Vegas

10:40 am: **The effect of motexafin gadolinium on ALA photodynamic therapy in glioma spheroids**, Marlon S. Mathews M.D., Rogelio C. Sanchez, Chung-Ho Sun M.D., Univ. of California/Irvine; Steen J. Madsen M.D., Univ. of Nevada/Las Vegas; Henry Hirschberg M.D., Univ. of California/Irvine [6842E-99]

11:00 am: **Targeted opening of the blood brain barrier by ALA mediated PDT**, Henry Hirschberg M.D., Univ. of California/Irvine; Michelle Zhang, David Chighvinadze, Univ. of Nevada/Las Vegas; Qian Peng, The Norwegian Radium Hospital (Norway); Steen J. Madsen, Univ. of Nevada/Las Vegas. . . [6842E-100]

11:20 am: **Monitoring Pc 4-mediated Photodynamic Therapy of U87 Tumors with Dynamic Contrast Enhanced-Magnetic Resonance Imaging (DCE-MRI) in the Athymic Nude Rat**, Davood Varghai M.D., Kelly Covey, Rahul Sharma, Nathan M. Cross, Denise K. Feyes, Nancy L. Oleinick, Chris A. Flask, David Dean, Case Western Reserve Univ. .... [6842E-101]

11:40 am: **Laser-assisted endoscopic third ventriculostomy: successful procedural and long-term results in a series of 202 patients**, Rudolf M. Verdaasdonk, Janneke v. Beijnum, Kathelijin Fischer, Univ. Medisch Ctr. Utrecht (Netherlands); Peter Vandertop, Academisch Medisch Ctr. (Netherlands); Patrick Hanlo, Univ. Medisch Ctr. Utrecht (Netherlands) ..... [6842E-102]

Lunch/Exhibition Break ..... 12:00 to 2:00 pm

### SESSION 22

Room: Conv. Ctr. C2 ..... Sat. 2:00 to 2:40 pm

#### Neuroimaging I

Session Chair: **Henry Hirschberg**, Univ. of California/Irvine

1:40 pm: **Evaluation of a novel gadolinium-based contrast agent for intraoperative magnetic resonance imaging**, Steen J. Madsen, Univ. of Nevada/Las Vegas and Consultant; Genevieve N. Wu, Univ. of California/Los Angeles; Henry Hirschberg M.D., Univ. of California/Irvine and Univ. of Nevada/Las Vegas ..... [6842E-104]

2:00 pm: **Second-Generation Non-Invasive Laser Technology for Early Detection of Alzheimer's Disease**, Anca Mocofanescu, Juliet A. Moncaster, Joy Ghosh, Mark Burton, Brigham and Women's Hospital; William E. Klunk, Chester A. Mathis, Univ. of Pittsburgh; John I. Clark, Univ. of Washington; Robert H. Webb, Schepens Eye Research Institute; Lee E. Goldstein, Brigham and Women's Hospital ..... [6842E-105]

2:20 pm: **Low-frequency noise characterization of near-IR VCSELs for functional brain imaging**, Thomas T. Lee, Paul G. Lim, James S. Harris, Jr., Krishna V. Shenoy, Stephen J. Smith, Stanford Univ. .... [6842E-106]

#### Posters-Saturday

Room: Conv. Ctr. C2 ..... Sat. 3:00 to 3:30 pm

Posters will be placed on display from Saturday morning. Authors will be present to discuss their posters during the Saturday afternoon coffee break.

Poster authors: Please put up your posters before the conference or during the Saturday morning coffee break.

**Functional brain imaging using combined NIRS-EEG system**, Dong-Su Ho, Kiwoon Kwon, Seungduk Lee, Gi-Yun Eom, Beop-Min Kim, Yonsei Univ. (South Korea) ..... [6842E-103]

Coffee Break ..... 3:00 to 3:30 pm

### SESSION 23

Room: Conv. Ctr. C2 ..... Sat. 3:30 to 4:50 pm

#### Neuroimaging II

Session Chair: **Steen J. Madsen**, Univ. of Nevada/Las Vegas

3:30 pm: **Using NIR spatial illumination for mapping chromophores during cerebral edema**, David Abookasis, Marlon S. Mathews M.D., Christopher M. Owen M.D., Devin K. Binder, Mark E. Linskey M.D., Ron D. Frostig, Univ. of California/Irvine; Bruce J. Tromberg, Beckman Laser Institute and Medical Clinic ..... [6842E-107]

3:50 pm: **Optical measurements of transient structural changes in squid giant axons during conduction**, Aarthi Sivaprakasam, Univ. of Minnesota; David Landowne, Univ. of Miami; Taner Akkin, Univ. of Minnesota. . [6842E-108]

4:10 pm: **Simultaneous measurements of electric and hemodynamic signals on rat brain induced by whisker stimulation**, Seungduk Lee, Kiwoon Kwon, Dong-Su Ho, Gi-Yun Eom, Beop-Min Kim, Yonsei Univ. (South Korea); Hyun J. Lee, Yiran Lang, Hyun Heo, Hyung-Cheul Shin, Hallym Univ. (South Korea) ..... [6842E-109]

4:30 pm: **Optical detection of action potential propagation using spectral-domain optical coherence tomography**, Boris H. Park, Massachusetts General Hospital; Christopher L. Passaglia, Boston Univ.; Johannes F. de Boer, Massachusetts General Hospital ..... [6842E-110]

**BIOS Hot Topics**  
 Convention Center J1-J4  
**Saturday 19 January · 7:00 to 9:30 pm**  
 See p. 23 for details.

# Lasers in Dentistry XIV

Conference Chair: **Peter Rechmann**, Univ. of California/San Francisco; **Daniel Fried**, Univ. of California/San Francisco

Program Committee: **Gregory B. Altshuler**, Palomar Medical Technologies, Inc.; **Tatjana Dostálová**, Charles Univ. in Prague (Czech Republic); **John D. B. Featherstone**, Univ. of California/San Francisco; **David M. Harris**, Bio-Medical Consultants, Inc.; **G. Lynn Powell**, The Univ. of Utah; **Joel M. White**, Univ. of California/San Francisco; **Harvey A. Wigdor**, Advocate Illinois Masonic Medical Ctr.

## Sunday 20 January

### SESSION 1

Room: Conv. Ctr. C1 ..... Sun. 8:30 to 11:40 am

#### Lasers in Caries Prevention and Treatment

Session Chair: **Daniel Fried**, Univ. of California/San Francisco

8:30 am: **Bovine dentin ablation using an MIR-FEL at the wavelength of 6.05 um**, Manabu Heya, Graduate School for Creation of New Photonics Industries (Japan); Kazushi Yoshikawa, Osaka Dental Univ. (Japan); Junji Kato D.D.S., Tokyo Dental College (Japan) ..... [6843-01]

8:50 am: **Characteristics of modified fiber tips for root canal treatment with Er laser systems: a study using ray tracing, high speed imaging, and thermal imaging techniques**, Rudolf M. Verdaasdonk, Univ. Medisch Ctr. Utrecht (Netherlands); Jan W. Blanken, Academisch Medisch Ctr. (Netherlands); Rowland de Roode, Herke J. Noordmans, Univ. Medisch Ctr. Utrecht (Netherlands) ..... [6843-02]

9:10 am: **Laser radiation bracket debonding**, Tatjana Dostálová M.D., Charles Univ. in Prague (Czech Republic); Helena Jelinkova, Jan Šulc D.D.S., Czech Technical Univ. in Prague (Czech Republic); Petr Koranda, Czech Technical Univ. (Czech Republic); Michal Nemeč, Czech Technical Univ. in Prague (Czech Republic); Jaroslav Racek, Charles Univ. in Prague (Czech Republic); Mitsunobu Miyagi, Sendai National College of Technology (Japan) ..... [6843-03]

9:30 am: **Changes in acid resistance of dentin irradiated by CW 10.6 μm CO<sub>2</sub> laser**, John D. B. Featherstone, Univ. of California/San Francisco; Dennis Hsu, Univ. of California San Francisco; Charles Q. Le, Saman Manesh, Daniel Fried, Univ. of California/San Francisco ..... [6843-04]

9:50 am: **Nanomechanical properties of dentin treated with a CO<sub>2</sub> laser for potential caries inhibition**, Stefan Habelitz, Univ. of California San Francisco; Daniel Fried, Charles Q. Le, John D. B. Featherstone, Univ. of California/San Francisco ..... [6843-05]

Coffee Break ..... 10:10 to 10:40 am

10:40 am: **Inhibition of caries in vital teeth by CO<sub>2</sub> laser treatment**, Peter Rechmann D.D.S., Daniel Fried, Charles Q. Le, Gerald Nelson, Marcia L. Rapozo-Hilo, Beate Rechmann, John D. B. Featherstone, Univ. of California/San Francisco ..... [6843-06]

11:00 am: **Ablation of dental hard tissues with a microsecond pulsed carbon dioxide laser operating at 9.3-μm with an integrated scanner**, Shlomo Assa, Steven Meyer, Daniel Fried, Univ. of California/San Francisco ..... [6843-07]

11:20 am: **Repairing method of fixed partial prostheses in dentistry: laser welding**, Meda Negrutiu, Cosmin G. H. Sinescu M.D., Univ. de Medicina si Farmacie Victor Babes, Timisoara (Romania); Dalibor Cozarov, Dali's Dentech (Romania); Laurentiu Culea, Politehnica Univ. Timisoara (Romania); Mihai Rominu, Daniela Pop, Univ. de Medicina si Farmacie Victor Babes, Timisoara (Romania) ..... [6843-08]

### POSTER POPS-Sunday

Room: Conv. Ctr. C1 ..... Sun. 11:40 am to 12:30 pm

Session Chair: **Peter Rechmann**, Univ. of California/San Francisco

Authors of the following posters will give a 3-minute overview of their posters using up to 3 vu-graphs. Posters will be on display in the hallway near the meeting room. Posters will be viewed at the conclusion of this session from 11:55-12:30.

Poster authors: please put up your poster before the conference or during the morning coffee break. Posters must be removed from the boards immediately following the conference. Any posters left on the boards following the session will be considered unwanted and will be discarded.

**Quality of linear incisions performed by dental students using Er:YAG laser in soft tissue**, Luciana Correa, Mayra T. Vasques, Moacyr Novelli, Ana Cecilia Aranha, Univ. of Sao Paulo (Brazil); Daiane T. Meneguzzo, Univ. de São Paulo (Brazil) ..... [6843-09]

**Selective laser ablation of natural occlusal caries using PS-OCT and a CO<sub>2</sub> laser**, You-Chen Tao, Daniel Fried, Univ. of California/San Francisco. [6843-10]

**Lack of dentin acid resistance following 9.3 μm CO<sub>2</sub> laser irradiation**, Charles Q. Le, Daniel Fried, John D. B. Featherstone, Univ. of California/San Francisco ..... [6843-11]

### SESSION 2

Room: Conv. Ctr. C1 ..... Sun. 2:00 to 4:50 pm

#### Lasers in Imaging and Diagnostics

Session Chair: **Peter Rechmann**, Univ. of California/San Francisco

2:00 pm: **Evaluating caries development and repair by OCT and polarized Raman spectroscopy**, Lin-P'ing Choo-Smith, Carl Durand, National Research Council Canada (Canada); Raymond Zhu, Kamil Gibrayel, Univ. of Manitoba (Canada); Dan P. Popescu, Mark D. Hewko, Michael G. Sowa, National Research Council Canada (Canada) ..... [6843-12]

2:20 pm: **Laser-induced photothermal technique used for detection of caries human tooth**, Ashraf F. El-Sherif, Military Technical College (Egypt) ..... [6843-13]

2:40 pm: **Thermographic analysis of surface damage in teeth**, Mario A. Conde-Contreras, Jose Bante-Guerra, Ctr. de Investigación y de Estudios Avanzados (Mexico); Edgar I. Hernandez-Garcia, Univ. Autónoma de Yucatán (Mexico); Patricia Quintana, Juan J. Alvarado-Gil, Ctr. de Investigación y de Estudios Avanzados (Mexico) ..... [6843-14]

3:00 pm: **Dynamic cure measurement of dental polymer composites using optical coherence tomography**, Peter H. Tomlins, National Physical Lab. (United Kingdom); Will M. Palin, Adrian C. Shortall, The Univ. of Birmingham (United Kingdom) ..... [6843-15]

Coffee Break ..... 3:20 to 3:50 pm

3:50 pm: **Dental scanning in cad/cam technologies: laser beams**, Cosmin G. H. Sinescu M.D., Meda Negrutiu, Univ. de Medicina si Farmacie Victor Babes, Timisoara (Romania); Nicolae Faur, Radu Negru, Politehnica Univ. Timisoara (Romania); Mihai Rominu, Univ. de Medicina si Farmacie Victor Babes, Timisoara (Romania); Dalibor Cozarov, Dali's Dentech (Romania) ..... [6843-16]

4:10 pm: **Optical coherence tomography for endodontic imaging**, Gijs van Soest, Erasmus Univ. Medical Ctr. (Netherlands); Hagay Shemesh, Min-Kai Wu, Luc van der Sluis, Paul Wesselink, Academisch Ctr. Tandheelkunde Amsterdam (Netherlands) ..... [6843-17]

4:30 pm: **Near-IR imaging of Er:YAG laser ablation with a water spray**, Cynthia L. Darling, Marie E. Maffei, Daniel Fried, Univ. of California/San Francisco ..... [6843-18]

**POSTER POPS-Sunday****Room: Conv. Ctr. C1 . . . . . Sun. 4:50 to 5:45 pm***Session Chair: Daniel Fried, Univ. of California/San Francisco*

Authors of the following posters will give a 3-minute overview of their posters using up to 3 vu-graphs. Posters will be on display in the hallway near the meeting room. Posters will be viewed at the conclusion of this session from 5:20-5:45.

*Poster authors: please put up your poster before the conference or during the morning coffee break. Posters must be removed from the boards immediately following the conference. Any posters left on the boards following the session will be considered unwanted and will be discarded.*

- Wavelet data analysis of micro-Raman spectra for oral pathologies diagnosis**, Carlo Camerlingo, Consiglio Nazionale delle Ricerche (Italy); Flora Zenone, Univ. degli Studi di Napoli Federico II (Italy); Giovanni M. Gaeta D.D.S., Seconda Univ. degli Studi di Napoli (Italy); Giuseppe Perna, Vito Capozzi, Univ. di Foggia (Italy); Maria Lepore, Seconda Univ. degli Studi di Napoli (Italy) . . . . . [6843-19]
- Occlusal caries detection using polarized Raman spectroscopy**, Iulian G. Ionita, Univ. din Bucuresti (Romania); Alain Bulou, Univ. du Maine (France) . . . . . [6843-21]
- Imaging natural and simulated root caries lesions with PS-OCT**, Saman Manesh, Cynthia L. Darling, Daniel Fried, Univ. of California/San Francisco. . . . . [6843-22]
- Imaging laser irradiated enamel surfaces with PS-OCT**, Dennis Hsu, Univ. of California San Francisco; Anna Can, Cynthia L. Darling, Daniel Fried, Univ. of California/San Francisco . . . . . [6843-23]
- Spectrophotometric measurements of color shade guides**, Priscila P. Portero, Univ. Estadual Paulista (Brazil); Fernando L. E. Florez D.D.S., Univ. de São Paulo (Brazil); Ticiane C. Fagundes, Univ. of Sao Paulo (Brazil); Osmir B. Oliveira, Jr., Univ. Estadual Paulista (Brazil) . . . . . [6843-24]
- In vitro investigation of the influence of three colored bleaching gels on the light absorption in dental whiteness by digital image**, F. L. E. Florez, Univ. de São Paulo (Brazil) and Univ. Estadual Paulista (Brazil); L. T. Moriyama, Univ. de São Paulo (Brazil); P. P. Portero, O. B. Oliveira, Jr., Univ. Estadual Paulista (Brazil); V. S. Bagnato, Univ. de São Paulo (Brazil) . . . . . [6843-25]
- Microleakage in dentistry: new methods for investigation the gaps in biomaterials interfaces**, Cosmin G. H. Sinescu M.D., Meda Negrutiu, Univ. de Medicina si Farmacie Victor Babes, Timisoara (Romania); Gheorghe Draganescu, Politehnica Univ. Timisoara (Romania); Carmen C. Todea, Dorin Dodenciu, Zeno Florita, Daniela Pop, Univ. de Medicina si Farmacie Victor Babes, Timisoara (Romania) . . . . . [6843-26]
- Microspectral analysis with laser in microleakage evaluation between infrastructure and veneer materials in fixed partial dentures**, Meda Negrutiu, Cosmin G. H. Sinescu M.D., Univ. de Medicina si Farmacie Victor Babes, Timisoara (Romania); Gheorghe Draganescu, Politehnica Univ. Timisoara (Romania); Carmen C. Todea D.D.S., Dorin Dodenciu, Roxana Rominu, Univ. de Medicina si Farmacie Victor Babes, Timisoara (Romania) . . . . . [6843-27]
- Complete denture analyzed by optical coherence tomography**, Meda Negrutiu, Cosmin G. H. Sinescu M.D., Carmen C. Todea D.D.S., Univ. de Medicina si Farmacie Victor Babes, Timisoara (Romania); Adrian G. Podoleanu, Univ. of Kent (United Kingdom). . . . . [6843-28]
- The Er:YAG laser ablation rate and efficiency of enamel and dentin with varying pulse duration from 30- $\mu$ s to 300- $\mu$ s**, Cuong Ho, Univ. of California, San Francisco; Daniel Fried, Univ. of California/San Francisco . . . . . [6843-29]

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# Ophthalmic Technologies XVIII

Conference Chairs: **Fabrice Manns**, Univ. of Miami; **Per G. Söderberg**, St Erik's Eye Hospital (Sweden); **Arthur Ho**, Institute for Eye Research (Australia)

Program Committee: **Rafat R. Ansari**, NASA Glenn Research Ctr.; **Michael Belkin**, Tel Aviv Univ. (Israel); **Ralf Brinkmann**, Univ. zu Lübeck (Germany); **Wolfgang Drexler**, Cardiff Univ. (United Kingdom); **Pier Giorgio Gobbi**, Univ. degli Studi di Milano (Italy); **Benedikt J. Jean**, Eberhard-Karls-Univ. Tuebingen (Germany); **Karen Margaret Joos**, Vanderbilt Univ.; **Katsuhiko Kobayashi**, Topcon Corp. (Japan); **Ezra I. Maguen**, Cedars-Sinai Medical Ctr.; **Peter J. Milne**, National Science Foundation; **Michael C. Mrochen**, ETH Zürich (Switzerland); **Daniel V. Palanker**, Stanford Univ. Medical Ctr.; **Jean-Marie A. Parel**, Univ. of Miami Medical School; **Luigi L. Rovati**, Univ. of Modena (Italy); **Jerry Sebag**, Univ. of Southern California; **Peter Soliz**, ORION International Technologies, Inc.; **William B. Telfair**, IRIDEX Corp.; **Valery V. Tuchin**, Saratov State Univ. (Russia)

*SPIE and the organizers gratefully acknowledge the following sponsor of the keynote lecture featured as a part of the Ophthalmic Technologies conference:*

**Swedish Ophthalmological Society,  
resident optics course, through the  
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## Saturday 19 January

### SESSION 1

Room: Conv. Ctr. A7/A8 ..... Sat. 8:30 to 9:30 am

#### Ophthalmic Imaging I: Animal Models

Session Chair: **Wolfgang Drexler**, Cardiff Univ. (United Kingdom); **Luigi L. Rovati**, Univ. degli Studi di Modena (Italy)

8:30 am: **In-vivo imaging of raptor retina with ultra high resolution spectral domain optical coherence tomography**, Marco Ruggeri, James C. Major, Jr., Craig McKeown, Hassan M. Wehbe, Shuliang Jiao, Carmen A. Puliafito, Univ. of Miami School of Medicine. .... [6844A-01]

8:45 am: **Multimodal optic nerve head imaging of the tree shrew**, Yih Chung Tham, Boris Povazay, Julie Albon, Bernd Hofer, Angelika Unterhuber, Boris Hermann, Cardiff Univ. (United Kingdom); Glen Jeffery, Univ. College London (United Kingdom); James E. Morgan, Wolfgang Drexler, Cardiff Univ. (United Kingdom) ..... [6844A-02]

9:00 am: **A sensorless adaptive optics scanning laser ophthalmoscope for mice**, David P. Biss, Schepens Eye Research Institute; Yaopeng Zhou, Wellman Ctr. for Photomedicine; Thomas G. Bifano, Boston Univ.; Robert H. Webb, Schepens Eye Research Institute; Charles P. Lin, Wellman Ctr. for Photomedicine ..... [6844A-03]

9:15 am: **A compact fundus camera for mouse retinal imaging**, Omer P. Kocaoglu, Univ. of Miami; Jean-Marie Parel, Bascom Palmer Eye Institute; Eleut Hernandez, Univ. of Miami Medical School; Fabrice Manns, Univ. of Miami. .... [6844A-04]

### SESSION 2

Room: Conv. Ctr. A7/A8 ..... Sat. 9:30 to 10:30 am

#### Ophthalmic Imaging II: Adaptive Optics

Session Chair: **Katsuhiko Kobayashi**, Topcon Corp. (Japan); **Peter Soliz**, ORION International Technologies, Inc.

9:30 am: **Methods of isoplanatic patch widening in human eye retina imaging**, Alexander Dubinin, Tatyana Cherezova, M.V. Lomonosov Moscow State Univ. (Russia); Alexis Kudryashov, Moscow State Open Univ. (Russia) ..... [6844A-05]

9:45 am: **Towards isotropic ultrahigh-resolution optical coherence tomography with pancorrection**, Cristiano Torti, Cardiff Univ. (United Kingdom); Enrique J. Fernández, Univ. de Murcia (Spain); Boris Hermann, Bernd Hofer, Boris Povazay, Angelika Unterhuber, Cardiff Univ. (United Kingdom); Peter Ahnelt, Medizinische Univ. Wien (Austria); Wolfgang Drexler, Cardiff Univ. (United Kingdom). .... [6844A-06]

10:00 am: **Ultra-high resolution adaptive optics: optical coherence tomography for in vivo imaging of healthy and diseased retinal structures**, Robert J. Zawadzki, Univ. of California/Davis Medical Ctr.; Yan Zhang II, Indiana Univ.; Steven M. Jones, Lawrence Livermore National Lab.; Stacey S. Choi, Univ. of California/Davis Medical Ctr.; Barry Cense, Indiana Univ.; Julia W. Evans, Lawrence Livermore National Lab.; Donald T. Miller, Indiana Univ.; Scot S. Olivier, Lawrence Livermore National Lab.; John S. Werner, Univ. of California/Davis Medical Ctr. .... [6844A-07]

10:15 am: **Novel perspectives on vitreo-maculopathies revealed by combined OCT-SLO imaging**, Jerry Sebag M.D., Univ. of Southern California ..... [6844A-58]

Coffee Break ..... 10:30 to 10:45 am

### SESSION 3

Room: Conv. Ctr. A7/A8 ..... Sat. 10:45 am to 12:00 pm

#### Optical Coherence Tomography I: Instrumentation and Image Processing

Session Chair: **Per G. Söderberg**, St Erik's Eye Hospital (Sweden); **Ralf Brinkmann**, Univ. zu Lübeck (Germany)

10:45 am: **Three dimensional tracker for ophthalmic imaging using spectral-domain optical coherence tomography**, Gopi N. Maguluri, Mircea Mujat, Boris H. Park, Ki H. Kim, Wei Sun, Massachusetts General Hospital; Nicusor V. Iftimia, R. Daniel Ferguson, Daniel X. Hammer, Physical Sciences Inc.; Johannes F. de Boer, Massachusetts General Hospital ..... [6844A-08]

11:00 am: **Texture analysis based segmentation for 3D OCT**, Vedran Kajic, Gavin Powell, Boris Hermann, Yaiza Garcia-Sanchez, Bernd Hofer, Boris Povazay, Angelika Unterhuber, David Marshall, Paul Rosin, Wolfgang Drexler, Cardiff Univ. (United Kingdom) ..... [6844A-09]

11:15 am: **Improved representation of retinal data acquired with volumetric Fd-OCT: co-registration, visualization and reconstruction of a large field of view**, Robert J. Zawadzki, Univ. of California/Davis Medical Ctr.; Alfred R. Fuller, Univ. of California/Davis; Stacey S. Choi, Univ. of California/Davis Medical Ctr.; David F. Wiley, Bernd Hamann, Univ. of California/Davis; John S. Werner, Univ. of California/Davis Medical Ctr. .... [6844A-10]

11:30 am: **Fast Detection and Segmentation of Drusen in Retinal Optical Coherence Tomography Images**, Sina Farsi, Stephanie J. Chiu, Joseph A. Izatt, Duke Univ.; Cynthia A. Toth M.D., Duke Univ. Medical Ctr. .... [6844A-11]

11:45 am: **Minimum distance mapping using volumetric OCT: a novel indicator for early glaucoma diagnosis**, Boris Povazay, Bernd Hofer, Boris Hermann, Angelika Unterhuber, Cardiff Univ. (United Kingdom); Carl Glittenberg, Susanne Binder, Ludwig Boltzmann Institut (Austria); James Morgan, Wolfgang Drexler, Cardiff Univ. (United Kingdom) ..... [6844A-12]

**SESSION 4**

**Room: Conv. Ctr. A7/A8 . . . . . Sat. 12:00 to 1:00 pm**

**Keynote Lecture**

*Session Chair: Per G. Söderberg, St Erik's Eye Hospital (Sweden)*

12:00 pm: **Keynote: Technology needs for tomorrow's treatment and diagnosis of retinal diseases**, Gisèle Soubrane M.D., Univ. Paris (France) . . . . . [6844A-13]

Lunch/Exhibition Break . . . . . 1:00 to 2:15 pm

**SESSION 5**

**Room: Conv. Ctr. A7/A8 . . . . . Sat. 2:15 to 3:30 pm**

**Ophthalmic Imaging III: Functional Imaging**

*Session Chairs: Rafat R. Ansari, The Univ. of Texas School of Health Information Sciences at Houston; Jerry Sebag, Univ. of Southern California*

2:15 pm: **Improved diagnostics by automated matching and enhancement of dynamic fundus images during fluorescein angiography**, Herke Jan Noordmans, Pieter R. v. d.Biesen, Rowland d. Roode, Rudolf M. Verdaasdonk, Univ. Medisch Ctr. Utrecht (Netherlands) . . . . . [6844A-14]

2:30 pm: **Optical imaging of the retina in response to the electrical stimulation**, Takashi Fujikado, Yoshitaka Okawa M.D., Tomomitsu Miyoshi M.D., Osaka Univ. (Japan); Toshifumi Mihashi, Yoko Hirohara, Topcon Corp. (Japan); Yauo Tano M.D., Osaka Univ. (Japan) . . . . . [6844A-15]

2:45 pm: **Frequency encoded optical assessment of human retinal physiology**, Rainer A. Leitgeb, Ecole Polytechnique Fédérale de Lausanne (Switzerland) and Medizinische Univ. Wien (Austria); Roland Michaely, Adrian H. Bachmann, Tilman Schmolli, Theo Lassner, Christoph Pache, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [6844A-16]

3:00 pm: **Mapping of photoreceptor dysfunction using high resolution, three-dimensional spectral optical coherence tomography**, Bartosz Sikorski, Maciej Szkulmowski, Jakub J. Kaluzny, Tomasz Bajraszewski, Andrzej Kowalczyk, Maciej Wojtkowski, Univ. Mikolaja Kopernika (Poland) . . . . . [6844A-17]

3:15 pm: **Retinal blood flow analysis using joint spectral and time domain optical coherence tomography**, Anna Szkulmowska, Maciej Szkulmowski, Tomasz Bajraszewski, Andrzej Kowalczyk, Maciej Wojtkowski, Univ. Mikolaja Kopernika (Poland) . . . . . [6844A-18]

Coffee Break . . . . . 3:30 to 4:400 pm

**SESSION 6**

**Room: Conv. Ctr. A7/A8 . . . . . Sat. 4:00 to 6:00 pm**

**Visual Optics and Biometry**

*Session Chairs: Ezra I. Maguen, American Eye Institute; William B. Telfair, IRIDEX Corp.*

4:00 pm: **Improved sensitivity measurement of the human eye length in vivo with Fourier domain optical coherence tomography**, Branislav Grajciar, Adolf F. Fercher, Christoph K. Hitzenberger, Michael Pircher, Medizinische Univ. Wien (Austria) . . . . . [6844A-19]

4:15 pm: **Wavefront aberrations in peripheral vision**, Yaiza Garcia-Sanchez, Cristiano Torti, Boris Povazay, Boris Hermann, Jonathan T. Erichsen, Wolfgang Drexler, Cardiff Univ. (United Kingdom) . . . . . [6844A-20]

4:30 pm: **Depth of focus of accommodating intra-ocular lenses: paraxial optics analysis**, Arthur Ho, Institute for Eye Research (Australia) . . . . . [6844A-21]

4:45 pm: **Mechanical properties of intra-ocular lenses**, Klaus Ehrmann, Vision CRC (Australia) and Institute for Eye Research Ltd. (Australia) and Univ. of New South Wales (Australia); Eon Kim, Vision CRC (Australia) and Institute for Eye Research (Australia); Jean-Marie A. Parel, Vision CRC (Australia) and Univ. of Miami Medical School and Univ. of Liege (Belgium) . . . . . [6844A-59]

5:00 pm: **Typical crosscorrelation between two eyes was found in fluctuation of accommodation but not in aberrations.**, Toshifumi Mihashi, Mariko Kobayashi, Yoko Hirohara, Topcon Corp. (Japan) . . . . . [6844A-22]

5:15 pm: **Profile of the whole ex-vivo human crystalline lens**, Raksha Urs, David Borja, Jared Smith, Fabrice Manns, Bascom Palmer Eye Institute and Univ. of Miami; Jean-Marie A. Parel, Bascom Palmer Eye Institute . . . . . [6844A-23]

5:30 pm: **Changes in lens shape and power of ex vivo monkey crystalline lenses during simulated accommodation**, David Borja, Stephen R. Uhlhorn, Bascom Palmer Eye Institute and Univ. of Miami; Esdras Arrieta-Quintero M.D., Bascom Palmer Eye Institute; Fabrice Manns, Univ. of Miami and Bascom Palmer Eye Institute; Klaus Ehrmann, Univ. of New South Wales (Australia); Arthur Ho, Institute for Eye Research (Australia); Jean-Marie Parel, Univ. of Miami Medical School and Bascom Palmer Eye Institute. . . . . [6844A-24]

5:45 pm: **The role of the anterior zonules in non-human primates during simulated accommodation**, Derek D. Nankivil, Noël Ziebarth, David Borja, Esdras Arrieta-Quintero, Bascom Palmer Eye Institute; Arthur Ho, Institute for Eye Research (Australia); Fabrice Manns, Univ. of Miami; Jean-Maire Parel, Bascom Palmer Eye Institute . . . . . [6844A-25]

**BIOS Hot Topics**  
*Convention Center J1-J4*  
**Saturday 19 January • 7:00 to 9:30 pm**  
*See p. 23 for details.*

**Sunday 20 January**

**SESSION 7**

**Room: Conv. Ctr. A7/A8 . . . . . Sun. 8:30 to 9:45 am**

**Ophthalmic Tissue Optics and Light-Tissue Interactions**

*Session Chairs: Ralf Brinkmann, Univ. zu Lübeck (Germany); William B. Telfair, IRIDEX Corp.*

8:30 am: **In vivo measurement of optical attenuation coefficients**, Daniel M. de Bruin, Dirk J. Faber, Harry de Vries, Frank D. Verbraak, Ton G. C.van Leeuwen, Univ. van Amsterdam (Netherlands) . . . . . [6844A-26]

8:45 am: **Refractive Index Measurement of the Crystalline Lens Using Optical Coherence Tomography**, Stephen R. Uhlhorn, David Borja, Fabrice Manns, Jean-Marie Parel, Bascom Palmer Eye Institute . . . . . [6844A-27]

9:00 am: **Fs-lentotomy: first in vivo studies on rabbit eyes with a 100 kHz laser system**, Silvia Schumacher, Laser Zentrum Hannover e.V. (Germany); Uwe Oberheide, Laserforum Koln e.V. (Germany); Michael Fromm, Wolfgang A. Ertmer, Laser Zentrum Hannover e.V. (Germany); Georg Garten, Laserforum Koln e.V. (Germany); Holger Lubatschowski, Laser Zentrum Hannover e.V. (Germany) . . . . . [6844A-28]

9:15 am: **Laser parameters, focusing optics, and side effects in femtosecond laser corneal surgery**, Karsten Plamann, Valeria Nuzzo, Donald A. Peyrot, Florent Deloison, Ecole Nationale Supérieure de Techniques Avancées (France); Michèle Savoldelli, Jean-Marc Legeais, Hôpital Hôtel Dieu (France) . . . . . [6844A-29]

9:30 am: **Detection of intracellular cavitation during selective targeting of the retinal pigment epithelium with a laser scanner**, Clemens Alt, Harvard Medical School; Ho Lee, Kyungpook National Univ. (South Korea); Costas M. Pitsillides, Charles P. Lin, Massachusetts General Hospital. . . . . [6844A-30]

**SESSION 8**

**Room: Conv. Ctr. A7/A8 . . . . . Sun. 9:45 to 11:30 am**

**Ocular Surgery and Therapy**

*Session Chairs: Karen Margaret Joos, Vanderbilt Univ.; Arthur Ho, Institute for Eye Research (Australia)*

9:45 am: **Minimally-traumatic retinal photocoagulation**, Daniel V. Palanker, Yannis M. Paulus, Atul Jain, Philip Huie, Stanford Univ. Medical Ctr.; Dan Andersen, OptiMedica Corp.; Boris Stanzel, Michael F. Marmor, Mark S. Blumenkranz, Stanford Univ. Medical Ctr. . . . . [6844A-31]

10:00 am: **UV-crosslinking of the cornea: techniques and safety**, Michael Bueeler, Michael Mrochen, Institut für Refraktive & Ophthalmolo-Chirurgie (Switzerland); Eberhard Spoerl, Univ. Hospital Carl Gustav Carus Dresden (Germany); Theo Seiler, Institut für Refraktive & Ophthalmolo-Chirurgie (Switzerland) . . . . . [6844A-32]

Coffee Break . . . . . 10:15 to 10:45 am

# Conference 6844A

10:45 am: **Second harmonic generation imaging of riboflavin-UVA-induced cross-linking in bovine cornea**, Hsien-Chung Lee, National Taiwan Univ. (Taiwan); Hsin-Yuan Tan, Chang Gung Memorial Hospital (Taiwan); Ming-Guo Lin, Yuh-Ling Chang, National Taiwan Univ. (Taiwan); Sung-Jan Lin, Shiou-Hwa Jee, National Taiwan Univ. Hospital (Taiwan); Chen-Yuan Dong, National Taiwan Univ. (Taiwan) ..... [6844A-33]

11:00 am: **Combining femtosecond laser ablation and diode laser welding**, Roberto Pini, Francesca Rossi, Istituto di Fisica Applicata Nello Carrara (Italy); Luca Menabuoni, Ivo Lenzetti, Azienda USL 4 (Italy); Sonia H. Yoo, Jean-Marie Parel, Univ. of Miami School of Medicine ..... [6844A-34]

11:15 am: **Measuring performance in virtual reality phacoemulsification surgery**, Per G. Söderberg, St Erik's Eye Hospital (Sweden) ..... [6844A-35]

## SESSION 9

Room: ..... Sun. 11:30 am

### Ophthalmic Express

*Session Chair:* **Arthur Ho**, Institute for Eye Research (Australia)

**Scleral Clearing**, Valery Tuchin, Saratov State Univ. (Russia)

*Discussion Panel:* **Ophthalmic Matters**

Lunch/Exhibition Break ..... 12:00 to 1:15 pm

## SESSION 10

Room: Conv. Ctr. A7/A8 ..... Sun. 1:15 to 2:30 pm

### Ophthalmic Diagnostics I: Microscopy, Scattering, Spectroscopy

*Session Chair:* **Michael Belkin**, Tel Aviv Univ. (Israel); **Daniel V. Palanker**, Stanford Univ. Medical Ctr.

1:15 pm: **The impact of horizontal offset of the cornea during corneal specular microscopy**, Curry P. Bucht, Kungliga Tekniska Högskolan (Sweden) ..... [6844A-36]

1:30 pm: **Ex-vivo multiphoton analysis of rabbit corneal wound healing following photorefractive keratectomy**, Tsung-Jen Wang, Taipei Medical Univ. Hospital (Taiwan) and National Taiwan Univ. Hospital (Taiwan) and National Taiwan Univ. (Taiwan); Wen Lo, Chen-Yuan Dong, National Taiwan Univ. (Taiwan); Fung-Rong Hu, National Taiwan Univ. Hospital (Taiwan) ..... [6844A-37]

1:45 pm: **Multiphoton fluorescence and second harmonic generation microscopy for imaging corneal edema**, Chiu-Mei Hsueh, Wen Lo, National Taiwan Univ. (Taiwan); Hsin-Yuan Tan, Chang Gung Memorial Hospital (China); Chen-Yuan Dong, National Taiwan Univ. (Taiwan) ..... [6844A-38]

2:00 pm: **Alpha-crystallin index: a new parameter to assess susceptibility to cataract in humans using dynamic light scattering**, Rafat R. Ansari, The Univ. of Texas School of Health Information Sciences at Houston; Manuel B. Dattiles III, National Institutes of Health; Kwang I. Suh, NASA Glenn Research Ctr.; Susan Vitale, George F. Reed, J. S. Zigler, Jr., Frederick L. Ferris, National Institutes of Health ..... [6844A-39]

2:15 pm: **Diffusing-wave-spectroscopy of the fundus tissues**, Luigi L. Rovati, Stefano Cattini, Univ. degli Studi di Modena (Italy); Francesco Viola, Giovanni Staurenghi, Univ. degli Studi di Milano (Italy) ..... [6844A-40]

## SESSION 11

Room: Conv. Ctr. A7/A8 ..... Sun. 2:30 to 4:30 pm

### Ophthalmic Diagnostics II: Polarization Techniques

*Session Chair:* **Jean-Marie A. Parel**, Univ. of Miami Medical School; **Daniel V. Palanker**, Stanford Univ. Medical Ctr.

2:30 pm: **Quantifying polarization properties of the in vivo retina with adaptive optics and polarization-sensitive optical coherence tomography**, Barry Cense, Ravi S. Jonnal, Weihua Gao, Donald T. Miller, Indiana Univ. .... [6844A-41]

2:45 pm: **Retinal nerve fiber layer birefringence measured with polarization sensitive spectral domain optical coherence tomography**, Erich Götzinger, Michael Pircher, Bernhard Baumann, Medizinische Univ. Wien (Austria); Cornelia Hirn, Clemens Vass, Allgemeines Krankenhaus Wien (Austria); Christoph K. Hitzenberger, Medizinische Univ. Wien (Austria) ..... [6844A-42]

3:00 pm: **A polarization measurement method for the quantification of retardation in optic nerve fiber layer**, Yasufumi Fukuma, Topcon Medical Systems, Inc.; Yoshio Okazaki, Takashi Shiiori, Topcon Corp. (Japan); Yukio Iida, Komazawa Univ. (Japan); Hisao Kikuta, Osaka Prefecture Univ. (Japan); Kazuhiko Ohnuma, Chiba Univ. (Japan) ..... [6844A-43]

Coffee Break ..... 3:15 to 3:45 pm

3:45 pm: **Single Channel High-Speed Polarization Sensitive Retinal SDOCT**, Mingtao Zhao, Yuankai Tao, Joseph A. Izatt, Duke Univ. .... [6844A-44]

4:00 pm: **Imaging the anterior eye segment by polarization-sensitive spectral-domain and swept-source optical coherence tomography**, Masahiro Miura, Tokyo Medical Univ. Kasumigaura Hospital (Japan); Masahiro Yamanari, Toyohiko Yatagai, Yoshiaki Yasuno, Tsukuba Univ. (Japan) ..... [6844A-45]

4:15 pm: **Imaging polarimetry of macular disease**, Masahiro Miura, Tokyo Medical Univ. Kasumigaura Hospital (Japan); Ann E. Elsner, Benno L. Petrig, Dean A. VanNasdale, Bryan P. Haggerty, Indiana Univ.; Takuya Iwasaki, Tokyo Medical Univ. Kasumigaura Hospital (Japan) ..... [6844A-46]

## SESSION 12

Room: Conv. Ctr. A7/A8 ..... Sun. 4:30 to 6:00 pm

### Optical Coherence Tomography III: Clinical Applications

*Session Chair:* **Jean-Marie A. Parel**, Univ. of Miami Medical School; **Wolfgang Drexler**, Cardiff Univ. (United Kingdom)

4:30 pm: **Direct visualization of tear film on soft contact lens using ultra-high resolution spectral domain optical coherence tomography**, Jianhua Wang, Shuliang Jiao, Jachandra R. Palakuru, Marco Ruggeri, Hassan M. Wehbe, Univ. of Miami School of Medicine ..... [6844A-47]

4:45 pm: **Retinal nerve fiber layer thickness maps and neuroretinal rim area as quantitative glaucoma characteristics measured with video-rate SDOCT**, Mircea Mujat, Massachusetts General Hospital; Teresa C. Chen, Massachusetts Eye and Ear Infirmary; Wei Sun, Massachusetts General Hospital; Kayoung Yi, Massachusetts Eye and Ear Infirmary; Gopi N. Maguluri, Massachusetts General Hospital; R. Daniel Ferguson, Daniel X. Hammer, Nicusor V. Iftimia, Physical Sciences Inc.; Johannes F. de Boer, Massachusetts General Hospital ..... [6844A-48]

5:00 pm: **Comparison of optic nerve head cup and disc borders as determined in fundus photographs with video-rate SDOCT images**, Wei Sun, Wellman Ctr. for Photomedicine and Boston Univ.; Mircea Mujat, Wellman Ctr. for Photomedicine and Harvard Medical School and Physical Sciences Inc.; Teresa C. Chen M.D., Harvard Medical School and Massachusetts Eye and Ear Infirmary; Kayoung Yi, Harvard Medical School and Massachusetts Eye and Ear Infirmary and Hallym Univ. (South Korea); Gopi Maguluri, Wellman Ctr. for Photomedicine; R. Daniel Ferguson, Daniel Hammer, Nicusor Iftimia, Physical Sciences Inc.; Johannes F. de Boer, Wellman Ctr. for Photomedicine and Harvard Medical School ..... [6844A-49]

5:15 pm: **High-penetration imaging of retinal and choroidal pathologies by 1  $\mu$ m swept-source optical coherence tomography and optical coherence angiography**, Yoshiaki Yasuno, Tsukuba Univ. (Japan); Masahiro Miura, Tokyo Medical Univ. Kasumigaura Hospital (Japan); Fumiki Okamoto, Tsukuba Univ. (Japan); Youngjoo Hong, Korea Advanced Institute of Science and Technology (South Korea) ..... [6844A-50]

5:30 pm: **In-vivo 3-D imaging of age-related macular degeneration using optical frequency domain imaging at 1050 nm**, Daina L. Burnes, Massachusetts General Hospital; Daniel M. de Bruin, Univ. van Amsterdam (Netherlands); Yueli Chen, Harvard Medical School; Gopi Maguluri, Massachusetts General Hospital; Susie Chang M.D., John Loewenstein M.D., Massachusetts Eye and Ear Infirmary; Johannes F. de Boer, Massachusetts General Hospital ..... [6844A-51]

5:45 pm: **Investigation of structural development defects in retinopathy of prematurity with adaptive optics Fourier domain optical coherence tomography**, Daniel X. Hammer, Nicusor V. Iftimia, R. D. Ferguson, Teoman E. Ustun, Chad E. Bigelow, Derek Morris, Physical Sciences Inc.; Amber M. Barnaby, Anne B. Fulton, Children's Hospital Boston . . . . . [6844A-52]

**Pascal Rol Award**  
*Sun. 6:00 to 6:15 pm*  
 Session Chairs: **Ezra I. Maguen**, American Eye Institute;  
**Wolfgang Drexler**, Cardiff Univ. (United Kingdom);  
**Jean-Marie A. Parel**, Univ. of Miami Medical School

## Monday 21 January

### POSTERS-Monday

**Room: Conv. Ctr. A7/A8 . . . . . Mon. 6:00 to 7:30 pm**

*All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.*

*Poster presenters may post their poster papers Monday morning starting at 10:00 am in the Civic Auditorium Complex, and will need to remove their papers immediately following the poster session that evening. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.*

**Detecting thermal phase transitions in corneal stroma by fluorescence microimaging analysis**, Roberto Pini, Francesca Rossi, Paolo Matteini, Istituto di Fisica Applicata Nello Carrara (Italy); Ivan Bruno, Paolo Nesi, Univ. degli Studi di Firenze (Italy) . . . . . [6844A-53]

**Gold nanorods as exogenous chromophores in the welding of ocular tissues**, Roberto Pini, Fulvio Ratto, Paolo Matteini, Francesca Rossi, Istituto di Fisica Applicata Nello Carrara (Italy); Sulabha K. Kulkarni, Neha R. Tiwari, Univ. of Pune (India) . . . . . [6844A-54]

**High luminance application of orange fiber laser**, Koichi Ito, Kazunobu Kojima, Ken-ichi Hayashi, NIDEK Co., Ltd. (Japan) . . . . . [6844A-55]

**Image quality with refractive intraocular lens based on different positions**, Minshan Jiang, Chuanqing Zhou, Qiushi Ren, Shanghai Jiao Tong Univ. (China) . . . . . [6844A-56]

**Generation of the wavefront aberrations with the micromachined membrane deformable mirror and the piezoelectric deformable mirror**, Minshan Jiang, Chuanqing Zhou, Qiushi Ren, Shanghai Jiao Tong Univ. (China) . . . . . [6844A-57]

*Don't miss the weekend*  
**Biomedical Optics Exhibition**  
 San Jose Convention Center, Exhibition Hall 1  
 Saturday 19 January . . . . . 1:00 to 5:00 pm  
 Sunday 20 January . . . . . 10:00 am to 4:00 pm



## Laser and Noncoherent Light Ocular Effects

Conference Chair: **Bruce E. Stuck**, U.S. Army Medical Research Detachment; **Michael Belkin**, Tel Aviv Univ. (Israel)

Program Committee: **Jeremiah Brown**, Ophthalmology Associates of San Antonio; **Henry D. Hacker**, U.S. Army Medical Research Detachment; **Richard C. Hollins**, Defence Science and Technology Lab. (United Kingdom); **Tamar Kadar**, Israel Institute for Biological Research (Israel); **Brian Jason Lund**, Northrop Grumman Corp.; **David J. Lund**, U.S. Army Medical Research Detachment; **Russell L. McCally**, Johns Hopkins Univ.; **Leon McLin**, Air Force Research Lab.; **Karl Schulmeister**, Austrian Research Ctrs. Seibersdorf Research GmbH (Austria); **David H. Sliney**, U.S. Army Ctr. for Health Promotion and Preventive Medicine; **Robert J. Thomas**, Air Force Research Lab.; **Deborah Whitmer**, U.S. Army Medical Research Detachment; **Joseph A. Zuclich**, Northrop Grumman Corp.; **Harry Zwick**, U.S. Army Medical Research Detachment

### Sunday 20 January

#### SESSION 13

Room: Conv. Ctr. M. . . . . Sun. 8:30 am to 12:20 pm

Session Chair: **Bruce E. Stuck**, U.S. Army Medical Research Detachment; **Michael Belkin**, Tel Aviv Univ. (Israel)

8:30 am: **Variation of retinal ED50 with exposure duration: a review of the bioeffects database**, David J. Lund, U.S. Army Medical Research Detachment. . . . . [6844B-58]

8:50 am: **Retinal thermal laser damage thresholds for different beam profiles and scanned exposure**, Karl Schulmeister, Bernhard Seiser, Johannes Husinsky, Reinhard Gilber, Letizia Farmer, Austrian Research Ctrs. GmbH (Austria) . . . . . [6844B-59]

9:10 am: **Retinal injury threshold for exposure to a single Q-switched laser pulse at 532 nm wavelength measured with wavefront correction**, Brian Lund, Northrop Grumman Corp.; David Lund, U.S. Army Medical Research Detachment; Peter Edsall, Northrop Grumman Corp. . . . . [6844B-60]

9:30 am: **Determination of the time dependence of colored afterimages**, Hans-Dieter Reidenbach, Univ. of Applied Sciences Köln (Germany) [6844B-61]

9:50 am: **Role of superoxide dismutase in the photochemical response of cultured RPE cells to laser exposure at 413 nm**, Michael L. Denton, Kurt J. Schuster, Northrop Grumman Corp.; Larry E. Estlack, Conceptual MindWorks, Inc.; Michael S. Foltz, Gary D. Noojin, Harvey M. Hodnett, Northrop Grumman Corp.; Robert J. Thomas, Air Force Research Lab. . . . . [6844B-62]

Coffee Break . . . . . 10:10 to 10:40 am

10:40 am: **Ocular laser bioeffects in Operation Iraqi Freedom**, Henry D. Hacker M.D., Rachel Cheramie, David J. Lund, Bruce Stuck, U.S. Army Medical Research Detachment. . . . . [6844B-63]

11:00 am: **Psychophysical and perceptual performance in a simulated-scotoma model of human eye injury**, Rachel Brandeis, Inbal Egoz, David Peri, Joseph Turetz, Israel Institute for Biological Research (Israel) . . . . . [6844B-64]

11:20 am: **Color and contrast sensitivity after glare from high-brightness LEDs**, Hans-Dieter Reidenbach, Univ. of Applied Sciences Köln (Germany) . . . . . [6844B-65]

11:40 am: **Initial validation of an advanced visual function tool for the assessment of laser-induced retinal injury**, Michael Boye, Harry Zwick, Bruce E. Stuck, U.S. Army Medical Research Detachment; Peter E. Edsall, Northrop Grumman Corp.; Andre Akers, U.S. Army Medical Research Detachment. . . . . [6844B-67]

12:00 pm: **NHP spectral sensitivity derived from a pursuit motor tracking task in assessment of laser induced visual dysfunction**, Harry Zwick, U.S. Army Medical Research Detachment; Peter E. Edsall, Northrop Grumman Corp.; David J. Lund, Roosevelt Cunningham, Bruce E. Stuck, U.S. Army Medical Research Detachment. . . . . [6844B-68]

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# Optical Methods for Tumor Treatment and Detection: Mechanisms and Techniques in Photodynamic Therapy XVII

Conference Chair: **David Kessel**, Wayne State Univ.

Conference Co-Chair: **Tayyaba Hasan**, Massachusetts General Hospital

Program Committee: **Thomas H. Foster**, Univ. of Rochester; **Charles J. Gomer**, Childrens Hospital Los Angeles; **Nancy L. Oleinick**, Case Western Reserve Univ.; **Brian W. Pogue**, Dartmouth College; **Kevin M. Smith**, Louisiana State Univ.; **Kenneth K. Wang**, Mayo Clinic

## Saturday 19 January

### SESSION 1

Room: Conv. Ctr. A2 ..... Sat. 9:00 to 10:30 am

#### Preclinical I

Session Chair: **David H. Kessel**, Wayne State Univ.

9:00 am: **Promotion of PDT efficacy by Bcl-2 family antagonists** (Invited Paper), David H. Kessel, Wayne State Univ. .... [6845-01]

9:30 am: **Syntheses and properties of metalloisoporphyrin sensitizers for PDT** (Invited Paper), Kevin M. Smith, Celinah Mwakwari, Louisiana State Univ. .... [6845-02]

10:00 am: **Mechanisms of synergy between epidermal growth factor receptor targeted immunotherapy and photodynamic treatment of ovarian cancer** (Invited Paper), Tayyaba Hasan, Thomas Stepinac, Massachusetts General Hospital; Sarika Verma, Univ. of Massachusetts; Humra Athar, Zhiming Mai, Massachusetts General Hospital. .... [6845-03]

Coffee Break ..... 10:30 to 11:00 am

### SESSION 2

Room: Conv. Ctr. A2 ..... Sat. 11:00 am to 12:40 pm

#### Preclinical II

Session Chair: **Charles J. Gomer**, Childrens Hospital Los Angeles

11:00 am: **Lysosome vs. mitochondrion as photosensitizer binding site: how does the tortoise overtake the hare?** (Invited Paper), Nancy L. Oleinick, Kashif Azizuddin, Song-Mao Chiu, Sheeba Joseph, Myriam E. Rodriguez, Liangyan Xue, Ping Zhang, Malcolm E. Kenney, Minh C. Lam, Case Western Reserve Univ.; Anna-Liisa Nieminen, Medical Univ. of South Carolina ..... [6845-04]

11:30 am: **Contribution of mitochondria and lysosomes to PDT-induced death in cancer cells**, Anna-Liisa Nieminen, Medical Univ. of South Carolina; Kashif Azizuddin, Ping Zhang, Malcolm E. Kenney, Case Western Reserve Univ.; Peter Padiaditakis, The Univ. of North Carolina at Chapel Hill; John J. Lemasters, Medical Univ. of South Carolina; Nancy L. Oleinick, Case Western Reserve Univ. .... [6845-05]

11:50 am: **Protein oxidation by the phthalocyanine photosensitizer Pc 4 and light: detection of a unique singlet oxygen-generated product in cytochrome c**, Myriam E. Rodriguez, Junhwan Kim, Malcolm E. Kenney, Nancy L. Oleinick, Vernon E. Anderson, Case Western Reserve Univ. .... [6845-06]

12:10 pm: **PDT effects on the tumor microenvironment: growing evidence for combined modality approaches** (Invited Paper), Charles J. Gomer, Childrens Hospital Los Angeles ..... [6845-07]

Lunch/Exhibition Break ..... 12:30 to 1:30 pm

### SESSION 3

Room: Conv. Ctr. A2 ..... Sat. 1:30 to 3:00 pm

#### Dosimetry

Session Chair: **Tayyaba Hasan**, Massachusetts General Hospital

1:30 pm: **Microscopic dose deposition and tumor response to PDT** (Invited Paper), Thomas H. Foster, Ken K. Wang, Soumya Mitra, Univ. of Rochester ..... [6845-08]

2:00 pm: **Reconstruction of hemodynamics and sensitizer distributions during interstitial PDT using spectroscopy with linear light sources**, Jarod C. Finlay, Jun Li, Xiaodong Zhou, Andreea Dimofte, Timothy C. Zhu, Univ. of Pennsylvania ..... [6845-09]

2:20 pm: **Femtosecond laser ablation produced colloidal silicon nanoparticles as potential photosensitizers**, Lothar D. Lilge, Alexander Y. Douplik, Sean Tjandra, Princess Margaret Hospital (Canada); David Rioux, Andrei V. Kabashin, Michel Meunier, Ecole Polytechnique de Montréal (Canada) ..... [6845-10]

2:40 pm: **Interstitial diffuse optical tomography using an adjoint model with linear sources**, Xiaodong Zhou, Timothy C. Zhu, Univ. of Pennsylvania. [6845-11]

### POSTERS-Saturday

Room: Conv. Ctr. A2 ..... Sat. 3:00 to 3:30 pm

Session Chair: **David H. Kessel**, Wayne State Univ.

Posters will be placed on display from Saturday morning. Authors will be present to discuss their posters during the Saturday afternoon coffee break.

Poster authors: Please put up your posters before the conference or during the Saturday morning coffee break.

**Light dosimetry using interstitial diffuse optical tomography with multiple linear sources**, Xiaodong Zhou, Timothy C. Zhu, Univ. of Pennsylvania ..... [6845-31]

**Photodynamic therapy (PDT) applied in the treatment of a chronic skin wound in a dog**, Raduan Hage, Helio Plapler, Univ. Federal de São Paulo (Brazil) ..... [6845-32]

**The role of autofluorescence diagnosis in the oral mucosa diseases**, Aleksander Sieron M.D., Jadwiga Waskowska M.D., Anna Kosciarz-Grzesiok, Anna A. Misiak, Rafal Koszowski M.D., Aleksandra Z. Kawczyk-Krupka, Medical Univ. of Silesia (Poland) ..... [6845-34]

**Antifungal activity of new water-soluble porphyrins**, Grigor V. Gyulkhandanyan, Institute of Biotechnology (Armenia); Robert K. Ghazaryan, Yerevan State Medical Univ. (Armenia); Susanna Badalyan, Narine Gharibyan, Yerevan State Univ. (Armenia); Sona S. Ghambaryan, Institute of Biotechnology (Armenia); Aram G. Gyulkhandanyan, Yerevan State Univ. (Armenia) . [6845-35]

**The difference of the PDT's effects between interstitial lighting and continuous lighting in low oxygen density**, Jiumin Yang, Yingxin Li, Tianjin Medical Univ. (China) ..... [6845-36]

**The role of antioxidant enzymes in photodynamic destruction of cells**, Grigor V. Gyulkhandanyan, Pharmagene Co., Ltd. (Armenia) ..... [6845-37]

**In silico analysis of photodynamic therapy dosimetry using the optical pharmacokinetic system**, Stephen C. Kanick, Robert S. Parker, Univ. of Pittsburgh ..... [6845-38]

**The modern trends of the evolution laser information technology in oncology**, Alexander Mikov, Viatcheslav N. Svirin, M.F. Stelmakh Polyus Research and Development Institute (Russia) ..... [6845-39]

**A frequency-modulated fluorescence system for real-time monitoring of sensitizer photobleaching during PDT**, Jarod C. Finlay, Xiaodong Zhou, Andreea Dimofte, Timothy C. Zhu, Univ. of Pennsylvania ..... [6845-40]

# Conference 6845

**Towards conformal photodynamic therapy: benefit of tailored light diffusers**, Cesar A. Rendon, Princess Margaret Hospital (Canada); J. Christopher Beck, Univ. of Toronto (Canada); Lothar D. Lilge, Princess Margaret Hospital (Canada) . . . . . [6845-41]

**Developing tissue transglutaminase-specific near infrared fluorescent agent for tumor boundary imaging**, Chia-Pin Pan, Jeanne P. Haushalter, Khalid Amin, Zishan Haroon, Gregory W. Faris, SRI International . . . . . [6845-42]

**Interstitial treatment planning with catheter based photosensitizer measurements and pre-treatment optical light fluence treatment planning based upon CT scans**, Timothy D. Monahan, Brian W. Pogue, Dax S. Kepshire, Dartmouth College; Steve Pereira, Univ. College London (United Kingdom); Tayyaba Hasan, Massachusetts General Hospital . . . . . [6845-43]

**Application of plasmon resonant nanoshells and nanorods of gold for IR laser photothermal therapy of cancer in small animals**, Garif G. Akchurin, Georgy G. Akchurin, Saratov State Univ. (Russia); Vladimir A. Bogatyrev, Lev A. Dykman, Institute of Biochemistry and Physiology of Plants and Microorganisms (Russia); Igor A. Ermolaev, Irina L. Maksimova, Elena M. Revzina, Alexander A. Scaptsov, Saratov State Univ. (Russia); Georgy S. Terentyuk, First Banian Hospital of Saratov (Russia); Boris N. Khelbtsov, Institute of Biochemistry and Physiology of Plants and Microorganisms (Russia) . . . . . [6845-44]

**Dosimetric considerations of interstitial photodynamic therapy of the canine prostate mediated by intra-arterially administered hypocrellin derivative**, Weiyang Liu, Dwayne J. Dickey, Univ. of Alberta (Canada); Zhengwen Xiao, Ronald B. Moore, Cross Cancer Institute (Canada); John Tulip, Univ. of Alberta (Canada) . . . . . [6845-45]

Coffee Break . . . . . 3:00 to 3:30 pm

## SESSION 4

**Room: Conv. Ctr. A2 . . . . . Sat. 3:30 to 4:50 pm**

### Preclinical III

*Session Chair: Thomas H. Foster, Univ. of Rochester*

3:30 pm: **Noninvasive fluorescence imaging for functional monitoring of murine glioma treatment strategies**, Summer L. Gibbs-Strauss, Julia A. O'Hara, Scott C. Davis, Dartmouth College; P. Jack Hoopes, Dartmouth Hitchcock Medical Ctr.; Tayyaba Hasan, Massachusetts General Hospital; Brian W. Pogue, Dartmouth College. . . . . [6845-12]

3:50 pm: **Optical imaging of PDT induced molecular and immune responses**, Soumya Mitra, Thomas H. Foster, Univ. of Rochester . . . . . [6845-13]

4:10 pm: **Inhibition of AKT activation mediated by photodynamic therapy can improve treatment responsiveness**, Ozguncem Bozkulak, Bogaziçi Univ. (Turkey); Sam Wong, Marian Luna, Angela Ferrario, Natalie Rucker, Childrens Hospital Los Angeles; Murat Gulsoy, Bogaziçi Univ. (Turkey); Charles J. Gomer, Childrens Hospital Los Angeles . . . . . [6845-14]

4:30 pm: **Effect of Vascular Microenvironment on PDT Responses**, Theresa Busch, E. P. Wileyto, Arjun Yodh, Guoqiang Yu, Shirron Carter, Elizabeth Rickter, Min Yuan, Univ. of Pennsylvania . . . . . [6845-15]

## Sunday 20 January

### SESSION 5

**Room: Conv. Ctr. A2 . . . . . Sun. 8:30 to 10:10 am**

### Clinical Studies

*Session Chair: Kenneth K. Wang, Mayo Clinic*

8:30 am: **Photodynamic therapy of esophageal neoplasm (Invited Paper)**, Kenneth K. Wang M.D., Mayo Clinic. . . . . [6845-16]

9:00 am: **Photodynamic therapy and the treatment of head and neck malignancies (Invited Paper)**, Merrill A. Biel, Univ. of Minnesota. . . . . [6842C-60]

9:30 am: **Simulations of measured photobleaching kinetics in human basal cell carcinomas suggest irradiance-dependent blood flow changes during 5-aminolevulinic acid-mediated photodynamic therapy**, Ken K. Wang, William J. Cottrell, Soumya Mitra, Univ. of Rochester; Allan R. Oseroff, Roswell Park Cancer Institute; Thomas H. Foster, Univ. of Rochester . . . . . [6845-17]

9:50 am: **Studies of photodynamic effect of a lyophilized formulation of WST09 in a canine prostate model**, Fred W. Hetzel, Qun Chen, Ken Dole, The Colorado Health Foundation; Dominique Blanc, Lab. Negma-Lerads (France); Zheng Huang, Univ. of Colorado at Denver . . . . . [6845-18]

Coffee Break . . . . . 10:10 to 10:40 am

### SESSION 6

**Room: Conv. Ctr. A2 . . . . . Sun. 10:40 am to 12:00 pm**

### PDT Delivery

*Session Chair: Brian W. Pogue, Dartmouth College*

10:40 am: **Up-converting nanophosphors in photodynamic therapy of mesothelioma in vivo**, Joshua E. Collins, Ba Nguyen, Univ. of Pennsylvania; Yiguang Ju, Jingning Shan, Rui Zhuo, Princeton Univ.; Jarod C. Finlay, Theresa M. Busch, Ajith Kumar, Univ. of Pennsylvania; Xiao Qin, Princeton Univ.; Howard Bell, Sunstone, Inc.; Valery Belov, Stephen M. Hahn, Joseph S. Friedberg, Univ. of Pennsylvania. . . . . [6845-19]

11:00 am: **Determination of optical properties in a heterogeneous turbid media using a cylindrical diffusing fiber**, Andreea Dimofte, Jarod C. Finlay, Jun Li, Timothy C. Zhu, Univ. of Pennsylvania . . . . . [6845-20]

11:20 am: **Macroscopic modeling of singlet oxygen during PDT: a theoretical analysis**, Timothy C. Zhu, Xiaodong Zhou, Jarod C. Finlay, Jun Li, Univ. of Pennsylvania . . . . . [6845-21]

11:40 am: **Monitoring ALA-induced PpIX-photodynamic therapy in the rat esophagus using fluorescence and reflectance spectroscopy**, Bastiaan Kruijt, Henriette S. de Bruijn, Angélique van der Ploeg-van den Heuvel, Ron W. F. de Bruin, Henricus J. C. M. Sterenberg, Arjen Amelink, Dominic J. Robinson, Erasmus Univ. Medical Ctr. (Netherlands) . . . . . [6845-22]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

### SESSION 7

**Room: Conv. Ctr. A2 . . . . . Sun. 1:30 to 2:50 pm**

### Delivery/Tomography

*Session Chair: Soumya Mitra, Univ. of Rochester*

1:30 pm: **Comparison of treatment planning using standard and tailored cylindrical diffusers for Photodynamic therapy of the prostate**, Cesar A. Rendon, Princess Margaret Hospital (Canada); J. Christopher Beck, Univ. of Toronto (Canada); Lothar D. Lilge, Princess Margaret Hospital (Canada) . . . . . [6845-23]

1:50 pm: **Sensitivity analysis of imaging geometries for prostate diffuse optical tomography**, Xiaodong Zhou, Timothy C. Zhu, Univ. of Pennsylvania . . . . . [6845-24]

2:10 pm: **Integrated light dosimetry system for prostate photodynamic therapy**, Jun Li, Timothy C. Zhu, Xiaodong Zhou, Univ. of Pennsylvania . . . . . [6845-25]

2:30 pm: **Fluorescence and reflectance spectroscopies in a clinical trial of Pc 4-PDT in cutaneous T-cell lymphoma**, Tammy K. Lee, William J. Cottrell, Univ. of Rochester; Valdir Colussi, Elma D. Baron, Case Western Reserve Univ.; Thomas H. Foster, Univ. of Rochester . . . . . [6845-26]

Coffee Break . . . . . 2:50 to 3:30 pm

### SESSION 8

**Room: Conv. Ctr. A2 . . . . . Sun. 3:30 to 4:50 pm**

### New Sensitizers

*Session Chair: Timothy C. Zhu, Univ. of Pennsylvania*

3:30 pm: **Synthesis, characterization and two-photon PDT efficacy studies of triads incorporating tumor targeting and imaging components**, Charles W. Spangler, Rasiris, Inc.; Jean R. Starkey, Aleksander Rebane, Mikhail A. Drobizhev, Montana State Univ./Bozeman; Fanqing Meng, Aijun Gong, MPA Technologies, Inc. . . . . [6845-27]

3:50 pm: **Time-resolved luminescence measurements of the magnetic field effect on paramagnetic photosensitizers in photodynamic reactions**, Ozzy Mermut, Jean-Pierre Bouchard, Jean-Francois Cormier, Patrice Desroches, Michel Fortin, Pascal Gallant, Sebastien Leclair, Isabelle Noisieux, Marcia L. Vernon, Institut National d'Optique (Canada); Kevin R. Diamond, Michael S. Patterson, Juravinski Cancer Ctr. (Canada) . . . . . [6845-28]

4:10 pm: **Histopathological and expression profiling studies of early tumor responses to near-infrared PDT treatment in SCID mice**, Jean R. Starkey, Aleksander Rebane, Mikhail A. Drobizhev, Montana State Univ./Bozeman; Fanqing Meng, Aijun Gong, MPA Technologies, Inc.; Aleisha Elliott, Kate McInerney, Montana State Univ./Bozeman; Charles W. Spangler, MPA Technologies, Inc. . . . . [6845-29]

4:30 pm: **Photodynamic antimicrobial activity and dark toxicity of meso-substituted water-soluble porphyrins**, Artak G. Tovmasyan, Robert K. Ghazaryan, Lida A. Sahakyan, Yerevan State Medical Univ. (Armenia); Anichka S. Hovsepyan, Marina Paronyan, Grigor V. Gyulkhandanyan, Institute of Biotechnology (Armenia) . . . . . [6845-30]

# Mechanisms for Low-Light Therapy III

**Conference Chairs:** Michael R. Hamblin, Massachusetts General Hospital; Ronald W. Waynant, U.S. Food and Drug Administration; Juanita Anders, Uniformed Services Univ. of the Health Sciences

**Program Committee:** Stuart K. Bisland, Princess Margaret Hospital (Canada); James D. Carroll, THOR International, Ltd. (United Kingdom); Mary Dyson, Dyderm Ltd. (United Kingdom); Valentin M. Grimblatov, Columbia Univ. Medical Ctr.

## Sunday 20 January

### SESSION 1

Room: Conv. Ctr. B4 ..... Sun. 8:30 to 10:20 am

#### Reviews and Dosimetry

*Session Chair:* Darayash B. Tata, U.S. Food and Drug Administration

8:30 am: **The role of nitric oxide in LLLT** (*Invited Paper*), Michael R. Hamblin, Massachusetts General Hospital ..... [6846-01]

9:00 am: **A 3D Model for Low Level Laser Therapy (LLLT) Biostimulation and Bioinhibition**, James D. Carroll, Photomedicine.com (United Kingdom) ..... [6846-02]

9:20 am: **Effect of light source characteristics and tissue optics on dosimetry of light-based therapies: a theoretical analysis**, Jarod C. Finlay, Xiaodong Zhou, Jun Li, Timothy C. Zhu, Univ. of Pennsylvania ..... [6846-03]

9:40 am: **How phototherapy affects the immune system**, Mary Dyson, King's College London (United Kingdom) and Longport Inc. .... [6846-04]

10:00 am: **The irradiation parameters investigation of photodynamic therapy on yeast cells**, Renato A. Prates, Aécio M. Yamada, Jr., Luis C. Suzuki, Instituto de Pesquisas Energéticas e Nucleares (Brazil); Eriques G. d.Silva, Claudete Rodrigues Paula, Univ. de São Paulo (Brazil); Martha S. Ribeiro, Instituto de Pesquisas Energéticas e Nucleares (Brazil) ..... [6846-05]

Coffee Break ..... 10:20 am

### SESSION 2

Room: Conv. Ctr. B4 ..... Sun. 10:50 am to 12:40 pm

#### In Vitro

*Session Chair:* Juanita Anders, Uniformed Services Univ. of the Health Sciences

10:50 am: **Laser light induced modulations in metabolic activities in human brain cancer** (*Invited Paper*), Ronald W. Waynant, Darayash B. Tata, U.S. Food and Drug Administration ..... [6846-06]

11:20 am: **Methylene blue aggregation in the presence of human saliva**, Sílvia C. Núñez, Aguinaldo S. Garcez, Laércio Gomes, Instituto de Pesquisas Energéticas e Nucleares (Brazil); Maurício S. Baptista, Univ. de São Paulo (Brazil); Martha S. Ribeiro, Instituto de Pesquisas Energéticas e Nucleares (Brazil) ..... [6846-07]

11:40 am: **Low level laser therapy for reduction of chronic joint pain: in vitro studies**, Maki E. Yamaura, Min E. Yao, Massachusetts General Hospital; Ilya V. Yaroslavsky, Richard Cohen, Michael H. Smotrich, Palomar Medical Technologies, Inc.; Irene E. Kochevar, Massachusetts General Hospital ..... [6846-08]

12:00 pm: **Influence of the fractionated irradiation energy in the phototherapy with low intensity laser on the growth of human dental pulp fibroblasts**, Daiane T. Meneguzzo, Univ. de São Paulo (Brazil); Martha S. Ribeiro, Instituto de Pesquisas Energéticas e Nucleares (Brazil); Carlos d. P. Eduardo, Márcia M. Marques, Univ. de São Paulo (Brazil) ..... [6846-09]

12:20 pm: **Cytoprotective effect of light emitting diode (630nm) on melanoblasts: implications for vitiligo treatment**, Chih-Chieh Chan, Yi-Ju Chen, Sung-Jan Lin, Hsien-Ching Chiu, Hsin-Su Yu, National Taiwan Univ. Hospital (Taiwan) ..... [6846-10]

Lunch/Exhibition Break ..... 12:40 pm

### SESSION 3

Room: Conv. Ctr. B4 ..... Sun. 1:40 to 4:20 pm

#### In Vivo

*Session Chair:* Michael R. Hamblin, Massachusetts General Hospital

1:40 pm: **Light promotes axonal regeneration and functional recovery in two spinal cord injury models** (*Invited Paper*), Juanita Anders, Xingjia Wu, Anton Dmitriev, Uniformed Services Univ. of the Health Sciences; Mario T. Cardoso, Walter Reed Army Medical Ctr.; Jackson Streeter, Luis H. De Taboada, PhotoThera, Inc.; Angela Veirs, Uniformed Services Univ. of the Health Sciences; Kimberly R. Byrnes, Georgetown Univ.; Lauren Kaczmarczyk, Uniformed Services Univ. of the Health Sciences. .... [6846-11]

2:10 pm: **Angiogenesis induced by low-intensity laser therapy: comparative study between single and fractionated dose on burn healing**, Martha S. Ribeiro, Stella T. Sugayama, Gessé Nogueira, Instituto de Pesquisas Energéticas e Nucleares (Brazil); Cristiane M. França, Univ. Ibirapuera (Brazil); Sílvia C. Núñez, Renato A. Prates, Daniela F. T. Silva, Instituto de Pesquisas Energéticas e Nucleares (Brazil) ..... [6846-12]

2:30 pm: **Analgesic effect of simultaneous exposure to infrared laser radiation and 1/4T magnetic field in rats**, Grzegorz J. Cieslar, Janina M. Mrowiec, Sławomir Kasperczyk, Aleksander R. Sieron M.D., Medical Univ. of Silesia (Poland) ..... [6846-13]

Coffee Break ..... 3:10 to 3:40 pm

3:40 pm: **Photosensitization of actinobacillus actinomycetemcomitans with methylene blue: a microbiological and spectroscopic analysis**, Aécio M. Yamada, Jr., Renato A. Prates, Instituto de Pesquisas Energéticas e Nucleares (Brazil); Silvana Cai, Univ. de São Paulo (Brazil); Martha S. Ribeiro, Instituto de Pesquisas Energéticas e Nucleares (Brazil) ..... [6846-14]

4:00 pm: **Antimicrobial comparison on effectiveness of endodontic therapy and endodontic therapy combined to photo-disinfection on patients with periapical lesion: a 6 month follow-up**, Aguinaldo S. Garcez, Sílvia C. Núñez, Instituto de Pesquisas Energéticas e Nucleares (Brazil); Michael R. Hamblin, Massachusetts General Hospital; Martha S. Ribeiro, Instituto de Pesquisas Energéticas e Nucleares (Brazil) ..... [6846-15]

### SESSION 4

Room: Conv. Ctr. B4 ..... Sun. 4:20 to 6:00 pm

#### Clinical

*Session Chair:* James D. Carroll, THOR International, Ltd. (United Kingdom)

4:20 pm: **Optical coherence tomography imaging for evaluating the photo biomodulation effects on tissue regeneration in the oral cavity**, Craig B. Gimbel, Lantis Laser Inc. .... [6846-16]

4:40 pm: **The oral cavity as a guide for the application of low level laser energy and its direct affect on the autonomic nervous system providing true energy healing for all health practitioners**, Herbert S. Yolin D.D.S., Northeast Dental Associates. .... [6846-18]

5:00 pm: **EHF-therapy in complex treatment of patients with professional vertebroneurologic diseases**, Igor A. Chesnokov, Federal State Unitary Enterprise (Russia); Elena P. Lyapina, Saratov State Medical Univ. (Russia); Natalia L. Borskaya, Vladislav A. Medentsov, Nikolay A. Bushuev, Lev A. Varshashov, Natalia V. Vinnichenko, Federal State Unitary Enterprise (Russia) ..... [6846-19]

5:20 pm: **Influence of helium-neon laser radiation on platelet function**, Grigory E. Brill, Ivan A. Budnik, Saratov State Medical Univ. (Russia); Levon V. Gasparyan, EMRED Oy (Finland) ..... [6846-20]

5:40 pm: **Treating cerebral palsy with aculaser therapy**, Shahzad Anwar, Anwar Shah's First C.P. and Paralysis Clinic and Research Ctr. (Pakistan) ..... [6846-21]

# Coherence Domain Optical Methods and Optical Coherence Tomography in Biomedicine XII

*Conference Chairs:* **Joseph A. Izatt**, Duke Univ.; **James G. Fujimoto**, Massachusetts Institute of Technology; **Valery V. Tuchin**, Saratov State Univ. (Russia)

*Program Committee:* **Peter Eskil Andersen**, Danmarks Tekniske Univ. (Denmark); **Stephen A. Boppart**, Univ. of Illinois at Urbana-Champaign; **Zhongping Chen**, Univ. of California/Irvine; **Johannes F. DeBoer**, Massachusetts General Hospital; **Wolfgang Drexler**, Cardiff Univ. (United Kingdom); **Christoph K. Hitzenberger**, Medizinische Univ. Wien (Austria); **Rainer Andreas Leitgeb**, École Polytechnique Fédérale de Lausanne (Switzerland); **Xingde Li**, Univ. of Washington; **Adrian G. Podoleanu**, Univ. of Kent at Canterbury (United Kingdom); **Andrew M. Rollins**, Case Western Reserve Univ.; **Natalia Mihailovna Shakhova**, Institute of Applied Physics (Russia); **Guillermo J. Tearney**, Massachusetts General Hospital; **Ruikang K. Wang**, Oregon Health and Science Univ.; **Maciej Wojtkowski**, Mikolaja Kopernika Univ. (Poland)

## Monday 21 January

### SESSION 1

**Room: Marriott Hotel: San Jose Ballroom III . . . Mon. 8:30 to 10:00 am**

#### Ophthalmic/Dental OCT

*Session Chair:* **Joseph A. Izatt**, Duke Univ.

8:30 am: **240 nm bandwidth in vivo high speed optical coherence tomography of the human retina**, Boris Povazay, Angelika Unterhuber, Bernd Hofer, Boris Hermann, Cardiff Univ. (United Kingdom); Enrique Joshua Fernández, Cardiff Univ. (United Kingdom) and Univ. de Murcia (Spain); James Morgan, Wolfgang Drexler, Cardiff Univ. (United Kingdom) . . . . . [6847-01]

8:45 am: **Motion corrected simultaneous SLO/OCT imaging of the human retina**, Michael Pircher, Bernhard Baumann, Erich Götzinger, Harald Sattmann, Christoph K. Hitzenberger, Medizinische Univ. Wien (Austria) . . . . . [6847-02]

9:00 am: **Keratometry and cornea topography using multiple delay element OCT**, Lucian Plesea, Adrian Podoleanu, Univ. of Kent (United Kingdom) . . . . . [6847-03]

9:15 am: **Segmentation of the retinal pigment epithelium by polarization sensitive optical coherence tomography**, Christoph K. Hitzenberger, Erich Götzinger, Michael Pircher, Bernhard Baumann, Stephan Michels, Wolfgang Geitzenauer, Ursula Schmidt-Erfurth, Medizinische Univ. Wien (Austria) [6847-04]

9:30 am: **Modeling light scattering from retinal photoreceptors**, Samer Abdallah, Alexandre Iolov, Omar Ramahi, Kostadinka K. Bizheva, Univ. of Waterloo (Canada) . . . . . [6847-05]

9:45 am: **Fixed partial dentures investigated by optical coherence tomography**, Cosmin G. H. Sinescu M.D., Meda Negrutiu, Carmen Todea D.D.S., Univ. de Medicina si Farmacie Victor Babes, Timisoara (Romania); Michael Hughes, Florin Tudorache, Adrian G. Podoleanu, Univ. of Kent (United Kingdom) . . . . . [6847-06]

Coffee Break . . . . . 10:00 to 10:30 am

### SESSION 2

**Room: Marriott Hotel: San Jose Ballroom III . . . Mon. 10:30 am to 12:00 pm**

#### Catheter/Endoscopic OCT

*Session Chair:* **James G. Fujimoto**, Massachusetts Institute of Technology

10:30 am: **In vivo endomicroscopy using three-dimensional optical coherence tomography and Fourier domain mode locked lasers**, Desmond C. Adler, Yu Chen, Massachusetts Institute of Technology; Robert Huber, Ludwig-Maximilians-Univ. München (Germany); Joseph Schmitt, LightLab Imaging; James G. Fujimoto, Massachusetts Institute of Technology . . . . . [6847-07]

10:45 am: **Three-dimensional comprehensive microscopy of the human esophagus in vivo**, Melissa J. Suter, Benjamin J. Vakoc, Harvard Medical School; Patrick Yachimski M.D., Massachusetts General Hospital; Milen Shishkov, William Oh, Adrien E. Desjardins, Harvard Medical School; Norman S. Nishioka M.D., Massachusetts General Hospital; Brett E. Bouma, Guillermo J. Tearney, Harvard Medical School . . . . . [6847-08]

11:00 am: **Design of balloon catheter optics for systematic three-dimensional high resolution OCT imaging of the esophagus**, Jiefeng Xi, Univ. of Washington . . . . . [6847-09]

11:15 am: **Catheter-based high-speed polarization sensitive optical frequency domain imaging**, William Oh, Seok-Hyun Yun, Benjamin J. Vakoc, Guillermo J. Tearney, Milen Shishkov, Adrien E. Desjardins, Jason T. Motz, Johannes F. de Boer, Boris H. Park, Brett E. Bouma, Massachusetts General Hospital . . . . . [6847-10]

11:30 am: **Imaging fiber bundles for Fizeau based optical coherence tomography**, Georgios F. Sarantavgas, Helen D. Ford, Ralph P. Tatam, Cranfield Univ. (United Kingdom) . . . . . [6847-11]

11:45 am: **Subsurface and Doppler spectrally-encoded endoscopy**, Dvir Yelin, DongKyun Kang, Brett E. Bouma, John J. Rosowski, Guillermo J. Tearney, Massachusetts General Hospital . . . . . [6847-12]

Lunch Break . . . . . 12:00 to 1:30 pm

### SESSION 3

**Room: Marriott Hotel: San Jose Ballroom III . . . Mon. 1:30 to 3:00 pm**

#### Retinal Functional Imaging

*Session Chair:* **Johannes F. de Boer**, Massachusetts General Hospital

1:30 pm: **Non-invasive optical detection of functionally-stimulated neural activity in the limulus compound eye**, Boris H. Park, Massachusetts General Hospital; Christopher L. Passaglia, Boston Univ.; Johannes F. de Boer, Massachusetts General Hospital . . . . . [6847-13]

1:45 pm: **Optical probing of human photoreceptor response using in vivo optophysiology**, Boris Hermann, Alison Binns, Bernd Hofer, Boris Povazay, Angelika Unterhuber, Tom Margrain, Wolfgang Drexler, Cardiff Univ. (United Kingdom) . . . . . [6847-14]

2:00 pm: **In vivo total retinal blood flow measurement by Fourier domain Doppler optical coherence tomography**, Yimin Wang, Ou Tan, David Huang M.D., Doheny Eye Institute . . . . . [6847-15]

2:15 pm: **In vivo human retinal optical Doppler tomography system with improved phase-resolved algorithm**, Bin Rao, Lingfeng Yu, Zhongping Chen, Univ. of California/Irvine . . . . . [6847-16]

2:30 pm: **Automatic retinal blood flow calculation using spectral domain optical coherence tomography**, Hassan Wehbe, Marco Ruggeri, Shuliang Jiao, Giovanni Gregori, Carmen A. Puliafito M.D., Univ. of Miami School of Medicine . . . . . [6847-17]

2:45 pm: **Retinal blood flow measurement by using optical coherence tomography**, Shuichi Makita, Univ. of Tsukuba (Japan); Tapio Fabritius, Univ. of Tsukuba (Japan) and Univ. of Oulu (Finland); Masahiro Miura, Univ. of Tsukuba (Japan) and Tokyo Med. Univ. (Japan); Toyohiko Yatagai, Yoshiaki Yasuno, Tsukuba Univ. (Japan) . . . . . [6847-18]

Coffee Break . . . . . 3:00 to 3:30 pm

## SESSION 4

Room: Marriott Hotel: San Jose Ballroom III . . . . Mon. 3:30 to 5:30 pm

## Fourier Domain OCT: New Technology

Session Chair: Maciej Wojtkowski, Univ. Mikolaja Kopernika (Poland)

3:30 pm: **Scanning spectrometer based SD-OCT for ultra-high-speed imaging at 500kHz a-scan rate**, Yuankai K. Tao, Bradley A. Bower, Audrey K. Ellerbee, Ryan P. McNabb, Joseph A. Izatt, Duke Univ. . . . . [6847-19]

3:45 pm: **Fourier domain OCT equipped with linear k spectrometer**, Zhilin Hu, Andrew M. Rollins, Case Western Reserve Univ. . . . . [6847-20]

4:00 pm: **60 MHz A-line rate ultra-high speed Fourier-domain optical coherence tomography**, Kohji Ohbayashi, DongHak Choi, Hideaki Hiro-Oka, Hiroyuki Furukawa, Reiko Yoshimura, Motoi Nakanishi, Kimiya Shimizu, Kitasato Univ. (Japan) . . . . . [6847-21]

4:15 pm: **Equal frequency interval optical spectrometer for spectral domain optical coherence tomography**, Grigory V. Gellikonov, Valentin M. Gellikonov, Pavel A. Shilyagin, Institute of Applied Physics (Russia) . . . . . [6847-22]

4:30 pm: **Multi-channel Fourier domain OCT System with superior lateral resolution for biomedical applications**, Jon Holmes, Michelson Diagnostics Ltd. (United Kingdom); Nicholas Stone, Florian Bazant-Hegemark, Hugh Barr M.D., Gloucestershire Royal Hospital (United Kingdom) . . . . . [6847-23]

4:45 pm: **1/f noise in spectrometer-based optical coherence tomography**, Emily J. McDowell, California Institute of Technology; Marinko V. Sarunic, Simon Fraser Univ. (Canada); Changhui Yang, California Institute of Technology . . . . . [6847-24]

5:00 pm: **High speed (47,000 lines /s), high resolution Fourier domain optical coherence tomography system at 1060nm**, Peter Forbes, Prabakar Puvanathan, Univ. of Waterloo (Canada); Douglas Malchow, SU1, Goodrich Corp.; Kostadinka K. Bizheva, Univ. of Waterloo (Canada) . . . . . [6847-25]

5:15 pm: **Narrowband wavelength selective detector applicable SD-OCT based on Fabry-Perot tunable filter and balanced photoreceiver**, Tae-Joong Eom, Vitali A. Tougbaev, Bong-Ahn Yu, Woojin Shin, Yeung Lak Lee, Do-Kyeong Ko, Gwangju Institute of Science and Technology (South Korea); Chang-Seok Kim, Eun Joo Jung, Jae Suk Park, Myung-Yung Jeong, Pusan National Univ. (South Korea); Eun Seo Choi, Chosun Univ. (South Korea) . . . . . [6847-26]

## POSTERS-Monday

Room: Civic Auditorium Complex . . . . . Mon. 6:00 to 7:30 pm

*All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.*

*Poster presenters may post their poster papers Monday morning starting at 10:00 am in the Civic Auditorium Complex, and will need to remove their papers immediately following the poster session that evening. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.*

**Fourier domain low coherence transillumination computed tomography**, Andrew S. Thomas, Bradley A. Bower, Yuankai K. Tao, Joseph A. Izatt, Duke Univ. . . . . [6847-28]

**Enhancement of extended depth of field by digital focusing**, Martin L. Villiger, Cedric Blatter, Theo Lasser, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Rainer A. Leitgeb, Ecole Polytechnique Fédérale de Lausanne (Switzerland) and Medizinische Univ. Wien (Austria) . . . . . [6847-79]

**Lateral resolution improvement in optical coherence tomography by digital focusing**, Lingfeng Yu, Bin Rao, Zhongping Chen, Univ. of California/Irvine . . . . . [6847-80]

**Numerical method for compensating the retinal shadows of optical coherence tomography images**, Tapio Fabritius, Univ. of Tsukuba (Japan) and Univ. of Oulu (Finland); Shuichi Makita, Univ. of Tsukuba (Japan); Youngjoo Hong, Korea Advanced Institute of Science and Technology (South Korea); Risto Myllylä, Univ. of Oulu (Finland); Toyohiko Yatagai, Yoshiaki Yasuno, Univ. of Tsukuba (Japan) . . . . . [6847-81]

**Speckle reduction algorithm for optical coherence tomography based on interval type II fuzzy set**, Prabakar Puvanathan, Kostadinka Bizheva, Univ. of Waterloo (Canada) . . . . . [6847-82]

**Use of cosine tapered window to improve dynamic range of OCT without loss of resolution**, Hideaki Hiro-Oka, Hiroyuki Furukawa, Reiko Yoshimura, Kohji Ohbayashi, Kitasato Univ. (Japan); Takeyuki Wakabayashi, Teikyo Univ. (Japan) . . . . . [6847-83]

**Spectral density from speckle contrast perfusion measurements**, Oliver B. Thompson, Michael K. Andrews, Industrial Research Ltd. (New Zealand) . . . . . [6847-84]

**Quantum noise sources in optical coherence tomography**, Mark E. Brezinski, Brigham and Women's Hospital. . . . . [6847-85]

**Side-imaging lensed photonic crystal fiber probe**, Hae Young Choi, Seon Young Ryu, Jihoon Na, Byeong Ha Lee, Ik-Bu Sohn, Young-Chul Noh, Jongmin Lee, Gwangju Institute of Science and Technology (South Korea) . . . . [6847-86]

**Doppler optical coherence tomography measurements in discretely swept optical frequency domain imaging**, Reiko Yoshimura, Hideaki Hiro-Oka, DongHak Choi, Hiroyuki Furukawa, Kitasato Univ. (Japan); Naoki Fujiwara, NTT Photonics Labs. (Japan); Kohji Ohbayashi, Kitasato Univ. (Japan) . . . . [6847-87]

**Dual channel full-field OCT system for real-time subcellular level imaging**, Masahiro Akiba, Yasufumi Fukuma, Kin-Pui Chan, Topcon Medical Systems, Inc. . . . . [6847-88]

**Contrast OCT with gold nanoparticles based on the thermal lens effect**, Hui Wang, Yinsheng Pan, Zhilin Hu, Yu Cheng, Clemens Burda, Andrew M. Rollins, Case Western Reserve Univ. . . . . [6847-89]

**K- microscopy: resolution beyond the diffraction limit**, Rainer A. Leitgeb, Matthias Geissbuehler, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [6847-91]

**Axial-lateral parallel time domain OCT with an optical zoom lens and high order diffracted lights at 830 nm**, Yuuki Watanabe, Yasutoki Takasugi, Manabu Sato, Yamagata Univ. (Japan) . . . . . [6847-92]

**All fiber probe for optical coherence tomography**, Seon Young Ryu, Hae Young Choi, Jihoon Na, Woo June Choi, Byeong Ha Lee, Gwangju Institute of Science and Technology (South Korea) . . . . . [6847-93]

**Spectral domain optical coherence tomography using a microchip laser-pumped photonic crystal fiber supercontinuum source**, Qi Zhao, Takashi Buma, Univ. of Delaware . . . . . [6847-94]

**Broadband superluminescent light-emitting device at 840nm with high performance stability**, Valerio Laino, Christian Vélez, Lorenzo Occhi, Exalos AG (Switzerland) . . . . . [6847-95]

**Measurement of sinusoidal flow oscillations**, Catherine Blake, James Edmunds, Leigh Shelford, Julian Moger, Univ. of Exeter (United Kingdom); Stephen J. Matcher, The Univ. of Sheffield (United Kingdom) . . . . . [6847-96]

**SGDBR monolithic wavelength tunable lasers for swept source OCT**, Dennis J. Derickson, Michael Bernacil, Andrew J. DeKelaita, Ben Maher, Shane O'Connor, California Polytechnic State Univ.; Matthew N. Sysak, Leif Johansson, Univ. of California/Santa Barbara . . . . . [6847-97]

**Measurement of the three-dimensional point-spread function in an optical coherence tomography imaging system**, Peter H. Tomlins, Peter Woolliams, National Physical Lab. (United Kingdom) . . . . . [6847-98]

**Real-time video-rate harmonically detected Fourier domain optical coherence tomography**, Andrei B. Vakhtin, Kristen A. Peterson, Daniel J. Kane, Southwest Sciences, Inc. . . . . [6847-99]

**Optimal source bandwidth for transillumination interferometry**, Paulino Vacas-Jacques, Marija Strojnik, Gonzalo Paez, Ctr. de Investigaciones en Óptica, A.C. (Mexico) . . . . . [6847-100]

**Enhancement of Fourier domain OCT images using discrete Fourier transform method**, Razul S. Gulam, Beng-Koon Ng, Tzu Hao Chow, Nanyang Technological Univ. (Singapore) . . . . . [6847-101]

**Characterization of Improved Resolution with Ultrasound Enhanced Optical Coherence Tomography**, Chuanyong Huang, Bin Liu, Mark E. Brezinski, Brigham and Women's Hospital . . . . . [6847-102]

**Penetration depth of optical frequency domain imaging at wavelengths of 1310 nm and 1550 nm**, Hiroyuki Furukawa, DongHak Choi, Hideaki Hiro-Oka, Reiko Yoshimura, Motoi Nakanishi, Kimiya Shimizu, Kohji Ohbayashi, Kitasato Univ. (Japan) . . . . . [6847-103]

**Common path SS-OCT interferometer with artifacts removal**, Sébastien Vergnole, Guy Lamouche, Marc Dufour, Bruno Gauthier, National Research Council Canada (Canada) . . . . . [6847-104]

**Polarization sensitive OFDI imaging using a real-time k-space clock**, Jordan C. Dwelle, Badr Elmaanaoui, The Univ. of Texas at Austin; Austin McElroy, Nathaniel Kemp, CardioSpectra, Inc.; H. G. Rylander III, Thomas Milner, The Univ. of Texas at Austin. . . . . [6847-105]

# Conference 6847

**In vivo three-dimensional imaging of human gastrointestinal tract by use of an endoscopic swept source optical coherence tomography with a microelectromechanical endoscopic rotational probe**, Jun Zhang, Jianping Su, Shuguang Guo, Kenneth Chang, Zhongping Chen, Univ. of California/Irvine ..... [6847-106]

**Real-time lymph node assessment using optical coherence tomography for the staging of breast cancer**, Freddy T. Nguyen, Adam M. Zysk, Univ. of Illinois at Urbana-Champaign; Jan G. Kotynek, Uretz J. Oliphant, John Brockenbrough, Frank J. Bellafiore M.D., Kendrith M. Rowland M.D., Patricia A. Johnson M.D., Carle Foundation Hospital and Carle Clinic Association; Eric J. Chaney, Univ. of Illinois at Urbana-Champaign; Stephen A. Boppart M.D., Univ. of Illinois at Urbana-Champaign and Carle Foundation Hospital and Carle Clinic Association ..... [6847-107]

**In vitro 3D articular cartilage imaging using endoscopic spectral domain optical coherence tomography (OCT) with a GRIN (gradient index) lens rod based probe**, Tuqiang Xie, Univ. of California/Irvine ..... [6847-108]

**Spectrometer based Fourier domain optical coherence tomography of the mouse retina**, Jing Xu, Mohammadali H. Khorasani, Jimmy N. B.Koo, Marinko V. Sarunic, Simon Fraser Univ. (Canada) ..... [6847-109]

**Imaging treated brain aneurysms in vivo using optical coherence tomography**, Jianping Su, Marlon Mathews M.D., Chiedozie Nwagwu M.D., Binh Nguyen, Mehrzad Heidari, Mark Linskey M.D., Zhongping Chen, Univ. of California/Irvine ..... [6847-110]

## Tuesday 22 January

### SESSION 5

**Room: Marriott Hotel: San Jose Ballroom III . . . Tues. 8:30 to 10:00 am**

#### Novel Techniques

*Session Chair: Xingde Li, Univ. of Washington*

8:30 am: **Miniature optical coherence tomography system based on silicon photonics**, Eduardo Margallo-Balbás, Grégory Pandraud, Patrick J. French, Technische Univ. Delft (Netherlands) ..... [6847-27]

8:45 am: **High speed polarization sensitive optical frequency domain imaging**, Charles Kerbage, Ki Hean Kim, Boris H. Park, Johannes de Boer, Wellman Ctr. for Photomedicine ..... [6847-90]

9:00 am: **Investigations of OCT imaging performance using an unique source providing several spectral wavebands**, Ramona Cernat, Univ. of Kent (United Kingdom) and National Institute for Lasers, Plasma and Radiation Physics (Romania); George M. Dobre, Irina Trifanov, Liviu Neagu, Adrian Bradu, Michael Hughes, Adrian Podoleanu, Univ. of Kent (United Kingdom) . [6847-29]

9:15 am: **Optical coherence domain imaging using superconducting single-photon detectors**, Nishant Mohan, Olga Minaeva, Magued Nasr, Bahaa E. A.Saleh, Alexander V. Sergienko, Malvin C. Teich, Boston Univ. .... [6847-30]

9:30 am: **Optical coherence tomography in material deformation by using short pulse laser irradiation**, Eun Seo Choi, Youngseop Kim, Wooseop Kwak, Yongjin Shin, Chosun Univ. (South Korea); Woonggyu Jung, Yeh-Chan Ahn, Zhongping Chen, Univ. of California/Irvine; Eun Joo Jeong, Chang-Seok Kim, Pusan National Univ. (South Korea) ..... [6847-31]

9:45 am: **Dispersion-assisted measurement of the refractive index and thickness by hybrid interferometer**, Seokhan Kim, Jihoon Na, Myoung Jin Kim, Byeong Ha Lee, Gwangju Institute of Science and Technology (South Korea) ..... [6847-32]

Coffee Break ..... 10:00 to 10:30 am

### SESSION 6

**Room: Marriott Hotel: San Jose Ballroom III . . . Tues. 10:30 am to 12:00 pm**

#### Fourier Domain Swept Source OCT

*Session Chair: Zhongping Chen, Univ. of California/Irvine*

10:30 am: **K-space linear Fourier domain mode locked (FDML) lasers**, Robert Huber, Benjamin R. Biedermann, Christoph M. Eigenwillig, Ludwig-Maximilians-Univ. München (Germany) ..... [6847-33]

10:45 am: **Programmable high speed (500kHz~1MHz) Vernier mode-locked frequency-swept laser for OCT**, Motonobu Kourogi, Yoshihisa Kawamura, Optical Comb, Inc. (Japan); Yoshiaki Yasuno, Univ. of Tsukuba (Japan); Hirotsada Oyaizu, Hidetoshi Miyao, Kazuhiro Imai, Optical Comb, Inc. (Japan) ..... [6847-34]

11:00 am: **Spectrally balanced detection for OFDI**, Yueli Chen, Harvard Medical School; Daniel M. de Bruin, Massachusetts General Hospital; Charles Kerbage, Wellman Ctr. for Photomedicine; Johannes F. de Boer, Massachusetts General Hospital ..... [6847-35]

11:15 am: **Large optical power margin of signal light in OFDR-OCT by using semiconductor optical amplifier**, Kota Asaka, NTT Photonics Labs. (Japan); Kohji Ohbayashi, Kitasato Univ. (Japan) ..... [6847-36]

11:30 am: **High speed broadband Fourier domain mode locked swept source with multiple SOAs**, Jun Zhang, Univ. of California/Irvine; Min Yong Jeon, Chungnam National Univ. (South Korea); Qiang Wang, Zhongping Chen, Univ. of California/Irvine ..... [6847-37]

11:45 am: **Single-mode 140 nm swept light source realized by using SSG-DBR lasers**, Naoki Fujiwara, Ryoko Yoshimura, Kazutoshi Kato, Hiroyuki Ishii, Fumiyoshi Kano, Yoshihiro Kawaguchi, Yasuhiro Kondo, NTT Photonics Labs. (Japan); Kohji Ohbayashi, Kitasato Univ. (Japan); Hiromi Oohashi, NTT Photonics Labs. (Japan) ..... [6847-38]

Lunch/Exhibition Break ..... 12:00 to 1:30 pm

### SESSION 7

**Room: Marriott Hotel: San Jose Ballroom III . . . Tues. 1:30 to 2:45 pm**

#### Full-Field, Phase, and Extended Focus Imaging

*Session Chair: Rainer A. Leitgeb, École Polytechnique Fédérale de Lausanne (Switzerland)*

1:30 pm: **Extended focus Fourier domain optical coherence microscopy and fluorescence lifetime imaging**, Martin L. Villiger, Cedric Blatter, Adrian H. Bachmann, Theo Lasser, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Rainer A. Leitgeb, Ecole Polytechnique Fédérale de Lausanne (Switzerland) and Medizinische Univ. Wien (Austria) ..... [6847-39]

1:45 pm: **Dispersion cancelled low coherence interferometry**, Kostadinka K. Bizheva, Prabakar Puvanathan, Kevin Resch, Univ. of Waterloo (Canada); Jeff Lundeen, Univ. of Oxford (United Kingdom); Morgan Mitchell, Institut de Ciències Fotòniques (Spain) ..... [6847-40]

2:00 pm: **Depth-encoded spectral domain phase microscopy for simultaneous multisite nanoscale displacement measurements**, Bradley A. Bower, Audrey K. Ellerbee, Joseph A. Izatt, Duke Univ. .... [6847-41]

2:15 pm: **Single-shot full-field OCT based on four quadrature phase-stepped interferometer**, Molly S. Hrbebesch, Yamagata Univ. (Japan) [6847-43]

2:30 pm: **Dynamic focusing with radial gratings for in vivo high resolution imaging**, Linbo Liu, Nanguang Chen, National Univ. of Singapore (Singapore) ..... [6847-44]

Coffee Break ..... 2:45 to 3:30 pm

## SESSION 8

Room: Marriott Hotel: San Jose Ballroom III . . . Tues. 3:30 to 5:30 pm

## Novel Contrast Mechanisms

*Session Chair: Stephen A. Boppart,*  
Univ. of Illinois at Urbana-Champaign3:30 pm: **Spectral domain magnetomotive OCT imaging of magnetic nanoparticle biodistribution**, Amy L. Oldenburg, Vasilica Crecea, Stephanie A. Rinne, Robabeh Rezaeiipoor, Eric J. Chaney, Stephen A. Boppart M.D., Univ. of Illinois at Urbana-Champaign . . . . . [6847-45]3:45 pm: **Fourier domain pump-probe optical coherence tomography: hemoglobin imaging at 830 nm**, Brian E. Applegate, Desmond Jacob, Texas A&M Univ.; Joseph A. Izatt, Duke Univ. . . . . [6847-46]4:00 pm: **Thermoelastic optical Doppler tomography of biological tissues**, Qiang Wang, Yeh-Chan Ahn, Univ. of California/Irvine; Hui-Hua K. Chiang, Yang-Ming Univ. (Taiwan); Changsoo Kim, Lingfeng Yu, Wangcun Jia, Zhongping Chen, Univ. of California/Irvine . . . . . [6847-47]4:15 pm: **Measurement of the hemoglobin oxygen saturation level with spectroscopic spectral-domain optical coherence tomography**, Cheng-Kuang Lee, Chih-Wei Lu, Meng-Tsan Tsai, Yih-Ming Wang, Chih-Chung Yang, National Taiwan Univ. (Taiwan) . . . . . [6847-48]4:30 pm: **Visible-light OCT spectrometer for microvascular oximetry**, Sergey V. Gangnus, Stephen J. Matcher, The Univ. of Sheffield (United Kingdom) . . . . . [6847-49]4:45 pm: **Quantifying permeability of glucose in rhesus monkey skin in vivo and pig aorta in vitro using optical coherence tomography**, Mohamad G. Ghosn, Esteban F. Carbajal, Natasha A. Befrui, Univ. of Houston; Valery V. Tuchin, Saratov State Univ. (Russia); Kirill V. Larin, Univ. of Houston . . . . . [6847-50]5:00 pm: **Motility contrast imaging of tumor response to anti-mitotic cancer drugs**, David D. Nolte, Kwan Jeong, John J. Turek, Purdue Univ. . . . . [6847-51]5:15 pm: **Gold nanoshells for increasing informativeness of OCT imaging**, Elena V. Zagainova, Marina Shirmanova, Nizhny Novgorod State Medical Academy (Russia); Mikhail Y. Kirillin, Univ. of Oulu (Finland); Anna G. Orlova, Irina V. Balalaeva, Vladislav A. Kamensky, Institute of Applied Physics (Russia); Marina V. Sirotkina, Nizhny Novgorod State Medical Academy (Russia) [6847-52]

## Wednesday 23 January

## SESSION 9

Room: Marriott Hotel: San Jose Ballroom III . . . Wed. 8:30 to 10:00 am

## Doppler and Polarization-Sensitive OCT

*Session Chair: Christoph K. Hitzberger,*  
Medizinische Univ. Wien (Austria)8:30 am: **In vivo volumetric imaging of cerebro-vascular blood perfusion in mice through intact skin by optical micro-angiography at 1.3µm wavelength**, Rui-Kang Wang, Oregon Health & Science Univ. . . . . [6847-53]8:45 am: **Optimization of beam scanning patterns for enhanced performance in phase-resolved Doppler OCT**, Benjamin J. Vakoc, William Oh, Adrien E. Desjardins, Guillermo J. Tearney M.D., Brett E. Bouma, Massachusetts General Hospital . . . . . [6847-54]9:00 am: **Polarization-sensitive swept-source optical coherence tomography with continuous polarization modulation**, Masahiro Yamanari, Shuichi Makita, Toyohiko Yatagai, Yoshiaki Yasuno, Tsukuba Univ. (Japan) . . . . . [6847-55]9:15 am: **Flow velocity analysis with joint spectral and time domain OCT**, Maciej Szkulmowski, Maciej Wojtkowski, Anna Szkulmowska, Andrzej Kowalczyk, Univ. Mikolaja Kopernika (Poland) . . . . . [6847-56]9:30 am: **Doppler calibration method for spectral-domain OCT spectrometers**, Dirk J. Faber, D. M. de Bruin, Vitali Kodach, Harry de Vries, Ton van Leeuwen, Univ. van Amsterdam (Netherlands) . . . . . [6847-57]9:45 am: **Simultaneous analysis of extinction and flow velocities with joint spectral and time domain OCT**, Maciej Wojtkowski, Maciej Szkulmowski, Tomasz Bajraszewski, Anna Szkulmowska, Andrzej Kowalczyk, Univ. Mikolaja Kopernika (Poland) . . . . . [6847-58]

Coffee Break . . . . . 10:00 to 10:30 am

## SESSION 10

Room: Marriott Hotel: San Jose Ballroom III . . . Wed. 10:30 am to 12:00 pm

## Fourier-Domain OCT: Image Enhancement

*Session Chair: Wolfgang Drexler,* Cardiff Univ. (United Kingdom)10:30 am: **Simple technique for full-range complex spectral domain optical coherence tomography**, Bernhard Baumann, Michael Pircher, Erich Götzinger, Christoph K. Hitzberger, Medizinische Univ. Wien (Austria) . . . . . [6847-59]10:45 am: **Phase manipulation without phase shifter for complex FDOCT signal reconstruction and resonant Doppler imaging**, Rainer A. Leitgeb, Roland Michaely, Adrian Bachmann, Martin Villiger, Theo Lasser, Cedric Blatter, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [6847-60]11:00 am: **Filter bank modeling and processing for FD-OCT**, Bernd Hofer, Cardiff Univ. (United Kingdom) and Technische Univ. Wien (Austria); Boris Povazay, Angelika Unterhuber, Boris Hermann, Cardiff Univ. (United Kingdom); Gerald Matz, Technische Univ. Wien (Austria); Wolfgang Drexler, Cardiff Univ. (United Kingdom) . . . . . [6847-61]11:15 am: **In vivo full range Fourier domain optical coherence tomography**, Rui-Kang Wang, Oregon Health & Science Univ. . . . . [6847-62]11:30 am: **Artifacts removal with a piezoelectric fiber stretcher in Fourier domain OCT**, Sébastien Vergnole, Guy Lamouche, Marc Dufour, Bruno Gauthier, National Research Council Canada (Canada) . . . . . [6847-63]11:45 am: **Full range 1-µm spectral domain optical coherence tomography by using electro-optical phase modulator**, Tapio Fabritius, Univ. of Tsukuba (Japan) and Univ. of Oulu (Finland); Shuichi Makita, Masahiro Yamanari, Univ. of Tsukuba (Japan); Youngjoo Hong, Korea Advanced Institute of Science and Technology (South Korea); Risto Myllylä, Univ. of Oulu (Finland); Toyohiko Yatagai, Yoshiaki Yasuno, Univ. of Tsukuba (Japan) . . . . . [6847-64]

Lunch/Exhibition Break. . . . . 12:00 to 1:30 pm

## SESSION 11

Room: Marriott Hotel: San Jose Ballroom III . . . Wed. 1:30 to 3:00 pm

## In Vivo Imaging Applications

*Session Chair: Peter Eskil Andersen,*  
Danmarks Tekniske Univ. (Denmark)1:30 pm: **An environmental chamber based OCT system for high-throughput longitudinal imaging of the embryonic heart**, Michael W. Jenkins, Case Western Reserve Univ.; Desmond C. Adler, Massachusetts Institute of Technology; Madhusudhana Gargasha, Case Western Reserve Univ.; Robert Huber, Ludwig-Maximilians-Univ. München (Germany); Osman Q. Chughtai, Lindsey M. Peterson, David L. Wilson, Michiko Watanabe, Case Western Reserve Univ.; James G. Fujimoto, Massachusetts Institute of Technology; Andrew M. Rollins, Case Western Reserve Univ. . . . . [6847-65]1:45 pm: **Real-time optical coherence tomography for the intraoperative microscopic assessment of surgical margins in breast cancer**, Freddy T. Nguyen, Adam M. Zysk, Univ. of Illinois at Urbana-Champaign; Jan G. Kotynek, Uretz J. Oliphant, Frank J. Bellafiore M.D., Kendrith M. Rowland, Patricia A. Johnson M.D., Carle Foundation Hospital and Carle Clinic Association; Eric J. Chaney, Univ. of Illinois at Urbana-Champaign; Stephen A. Boppart M.D., Univ. of Illinois at Urbana-Champaign and Carle Foundation Hospital and Carle Clinic Association . . . . . [6847-66]2:00 pm: **In vivo imaging and vibration measurement of guinea pig cochlea**, Niloy Choudhury, Fangyi Chen, Jiefu Zheng, Alfred L. Nuttall, Steven L. Jacques, Oregon Health & Science Univ. . . . . [6847-67]2:15 pm: **Versatile confocal/optical coherence tomography system for embryonic developmental imaging**, Adrian Bradu, Lisha Ma, Adrian Podoleanu, Jim Bloor, Univ. of Kent (United Kingdom) . . . . . [6847-68]2:30 pm: **Monitoring the evolution of oral cancerous tissue with swept-source optical coherence tomography**, Meng-Tsan Tsai, Hsiang-Chieh Lee, Chih-Wei Lu, Yih-Ming Wang, Cheng-Chang Chang, Chih-Chung Yang, Chun-Ping Chiang, National Taiwan Univ. (Taiwan) . . . . . [6847-69]2:45 pm: **Dynamic analysis of eccrine sweat glands on human fingertips by optical coherence tomography**, Masamitsu Haruna, Masato Ohmi, Yoshihiro Ueda, Akihiro Yamada, Hiroyuki Saigusa, Osaka Univ. (Japan) . . . . . [6847-70]

Coffee Break . . . . . 3:00 to 3:30 pm

# Conference 6847

## SESSION 12

Room: Marriott Hotel: San Jose Ballroom III . . . . Wed. 3:30 to 5:30 pm

### OCT Signal and Image Processing

Session Chair: **Valery Viktorovich Tuchin**,  
Saratov State Univ. (Russia)

- 3:30 pm: **Clustering of spectroscopic optical coherence tomography images for contrast enhancement, segmentation, and diagnosis**, Costas Pitris, Andreas Kartakoulis, Panayiotis Ioannides, Univ. of Cyprus (Cyprus) . . . . . [6847-71]
- 3:45 pm: **Automated calculation of fiber orientation from three-dimensional cardiac optical coherence tomography volumes**, Christine P. Fleming, Case Western Reserve Univ.; Crystal M. Ripplinger, Washington Univ. in St. Louis; Bryan Webb, Case Western Reserve Univ.; Igor R. Efimov, Washington Univ. in St. Louis; Andrew M. Rollins, Case Western Reserve Univ. . . . . [6847-72]
- 4:00 pm: **Alignment of intravascular optical coherence tomography movies affected by non-uniform rotation distortion**, Gijs van Soest, Erasmus Univ. Medical Ctr. (Netherlands); Hans Bosch, Univ. Medisch Ctr. Rotterdam (Netherlands); Ton van der Steen, Univ. Medisch Ctr. Rotterdam (Netherlands) and Erasmus Univ. Medical Ctr. (Netherlands) . . . . . [6847-73]
- 4:15 pm: **Denoising and four-dimensional volume visualization of OCT images**, Madhusudhana Gargasha, Michael W. Jenkins, Case Western Reserve Univ.; Nnamdi C. Osia, Univ. of Maryland/Baltimore; Andrew M. Rollins, David L. Wilson, Case Western Reserve Univ. . . . . [6847-74]
- 4:30 pm: **Real time signal processing for spectral domain optical coherence tomography using field programmable gate arrays**, Teoman Ustun, R. Daniel Ferguson, Nicusor Iftimia, Daniel Hammer, Physical Sciences Inc. . . . . [6847-75]
- 4:45 pm: **On the speckle size in optical coherence tomography**, Guy Lamouche, Charles-Etienne Bisailon, Sébastien Vergnole, Jean-Pierre Monchalain, National Research Council Canada (Canada) . . . . . [6847-76]
- 5:00 pm: **Local variations in bone mineral density: a comparison of OCT versus x-ray micro CT**, Nadezhda Ugryumova, Stephen J. Matcher, The Univ. of Sheffield (United Kingdom) . . . . . [6847-77]
- 5:15 pm: **Gouy phase shift in Fourier-domain optical coherence tomography**, Guy Lamouche, Marc L. Dufour, Sébastien Vergnole, Bruno Gauthier, National Research Council Canada (Canada) . . . . . [6847-78]

**Don't miss the weekend**  
**Biomedical Optics Exhibition**  
*San Jose Convention Center, Exhibition Hall 1*  
Saturday 19 January . . . . . 1:00 to 5:00 pm  
Sunday 20 January . . . . . 10:00 am to 4:00 pm



# Advanced Biomedical and Clinical Diagnostic Systems VI

*Conference Chairs:* **Tuan Vo-Dinh**, Duke Univ.; **Warren S. Grundfest**, UCLA; **David A. Benaron**, Spectros Corp.; **Gerald E. Cohn**, Cyber Tech Applied Science

*Conference Co-Chairs:* **James N. Herron**, The Univ. of Utah; **James J. Leary**, ; **Anita Mahadevan-Jansen**, Vanderbilt Univ.; **Richard B. Thompson**, Univ. of Maryland/Baltimore; **Joseph R. Lakowicz**, Univ. of Maryland/Baltimore; **Zygmunt Karol Gryczynski**, Univ. of North Texas

*Program Committee:* **Leslie Baillie**, Univ. of Maryland/College Park; **Jennifer Kehlet Barton**, The Univ. of Arizona; **Irving J. Bigio**, Boston Univ.; **Claude Boccard**, École Supérieure de Physique et de Chimie Industrielles (France); **Stephen G. Bown**, Univ. College London (United Kingdom); **Sabato D'Auria**, Consiglio Nazionale delle Ricerche (Italy); **Cheryl Dawn DiCarlo**, U.S. Army Institute of Surgical Research; **Daniel L. Farkas**, Cedars-Sinai Medical Ctr.; **Amir H. Gandjbakhche**, National Institutes of Health; **Christopher D. Geddes**, Univ. of Maryland/Baltimore; **Ewa M. Goldys**, Macquarie Univ. (Australia); **Joseph A. Izatt**, Duke Univ.; **Omar S. Khalil**, Abbott Labs.; **Richard M. Levenson**, Cambridge Research & Instrumentation, Inc.; **Hong Liu**, Univ. of Oklahoma; **Laura Marcu**, Univ. of California/Davis; **Joseph A. Miragliotta**, Johns Hopkins Univ.; **Mary-Ann Mycek**, Univ. of Michigan; **Maria Teresa C. A. Neves-Petersen**, Aalborg Univ. (Denmark); **Marcia L. Vernon**, Institut National d'Optique (Canada); **Georges A. Wagnières**, École Polytechnique Fédérale de Lausanne (Switzerland); **William P. Wiesmann**, Sekos, Inc.; **Tony Wilson**, Univ. of Oxford (United Kingdom); **Ruth M. Woodward**, HT Consultants Ltd. (United Kingdom); **Xiao-Hong Nancy Xu**, Old Dominion Univ.

## Sunday 20 January

### SESSION 1

Room: Conv. Ctr. A3 ..... Sun. 8:30 to 10:10 am

#### New Modalities In Diagnostic Instrumentation

8:30 am: **Source-based hyperspectral imaging spectroscopy for clinical applications**, Maritoni Litorja, David W. Allen, Steven W. Brown, National Institute of Standards and Technology; Karel Zuzak, The Univ. of Texas at Arlington ..... [6848-01]

8:50 am: **Automated temperature dependent calibration of liquid crystal cells for implementation in an imaging Mueller matrix noninvasive skin cancer detection system**, Justin S. Baba, Philip R. Boudreaux, Oak Ridge National Lab. .... [6848-02]

9:10 am: **A low cost CD4 counter for global health impact: minimalist technology for maximum impact**, J. Paul Robinson, Purdue Univ.; Gary Durack, iCyt Visionary Bioscience, Inc.; Hildred Rochon, Lova Rakotomalala, Purdue Univ. .... [6848-03]

9:30 am: **SSOCT/laser therapy system for pancreatic cancer diagnosis and therapy**, Nicusor V. Iftimia, Daniel Hammer, Teoman Ustun, Daniel Ferguson, Physical Sciences Inc.; William Brugge, Massachusetts General Hospital ..... [6848-04]

9:50 am: **Development of a practical vein viewing system for vein punctures in children**, Natascha Cuper D.V.M., Rudolf M. Verdaasdonk, Erica Septer, Rowland d. Roode, Univ. Medisch Ctr. Utrecht (Netherlands) ..... [6848-05]  
Coffee Break ..... 10:10 to 10:40 am

### SESSION 2

Room: Conv. Ctr. A3 ..... Sun. 10:40 am to 12:20 pm

#### Near Infrared Methods

10:40 am: **A low-cost, linear, DC - 35 MHz, high-power LED driver for continuous wave (CW) and fluorescence lifetime imaging (FLIM)**, Sylvain Gioux, Beth Israel Deaconess Medical Ctr. and Boston Univ.; Vida Kianzad, Razvan Ciocan, Beth Israel Deaconess Medical Ctr.; Jeffrey Thumm, Duke-River Engineering Co.; Chad Nelson, Maxim Integrated Products, Inc.; John V. Frangioni, Beth Israel Deaconess Medical Ctr. .... [6848-06]

11:00 am: **Pressure-enhanced near-infrared breast imaging: phantom and normal subject tests**, Shudong Jiang, Brian W. Pogue, Ashley M. Laughney, Keith D. Paulsen, Dartmouth College ..... [6848-07]

11:20 am: **Fluorescence-enhanced imaging using a novel hand-held based optical imager: phantom studies**, Jiajia Ge, Banghe Zhu, Steven Regalado, Anuradha Godavarty, Florida International Univ. .... [6848-08]

11:40 am: **Hemoglobin concentration changes derived with a new algorithm for continuous wave near infrared spectroscopy applied in in-vivo animal experiments and on human skin**, John H. G. M. Klaessens, Univ. Medisch Ctr. Utrecht (Netherlands); Jeroen C. W. Hopman, Kian D. Liem, Johan Thijssen, Univ. Children's Hospital Nijmegen (Netherlands); Rowland d. Roode, Rudolf M. Verdaasdonk, Univ. Medisch Ctr. Utrecht (Netherlands) ..... [6848-09]

12:00 pm: **Blood glucose prediction using neural network**, Siang Soh Chit, Univ. Malaya (Malaysia); Xiqin Zhang, Nanyang Technological Univ. (Singapore); Jianhong Chen, Nanayng Technological Univ. (Singapore); P. Raveendran, Univ. Malaya (Malaysia); Phey Hong Soh, Nanyang Technological Univ. (Singapore); Joon Hock Yeo, Nanayng Technological Univ. (Singapore) ..... [6848-10]

Lunch/Exhibition Break ..... 12:20 to 1:30 pm

### SESSION 3

Room: Conv. Ctr. A3 ..... Sun. 1:30 to 3:10 pm

#### Fluorescence Systems

1:30 pm: **Spectral-domain low coherence interferometry system for fine/core needle biopsy guidance**, Danthu Vu, Teoman Ustun, Daniel X. Hammer, Nicusor V. Iftimia, Physical Sciences Inc. .... [6848-11]

1:50 pm: **Spectral-domain optical coherence reflectometric sensor for highly sensitive detection of protein arrays**, Chulmin Joo, Massachusetts General Hospital; Emre I. Ozkumur, James Needham, M. Selim Unlu, Boston Univ.; Johannes F. de Boer, Massachusetts General Hospital. .... [6848-12]

2:10 pm: **Endoscopic low coherence interferometry in upper airways**, Yves Delacrétaz, Florian Charrière, Jonas Kühn, Tristan Colomb, Christian D. Depeursinge, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Florian Lang, Ctr. Hospitalier Univ. Vaudois (Switzerland) ..... [6848-13]

2:30 pm: **Near-infrared fluorescence spectroscopy and imaging for cancer detection in the colon**, Xiaozhuo Shao, Jianhua Mo, Wei Zheng, Zhiwei Huang, National Univ. of Singapore (Singapore) ..... [6848-14]

2:50 pm: **Autofluorescence spectroscopy and imaging for cancer detection in the head and neck**, Kan Lin, Wei Zheng, Zhiwei Huang, National Univ. of Singapore (Singapore) ..... [6848-15]

Coffee Break ..... 3:10 to 3:40 pm

### SESSION 4

Room: Conv. Ctr. A3 ..... Sun. 3:40 to 5:40 pm

#### Noninvasive Techniques

3:40 pm: **Development of a point-of-care diagnostic instrument for the quantification of bilirubin in cerebral spinal fluid**, Fred R. Beyette, Jr., Xanthostat Diagnostics Inc. and Univ. of Cincinnati; William L. Wurster, Gail Pyne-Geithman, Xanthostat Diagnostics Inc; Chad J. Morgan M.D., Joseph F. Clark, Xanthostat Diagnostics Inc. .... [6848-16]

4:00 pm: **Simultaneous time- and wavelength-resolved spectroscopy aiming to the real-time tissue diagnosis**, Yinghua H. Sun, Univ. of California/Davis and NSF Ctr. for Biophotonics Science & Technology; Rui Liu, Univ. of California/Davis; Daniel S. Elson, Imperial College London; Chris Hollars, Univ. of California/Davis; Javier A. Jo, Texas A&M Univ.; Jesung Park, Yang Sun, Laura Marcu, Univ. of California/Davis ..... [6848-17]

4:20 pm: **Nonlinear optical measurements of glucose concentration**, Vladislav V. Yakovlev, Univ. of Wisconsin/Milwaukee ..... [6848-18]

4:40 pm: **Vanishing 'tattoo' multisensor for biomedical diagnostics**, Ewa Moczko, Boris A. Veksler, Igor V. Meglinski, Sergey A. Piletsky, Cranfield Univ. (United Kingdom) ..... [6848-19]

# Conference 6848

5:00 pm: **Joint optical-electrical technique for non-invasive glucose measurement**, Edgar Guevara, Univ. Autónoma de San Luis Potosí (Mexico); Ricardo Femat, Instituto Potosino de Investigación Científica y Tecnología (Mexico); Francisco J. Gonzalez, Univ. Autónoma de San Luis Potosí (Mexico) . . . . . [6848-20]

5:20 pm: **Effects of compression injury on brain mitochondrial and tissue viability evaluated by a multiparametric monitoring system**, Galit Bachbut, Efrat Barbiro-Michaely, Avraham Mayevsky, Bar-Ilan Univ. (Israel) . . . [6848-21]

## Monday 21 January

### SESSION 5

Room: Conv. Ctr. A3 . . . . . Mon. 8:30 to 11:40 am

#### Biosensors and Labeling

8:30 am: **Automated method for RNFL segmentation in spectral domain OCT**, Amit S. Paranjape, Badr Elmaanaoui, Jordan Dewelle, H. Grady Rylander III, Thomas E. Milner, The Univ. of Texas at Austin. . . . . [6848-23]

8:50 am: **Photonic molecular immobilization technology and its use for nanolabeling, ultra-sensitive microarray sensing, and new biomarkers discovery**, Maria Teresa C. A.Neves-Petersen, Meg Duroux, Esben Skovsen, Laurent Duroux, Steffen B. Petersen, Aalborg Univ. (Denmark) . . . . . [6848-24]

9:10 am: **An optical multi-channel plastic biochip based on fluorescence anisotropy**, Francesco Baldini, Cosimo Trono, Ambra Giannetti, Andrea A. Mencaglia, Istituto di Fisica Applicata Nello Carrara (Italy); Giampiero Porro, DATAMED S.r.L. (Italy); Adolfo Carloni, Istituto di Fisica Applicata Nello Carrara (Italy) . . . . . [6848-25]

9:30 am: **Effects of catheter bending on images from single and dual detector PS-OCT**, Kathy Zheng, Brigham and Women's Hospital; Mark E. Brezinski, Brigham and Women's Hospital. . . . . [6848-26]

9:50 am: **A clinical instrument for spectral diagnosis of cutaneous malignancy**, Narasimhan Rajaram, Timothy J. Aramil, Kelvin Lee, James W. Tunnell, The Univ. of Texas at Austin . . . . . [6848-27]

Coffee Break . . . . . 10:10 to 10:40 am

10:40 am: **Multiplexed BioCD for prostate specific antigen detection**, Xuefeng Wang, Ming Zhao, David D. Nolte, Purdue Univ. . . . . [6848-28]

11:00 am: **Generation of antitumor vaccines for h22 tumor on mouse using photodynamic therapy**, Yingxin Li, Hongyu Zhang, Tianjin Medical Univ. (China) . . . . . [6848-29]

11:20 am: **SiOB three-dimensional micromirror OCT probe for in vivo optical biopsy**, Janak Singh, Yingshun Xu, C. S. Premachandran, Jason H. S.Teo, Kairyanto B. R.Ahmad, Kelvin W. S.Chen, Institute of Microelectronics (Singapore); Nanguang Chen, Colin J. R.Sheppard, National Univ. of Singapore (Singapore); Malini Olivo, National Cancer Ctr. of Singapore (Singapore) . . . . . [6848-30]

Lunch Break . . . . . 11:40 am to 1:00 pm

### SESSION 6

Room: Conv. Ctr. A3 . . . . . Mon. 1:00 to 5:30 pm

#### Advanced Tissue Diagnostic Systems

1:00 pm: **Time-resolved fluorescence spectroscopy with single-fiber catheter for intravascular study**, Jesung Park, Yang Sun, Univ. of California/Davis; Thannassis Papaioannou, Cedars-Sinai Medical Ctr.; Douglas N. Stephens, Laura Marcu, Univ. of California/Davis . . . . . [6848-31]

1:20 pm: **Real time endoscopic optical biopsy system based on time-resolved laser-induced fluorescence spectroscopy**, Ji-Young Hwang, Ye Yuan, Yuan Zhang, Ehab Mohammed, Jennifer A. Russell, Nanxi Zha, McMaster Univ. (Canada); Louis W. Liu, Frances Tse, Toronto Western Hospital (Canada); Jamal Deen, Qiyin Fang, McMaster Univ. (Canada) . . . . . [6848-32]

1:40 pm: **Mathematical method for pathophysiological interpretation of time-dependent optical spectroscopic signals**, Bradley Fernald, Florida International Univ.; Sanghoon Oh, Miami Children's Hospital and Florida International Univ.; Wei-Chiang Lin, Florida International Univ. . . . . [6848-33]

2:00 pm: **Comparison of Boosting and Partial Least Squares techniques for real-time Pattern Recognition of Brain Activation in Functional Magnetic Resonance Imaging**, Herbert T. Davis III, VisionQuest Inc.; Stefan Posse, Eduardo Castro-Witty, The Univ. of New Mexico; Peter Soliz, VisionQuest Inc. . . . . [6848-34]

2:20 pm: **Fluorescence excitation spectroscopic imaging with a tunable light source and dimensionality reduction using FR-IsoMap: endoscopy with fluorescence dyes, tissue phantoms and tissue**, Daniel S. Elson, Kevin Koh, Imperial College London (United Kingdom); Hao Zhang, Nankai Univ. (China); Karim Lekadir, Guang-Zhong Yang, Imperial College London (United Kingdom) . . . . . [6848-35]

2:40 pm: **Intraoperative needle-based refractive index measurement of human breast tissue**, Adam M. Zysk, Daniel L. Marks, Freddy T. Nguyen, Univ. of Illinois at Urbana-Champaign; Jan G. Kotynek, Uretz J. Oliphant, Frank J. Bellafiore, Patricia A. Johnson, Kendrith M. Rowland, Carle Foundation Hospital and Carle Clinic Association; Stephen A. Boppart, Univ. of Illinois at Urbana-Champaign and Carle Foundation Hospital and Carle Clinic . . . . . [6848-36]

Coffee Break . . . . . 3:00 to 3:30 pm

3:30 pm: **Fluorescence and reflectance spectroscopy and spectral imaging for evaluating surgical margin status during breast cancer resection**, Matthew D. Keller, Shovan K. Majumder, Vanderbilt Univ.; Mark C. Kelley, Ingrid Meszoely, Fouad Boulos, Vanderbilt Univ. Medical Ctr.; Anita Mahadevan-Jansen, Vanderbilt Univ. . . . . [6848-37]

3:50 pm: **A miniature optical smart needle system: needle guidance using optical frequency domain reflectometry**, Brian D. Goldberg, Massachusetts General Hospital and Harvard-MIT Division of Health Sciences and Technology and Massachusetts General Hospital; Reza Motaghian, Massachusetts General Hospital and Massachusetts General Hospital and Harvard Medical School; Priyanka A. Jillella, Massachusetts General Hospital and Massachusetts General Hospital; Brett E. Bouma, Massachusetts General Hospital and Massachusetts General Hospital and Harvard-MIT Division of Health Sciences and Technology; Gary J. Tearney, Massachusetts General Hospital and Massachusetts General Hospital and Harvard Medical School. . . . . [6848-38]

4:10 pm: **Application of fluorescence lifetime imaging and a hyperspectral fluorescence lifetime fiber probe to autofluorescence of skin cancer**, James A. McGinty, Neil P. Galletly, Pieter A. A.De Beule, Christopher W. Dunsby, Mark A. A.Neil, Anthony Chu, Gordon W. H.Stamp, Paul M. W.French, Imperial College London (United Kingdom) . . . . . [6848-39]

4:30 pm: **Optimizing tumor resection using sound and workflow feedback**, Herke J. Noordmans, Peter A. Woerdeman, Peter W. A.Willems, Jan W. Berkelbach van der Sprenkel, Univ. Medisch Ctr. Utrecht (Netherlands)[6848-40]

4:50 pm: **Surface shape parameters and analysis of data captured with use of four-dimensional surface scanners**, Marcin Witkowski, Robert Sitnik, Politechnika Warszawska (Poland); Walter Rapp, Univ. Tübingen (Germany); Bart Haex, Katholieke Univ. Leuven (Belgium); Marcin Kowalski, Smarttech Sp. z o.o. (Poland); Sven Mooshake, DIERS International GmbH (Germany) [6848-41]

5:10 pm: **Clinical applications of in vivo fluorescence confocal laser scanning microscopy**, Chilhwan Oh, Sangyong Park, Junhyung Kim, Seunghan Ha, Gyuman Park, Onseok Lee, Gunwoo Lee, Korea Univ. (South Korea); Byung Seon Chun, DaeGab Gweon, Korea Advanced Institute of Science and Technology (South Korea) . . . . . [6848-42]

### POSTERS-Monday

Room: Conv. Ctr. A3. . . . . Mon. 6:00 to 7:30 pm

*All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.*

*Poster presenters may post their poster papers Monday morning starting at 10:00 am in the Civic Auditorium Complex, and will need to remove their papers immediately following the poster session that evening. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.*

**Various clinical application of phase contrast x-ray**, Chilhwan Oh, Sangyong Park, Seunghan Ha, Gyuman Park, Onseok Lee, Gunwoo Lee, Korea Univ. (South Korea); Jungho Je, Pohang Univ. of Science and Technology (South Korea) . . . . . [6848-43]

**The development of excitation light source device for photodynamic diagnosis**, Hyun Soo Lim, Chungnam National Univ. (South Korea) . . [6848-44]

**Tissue temperature control technique for stationary hyperthermia**, Sergey A. Shevchik, G. V. Zhukov, I. N. Golovanov, Kirill G. Linkov, General Physics Institute (Russia); Vladimir V. Barun, B.I. Stepanov Institute of Physics (Belarus); Boris Y. Kogan, Organic Intermediates and Dyes Institute (Russia); Viktor B. Loschenov II, A.M. Prokhorov General Physics Institute (Russia); Arkady P. Ivanov, B.I. Stepanov Institute of Physics (Belarus) . . . . . [6848-45]

**Parameters of locating carcinoma in blue light induced fluorescence image**, Weiping Gao, Tianjin Medical Univ. (China) . . . . . [6848-46]

**Full field OCT: a tool for pathologists?** Claude Boccara, Ctr. National de la Recherche Scientifique (France) . . . . . [6848-47]

**Imaging hemodynamic changes in a preterm infant brain with two-dimensional diffuse optical tomography**, Feng Gao, Tianjin Univ. (China); Takashi Kusaka, Kagawa Univ. (Japan); Yukio Yamada, The Univ. of Electro-Communications (Japan). . . . . [6848-48]

**CO<sub>2</sub> laser sclerostomy with sclerostomy in glaucoma**, Zhixiao Xue, Tianjin Medical Univ. (China). . . . . [6848-49]

**Fiber-optics based fluorescence lifetime imaging microscopy (FLIM) for the diagnosis of carcinoma**, Yinghua H. Sun, Univ. of California/Davis; Daniel S. Elson, Imperial College London (United Kingdom); Jennifer Phipps, Heather Stoy, Steven Tinling, Frank S. Chuang, Gregory D. Farwell, Laura Marcu, Univ. of California/Davis . . . . . [6848-51]

**Real time monitoring of femto-second laser processing by using optical coherence tomography**, Tae Joong Eom, Ik-Bu Sohn, Young-Chul Noh, Do-Kyeong Ko, Jongmin Lee, Gwangju Institute of Science and Technology (South Korea); Chang-Seok Kim, Eun Joo Jung, Myung Yung Jeong, Pusan National Univ. (South Korea); Eun Seo Choi, Chosun Univ. (South Korea) . . . . . [6848-52]

**Development of a noninvasive diagnostic system for bilirubin quantification utilizing a skin blanching technique**, Suresh K. Alla, Joseph F. Clark, William L. Wurster, Fred R. Beyette, Jr., Univ. of Cincinnati . . . . . [6848-53]

**Protein profile study of clinical samples using laser induced fluorescence as the detection methods: case of cancer and normal cervical tissues**, Santhosh Chidangil, Manipal Univ. (India). . . . . [6848-54]

**A low-cost, universal, and cumulative gating circuit for small and large animal clinical imaging**, Sylvain Gioux, Beth Israel Deaconess Medical Ctr. and Boston Univ.; John V. Frangioni, Beth Israel Deaconess Medical Ctr. . [6848-55]

**Intraoperative near-infrared fluorescence molecular imaging system**, Vida Kianzad, Sylvain Gioux, Razvan Ciocan, Beth Israel Deaconess Medical Ctr.; Aya Matsui, Hokkaido Univ. Hospital; John V. Frangioni, Beth Israel Deaconess Medical Ctr. . . . . [6848-56]

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## Design and Quality for Biomedical Technologies

*Conference Chair:* **Ramesh Raghavachari**, U.S. Food and Drug Administration; **Rongguang Liang**, Carestream Health, Inc.

*Conference Co-Chair:* **Joshua Pfefer**, U.S. Food and Drug Administration

*Program Committee:* **Anthony Joseph Durkin**, Beckman Laser Institute and Medical Clinic; **Jeeseong Hwang**, National Institute of Standards and Technology; **Orhan H. Suleiman**, U.S. Food and Drug Administration; **Jannick Rolland**, Univ. of Central Florida

### Monday 21 January

#### SESSION 1

Room: Conv. Ctr. C4 ..... Mon. 8:30 to 10:00 am

##### Design of Biomedical Imaging Technologies

*Session Chair:* **Ramesh Raghavachari**,  
U.S. Food and Drug Administration

8:30 am: **Recent development in multifunctional endoscope** (*Invited Paper*), Kazuhiro Gono, Olympus Medical Systems Corp. (Japan) ..... [6849-01]

9:00 am: **Optical coherence microscope for invariant high resolution in vivo skin imaging**, Supraja Murali, Jannick P. Rolland, College of Optics & Photonics/Univ. of Central Florida ..... [6849-02]

9:20 am: **High performance time-resolved diffuse optical tomography system**, Nanguang Chen, Weirong Mo, National Univ. of Singapore (Singapore) ..... [6849-04]

9:40 am: **Development and optimization of two-dimensional centering algorithm for the bacteria rapid detection using optical scattering technology (BARDOT) platform**, Euiwon Bae, Andry Lesmana, E. Daniel Hirlleman, Arun K. Bhunia, Purdue Univ. .... [6849-05]

Coffee Break ..... 10:00 am

#### SESSION 2

Room: Conv. Ctr. C4 ..... Mon. 10:30 am to 12:40 pm

##### Optical Design for Biomedical Imaging

*Session Chair:* **Rongguang Liang**, Carestream Health, Inc.

10:30 am: **Design and construction of an array microscope for microscope-slide scanning** (*Invited Paper*), Chen Liang, Artur G. Olszak, DMetrix, Inc.; Michael R. Descour, College of Optical Sciences/The Univ. of Arizona [6849-06]

11:00 am: **An optical imaging system for window chambers in MRI system**, Yuxiang Lin, Mir F. S. Salek, College of Optical Sciences/The Univ. of Arizona; Dominique I. Jennings, Arthur F. Gmitro, The Univ. of Arizona. .... [6849-07]

11:20 am: **Optical design of a multimodal imaging system**, Rongguang Liang, Carestream Health, Inc.; Victor C. Wong, Paul O. McLaughlin, Eastman Kodak Co. .... [6849-08]

11:40 am: **Adaptive optics in ophthalmology: human eye wavefront generator**, Sergey Galetskiy, M.V. Lomonosov Moscow State Univ. (Russia); Tatyana Y. Cherezova, Active Optics Ltd. (Russia); Alexis V. Kudryashov, Moscow State Open Univ. (Russia). .... [6849-09]

12:00 pm: **Multi-wavelength fiber ring laser source for high resolution spectral OCT**, Chang-Seok Kim, Eun Joo Jung, Jae Suk Park, Myung-Yung Jeong, Pusan National Univ. (South Korea); Tae-Joong Eom, Vitali A. Toughbaev, Bong-Ahn Yu, Woojin Shin, Do-Kyeong Ko, Gwangju Institute of Science and Technology (South Korea); Ji-Hye Lee, Univ. of Edinburgh (United Kingdom) ..... [6849-10]

12:20 pm: **1050nm broadband superluminescent light emitting diodes and semiconductor optical amplifier**, Xiangjun Zhao, Lisa T. Li, Zhenghua Wu, Weiming Zhu, Jinyan Jin, Wenchao Xu, Qinian Qi, David Eu, InPhenix Inc. .... [6849-11]

Lunch Break ..... 12:40 pm

#### SESSION 3

Room: Conv. Ctr. C4 ..... Mon. 1:40 to 3:40 pm

##### Quality Assessment of Spectroscopic Systems

*Session Chair:* **Anthony Joseph Durkin**,  
Beckman Laser Institute and Medical Clinic

1:40 pm: **Quantitative evaluation of ViOptix's tissue oximeter in an ex-vivo animal model**, Jian-Min Mao, ViOptix, Inc.; Ronald Xu, The Ohio State Univ.; Bob Lash, ViOptix, Inc. .... [6849-12]

2:00 pm: **Control of systematic and random errors in optical spectroscopy**, Urs Utzinger, Archana Chandrasekaran, Nathaniel D. Kirkpatrick, The Univ. of Arizona. .... [6849-13]

2:20 pm: **Evaluation of a fiber probe coupled with half ball lens for depth-resolved fluorescence measurements**, Franck Jaillon, Wei Zheng, Zhiwei Huang, National Univ. of Singapore (Singapore). .... [6849-14]

2:40 pm: **Clinical validation of optical sensors in the presence and in the absence of a reference technique**, Francesco Baldini, Istituto di Fisica Applicata Nello Carrara (Italy) ..... [6849-15]

3:00 pm: **Validation of a fiberoptic-based UVA-VIS optical property measurement system**, Quanzeng Wang, U.S. Food and Drug Administration and Univ. of Maryland/College Park; Anant Agrawal, U.S. Food and Drug Administration; Nam S. Wang, Univ. of Maryland/College Park; Josh Pfefer, U.S. Food and Drug Administration ..... [6849-16]

3:20 pm: **Thermal properties of gold nanoshells in lipid vesicles and cell membranes by single particle tracking and ratiometric fluorescence measurement**, Matthew L. Clarke, Hyeong Gon Kang, Peter B. Yim, Rani B. Kishore, Kristian Helmersson, Jeeseong Hwang, National Institute of Standards and Technology. .... [6849-17]

Coffee Break ..... 3:40 pm

#### SESSION 4

Room: Conv. Ctr. C4 ..... Mon. 4:00 to 5:40 pm

##### Quality Assessment of Imaging Systems

*Session Chair:* **Joshua Pfefer**, U.S. Food and Drug Administration

4:00 pm: **Validation of luminescent source reconstruction using spectrally resolved bioluminescence images**, John M. Virostko, Vanderbilt Univ.; Alvin C. Powers, Vanderbilt Univ. Medical Ctr.; E. D. Jansen, Vanderbilt Univ. .... [6849-18]

4:20 pm: **Polarization aberration problems in biomedical imaging**, Yanming Zhao, Indiana Univ.; Yan Zhang, Alcon Labs., Inc. .... [6849-19]

4:40 pm: **Quantitative assessment of degradation of the optical quality of rigid endoscopes in clinical practice**, Herke J. Noordmans, Sander Kruit, Patrick Stroosnijder, Henk van den Brink, Rudolf M. Verdaasdonk, Univ. Medisch Ctr. Utrecht (Netherlands). .... [6849-20]

5:00 pm: **Detection of abnormality in biological tissue using optical coherence tomography**, Kit-lu Cheong, Eric W. Clarkson, College of Optical Sciences/The Univ. of Arizona; Jannick P. Rolland, College of Optics & Photonics/Univ. of Central Florida ..... [6849-21]

5:20 pm: **A new light for life sciences**, Claudia B. Jaffe, Lumencor, Inc.; Steven M. Jaffe, Quantum Vision, Inc.; Michieal S. Jones, Lumencor, Inc.; Arlie R. Conner, AC Consulting Services ..... [6849-22]

**POSTERS-Monday**

**Room: Conv. Ctr. C4. . . . . Mon. 6:00 to 7:30 pm**

*Session Chair: Ramesh Raghavachari,  
U.S. Food and Drug Administration*

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**Generation of antitumor vaccines for H22 tumor on mouse,** Yingxin Li, Hongyu Zhang, Tianjin Medical Univ. (China) . . . . . [6849-23]

**A new design of laser scalpel and the measurement of its light intensity distribution,** Jin Fan, Kun Yang, Shanghai Jiao Tong Univ. (China); Xinyu Chai, Qiushi Ren, Shanghai Jiao Tong Univ. . . . . [6849-24]

**Simple models for color changes in a finger during a fingerprint input action,** Atsushi Hori, Nobuyuki Takeoka, Ichiro Fujieda, Ritsumeikan Univ. (Japan) . . . . . [6849-25]

**Software-algorithmic tools of the undertaking the therapeutic procedures in oncology,** Alexander Mikov, Viatcheslav Svirin, M.F. Stelmakh Polyus Research and Development Institute (Russia) . . . . . [6849-26]

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# Multimodal Biomedical Imaging III

Conference Chair: **Fred S. Azar**, Siemens Corporate Research; **Xavier Intes**, Rensselaer Polytechnic Institute

Program Committee: **Mostafa Analoui**, Pfizer Inc.; **Nicholas Ayache**, Institut National de Recherche en Informatique et en Automatique (France); **David A. Boas**, Massachusetts General Hospital; **Nada N. Boustany**, Rutgers Univ.; **Britton Chance**, Univ. of Pennsylvania; **Larry Clarke**, National Cancer Institute; **Sergio Fantini**, Tufts Univ.; **Keyvan Farahani**, National Institutes of Health; **Gultekin Gulsen**, Univ. of California/Irvine; **Mario Khayat**, ART Advanced Research Technologies Inc. (Canada); **Sacha Loiseau**, Mauna Kea Technologies (France); **Dimitris N. Metaxas**, Rutgers Univ.; **Nassir Navab**, Technische Univ. München (Germany); **Tim Nielsen**, Philips Research Labs. (Germany); **Vasilis Ntzachristos**, Massachusetts General Hospital; **Brian W. Pogue**, Dartmouth College; **YanJun Wu**, GlaxoSmithKline; **Birsan Yazici**, Rensselaer Polytechnic Institute; **Arjun G. Yodh**, Univ. of Pennsylvania; **Yantian Zhang**, National Institutes of Health

## Saturday 19 January

### SESSION 1

Room: Conv. Ctr. B2 ..... Sat. 8:50 to 10:30 am

#### Advances in Spectroscopic Imaging and Microscopy

Session Chair: **Daqing Piao**, Oklahoma State Univ.;  
**Fred S. Azar**, Siemens Corporate Research

- 8:50 am: **NIRS evaluates the thinking process of Mushi-kuizan task**, Hideo Eda, Hamamatsu Photonics K.K. (Japan); Yasufumi Kuroda, Bukkyo Univ. (Japan); Naoko Okamoto, Takanori Maesako, Osaka Univ. (Japan) . . . [6850-01]
- 9:10 am: **Fluorescence lifetime estimation of multiple near-infrared dyes in mice**, Guobin Ma, Simon Fortier, Muriel Jean-Jacques, Nicolae Mincu, Zahia Ichalalene, Frederic Leblond, Anader Benyamin-Seeyar, Mario Khayat, ART Advanced Research Technologies Inc. (Canada) . . . . . [6850-02]
- 9:30 am: **Miniprobe-based confocal fluorescence microscopy for in-vivo histopathology of the common bile duct**, Alexander Meining, Valentin Becker, Claus Hann von Weyhern, Roland Schmidt, Christian Prinz, Technische Univ. München (Germany); Anne Osdoit, Mauna Kea Technologies (France) [6850-03]
- 9:50 am: **Characterization of natural fluorescence in mice**, Salim Djeziri, Guobin Ma, Nicolae Mincu, Anader Benyamin Seeyar, ART Advanced Research Technologies Inc. (Canada) . . . . . [6850-04]
- 10:10 am: **Feasibility of miniprobe confocal laser microscopy during double-balloon enteroscopy**, Stephan Miehlke, Univ. Hospital Carl Gustav Carus Dresden (Germany); Anne Osdoit, Mauna Kea Technologies (France); Ahmed Madisch, Daniela Aust, Univ. Hospital Carl Gustav Carus Dresden (Germany); Michael Vieth, Klinikum Bayreuth GmbH (France); Andrea Morgner, Univ. Hospital Carl Gustav Carus Dresden (Germany) . . . . . [6850-05]
- Coffee Break . . . . . 10:30 to 10:50 am

### SESSION 2

Room: Conv. Ctr. B2 ..... Sat. 10:50 am to 12:40 pm

#### Analysis and Reconstruction Techniques

Session Chair: **Xavier Intes**, Rensselaer Polytechnic Institute;  
**Martin B. van der Mark**, Philips Research Labs. (Netherlands)

- 10:50 am: **Discrimination of cysts by spectral DOT: analysis using MRI** (*Invited Paper*), Marjolein van der Voort, Martin B. van der Mark, Leon Bakker, Philips Research Labs. (Netherlands); Anais Leproux, Philips Research Eindhoven (Netherlands); Gert W. t'Hooft, Rik Harbers, Philips Research Labs. (Netherlands); Tim Nielsen, Bernhard J. Brendel, Philips Research Labs. (Germany); Andrea J. Wiethoff, Philips Medical Systems (Netherlands); Stephanie van de Ven, Peter Luijten, Willem Mali, Univ. Medisch Ctr. Utrecht (Netherlands) . . . . . [6850-06]
- 11:20 am: **Data analysis and statistical tests for near-infrared functional studies of the brain**, Angelo Sassaroli, Yunjie Tong, Christian Benes, Sergio Fantini, Tufts Univ. . . . . [6850-07]
- 11:40 am: **Fluorescence diffuse optical imaging: sensitivity analysis in presence of auto-fluorescence and optical properties heterogeneities**, Frederic Leblond, Nicolas Robitaille, Simon Fortier, ART Advanced Research Technologies Inc. (Canada) . . . . . [6850-08]
- 12:00 pm: **Accelerated DOT reconstruction using multiple sub-volumes**, Ronny Ziegler, Philips Research Labs. (Germany) and Free Univ. of Berlin (Germany); Tim Nielsen, Philips Research Labs. (Germany); Dirk Grosenick, Oliver Steinkellner, Axel J. Hagen, Rainer Macdonald, Herbert H. Rinneberg, Physikalisch-Technische Bundesanstalt (Germany) . . . . . [6850-09]
- 12:20 pm: **Discretization error in fluorescence diffuse optical tomography**, Laurel K. Reilly-Raska, Rensselaer Polytechnic Institute . . . . . [6850-10]
- Lunch/Exhibition Break . . . . . 12:40 to 1:40 pm

### SESSION 3

Room: Conv. Ctr. B2 ..... Sat. 1:40 to 4:10 pm

#### Multimodality Imaging

Session Chair: **Gultekin Gulsen**, Univ. of California/Irvine;  
**Xavier Intes**, Rensselaer Polytechnic Institute

- 1:40 pm: **Diffuse optical-MRI fusion and applications** (*Invited Paper*), Frédéric Lesage, Mathieu Dehaes, Louis Gagnon, Ecole Polytechnique de Montréal (Canada) . . . . . [6850-11]
- 2:10 pm: **Design and performance analysis of a small-animal fluorescence tomography system coupled to MicroCT**, Dax S. Kepshire, Dartmouth College; Michael Hutchins, ART Advanced Research Technologies Inc. (Canada); Annie Provencher, ART Advanced Research Technologies Inc.; Nicolae Mincu, ART Advanced Research Technologies Inc. (Canada); Frederic Leblond, ART Advanced Research Technologies Inc.; Brian W. Pogue, Dartmouth College; Mario Khayat, ART Advanced Research Technologies Inc. . . . . [6850-12]
- 2:30 pm: **Approach on trans-rectal NIR optical tomography probing for the imaging of prostate with trans-rectal ultrasound correlation** (*Invited Paper*), Daqing Piao, Oklahoma State Univ. . . . . [6850-13]
- Coffee Break . . . . . 3:00 to 3:20 pm
- 3:20 pm: **Quantification of breast tissue/density changes in a high-risk patient taking Tamoxifen using MRI and DOS** (*Invited Paper*), Catherine S. Klifa, Univ. of California/San Francisco . . . . . [6850-14]
- 3:50 pm: **Multi-parameter optical image interpretations based on self-organizing mapping**, Christian D. Klose, Andreas H. Hielscher, Columbia Univ. . . . . [6850-15]

### SESSION 4

Room: Conv. Ctr. B2 ..... Sat. 4:10 to 6:20 pm

#### Network for Translational Research in Optical Imaging: Breast Cancer Diffuse Optical Imaging

Session Chair: **Brian W. Pogue**, Dartmouth College;  
**Fred S. Azar**, Siemens Corporate Research

- 4:10 pm: **Integration of diffuse optical spectroscopy into MRI and CT: analysis of geometry and calibration issues** (*Invited Paper*), Brian W. Pogue, Dartmouth College . . . . . [6850-16]
- 4:40 pm: **Co-registered diffuse optical and positron emission tomography of human breast** (*Invited Paper, Presentation Only*), Soren D. Konecky, Univ. of Pennsylvania . . . . . [6850-17]
- 5:10 pm: **Dynamic imaging using a multi-modality system and novel contrast agents** (*Invited Paper*), Gultekin Gulsen, Univ. of California/Irvine . . . . . [6850-18]
- 5:40 pm: **MRI-coupled spectrally-resolved fluorescence tomography for in vivo imaging**, Scott C. Davis, Summer L. Gibbs-Strauss, Stephen B. Tuttle, Dartmouth College; Hamid Dehghani, Univ. of Exeter (United Kingdom) and Dartmouth College; Shudong Jiang, Dartmouth College; Roger Springett, Dartmouth College and Thayer School of Engineering; Keith D. Paulsen, Brian W. Pogue, Dartmouth College. . . . . [6850-19]
- 6:00 pm: **Variability of pharmacokinetic parameters in ICG imaging**, Mehmet B. Unlu, Ozlem Birgul, Roshanak Shafiiha, Gultekin Gulsen, Univ. of California/Irvine . . . . . [6850-20]

**BIOS Hot Topics**  
*Convention Center J1-J4*  
**Saturday 19 January • 7:00 to 9:30 pm**  
*See p. 23 for details.*

## Monday 21 January

### POSTERS-Monday

**Room: Civic Auditorium Complex . . . . . Mon. 6:00 to 7:30 pm**

*Session Chair: Fred S. Azar, Siemens Corporate Research*

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**An analytic reflection method for time-domain fluorescence diffuse optical tomography based on a generalized pulse spectrum technique**, Feng Gao, Huiyuan He, Tianjin Univ. (China) . . . . . [6850-21]

**A self-normalized full time-resolved scheme for fluorescence diffuse optical tomography**, Feng Gao, Huijuan Zhao, Tianjin Univ. (China); Yukari Tanikawa, National Institute of Advanced Industrial Science and Technology (Japan); Yukio Yamada, The Univ. of Electro-Communications (Japan) [6850-22]

**Implementation of a VIS/NIR three-dimensional hyperspectral instrument for in vivo imaging**, Hector Erives, New Mexico Institute of Mining and Technology . . . . . [6850-23]

**Time-resolved diffuse optical tomography of conical geometry by dual-grid strategy**, Yiwen Ma, Shaorun Gong, Fang Yang, Feng Gao, Tianjin Univ. (China) . . . . . [6850-24]

**Second harmonic optical coherence microscopy for functional optical imaging of biological tissues**, Chang-Keun Kim, Sang-Won Lee, Beop-Min Kim, Yonsei Univ. (South Korea) . . . . . [6850-25]

**Feasibility study of enhanced total internal reflection imaging using dielectric films**, Kyujung Kim, Eun-Jin Cho, Yonsei Univ. (South Korea); Donghyun Kim, Yonsei Univ. (South Korea) and School of Electrical Engineering (South Korea); Yong-Min Huh, Yonsei Univ. (South Korea) and School of Medicine (South Korea) . . . . . [6850-26]

**Imaging photoplethysmographic system: a new non-contact approach for visualization of blood perfusion in tissue**, Sijung Hu, Jia Zheng, Loughborough Univ. (United Kingdom) . . . . . [6850-27]

**NIRS-SPM: statistical parametric mapping for near infrared spectroscopy**, Sungho Tak, Kwang-Eun Jang, Jinwook Jung, Yong Jeong, Jong Chul Ye, Korea Advanced Institute of Science and Technology (South Korea) . [6850-28]

**Second order inverse born expansion algorithm for diffuse optical tomography**, Kiwoon Kwon, Dong-Su Ho, Seungduk Lee, Beop-Min Kim, Yonsei Univ. (South Korea) . . . . . [6850-29]

**The visual stimulus system using LED for the brain researchers**, Kosuke Kiyohara, Shigeru Eura, Hideo Eda, Graduate School for Creation of New Photonics Industries (Japan) . . . . . [6850-30]

**Effect of discretization error on the accuracy of diffuse optical imaging**, Murat Guven, Birsen Yazici, Rensselaer Polytechnic Institute; Eldar Giladi, Helicos BioSciences Corp. . . . . [6850-31]

**Evaluation of a non-invasive uniquely-cerebral hemodynamic NIRS system: toward improved specificity in the functional imaging of the brain**, Rolf B. Saager, Andrew Berger, Univ. of Rochester . . . . . [6850-32]

**Hyperspectral small animal fluorescence imaging: spectral selection imaging**, Silas J. Leavesley, Yanan Jiang, Valery Patsekin, Purdue Univ.; Heidi Hall, Douglas Vizard, Carestream Health, Inc.; J. Paul Robinson, Purdue Univ. . . . . [6850-33]

**Wavelet-MDL detrending for near infrared spectroscopy (NIRS)**, Kwang Eun Jang, Sungho Tak, Jinwook Jung, Jong-Chul Ye, Korea Advanced Institute of Science and Technology (South Korea) . . . . . [6850-34]

**Fluorescence diffuse optical tomography with functional and anatomical a priori information**, Yuting Lin, Hao Gao, Orhan Nalcioglu, Gultekin Gulsen, Univ. of California/Irvine . . . . . [6850-35]

**Correction for source decay in bioluminescence tomography**, Mehmet B. Unlu, Gultekin Gulsen, Univ. of California/Irvine . . . . . [6850-36]

**Numerical simulation of thermography for breast tumor detection**, Hongqin Yang, Qingyuan Lin, Fujian Normal Univ. (China); Zhen Ye, Shuqiang Chen, Fujian Medical Univ. (China); Shusen Xie, Fujian Normal Univ. (China) [6850-38]

## Endoscopic Microscopy III

Conference Chair: **Guillermo J. Tearney**, Massachusetts General Hospital; **Thomas D. Wang**, Univ. of Michigan

Program Committee: **Arthur F. Gmitro**, The Univ. of Arizona; **Martin R. Harris**, OptiScan Pty. Ltd. (Australia); **Ralf Kiesslich**, Johannes Gutenberg Univ. Mainz (Germany); **François Lacombe**, Mauna Kea Technologies (France); **Stephen Lam**, British Columbia Cancer Agency (Canada); **Hiroshi Mashimo**, Harvard Medical School; **Kenzi Murakami**, Olympus Corp. (Japan); **Norman S. Nishioka**, Massachusetts General Hospital; **Mark J. Schnitzer**, Stanford Univ.; **Peter T. C. So**, Massachusetts Institute of Technology

### Sunday 20 January

#### SESSION 1

Room: Conv. Ctr. K ..... Sun. 8:30 to 10:20 am

##### Confocal Techniques

Session Chair: **Thomas D. Wang**, Univ. of Michigan

8:30 am: **Pathology for endoscopic microscopists (Invited Paper)**, Guillermo J. Tearney, Massachusetts General Hospital ..... [6851-01]

9:00 am: **Clinical evaluation of a confocal microendoscope for imaging the ovary**, Anthony A. Tanbakuchi, Andrew R. Rouse, Joshua A. Udovich, Arthur F. Gmitro, The Univ. of Arizona ..... [6851-02]

9:20 am: **In-vivo endoscopic autofluorescence microspectro-imaging of bronchi and alveoli**, Genevieve Bourg-Heckly, Univ. Pierre et Marie Curie (France) and Ctr. National de la Recherche Scientifique, UMR 7033; Luc Thiberville M.D., Rouen Univ. Hospital (France); Bertrand Viellerobe, Mauna Kea Technologies (France); Christine Vever-Bizet, Univ. Pierre et Marie Curie (France) and Ctr. National de la Recherche Scientifique, UMR 7033 (France); Mathieu Salaun, Sophie Moreno-Swiric, Rouen Univ. Hospital (France) [6851-03]

9:40 am: **The potential of miniprobe confocal laser microscopy in the diagnosis of gastrointestinal disorders**, Stephan Miehke, Univ. Hospital Carl Gustav Carus Dresden (Germany); Anne Osdoit, Mauna Kea Technologies (France); Andrea Morgner, Daniela Aust, Univ. Hospital Carl Gustav Carus Dresden (Germany); Michael Vieth, Klinikum Bayreuth GmbH (Germany); Ahmed Madisch, Univ. Hospital Carl Gustav Carus Dresden (Germany) ..... [6851-04]

10:00 am: **Deep three-dimensional histology with dual-axes confocal fluorescence microscopy**, Jonathan T. C.Liu, Michael J. Mandella, Wibool Piyawattanametha, Hyejun Ra, Olav Solgaard, Gordon S. Kino, Stanford Univ.; Christopher H. Contag, Stanford Univ. School of Medicine; Thomas D. Wang, Univ. of Michigan ..... [6851-05]

Coffee Break ..... 10:20 to 10:40 am

#### SESSION 2

Room: Conv. Ctr. K ..... Sun. 10:50 pm to 12:30 am

##### Endoscopic OCT

Session Chair: **Guillermo J. Tearney**, Massachusetts General Hospital

10:50 pm: **Laparoscopic optical coherence tomographic imaging of human ovarian cancer**, Lida P. Hariri, The Univ. of Arizona and College of Medicine; Garret T. Bonnema, Kathy Schmidt, Kenneth Hatch M.D., The Univ. of Arizona; Urs Utzinger, The Univ. of Arizona and Dept. of Obstetrics and Gynecology; Molly Brewer M.D., Univ. of Connecticut Health Ctr. and The Univ. of Arizona; Jennifer K. Barton, The Univ. of Arizona ..... [6851-06]

11:10 pm: **A plaque excision catheter with real-time OCT imaging for intravascular surgery**, John F. Black, John B. Simpson M.D., Michael Rosenthal, Wen Lin, Himanshu Patel, Sorin Grunwald, Christina Van, Eduardo Sager, FoxHollow Technologies, Inc. .... [6851-07]

11:30 pm: **In-vivo arthroscopic imaging in patients undergoing meniscectomy: comparisons with MRI and arthroscopy**, Kathy Zheng, Scott Martin, Namita P. Kumar, Bin Liu, Mark E. Brezinski, Brigham and Women's Hospital ..... [6851-08]

11:50 pm: **In vivo comprehensive volumetric microscopy of the distal esophagus for management of Barrett's patients**, Melissa J. Suter, Benjamin J. Vakoc, Norman S. Nishioka M.D., Patrick Yachinski M.D., Milen Shishkov, William Oh, Adrien E. Desjardins, Brett E. Bouma, Guillermo J. Tearney M.D., Massachusetts General Hospital ..... [6851-09]

12:10 am: **Scatter sensitive microscopy techniques to identify contrasting mucosal structures in ultrahigh-resolution optical coherence tomograms of mouse colon**, Alexandre R. Tumlinson, Lida P. Hariri, The Univ. of Arizona; Wolfgang Drexler, Cardiff Univ.; Jennifer K. Barton, The Univ. of Arizona ..... [6851-10]

Lunch/Exhibition Break ..... 12:30 to 1:30 pm

#### SESSION 3

Room: Conv. Ctr. K ..... Sun. 1:30 to 3:10 pm

##### Emerging Imaging Techniques

Session Chair: **Arthur F. Gmitro**, The Univ. of Arizona

1:30 pm: **Two-photon imaging using a flexible endoscope**, Iris Riemann, Selma Schenk, Alexander Ehlers, Fraunhofer-Institut für Biomedizinische Technik (Germany); Bernhard Messerschmidt, Grintech GmbH (Germany); Daniel Sauer, Fraunhofer-Institut für Biomedizinische Technik (Germany); Karsten Koenig, JenLab GmbH (Germany) ..... [6851-11]

1:50 pm: **Two-axis magnetically-driven MEMS scanning catheter for endoscopic spectral-domain optical coherence tomography**, Ki Hean Kim, Boris H. Park, Gopi N. Maguluri, Brett E. Bouma, Massachusetts General Hospital; Tom W. Lee, Fran J. Rogomentich, Mirela G. Bancu, Jonathan J. Bernstein, The Charles Stark Draper Lab., Inc.; Johannes F. de Boer, Massachusetts General Hospital ..... [6851-12]

2:10 pm: **Miniaturized probe using 2 axis MEMS scanner for endoscopic multiphoton microscopy**, Woonggyu Jung, Beckman Laser Institute and Medical Clinic and Biomedical engineering, UC Irvine; Shuo Tang, Beckman Laser Institute and Medical Clinic and Univ. of British Columbia (Canada); Daniel T. McCormick, AdvancedMEMS; Jianping Su, Beckman Laser Institute and Medical Clinic and Univ. of California/Irvine; Tiquiang Xie, Yeh-Chan Ahn, Beckman Laser Institute and Medical Clinic; Bruce J. Tromberg, Zhongping Chen, Beckman Laser Institute and Medical Clinic and Univ. of California/Irvine ..... [6851-13]

2:30 pm: **Three-dimensional in-vivo imaging with a miniature dual-axes confocal fluorescence microscope**, Wibool Piyawattanametha, Michael Mandella, Hyejun Ra, Christine Du, Christopher H. Contag, Gordon S. Kino, Olav Solgaard, Stanford Univ. School of Medicine; Thomas D. Wang, Univ. of Michigan ..... [6851-14]

2:50 pm: **Real-time image mosaicing with a dual-axes confocal microscope**, Kevin E. Loewke, David Camarillo, Wibool Piyawattanametha, Kenneth Salisbury, Jr., Stanford Univ. School of Medicine ..... [6851-15]

Coffee Break ..... 3:10 to 3:30 pm



**SESSION 4****Room: Conv. Ctr. K . . . . . Sun. 3:30 to 5:30 pm****Novel Imaging Approaches***Session Chair: Stephen Lam, The BC Cancer Research Ctr. (Canada)*

3:30 pm: **Artifacts removal in Fourier-domain OCT with a rotating probe**, Sébastien Vergnole, Guy Lamouche, Marc Dufour, Bruno Gauthier, Christian Padioleau, National Research Council Canada (Canada). . . . . [6851-16]

3:50 pm: **High-speed cellular level brain imaging in freely moving mice using fluorescence microendoscopy**, Benjamin A. Flusberg, Axel Nimmerjahn, Eric D. Cocker, Eran A. Mukamel, Robert P. J. Baretto, Tony H. Ko, Juergen C. Jung, Mark J. Schnitzer, Stanford Univ. School of Medicine . . . . . [6851-17]

4:10 pm: **Endoscopic common-path OCT based on sweeping laser source and curled optical patch cord**, Jae Suk Park, Eun Joo Jung, Myung-Yung Jeong, Chang-Seok Kim, Pusan National Univ. (South Korea); Jin Ung Kang, Johns Hopkins Univ. . . . . [6851-18]

4:30 pm: **Peptide contrast agents for in-vivo detection of colonic dysplasia**, Pei-Lin Hsiung, Jonathan Hardy, Christine Du, Stanford Univ. School of Medicine; Shai Friedland, Stanford Univ. School of Medicine and Veterans Affairs Palo Alto Health Care System; Christopher Contag, Stanford Univ. School of Medicine; Thomas Wang, Univ. of Michigan and Veterans Affairs Palo Alto Health Care System. . . . . [6851-19]

4:50 pm: **An endoscope for simultaneous macroscopic navigation and microscopic inspection of luminal sidewalls**, Silas J. Leavesley, Jennifer Sturgis, J. Paul Robinson, Purdue Univ. . . . . [6851-20]

5:10 pm: **Fluorescent and scattering contrast agents in a mouse model of colorectal cancer**, Amy M. Winkler, Photini F. S. Rice, The Univ. of Arizona; Rebekah A. Drezeck, Rice Univ.; Marek Romanowski, Jennifer K. Barton, The Univ. of Arizona. . . . . [6851-21]

**POSTERS-Monday****Monday 21 January Room: Conv. Ctr. K . . . . . Mon. 6:00 to 7:30 pm**

*Session Chairs: Thomas D. Wang, Univ. of Michigan; Guillermo J. Tearney, Massachusetts General Hospital*

*All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.*

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**Spectrally encoded confocal microscopy for large area imaging**, DongKyun Kang, Dvir Yelin, Brett E. Bouma, Guillermo J. Tearney, Massachusetts General Hospital . . . . . [6851-22]

**A novel fiber-bundle based fluorescence endoscopy using speckle pattern illumination**, Yonghong Shao, Junle Qu D.D.S., Haoming Lin, Hanben Niu, Shenzhen Univ. (China). . . . . [6851-24]

# Conference 6852 · Room: Conv. Ctr. B3

Saturday-Sunday 19-20 January 2008 • Proceedings of SPIE Vol. 6852

## Optical Fibers and Sensors for Medical Diagnostics and Treatment Applications VIII

Conference Chair: **Israel Gannot**, Tel Aviv Univ. (Israel)

Program Committee: **Richard O. Claus**, Virginia Tech; **Ilko K. Ilev**, U.S. Food and Drug Administration; **Karl-Friedrich Klein**, Fachhochschule Giessen-Friedberg (Germany); **Pierre Lucas**, The Univ. of Arizona; **Yuji Matsuura**, Tohoku Univ. (Japan)

### Saturday 19 January

#### SESSION 1

Room: Conv. Ctr. B3 ..... Sat. 8:30 to 10:10 am

Session Chair: **Israel Gannot**, Tel Aviv Univ. (Israel)

8:30 am: **A fiber optic probe for measurement of an autonomic dysreflexia event on SCI patients**, Jessica C. Ramella-Roman, Joseph Hidler, The Catholic Univ. of America ..... [6852-01]

8:50 am: **Highly sensitive evanescent wave combination tapered Fiber optic fluorosensor for protein detection**, Vincent Nardone, Davidson College; Rakesh Kapoor, The Univ. of Alabama at Birmingham ..... [6852-02]

9:10 am: **Low concentration biomolecule detection using liquid core photonic crystal fiber SERS sensor**, Chao Shi, Yi Zhang, Claire Gu, Leo Seballos, Jin Z. Zhang, Univ. of California/Santa Cruz ..... [6852-03]

9:30 am: **EMC noise free endoscope using optical fiber communication technology**, Wataru Kubo, Tadashi Minakuchi, Koichi Sato, Koichi Tsutamura, Takaaki Shoji, Kazuo Sugitani, Akira Arimoto, Shinichi Arai, Pentax Corp. (Japan) ..... [6852-04]

9:50 am: **Side-polished fiber immunosensor based on surface plasmon resonance for the detection of Legionella pneumophila**, Yu-chia Tsao, Yang Yi-Wen, Forward Electronics Co., Ltd. (Taiwan); Woo-Hu Tsai, Tsong-Rong Yan, Tatung Univ. (Taiwan) ..... [6852-05]

Coffee Break ..... 10:10 to 10:40 am

#### SESSION 2

Room: Conv. Ctr. B3 ..... Sat. 10:40 am to 12:30 pm

Session Chair: **Pierre Lucas**, The Univ. of Arizona

10:40 am: **1-mm catheterscope (Invited Paper)**, Eric J. Seibel, Univ. of Washington ..... [6852-06]

11:10 am: **The application of the mid-infrared spectral region in dermatological treatment and diagnosis**, Angela B. Seddon, The Univ. of Nottingham (United Kingdom) ..... [6852-07]

11:30 am: **Quality control of UV resistant fibers for 200-300 nm spectroscopic applications**, Mathias Belz, World Precision Instruments, Inc.; Karl-Friedrich Klein, Fachhochschule Giessen-Friedberg (Germany) .. [6852-33]

11:50 am: **Label-free, single molecule all-optical sensor**, Andrea M. Armani, Scott E. Fraser, Richard C. Flagan, California Institute of Technology. [6852-09]

12:10 pm: **Research on the Ge-B codoped sensing fiber's photosensitivity**, Feng Tu, Tao Deng, Yangtze Optical Fibre and Cable Co., Ltd. (China) [6852-10]

Lunch/Exhibition Break ..... 12:30 to 1:30 pm

#### SESSION 3

Room: Conv. Ctr. B3 ..... Sat. 1:50 to 3:10 pm

Session Chair: **Karl-Friedrich Klein**, Fachhochschule Giessen-Friedberg (Germany)

1:50 pm: **Research on the HPCF used for the medical application**, Feng Tu, Huazhong Univ. of Science and Technology (China) ..... [6852-11]

2:10 pm: **Fluoride glass fiber for reliable Er:YAG and Er,Cr:YSGG laser power delivery**, Francois Seguin, Mohammed Saad, Patrick Orsini, Dieter Baierl, IR Photonics (Canada) ..... [6852-12]

2:30 pm: **Dual-wavelength laser radiation through hollow optical fiber for soft and hard tissue ablation**, Tomonori Watanabe, Tohoku Univ. (Japan); Katsumasa Iwai, Sendai National College of Technology (Japan); Yuji Matsuura, Tohoku Univ. (Japan) ..... [6852-13]

2:50 pm: **A new optical fiber biosensor with optical resonator**, Huihua K. Chiang, Yu-Cheng Su, National Yang-Ming Univ. (Taiwan) ..... [6852-15]

Coffee Break ..... 3:10 to 3:40 pm

#### SESSION 4

Room: Conv. Ctr. B3 ..... Sat. 3:40 to 5:40 pm

Session Chair: **Ilko K. Ilev**, U.S. Food and Drug Administration

3:40 pm: **Acoustic manipulation and optical detection of nano-particles in hollow optical fiber**, Eun Sun Kim, Young-Ho Kim, Byung-Chon Jeon, In-Kag Hwang, Chonnam National Univ. (South Korea) ..... [6852-16]

4:00 pm: **Curled optical patch cord for bending insensitive biomedical imaging endoscope**, Chang-Seok Kim, Myung Yung Jeong, Pusan National Univ. (South Korea); Chang-Hyun Jung, Chi-Hwan Ouh, Hee-Jeon Kang, Optomagic Co., Ltd. (South Korea); Young-Geun Han, Hanyang Univ. (South Korea) ..... [6852-17]

4:20 pm: **Novel 1.8- $\mu$ m-band light sources composed of thulium-doped fiber for in-vivo imaging**, Junji Yoshida, Takeshi Segi, Keiji Kaneda, Fujikura Ltd. (Japan) ..... [6852-18]

4:40 pm: **Sensitivity enhancement of an in-fiber Michelson interferometer evanescent wave sensor using a silver nanoparticle-polymer composite overlay**, Pawan S. Sandhu, Jian Yang, Chang-Qing Xu, McMaster Univ. (Canada) ..... [6852-19]

5:00 pm: **Integrated capture and spectroscopic detection of viruses in an aqueous environment**, Allison A. Wilhelm, Pierre Lucas, Kelly A. Reynolds, Mark R. Riley, The Univ. of Arizona ..... [6852-20]

5:20 pm: **Fiber dosimetry for radiation therapy validation**, Indu F. Saxena, Intelligent Optical Systems, Inc.; Gabor Jozsef, New York Univ. .... [6852-34]

#### BIOS Hot Topics

Convention Center J1-J4

Saturday 19 January · 7:00 to 9:30 pm

See p. 23 for details.

### Sunday 20 January

#### SESSION 5

Room: Conv. Ctr. B3 ..... Sun. 8:30 to 10:20 am

Session Chair: **Yuji Matsuura**, Tohoku Univ. (Japan)

8:30 am: **IR waveguides update (Invited Paper)**, James A. Harrington, Rutgers Univ. .... [6852-21]

9:00 am: **The dynamic change in optical behavior of modified fiber tips in water during laser vaporization: effectiveness and safety**, Rudolf M. Verdaasdonk, Herke J. Noordmans, John H. G. M. Klaessens, Rowland de Roode, Tjeerd de Boorder, Univ. Medisch Ctr. Utrecht (Netherlands); Jan W. Blanken, Academisch Ctr. Tandheelkunde Amsterdam (Netherlands) . [6852-22]

9:20 am: **Telemetric light delivery and monitoring system for photodynamic therapy based on solid-state optodes**, Eduardo Margallo-Balbas, Technische Univ. Delft (Netherlands); Henricus J. C. M. Sterenberg, Erasmus Univ. Medical Ctr. (Netherlands); Patrick J. French, Technische Univ. Delft (Netherlands); Dominic J. Robinson, Erasmus Univ. Medical Ctr. (Netherlands) . . . . [6852-23]

9:40 am: **Biomarker monitoring device**, Ponniah Sivanesan, Naresh V. Menon, Paul I. Shnitser, Kevin R. Pichay, Physical Optics Corp.; Mark D. Goldberg, California State Univ./Los Angeles; Camilla Mauzy, Wright-Patterson Air Force Base ..... [6852-24]

10:00 am: **Analysis of the temperature of bent fiber and high optical power at 2140 nm**, Xiaoguang Sun, Jie Li, OFS Specialty Photonics. .... [6852-25]

Coffee Break ..... 10:20 to 10:50 am

**SESSION 6**

**Room: Conv. Ctr. B3 . . . . . Sun. 10:50 am to 12:30 pm**

*Session Chair: James A. Harrington, Rutgers Univ.*

10:50 am: **Temperature measurement of Ho:YAG laser induced bubble in water using silver halide IR optical fiber**, Takehiro Iwasaki, Eriko Nakatani, Tsunenori Arai, Keio Univ. (Japan) . . . . . [6852-26]

11:10 am: **Fabrication of 100- $\mu$ m-bore hollow fiber for infrared transmission**, Katsumasa Iwai, Mitsunobu Miyagi, Sendai National College of Technology (Japan); Yi-Wei Shi, Fudan Univ. (China); Yuji Matsuura, Tohoku Univ. (Japan) . . . . . [6852-27]

11:30 am: **Light-delivery systems for pulsed laser light**, Karl-Friedrich Klein, Fachhochschule Giessen-Friedberg (Germany); Rene Wandschneider, Hartmut Dietz, Hochschule Merseburg (Germany); Hanns-Simon Eckhardt, Fachhochschule Giessen-Friedberg (Germany); Georg Hillrichs, Hochschule Merseburg (Germany) . . . . . [6852-28]

11:50 am: **Optimum taper length for maximum fluorescence signal from an evanescent wave fiber optic biosensor**, Kailiang Sun, Rakesh Kapoor, The Univ. of Alabama at Birmingham. . . . . [6852-29]

12:10 pm: **GeSbSe chalcogenide thin films grown at glancing angle for chemical- and bio-sensing**, Raul J. Martin-Palma, Joseph V. Ryan, Carlo G. Pantano, The Pennsylvania State Univ. . . . . [6852-30]

**Monday 21 January**

**POSTERS-Monday**

**Room: Conv. Ctr. B3 . . . . . Mon. 6:00 to 7:30 pm**

*Session Chair: Israel Gannot, Tel Aviv Univ. (Israel)*

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**Thin hollow glass waveguide for near IR radiation delivery**, Michal Nemeč, Helena Jelinkova, Jan Šulc D.D.S., Czech Technical Univ. (Czech Republic); Mitsunobu Miyagi, Katsumasa Iwai, Sendai National College of Technology (Japan); Yi-Wei Shi, Yuji Matsuura, Tohoku Univ. (Japan) . . . . . [6852-31]

**Transmission of LED-light through optical fibers for optical tissue diagnostics**, Tobias J. Beck, Ludwig-Maximilians-Univ. München (Germany); André Erhardt, KARL STORZ GmbH & Co. KG (Germany); Simone Mitterer, Hilmar Schachenmayr, Herbert G. Stepp, Christian S. Betz, Ludwig-Maximilians-Univ. München (Germany). . . . . [6852-32]

***Don't miss the weekend***  
**Biomedical Optics Exhibition**  
*San Jose Convention Center, Exhibition Hall 1*  
 Saturday 19 January . . . . . 1:00 to 5:00 pm  
 Sunday 20 January . . . . . 10:00 am to 4:00 pm

# Conference 6853A · Room: Conv. Ctr. A1

Saturday-Sunday 19-20 January 2008 • Proceedings of SPIE Vol. 6853A

## Biomedical Vibrational Spectroscopy V: Advances in Research and Industry

*Conference Chair:* **Anita Mahadevan-Jansen**, Vanderbilt Univ.; **Wolfgang Petrich**, Roche Diagnostics GmbH (Germany)

*Program Committee:* **Dieter Naumann**, Robert Koch-Institut (Germany); **Max Diem**, Northeastern Univ.; **Airton Abrahão Martin**, Univ. do Vale do Paraíba (Brazil); **Michael D. Morris**, Univ. of Michigan; **Andrew J. Berger**, Univ. of Rochester; **Nicholas Stone**, Gloucestershire Royal Hospital (United Kingdom)

### Saturday 19 January

#### SESSION 1

Room: Conv. Ctr. A1 ..... Sat. 1:50 to 3:30 pm

##### Cells and Molecules

*Session Chair:* **Nicholas Stone**, Gloucestershire Royal Hospital (United Kingdom)

1:50 pm: **Characterization of human embryonic stem cells using micro-Raman spectroscopy**, James W. Chan, Lawrence Livermore National Lab.; Deborah K. Lieu, Thomas R. Huser, Ronald A. Li, Univ. of California/Davis ..... [6853A-03]

2:10 pm: **Raman spectroscopic study of a genetically altered kidney cell**, Joel Joshi, Hospital Virgen de Macarena (Spain); Francisco Garcia, Univ. de Cádiz (Spain); Silvia Centeno, Univ. de Málaga (Spain); Narahari V. Joshi, Univ. de Los Andes (Venezuela) ..... [6853A-04]

2:30 pm: **Rapid Raman microscopic biochemical imaging for potential histological screening**, Joanne Hutchings, Catherine A. Kendall, Nicholas Stone, Gloucestershire Royal Hospital (United Kingdom) ..... [6853A-33]

2:50 pm: **Practical protocols for ultrafast histopathology by FTIR imaging**, Rohit Bhargava, Rohith K. Reddy, Xavier Llorca, Univ. of Illinois at Urbana-Champaign ..... [6853A-05]

3:10 pm: **Cell imaging by transient fluorescence detected infrared microscopy**, Tsutomu Ohmori, National Defense Medical College (Japan); Makoto Sakai, Tokyo Institute of Technology (Japan); Miya Ishihara, Makoto Kikuchi, National Defense Medical College (Japan); Masaaki Fujii, Tokyo Institute of Technology (Japan) ..... [6853A-02]

Coffee Break ..... 3:30 to 3:50 pm

#### SESSION 2

Room: Conv. Ctr. A1 ..... Sat. 3:50 to 5:30 pm

##### Analytes and Drugs

*Session Chair:* **Andrew J. Berger**, Univ. of Rochester

3:50 pm: **Imaging of anticancer agent distribution by a slit-scanning Raman microscope**, Yoshinori Harada, Kyoto Prefectural Univ. of Medicine (Japan); Taisuke Ota, Osaka Univ. (Japan); Ping Dai, Yoshihisa Yamaoka, Keimei Nakano, Kyoto Prefectural Univ. of Medicine (Japan); Keisaku Hamada, Katsumasa Fujita, Osaka Univ. (Japan); Tetsuro Takamatsu, Kyoto Prefectural Univ. of Medicine (Japan) ..... [6853A-07]

4:10 pm: **Drop coated deposition Raman spectroscopy of human tears: a baseline study**, Jacob Filik, Nicholas Stone, Gloucestershire Royal Hospital (United Kingdom) ..... [6853A-34]

4:30 pm: **Divided shifted Raman spectroscopy for carotenoid detection**, Scott Bergeson, Justin Peatross, Brigham Young Univ.; N. Jay Eyring, John Fralick, Scott B. Ferguson, Pharmanex ..... [6853A-08]

4:50 pm: **Online monitoring of concentration fluctuations of various drugs in a segmented microfluidic system via surface enhanced Raman spectroscopy**, Petra Rösch, Katrin R. Strehle, Anne Maerz, Friedrich-Schiller-Univ. Jena (Germany); Thomas Henkel, Institut für Photonische Technologien e.V. (Germany); Jürgen Popp, Friedrich-Schiller-Univ. Jena (Germany) and Institut für Photonische Technologien e.V. (Germany) ..... [6853A-06]

5:10 pm: **Infrared spectroscopy in cardiovascular diagnostics**, Wolfgang Petrich, Roche Diagnostics GmbH (Germany); Kent B. Lewandrowski, Massachusetts General Hospital; Joseph Muhlestein, M. Elizabeth H. Hammond, Consultant; James Januzzi, Elizabeth L. Lewandrowski, Massachusetts General Hospital; Robert Pearson, LDS Hospital; Brion Dolenko, National Research Council Canada (Canada); Johanna Frueh, Roche Diagnostics GmbH (Germany); Walter Koehler, Consultant (Germany); Reinhold Mischler, Roche Diagnostics GmbH (Germany); Joachim Moecks, Consultant (Germany); Rajmund L. Somorjai, National Research Council Canada (Canada); Arnulf Staib, Ortrud Quarder, Gerhard H. Werner, Rainer Zerback, Roche Diagnostics GmbH (Germany) ..... [6853A-36]

### Sunday 20 January

#### SESSION 3

Room: Conv. Ctr. A1 ..... Sun. 8:30 to 10:20 am

##### Micro-organisms

*Session Chair:* **Dieter Naumann**, Robert Koch-Institut (Germany)

8:30 am: **Microbial typing by Raman spectroscopy (Invited Paper)**, Gerwin J. Puppels, Diana Willemse-Erix, Maarten Scholtes, Jan-Willem Jachtenberg, Tom C. Bakker-Schut, Alex van Belkum, Kees Maquelin, Univ. Medisch Ctr. Rotterdam (Netherlands) ..... [6853A-32]

9:00 am: **Fluorescence and Raman spectroscopic identification of single bacteria**, Jürgen Popp, Friedrich-Schiller-Univ. Jena (Germany) and Institute of Photonic Technology (IPHT) Jena (Germany); Mario Krause, Michaela K. Harz, Michael Schmitt, Petra Roesch, Friedrich-Schiller-Univ. Jena (Germany) ..... [6853A-09]

9:20 am: **Rapid detection of bacterial contamination in cell or tissue cultures based on Raman spectroscopy**, Carsten Bolwien, Gerd Sulz, Fraunhofer-Institut für Physikalische Messtechnik (Germany); Sebastian Becker, Hagen Thielecke, Fraunhofer-Institut für Biomedizinische Technik (Germany); Heike Mertsching, Steffen Koch, Fraunhofer Institut für Grenzflächen- und Bioverfahrenstechnik (Germany) ..... [6853A-10]

9:40 am: **FT-IR spectroscopy of microorganisms at the Robert Koch-Institute: experiences gained during a joint pilot study**, Dieter Naumann, Robert Koch-Institut (Germany) ..... [6853A-11]

10:00 am: **Single cell analysis of liquor cerebrospinalis by means of Raman spectroscopy**, Michaela K. Harz, Michael Kiehntopf, Stephan Stöckel, Petra Rösch, Eberhard Straube, Thomas Deufel, Friedrich-Schiller-Univ. Jena (Germany); Jürgen Popp, IPHT Jena (Germany) ..... [6853A-38]

Coffee Break ..... 10:20 to 10:50 am

#### SESSION 4

Room: Conv. Ctr. A1 ..... Sun. 10:50 am to 12:40 pm

##### In Vivo Application

*Session Chair:* **Max Diem**, Northeastern Univ.

10:50 am: **Spatially offset Raman spectroscopy and diffuse Raman tomography: subsurface spectroscopy and imaging in animal tissue and other scattering media (Invited Paper)**, Michael D. Morris, Univ. of Michigan ..... [6853A-37]

11:20 am: **Development and preliminary results of an in-vivo Raman probe for early lung cancer detection**, Michael A. Short, Stephen Lam, Annette McWilliams, Jianhua Zhao, The BC Cancer Research Ctr. (Canada); Harvey Lui, The Univ. of British Columbia (Canada); Haishan Zeng, The BC Cancer Research Ctr. (Canada) ..... [6853A-12]

#### BiOS Hot Topics

Convention Center J1-J4

Saturday 19 January · 7:00 to 9:30 pm

See p. 23 for details.

## Monday 21 January

## POSTERS-Monday

Room: Conv. Ctr. A1 ..... Mon. 6:00 to 7:30 pm

Session Chair: Wolfgang Petrich, Roche Diagnostics GmbH (Germany)

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11:40 am: **Discrimination between normal gastric tissue and intestinal metaplasia by near-infrared Raman spectroscopy**, Seng K. Teh, Wei Zheng, National Univ. of Singapore (Singapore); Khek Yu Ho M.D., Ming Teh M.D., Khay Guan Yeoh M.D., National Univ. of Singapore (Singapore) and National University Hospital (Singapore); Zhiwei Huang, National Univ. of Singapore (Singapore) ..... [6853A-16]

12:00 pm: **Application study of the optical biopsy system**, Hidetoshi Sato, Toshiaki Suzuki, Shin'ichi Morita, Atsushi Maruyama, The Institute of Physical and Chemical Research (RIKEN) (Japan); Toru Shimosegawa, Yuji Matsuura, Tohoku Univ. (Japan); Gen'ichi Kanai, Machida Endoscope Co., Ltd. (Japan); Nobuo Ura, Soma Opto Co., Ltd. (Japan); Koji Masutani, Micro Science Co. Ltd. (Japan); Yukihiko Ozaki, Kwansai Gakuin Univ. (Japan) ..... [6853A-17]

12:20 pm: **Fourier transform infrared (FTIR) spectroscopy of the colon: an application towards in vivo analysis of colonic neoplasia**, Mark A. Mackanos, Stanford Univ.; John Hargrove, BAE Systems North America; Christine B. Du, Larry K. Wong, Stanford Univ.; Rolf Wolters, Allen B. Poirson, STI Medical Systems; Christopher H. Contag, Thomas D. Wang, Stanford Univ. .... [6853A-15]

Lunch/Exhibition Break ..... 12:40 to 2:00 pm

## SESSION 5

Room: Conv. Ctr. A1 ..... Sun. 2:00 to 4:10 pm

## Gynecology

Session Chair: Airton Abrahão Martin,  
Univ. do Vale do Paraíba (Brazil)

2:00 pm: **Novel Raman signal recovery from deeply buried tissue components (Invited Paper)**, Nicholas Stone, Rebecca N. Baker, Gloucestershire Royal Hospital (United Kingdom); Pavel Matousek, Science and Technology Facilities Council (United Kingdom) ..... [6853A-35]

2:30 pm: **In vivo Raman spectroscopy for breast cancer: diagnosis in animal model**, Renata A. Bitar, Airton A. Martin D.V.M., Mario A. Martins, Dayana Ribeiro, Carolina Carvalho, Univ. do Vale do Paraíba (Brazil); Leandra N. Z.Ramalho, Univ. of Sao Paulo (Brazil); Fernando Soares, Univ. de São Paulo (Brazil); Herculano d. S.Martinho, Univ. do Vale do Paraíba (Brazil) . . [6853A-18]

2:50 pm: **Early identification of cervical neoplasia with Raman spectroscopy and advanced methods for biomedical applications**, Phillip R. Jess, Daniel D. Smith, Iain Cormack, Michael Mazilu, Andrew C. Riches, Simon Herrington, Kishan Dholakia, Univ. of St. Andrews (United Kingdom) [6853A-19]

Coffee Break ..... 3:10 to 3:30 pm

3:30 pm: **Combining near-infrared autofluorescence and Raman spectroscopy enhances the in-vivo diagnosis of precancer in the cervix**, Zhiwei Huang, Jianhua Mo, Wei Zheng, Jeffrey Low, Joseph Ng, A. Ilancheran, National Univ. of Singapore (Singapore) ..... [6853A-20]

3:50 pm: **Use of Raman Spectroscopy to Characterize Healthy Cervical Tissue**, Elizabeth Kanter, Shovan Majumder, Gautam Rao, Anita Mahadevan-Jansen, Vanderbilt Univ. .... [6853A-21]

## SESSION 6

Room: Conv. Ctr. A1 ..... Sun. 4:10 to 6:00 pm

## Technology Development

Session Chair: Michael D. Morris, Univ. of Michigan

4:10 pm: **Exploring tissues with CARS (Invited Paper)**, Eric O. Potma, Univ. of California/Irvine ..... [6853A-22]

4:40 pm: **Integrated Raman and angular-scattering microscopy (IRAM)**, Zachary J. Smith, Andrew J. Berger, Univ. of Rochester ..... [6853A-25]

5:00 pm: **Comparison of Confocal Raman Spectroscopy with a Probe Based Raman Device for Evaluation of Skin Malignancy**, Chetan A. Patil, Vanderbilt Univ.; Nienke Bosschaart, Univ. Twente (Netherlands); Shovan K. Majumder, Anita Mahadevan-Jansen, Vanderbilt Univ. .... [6853A-13]

5:20 pm: **Raman tomography in tissue phantoms and tissue**, Matthew V. Schulmerich, Univ. of Michigan; Subhadra Srinivasan, Dartmouth College; Jaclynn Kreider, Univ. of Michigan Medical School; Jacqueline H. Cole, Kathryn A. Dooley, Steven A. Goldstein, Univ. of Michigan; Brian W. Pogue, Dartmouth College; Michael D. Morris, Univ. of Michigan ..... [6853A-23]

5:40 pm: **Polarization Raman spectroscopy: application to biomechanics**, Mekhala Raghavan, Michael D. Morris, Nadder D. Sahar, David H. Kohn, Univ. of Michigan ..... [6853A-24]

# Conference 6853B · Room: Conv. Ctr. L

Wednesday 23 January 2008 • Proceedings of SPIE Vol. 6853B

## Optical Biopsy VII

Conference Chair: **Robert R. Alfano**, City College/CUNY; **Alvin Katz**, City College/CUNY

Program Committee: **Stavros G. Demos**, Lawrence Livermore National Lab.; **Amir H. Gandjbakhche**, National Institutes of Health; **Israel Gannot**, Tel Aviv Univ. (Israel) and The George Washington Univ. (Israel); **Richard B. Rosen**, The New York Eye and Ear Infirmary; **Urs Utzinger**, The Univ. of Arizona; **Wubao B. Wang**, City College/CUNY; **Daniel Moy**, City College/CUNY

### Wednesday 23 January

#### SESSION 8

Room: Conv. Ctr. L ..... Wed. 9:00 am to 12:10 pm

Session Chair: **Alvin Katz**, City College/CUNY

9:00 am: **Can Raman spectroscopy identify the origin of Paget disease**, Airtón A. Martin, Marcelo Moreno, Herculano d. S.Martinho, Renata A. Bitar-Carter, Ana M. Espírito Santo, Univ. do Vale do Paraíba (Brazil) . . . . [6853B-31]

9:20 am: **Differential Raman spectroscopy for biological samples analysis**, Mário A. Martins, Dayana G. Ribeiro, Daniela F. Teixeira Silva, Airtón A. Martin, Univ. do Vale do Paraíba (Brazil); Adriana Fontes, Univ. Federal de Pernambuco (Brazil); Herculano d. S.Martinho, Univ. do Vale do Paraíba (Brazil) . . [6853B-32]

9:40 am: **In situ Raman study of the instant spectral changes observed in a pancreatic tumor tissue in a living and dead model mouse**, Toshiaki Suzuki, The Institute of Physical and Chemical Research (RIKEN) (Japan); Atsushi Kannno, Kennichi Satoh, Tohoku Univ. (Japan); Toru Asakura, Miyagigakuin Women's Univ. (Japan); Toru Shimosegawa, Tohoku Univ. (Japan); Hidetoshi Sato, The Institute of Physical and Chemical Research (RIKEN) (Japan) . . . . . [6853B-33]

10:00 am: **Raman spectroscopic detection changes in oxidation states of nicotinamide adenine dinucleotides due to oxidative stress in mice skeletal muscles**, Vidyasagar Sriramoju, Alexandra N. Alimova, Rahul Chakraverty, Alvin Katz, Swapan K. Gayen, Robert R. Alfano, City College/CUNY . . . . [6853B-34]

Coffee Break . . . . . 10:20 to 10:50 am

10:50 am: **Fast Fourier fluorescence excitation and emission spectrometer**, Leilei Peng, Jason T. Motz, Guillermo J. Tearney, Brett E. Bouma, Massachusetts General Hospital . . . . . [6853B-35]

11:10 am: **Near-infrared autofluorescence spectroscopy for in-vivo diagnosis of precancer in the cervix**, Jianhua Mo, Wei Zheng, National Univ. of Singapore (Singapore); Jeffrey Low, Joseph S. Y.Ng, Arunachalam Ilancheran, National Univ. Hospital (Singapore); Zhiwei Huang, National Univ. of Singapore (Singapore) . . . . . [6853B-36]

11:30 am: **Autofluorescence dynamics during reperfusion following long-term renal ischemia in a rat model**, Rajesh N. Raman, Univ. of California/Davis; Christopher D. Pivetti, Univ. of California/Davis Medical Ctr.; Dennis L. Matthews, Univ. of California/Davis; Christoph Troppmann, Univ. of California/Davis Medical Ctr.; Stavros G. Demos, Lawrence Livermore National Lab. . . . . [6853B-37]

11:50 am: **A comparative study of intrinsic versus bulk polarized fluorescence in cervical tissues**, Md. Ejaz A. Lodhi, Prashant Shukla, Indian Institute of Technology Kanpur (India); Nidhi Agarwal, Kiran Pandey, Ganesh Shanker Vidhyarthi Memorial Medical College (India); Asima Pradhan, Indian Institute of Technology Kanpur (India) . . . . . [6853B-38]

Lunch Break . . . . . 12:10 to 1:10 pm

#### SESSION 9

Room: Conv. Ctr. L ..... Wed. 1:10 to 3:30 pm

Session Chair: **Alvin Katz**, City College/CUNY

1:10 pm: **Depth information of inhomogeneity in human breast tissue through spatially resolved fluorescence technique**, Rohit B. Patel, M. Anil Kumar, Kalyan Ray, Prashant Shukla, Asima Pradhan, Indian Institute of Technology Kanpur (India); Meetu Dhingra, Asha Agarwal, Ganesh Shanker Vidhyarthi Memorial Medical College (India) . . . . . [6853B-39]

1:30 pm: **Mitochondrial dysfunction: bench-to-bedside optical monitoring of tissue vitality**, Avraham Mayevsky, Bar-Ilan Univ. (Israel); Nava Dekel, Levi Oren, Assaf Deutsch, Eliyahu Pewzner, CritiSense Ltd. (Israel) . . . . [6853B-40]

1:50 pm: **Quantitative fluorescence imaging in turbid media using spatially structured light**, Amaan Mazhar, Beckman Laser Institute and Medical Clinic; David J. Cuccia, Modulated Imaging, Inc.; Anthony J. Durkin, Bruce J. Tromberg, Beckman Laser Institute and Medical Clinic . . . . . [6853B-41]

2:10 pm: **Fluorescence signatures for ovarian cancer screening**, Urs Utzinger, Michalis Michaelides, The Univ. of Arizona; Molly A. Brewer, Univ. of Connecticut Health Ctr. . . . . [6853B-42]

2:30 pm: **Study of lipid rich compositions in the intimal wall of aorta**, Cheng-Hui Liu, Wubao B. Wang, Maya Frankfurt, City College/CUNY . . . . [6853B-43]

2:50 pm: **High Contrast Imaging of Nonmelanoma Skin Cancers**, Anna N. Yaroslavsky, Elena V. Salomatina, Massachusetts General Hospital. [6853B-44]

3:10 pm: **Characterization of Cancer and Normal Tissue Fluorescence through Wavelet Transform and Singular Value Decomposition**, Anita Gharekhan, C.U. Shah Science College (India); Nrusingh C. Biswal, Univ. of Connecticut; Sharad Gupta, Tufts Univ.; Asima Pradhan, Indian Institute of Technology Kanpur (India); M. B. Suresh Kumar, The Maharaja Sayajirao Univ. of Baroda (India); Prasanta K. Panigrahi, Physical Research Lab. (India) . . . . . [6853B-45]

### Monday 21 January

#### POSTERS-Monday

Room: Conv. Ctr. L ..... Mon. 6:00 to 7:30 pm

*All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.*

*Poster presenters may post their poster papers Monday morning starting at 10:00 am in the Civic Auditorium Complex, and will need to remove their papers immediately following the poster session that evening. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.*

**Mucosal layer as major source of green autofluorescence in the rat colon under excitation by blue light**, Keimei Nakano, Yoshinori Harada, Yoshihisa Yamaoka, Kiichiro Miyawaki, Naoki Wakabayashi, Shoji Mitsufuji, Kyoto Prefectural Univ. of Medicine (Japan); Katsuchi Imaizumi, Hideyuki Takaoka, Masaya Nakaoka, Olympus Co., Ltd. (Japan); Tetsuro Takamatsu, Kyoto Prefectural Univ. of Medicine (Japan) . . . . . [6853B-46]

# Optical Interactions with Tissue and Cells XIX

Conference Chair: **Steven L. Jacques**, Oregon Health and Science Univ.; **William P. Roach**, Air Force Research Lab.

Program Committee: **Randolph D. Glickman**, The Univ. of Texas Health Science Ctr. at San Antonio; **Anita Mahadevan-Jansen**, Vanderbilt Univ.; **E. Duco Jansen**, Vanderbilt Univ.; **Jill McQuade**, Air Force Research Lab.; **Jessica C. Ramella-Roman**, The Catholic Univ. of America; **Robert J. Thomas**, Air Force Research Lab.; **Alfred Vogel**, Univ. zu Lübeck (Germany); **Lihong V. Wang**, Washington Univ. in St. Louis

## Monday 21 January

### SESSION 1

Room: Conv. Ctr. C1 ..... Mon. 8:30 am to 12:10 pm

#### Photo-Thermal Interaction

Session Chair: **E. Duco Jansen**, Vanderbilt Univ.

8:30 am: **Controlling heat shock protein expression in laser cancer therapy** (*Invited Paper*), Marissa N. Rylander, Jessica Fisher, Saugata Sarkar, Virginia Polytechnic Institute and State Univ. .... [6854-01]

9:00 am: **Use of optical reporter genes to assess sublethal cellular damage following skin ablation**, Gerald J. Wilmink, Susan R. Opalenik, Jeffrey M. Davidson, E. Duco Jansen, Vanderbilt Univ. .... [6854-02]

9:20 am: **Morphological analysis of embryonic development following femtosecond laser manipulation: part II**, Vikram Kohli, Abdulhakem Y. Elezabi, Univ. of Alberta (Canada) ..... [6854-03]

9:40 am: **NIR-laser tissue welding in-vivo studies in a guinea pig animal model**, Vidyasagar Sriramoju, City College/CUNY; Howard E. Savage, The New York Eye and Ear Infirmary; Alvin Katz, Rakhi Podder, Naghmeh Davatgarzadeh, Rahul Chakraverty, City College/CUNY; Richard B. Rosen, The New York Eye and Ear Infirmary; Robert R. Alfano, City College/CUNY ..... [6854-04]

10:00 am: **Comparison of porcine skin threshold damage by 1.214 micron and 2.0 micron laser irradiations**, Bo Chen, The Univ. of Texas at Austin; Jeffery W. Oliver, Air Force Research Lab.; Rebecca L. Vincelette, Ginger M. Pocock, The Univ. of Texas at Austin; Sharon L. Thomsen, Pathology Consultant to Engineers and Physicists; Ashley J. Welch, The Univ. of Texas at Austin ..... [6854-05]

Coffee Break ..... 10:20 to 10:50 am

10:50 am: **Skin and cornea damage thresholds with continuous wave laser exposures in the infrared wavelength range of 1 to 2 µm**, Jeffrey W. Oliver, Semih S. Kumru, David J. Stolarski, Gary D. Noojin, Michael S. Foltz, Air Force Research Lab. .... [6854-06]

11:10 am: **The potential application of hairless guinea pigs as a replacement for the Yucatan mini-pig in animal studies**, Nichole M. Jindra, Air Force Research Lab.; Michelle L. Imholte, Northrop Grumman Corp. .... [6854-07]

11:30 am: **Air leak seal for lung dissection plane with diode laser irradiation: monitoring heat-denature with auto-fluorescence**, Maya Gotoh, Tsunenori Arai, Keio Univ. (Japan) ..... [6854-08]

11:50 am: **Reshaping of costal cartilage: a numerical model**, Dmitry E. Protsenko, Brian J. Wong M.D., Univ. of California/Irvine ..... [6854-09]

Lunch Break ..... 12:10 to 1:30 pm

### SESSION 2

Room: Conv. Ctr. C1 ..... Mon. 1:30 to 5:10 pm

#### Neural Stimulation

Session Chair: **Anita Mahadevan-Jansen**, Vanderbilt Univ.

1:30 pm: **Frontiers in optical stimulation of neural tissues: past, present, and future** (*Invited Paper*), Jonathon D. Wells, Vanderbilt Univ.; Mark P. Bendett, Jim Webb, Heather A. Ralph, Aculight Corp.; Claus Richter, Vanderbilt Univ.; Agnella D. Izzo, Northwestern Univ.; E. D. Jansen, Anita Mahadevan-Jansen, Vanderbilt Univ. .... [6854-10]

2:00 pm: **Laser stimulation of the auditory system at 1.94µm and microsecond pulse durations**, Agnella D. Izzo, Joseph T. Walsh, Jr., Northwestern Univ.; Heather A. Ralph, Jim Webb, Mark P. Bendett, Jonathon Wells, Aculight Corp.; Claus-Peter Richter, Northwestern Univ. .... [6854-11]

2:20 pm: **Optical stimulation of rat thalamocortical brain slices**, Jonathan M. Cayce, Chris Kao, Gajendiran Mahadevan, Jonathan D. Malphrus, Peter E. Konrad, E. Duco Jansen, Anita Mahadevan-Jansen, Vanderbilt Univ. . [6854-12]

2:40 pm: **Photostimulation of sensory neurons of the rat vagus nerve**, Joseph P. Y.Kao, Albert Y. Rhee, Gong Li, Univ. of Maryland School of Medicine; Jonathon Wells, Aculight Corp. .... [6854-13]

3:00 pm: **Characterization of single auditory nerve fibers in response to laser stimulation**, Philip Littlefield, Agnella D. Izzo, Jagmeet Mundi, Joseph T. Walsh, Jr., Northwestern Univ.; E. Duco Jansen, Vanderbilt Univ.; Mark P. Bendett, Jim Webb, Heather A. Ralph, Aculight Corp.; Claus-Peter Richter, Northwestern Univ. .... [6854-14]

Coffee Break ..... 3:20 to 3:50 pm

3:50 pm: **A microfluidic approach to optical nerve stimulation**, Jonathan D. Malphrus, Jonathan M. Cayce, Vanderbilt Univ.; Chris Kao, Vanderbilt Univ. Medical Ctr.; Gajendiran Mahadevan, Vanderbilt Univ.; Noo-Li Jeon, Univ. of California/Irvine; Peter E. Konrad, Vanderbilt Univ. Medical Ctr.; Anita Mahadevan-Jansen, E. Duco Jansen, Vanderbilt Univ. .... [6854-15]

4:10 pm: **Prosthetic systems for therapeutic optical activation and silencing of genetically-targeted neurons**, Jacob Bernstein, Xiaofeng Qian, Xue Han, Jackie P. McConnell, Emily Ko, Patrick Stern, Edward S. Boyden, Massachusetts Institute of Technology. .... [6854-16]

4:30 pm: **Optical stimulation of excised murine sciatic nerve using 1.8-µm wavelength laser**, Steven L. Jacques, Oregon Health & Science Univ. [6854-17]

4:50 pm: **Photonic stimulation for a vestibular prosthesis**, David M. Harris, Steve Bierer, Univ. of Washington; Jonathon Wells, James O. Philips, Aculight Corp. .... [6854-18]

# Conference 6854

## POSTERS-Monday

Room: Civic Auditorium Complex . . . . . Mon. 6:00 to 7:30 pm

Session Chair: William P. Roach, Air Force Research Lab.

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.

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**Diode laser cartilage reshaping**, Tarek A. El-Tayeb, The German Univ. in Cairo (Egypt); Ahmad Elkharbotly, Yosry Mostafa, Hesham Ibraheim, Cairo Univ. (Egypt) . . . . . [6854-58]

**Morphometric effects of different energy densities of diode laser on adipose tissue in rats**, Halina C. Senhorinho, Gerson L. Bichinho, Percy Nohama, Munir A. Gariba, Pontificia Univ. Católica do Paraná (Brazil) [6854-59]

**Femtosecond laser manipulation techniques for individual patterning of biological micro-object**, Yoichiro Hosokawa, Hamano Life Science Research Foundation (Japan) and Osaka Univ. (Japan); Yuqiang Jiang, Isamu Oh, Osaka Univ. (Japan); Noriko Takizawa, Takayuki Uwada, Kazunori Okano, Hiroshi M. Masuhara, Hamano Life Science Research Foundation (Japan) . . . . . [6854-60]

**Femtosecond cellular transfection using a non-diffracting light beam**, Xanthi Tsampoula, Veneranda G. Garces-Chavez, Muriel M. Comrie, David J. Stevenson, Ben Agate, Christian T. A. Brown, Frank J. Gunn-Moore, Kishan Dholakia, Univ. of St. Andrews (United Kingdom) . . . . . [6854-61]

**Full path Monte-Carlo simulation of fluorescence in non-voxelized complex heterogeneous mouse model**, Jean-Francois Delorme, Guobin Ma, Advanced Research Technologies (Canada); Frederic Lesage, Ecole Polytechnique de Montréal (Canada); Frederic Leblond, Anader Benyamin-Seyar, Advanced Research Technologies (Canada) . . . . . [6854-62]

**Optical characterization of cone-dominated chicken eye tissues**, Fred J. Barrera, Dhiraj K. Sardar, Andrew T. Tsin, The Univ. of Texas at San Antonio . . . . . [6854-63]

10:50 am: **Sub-cellular studies of chronic low-level laser irradiation in the skin**, Nichole M. Jindra, Air Force Research Lab.; Michael L. Denton, Northrup Grumman Corp. . . . . [6854-24]

11:10 am: **The vascular response observation by the monitoring of the photosensitizer, oxygen, and blood flow during the high intensity pulsed excitation photodynamic therapy 1h after water-soluble photosensitizer intravenous injection**, Shiho Hakomori, Hiroki Matsuo, Tsunenori Arai, Keio Univ. (Japan) . . . . . [6854-25]

11:30 am: **Laser-optical methods of detection and elimination the local tissue hypoxia: new approaches in prediction and prevention the risk of solid tumor formation**, Mustafó M. Asimov, B.I. Stepanov Institute of Physics (Belarus); Rustam M. Asimov, Applied Systems Ltd. (Belarus); Anatoli N. Rubinov, B.I. Stepanov Institute of Physics (Belarus) . . . . . [6854-26]

11:50 am: **Laser-induced photodissociation of oxyhemoglobin in vivo and primary mechanism of biostimulation and therapeutic effect of low intensity laser radiation**, Mustafó M. Asimov, B.I. Stepanov Institute of Physics (Belarus); Rustam M. Asimov, Applied Systems Ltd. (Belarus); Anatoli N. Rubinov, B.I. Stepanov Institute of Physics (Belarus) . . . . . [6854-27]

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

## SESSION 4

Room: Conv. Ctr. C1 . . . . . Tues. 1:30 to 4:50 pm

### Modeling and Computation

Session Chair: Robert J. Thomas, Air Force Research Lab.

1:30 pm: **Modeling tissue optics using Monte Carlo modeling: a tutorial (Invited Paper)**, Steven L. Jacques, Oregon Health & Science Univ. . . . . [6854-28]

2:00 pm: **Modeling the interaction of lasers and tissue: importance of accounting for time varying electric properties**, Daniel J. Evans, Mark Manwaring, Univ. of Idaho . . . . . [6854-29]

2:20 pm: **Incorporation of refractive index gradients in the solution of the radiative transport equation**, Justin J. Zohner, Air Force Research Lab.; Clifton D. Clark III, Northrup Grumman Corp.; Taufiqar Kahn, Bonnie C. McAdoo, Clemson Univ.; Dane A. Burrows, Robert J. Thomas, Air Force Research Lab. . . . . [6854-30]

2:40 pm: **Total solving of Pennes' bio-heat equation in R3-space**, Luisiana X. Cundin, Conceptual MindWorks, Inc.; Dustin G. Mixon, William P. Roach, Air Force Research Lab. . . . . [6854-31]

Coffee Break . . . . . 3:00 to 3:30 pm

3:30 pm: **Modeling thermal effects of electromagnetic exposure with heat transfer**, Dustin G. Mixon, Air Force Research Lab.; Luisiana X. Cundin, Conceptual MindWorks, Inc.; William P. Roach, Air Force Research Lab. . . . . [6854-33]

3:50 pm: **Experimental determination of thresholds for terahertz electromagnetic energy**, Jill McQuade, Air Force Research Lab.; Semih S. Kumru, Air Force Research Lab.; Nichole Jindra, Air Force Research Lab.; Ronald Seaman, Alex Salazar, General Dynamics Advanced Information Systems; Victor Villavicencio, Northrup Grumman Corp.; William Roach, Air Force Research Lab. . . . . [6854-34]

4:10 pm: **Bioeffects modeling and simulation in the terahertz region of the electromagnetic spectrum**, Jason A. Payne, Jill McQuade, William P. Roach, Air Force Research Lab. . . . . [6854-35]

4:30 pm: **A comparison of finite difference time domain and Monte Carlo modeling of human skin interaction with terahertz radiation**, Bennett L. Ibey, Jason A. Payne, William P. Roach, Air Force Research Lab. . . . . [6854-36]

## Tuesday 22 January

### SESSION 3

Room: Conv. Ctr. C1 . . . . . Tues. 8:30 am to 12:10 pm

### Cell Biology and Photochemistry

Session Chair: Randolph D. Glickman,

The Univ. of Texas Health Science Ctr. at San Antonio

8:30 am: **Neuroprotection-a potential treatment of laser-induced retinal injuries (Invited Paper)**, Michael Belkin M.D., Tel Aviv Univ. (Israel) . . . . . [6854-19]

9:00 am: **UV light blocks EGFR signaling in human cancer cell lines**, Maria Teresa C. A. Neves-Petersen, Soren Klitgaard, Meg Duroux, Steffen B. Petersen, Aalborg Univ. (Denmark) . . . . . [6854-20]

9:20 am: **The measurement of the PDT-induced intracellular Ca<sup>2+</sup> concentration changes in cardiac myocytes**, Arisa Ito, Shuntaro Hosokawa, Shiho Hakomori, Keio Univ. (Japan); Shunichiro Miyoshi, Kyoko Soejima, Keio Univ. School of Medicine (Japan); Tsunenori Arai, Keio Univ. (Japan) . . . . . [6854-21]

9:40 am: **Inactivation of viruses with a femtosecond laser via impulsive stimulated Raman scattering**, Kong-Thon Tsen, Arizona State Univ.; Shaw-Wei D. Tsen, Johns Hopkins Univ.; Juliann G. Kiang, Armed Forces Radiobiology Research Institute . . . . . [6854-22]

10:00 am: **Investigation of reactive oxygen species formation in living cells during femtosecond laser based cell surgery**, Judith Baumgart, Laser Zentrum Hannover e.V. (Germany); Willem Bintig, Anacllet Ngezahayo, Wolfgang A. Ertmer, Univ. Hannover (Germany); Holger Lubatschowski, Alexander Heisterkamp, Laser Zentrum Hannover e.V. (Germany) . . . . . [6854-23]

Coffee Break . . . . . 10:20 to 10:50 am



## Wednesday 23 January

### SESSION 5

Room: Conv. Ctr. C1 ..... Wed. 8:50 am to 12:30 pm

#### Photo-Thermal Ablation

Session Chair: **William P. Roach**, Air Force Research Lab.

- 8:50 am: **Pressure (mechanical) effects in infrared tissue ablation** (*Invited Paper*), Glenn S. Edwards, Duke Univ. .... [6854-37]
- 9:20 am: **Viability evaluation of culture cells patterned by femtosecond laser-induced impulsive force**, Noriko Takizawa, Okano Kazunori, Takayuki Uwada, Hamano Life Science Research Foundation (Japan); Yoichiroh Hosokawa, Hamano Life Science Research Foundation (Japan) and Osaka Univ. (Japan); Hiroshi Masuhara, Hamano Life Science Research Foundation (Japan). .... [6854-38]
- 9:40 am: **Threshold parameters of the mechanisms of selective nanophotothermolysis with gold nanoparticles**, Victor K. Pustovalov, Belarussian Institute of System Analysis (Belarus); Vladimir P. Zharov, Univ. of Arkansas for Medical Sciences. .... [6854-39]
- 10:00 am: **Embryonic surgery using femtosecond laser pulses for the delivery of exogenous materials and the analysis of gene expression: part I**, Vikram Kohli, Abdulhakem Y. Elezzabi, Univ. of Alberta (Canada) .... [6854-40]
- Coffee Break ..... 10:20 to 10:50 am
- 10:50 am: **Smart bombing a single targeted cell with femtogram order reagents using laser-induced shockwave technique**, Kazunori Okano, Noriko Takizawa, Hamano Life Science Research Foundation (Japan); Yoichiroh Hosokawa, Hamano Life Science Research Foundation (Japan) and Osaka Univ. (Japan); Takayuki Uwada, Hiroshi M. Masuhara, Hamano Life Science Research Foundation (Japan) ..... [6854-41]
- 11:10 am: **An in vitro corneal model with a laser damage threshold at 2  $\mu\text{m}$  that is similar to that in the rabbit**, Michael S. Foltz, Michael L. Denton, Kurt J. Schuster, Northrop Grumman Corp.; Larry E. Estlack, Conceptual MindWorks, Inc.; Taufiqar R. Khan, Clemson Univ.; Clifton D. Clark III, Northrop Grumman Corp.; Semih Kumru, Air Force Research Lab. .... [6854-42]
- 11:30 am: **Ultra-short pulsed laser tissue ablation using focused laser beam**, Shreya Raje, Megan Jaunich, Molly Fahey, Michael S. Grace, Kunal Mitra, Florida Institute of Technology; Greg J. R. Spooner, Raydiance, Inc. .... [6854-44]
- 11:50 am: **Erbium:ZBLAN laser ablation of otic capsule tissue**, Ryan McCaughey, Brian J. F. Wong, Univ. of California/Irvine. .... [6854-45]
- 12:10 pm: **Selective removal of cholesterol ester in atherosclerotic plaque using nanosecond pulsed laser at 5.75  $\mu\text{m}$** , Katsunori Ishii, Hideki Tsukimoto, Hisanao Hazama, Kunio Awazu, Osaka Univ. (Japan) ..... [6854-46]
- Lunch/Exhibition Break ..... 12:30 to 1:50 pm

### SESSION 6

Room: Conv. Ctr. C1 ..... Wed. 1:50 to 5:20 pm

#### Spectroscopy, Optics, and Scattering

Session Chair: **Lihong V. Wang**, Washington Univ. in St. Louis

- 1:50 pm: **Optimizing the use of laser alignment thermal sensitive paper for a 1.54 micron Er:glass laser**, Kenneth J. Walter, Thomas E. Eurell, Thomas E. Johnson, Colorado State Univ. .... [6854-47]
- 2:10 pm: **Coherent backscattering of polarized light for tissue diagnostics: an electric field Monte Carlo study**, Min Xu, Fairfield Univ. .... [6854-48]
- 2:30 pm: **Measurement of optical properties for optical detection of cancerous oral tissues: a feasibility study**, Youngjin Oh, Namkyung Jeon, Jin Kim, Donghyun Kim, Yonsei Univ. (South Korea); Won-Suk Chang, Seunghee Han, Korea Electrotechnology Research Institute (South Korea) .... [6854-50]
- 2:50 pm: **Optical properties of human tendons characterized by PSOCT and their relation to tendinopathy: a clinical study**, Pierre O. Bagnaninchi, Keele Univ. (United Kingdom); Dmitry Y. Churmakov, Marco Bonesi, Cranfield Univ. (United Kingdom); Ying Yang, Keele Univ. (United Kingdom); Cordelia Phelan, Univ. Hospital of North Staffordshire (United Kingdom); Nicola Maffulli, Keele Univ. (United Kingdom); Igor V. Meglinski, Cranfield Univ. (United Kingdom); Alicia J. El Haj, Keele Univ. (United Kingdom). .... [6854-51]
- Coffee Break ..... 3:10 to 3:40 pm
- 3:40 pm: **Optical imaging of structures within highly scattering material using a lens and aperture to form a spatiofrequency filter**, Nick Pfeiffer, Fartash Vasefi, Glenn H. Chapman, Paulman K. Y. Chan, Bozena Kaminska, Simon Fraser Univ. (Canada). .... [6854-52]
- 4:00 pm: **Enhanced angular domain optical imaging by background scattered light subtraction from a deviated laser source**, Fartash Vasefi, Glenn H. Chapman, Paulman K. Y. Chan, Bozena Kaminska, Nick Pfeiffer, Simon Fraser Univ. (Canada) ..... [6854-53]
- 4:20 pm: **Enhancement of light in tissue using hyper-osmotic agents**, Raiyan T. Zaman, Bo Chen, Ashwin B. Parthasarathy, Arnold D. Estrada, Jr., Adrien Ponticorvo, Henry G. Rylander III, Andrew K. Dunn, Ashley J. Welch, The Univ. of Texas at Austin ..... [6854-54]
- 4:40 pm: **Mechanical compression technique for optical clearing of tissue**, Christopher G. Rylander, Virginia Polytechnic Institute and State Univ.; Thomas E. Milner, The Univ. of Texas at Austin ..... [6854-55]
- 5:00 pm: **Characterization of neutral density filters for use in near infrared lasers**, Edward T. Rickers, Kenneth J. Walter, Thomas E. Eurell, Thomas E. Johnson, Colorado State Univ. .... [6854-56]

# Complex Dynamics and Fluctuations in Biomedical Photonics V

Conference Chair: **Valery V. Tuchin**, Saratov State Univ. (Russia); **Lihong V. Wang**, Washington Univ. in St. Louis

Program Committee: **Vadim S. Anischenko**, Saratov State Univ. (Russia); **Wei R. Chen**, Univ. of Central Oklahoma; **Bernard Choi**, Beckman Laser Institute and Medical Clinic; **Sean J. Kirkpatrick**, Oregon Health and Science Univ.; **Jürgen Lademann**, Humboldt-Univ. zu Berlin (Germany); **Kirill V. Larin**, Univ. of Houston; **Hong Liu**, Univ. of Oklahoma; **Qingming Luo**, Huazhong Univ. of Science and Technology (China); **Alexander V. Priezzhev**, M.V. Lomonosov Moscow State Univ. (Russia); **Vladislav Y. Toronov**, Ryerson Univ. (Canada); **Ruikang K. Wang**, Oregon Health and Science Univ.; **Vladimir P. Zharov**, Univ. of Arkansas for Medical Sciences; **Dmitry A. Zimnyakov**, Saratov State Univ. (Russia)

## Saturday 19 January

### SESSION 1

Room: Conv. Ctr. B4 ..... Sat. 8:20 to 10:10 am

#### Coherent-Domain Methods for Monitoring of Tissue Complex Structure and Dynamics

Session Chair: **Valery Viktorovich Tuchin**, Saratov State Univ. (Russia)

8:20 am: **What is the proper statistical model for laser speckle flowmetry?** (*Invited Paper*), Donald D. Duncan, Sean J. Kirkpatrick, James C. Gladish, Oregon Health & Science Univ. .... [6855-01]

8:50 am: **Nonlinear diffusivity of analytes in tissues measured in vitro and in vivo** (*Invited Paper*), Kirill V. Larin, Mohamad G. Ghosn, Esteban F. Carbajal, Natasha A. Befru, Univ. of Houston; Valery V. Tuchin, Saratov State Univ. (Russia) ..... [6855-02]

9:20 am: **High contrast imaging of nonmelanoma skin cancers** (*Invited Paper*), Anna N. Yaroslavsky, Elena V. Salomatina, Massachusetts General Hospital ..... [6855-27]

9:50 am: **Algorithms for simulation of speckle (laser and otherwise)**, Donald D. Duncan, Sean J. Kirkpatrick, Oregon Health & Science Univ. .... [6855-04]

Coffee Break ..... 10:10 to 10:40 am

### SESSION 2

Room: Conv. Ctr. B4 ..... Sat. 10:40 am to 12:10 pm

#### Biophotonic Imaging and Spectroscopy

Session Chair: **Sean J. Kirkpatrick**, Oregon Health & Science Univ.

10:40 am: **Multispectral multi-distance method to measure optical properties of non-homogeneous tissues**, Vladislav Y. Toronov, Ryerson Univ. (Canada) ..... [6855-24]

11:10 am: **Development of an integrated computerized scheme for metaphase chromosome image analysis: a robustness experiment**, Xingwei Wang, Univ. of Oklahoma; Bin Zheng, Univ. of Pittsburgh; Shibo Li, Oklahoma Medical Research Foundation; John J. Mulvihill, Univ. of Oklahoma; Wei R. Chen, Univ. of Central Oklahoma; Hong Liu, Univ. of Oklahoma ..... [6855-06]

11:30 am: **Determination of glucose concentration in tissue-like material using spatially resolved steady-state diffuse reflectance spectroscopy**, Par Hjalmarsson, Suresh N. Thennadi, Newcastle Univ. (United Kingdom) [6855-07]

11:50 am: **Polarized light propagation within birefringent biological tissues: computational model and experiment**, Boris Veksler, Dmitry Churmakov, Igor Meglinski, Cranfield Univ. (United Kingdom); Pierre Bagnaninchi, Ying Yang, Alicia J. El Haj, Keele Univ. (United Kingdom). .... [6855-08]

Lunch/Exhibition Break ..... 12:10 to 1:20 pm

### SESSION 3

Room: Conv. Ctr. B4 ..... Sat. 1:20 to 3:10 pm

#### Blood and Lymph Flow Complex Dynamics

Session Chair: **Qingming Luo**, Huazhong Univ. of Science and Technology (China)

1:20 pm: **Volumetric imaging of microcirculations in human retina and choroids in vivo by optical micro-angiography** (*Invited Paper*), Lin An, Ruikang Wang, Oregon Health & Science Univ. .... [6855-11]

1:50 pm: **Imaging of flow velocity profiles within the complex geometry vessels by Doppler optical coherence tomography** (*Invited Paper*), Marco Bonesi, Dmitry Y. Churmakov, Igor V. Meglinski, Cranfield Univ. (United Kingdom) ..... [6855-12]

2:10 pm: **New prospects for noninvasive blood monitoring based on effect of RBC aggregation** (*Invited Paper*), Leonid D. Shvartsman, The Hebrew Univ. of Jerusalem (Israel); Ilya Fine, ELFI-Tech Ltd. (Israel); Dmitri Romanov, Temple Univ. .... [6855-09]

2:40 pm: **Combined use of fluorescent and dynamic light scattering imaging for applications in vascular biology** (*Invited Paper*), Vyacheslav Kalchenko M.D., Keren Ziv, Michal Neeman, Alon Harmelin D.V.M., Weizmann Institute of Science (Israel) ..... [6855-10]

Coffee Break ..... 3:10 to 3:40 pm

### SESSION 4

Room: Conv. Ctr. B4 ..... Sat. 3:40 to 5:20 pm

#### Microscopy and Nonlinear Dynamic Processes

Session Chair: **Vladislav Y. Toronov**, Ryerson Univ. (Canada)

3:40 pm: **Bifurcation and chaos in the spontaneous firing** (*Invited Paper*), Qingming Luo, Huazhong Univ. of Science and Technology (China) . . [6855-13]

4:10 pm: **Tomographic phase microscopy**, Wonshik Choi, Michael S. Feld, Massachusetts Institute of Technology. .... [6855-25]

4:40 pm: **Coherence properties of cell membrane motions**, Gabriel Popescu, Young Keun Park, Kamran Badizadegan, Ramachandra R. Dasari, Michael S. Feld, Massachusetts Institute of Technology . . . . [6855-05]

5:00 pm: **Computed optical coherence tomography**, Li Li, Lihong V. Wang, Washington Univ. in St. Louis ..... [6855-03]

#### BIOS Hot Topics

Convention Center J1-J4

Saturday 19 January • 7:00 to 9:30 pm

See p. 23 for details.

**Monday 21 January****POSTERS-Monday****Room: Conv. Ctr. B4. . . . . Mon. 6:00 to 7:30 pm****Session Chair: Valery Viktorovich Tuchin,**  
Saratov State Univ. (Russia)

*All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.*

*Poster presenters may post their poster papers Monday morning starting at 10:00 am in the Civic Auditorium Complex, and will need to remove their papers immediately following the poster session that evening. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.*

**Wavelet-analysis of multimode dynamics in living systems,**

Alexey N. Pavlov, Olga N. Pavlova, Alexey A. Anisimov, Saratov State Univ. (Russia) . . . . . [6855-15]

**Conversion coefficients for external monoenergetic photon beams in the visible Chinese human model,**

Qian Liu, Qingming Luo, Huazhong Univ. of Science and Technology (China). . . . . [6855-16]

**Staining dynamic of gold spheres, nanorods and silica/gold nanoshells in bio-tissues and phantoms on basis of OCT and backscattering spectrums,**

Garif G. Akchurin, Saratov State Univ. (Russia); Nikolay G. Khlebtsov, Boris N. Khlebtsov, Institute of Biochemistry and Physiology of Plants and Microorganisms (Russia); Igor O. Kolbenev, Saratov State Medical Univ. (Russia); Vladislav V. Lychagov, Irina L. Maksimova, Vladimir P. Ryabokho, Alexander A. Skaptsov, Saratov State Univ. (Russia); Georgy S. Terentyuk, First Banian Hospital of Saratov (Russia); Valery V. Tuchin, Saratov State Univ. (Russia) . . . . . [6855-17]

**Spectral domain polarization sensitive optical coherence tomography achieved by single camera detection,**

Chuanmao Fan, Oregon Health &amp; Science Univ.; Yi Wang, Oregon Graduate Institute; Rui-Kang Wang, Oregon Health &amp; Science Univ. . . . . [6855-18]

**Optimal sorting of neural spikes with wavelet and filtering techniques,**

Valeri A. Makarov, Univ. Complutense de Madrid (Spain); Alexey N. Pavlov, Anatoly N. Tupitsyn, Saratov State Univ. (Russia) . . . . . [6855-19]

**Modeling the nonlinear dynamics of immunity at cancer treatment by interleukin-2 conjugate with gold nanoparticles,**

Georgy S. Terentyuk, First Banian Hospital of Saratov (Russia); Vladimir A. Bogatyrev, Lev A. Dykman, Boris N. Khlebtsov, Nikolaj G. Khlebtsov, Institute of Biochemistry and Physiology of Plants and Microorganisms (Russia); Irina L. Maksimova, Elena M. Revzina, Nikita M. Ryskin, Saratov State Univ. (Russia); Ekaterina P. Soboleva, Leyla V. Suleymanova, First Banian Hospital of Saratov (Russia). . . . . [6855-20]

**Optical properties of human spinal cord,**

Alexey N. Bashkatov, Elina A. Genina, Valery V. Tuchin, Saratov State Univ. (Russia). . . . . [6855-21]

**Analysis of local instabilities of imbibition fronts with the use of coherent and non-coherent light,**

Dmitry A. Zimnyakov, Anton V. Sadovoy, Maxim A. Vilensky, Saratov State Univ. (Russia). . . . . [6855-26]

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# Photons Plus Ultrasound: Imaging and Sensing 2008: The Ninth Conference on Biomedical Thermoacoustics, Optoacoustics, and Acousto-optics

Conference Chair: **Alexander A. Oraevsky**, Fairway Medical Technologies, Inc.; **Lihong V. Wang**, Washington Univ. in St. Louis

Program Committee: **Mark A. Anastasio**, Illinois Institute of Technology; **Paul C. Beard**, Univ. College London (United Kingdom); **Claude Boccara**, École Supérieure de Physique et de Chimie Industrielles (France); **Richard J. Dewhurst**, The Univ. of Manchester (United Kingdom); **Gerald J. Diebold**, Brown Univ.; **Charles A. DiMarzio**, Northeastern Univ.; **Stanislav Y. Emelianov**, The Univ. of Texas/Austin; **Rinat O. Esenaliev**, The Univ. of Texas Medical Branch at Galveston; **Martin Frenz**, Univ. Bern (Switzerland); **Xiaoyan Han**, Wayne State Univ.; **P. Mark Henrichs**, Fairway Medical Technologies, Inc.; **Steven L. Jacques**, Oregon Health and Science Univ.; **Robert A. Kruger**, OptoSonics, Inc.; **Andreas Mandelis**, Univ. of Toronto (Canada); **Matthew O'Donnell**, Univ. of Washington; **Guenther Paltauf**, Karl-Franzens-Univ. Graz (Austria); **Igor Patrikeev**, The Univ. of Texas Medical Branch at Galveston; **Markus W. Sigrist**, ETH Zürich (Switzerland); **Gloria M. Spirou**, Univ. of Toronto (Canada); **Wiendelt Steenbergen**, Univ. Twente (Netherlands); **Vladimir P. Zharov**, Univ. of Arkansas for Medical Sciences; **Quing Zhu**, Univ. of Connecticut

*SPIE and the organizers gratefully acknowledge the following sponsors of the conference on Photons Plus Ultrasound: Imaging and Sensing*

**Fairway Medical Technologies**

## Sunday 20 January

### Opening Remarks

Room: Conv. Ctr. A4 ..... Sun. 8:10 am

Session Chairs: **Alexander A. Oraevsky**, Fairway Medical Technologies, Inc.; **Lihong V. Wang**, Washington Univ. in St. Louis

### SESSION 1

Room: Conv. Ctr. A4 ..... Sun. 8:30 to 10:10 am

#### Translational Research I

Session Chair: **Wiendelt Steenbergen**, Univ. Twente (Netherlands)

8:30 am: **Photoacoustic imaging of tumor angiogenesis**, Roy G. M. Kolkman, Kiran K. Thumma, Gerbert A. ten Brinke, Univ. Twente (Netherlands); Ronald I. Siphanto, J. W. van Neck, Univ. Medisch Ctr. Rotterdam (Netherlands); Ton G. van Leeuwen, Univ. van Amsterdam (Netherlands); **Wiendelt Steenbergen**, Univ. Twente (Netherlands) ..... [6856-01]

8:50 am: **Optoacoustic imaging of breast cancer with data processing based on wavelet transform**, Sergey A. Ermilov, Reda R. Gharieb, Fairway Medical Technologies, Inc.; **Igor Patrikeev**, Tuenchit Khamapirad, The Univ. of Texas Medical Branch at Galveston; **Alexander A. Oraevsky**, Fairway Medical Technologies, Inc. .... [6856-02]

9:10 am: **Photoacoustic tomography of human peripheral joints**, Xueding Wang, David L. Chamberland, David A. Jamadar, Univ. of Michigan. . [6856-03]

9:30 am: **Monitoring of healing process of burns based on multiwavelength photoacoustic measurement**, Aizawa Kazuya, National Defense Medical College (Japan) and Keio Univ. (Japan); Sato Shunichi, Saitoh Daizoh, Hiroshi Ashida, National Defense Medical College (Japan); Minoru Obara, Keio Univ. (Japan). .... [6856-04]

9:50 am: **Photoacoustic imaging of cardiac ablation lesions in explanted ovine hearts**, Raymond C. Chan, Ladislav Jankovic, Khalid Shahzad, Daniel R. Elgort, Robert M. Manzke, Philips Research North America; Aravinda Thiagaligam, Vivek Y. Reddy, Massachusetts General Hospital. .... [6856-05]

Coffee Break ..... 10:10 to 10:30 am

### SESSION 2

Room: Conv. Ctr. A4 ..... Sun. 10:30 am to 12:10 pm

#### Translational Research II

Session Chair: **Quing Zhu**, Univ. of Connecticut

10:30 am: **Detection of dilute sperm samples using photoacoustic flowmetry**, John A. Viator, Peter Sutovsky, Ryan M. Weight, Univ. of Missouri/Columbia. .... [6856-06]

10:50 am: **Monkey brain cortex imaging by use of photoacoustic tomography**, Xinmai Yang, Lihong V. Wang, Washington Univ. in St. Louis ..... [6856-07]

11:10 am: **Photoacoustic detection of breast cancer cells in human blood**, John A. Viator, Theodore S. Thomas, Paul S. Dale, Ryan M. Weight, Uls Atasoy, Joseph D. Magee, Univ. of Missouri/Columbia ..... [6856-08]

11:30 am: **Laser-induced photoacoustic imaging: a tool for real time in vitro identification of breast cancer**, Yasser H. El-Sharkawy M.D., Cairo Univ. (Egypt) ..... [6856-09]

11:50 am: **Experimental investigation of demineralization and remineralization of human teeth using infrared photothermal radiometry and modulated luminescence**, Raymond J. Jeon, Univ. of Toronto (Canada); Adam Hellen, The Univ. of Western Ontario (Canada); Anna Matvienko, Andreas Mandelis, Univ. of Toronto (Canada); Stephen H. Abrams, Quantum Dental Technologies (Canada); Bennett T. Amaechi, The Univ. of Texas Health Science Ctr. at San Antonio ..... [6856-10]

Lunch/Exhibition Break ..... 12:10 to 1:30 pm

### SESSION 3

Room: Conv. Ctr. A4 ..... Sun. 1:30 to 3:10 pm

#### Novel Systems

Session Chair: **Andreas Mandelis**, Univ. of Toronto (Canada)

1:30 pm: **Photoacoustic generation of focused ultrasonic pulses with predefined temporal profiles including quasi-unipolar pressure pulses**, Konstantin Maslov, Hao F. Zhang, Lihong V. Wang, Washington Univ. in St. Louis ..... [6856-11]

1:50 pm: **Photoacoustic dye indicators**, Shai Ashkenazi, Univ. of Michigan ..... [6856-12]

2:10 pm: **Integrated waveguide sensor for acoustic wave detection in photoacoustic tomography**, Robert Nuster, Guenther Paltauf, Harald Dittbacher, Karl-Franzens-Univ. Graz (Austria); Peter Burgholzer, Upper Austrian Research GmbH (Austria) ..... [6856-13]

2:30 pm: **Discrimination of shear mechanical and optical contrasts in tissue phantom by use of opto-elastography**, Khalid Daoudi, Albert-Claude Boccara, Emmanuel Bossy, Ecole Supérieure de Physique et de Chimie Industrielles (France) ..... [6856-14]

2:50 pm: **Realtime photoacoustic imaging of cardiac and respiratory dynamics in mice**, Roger J. Zemp, Liang Song, Washington Univ. in St. Louis; Rachel Bitton, K. Kirk Shung, Univ. of Southern California; Lihong V. Wang, Washington Univ. in St. Louis ..... [6856-15]

Coffee Break ..... 3:10 to 3:30 pm

**SESSION 4**

**Room: Conv. Ctr. A4 . . . . . Sun. 3:30 to 5:30 pm**

**Gold Nanoparticles as Contrast Agent**

*Session Chair: Gerald J. Diebold, Brown Univ.*

3:30 pm: **Imaging of inflammatory responses by photoacoustics using cell-targeted gold nanorods (GNR) as contrast agent**, Kang Kim, Ashish Agarwal, April P. McDonald, Daniel D. Myers, Sheng-Wen Huang, Shai Ashkenazi, Russell S. Witte, Mariana J. Kaplan, Thomas W. Wakefield, Univ. of Michigan; Matthew O'Donnell, Univ. of Washington; Nicholas A. Kotov, Univ. of Michigan . . . . . [6856-16]

3:50 pm: **Photoacoustic tomography with novel optical contrast agents based on gold nanocages or nanoparticles containing NIR dyes**, Xinmai Yang, Washington Univ. in St. Louis; Sara E. Skrabalak, Univ. of Washington; Erich Stein, Washington Univ. in St. Louis; Bin Wu, Phosphorex, Inc.; Younan Xia, Univ. of Washington; Lihong V. Wang, Washington Univ. in St. Louis . . . . . [6856-17]

4:10 pm: **In-vivo photoacoustic imaging with multiple selective targeting using bioconjugated gold nanorods**, Chen-Wei Wei, Chao-Kang Liao, National Taiwan Univ. (Taiwan); Ying-Yi Chen, Chung-Ren C. Wang, National Chung Cheng Univ. (Taiwan); Ann-Ann Ding, Dar-Bin Shieh, National Cheng Kung Univ. (Taiwan); Pai-Chi Li, National Taiwan Univ. (Taiwan) . . . . . [6856-18]

4:30 pm: **Generation and Detection of Intracellular Photothermal Bubbles Around Gold Nanorod Clusters**, Dmitri Lapotko, Ekaterina Lukianova-Hleb, A.V. Luikov Heat and Mass Transfer Institute (Belarus); Jason H. Hafner, Rice Univ.; Michael Andreeff, Marina Konopleva, The Univ. of Texas M.D. Anderson Cancer Ctr.; Alexander A. Oraevsky, Fairway Medical Technologies, Inc. . . . . [6856-19]

4:50 pm: **Comparative Analysis of Optical Absorption and Photoacoustic Signal Generation in Nanoparticles**, Horacio Rivera Lamela, Vincent B. Cunningham, P. Pedreira, Daniel Gallego, Pablo Acedo, Univ. Carlos III de Madrid (Spain); Wolfgang Fritzsche, Andrea Csaki, Grit Festag, Andrea Steinbrück, Institut für Photonische Technologien e.V. (Germany) . . . . . [6856-20]

5:10 pm: **Synthesis and in vitro cytotoxicity of mPEGylated gold nanorods**, Candice L. Didychuk, Pinhas Ephrat, Michelle L. Belton, Jeff Carson, Lawson Health Research Institute (Canada) . . . . . [6856-21]

**Monday 21 January**

**SESSION 5**

**Room: Conv. Ctr. A4 . . . . . Mon. 8:30 to 10:10 am**

**Small Animal Imaging**

*Session Chair: Steven L. Jacques, Oregon Health & Science Univ.*

8:30 am: **In-vivo photoacoustic imaging of nude mice vasculatures using a photoacoustic imaging system based on a commercial ultrasound scanner**, Ladislav Jankovic, Khalid Shahzad, Yao Wang, Michael Burcher, Philips Research North America; Sabine Mofina, Mihaela Skobe, Mount Sinai School of Medicine; Frank-Detlef Scholle, Peter Hauff, Bayer Schering Pharma AG (Germany) . . . . . [6856-22]

8:50 am: **A modified commercial ultrasound scanner used for in-vivo photoacoustic imaging of nude mice injected with non-targeted contrast agents**, Ladislav Jankovic, Khalid Shahzad, Yao Wang, Philips Research North America; Frank-Detlef Scholle, Peter Hauff, Bayer Schering Pharma AG (Germany); Sabine Mofina, Mihaela Skobe, Mount Sinai School of Medicine . . . . . [6856-23]

9:10 am: **3D photoacoustic imaging system for in-vivo studies of small animal models**, Edward Z. Y. Zhang, Jan G. Laufer, Paul C. Beard, Univ. College London (United Kingdom) . . . . . [6856-24]

9:30 am: **Small animal imaging using a curved array photoacoustic tomography system**, John K. Gamelin, Andres S. Aguirre, Anastasios Maurudis, Fei Huang, Diego Castillo, Univ. of Connecticut; Lihong V. Wang, Washington Univ. in St. Louis; Quing Zhu, Univ. of Connecticut . . . . . [6856-25]

9:50 am: **Photoacoustic system for 3D functional and molecular imaging in nude mice**, Alexander A. Oraevsky, Sergey A. Ermilov, Tom Miller, Fairway Medical Technologies, Inc.; Donald Herzog, Scott Thompson, Seno Medical Instruments, Inc.; Alan Stein M.D., Seno Medical Instruments, Inc.; Anton Liopo, Mohammad A. Eghtedari M.D., Massoud Motamedi, The Univ. of Texas Medical Branch at Galveston . . . . . [6856-26]

Coffee Break . . . . . 10:10 to 10:30 am

**SESSION 6**

**Room: Conv. Ctr. A4 . . . . . Mon. 10:30 am to 12:30 pm**

**Hybrid and Other Modalities**

*Session Chair: Stanislav Y. Emelianov, The Univ. of Texas at Austin*

10:30 am: **First practical experiences with the optoacoustic/ultrasound system OPUS**, Christoph Haisch, Karin Zell, Reinhard Niessner, Technische Univ. München (Germany); Peter Menzenbach, Innolas GmbH (Germany); Jonathan I. Sperl, Sebastian Ketzer, Mika W. Vogel, GE Global Research-Europe (Germany) . . . . . [6856-27]

10:50 am: **Hybrid Optoacoustic and Ultrasonic Imaging System for Detection of Prostate Malignancies**, Mohammad A. Yaseen, Rice Univ.; Sergey A. Ermilov, Reda R. Gharieb, Andre Conjusteau, Hans-Peter F. Q. Brecht, Alexander A. Oraevsky, Fairway Medical Technologies, Inc. . . . . [6856-28]

11:10 am: **Photoacoustic and ultrasound imaging to guide photothermal therapy: ex-vivo study**, Jignesh Shah, Suhyun Park, Salavat R. Aglyamov, Timothy Larson, Li Ma, Konstantin V. Sokolov, Keith P. Johnston, Thomas E. Milner, Stanislav Y. Emelianov, The Univ. of Texas at Austin . . . . . [6856-29]

11:30 am: **Investigation of photoacoustic guidance of Diffusive Optical Tomography**, John K. Gamelin, Anastasios Maurudis, Quing Zhu, Univ. of Connecticut . . . . . [6856-30]

11:50 am: **Biothermophotonic analysis of teeth demineralization using photothermal radiometry**, Andreas Mandelis, Anna Matvienko, Raymond J. Jeon, Univ. of Toronto (Canada); Stephen H. Abrams, Quantum Dental Technologies (Canada); Bennett T. Amaechi, The Univ. of Texas Health Science Ctr. at San Antonio . . . . . [6856-31]

12:10 pm: **Shielding for thermoacoustic tomography with RF excitation**, Michael Mitchell, Gerald Becker, Prasenjit Dey, Sarah K. Patch, Univ. of Wisconsin/Milwaukee . . . . . [6856-32]

Lunch Break . . . . . 12:30 to 1:30 pm

**SESSION 7**

**Room: Conv. Ctr. A4 . . . . . Mon. 1:30 to 3:10 pm**

**Quantitative Imaging**

*Session Chair: Paul C. Beard, Univ. College London (United Kingdom)*

1:30 pm: **Recovering contrast agent concentrations in photoacoustic molecular imaging: ill-posedness and gradient-based inversions**, Benjamin T. Cox, Simon R. Arridge, Paul C. Beard, Univ. College London (United Kingdom) . . . . . [6856-33]

1:50 pm: **Quantitative molecular imaging using photoacoustic spectroscopy: accuracy and limitations**, Jan G. Laufer, Edward Z. Y. Zhang, Paul C. Beard, Univ. College London (United Kingdom) . . . . . [6856-34]

2:10 pm: **Measurement of photoacoustic detector sensitivity distribution by robotic source placement**, Pinhas Ephrat, Jeffrey J. L. Carson, Lawson Health Research Institute (Canada) . . . . . [6856-35]

2:30 pm: **Application of intense ultrasound bursts for quantitative acousto-optic sensing**, Aliaksandr Bratchenia, Robert Molenaar, Rob P. H. Kooyman, Univ. Twente (Netherlands) . . . . . [6856-36]

2:50 pm: **RF diffraction effect in RF-induced thermoacoustic tomography: calibration and distortion**, Changhui Li, Pramanik Manojit, Lihong V. Wang, Washington Univ. in St. Louis . . . . . [6856-37]

Coffee Break . . . . . 3:10 to 3:30 pm

# Conference 6856

## SESSION 8

Room: Conv. Ctr. A4 ..... Mon. 3:30 to 5:10 pm

### Molecular Imaging

Session Chair: **Alexander A. Oraevsky**,  
Fairway Medical Technologies, Inc.

3:30 pm: **Multispectral photoacoustic molecular tomography resolves fluorochrome distribution with high resolution and sensitivity in small animals**, Daniel Razansky, Vasilis Ntziachristos, Massachusetts General Hospital ..... [6856-38]

3:50 pm: **Enhanced photoacoustic neuroimaging with gold nanorods and PEBBLES**, Russell S. Witte, The Univ. of Arizona; Kang Kim, Ashish Agarwal, Wenzhe Fan, Michael D. Joseph, Raoul Kopelman, Nicholas A. Kotov, Daryl R. Kipke, Univ. of Michigan; Matthew O'Donnell, Univ. of Washington .. [6856-39]

4:10 pm: **Optoacoustic sensing of ocular bacterial antigen using targeted gold nanorods**, Saher M. Maswadi, Leland Page, Lee Woodward, Randolph D. Glickman, The Univ. of Texas Health Science Ctr. at San Antonio; Norman Barslou, Naval Health Research Ctr. Detachment ..... [6856-40]

4:30 pm: **Molecular specific photoacoustic imaging with plasmonic nanosensors**, Srivalleesha Mallidi, Timothy Larson, Konstantin V. Sokolov, Stanislav Y. Emelianov, The Univ. of Texas at Austin ..... [6856-41]

4:50 pm: **Fluorescence molecular tomography using a-priori photoacoustic data**, Daniel Razansky, Vasilis Ntziachristos, Massachusetts General Hospital ..... [6856-42]

## POSTERS-Monday

Room: Civic Auditorium Complex ..... Mon. 6:00 to 7:30 pm

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.

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**Photoacoustic studies of tissue-like phantoms with scattering and absorbing properties**, Khalid Shahzad, Ladislav Jankovic, Yao Wang, Philips Research North America ..... [6856-77]

**Non-invasive detection of osteoporotic bone loss using photothermal radiometry and modulated luminescence**, Chi-Hang Kwan, Anna Matvienko, Andreas Mandelis, Univ. of Toronto (Canada) ..... [6856-78]

**Monitoring tissue thermal dose using photoacoustics during thermal therapy**, Robin Castellino, William M. Whelan, Michael C. Kolios, Ryerson Univ. (Canada) ..... [6856-79]

**Adaptive photoacoustic imaging using the Mallart-Fink focusing factor**, Meng-Lin Li, National Tsing Hua Univ. (Taiwan) ..... [6856-80]

**Calculating absolute optical absorption coefficients from photoacoustic signals by iteratively fitting**, Yi Wang, Oregon Graduate Institute; Rui-Kang Wang, Oregon Health & Science Univ. .... [6856-81]

**Photoacoustic tomography with a modified algebraic reconstruction technique**, Yi Wang, Rui-Kang Wang, Oregon Health & Science Univ. [6856-82]

**Feasibility study of three-dimensional co-registered ultrasound and photoacoustic imaging for cancer detection and visualization**, Andres S. Aguirre, John K. Gamelin, Puyun Guo, Shikui Yan, Qing Zhu, Univ. of Connecticut. .... [6856-83]

**Ultrasound image-guided optoacoustic monitoring of mixed venous blood oxygenation and total hemoglobin concentration**, Irina Y. Petrova, Michael Kinsky, Yuriy Y. Petrov, Rinat O. Esenaliev, Donald S. Prough, The Univ. of Texas Medical Branch at Galveston ..... [6856-84]

**Optoacoustic probes for accurate measurement of blood effective attenuation coefficient in veins and arteries: Implication for oxygenation and total hemoglobin concentration monitoring**, Yuriy Y. Petrov, Donald S. Prough, Irina Y. Petrova, Rinat O. Esenaliev, The Univ. of Texas Medical Branch at Galveston ..... [6856-85]

**Optoacoustic monitoring of hemoglobin concentration in brachial artery: Monte Carlo modeling and phantom experiment**, Igor Patrikeev, Donald S. Prough, Hans-Peter F. Brecht, Rinat O. Esenaliev, The Univ. of Texas Medical Branch at Galveston ..... [6856-86]

**Studying the Feasibility of Sonic IR Imaging Crack Detection in Teeth with Ultrasonic Dental Cleaner**, Xiaoyan Han, Esmeralda Yitamben, Wayne State Univ. .... [6856-87]

## Tuesday 22 January

### SESSION 9

Room: Conv. Ctr. A4 ..... Tues. 8:30 to 10:10 am

### Signal Processing and Image Reconstruction I

Session Chair: **Igor Patrikeev**,  
The Univ. of Texas Medical Branch at Galveston

8:30 am: **L1-Norm Minimization Image Reconstruction Methods with Applications to Biomedical Imaging (Invited Paper)**, Guang-Hong Chen, Julia V. Velikina, Brian E. Nett, Shuai Leng, Jie Tang, Univ. of Wisconsin/Madison. .... [6856-43]

9:10 am: **Photoacoustic wave propagation simulations using the FDTD method with Berenger's perfectly matched layers**, Yae-Lin Sheu, Chen-Wei Wei, Chao-Kang Liao, Pai-Chi Li, National Taiwan Univ. (Taiwan). ... [6856-44]

9:30 am: **Pulsed laser induced acoustic wave propagation and interaction in liquid: experiment and simulation**, Seung Hwan Ko, Sang Gil Ryu, Nipun Misra, Heng Pan, Costas P. Grigoropoulos, Univ. of California/Berkeley; Nick Kladias, Elias Panides, Gerald A. Domoto, Xerox Corp. .... [6856-45]

9:50 am: **Improving limited-view reconstruction of photoacoustic tomography by incorporating a priori boundary information**, Mark A. Anastasio, Jin Zhang, Illinois Institute of Technology; Gabe A. Kruger, Daniel R. Reinecke, Robert A. Kruger, Optosonics Inc. .... [6856-46]

Coffee Break ..... 10:10 to 10:30 am

### SESSION 10

Room: Conv. Ctr. A4 ..... Tues. 10:30 am to 12:30 pm

### Signal Processing and Image Reconstruction II

Session Chair: **Mark A. Anastasio**, Illinois Institute of Technology

10:30 am: **Iterative method for reducing image background caused by backscattered Optoacoustic transients**, Michael Jaeger, Martin Frenz, Univ. Bern (Switzerland) ..... [6856-47]

10:50 am: **Implementation and comparison of reconstruction algorithms for 2D optoacoustic tomography using a linear array**, Dimple Modgil, Patrick J. La Rivière, The Univ. of Chicago. .... [6856-48]

11:10 am: **Elucidation of 2D and 3D photoacoustic tomography**, Jin Zhang, Mark A. Anastasio, Illinois Institute of Technology ..... [6856-49]

11:30 am: **Simultaneous reconstruction of speed-of-sound and optical absorption properties in photoacoustic tomography via a time-domain iterative algorithm**, Jin Zhang, Yongyi Yang, Mark A. Anastasio, Illinois Institute of Technology ..... [6856-50]

11:50 am: **Multi-bandwidth image reconstruction in photoacoustic tomography**, Cheng-Ying Chou, Mark A. Anastasio, Jin Zhang, Illinois Institute of Technology; Geng Ku, Lihong V. Wang, Washington Univ. in St. Louis ..... [6856-51]

12:10 pm: **Transducer frequency response and impact on TPOAT signal**, Deepti Pachauri, Univ. of Wisconsin/Milwaukee; Timothy A. Stiles, Univ. of Wisconsin/Madison; Namrta Purwar, Prasenjit Dey, Sarah K. Patch, Univ. of Wisconsin/Milwaukee ..... [6856-52]

Lunch/Exhibition Break ..... 12:30 to 1:30 pm

**SESSION 11**

**Room: Conv. Ctr. A4 . . . . . Tues. 1:30 to 3:10 pm**

**High Resolution Imaging**

*Session Chair: Lihong V. Wang*, Washington Univ. in St. Louis

1:30 pm: **Optical-resolution confocal photoacoustic microscopy**, Konstantin Maslov, Hao F. Zhang, Lihong V. Wang, Washington Univ. in St. Louis [6856-53]

1:50 pm: **Non-invasive mapping of electrically stimulated rat brain activity using photoacoustic microscopy**, Erich W. Stein, Kwanghyun Song, Konstantin I. Maslov, Lihong V. Wang, Washington Univ. in St. Louis . [6856-54]

2:10 pm: **High-frequency 2D optoacoustic arrays using parallel etalon detection**, Sheng-Wen Huang, Yang Hou, Shai Ashkenazi, Univ. of Michigan; Matthew O'Donnell, Univ. of Washington . . . . . [6856-55]

2:30 pm: **High-sensitivity polymer microring resonators for broadband ultrasound detection and imaging**, Adam D. Maxwell, Sheng-Wen Huang, Tao Ling, Jin-Sung Kim, Shai Ashkenazi, L. Jay Guo, Univ. of Michigan . . [6856-56]

2:50 pm: **Photoacoustic Doppler flowmetry**, Hui Fang, Lihong V. Wang, Washington Univ. in St. Louis . . . . . [6856-57]

Coffee Break . . . . . 3:10 to 3:30 pm

**SESSION 12**

**Room: Conv. Ctr. A4 . . . . . Tues. 3:30 to 5:30 pm**

**Ultrasound-Modulated (Acousto) Optical Tomography**

*Session Chair: Claude Boccara*,

Ctr. National de la Recherche Scientifique (France)

3:30 pm: **Acousto-optic imaging for the Cancéropôle project: from bench to bedside**, Pedro Santos, Max Lesaffre, Khalid Daoudi, Florence Jean, Benoît C. Forget, Emmanuel Bossy, Francois Ramaz, A. Claude Boccara, Ecole Supérieure de Physique et de Chimie Industrielles (France); Michel Gross, Lab. Kastler Brossel (France) . . . . . [6856-58]

3:50 pm: **Improvement of sensitivity of acousto-optical imaging using a powerful long pulse laser**, Guy Rousseau, Alain Blouin, Jean-Pierre Monchalain, National Research Council Canada (Canada) . . . . . [6856-59]

4:10 pm: **Imaging of optical scattering contrast using ultrasound-modulated optical tomography**, Sri-Rajasekhar Kothapalli, Washington Univ. in St. Louis; Sava Sakadzic, Massachusetts General Hospital; Chulhong Kim, Lihong V. Wang, Washington Univ. in St. Louis . . . . . [6856-60]

4:30 pm: **Modeling of amplitude and exit location variation of light propagation under ultrasonic modulation**, Quan Liu, Stephen J. Norton, Tuan Vo-Dinh, Duke Univ. . . . . [6856-61]

4:50 pm: **Ultrasound-modulated optical tomography using spectral hole-burning**, Youzhi Li, Chulhong Kim, Washington Univ. in St. Louis; Huiliang Zhang, Texas A&M Univ.; Kelvin H. Wagner, Univ. of Colorado at Boulder; Philip R. Hemmer, Texas A&M Univ.; Lihong V. Wang, Washington Univ. in St. Louis . . . . . [6856-62]

5:10 pm: **Ultrasound-modulated optical tomography using four-wave mixing in photorefractive polymers**, Huiliang Zhang, Philip R. Hemmer, Texas A&M Univ.; Peng Wang, Shuji Rokutanda, Michiharu Yamamoto, Nitto Denko Technical Corp.; Lihong V. Wang, Washington Univ. in St. Louis . . . . [6856-63]

**Wednesday 23 January**

**SESSION 13**

**Room: Conv. Ctr. A4 . . . . . Wed. 8:30 to 10:10 am**

**Functional Imaging**

*Session Chair: Rinat O. Esenaliev*,

The Univ. of Texas Medical Branch at Galveston

8:30 am: **Effects of wavelength-dependent fluence attenuation on the noninvasive photoacoustic imaging of hemoglobin oxygen saturation in subcutaneous vasculature in vivo**, Hao F. Zhang, Konstantin Maslov, Lihong V. Wang, Washington Univ. in St. Louis . . . . . [6856-64]

8:50 am: **Toward functional ultrasound-modulated optical tomography: a phantom study**, Chulhong Kim, Lihong V. Wang, Washington Univ. in St. Louis . . . . . [6856-65]

9:10 am: **Photoacoustic determination of absorption coefficient of coagulated blood**, Emily Spradling, Robert J. Talbert, John A. Viator, Univ. of Missouri/Columbia . . . . . [6856-66]

9:30 am: **Deep reflection-mode photoacoustic imaging of internal organs**, Kwanghyun Song, Lihong V. Wang, Washington Univ. in St. Louis . . . [6856-67]

9:50 am: **Photoacoustic characterization of vascular tissue at NIR wavelengths**, Thomas J. Allen, Paul C. Beard, Univ. College London (United Kingdom) . . . . . [6856-68]

Coffee Break . . . . . 10:10 to 10:30 am

**SESSION 14**

**Room: Conv. Ctr. A4 . . . . . Wed. 10:30 am to 12:30 pm**

**Systems Optimization**

*Session Chair: Guenther Paltauf*, Karl-Franzens-Univ. Graz (Austria)

10:30 am: **Optimization of tissue irradiation in optoacoustic imaging with a linear array transducer: Theory and experiments**, Michael Jaeger, Martin Frenz, Univ. Bern (Switzerland) . . . . . [6856-69]

10:50 am: **Measurement of photoacoustic transducer position by robotic source placement and nonlinear parameter estimation**, Jeff Carson, Pinhas Ephrat, Adam Seabrook, Lawson Health Research Institute (Canada). [6856-70]

11:10 am: **Photoacoustic tomography of heterogeneous media using a model-based time reversal method**, Hubert Gruen, Upper Austrian Research GmbH (Austria); Robert Nuster, Günther Paltauf, Karl-Franzens-Univ. Graz (Austria); Markus Haltmeier, Leopold-Franzens-Univ. Innsbruck (Austria); Peter Burgholzer, Upper Austrian Research GmbH (Austria) . . . . . [6856-71]

11:30 am: **Optimizing image resolution in three-dimensional photoacoustic tomography with line detectors**, Guenther Paltauf, Robert Nuster, Klaus Passler, Karl-Franzens-Univ. Graz (Austria); Markus Haltmeier, Leopold-Franzens-Univ. Innsbruck (Austria); Peter Burgholzer, Upper Austrian Research GmbH (Austria) . . . . . [6856-72]

11:50 am: **Real time photoacoustic data acquisition with Philips iE33 ultrasound scanner**, John Dean, Viktor Gornstein, Michael Burcher, Ladislav Jankovic, Philips Research North America . . . . . [6856-73]

12:10 pm: **Improving the image quality of thermoacoustic tomography (TAT) by using a negative acoustic lens**, Geng Ku, Manojit Pramanik, Lihong V. Wang, Washington Univ. in St. Louis . . . . . [6856-74]

Lunch/Exhibition Break . . . . . 12:30 to 1:50 pm

**Hot Topics Open Forum**

*Wed. 1:30 pm*

*Session Chair: Alexander A. Oraevsky*, Fairway Medical Technologies, Inc.; Lihong V. Wang, Washington Univ. in St. Louis

**Best Paper Award**

*Wed. 2:30 pm*

*Session Chair: Alexander A. Oraevsky*, Fairway Medical Technologies, Inc.

# Biophotonics and Immune Responses III

Conference Chair: **Wei R. Chen**, Univ. of Central Oklahoma

Program Committee: **Samuel Achilefu**, Washington Univ. in St. Louis; **Gianfranco L. Canti**, Univ. degli Studi di Milano (Italy); **Yuncheng Ge**, Beijing Glass Research Institute (China); **Sandra O. Gollnick**, Roswell Park Cancer Institute; **Michael R. Hamblin**, Massachusetts General Hospital; **Zheng Huang**, Univ. of Colorado at Denver; **Mladen Korbelik**, The BC Cancer Research Ctr. (Canada); **Mark F. Naylor**, Univ. of Oklahoma; **Karl-Goran Tranberg**, Lunds Univ. (Sweden); **Xunbin Wei**, Fudan Univ.; **Vladimir P. Zharov**, Univ. of Arkansas for Medical Sciences

## Monday 21 January

### SESSION 1

Room: Conv. Ctr. L ..... Mon. 8:30 to 10:00 am

#### Phototherapy and Immune Activities I - Clinical Studies

Session Chairs: **Mark F. Naylor**, Univ. of Oklahoma; **Karl-Goran Tranberg**, Lunds Univ. (Sweden)

8:30 am: **Clinical results in a phase I melanoma trial using in situ photoimmunotherapy** (Invited Paper), Mark F. Naylor, Kent Teague, Univ. of Oklahoma; Wei R. Chen, Univ. of Central Oklahoma ..... [6857-01]

9:00 am: **Changes in immunocompetent cells after interstitial laser thermotherapy of breast carcinoma** (Invited Paper), Karl-Goran Tranberg, Kristin H. Haraldsdóttir, Kjell Ivarsson, Unne Stenram, Lunds Univ. (Sweden) ..... [6857-02]

9:30 am: **Combination of photodynamic therapy and immunotherapy: evolving role in dermatology** (Invited Paper), Xiu-Li Wang, Fudan Univ. (China); Hong-Wei Wang, Shanghai Skin Diseases and STD Hospital (China); Zheng Huang, Univ. of Colorado at Denver ..... [6857-03]

Coffee Break ..... 10:00 am

### SESSION 2

Room: Conv. Ctr. L ..... Mon. 10:30 am to 12:20 pm

#### Phototherapy and Immune Activities II - Pre-Clinical Studies

Session Chairs: **Mladen Korbelik**, The BC Cancer Research Ctr. (Canada); **Michael R. Hamblin**, Massachusetts General Hospital

10:30 am: **Hormonal component of tumor photodynamic therapy response** (Invited Paper), Mladen Korbelik, Soroush Merchant, The BC Cancer Research Ctr. (Canada) ..... [6857-04]

11:00 am: **Photodynamic therapy and anti-tumor immunity** (Invited Paper), Michael R. Hamblin, Pawel Mroz, Ana P. Castano, Massachusetts General Hospital ..... [6857-05]

11:30 am: **Immunological responses induced by the combination of phototherapy and immunotherapy in the treatment of metastatic melanoma** (Invited Paper), Wei R. Chen, Univ. of Central Oklahoma; Kent Teague, Mark F. Naylor, Univ. of Oklahoma ..... [6857-06]

12:00 pm: **The influence of photodynamic therapy (PDT) with delta-aminolevulinic acid (ALA) on J-774A.1 macrophage cell line**, Aleksandra Z. Kawczyk-Krupka M.D., Medical Univ. of Silesia (Poland) and Center for Laser Diagnostics and Therapy (Poland); Zenon P. Czuba, Aleksandra E. Ledwon M.D., Wojciech Latos, Ewelina Sliszka M.D., Wojciech Krol, Aleksander Sieron M.D., Medical Univ. of Silesia (Poland) ..... [6857-07]

Lunch Break ..... 12:20 pm

### SESSION 3

Room: Conv. Ctr. L ..... Mon. 2:00 to 3:30 pm

#### Detection of Immune Activities

Session Chair: **Xing Da**, South China Normal Univ. (China); **Xunbin Wei**, Fudan Univ. (China)

2:00 pm: **Imaging cellular choreography in lymph node with two-photon microscopy** (Invited Paper), Michael Cahalan, Univ. of California/Irvine [6857-08]

2:30 pm: **Monitoring circulating apoptotic cells by in-vivo flow cytometry** (Invited Paper), Xunbin Wei, Fudan Univ. (China) ..... [6857-09]

3:00 pm: **Characteristics and mechanism of cell apoptosis induced by high-fluence-low-power laser irradiation** (Invited Paper), Xing Da, Shengnan Wu, South China Normal Univ. (China) ..... [6857-10]

Coffee Break ..... 3:30 pm

### SESSION 4

Room: Conv. Ctr. L ..... Mon. 4:00 to 5:40 pm

#### Monitoring Techniques

Session Chairs: **Zheng Huang**, Univ. of Colorado at Denver; **Wei R. Chen**, Univ. of Central Oklahoma

4:00 pm: **PDT-apoptotic tumor cells induce macrophage immune response**, Feifan Zhou, Xing Da, South China Normal Univ.; Wei R. Chen, Univ. of Central Oklahoma ..... [6857-11]

4:20 pm: **Spatial and temporal changes in Bax subcellular localization during NPE6-PDT-induced apoptosis**, Lei Liu, Qingling Wan, Xing Da, Feifan Zhou, South China Normal Univ. (China); Wei R. Chen, Univ. of Central Oklahoma ..... [6857-12]

4:40 pm: **The correlation study of temperature distribution with the immunology response under laser radiation**, Yichao Chen, Ganrav Kumar, Jennifer Ellis, Univ. of Central Oklahoma; Feng Wu, Chongqing Medical Univ. (China); Hong Liu, Univ. of Oklahoma; Rheel A. Towner, Oklahoma Medical Research Foundation; Wei R. Chen, Univ. of Central Oklahoma ..... [6857-13]

5:00 pm: **A high precision automated microscope scanning system for clinical chromosome diagnostics: the impact of scanning speed to image quality and design strategies**, Marc C. Wood, Univ. of Oklahoma; Shibo Li, Oklahoma Medical Research Foundation; Bin Zheng, Univ. of Pittsburgh; Hong Liu, Univ. of Oklahoma ..... [6857-14]

5:20 pm: **Computed radiography phase contrast x-ray imaging prototype**, Yuhua Li, Univ. of Oklahoma; John X. Rong, Robert Y. L. Chu, Univ. of Oklahoma Health Sciences Ctr.; Da Zhang, Univ. of Oklahoma; Ann Archer, Univ. of Oklahoma Health Sciences Ctr.; Laurie L. Fajardo, The Univ. of Iowa; Xizeng Wu, The Univ. of Alabama at Birmingham; Hong Liu, Univ. of Oklahoma ..... [6857-15]

### POSTERS-Monday

Room: Conv. Ctr. L ..... Mon. 6:00 to 7:30 pm

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Monday morning starting at 10:00 am in the Civic Auditorium Complex, and will need to remove their papers immediately following the poster session that evening. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

**Cytotoxic and photodynamic activities of hypericin and H. perforatum extracts**, Hrachik R. Vardapetyan, Alina S. Martirosyan, Russian-Armenian (Slavonic) State Univ. (Armenia); Susanna G. Tiratsuyan, Ashkhen A. Hovhannisyian, Lernik S. Hunanayan, Yerevan State Univ. (Armenia) . . [6857-16]

**Analysis of caspase3 activation in ChanSu-induced apoptosis of ASTC-a-1 cells by fluorescence techniques**, Lei Sun, Tongsheng Chen, Longxiang Wang, Huiying Wang, South China Normal Univ. (China) ..... [6857-17]

**Analysis of caspase-3 activation in mitomycin C-induced ASTC-a-1 cell apoptosis using acceptor photobleaching techniques**, Huiying Wang, Tongsheng Chen, Lei Sun, South China Normal Univ. (China) ..... [6857-18]

**The joint action of hypericin and additives on erythrocytes photohemolysis**, Hrachik R. Vardapetyan, Alina S. Martirosyan, Russian-Armenian (Slavonic) State Univ. (Armenia); Susanna G. Tiratsuyan, Ashkhen A. Hovhannisyian, Yerevan State Univ. (Armenia) . . . . . [6857-19]



**Fluorescence imaging analysis of taxol-induced cell death with cell swelling and cytoplasmic vascularization**, Tongsheng Chen, Lei Sun, Huiying Wang, Longxiang Wang, South China Normal Univ. (China) . . . . . [6857-20]

**Fluorescence spectroscopic and electrophoretic studies on binding of hypericin to human serum albumin**, Hrachik R. Vardapetyan, Russian-Armenian (Slavonic) State Univ. (Armenia); Susanna G. Tiratsuyan, Ashkhen A. Hovhannisyan, Yerevan State Univ. (Armenia); Alina S. Martirosyan, Russian-Armenian (Slavonic) State Univ. (Armenia); Seda V. Marutyan, Yerevan State Univ. (Armenia) . . . . . [6857-21]

**PUMA can promote the translocation of Bax via binding to Bcl-XL during UV-induced apoptosis**, Yingjie Zhang, Yinyuan Wu, Xing Da, South China Normal Univ. (China); Wei R. Chen, Univ. of Central Oklahoma; Xichao Wang, South China Normal Univ. (China). . . . . [6857-22]

**Thermal damage in dye-enhanced tissues during laser irradiation**, Surya C. Gnyawali, Oklahoma State Univ.; Wei R. Chen, Univ. of Central Oklahoma . . . . . [6857-23]

**Detecting and comparing the caspase-3 activation process during anticancer drugs induced tumor cells apoptosis**, Zhihong Zhang, Xiaohua Li, Huazhong Univ. of Science and Technology (China) . . . . . [6857-24]

**Histological and morphological studies of immune responses induced by laser immunotherapy**, Robert E. Nordquist, Wound Healing of Oklahoma; Mark F. Naylor, Oklahoma Medical Research Foundation; Wei R. Chen, Univ. of Central Oklahoma . . . . . [6857-25]

**Simultaneous imaging of two initiator caspases during cisplatin-induced HeLa apoptosis**, Jun Chu, Qingming Luo, Zhihong Zhang D.V.M., Huazhong Univ. of Science and Technology (China) . . . . . [6857-26]



# Conference 6858 · Room: Marriott Hotel: San Jose Ballroom I

Sunday 20 January 2008 • Proceedings of SPIE Vol. 6858

## Optics in Tissue Engineering and Regenerative Medicine II

*Conference Chair:* **Sean J. Kirkpatrick**, Oregon Health and Science Univ.; **Ruikang K. Wang**, Oregon Health and Science Univ.

*Program Committee:* **Stephen A. Boppart**, Univ. of Illinois at Urbana-Champaign; **Sergio Fantini**, Tufts Univ.; **Irene Georgakoudi**, Tufts Univ.; **Miya Ishihara**, National Defense Medical College (Japan); **Stephen John Matcher**, The Univ. of Sheffield (United Kingdom); **Steve P. Morgan**, The Univ. of Nottingham (United Kingdom); **Ying Yang**, Keele Univ. (United Kingdom)

### Sunday 20 January

#### SESSION 1

**Room: Marriott Hotel: San Jose Ballroom I . . . . Sun. 8:30 to 10:30 am**

##### Mechanics

*Session Chair:* **Rui-Kang Wang**, Oregon Health and Science Univ.

8:30 am: **Spatio-temporal algorithms for processing laser speckle imaging data**, Donald D. Duncan, Sean J. Kirkpatrick, Oregon Health & Science Univ. . . . . [6858-01]

8:50 am: **Modeling and measurement of tissue elastic moduli using optical coherence elastography**, Xing Liang, Amy Oldenburg, Vasilica Crecea, Sureshkumar Kalyanam, Michael Insana, Stephen Boppart, Univ. of Illinois at Urbana-Champaign. . . . . [6858-02]

9:10 am: **Complex flow characterization of a degrading porous tissue scaffold measured by Doppler optical coherence tomography**, Peter H. Tomlins, Matthew Tedaldi, Paul Tomlins, National Physical Lab. (United Kingdom). . . . . [6858-03]

9:30 am: **Modification of measurement methods for evaluation of tissue-engineered cartilage function and biochemical properties using nanosecond pulsed laser**, Miya Ishihara, National Defense Medical College (Japan); Masato Sato M.D., Toshiharu Kutsuna M.D., Tokai Univ. School of Medicine (Japan); Mamoru Iwasa, Minoru Doshida, Ministry of Defense (Japan); Joji Mochida M.D., Tokai Univ. School of Medicine (Japan); Makoto Kikuchi D.D.S., National Defense Medical College (Japan). . . . . [6858-04]

9:50 am: **Monitoring the effect of mechanical stress on mesenchymal stem cell collagen production by multiphoton microscopy**, Wei-Liang Chen, Chia-Cheng Chang, National Taiwan Univ. (Taiwan); Ling-Ling Chiou, National Taiwan Univ. Hospital (Taiwan); Hsuan-Shu Lee M.D., National Taiwan Univ. Hospital (Taiwan) and National Taiwan Univ. College of Medicine (Taiwan); Chen-Yuan Dong, National Taiwan Univ. (Taiwan). . . . . [6858-05]

10:10 am: **Ultra high-resolution whole field optical coherence tomography of cell morphology and cell dynamics in three dimensional tissue models**, Yali Jia, Oregon Health & Science Univ.; Chuanmao Fan, Tianjin Univ. (China); Ruikang Wang, Oregon Health & Science Univ. . . . . [6858-06]

Coffee Break . . . . . 10:30 to 11:00 am

#### SESSION 2

**Room: Marriott Hotel: San Jose Ballroom I . . . . Sun. 11:00 am to 12:30 pm**

##### Imaging I

*Session Chair:* **Sean J. Kirkpatrick**, Oregon Health and Science Univ.

11:00 am: **Label-free imaging of complex biological samples by time-resolved broadband CARS microscopy (Invited Paper)**, Marcus T. Cicerone, Young J. Lee, National Institute of Standards and Technology . . . . . [6858-07]

11:30 am: **Tissue morphology from spectral polarimetry**, Donald D. Duncan, James C. Gladish, Brandon D. Markway, Oregon Health & Science Univ. . . . . [6858-08]

11:50 am: **Rotational orthogonal polarization imaging of tissue**, Steve P. Morgan, Ian M. Stockford, Qun Zhu, John Crowe, Nicolas Sawyer, The Univ. of Nottingham (United Kingdom). . . . . [6858-09]

12:10 pm: **Polarization sensitive optical frequency domain OCT for dynamic imaging of biological samples at 1.064 micron**, Badr Elmaanaoui, Jordan Dwelle, Amit Paranjape, Henry G. Rylander, Thomas Milner, The Univ. of Texas at Austin . . . . . [6858-11]

Lunch/Exhibition Break . . . . . 12:30 to 1:50 pm

#### SESSION 3

**Room: Marriott Hotel: San Jose Ballroom I . . . . . Sun. 1:50 to 3:40 pm**

##### Imaging II

*Session Chair:* **Miya Ishihara**, National Defense Medical College (Japan)

1:50 pm: **Multiphoton tomography for tissue engineering (Invited Paper)**, Karsten Koenig, JenLab GmbH (Germany). . . . . [6858-12]

2:20 pm: **Live imaging of collagen remodeling during angiogenesis**, Urs Utzinger, Nathaniel D. Kirkpatrick, James B. Hoying, The Univ. of Arizona. . . . . [6858-13]

2:40 pm: **Optically characterizing vascular tissue constructs made with soluble versus homogenized collagen**, David Levitz, Monica T. Hinds, Noi Tran, Stephen R. Hanson, Steven L. Jacques, Oregon Health & Science Univ. . . . . [6858-14]

3:00 pm: **Imaging stented tissue engineered blood vessel mimics**, Garret T. Bonnema, Kristen O. Cardinal, The Univ. of Arizona; Stuart K. Williams, Univ. of Louisville; Jennifer K. Barton, The Univ. of Arizona . . . . . [6858-15]

3:20 pm: **In situ monitoring of localized shear stress and fluid flow within developing tissue constructs by Doppler optical coherence tomography**, Yali Jia, Ruikang Wang, Oregon Health & Science Univ. . . . . [6858-16]

Coffee Break . . . . . 3:40 to 4:10 pm

#### SESSION 4

**Room: Marriott Hotel: San Jose Ballroom I . . . . . Sun. 4:10 to 6:10 pm**

##### Imaging III

*Session Chair:* **Irene Georgakoudi**, Tufts Univ.

4:10 pm: **Utilizing two-photon fluorescence and second harmonic generation microscopy to study human bone marrow mesenchymal stem cell morphogenesis in chitosan scaffold**, Ping-Jung Su, Chi-Hsiao Huang, Chen-Yuan Dong, National Taiwan Univ. (Taiwan). . . . . [6858-17]

4:30 pm: **The three-dimensional orientation of cartilage collagen matrix**, Nadezhda V. Ugryumova, Stephen J. Matcher, The Univ. of Sheffield (United Kingdom). . . . . [6858-18]

4:50 pm: **Imaging of artificial cartilage with optical coherence tomography**, Klaus Eder, Robert Schmitt, Fraunhofer-Institut für Produktionstechnologie (Germany); Ralf Müller-Rath, Univ. Clinic Aachen (Germany). . . . . [6858-19]

5:10 pm: **Application of polarization-sensitive OCT in tissue engineering**, Ying Yang, Pierre Bagnaninchi, Karen Hampson, Bin Hu, Alicia El Haj, Keele Univ. (United Kingdom). . . . . [6858-20]

5:30 pm: **Application of ultrahigh resolution full-field optical coherence tomography for evaluating cultured corneal epithelial cells in regenerative medicine**, Masahiro Akiba, Topcon Medical Systems, Inc.; Akira Kubota, Tohoku Univ. (Japan); Yasufumi Fukuma, Topcon Medical Systems, Inc.; Kohji Nishida, Tohoku Univ. (Japan); Kinpui Chan, Topcon Medical Systems, Inc. . . . . [6858-21]

5:50 pm: **Three-dimensional OCT in the engineering of tissue constructs: a potentially powerful tool for assessing optimal scaffold structure**, Kathy Zheng, Bin Liu, Maria A. Rupnick, Mark E. Brezinski, Brigham and Women's Hospital . . . . . [6858-22]

**Monday 21 January**

**POSTERS-Monday**

**Room: Marriott Hotel: San Jose Ballroom I . . . . Mon. 6:00 to 7:30 pm**

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**Availability of thiazone as an enhancer for optical clearing of skin tissue in vitro**, Jingying Jiang, Wei Chen, Tianjin Univ. (China); Rui-Kang Wang, Oregon Health & Science Univ.; Kexin Xu, Tianjin Univ. (China) . . . . . [6858-23]

**Correlations between second harmonic signal, microstructure, and stiffness of contracting collagen gels**, Christopher B. Raub, Peter D. Kim, Andrew J. Putnam, John S. Lowengrub, Bruce J. Tromberg, Steven C. George, Univ. of California/Irvine . . . . . [6858-25]

*Don't miss the weekend*  
**Biomedical Optics Exhibition**  
*San Jose Convention Center, Exhibition Hall 1*  
 Saturday 19 January . . . . . 1:00 to 5:00 pm  
 Sunday 20 January . . . . . 10:00 am to 4:00 pm

# Imaging, Manipulation, and Analysis of Biomolecules, Cells, and Tissues VI

*Conference Chairs:* **Daniel L. Farkas**, Cedars-Sinai Medical Ctr.; **Dan V. Nicolau**, The Univ. of Liverpool (United Kingdom); **Robert C. Leif**, Newport Instruments

*Conference Co-Chairs:* **J. Paul Robinson**, Purdue Univ.; **Attila Tarnok**, Univ. Leipzig (Germany); **Ramesh Raghavachari**, U.S. Food and Drug Administration

*Program Committee:* **Christopher H. Contag**, Stanford Univ.; **Paul Dan A. Cristea**, Univ. Politehnica Bucharest (Romania); **Alberto Diaspro**, Univ. degli Studi di Genova (Italy); **Erik G. Fällman**, Umeå Univ. (Sweden); **Jesper Glückstad**, Danmarks Tekniske Univ. (Denmark); **Ewa M. Goldys**, Macquarie Univ. (Australia); **James F. Leary**, Purdue Univ.; **Charles P. Lin**, Massachusetts General Hospital; **Andreas Nowatzky**, Cedars-Sinai Medical Center; **Markus Sauer**, Univ. Bielefeld (Germany)

## Monday 21 January

### SESSION 1

Room: Conv. Ctr. A5 . . . . . Mon. 8:30 am to 12:30 pm

#### Cell and Tissue Functional Imaging I

*Session Chair:* **Daniel L. Farkas**, Cedars-Sinai Medical Ctr.

- 8:30 am: **Characterization of dermal structural assembly in normal and pathological connective tissues by intrinsic signal multiphoton optical microscopy** (*Invited Paper*), Julia G. Lyubovitsky, Univ. of California/Riverside . . . . . [6859-01]
- 9:00 am: **Multidimensional two-photon imaging of diseased skin**, Riccardo Cicchi, Serena Sestini, Vincenzo De Giorgi, Paolo Carli, Daniela Massi, Torello Lotti, Francesco S. Pavone, Univ. degli Studi di Firenze (Italy). . . . . [6859-02]
- 9:20 am: **Texture analysis of tissues in Gleason grading of prostate cancer**, Eleni Alexandratou, Dido M. Yova, Petros Maragos, National Technical Univ. of Athens (Greece); Nikolaos Kavantzias, Univ. of Athens (Greece) . . . . . [6859-03]
- 9:40 am: **Development of a direct Raman imaging system for rapid diagnosis of malignant tumor**, Yusuke Oshima, The Institute of Physical and Chemical Research (Japan); Chie Furihata, Aoyama Gakuin Univ. (Japan); Hidetoshi Sato, The Institute of Physical and Chemical Research (Japan). . . . . [6859-04]
- 10:00 am: **The role of autofluorescence colonoscopy in diagnosis and management of solitary rectal ulcer syndrome (SRUS)**, Wojciech Latos, Aleksandra Z. Kawczyk-Krupka, Aleksandra Ledwon, Anna Kosciarz-Grzesiok, Anna A. Misiak, Aleksander R. Sieron M.D., Medical Univ. of Silesia (Poland) . . . . . [6859-05]
- Coffee Break . . . . . 10:20 to 10:50 am
- 10:50 am: **Blood oxygen saturation determination of frozen tissue using reflection spectroscopy in a cryomicrotome**, Maurice C. G.Aalders, Rene D. ter Wee, Boy Braaf, Geert Streekstra, Dirk J. Faber, Univ. van Amsterdam (Netherlands). . . . . [6859-06]
- 11:10 am: **Cellular discrimination based on spectral analysis of intrinsic fluorescence**, Gregory R. Goddard, Jessica P. Houston, Joseph Hickey, John C. Martin, James P. Freyer, Steven W. Graves, Los Alamos National Lab. . . . . [6859-07]
- 11:30 am: **Quantitative imaging of intracellular dynamics by spectral-domain optical coherence phase microscopy**, Chulmin Joo, Reza Motaghiannezam, Thomas Stepinac, Tayyaba Hasan, Johannes F. de Boer, Massachusetts General Hospital . . . . . [6859-08]
- 11:50 am: **Accurate measurements of cellular autofluorescence is critical for imaging of host-pathogen interactions**, Jerilyn A. Timlin, Rachel M. Noek, Julia N. Kaiser, Michael B. Sinclair, Howland D. T.Jones, Ryan W. Davis, Todd W. Lane, Sandia National Labs. . . . . [6859-09]
- 12:10 pm: **Spectroscopic assessment of the hemoglobin to methemoglobin conversion in blood stains**, Rolf H. Bremmer, Annemarie Nadort, Barbara Stam, Maurice C. G.Aalders, Academisch Medisch Ctr. (Netherlands) [6859-10]
- Lunch Break . . . . . 12:30 to 1:30 pm

### SESSION 2

Room: Conv. Ctr. A5 . . . . . Mon. 1:30 to 4:20 pm

#### Cell and Tissue Functional Imaging II

*Session Chair:* **Andreas G. Nowatzky**, Cedars-Sinai Medical Ctr.

- 1:30 pm: **A fluorescence lifetime imaging microscopy (FLIM) system for the characterization of haematoxylin and eosin stained sample**, Dinish U. K.Soudamini Amma, Chit Yaw Fu, Beng-Koon Ng, Murukeshan V. Matham, Leong Keeey Seah, Nanyang Technological Univ. (Singapore); Soo Kim Lim-Tan, Singapore General Hospital (Singapore). . . . . [6859-12]
- 1:50 pm: **The binding properties of methylene blue to MCF-7 human breast cancer DNA**, Tang Zhang, Ping Chen, Lie Lin, Guoqing Tang, Nankai Univ. (China) . . . . . [6859-13]
- 2:10 pm: **Real-time monitoring of chemical and structural changes induced by light irradiation of cells and tissues**, Vladislav V. Yakovlev, Univ. of Wisconsin/Milwaukee . . . . . [6859-14]
- 2:30 pm: **Characterization of Cells by Differential Nuclear Methylation Imaging**, Jian Tajbakhsh, Kolja Wawrowsky, Eugene Vishnevsky, Erik H. Lindsley, Daniel L. Farkas, Cedars-Sinai Medical Ctr. . . . . [6859-15]
- 2:50 pm: **Large Field of View Scanning Fluorescence Lifetime Imaging System for Multi-mode Optical imaging of Small Animals**, Jae Youn Hwang, Daniel L. Farkas, Cedars-Sinai Medical Ctr. . . . . [6859-16]
- Coffee Break . . . . . 3:10 to 3:40 pm
- 3:40 pm: **Detection and identification of esophageal cancer using fluorescence and Raman spectrum**, Xiaozhou Li, Deli Wang, Shenyang Ligong Univ. (China) . . . . . [6859-17]
- 4:00 pm: **Effects of magnetic field on immunofluorescence images of human neutrophil**, Elbert O. Reyes D.V.M., Univ. de Los Andes (Venezuela); Wilferdo Molina, Joshi V. Narahaki, Univ de Los Andes (Venezuela) . . . . . [6859-18]
- 4:20 pm: **Heterodyne fluorescence tomography**, A. G. Nowatzky, Cedars-Sinai Medical Ctr. . . . . [6859-77]

**POSTERS-Monday**

**Room: Civic Auditorium Complex . . . . . Mon. 6:00 to 7:30 pm**

*Session Chair: Dan V. Nicolau, The Univ. of Liverpool (United Kingdom) All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.*

*Poster presenters may post their poster papers Monday morning starting at 10:00 am in the Civic Auditorium Complex, and will need to remove their papers immediately following the poster session that evening. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.*

- Polychromatic flow cytometry with an avalanche photodiode array**, William G. Lawrence, Gyula Varadi, Gerald Entine, Radiation Monitoring Devices, Inc.; Edward Podniesinski, Paul K. Wallace, Roswell Park Cancer Institute [6859-56]
- The NANIVID: a new approach for cancer cell migration studies**, Waseem K. Raja, Ebenezer K. Amponsah, James Castracane, Univ. at Albany; John S. Condeelis, Jacco van Rheenen, Albert Einstein College of Medicine. [6859-57]
- Frequency domain inverse Monte Carlo simulation for the diagnosis of early cervical cancer with NIR diffuse optical measurement**, Huijuan Zhao, Zhaoxia Wang, Miao Hui, Du Zhen, Shunqi Zhang, Tianjin Univ. (China)[6859-58]
- Lipid raft-dependent endocytosis of superparamagnetic iron oxide in HepG2 cells under laser scanning confocal microscope**, Wen Li Chen D.D.S., South China Normal Univ. (China) . . . . . [6859-59]
- Effects of DCMU on measurement of fluorescence spectra in Acetabularia acetabulum**, Wen Li Chen D.D.S., South China Normal Univ. (China) [6859-60]
- Optimizing the depth of field for short object distance of capsule endoscope**, Ou-Yang Mang, Shih-Wei Huang, National Central Univ. (Taiwan) . . . . . [6859-62]
- Measurements of RBC damage thresholds using laser tweezers Raman spectroscopy (LTRS) during femtosecond laser optical trapping**, Sung-Bin Ju, Jae-Young Jang, Seung-Duk Lee, Beop-Min Kim, Yonsei Univ. (South Korea) . . . . . [6859-63]
- Assessment of rotator cuff tendon integrity with single detector PS-OCT**, Namita P. Kumar, Scott Martin, Brigham and Women's Hospital; James Jiang, Thorlabs, Inc.; Kelly Parks, Mark E. Brezinski, Brigham and Women's Hospital . . . . . [6859-64]
- Automated multi-color FISH analysis workstation for lung pharmacogenomics: scanning, spot-counting, and architecture**, Piotr Dubrowski, Stephen Lam, Victor Ling, Wan L. Lam, Calum E. MacAulay, The BC Cancer Research Ctr. (Canada) . . . . . [6859-66]
- Study of melanoma invasion by FTIR**, Ying Yang, Josep Sulé-Suso, Keele Univ. (United Kingdom) . . . . . [6859-67]
- Quantification of telomere length by FISH and laser scanning cytometry**, Alexei Protopopov, Mariela Jaskelioff, Jed Mahoney, Dana-Farber Cancer Institute . . . . . [6859-68]
- Parametric cell viability studies on microscale cell culture assays using portable optical fluorescence measurement in situ**, Jong-Ryul Choi, Yonsei Univ. (South Korea); Jong Hwan Sung, Michael L. Shuler, Cornell Univ.; Taek-il Oh, Dong-Hyun Kim, Yonsei Univ. (South Korea) . . . . . [6859-69]
- An optical microfluidics approach for real-time PCR**, Hanyoup Kim, Sanhita Dixit, Gregory W. Faris, SRI International . . . . . [6859-71]
- High throughput analysis of protein using mid-infrared laser**, Sachiko Suzuki, Tamami Fujita, Izuru Sato, Kunio Awazu, Osaka Univ. (Japan) [6859-72]
- A conjugated SERS-AFM approach for ultrasensitive biomolecular detection**, Anna Rita Bizzarri, Salvatore Cannistraro, Univ. degli Studi della Tuscia (Italy) . . . . . [6859-73]
- Analysis of Human Tissue Optical Scattering Spectra for the Purpose of Breast Cancer Diagnostics Using Multi-Layer Perceptron**, Tatiana Lyubynskaya, RFNC-VNIIEF (Russia); Anton Nuzhny, Sergey Shumsky, Alexey V. Korzhov, P.N. Lebedev Physical Institute (Russia) . . . . . [6859-74]

**Analysis of data obtained in clinical trials of optical biopsy system for breast cancer diagnostics**, Sergey A. Belkov, RFNC-VNIIEF (Russia) and BIOFIL Ltd. (Russia); Gennady Kochemasov, BIOFIL Ltd. (Russia); Stanislav Kulikov, N. V. Maslov, Sergey Bondarenko, RFNC-VNIIEF (Russia); Natalia M. Shakhova M.D., Institute of Applied Physics (Russia); Irina Pavlycheva, Nizhny Novgorod State Medical Academy (Russia); Alexander Rubenchik, Lawrence Livermore National Lab.; Luiz Da Silva, BioTelligent. . . . . [6859-75]

**Multi-frequency electrical impedance tomography: image reconstruction using current density**, Amani M. Soliman, Al-Fateh Univ. (Libya) . . . . [6859-76]

**Tuesday 22 January**

**SESSION 3**

**Room: Conv. Ctr. A5 . . . . . Tues. 8:30 am to 12:40 pm**

**Cytomics**

*Session Chair: Robert C. Leif, Newport Instruments*

- 8:30 am: Advances in cytometry: hyperspectral analysis of single cells at high speed** (*Invited Paper*), J. Paul Robinson, Bartek P. Rajwa, James T. Jones, Valery Patsekun, Purdue Univ.; Gérald J. Gregori, Univ. de la Méditerranée (France) . . . . . [6859-19]
- 9:00 am: Cytomics in regenerative medicine**, Attila Tarnok, Univ. Leipzig (Germany) . . . . . [6859-20]
- 9:20 am: A comparison of avalanche photodiode and photomultiplier tube detectors for flow cytometry**, William G. Lawrence, Gyula Varadi, Gerald Entine, Radiation Monitoring Devices, Inc.; Edward Podniesinski, Paul K. Wallace, Roswell Park Cancer Institute. . . . . [6859-21]
- 9:40 am: Immunological changes following protein losing enteropathy after surgery total cavopulmonary connection (TCPC) by cytomics**, Josef Bocsi, Dominik Lenz, Anja Mittag, Univ. Leipzig (Germany); Ursula Sauer, Deutsches Herzzentrum München (Germany); Lena Wild, Univ. Leipzig (Germany); John Hess, Deutsches Herzzentrum München (Germany); Dietmar Schranz, Justus-Liebig-Universität Giessen (Germany); Jörg Hamsch, Peter Schneider, Attila Tarnok, Univ. Leipzig (Germany) . . . . . [6859-22]
- 10:00 am: UV LED excited time-gated luminescence flow cytometry: evaluation for rare-event particle counting**, Dayong Jin, Macquarie Univ. (Australia); Robert C. Leif, Newport Instruments; Belinda Ferrari, Macquarie Univ. (Australia); Sean Yang, Newport Instruments; Lidia M. Vallarino, John W. Williams, Virginia Commonwealth Univ.; James A. Piper, Macquarie Univ. (Australia) . . . . . [6859-23]
- Coffee Break . . . . . 10:20 to 10:50 am
- 10:50 am: Comparison of DNA dyes for immunophenotyping by slide-based cytometry (SBC)** (*Invited Paper*), Attila Tarnok, Wiebke Laffers, Univ. Leipzig (Germany); Friedrich Bootz, Andreas O. H.Gerstner, Univ. Bonn (Germany) . . . . . [6859-24]
- 11:20 am: Cytometry standards continuum**, Robert C. Leif, Newport Instruments . . . . . [6859-25]
- 11:40 am: Monitoring circulating cells by in vivo flow cytometry**, Costas M. Pitsillides, Judith M. Runnels, Joel A. Spencer, Massachusetts General Hospital; Zhigang Fan, Beth Israel Deaconess Medical Ctr.; Irene M. Ghobrial, Dana-Farber Cancer Institute; Maria Koulmanda, Terry B. Strom, Beth Israel Deaconess Medical Ctr.; Charles P. Lin, Massachusetts General Hospital . . . . . [6859-26]
- 12:00 pm: Retinal flow cytometry for quantification of circulating cells**, Clemens Alt, Massachusetts General Hospital; Israël Veilleux, Univ. Laval (Canada); Ho Lee, Kyungpook National Univ. (South Korea); Costas M. Pitsillides, Massachusetts General Hospital; Daniel Côté, Univ. Laval (Canada); Alicia L. Carlson, Charles P. Lin, Massachusetts General Hospital . . . [6859-27]
- 12:20 pm: Endogenous fluorescence lifetime of viable tumorigenic and non-tumorigenic cells by flow cytometry**, Jessica P. Houston, Mark Naivar, John C. Martin, Gregory R. Goddard, James P. Freyer, Los Alamos National Lab. . . . . [6859-28]
- Lunch/Exhibition Break . . . . . 12:40 to 1:40 pm

## SESSION 4

Room: Conv. Ctr. A5 ..... Tues. 1:40 to 3:20 pm

### Microscale Devices and Microarrays

Session Chair: J. Paul Robinson, Purdue Univ.

1:40 pm: **Examining the behavior of fungal cells in microconfined maze-like structures**, Marie Held, Clive Edwards, Dan V. Nicolau, The Univ. of Liverpool (United Kingdom) ..... [6859-29]

2:00 pm: **Design of a multi-stage microfluidics system for high-speed flow cytometry and closed system cell sorting for cytomics**, Meggie Grafton, Lisa M. Reece, Pedro P. Irazoqui, Byunghoo Jung, Purdue Univ.; Huw D. Summers, Cardiff Univ. (United Kingdom); Rashid Bashir, James F. Leary, Purdue Univ. .... [6859-30]

2:20 pm: **Characterization of a polymeric coating for microarray applications using spectral self-interference fluorescence microscopy**, Ayca Yalcin, Boston Univ.; Francesco Damin, Consiglio Nazionale delle Ricerche (Italy); Emre I. Ozkumur, Boston Univ.; Gabriele di Carlo, Consiglio Nazionale delle Ricerche (Italy); Bennett B. Goldberg, M. Selim Unlu, Boston Univ.; Marcella Chiari, Consiglio Nazionale delle Ricerche (Italy) ..... [6859-31]

2:40 pm: **Label-free real-time microarray imaging using spectral reflectivity information**, Emire I. Ozkumur, James W. Needham, David A. Bergstein, Bennett B. Goldberg, M. Selim Unlu, Boston Univ. .... [6859-32]

3:00 pm: **Optofluidic microscope: a complete on-chip imaging device**, Xiquan Cui, Xin Heng, Changhui Yang, California Institute of Technology ..... [6859-33]

Coffee Break ..... 3:20 to 3:50 pm

## SESSION 5

Room: Conv. Ctr. A5 ..... Tues. 3:50 to 6:00 pm

### Optical Manipulation

Session Chair: Attila Tarnok, Univ. Leipzig (Germany)

3:50 pm: **Turn key calibration of counter-propagating multiple beam three-dimensional trapping system**, Jeppe S. Dam, Peter John L. Rodrigo, Ivan R. Perch-Nielsen, Jesper Glückstad, Danmarks Tekniske Univ. (Denmark) ..... [6859-34]

4:10 pm: **A novel interactive imaging/laser assisted dilution technique to produce clonal colonies of HCT116 cells**, Michael D. Zordan, Ray O. Fatig, Lisa M. Reece, V. Jo Davisson, James F. Leary, Purdue Univ. .... [6859-35]

4:30 pm: **High-throughput laser-based processing of living cells**, Jacques Weissman, Ha-Yong Lim, Glenn C. Sasaki, Gary R. Bright, Manfred R. Koller, Cyntellect Inc. .... [6859-70]

4:50 pm: **Three-dimensional image and spatial spectrum analysis of behavior of small animal erythrocytes in optical tweezers**, Hui Chi Chen, Wen-Tai Shen, Yu-Han Kong, Chun-Hao Chuang, Fu Jen Catholic Univ. (Taiwan) ..... [6859-37]

5:10 pm: **Characterization of cells and bacteria by photophoretic velocimetry**, Christoph Haisch, Clemens Helmbrecht, Reinhard Niessner, Technische Univ. München (Germany) ..... [6859-38]

5:30 pm: **Nanolaser spectroscopy for studying novel biomaterials (Invited Paper)**, Paul L. Gourley, Darryl Y. Sasaki, Sandia National Labs.; Robert K. Naviaux, Univ. of California/San Diego ..... [6859-78]

## Wednesday 23 January

## SESSION 6

Room: Conv. Ctr. A5 ..... Wed. 8:30 to 11:50 am

### Advances in Bioimaging I: Experimental Techniques

Session Chair: Dan V. Nicolau, The Univ. of Liverpool (United Kingdom)

8:30 am: **Photonic calibration for fluorescence microscopy (Invited Paper)**, Ian T. Young, Guus Liqui Lung, Bart J. Vermolen, Technische Univ. Delft (Netherlands) ..... [6859-39]

9:00 am: **Two-dimensional differential interference contrast microscopy based on four-hole variation of Young's interference**, Matthew Lew, Xiquan Cui, Xin Heng, Changhui Yang, California Institute of Technology ... [6859-40]

9:20 am: **Lanthanide ion containing calibration beads**, Robert C. Leif, Newport Instruments; Dayong Jin, James A. Piper, Macquarie Univ. (Australia); Lidia M. Vallarino, John W. Williams, Virginia Commonwealth Univ.; Sean Yang, Newport Instruments; Robert M. Zucker, U.S. Environmental Protection Agency ..... [6859-41]

9:40 am: **Using a reflectance mode confocal microscope to determine the absorber concentration in the tissue-like phantom and biofilm in the photodynamic process**, Yongji Fu, Ravikant Samatham, Steven L. Jacques, Oregon Health & Science Univ. .... [6859-42]

10:00 am: **A high-content screening platform utilising polarisation anisotropy and FLIM microscopy**, Daniel R. Matthews, Simon M. Ameer-Beg, Melanie D. Keppler, King's College London (United Kingdom); Paul R. Barber, Boris Vojnovic, Gray Cancer Institute (United Kingdom); Klaus Suhling, Tony C. Ng, Malcolm Irving, King's College London (United Kingdom) ..... [6859-43]

Coffee Break ..... 10:20 to 10:50 am

10:50 am: **Anorganic fluorescence reference materials**, Axel Engel, SCHOTT AG (Germany) ..... [6859-44]

11:10 am: **The use of a high speed CMOS camera to resolve nanometer displacements of inner ear hair cell stereocilia in the bullfrog sacculus**, Lea Fredrickson, Adrian Cheng, Clark E. Strimbu, Dolores Bozovic, Katsushi Arisaka, Univ. of California/Los Angeles ..... [6859-45]

11:30 am: **In vivo diffuse fluorescence tomography of small animals with photosensitizer- and QDs-labeled tumors**, Irina V. Balalaeva, Marina V. Shirmanova, Institute of Applied Physics (Russia); Elena V. Zagainova, Marina V. Sirotkina, Irina V. Plekhanova, Nizhny Novgorod State Medical Academy (Russia); Mikhail Kleshnin, Anna G. Orlova, Ilya V. Turchin, Institute of Applied Physics (Russia) ..... [6859-46]

## SESSION 7

Room: Conv. Ctr. A5 ..... Wed. 11:50 am to 1:10 pm

### Advances in Bioimaging II: Computation and Image Analysis I

Session Chair: Dan V. Nicolau, The Univ. of Liverpool (United Kingdom)

11:50 am: **Analysis of inserts in prokaryote genomes**, Paul Dan A. Cristea, Rodica A. Tuduce, Univ. Politehnica Bucharest (Romania) ..... [6859-47]

12:10 pm: **The possibilities of improvement the sensitivity of cancer fluorescence diagnostics by computer image processing**, Aleksandra E. Ledwon M.D., Medical Univ. of Silesia (Poland); Robert Bieda, Polish Japanese Institute of Information Technology (Poland); Aleksandra Z. Kawczyk-Krupka, Medical Univ. of Silesia (Poland); Konrad Wojciechowski, Polish Japanese Institute of Information Technology (Poland); Wojciech Latos, Aleksander R. Sieron M.D., Medical Univ. of Silesia (Poland) ..... [6859-48]

12:30 pm: **Novel fast global analysis for fluorescence lifetime imaging microscopy (FLIM) based on the Laguerre expansion technique: method and validation**, Javier A. Jo, Texas A&M Univ.; V. Krishnan Ramanujan, Brian A. Herman, The Univ. of Texas Health Science Ctr. at San Antonio. .... [6859-49]

12:50 pm: **Developing an optical technique for the classification of bruises**, Barbara Stam, Rolf H. Bremmer, Academisch Medisch Ctr. (Netherlands); Lise L. Randeberg, Norwegian Univ. of Science and Technology (Norway); Maurice C. G. Aalders, Academisch Medisch Ctr. (Netherlands) ..... [6859-50]

Lunch/Exhibition Break ..... 1:10 to 2:30 pm

## SESSION 8

Room: Conv. Ctr. A5 ..... Wed. 2:30 to 4:10 pm

**Advances in Bioimaging III:  
Computation and Image Analysis II***Session Chair: Dan V. Nicolau,*  
The Univ. of Liverpool (United Kingdom)2:30 pm: **Data fitting and image fine tuning approach to solve the inverse problem in fluorescence molecular imaging**, Dimitris S. Gorpas, Kostas Poltopoulos, Dido M. Yova, National Technical Univ. of Athens (Greece); Stefan Andersson-Engels, Lunds Tekniska Högskola (Sweden) ..... [6859-51]2:50 pm: **Dimensionality reduction in nonlinear optical datasets via diffusion mapping: case study of short-pulse second harmonic generation**, Dmitri A. Romanov, Stanley M. Smith, John Brady, Robert J. Levis, Temple Univ. .... [6859-52]

Coffee Break ..... 3:10 to 3:30 pm

3:30 pm: **Optical database for hyperspectral medical imaging**, David W. Allen, Steven W. Brown, Maritoni Litorja, National Institute of Standards and Technology ..... [6859-53]3:50 pm: **Intravenous application of fluorescein for confocal laser scanning microscopy: evaluation of contrast dynamics and image quality with increasing injection-to-imaging time**, Alexander Meining, Valentin Becker, Technische Univ. München (Germany); Malek Bajbouj, Charité Universitätsmedizin Berlin (Germany); Stefan von Delius, Roland Schmidt, Technische Univ. München (Germany); Anne Osdoit, Mauna Kea Technologies (France) ..... [6859-54]

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## Multiphoton Microscopy in the Biomedical Sciences VIII

Conference Chair: **Ammasi Periasamy**, Univ. of Virginia; **Peter T. C. So**, Massachusetts Institute of Technology

Program Committee: **Keith M. Berland**, Emory Univ.; **Guy C. Cox**, The Univ. of Sydney (Australia); **Alberto Diaspro**, Univ. degli Studi di Genova (Italy); **Chen Y. Dong**, National Taiwan Univ. (Taiwan); **Scott E. Fraser**, California Institute of Technology; **Hans C. Gerritsen**, Univ. Utrecht (Netherlands); **Min Gu**, Swinburne Univ. of Technology (Australia); **Stefan W. Hell**, Deutsches Krebsforschungszentrum (Germany); **Brian A. Herman**, The Univ. of Texas Health Science Ctr. at San Antonio; **Satoshi Kawata**, Osaka Univ. (Japan); **Karsten König**, Fraunhofer-Institut für Biomedizinische Technik (Germany); **Arnd K. Krueger**, Spectra-Physics Lasers; **Joseph R. Lakowicz**, Univ. of Maryland/Baltimore; **Stephen M. McDonald**, Coherent, Inc.; **Jerome Mertz**, Boston Univ.; **Paul W. Wiseman**, McGill Univ. (Canada); **Sunney Xie**, Harvard Univ.; **Bernhard Zimmermann**, Carl Zeiss Jena GmbH (Germany); **Warren R. Zipfel**, Cornell Univ.; **Simon C. Watkins**, Univ. of Pittsburgh

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### Sunday 20 January

#### Welcome Address

Room: Marriott Hotel: San Jose Ballroom Salon IV ..... Sun. 8:10 am

Session Chair: **Ammasi Periasamy**, Univ. of Virginia

#### SESSION 1

Room: Marriott Hotel: San Jose Ballroom Salon IV . . . Sun. 8:20 to 9:00 am

#### Keynote

Session Chair: **Ammasi Periasamy**, Univ. of Virginia

8:20 am: **Least invasive in vivo imaging using harmonic generation microscopy**, Chi-Kuang Sun, National Taiwan Univ. (Taiwan). . . . . [6860-01]

#### SESSION 2

Room: Marriott Hotel: San Jose Ballroom Salon IV . . . Sun. 9:00 to 11:40 am

#### Harmonic Generation Microscopy I

Session Chair: **Chen-Yuan Dong**, National Taiwan Univ. (Taiwan)

9:00 am: **Contrast generation and signal epidetection in THG microscopy of turbid media** (Invited Paper), Delphine Débarre, Nicolas Olivier, Emmanuel Beaufreire, Ecole Polytechnique (France) . . . . . [6860-02]

9:30 am: **Coherent interaction of optical second harmonic generation in collagen fibrils**, Shi-Wei Chu, Shih-Peng Tai, Ming-Che Chan, Chi-Kuang Sun, National Taiwan Univ. (Taiwan); I-Ching Hsiao, Chi-Hung Lin, National Yang-Ming Univ. (Taiwan); Yung-Chih Chen, Bai-Ling Lin, Development Ctr. for Biotechnology (Taiwan). . . . . [6860-03]

9:50 am: **Enhancement of third harmonic contrast with harmonophores in multimodal non-linear microscopy of histological sections**, Adam E. Tuer, Univ. of Toronto at Mississauga (Canada); Ludmilla Bakueva, Sunnybrook and Women's Health Sciences Ctr. (Canada); Richard Cisek, Univ. of Toronto at Mississauga (Canada); Jennifer Alami, Daniel J. Dumont, John A. Rowlands, Sunnybrook and Women's Health Sciences Ctr. (Canada); Virginijus Barzda, Univ. of Toronto at Mississauga (Canada) . . . . . [6860-04]

Coffee Break . . . . . 10:10 to 10:30 am

10:30 am: **Second harmonic generation imaging microscopy of diseased states** (Invited Paper), Ron B. LaComb, Oleg Nadiarnykh, Molly Brewer, Paul J. Campagnola, Univ. of Connecticut Health Ctr. . . . . [6860-05]

11:00 am: **Utilizing nonlinear optical microscopy to investigate the development of early cancer in nude mice in vivo**, Ming-Gu Lin, Chun-Chin Wang, Feng-Chieh Li, National Taiwan Univ. (Taiwan); Sung-Jan Lin, National Taiwan Univ. Hospital (Taiwan); Wen Lo, Chen-Yuan Dong, National Taiwan Univ. (Taiwan) . . . . . [6860-06]

11:20 am: **Polarization dependant in vivo second harmonic generation imaging of Caenorhabditis elegans vulval, pharynx, and body wall muscles**, Sotiris Psilodimitrakopoulos, Manoj Mathew, Anisha Thayil, Ivan Amat-Roldán, Susana Santos, Institut de Ciències Fotòniques (Spain); David Artigas-García, Univ. Politècnica de Catalunya (Spain); Pablo Loza-Alvarez, Institut de Ciències Fotòniques (Spain). . . . . [6860-07]

Lunch/Exhibition Break . . . . . 11:40 am to 1:00 pm

#### SESSION 3

Room: Marriott Hotel: San Jose Ballroom Salon IV Sun. 1:00 to 3:40 pm

#### Harmonic Generation Microscopy II

Session Chair: **Paul J. Campagnola**, Univ. of Connecticut Health Ctr.

1:00 pm: **Nonlinear spectral imaging of Type I collagen based on second harmonic generation, multiphoton-excited autofluorescence and nonlinear Raman scattering** (Invited Paper), Jonathan A. Palero, Univ. Utrecht (Netherlands); Henriette S. de Bruijn, Angélique van der Ploeg-van den Heuvel, Henricus J. C. M. Sterenberg, Erasmus Univ. Medical Ctr. (Netherlands); Hans C. Gerritsen, Univ. Utrecht (Netherlands) . . . . . [6860-09]

1:30 pm: **Structural dynamics of the skeletal muscle fiber by second harmonic generation**, Valentina Nucciotti, Chiara Stringari, Leonardo Sacconi, Francesco Vanzì, Marco Linari, Gabriella Piazzesi, Vincenzo Lombardi, Francesco S. Pavone, Univ. degli Studi di Firenze (Italy) . . . . . [6860-10]

1:50 pm: **Endogenous optical biomarkers of ovarian cancer evaluated with multiphoton microscopy**, Urs Utzinger, Nathaniel D. Kirkpatrick, The Univ. of Arizona; Molly A. Brewer, Univ. of Connecticut Health Ctr. . . . . [6860-11]

2:10 pm: **Corneal imaging by second and third harmonic generation microscopy**, Arnaud Brocas, Louis Jay, Tsuneyuki Ozaki, Institut National de la Recherche Scientifique (Canada); Eric P. Mottay, Amplitude Systemes (France); Isabelle Brunette, Univ. de Montréal (Canada) . . . . . [6860-12]

2:30 pm: **Multimodal assessment of kidney collagenous fibrosis using second harmonic microscopy**, Mathias Strupler, Monica Ernest, Ana-Maria Pena, Jean-Louis Martin, Emmanuel Beaufreire, Ecole Polytechnique (France); Pierre-Louis Tharoux, INSERM (France); Marie-Claire Schanne-Klein, Ecole Polytechnique (France) . . . . . [6860-13]

2:50 pm: **Starch granules as a probe for the polarization at the sample plane of a high resolution multiphoton microscope**, Sotiris Psilodimitrakopoulos, Ivan Amat-Roldán, Manoj Mathew, Anisha Thayil, Dobryna Zalvidea, Institut de Ciències Fotòniques (Spain); David Artigas-García, Univ. Politècnica de Catalunya (Spain); Pablo Loza-Alvarez, Institut de Ciències Fotòniques (Spain). . . . . [6860-14]

3:10 pm: **Forward- and backward-second harmonic generation imaging of corneal and scleral collagen** (Invited Paper), Wen Lo, National Taiwan Univ. (Taiwan); Hsin-Yuan Tan, Chang Gung Memorial Hospital (Taiwan); Ming-Gu Lin, Chu-Mei Hsueh, Wei-Liang Chen, National Taiwan Univ. (Taiwan); Sung-Jan Lin, Shiu-Hwa Jee, National Taiwan Univ. Hospital (Taiwan); Chen-Yuan Dong, National Taiwan Univ. (Taiwan) . . . . . [6860-15]

Coffee Break . . . . . 3:30 to 3:50 pm



## SESSION 4

Room: Marriott Hotel: San Jose Ballroom Salon IV Sun. 3:50 to 5:30 pm

## Technology Development and Applications I

Session Chair: Ammasi Periasamy, Univ. of Virginia

- 3:50 pm: **In vivo multiphoton imaging of bile duct ligation** (*Invited Paper*), Yuan Liu, Tzu-Lin Sun, Feng-Chieh Li, National Taiwan Univ. (Taiwan); Hsuan-Shu Lee, National Taiwan Univ. Hospital (Taiwan); Chen-Yong Dong, National Taiwan Univ. (Taiwan) . . . . . [6860-16]
- 4:10 pm: **Latest advances in ultrafast laser sources for multiphoton microscopy**, Philip G. Smith, Spectra-Physics . . . . . [6860-17]
- 4:30 pm: **Advances in lasers for multiphoton excitation microscopy**, David P. Armstrong, Coherent Scotland Ltd. (United Kingdom) . . . . . [6860-27]
- 4:50 pm: **New development in mirror and filter design; with a short history of optics for multiphoton microscopy**, Michael C. Stanley, Chroma Technology Corp. . . . . [6860-19]
- 5:10 pm: **A new imaging method for confocal microscopy**, Hisashi Okugawa, Nikon Corp. (Japan) . . . . . [6860-41]

## POSTERS-Sunday

Room: Marriott Hotel: San Jose Ballroom Salon IV . . . Sun. 6:00 to 7:30 pm

Session Chairs: **Simon C. Watkins**, Univ. of Pittsburgh;  
**Angelika C. Rueck**, Univ. Ulm (Germany);  
**Klaus Suhling**, King's College London (United Kingdom)

Posters will be on display from 6:00 pm Sunday in the hallway near the conference room. A poster session, with authors present at their posters, will be held on Sunday from 6:00-7:30 pm. Attendees are requested to wear their conference badges.

\*Presentations included in Student Poster Competition

Poster presenters may put up their posters Sunday afternoon beginning at 5:30 pm and will need to remove their posters immediately following the poster session. Any papers left on the boards following the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their posters from 6:00 to 7:30 Sunday evening to discuss their work with session attendees.

- Greater signal and contrast in two-photon microscopy with ultrashort pulses\***, Lindsay R. Weisel, Peng Xi, Yair Andegeko, Daniel Schlam, Vadim V. Lozovoy, Marcos M. Dantus, Michigan State Univ. . . . . [6860-18]
- Application of frequency modulation CARS microscopy to imaging metabolites\***, Christian W. Freudiger, Brian G. Saar, Conor L. Evans, Huiyi Chen, Gary R. Holtom, Sunney Xie, Harvard Univ. . . . . [6860-58]
- Label free high resolution in vivo optical imaging of microvessels\***, Dan Fu, Princeton Univ.; Thomas E. Matthews, Tong Ye, Warren S. Warren, Duke Univ. . . . . [6860-59]
- Fiber delivery of sub-10-fs pulses for nonlinear optical microscopy\***, Adam M. Larson, Alvin T. Yeh, Texas A&M Univ. . . . . [6860-60]
- Application of coherent anti-stokes Raman scattering (CARS) to study biomass conversion into biofuel\***, Marcel G. Friedrich, Gary R. Holtom, Conor L. Evans, Harvard Univ.; Michael E. Himmel, Shi-You Ding, National Renewable Energy Lab.; Sunney Xie, Harvard Univ. . . . . [6860-61]
- Analysis of pulse shaping for selective excitation of coherent anti-Stokes Raman scattering for improvement of nonlinear interferometric vibrational imaging\***, Joseph B. Geddes III, Daniel L. Marks, Zhi Jiang, Stephen A. Boppart, Univ. of Illinois at Urbana-Champaign . . . . . [6860-62]
- Two-photon laser scanning microscopy with ultrabroad bandwidth 110 nm FWHM femtosecond pulses\***, Peng Xi, Lindsay R. Weisel, Yair Andegeko, Daniel Schlam, Vadim V. Lozovoy, Marcos M. Dantus, Michigan State Univ. . . . . [6860-63]
- An intra-vital two-photon-based approach to study membrane traffic in salivary glands of living rodents\***, Andrius Masedunskas, Roberto Weigert, National Institutes of Health . . . . . [6860-64]
- Two-photon imaging of stem cells\***, Aisada A. Uchugonova, Karsten Koenig, Fraunhofer-Institut für Biomedizinische Technik (Germany) . . . . . [6860-65]
- Multimodal optical microscopy for monitoring fast neuronal activity and signaling\***, Stéphane Pagès, Israël Veilleux, Paul De Koninck, Daniel Côté, Univ. Laval (Canada) . . . . . [6860-66]

**Imaging a side effect of metabolism of liver on using panadol in vivo by multiphoton microscopy\***, Feng Chieh Li, National Taiwan Univ. (Taiwan) . . . . . [6860-67]

**Two-photon fluorescence imaging and femtosecond laser microsurgery to study drosophila dorsal closure\***, Anisha Thayil Karunakaran Nair, Institut de Ciències Fotòniques (Spain); Andrea Pereira, Parc Científic de Barcelona (Spain); Manoj Mathew, Institut de Ciències Fotòniques (Spain); David Artigas, Univ. Politècnica de Catalunya (Spain); Enrique Martín Blanco, Parc Científic de Barcelona (Spain); Pablo Loza-Alvarez, Institut de Ciències Fotòniques (Spain) . . . . . [6860-68]

**Two-photon bioimaging with a multi-kilowatt-peak-power optical pulse source utilizing a 1- $\mu$ m wavelength mode-locked semiconductor laser\***, Hengchang Guo, Keijiro Takashima, Aya Sato, Hiroyuki Yokoyama, Tohoku Univ. (Japan); Masahito Mure, Yuji Iseki, Sumitomo Osaka Cement Co., Ltd. (Japan); Hiroshi Tsubokawa, Tohoku Univ. (Japan) . . . . . [6860-69]

**Understanding heterogeneous transport dynamics in vivo using stochastic scanning multiphoton multifocal microscopy and segmented spatiotemporal image correlation spectroscopy**, Hee Y. Kim, Justin E. Jureller, Andrey Kuznetsov, Louis H. Philipson, Norbert F. Scherer, The Univ. of Chicago . . . . . [6860-70]

**Impact of perivascular plaques on local cerebral blood flow dynamics**, Gabriele Nase, Rune Enger, P. Johannes Helm, Reidun Torp, Ole-Petter Ottersen M.D., Univ. of Oslo (Norway) . . . . . [6860-71]

**Confocal microscopy versus two-photon microscopy: imaging of ocular surface pathologies**, Philipp Steven, Norbert Koop, Gereon Huettmann, Univ. zu Lübeck (Germany) . . . . . [6860-72]

**In vivo multiphoton nanosurgery on cortical neurons: focusing on network organization**, Leonardo Sacconi, Rod O'Connor, Audrius Jasaitis, Francesco S. Pavone, Univ. degli Studi di Firenze (Italy) . . . . . [6860-73]

**Heterodyne Fourier-transform CARS microscopy with multi-focus**, Jun Yin, Junle Qu D.D.S., Hanben Niu, Shenzhen Univ. (China) . . . . . [6860-74]

**Time- and spectrum-resolved multifocal multiphoton microscopy using a streak camera and a novel field of view zoom scanning protocol**, Lixin Liu, Junle Qu D.D.S., Ziyang Lin, Yonghong Shao, Hanben Niu, Shenzhen Univ. (China) . . . . . [6860-75]

**High spatial resolved retinal imaging with infrared femtosecond laser**, Lingling Zhao, Junle Qu D.D.S., Hanben Niu, Shenzhen Univ. (China) . [6860-78]

**Quantum dot based image correlation spectroscopy with widefield illumination multiphoton excitation fluorescence microscopy\***, Daekeun Kim, Peter T. C. So, Massachusetts Institute of Technology. . . . . [6860-81]

**Screening of cardiomyocyte fluorescence during cell contraction by multi-dimensional TCSPC**, Dusan Chorvat, Jr., International Laser Ctr. (Slovak Republic); S. Abdulla, F. Elzwiei, Univ. de Montréal (Canada); Anton Mateasik, International Laser Ctr. (Slovak Republic); Alzbeta Chorvatova, Univ. de Montréal (Canada) . . . . . [6860-82]

**In vivo metabolite flux measurement using FRET-based metabolite sensors**, Sakiko Okumoto, Carnegie Institution of Washington and Virginia Tech; Bhavna Chaudhuri, Karen Deuschle, Wolf Frommer, Carnegie Institution of Washington . . . . . [6860-85]

# Conference 6860

## Monday 21 January

### SESSION 5

Room: Marriott Hotel:  
San Jose Ballroom Salon IV . . . . . Mon. 8:20 am to 12:10 pm

#### CARS Microscopy I

Session Chair: Sunney Xie, Harvard Univ.

- 8:20 am: **Biomedical applications and new developments of CARS microscopy** (*Invited Paper*), Ji-Xin Cheng, Purdue Univ. . . . . [6860-21]  
8:50 am: **FM-CARS and skin** (*Invited Paper*), Brian G. Saar, Conor L. Evans, Harvard Univ.; Chrisita Ackermann, Pfizer Inc.; Sunney Xie, Harvard Univ. . . . . [6860-22]  
9:20 am: **In vivo assessment of nerve injuries with coherent anti-Stokes Raman scattering microscopy**, Daniel Cote, Univ. Laval (Canada); Francis P. Henry, Jonathan M. Winograd, Mark A. Randolph, Irene E. Kochevar, Charles P. Lin, Harvard Medical School . . . . . [6860-23]  
9:40 am: **Leica solution: CARS microscopy at video rates**, Vanessa Lurquin, Leica Microsystems Heidelberg GmbH (Germany) . . . . . [6860-24]  
Coffee Break . . . . . 10:00 to 10:30 am

10:30 am: **From microfluidics to lipid droplets: applications of quantitative multiplex CARS micro/spectroscopy** (*Invited Paper*), Mischa Bonn, FOM Institute for Atomic and Molecular Physics (Netherlands); Michiel Muller, Hilde A. Rinia, Univ. van Amsterdam (Netherlands) . . . . . [6860-25]

11:00 am: **Intra-operative CARS brain tumor imaging**, Geoffrey S. Young, Brigham and Women's Hospital; Conor L. Evans, Harvard Univ.; Xiaoyin Xu, Santosh Kesari, Anita J. Huttner, Brigham and Women's Hospital; Sunney Xie, Harvard Univ.; Stephen T. Wong, Methodist Hospital Research Institute . . . . . [6860-26]

11:20 am: **Shot noise limited heterodyne detection of CARS signals**, Martin Jurna, Univ. Twente (Netherlands); Edlef Buettner, APE GmbH (Germany); Jeroen P. Korterik, Cornelis Otto, Univ. Twente (Netherlands); Ingo Rimke, APE GmbH (Germany); Herman L. Offerhaus, Univ. Twente (Netherlands) . . . . . [6860-86]

11:40 am: **Advances in fiber lasers for nonlinear microscopy** (*Invited Paper*), Frank W. Wise, Cornell Univ. . . . . [6860-28]

Lunch Break . . . . . 12:10 to 1:30 pm

### SESSION 6

Room: Marriott Hotel: San Jose Ballroom Salon IV . . . . . Mon. 1:30 to 6:00 pm

#### CARS Microscopy II

Session Chair: Ji-Xin Cheng, Purdue Univ.

1:30 pm: **Adaptive optics for increased penetration depth in coherent anti-Stokes Raman scattering microscopy** (*Invited Paper*), John M. Girkin, Simon P. Poland, Amanda J. Wright, Univ. of Strathclyde (United Kingdom); Conor L. Evans, Christian W. Freudiger, Sunney Xie, Harvard Univ. . . . . [6860-29]

2:00 pm: **Chemical imaging with frequency modulation CARS microscopy**, Brian G. Saar, Conor L. Evans, Christian W. Freudiger, Huiyi Chen, Harvard Univ.; Chrisita Ackermann, Pfizer Inc.; Sunney Xie, Harvard Univ. . . . . [6860-30]

2:20 pm: **Separating multiphoton-excited tissue autofluorescence from coherent anti-Stokes Raman scattering imaging using time-gated single photon counting detection**, Gregory P. McNERney, Sonny P. Ly, Samantha R. Fore, Univ. of California/Davis; James W. Chan, Lawrence Livermore National Lab.; Thomas R. Huser, Univ. of California/Davis . . . . . [6860-31]

2:40 pm: **Imaging arterial cells and atherosclerosis by multimodal nonlinear optical microscopy**, Han-Wei Wang, Purdue Univ.; Vlad V. Simianu, Michael Sturek, Indiana Univ.-Purdue Univ. Indianapolis; Ji-Xin Cheng, Purdue Univ. . . . . [6860-32]

Coffee Break . . . . . 3:00 to 3:30 pm

3:30 pm: **Pushing the limits of nonlinear Raman microspectroscopy**, Vladislav V. Yakovlev, Univ. of Wisconsin/Milwaukee . . . . . [6860-33]

3:50 pm: **Nonlinear interferometric vibrational imaging of biological tissue**, Zhi Jiang, Daniel L. Marks, Joseph B. Geddes, Stephen A. Boppart, Univ. of Illinois at Urbana-Champaign . . . . . [6860-34]

4:10 pm: **Interferometric polarization coherent anti-stokes Raman scattering microscopy**, Fake Lu, Wei Zheng, Zhiwei Huang, National Univ. of Singapore (Singapore) . . . . . [6860-35]

4:30 pm: **Multimodal second and third order nonlinear microscopy on muscle preparations**, Martin Vogel, Harvard Univ.; Christian P. Pfeffer, Harvard Medical School; Feruz Ganikhanov, West Virginia Univ. . . . . [6860-36]

4:50 pm: **Seeing more with focus-engineered CARS imaging** (*Invited Paper*), Eric O. Potma, Vishnu V. Krishnamachari, Univ. of California/Irvine . . . . . [6860-80]

5:20 pm: **CARS microscopy for the monitoring of lipid storage in C. elegans**, Annika M. K.Enejder, Christian Brackmann, Claes Axäng, Marc Pilon, Chalmers Tekniska Högskola (Sweden) . . . . . [6860-37]

5:40 pm: **Fourier transform spectral interferometry coherent anti-stokes Raman scattering (FTSI-CARS) microscopy**, Sang-Hyun Lim, The Univ. of Texas at Austin . . . . . [6860-84]

## Tuesday 22 January

### SESSION 7

Room: Marriott Hotel: San Jose Ballroom Salon IV . . . . . Tues. 8:00 to 11:30 am

#### Technology Development and Applications II

Session Chair: Peter T. C. So, Massachusetts Institute of Technology

8:00 am: **Two-photon scanning systems for clinical high resolution in vivo tissue imaging** (*Invited Paper*), Karsten Koenig, Jens Müller, JenLab GmbH (Germany) . . . . . [6860-38]

8:30 am: **Negatively-chirped laser enables nonlinear excitation and nanoprocessing with sub-20-fs pulses**, Aisada Uchugonova, Karsten König, Fraunhofer-Institut für Biomedizinische Technik (Germany); Rainer Bückle, JenLab GmbH (Germany); Gabriel Tempea, Andreas Isemann, Andreas Stingl, Femtolasers Produktions GmbH (Austria) . . . . . [6860-39]

8:50 am: **Development of multiphoton endoscope using 2-axis MEMS scanner**, Shuo Tang, Univ. of California/Irvine; Daniel T. McCormick, Univ. of California/Berkeley; Tuqiang Xie, Jiangping Su, Woonggyu Jung, Zhongping Chen, Bruce J. Tromberg, Univ. of California/Irvine . . . . . [6860-40]

9:10 am: **A miniaturized surface probe for combined two-photon microscopy and femtosecond laser microsurgery**, Adela Ben-Yakar, Christopher L. Hoy, Nicholas J. Durr, Pengyuan Chen, The Univ. of Texas at Austin; Wibool Piyawattanametha, Olav D. Solgaard, Stanford Univ. . . . . [6860-42]

9:30 am: **Determination of two-photon excitation and emission spectra of fluorescent molecules in single living cells**, Valerica Raicu, Georgi I. Petrov, Anurag Chaturvedi, Devin Gillman, Russell Fung, Univ. of Wisconsin/Milwaukee . . . . . [6860-43]

9:50 am: **Imaging of Drosophila larval development using multiphoton microscopy**, Chiao-Ying Lin, Vladimir Hovhannisyann, National Taiwan Univ. (Taiwan); Shiou-Hwa Jee, June-Tai Wu, Sung-Jan Lin, National Taiwan Univ. Hospital (Taiwan); Chen-Yuan Dong, National Taiwan Univ. (Taiwan) . . . . . [6860-44]

Coffee Break . . . . . 10:10 to 10:30 am

10:30 am: **In vivo nonlinear spectral imaging of cellular NAD(P)H/flavoprotein autofluorescence**, Jonathan A. Palero, Univ. Utrecht (Netherlands); Henriette S. de Bruijn, Angélique van der Ploeg-van den Heuvel, Henricus J. C. M. Sterenberg, Erasmus Univ. Medical Ctr. (Netherlands); Hans C. Gerritsen, Univ. Utrecht (Netherlands) . . . . . [6860-45]

10:50 am: **Selective labeling of a single organelle by using two-photon conversion of a photoconvertible fluorescent protein**, Wataru Watanabe, National Institute of Advanced Industrial Science and Technology (Japan); Tomoko Shimada, Sachihiko Matsunaga, Daisuke Kurihara, Osaka Univ. (Japan); Shin-ichi Arimura, Nobuhiro Tsutsumi, The Univ. of Tokyo (Japan); Kiichi Fukui, Kazuyoshi Itoh, Osaka Univ. (Japan) . . . . . [6860-20]

11:10 am: **Serotonin: a macro and a micro view**, Suman Nag, Sanjeev K. Kaushalya, Jayprakash Balaji, Perunthiruthy K. Madhu, Sudipta Maiti, Tata Institute of Fundamental Research (India) . . . . . [6860-46]

Lunch/Exhibition Break . . . . . 11:30 am to 1:00 pm

## SESSION 8

Room: Marriott Hotel: San Jose Ballroom Salon IV . . . Tues. 1:40 to 5:20 pm

## FRET, FLIM, and FCS

Session Chair: **Karsten Koenig**, Fraunhofer-Institut für Biomedizinische Technik (Germany)

- 1:40 pm: **Advanced FRET and FCS measurements with laser scanning microscopes based on time-resolved techniques**, Benedikt Kraemer, Uwe Ortmann, Volker Buschmann, Felix Koberling, Michael Wahl, Mathias Patting, Peter Kapusta, Andreas Buelter, Rainer Erdmann, PicoQuant GmbH (Germany) . . . . . [6860-47]
- 2:00 pm: **Multispectral FLIM of tissue autofluorescence**, Wolfgang Becker, Vicky Katsoulidou, Bertram Su, Axel Bergmann, Becker & Hickl GmbH (Germany) . . . . . [6860-48]
- 2:20 pm: **SLIM for multispectral FRET imaging (Invited Paper)**, Angelika C. Rueck, Univ. Ulm (Germany) . . . . . [6860-49]
- 2:40 pm: **Multidimensional multiphoton fluorescence lifetime imaging of cells**, James A. Levitt, Nicolas Sergent, King's College London (United Kingdom); Anne Chauveau, Daniel M. Davis, Imperial College London (United Kingdom); Klaus Suhling, King's College London (United Kingdom) . . [6860-50]
- 3:00 pm: **High-speed optically sectioned fluorescence lifetime imaging of live cells**, David M. Grant, Sunil Kumar, James A. McGinty, Clifford B. Talbot, Ewan J. McGhee, Dylan M. Owen, Pieter A. A.De Beule, Ian Munro, Gordon T. Kennedy, Imperial College London (United Kingdom); Patrick Courtney, Perkin Elmer Inc. (United Kingdom); Daniel M. Davis, Imperial College London (United Kingdom); Matilda Katan, The Institute of Cancer Research (United Kingdom); Christopher Dunsby, Anthony I. Magee, Mark A. A.Neil, Paul M. W.French, Imperial College London (United Kingdom) . . . . . [6860-51]
- 3:20 pm: **Multi-dimensional fluorescence lifetime measurements (Invited Paper)**, Christoph U. Biskup, Birgit Hoffmann, Friedrich-Schiller-Univ. Jena (Germany); Laimonas Kelbauskas, Arizona State Univ.; Thomas Zimmer, Friedrich-Schiller-Univ. Jena (Germany); Nikolaj Klöcker, Albert-Ludwigs-Univ. Freiburg (Germany); Wolfgang Becker, Becker & Hickl GmbH (Germany); Klaus Benndorf, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [6860-52]
- 3:40 pm: **Non-linear optical approaches to enhance imaging and diagnosis from hematoxylin and eosin stained sections of tumor samples**, Matthew W. Conklin, Kevin Eliceiri, Andreas Friedl, Jens Eickhoff, Paolo Provenzano, Patricia J. Keely, Univ. of Wisconsin/Madison. . . . . [6860-53]
- 4:00 pm: **Non-linear imaging of Rho in three-dimensional breast cancer models**, Steven M. Trier, Suzanne M. Ponik, Long Yan, Kevin W. Eliceiri, Patricia J. Keely, Univ. of Wisconsin/Madison . . . . . [6860-54]
- 4:20 pm: **Two-photon fluorescence imaging and correlation analysis applied to protein dynamics in C. elegans embryo**, Zdenek Petrasek, Technische Univ. Dresden (Germany); Carsten Hoege, Anthony A. Hyman, Max Planck Institute of Molecular Cell Biology and Genetics (Germany); Petra Schwill, Technische Univ. Dresden (Germany) . . . . . [6860-55]
- 4:40 pm: **Lipid domains detected by fluorescence microscopy based FLIM analysis**, Martin Stoeckl, Anna P. Palazzo, Humboldt-Univ. zu Berlin (Germany); Felix Koberling, Rainer Erdmann, PicoQuant GmbH (Germany); Andreas Herrmann, Thomas Korte, Humboldt-Univ. zu Berlin (Germany) . . . . . [6860-56]
- 5:00 pm: **Fiber amplified and frequency doubled diode lasers as a highly flexible pulse source at 532nm**, Kristian Lauritsen, Martin Langkopf, Dietmar Klemme, Felix Koberling, Andreas Buelter, Rainer Erdmann, PicoQuant GmbH (Germany) . . . . . [6860-57]

**Don't miss the weekend  
Biomedical Optics Exhibition**

San Jose Convention Center, Exhibition Hall 1

Saturday 19 January . . . . . 1:00 to 5:00 pm

Sunday 20 January . . . . . 10:00 am to 4:00 pm

# Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XV

Conference Chairs: **Jose-Angel Conchello**, Oklahoma Medical Research Foundation; **Carol J. Cogswell**, Univ. of Colorado/Boulder; **Tony Wilson**, Univ. of Oxford (United Kingdom)

Conference Co-Chair: **Thomas G. Brown**, Univ. of Rochester

Program Committee: **Fred Brakenhoff**, Univ. van Amsterdam (Netherlands); **Charles A. DiMarzio**, Northeastern Univ.; **Mats G. Gustafsson**, Univ. of California/San Francisco; **Gordon S. Kino**, Stanford Univ.; **Raimund J. Ober**, The Univ. of Texas at Dallas; **Rudolf Oldenbourg**, Marine Biological Lab.; **Chrysanthe Preza**, The Univ. of Memphis

## Monday 21 January

### POSTERS-Monday

Room: Marriott Hotel: San Jose Ballroom Salon IV . . Mon. 6:00 to 7:30 pm

Session Chair: **Thomas G. Brown**,  
Univ. of Rochester

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Monday morning starting at 10:00 am in the Civic Auditorium Complex, and will need to remove their papers immediately following the poster session that evening. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

**High-throughput and three-dimensional correlative light electron microscopy**, Giuseppe Vicidomini, Maria C. Gagliani, Michela Canfora, Paolo Bianchini, Katia Cortese, Patrizia Boccacci, Carlo Tacchetti, Alberto Diaspro, Univ. degli Studi di Genova (Italy) . . . . . [6861-14]

**Studying the illumination puzzle towards an isotropic increase of optical resolution**, Francesca Cella, Emiliano Ronzitti, Giuseppe Vicidomini, Partha P. Mondal, Alberto Diaspro, Univ. degli Studi di Genova (Italy) . . . . . [6861-30]

**Three-dimensional microscope**, Keigo Iizuka, Univ. of Toronto (Canada) . . . . . [6861-42]

**Three-dimensional image study on the vascular structure after angiopoietin-1 transduction in isolated mouse pancreatic islets**, Jing He, Dongming Su, Massimo N. Trucco, Univ. of Pittsburgh . . . . . [6861-43]

**Multi-foci confocal microscopy for high speed three-dimensional measurement**, Wanhee Chun, SeungWoo Lee, Dae-Gab Gweon, Korea Advanced Institute of Science and Technology (South Korea) . . . . . [6861-44]

**High-speed image acquisition synchronized with the motion of galvanometer scanner for confocal microscopy**, Yoon Sung Bae, Su-bei Moon, Dug Young Kim, Gwangju Institute of Science and Technology (South Korea) . . . . . [6861-45]

## Wednesday 23 January

### SESSION 1

Room: Marriott Hotel: San Jose Ballroom Salon IV . . Wed. 8:50 to 10:10 am

#### Recent Advances in Phase Microscopy I

Session Chair: **Raimund J. Ober**, The Univ. of Texas at Dallas

8:50 am: **Observing dynamics of transparent samples by harmonically matched grating-based full-field quadrature phase interferometer**, Jigang Wu, Zahid Yaqoob, Xin Heng, Lap Man Lee, Xiquan Cui, Changhui Yang, California Institute of Technology . . . . . [6861-01]

9:10 am: **Diffractive optical microtomography of the refractive index of transparent objects**, Stanislas Vertu, Masato Ochiai, Masaki Shuzo, Ichiro Yamada, Jean-Jacques Delaunay, The Univ. of Tokyo (Japan); Olivier Haeberlé, Univ. de Haute Alsace (France); Yoshitaka Okamoto, Chiba Univ. (Japan) . . . . . [6861-02]

9:30 am: **Improving phase sensitivity of the biological structure in Fourier domain optical coherence phase microscopy using maximum likelihood estimator**, Reza S. M. Motaghianezam, Chulmin Joo, Johannes F. de Boer, Brett E. Bouma, Guillermo J. Tearney, Massachusetts General Hospital . . . . . [6861-04]

9:50 am: **QSIP: phase imaging made possible in a bright field microscope**, Sri R. P. Pavani, Ariel R. Libertun, Sharon V. King, Carol J. Cogswell, Univ. of Colorado at Boulder . . . . . [6861-05]

Coffee Break . . . . . 10:10 to 10:40 am

### SESSION 2

Room: Marriott Hotel:

San Jose Ballroom Salon IV . . . . . Wed. 10:40 am to 12:20 pm

#### Recent Advances in Phase Microscopy II

Session Chair: **Thomas G. Brown**, Univ. of Rochester

10:40 am: **Three-dimensional quantitative phase imaging: current and future perspectives**, Nicoleta M. A. Dragomir, XiaoMing Goh, Ann Roberts, The Univ. of Melbourne (Australia) . . . . . [6861-06]

11:00 am: **Full-field quantitative phase imaging**, Charles A. DiMarzio, Northeastern Univ. . . . . [6861-07]

11:20 am: **Extension of spectral domain phase microscopy to three-dimensional nanoscale displacement mapping in cardiomyocytes**, Audrey K. Ellerbee, Hansford C. Hendargo, Amy Motomura, Joseph A. Izatt, Duke Univ. . . . . [6861-08]

11:40 am: **Advantages of digital holographic microscopy for real-time full field absolute phase imaging**, Tristan Colomb, Florian Charrière, Jonas Kühn, Pierre P. Marquet, Christian D. Depeursinge, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [6861-09]

12:00 pm: **Modeling phase information for three-dimensional objects at different focal planes**, Heidi Sierra, Charles A. DiMarzio, Dana H. Brooks, Northeastern Univ. . . . . [6861-10]

Lunch/Exhibition Break . . . . . 12:20 to 1:40 pm

### SESSION 3

Room: Marriott Hotel: San Jose Ballroom Salon IV . . . Wed. 1:40 to 3:00 pm

#### New Methods for High-Speed Microscopy

Session Chair: **Charles A. DiMarzio**, Northeastern Univ.

1:40 pm: **High-speed two-dimensional standing wave microscopy**, Olga Gliko, Baylor College of Medicine; G. Duemani Reddy, Rice Univ.; William E. Brownell, Peter Saggau, Baylor College of Medicine . . . . . [6861-11]

2:00 pm: **Real time autonomous video image registration for endomicroscopy: fighting the compromises**, Tom Vercauteren, Mauna Kea Technologies (France); Alexander Meaning, Technische Univ. München (Germany); Aymeric Perchant, Mauna Kea Technologies (France) . . . . [6861-12]

2:20 pm: **Video rate laser scanning microscope**, Hongzhou Ma, James Jiang, Hongwu Ren, Alex E. Cable, Thorlabs, Inc. . . . . [6861-13]

2:40 pm: **32 kilohertz confocal microscope with intensified CMOS camera for fast imaging**, Adrian Cheng, Univ. of California/Los Angeles . . . . [6861-15]

Coffee Break . . . . . 3:00 to 3:30 pm

**SESSION 4**

**Room: Marriott Hotel:  
San Jose Ballroom Salon IV . . . . . Wed. 3:30 to 5:30 pm**

**Novel Microscopical Methods**

*Session Chair: Chrysanthe Preza, The Univ. of Memphis*

- 3:30 pm: **Focal modulation microscopy**, NanGuang Chen, Chee-Howe Wong, Colin J. R. Sheppard, National Univ. of Singapore (Singapore) . . . . . [6861-16]
- 3:50 pm: **Multi-view optical tomography using L1 data fidelity and sparsity constraint**, Jong-Chul Ye, Jaeduck Jang, Korea Advanced Institute of Science and Technology (South Korea) . . . . . [6861-17]
- 4:10 pm: **Isotropic three-dimensional fluorescence tomography of single living cells by combined axial microrotation imaging**, Olivier Renaud, Institut Pasteur (France); Yong Yu, Ecole Normale Supérieure de Cachan (France); Jose Viña, Scientific Volume Imaging B.V. (Netherlands); Christophe Machu, Institut Pasteur (France); Alain Trouvé, Ecole Normale Supérieure de Cachan (France); Hans T. M. Van der Voort, Scientific Volume Imaging B.V. (Netherlands); Bernard Chalmond, Ecole Normale Supérieure de Cachan (France); Spencer L. Shorte, Institut Pasteur (France) . . . . . [6861-18]
- 4:30 pm: **Image based adaptive optics for biological imaging**, Delphine Debarre, Martin J. Booth, Tony Wilson, Univ. of Oxford (United Kingdom) . . . . . [6861-19]
- 4:50 pm: **Real-time dual-wavelength digital holographic microscopy for extended measurement range with enhanced axial resolution**, Jonas Kuhn, Tristan Colomb, Christophe Pache, Florian Charrière, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Frédéric Montfort, Etienne Cuche, Yves Emery, Lycée Tec SA (Switzerland); Pierre P. Marquet, Christian D. Depeursinge, Ecole Polytechnique Fédérale de Lausanne (Switzerland)[6861-20]
- 5:10 pm: **Wide-field time-correlated single photon counting imaging for luminescence microscopy**, Nicolas Sergent, James A. Levitt, Mark A. Green, Klaus Suhling, King's College London (United Kingdom) . . . . . [6861-21]

**Thursday 24 January**

**SESSION 5**

**Room: Marriott Hotel: San Jose Ballroom Salon IV . . Thurs. 8:30 to 9:50 am**

**New Methods in Fluorescence Microscopy**

*Session Chair: Fred Brakenhoff, Univ. van Amsterdam (Netherlands)*

- 8:30 am: **Saturated structured illumination microscopy using photoswitchable fluorescent proteins**, Liisa M. Hirvonen, Kai Wicker, Ondrej Mandula, Rainer Heintzmann, King's College London (United Kingdom) . . . . . [6861-22]
- 8:50 am: **Triplet state imaging by modulated excitation**, Matthias Geissbuehler, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Tor Sandén, Gustav Persson, Kungliga Tekniska Högskolan (Sweden); Thiemo Spielmann, Iwan Märki, Vladislav Shcheslavskiy, Marcel Leutenegger, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Jerker Widengren, Kungliga Tekniska Högskolan (Sweden); Theo Lasser, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [6861-23]
- 9:10 am: **Combined optical coherence microscopy and fluorescence lifetime imaging**, Martin L. Villiger, Cedric Blatter, Adrian H. Bachmann, Theo Lasser, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Rainer A. Leitgeb, Ecole Polytechnique Fédérale de Lausanne (Switzerland) and Medizinische Univ. Wien (Austria) . . . . . [6861-24]
- 9:30 am: **On scattering effects in fluorescence coherence tomography**, Alberto Bilenca, Massachusetts General Hospital; Theo Lasser, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Aydogan Ozcan, Massachusetts General Hospital; Rainer A. Leitgeb, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Brett E. Bouma, Guillermo J. Tearney, Massachusetts General Hospital . . . . . [6861-25]
- Coffee Break . . . . . 10:10 to 10:40 am

**SESSION 6**

**Room: Marriott Hotel:  
San Jose Ballroom Salon IV . . . . . Thurs. 10:40 am to 12:00 pm**

**Characterization and Assessment of Light Microscopes I**

*Session Chair: Mats G. Gustafsson, Univ. of California/San Francisco*

- 10:40 am: **Axial field engineering in the nonparaxial domain**, Toufic Jabbour, Stephen M. Kuebler, College of Optics & Photonics/Univ. of Central Florida . . . . . [6861-27]
- 11:00 am: **Beyond the three-dimensional resolution barrier in optical microscopy: a new three-dimensional resolution measure for modern imaging applications**, Sripad Ram, The Univ. of Texas Southwestern Medical Ctr. at Dallas; Jerry Chao, Anish V. Abraham, The Univ. of Texas at Dallas; E. Sally Ward, The Univ. of Texas Southwestern Medical Ctr. at Dallas; Raimund J. Ober, The Univ. of Texas at Dallas . . . . . [6861-28]
- 11:20 am: **Fast focus field calculations**, Marcel Leutenegger, Matthias Geissbuehler, Iwan Märki, Rainer A. Leitgeb, Theo Lasser, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [6861-29]
- 11:40 am: **Efficient calibration algorithm, and calibration pattern for correcting distortions for three-dimensional image acquisition systems for microscopic applications**, Wojtek J. Walecki, Fanny Szondy, Sunrise Optical LLC . . . . . [6861-31]
- Lunch Break . . . . . 12:00 to 1:20 pm

**SESSION 7**

**Room: Marriott Hotel: San Jose Ballroom Salon IV . . Thurs. 1:20 to 3:00 pm**

**Characterization and Assessment of Light Microscopes II**

*Session Chair: Carol J. Cogswell, Univ. of Colorado at Boulder*

- 1:20 pm: **Modeling of optical quadrature microscopy for imaging mouse embryos**, William C. Warger II, Charles A. DiMarzio, Northeastern Univ. . . . . [6861-32]
- 1:40 pm: **Characterizing scattering and absorption spectra in Fourier domain optical coherence tomography**, Ji Yi, Jianmin Gong, Xu Li, Northwestern Univ. . . . . [6861-33]
- 2:00 pm: **Simulation of imaging with a theta line-scanning confocal microscope**, Blair Simon, Charles A. DiMarzio, Northeastern Univ. . . [6861-34]
- 2:20 pm: **Understanding dynamic relationships between blood flow and embryonic heart development using spectral Doppler velocimetry**, Anjul M. Davis, Duke Univ.; Florence G. Rothenberg, Univ. of Cincinnati; Neal Shepherd, Joseph A. Izatt, Duke Univ. . . . . [6861-35]
- 2:40 pm: **K-microscopy: optical imaging beyond the limits of diffraction**, Matthias Geissbuehler, Marcel Leutenegger, Theo Lasser, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Rainer Leitgeb, Medizinische Univ. Wien (Austria) and Ecole Polytechnique Fédérale de Lausanne (Switzerland) [6861-36]
- Coffee Break . . . . . 3:00 to 3:30 pm

**SESSION 8**

**Room: Marriott Hotel: San Jose Ballroom Salon IV . . Thurs. 3:30 to 4:30 pm**

**Novel Methods and Applications of Light Microscopy**

*Session Chair: Carol J. Cogswell,  
Univ. of Colorado/Boulder*

- 3:30 pm: **Optical imaging of cell mass and growth dynamics**, Gabriel Popescu, YoungKeun Park, Niyom Lue, Massachusetts Institute of Technology; Catherine Best-Popescu, Massachusetts General Hospital; Ramachandra R. Dasari, Kamran Badizadegan, Michael S. Feld, Massachusetts Institute of Technology . . . . . [6861-37]
- 3:50 pm: **Cell dynamics revealed by digital holographic microscopy**, Pierre P. Marquet, Ctr. Hospitalier Univ. Vaudois (Switzerland); Benjamin Rappaz, Florian Charrière, Tristan Colomb, Jonas Kuhn, Nicolas Pavillon, Christian D. Depeursinge, Pierre J. Magistretti, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [6861-38]
- 4:10 pm: **Aberration free refocusing for high NA microscopy**, Edward J. Botcherby, Rimas Juskaitis, Martin J. Booth, Tony Wilson, Univ. of Oxford (United Kingdom) . . . . . [6861-41]

# Conference 6862 · Room: Conv. Ctr. C4

Saturday-Sunday 19-20 January 2008 • Proceedings of SPIE Vol. 6862

## Single Molecule Spectroscopy and Imaging

**Conference Chairs:** Jörg Enderlein, Eberhard Karls Univ. Tübingen (Germany); Zygmunt Karol Gryczynski, Univ. of North Texas; Rainer Erdmann, PicoQuant GmbH (Germany)

**Program Committee:** Sabato D'Auria, Consiglio Nazionale delle Ricerche (Italy); Ewa M. Goldys, Macquarie Univ. (Australia); Johan Hofkens, Katholieke Univ. Leuven (Belgium); Borys Kierdaszuk, Univ. Warszawski (Poland); Gabor Laczko, Univ. of Szeged (Hungary); Joseph A. Miragliotta, Johns Hopkins Univ.; Maria Teresa C. A. Neves-Petersen, Aalborg Univ. (Denmark); Markus Sauer, Univ. Bielefeld (Germany); Andong Xia, Institute of Chemistry (China)

*SPIE and the organizers gratefully acknowledge*

### PicoQuant GmbH

*for their generous sponsorship of the Young Investigator Award given as a part of the conference on Ultrasensitive and Single-Molecule Detection Technologies.*

## Saturday 19 January

### Welcome and Introduction

Room: Conv. Ctr. C4 ..... Sat. 9:00 am

**Session Chairs:** Jörg Enderlein, Eberhard Karls Univ. Tübingen (Germany); Zygmunt Karol Gryczynski, Univ. of North Texas; Rainer Erdmann, PicoQuant GmbH (Germany)

### SESSION 1

Room: Conv. Ctr. C4 ..... Sat. 9:10 to 10:20 am

#### FCS I

**Session Chair:** Rainer Erdmann, PicoQuant GmbH (Germany)

9:10 am: **Latest applications for 2-focus fluorescence correlation spectroscopy** (*Invited Paper*), Thomas Dertinger, Univ. of California/Los Angeles; Iris von der Hocht, Anastasiya Loman, Forschungszentrum Jülich GmbH (Germany); Rainer Erdmann, PicoQuant GmbH (Germany); Jörg Enderlein, Eberhard Karls Univ. Tübingen (Germany) ..... [6862-01]

9:40 am: **Calcium-myristoyl-switch of recoverin**, Iris von der Hocht, Forschungszentrum Jülich GmbH (Germany); Thomas Dertinger, Univ. of California/Los Angeles; Joerg Enderlein, Eberhard Karls Univ. Tübingen (Germany) ..... [6862-02]

10:00 am: **Single molecules in fluorescence fluctuation spectroscopy: effective volume and photon-counting histogram**, Joerg Ackermann, FluIT Biosystems GmbH (Germany); Benjamin Greiner, Fraunhofer-Gesellschaft e.V. (Germany); Harald P. Mathis, Fraunhofer Gesellschaft e.V. (Germany) [6862-03]

Coffee Break ..... 10:20 to 10:50 am

### SESSION 2

Room: Conv. Ctr. C4 ..... Sat. 10:50 am to 12:20 pm

#### FCS II

**Session Chair:** Thomas Dertinger, Univ. of California/Los Angeles

10:50 am: **Fluorescence brightness distribution analysis of single molecules by combining 2-focus fluorescence confocal detection with microfluidics** (*Invited Paper*), Ingo Gregor, Anastasia Loman, Forschungszentrum Jülich GmbH (Germany); Thomas Dertinger, Univ. of California/Los Angeles; Iris von der Hocht, Forschungszentrum Jülich GmbH (Germany); Joerg Enderlein, Eberhard Karls Univ. Tübingen (Germany) ..... [6862-04]

11:20 am: **Stoichiometry of Molecular Complexes in Solution determined by Fluorescence Antibunching**, Ingo Gregor, Forschungszentrum Jülich GmbH (Germany); Jörg Enderlein, Eberhard Karls Univ. Tübingen (Germany) [6862-05]

11:40 am: **RatiometricFRET-based Surface Confined Detection of Mi-RNA**, Ignacy Gryczynski, Evgenia Matveeva, Zygmunt K. Gryczynski, Julian Borejdo, Pabak Sarkas, The Univ. of North Texas Health Science Ctr.; Don Stewart, Omm Scientific, Inc. .... [6862-07]

12:00 pm: **Fluorescence correlation spectroscopy to study antibody binding and stoichiometry of complexes**, Kerry M. Swift, Edmund D. Matayoshi, Abbott Labs. .... [6862-08]

Lunch/Exhibition Break ..... 12:20 to 1:40 pm

### SESSION 3

Room: Conv. Ctr. C4 ..... Sat. 1:40 to 3:30 pm

#### New Developments in Methods and System I

**Session Chair:** Jörg Enderlein, Eberhard Karls Univ. Tübingen (Germany)

1:40 pm: **Recent advances in time-correlated single-photon counting** (*Invited Paper*), Felix Koberling, Benedikt Kraemer, Uwe Ortmann, Mathias Patting, Michael Wahl, Benjamin Ewers, Peter Kapusta, Rainer Erdmann, PicoQuant GmbH (Germany) ..... [6862-09]

2:10 pm: **Single-molecule protein folding kinetics in a co-axial microfluidic mixer**, Kambiz M. Hamadani, Marcus Jaeger, Shimon Weiss, Univ. of California/Los Angeles. .... [6862-10]

2:30 pm: **Lipid membrane detected by silica microtube-based optical resonator biosensor**, Tao Ling, Sheereen Majd, Michael Mayer, L. Jay Guo, Univ. of Michigan. .... [6862-11]

2:50 pm: **Label-free detection of cytokines using optical microcavities**, Andrea M. Armani, Scott E. Fraser, California Institute of Technology. .... [6862-12]

3:10 pm: **Toward single-molecule detection with very compact DNA sequencer based on single-photon avalanche diode array**, Ivan Rech, Stefano Marangoni, Angelo Gulinatti, Massimo Ghioni, Sergio Cova, Politecnico di Milano (Italy) ..... [6862-13]

Coffee Break ..... 3:30 to 4:00 pm

## SESSION 4

Room: Conv. Ctr. C4 ..... Sat. 4:00 to 6:00 pm

## New Developments in Methods and System II

Session Chair: Felix Koberling, PicoQuant GmbH

4:00 pm: **Dark-State Relaxation Microscopy under Live-Cell Imaging Conditions** (*Invited Paper*), Don C. Lamb, Ludwig-Maximilians-Univ. München (Germany) and Univ. of Illinois at Urbana-Champaign; Nadia Ruthardt, Sergey V. Ivanchenko, Ludwig-Maximilians-Univ. München (Germany); Kristian Lauritsen, Martin Langkopf, Rainer Erdmann, PicoQuant GmbH (Germany); Christoph R. Bräuchle, Ludwig-Maximilians-Univ. München (Germany) ..... [6862-14]

4:30 pm: **Hybrid photodetector for single-molecule fluorescence spectroscopy and microscopy** (*Invited Paper*), Xavier Michalet, Adrian M. Cheng, Univ. of California/Los Angeles; Motohiro Suyama, Hamamatsu Photonics K.K. (Japan); Katsushi Arisaka, Shimon Weiss, Univ. of California/Los Angeles ..... [6862-15]

5:00 pm: **Integrated microfluidic diagnostic platform for marker and environmental detection**, Harald P. Mathis, Guido Bläss, Benjamin Greiner, Fraunhofer-Gesellschaft e.V. (Germany) ..... [6862-16]

5:20 pm: **Single-molecule detection for in-vitro diagnostics**, Thomas Kirner, Joerg Ackermann, FluiT Biosystems GmbH (Germany); Harald P. Mathis, Benjamin Greiner, Fraunhofer-Institut für Angewandte Informationstechnik (Germany); Thomas Tonn, David Tschachojan, Natasa Kukoc-Zivojnov, Sebastian Giehring, FluiT Biosystems GmbH (Germany) ..... [6862-17]

5:40 pm: **Noninvasive, high-speed optical imaging of biochemical interactions in microfluidic devices**, Vladislav V. Yakovlev, Univ. of Wisconsin/Milwaukee ..... [6862-18]

## BiOS Hot Topics

Convention Center J1-J4

Saturday 19 January • 7:00 to 9:30 pm

See p. 23 for details.

## Sunday 20 January

## SESSION 5

Room: Conv. Ctr. C4 ..... Sun. 8:30 to 9:10 am

## Keynote Presentation

8:30 am: **Recent progress in single-biomolecule fluorescence imaging** (*Keynote Presentation*) (*Presentation Only*), William E. Moerner, Stanford Univ. .... [6862-19]

## SESSION 6

Room: Conv. Ctr. C4 ..... Sun. 9:10 to 10:20 am

## FRET

Session Chair: Samantha Fore, Univ. of California/Davis

9:10 am: **Molecular optical switches and waveguides** (*Invited Paper*), Mike Heilemann, Robert Kasper, Univ. Bielefeld (Germany); Philip Tinnefeld, Ludwig-Maximilians-Univ. München (Germany); Markus Sauer, Univ. Bielefeld (Germany) ..... [6862-20]

9:40 am: **Single-molecule FRET investigations of RNA folding dynamics**, Julie L. Fiore, David J. Nesbitt, Univ. of Colorado at Boulder; Felix Koberling, Benedikt Kraemer, Rainer Erdmann, PicoQuant GmbH (Germany) ... [6862-21]

10:00 am: **Monitoring the conformational dynamics of a single potassium transporter by ALEX-FRET**, Nawid Zarrabi, Univ. Stuttgart (Germany); Thomas Heitkamp, Joerg Greie, Univ. Osnabrück (Germany); Michael Boersch, Univ. Stuttgart (Germany) ..... [6862-22]

Coffee Break ..... 10:20 to 10:50 am

## SESSION 7

Room: Conv. Ctr. C4 ..... Sun. 10:50 am to 12:20 pm

## New Developments in Methods and Technology

Session Chair: Zygmunt Karol Gryczynski, The Univ. of North Texas Health Science Ctr.

10:50 am: **Far-field fluorescence microscopy with nanoscale resolution: from the basics to applications** (*Invited Paper*), Christian Eggeling, Stefan W. Hell, Max-Planck-Institut für biophysikalische Chemie (Germany) .... [6862-23]

11:20 am: **Overcoming the depth-discrimination barrier in widefield microscopes: 3D single-molecule tracking with high axial accuracy**, Sripad Ram, The Univ. of Texas Southwestern Medical Ctr. at Dallas; Jerry Chao, Prashant Prabhat, The Univ. of Texas at Dallas; E. Sally Ward, The Univ. of Texas Southwestern Medical Ctr. at Dallas; Raimund J. Ober, The Univ. of Texas at Dallas ..... [6862-24]

11:40 am: **Maximum-likelihood position sensing and actively controlled electrokinetic transport for single-molecule trapping**, Lloyd M. Davis, William N. Robinson, Zbigniew Sikorski, Guoqing Shen, The Univ. of Tennessee Space Institute ..... [6862-25]

12:00 pm: **Novel detection scheme for optical biosensing using whispering gallery modes in clusters of dielectric particles**, Alexandre Francois, Sivashankar Krishnamoorthy, Michael Himmelhaus, Fujirebio Inc. (Japan) ..... [6862-27]

Lunch/Exhibition Break ..... 12:20 to 1:40 pm

## SESSION 8

Room: Conv. Ctr. C4 ..... Sun. 1:40 to 3:20 pm

## Plasmons and Metal Interaction

Session Chair: Christian Eggeling, Max-Planck-Institut für biophysikalische Chemie (Germany)

1:40 pm: **Surface Plasmons Assisted Microscopy (SPAM)-New Approach To Monitor Conformational Rearrangements**. (*Invited Paper*), Zygmunt K. Gryczynski, Evgenia Matveeva, Julian Borejdo, Priya Muthu, Pabak Sarkas, Nils Calander, Ignacy Gryczynski, The Univ. of North Texas Health Science Ctr. .... [6862-28]

2:10 pm: **Single Molecule Photophysics near Metallic Nanostructures** (*Invited Paper*), Joseph R. Lakowicz, Univ. of Maryland/Baltimore; Krishanu Ray, Yi Fu, Jian Zhang, Mustafa H. Chowdhury, Henryk Szmazinski, Kazimierz Nowaczyk, Univ. of Maryland School of Medicine ..... [6862-29]

2:40 pm: **Fluorescence Enhancement on Silver Nanostructures**, Wlodek Mandecki, Univ. of Medicine and Dentistry of New Jersey. .... [6862-30]

3:00 pm: **Optical cavity mode excitations in metal-coated microspheres**, Michael Himmelhaus, Fujirebio Inc. (Japan) ..... [6862-31]

Coffee Break ..... 3:20 to 3:50 pm

## SESSION 9

Room: Conv. Ctr. C4 ..... Sun. 3:50 to 5:40 pm

## SMS in Biology

Session Chair: Markus Sauer, Univ. Bielefeld (Germany)

3:50 pm: **Single-molecule protein-protein interaction studies of the phytofluor red 1 (PR1) fluorescent protein inside metal nano-apertures** (*Invited Paper*), Samantha Fore, Thomas R. Huser, John C. Lagarias, Victoria Lee, Univ. of California/Davis; Yin Yuen, Lambertus Hesselink, Stanford Univ. .... [6862-32]

4:20 pm: **Specific molecular aggregation of photosynthetic pigment-protein complex LHClI**, Wieslaw I. Gruszecki, Wojciech Grudzinski, Maria Curie-Sklodowska Univ. (Poland); Peter Kernen, Zymoix Inc.; Malgorzata Gospodarek, Politechnika Lubelska (Poland); Zbigniew Krupa, Maria Curie-Sklodowska Univ. (Poland) ..... [6862-33]

4:40 pm: **Imaging of G protein-coupled receptors in solid-supported planar membranes at the single-molecule level**, Iwan Märki, Marcel Leutenegger, Matthias Geissbühler, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Rudolf Robelek, Univ. Regensburg (Germany); Eva-Kathrin Sinner, Max-Planck-Institut für Polymerforschung (Germany); Theo Lasser, Ecole Polytechnique Fédérale de Lausanne (Switzerland) ..... [6862-34]

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5:00 pm: **Rotational diffusion of GFP-fusion proteins**, Heike Hornen, Ralf Kühnemuth, Suren Felekyan, Claus A. M. Seidel, Heinrich-Heine-Univ. Düsseldorf (Germany) ..... [6862-35]

5:20 pm: **Serum-protein profile study of clinical samples using high-performance liquid chromatography laser induced fluorescence technique: cases of cervical and oral cancers**, Santhosh Chidangil, Manipal Univ. (India) ..... [6862-36]

## PicoQuant Young Investigator Award

Sun. 5:40 to 5:50 pm

Session Chair: **Zygmunt Karol Gryczynski**,  
The Univ. of North Texas Health Science Ctr.

## Monday 21 January

### POSTERS-Monday

Room: **Conv. Ctr. C4** ..... **Mon. 6:00 to 7:30 pm**

Session Chair: **Rainer Erdmann**, PicoQuant GmbH (Germany)

*All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.*

*Poster presenters may post their poster papers Tuesday morning starting at 10:00 am in the Fairmont Hotel, and will need to remove their papers immediately following the poster session that evening. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.*

**Fluorescence microscope using total internal reflection for measuring biochip**, Soo-Jin Bae, Uk Kang, Korea Electrotechnology Research Institute (South Korea) ..... [6862-37]

**Advances in label-free optical biosensing: direct comparison of whispering gallery mode sensors with surface plasmon resonance**, Alexandre Francois, Sivashankar Krishnamoorthy, Michael Himmelhaus, Fujirebio Inc. (Japan) ..... [6862-38]

**A new DNA-assay based on fluorescently labeled PNA-probes that are quenched by gold colloids**, Jens-Peter Knemeyer, Deutsches Krebsforschungszentrum (Germany); Anna Piers, Ruprecht-Karls-Univ. Heidelberg (Germany); Achim Friedrich, Anette Jacob, Joerg D. Hoheisel, Deutsches Krebsforschungszentrum (Germany); Nicole Marme, Ruprecht-Karls-Univ. Heidelberg (Germany) ..... [6862-39]

**Combining Fluorescence Correlation Spectroscopy (FCS) with Picosecond based Photon Filtering**, Volker Buschmann, Peter Kapusta, Felix Koberling, Benedikt Krämer, Matthias Patting, Michael Wahl, Rainer Erdmann, PicoQuant GmbH (Germany) ..... [6862-40]

**Two-Focus FCS: from development to implementation**, Benjamin Ewers, Benedikt Krämer, Felix Koberling, PicoQuant GmbH (Germany); Thomas Dertinger, Univ. of California/Los Angeles; Jörg Enderlein, Eberhard Karls Univ. Tübingen (Germany); Matthias Patting, Michael Wahl, Uwe Ortmann, Rainer Erdmann, PicoQuant GmbH (Germany) ..... [6862-41]

**Single fluorescent nanodiamonds: a potential cellular biomarker**, Wunshain S. Fann, Institute of Atomic and Molecular Sciences (Taiwan) ..... [6862-42]



# Optical Diagnostics and Sensing VIII

Conference Chair: **Gerard L. Coté**, Texas A&M Univ.; **Alexander V. Priezzhev**, M.V. Lomonosov Moscow State Univ. (Russia)

Program Committee: **Rafat R. Ansari**, NASA Glenn Research Ctr.; **Werner Gellermann**, The Univ. of Utah; **Yuri I. Gurfinkel**, Central Clinical Hospital (Russia); **Jürgen Lademann**, Humboldt-Univ. zu Berlin (Germany); **Michael J. McShane**, Texas A&M Univ.; **Kenith E. Meissner**, Texas A&M Univ.; **Risto A. Myllylä**, Univ. of Oulu (Finland); **Gert E. Nilsson**, Univ. Hospital Linköping (Sweden); **Jeffery S. Reynolds**, Bayer Healthcare; **Wiendelt Steenbergen**, Univ. Twente (Netherlands); **Kexin Xu**, Tianjin Univ. (China); **Shaoqun Zeng**, Huazhong Univ. of Science and Technology (China); **Dmitry A. Zimnyakov**, Saratov State Univ. (Russia)

## Wednesday 23 January

### SESSION 1

Room: Conv. Ctr. C2 .....Wed. 8:30 to 9:50 am

#### Molecular Sensing and Measurements

Session Chair: **Alexander V. Priezzhev**, M.V. Lomonosov Moscow State Univ. (Russia)

8:30 am: **Combining AFM and FRET for studies at the cellular level**, Kenith E. Meissner, Texas A&M Univ.; Zhe Sun, Univ. of Missouri/Columbia; Bhavik Nathwani, Richard E. Beckham, William N. Everett, Texas A&M Univ.; Xudong Fan, Univ. of Missouri/Columbia; Gerard L. Cote, Texas A&M Univ.; Gerald A. Meininger, Univ. of Missouri/Columbia ..... [6863-01]

8:50 am: **Tagless remote refractometric sensor based on WGMs in quantum dot-embedded microspheres**, Shuo Pang, Kenith E. Meissner, Texas A&M Univ. .... [6863-02]

9:10 am: **Minimized surface plasma resonance sensors for bioflow measurement**, Shaoqun Zeng, Qingming Luo, Huazhong Univ. of Science and Technology (China) ..... [6863-03]

9:30 am: **High-sensitivity measurement of free-protein concentration using optical tweezers**, Osman Akcakir, Chris Knutson, Crystal Duke, Evan Tanner, Daniel M. Mueh, Joseph S. Plewa, Kenneth C. Bradley, Arryx, Inc. . . [6863-05]

Coffee Break ..... 10:00 to 10:40 am

### SESSION 2

Room: Conv. Ctr. C2 ..... Wed. 10:40 am to 12:00 pm

#### Glucose Sensing and Monitoring

Session Chair: **Gerard L. Coté**, Texas A&M Univ.

10:40 am: **Specular reflection versus backscattering for transdermal OCT-based glucose monitoring with an implantable sensor system**, Alexander I. Kholodnykh, The Univ. of Texas Medical Branch at Galveston; Ralph Ballerstadt, BioTex, Inc. .... [6863-06]

11:00 am: **Stability of response and in vivo potential of microparticle glucose sensors**, Michael J. McShane, Saurabh Singh, Ruiqi Long, Texas A&M Univ. .... [6863-08]

11:20 am: **Microdialysis based monitoring of subcutaneous interstitial and venous blood glucose in type 1 diabetic subjects by mid-infrared spectrometry for intensive insulin therapy**, Herbert M. Heise, Uwe Damm, Venkata R. Kondepoti, Univ. Dortmund (Germany); Franz Feichtner, JOANNEUM RESEARCH GmbH (Austria) and Institute of Medical Technologies & Health Management (Austria); Julia K. Mader, Martin Ellmerer, Medizinischen Univ. Graz (Austria). .... [6863-09]

11:40 am: **Optical polarimetry probe system for glucose concentration monitoring in cell culture process**, Heesung Kang, Yong-heum Lee, Byungjo Jung, Yonsei Univ. (South Korea) ..... [6863-10]

Lunch/Exhibition Break ..... 12:00 to 1:00 pm

### SESSION 3

Room: Conv. Ctr. C2 .....Wed. 1:00 to 3:00 pm

#### Imaging and Measurement of Brain Activity and Blood Flow

Session Chair: **Rafat R. Ansari**, NASA Glenn Research Ctr.

1:00 pm: **Novel optical oxy/deoxy hemoglobin monitoring as a modality for non-invasive real-time monitoring of cognitive activity and beyond**, Dana Davies-Shaw, Univ. of California, Davis and NSF Ctr. for Biophotonics Science and Technology; Thomas R. Huser, Univ. of California/Davis and NSF Ctr. for Biophotonics Science and Technology. .... [6863-36]

1:20 pm: **Functional imaging of brain activation by combining the spectroscopic imaging of intrinsic signal and laser speckle imaging techniques**, Pengcheng Li, Qingming Luo, Huazhong Univ. of Science and Technology ..... [6863-11]

1:40 pm: **Connecting laser Doppler perfusion imaging and laser speckle contrast analysis**, Matthijs Draijer, Erwin Hondebrink, Wiendelt Steenbergen, Ton v. Leeuwen, Univ. Twente (Netherlands) ..... [6863-12]

2:00 pm: **Optical capillaroscopy assessment of solar activity effect on the parameters of blood microcirculation**, Yuri I. Gurfinkel, Central Clinical Hospital (Russia) ..... [6863-13]

2:20 pm: **Measurements of brain activity under simulated and actual flight conditions using NIRS**, Rafat R. Ansari, James F. King, NASA Glenn Research Ctr. .... [6863-14]

2:40 pm: **Measurement of microfluidic flow velocity profile with two Doppler Optical Coherence Tomography systems**, Janne Lauri, Meng Wang, Matti T. Kinnunen, Risto Myllylä, Univ. of Oulu (Finland) ..... [6863-15]

Coffee Break ..... 3:00 to 3:30 pm

### SESSION 4

Room: Conv. Ctr. C2 .....Wed. 3:30 to 5:30 pm

#### Optical Diagnostic and Monitoring Techniques

Session Chair: **Shaoqun Zeng**, Huazhong Univ. of Science and Technology (China)

3:30 pm: **Dental resin cure monitoring by inherent fluorescence**, Qun Li, Jack X. Zhou, Qingxiang Li, Sean X. Wang, B&W Tek, Inc. .... [6863-16]

3:50 pm: **Optical monitoring for human teeth diagnosis using time-resolved photomechanical techniques**, Yasser H. El-Sharkawy D.D.S., Cairo Univ. (Egypt) and Egyptian Armed Forces (Egypt) ..... [6863-17]

4:10 pm: **Transillumination breast spectroscopy: a longitudinal study in normal and pregnant women**, Samanta Dick, Princess Margaret Hospital (Canada); Kristina M. Blackmore, Ellen Greenblatt, Mount Sinai Hospital (Canada); Yumi Moriyama, Lothar D. Lilge, Princess Margaret Hospital (Canada) ..... [6863-18]

4:30 pm: **Multiphoton and second-harmonic generation diagnosis of hepatocellular carcinoma**, Yuan Liu, Tzu-Lin Sun, Chuen-Huei Yang, Vladimir A. Hovhannisyann, National Taiwan Univ. (Taiwan); Wei-Chou Lin, Hsuan-Shu Lee, National Taiwan Univ. Hospital (Taiwan); Chen-Yong Dong, National Taiwan Univ. (Taiwan) ..... [6863-19]

4:50 pm: **Design, fabrication and analysis of a semiconductor photonic oxygen detection system to be used for the photodynamic therapy (PDT) of esophageal carcinoma**, Amaranath Premasiri, Gemunu S. Hapawana, Southern Methodist Univ. .... [6863-20]

5:10 pm: **Noninvasive quantitative assessment of diabetic wounds with diffuse photon density wave technology**, Michael T. Neidrauer, Leonid Zubkov, Drexel Univ.; Michael S. Weingarten M.D., Drexel Univ. College of Medicine; Linda S. Zhu, Elisabeth S. Papazoglou, Kambiz Pourrezaei, Drexel Univ. .... [6863-21]

## Monday 21 January

### POSTERS-Monday

Room : Civic Auditorium Complex . . . . . Mon. 6:00 to 9:00 pm

Session Chairs: Gerard L. Coté, Texas A&M Univ.;

Alexander V. Priezzhev, M.V. Lomonosov Moscow State Univ. (Russia)

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Monday morning starting at 10:00 am in the Civic Auditorium Complex, and will need to remove their papers immediately following the poster session that evening. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

**Determination of glucose in interstitial fluid by surface plasmon resonance biosensor**, Huang Fuxiang, Tiajin Univ. (China) . . . . . [6863-07]

**Photoluminescence of urine samples**, Oksana Z. Drobchak, Oleg M. Bordun, Ivan Franko National Univ. of L'viv (Ukraine). . . . . [6863-22]

**Laser-induced breakdown spectroscopy of whole blood and other liquid-organic compounds**, Steven Rock, Huanfeng Ding, Nouredine Melikechi, Aristides Marcano, Delaware State Univ. . . . . [6863-24]

**Identification of antibodies isotypes in biological fluid by means of micro-Raman spectroscopy and chemometric methods**, Cuauhtémoc Araujo Andrade, Juan L. Pichardo Molina, Ctr. de Investigaciones en Óptica, A.C. (Mexico); Gloria Barbosa Sabanero, Univ. de Guanajuato (Mexico); Claudio Frauto Reyes, Ctr. de Investigaciones en Óptica, A.C. (Mexico) . . . . . [6863-25]

**Influence of room temperature on the precision of non-invasive glucose sensing by near-infrared spectroscopy**, Rong Liu, Wenliang Chen, Yun Chen, Kexin Xu, Tianjin Univ. (China). . . . . [6863-27]

**Research on the wavelength-dependent characteristic of the floating-reference point in the non-invasive glucose sensing**, Rong Liu, Wenliang Chen, Yue Yang, Kexin Xu, Tianjin Univ. (China) . . . . . [6863-28]

**Using skin impedance to improve prediction accuracy of continuous glucose monitoring system**, Haixia Yu, Jin Liu, Ting Shi, Dachao Li, Zhenhui Du, Kexin Xu, Tianjin Univ. (China) . . . . . [6863-29]

**Enlarging the linear response range with optimized imaging parameters and a simply modified data processing**, Pengcheng Li, Qingming Luo, Huazhong Univ. of Science and Technology (China) . . . . . [6863-30]

**The effects of peripheral nerve stimulation on**, Pengcheng Li, Qingming Luo, Huazhong Univ. of Science and Technology (China) . . . . . [6863-31]

**Diagnostic algorithms for cervical cancer based on FTIR spectroscopy**, Benjamin Appiah, Rebekah Drezek, Rice Univ. . . . . [6863-32]

**Non-invasive in-situ detection of malignant skin tissue and other abnormalities using portable LIBS system with fiber spectrometer and eye-safe erbium glass laser**, Michael J. Myers, John D. Myers, Baoping Guo, Chengxin Yang, Christopher R. Hardy, Jeffrey A. Myers, Abbey G. Myers, Kigre, Inc. . . . . [6863-33]

**Imaging and characterization of blood vessels by spatial resolved diffuse reflection studied by Monte Carlo simulations**, Alexander V. Priezzhev, M.V. Lomonosov Moscow State Univ. (Russia); Alexander V. Bykov, Univ. of Oulu (Finland) and M.V. Lomonosov Moscow State Univ. (Russia); Risto A. Myllylä, Univ. of Oulu (Finland) . . . . . [6863-34]

**Comparison of protecting properties of TiO<sub>2</sub> and Si nanoparticles as sunscreen constituents against UV radiation**, Alexey P. Popov, Univ. of Oulu (Finland); Alexander V. Priezzhev, M.V. Lomonosov Moscow State Univ. (Russia); Jürgen Lademann, Humboldt Univ. (Germany); Risto A. Myllylä, Univ. of Oulu (Finland) . . . . . [6863-35]

# Biomedical Applications of Light Scattering II

Conference Chair: **Adam Wax**, Duke Univ.; **Vadim Backman**, Northwestern Univ.

Program Committee: **Irving J. Bigio**, Boston Univ.; **Stephen A. Boppart**, Univ. of Illinois at Urbana-Champaign; **Thomas H. Foster**, Univ. of Rochester; **Steven L. Jacques**, Oregon Health and Science Univ.; **Lev T. Perelman**, Harvard Medical School; **Brian W. Pogue**, Dartmouth College; **Bruce Jason Tromberg**, Beckman Laser Institute and Medical Clinic

## Saturday 19 January

### SESSION 1

Room: Conv. Ctr. A6 ..... Sat. 8:30 to 10:20 am

#### New Approaches

Session Chair: **Vadim Backman**, Northwestern Univ.

8:30 am: **A raster scanning reflectance imager for nonmodel-based quantification**, Venkataraman Krishnaswamy, Dartmouth College; Wendy A. Wells, Dartmouth Medical School; Brian W. Pogue, Dartmouth College [6864-01]

8:50 am: **Brillouin confocal microscope**, Giuliano Scarcelli, Seok-Hyun Yun, Harvard Medical School ..... [6864-02]

9:10 am: **Use of microfluidic device to characterize blood-flow imaging capabilities of laser speckle imaging**, Yu-Chih Huang, Youssef Farhat, Albert T. Hsieh, Abraham P. Lee, Bernard Choi, Univ. of California/Irvine ... [6864-03]

9:30 am: **Single-cell partial-wave spectroscopic microscopy: early detection of cancer** (*Invited Paper*), Hariharan Subramanian, Prabhakar Pradhan, Nicholas Deep, Vishal Parikh, Dhananjay Kunte, Hemant Roy, Vadim Backman, Northwestern Univ. .... [6864-04]

10:00 am: **Detection of partial-thickness tears in ligaments and tendons by Stokes-polarimetry imaging**, Jihoon Kim, Raheel John, Joseph T. Walsh, Jr., Northwestern Univ. .... [6864-05]

Coffee Break ..... 10:20 to 10:50 am

### SESSION 2

Room: Conv. Ctr. A6 ..... Sat. 10:50 am to 12:10 pm

#### Low Coherence Light Scattering

Session Chair: **Stephen A. Boppart**, Univ. of Illinois at Urbana-Champaign

10:50 am: **Interferometric synthetic aperture microscopy: tissue structure inferred by computed imaging techniques** (*Invited Paper*), Daniel L. Marks, Tyler S. Ralston, Univ. of Illinois at Urbana-Champaign; Brynmor J. Davis, Boston Univ. and Univ. of Illinois at Urbana-Champaign; P. Scott Carney, Stephen A. Boppart, Univ. of Illinois at Urbana-Champaign. .... [6864-06]

11:20 am: **Propagation properties of 1320-nm light in blood/saline mixtures determined through**, Dan P. Popescu, Mark D. Hewko, Jeri Friesen, Michael G. Sowa, National Research Council Canada (Canada) ..... [6864-07]

11:40 am: **Measurement of nanotopography induced nuclear morphology using angle-resolved low-coherence interferometry** (*Invited Paper*), Kevin J. Chalut, Sulin Chen, Michael G. Giacomelli, Cyrus Amoozegar, Kam W. Leong, Adam Wax, Duke Univ. .... [6864-08]

Lunch/Exhibition Break ..... 12:10 to 1:30 pm

### SESSION 3

Room: Conv. Ctr. A6 ..... Sat. 1:30 to 3:20 pm

#### Clinical and Preclinical Studies

Session Chair: **Irving J. Bigio**, Boston Univ.

1:30 pm: **Optical biopsy scanner utilizing elastic scattering spectroscopy for intra-operative diagnosis of sentinel-node metastases in breast cancer**, Santosh K. Somasundaram, Dennis W. Chicken, Martin R. Austwick, Alexander Mosse, Mary Falzon, Gabrijela Kocjan, Ying Zhu, Univ. College London (United Kingdom); Irving J. Bigio, Boston Univ.; Thomas Fearn, Stephen G. Bown, Mohammed R. S.Keshtgar, Univ. College London (United Kingdom) . [6864-09]

1:50 pm: **Measuring tissue optical properties in vivo using reflectance-mode confocal microscopy and OCT**, Steven L. Jacques, Ravikant Samatham, Niloy Choudhury, David Levitz, Yongji Fu, Oregon Health & Science Univ. .... [6864-10]

2:10 pm: **Enhanced gastro-intestinal endoscopy: nonlight-based technologies** (*Invited Paper*), Jacques Van Dam, Stanford Univ. .... [6864-11]

2:40 pm: **Development of a clinical Fourier-domain angle resolved low-coherence interferometry system for in-vivo measurements**, Neil G. Terry, Yizheng Zhu, William J. Brown, Adam Wax, Duke Univ. .... [6864-12]

3:00 pm: **Non-invasive quantitative monitoring of patch test reactions by reflectance spectrophotometry, laser Doppler flowmetry, and transepidermal water loss**, Natalja S. Eikje M.D., Waseda Univ. (Japan) and Tokushima Univ. (Japan) ..... [6864-13]

Coffee Break ..... 3:20 to 3:50 pm

### SESSION 4

Room: Conv. Ctr. A6 ..... Sat. 3:50 to 5:40 pm

#### Theory

Session Chair: **Lev T. Perelman**, Harvard Medical School

3:50 pm: **Multiple scattering effects on light-scattering methods for optical characterization of biological tissues** (*Invited Paper*), Xu Li, Wendy Yip, Northwestern Univ. .... [6864-14]

4:20 pm: **Particle shape as revealed by spectral depolarization**, Donald D. Duncan, Oregon Health & Science Univ.; Michael E. Thomas, The Johns Hopkins Univ. Applied Physics Lab. .... [6864-15]

4:40 pm: **Finite difference time-domain model of light scattering from retinal photoreceptors**, Samer S. Abdallah, Alexandre Iolov, Omar M. Ramahi, Kostadinka K. Bizheva, Univ. of Waterloo (Canada) ..... [6864-16]

5:00 pm: **Adaptive spectral window sizes for feature extraction from optical spectra**, Chih-Wen Kan, Nhi Pham, Linda T. Nieman, Konstantin V. Sokolov, Mia K. Markey, The Univ. of Texas at Austin ..... [6864-17]

5:20 pm: **Incorporation of the exposure time in the modified laser speckle imaging method with improved spatial resolution**, Julio C. Ramirez-San-Juan, Victor I. Ruiz-Pérez, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Nicté Y. Arenas-Heredia, Univ. de las Américas Puebla (Mexico); Yu-Chih Y. Huang, Univ. of California/Irvine; Ruben Ramos-Garcia, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Bernard Choi, Univ. of California/Irvine ..... [6864-18]

### BiOS Hot Topics

Convention Center J1-J4

Saturday 19 January • 7:00 to 9:30 pm

See p. 23 for details.

**Sunday 20 January**

**SESSION 5**

**Room: Conv. Ctr. A6 . . . . . Sun. 8:30 to 10:30 am**

**Animal Studies**

*Session Chair: Adam Wax, Duke Univ.*

8:30 am: **Relationship between light scattering and absorption due to cytochrome c oxidase reduction during loss of tissue viability in brains of rats.** Satoko Kawauchi, Shunichi Sato, Hidetoshi Oogawa, Hiroshi Nawashiro, Makoto Kikuchi, National Defense Medical College (Japan). . . . . [6864-19]

8:50 am: **Noncontact imaging of multispectral absorption and scattering changes in vivo using spatially modulated illumination.** Jessie R. Weber, Beckman Laser Institute and Medical Clinic. . . . . [6864-20]

9:10 am: **Optical visualization of stimulus-evoked fast neural activity and spreading waves in amphibian retina.** Xincheng Yao, Youbo Zhao, The Univ. of Alabama at Birmingham . . . . . [6864-21]

9:30 am: **Evaluation of optical imaging and spectroscopy approaches for cardiac tissue depth assessment.** Bevin Lin, Dennis L. Matthews, Univ. of California/Davis; Victor V. Chernomordik, Amir Gandjbakhche, National Institutes of Health; Stephen M. Lane, Univ. of California/Davis and Lawrence Livermore National Lab.; Stavros G. Demos, Lawrence Livermore National Lab. . . . . [6864-22]

9:50 am: **Reflectance spectroscopy with polarized light for oral cancer diagnosis.** Jung-Rae Chung, Petra Wilder-Smith, Zhongping Chen, Univ. of California/Irvine . . . . . [6864-23]

10:10 am: **Measuring neoplastic transformation in the hamster cheek pouch using Fourier-domain low-coherence interferometry.** Robert N. Graf, Duke Univ.; Latres Dominick, Xiaoxin Chen, North Carolina Central Univ.; William J. Brown, Adam Wax, Duke Univ. . . . . [6864-24]

Coffee Break . . . . . 10:30 to 11:00 am

**SESSION 6**

**Room: Conv. Ctr. A6 . . . . . Sun. 11:00 am to 12:40 pm**

**In Vitro Cell Studies**

*Session Chair: Thomas H. Foster, Univ. of Rochester*

11:00 am: **Scattering signatures of intracellular organelles (Invited Paper).** Jeremy D. Wilson, William J. Cottrell, Thomas H. Foster, Univ. of Rochester . . . . . [6864-25]

11:30 am: **Refractive index of cells and tissues measured by quantitative phase imaging.** Gabriel Popescu, Niyom Lue, Kamran Badizadegan, Ramachandra R. Dasari, Michael S. Feld, Massachusetts Institute of Technology . . . . . [6864-26]

11:50 am: **Phenotypic analysis of bacterial colonies using laser light scatter and pattern-recognition techniques.** Bartek P. Rajwa, Bulent Bayraktar, Padmapriya P. Banada, Karleigh Huff, Arun K. Bhunia, E. Daniel Hirleman, J. Paul Robinson, Purdue Univ. . . . . [6864-27]

12:10 pm: **Studying cell dynamics and function with CLASS microscopy (Invited Paper).** Le Qiu, Edward Vitkin, Saira Salahuddin, Irving Itzkan, Eugene B. Hanlon, Lev T. Perelman, Harvard Medical School. . . . . [6864-28]

Lunch/Exhibition Break . . . . . 12:40 to 1:40 pm

**SESSION 7**

**Room: Conv. Ctr. A6 . . . . . Sun. 1:40 to 3:00 pm**

**Dynamic and Time Resolved Methods**

*Session Chair: Adam Wax, Duke Univ.*

1:40 pm: **Depth-resolved motility contrast imaging by dynamic light scatter from tissue.** David D. Nolte, Kwan Jeong, John J. Turek, Purdue Univ. . . . . [6864-29]

2:00 pm: **Dynamic scattering microscopy.** Gabriel Popescu, M. Shahrooz Amin, Young-Keun Park, Niyom Lue, Ramachandra R. Dasari, Kamran Badizadegan, Michael S. Feld, Massachusetts Institute of Technology [6864-30]

2:20 pm: **Clinically compatible time-resolved diffuse spectroscopy in the 600-1060nm bandwidth.** Andrea Bassi, Andrea Farina, Cosimo D'Andrea, Antonio Pifferi, Gianluca Valentini, Rinaldo Cubeddu, Politecnico di Milano (Italy) . . . . . [6864-31]

2:40 pm: **Time-reversal optical phase conjugation for tissue turbidity suppression.** Zahid Yaqoob, California Institute of Technology; Demetri Psaltis, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Changhui Yang, California Institute of Technology . . . . . [6864-32]

**Monday 21 January**

**POSTERS-Monday**

**Room: Conv. Ctr. A6 . . . . . Mon. 6:00 to 7:30 pm**

*Session Chair: Adam Wax, Duke Univ.*

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**Signal sources in elastic-light scattering by biological cells and tissues: what can elastic-light scattering spectroscopy tell us?** Min Xu, Fairfield Univ.; Tao T. Wu, Jianan Y. Qu, Hong Kong Univ. of Science and Technology (Hong Kong China) . . . . . [6864-34]

**A universal numerical treatment of forward-scattering approximations of radiative transfer in the slab geometry using the classic Pn-method.** Kevin G. Phillips, Carlo Lancellotti, College of Staten Island/CUNY . . . . . [6864-35]

**Time-resolved optical spectroscopic quantification of the red blood-cell damages by the cardiovascular devices.** Daisuke Sakota, Tokyo Medical and Dental Univ. (Japan); Ryuki Sakamoto, Sophia Univ. (Japan); Katsuhiro Ohuchi, Hideo Sobajima, Yoshimasa Yokoyama, Naoyuki Yokoyama, Satoshi Waguri, Setsuo Takatani, Tokyo Medical and Dental Univ. (Japan). . . . . [6864-36]

**Rapid detection of bacterial cells by light-scattering method.** Oleksandr I. Bilyi, Vasyl B. Getman, Ivan Franko National Univ. of L'viv (Ukraine); Rostyslav O. Bilyy, Institute of Cell Biology (Ukraine); Igor M. Kushnir, Igor Y. Kotsiumbas, State Scientific-Research Control Institute of Veterinary Preparations and Fodder Additives (Ukraine) . . . . . [6864-37]

**Defining edge of melanoma lesion using elastic light single-scattering spectroscopy on an animal model.** M. Canpolat, N. Erin, A. M. Ciftcioglu, Akdeniz Univ. (Turkey). . . . . [6864-38]

**Laser scatter imaging in clinical diagnostics.** Ed Luther, CompuCyte Corp.; William Geddie, Univ. Health Network (Canada). . . . . [6864-39]

**Estimation of absorption coefficient in bottom regions in multilayered turbid-media based on the time-domain depth sensitivity: a Monte Carlo investigation.** Chie Sato, National Institute of Advanced Industrial Science and Technology (Japan) and Tokyo Institute of Psychiatry (Japan); Miho Shimada, Institute for Molecular Science (Japan); Yoko Hoshi, Tokyo Institute of Psychiatry (Japan). . . . . [6864-40]

**Simultaneous iterative reconstruction technique for diffuse optical tomography imaging: iteration criterion and image recognition.** Zong-Han Yu, Chun-Ming Wu, National Taiwan Univ. (Taiwan); Yo-Wei Lin, National Taiwan Univ. of Science and Technology (Taiwan); Jui-Che Tsai, National Taiwan Univ. (Taiwan); Chia-Wei Sun, Industrial Technology Research Institute (Taiwan) . . . . . [6864-41]

**Diagnosis of cardiovascular diseases based on diffuse optical tomography system.** Zong-Han Yu, Chun-Ming Wu, National Taiwan Univ. (Taiwan); Yo-Wei Lin, National Taiwan Univ. of Science and Technology (Taiwan); Jui-Che Tsai, National Taiwan Univ. (Taiwan); Chia-Wei Sun, Industrial Technology Research Institute (Taiwan) . . . . . [6864-42]

**Chemometric techniques on the analysis of Raman spectra of serum blood samples of breast cancer patients.** Juan L. Pichardo-Molina, Laura N. Rocha-Osornio, C. Araujo-Andrade, Claudio Frausto-Reyes, Ctr. de Investigaciones en Óptica, A.C. (Mexico); Jose M. De la Roca, Univ. de Guanajuato (Mexico); Oracio C. Barbosa-Garcia, Ctr. de Investigaciones en Óptica, A.C. (Mexico). . . . . [6864-43]

**Discrimination of normal and dysplasia in cervix tissue by Mueller matrix analysis.** Prashant Shukla, Amit Awasthi, Prabodh K. Pandey, Asima Pradhan, Indian Institute of Technology Kanpur (India) . . . . . [6864-44]

# Nanoscale Imaging, Sensing, and Actuation for Biomedical Applications V

Conference Chair: **Alexander N. Cartwright**, Univ. at Buffalo; **Dan V. Nicolau**, The Univ. of Liverpool (United Kingdom)

Program Committee: **Igal Brener**, Sandia National Labs.; **Philippe M. Fauchet**, Univ. of Rochester; **Paul Lee Gourley**, Sandia National Labs.; **Piotr Grodzinski**, Los Alamos National Lab.; **Brian McGrath**, Dublin City Univ. (Ireland); **Igor L. Medintz**, Naval Research Lab.; **Ammasi Periasamy**, Univ. of Virginia; **Paras N. Prasad**, Univ. at Buffalo; **Weihong Tan**, Univ. of Florida

## Monday 21 January

### Posters-Monday

Room: Conv. Ctr. M ..... Mon. 6:00 to 7:30 pm

Session Chair: **Dan V. Nicolau**,  
The Univ. of Liverpool (United Kingdom)

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**Quantitative detection of antibiotic resistance genes using magnetic/luminescent core-shell nanoparticles**, Ahjeong Son, Dosi K. Dosev, Ian M. Kennedy, Krassimira R. Hristova, Univ. of California/Davis ..... [6865-18]

**Gold nanoshell thermal confinement of conformal laser thermal therapy in liver metastasis**, Andrew M. Elliott, Roger J. Stafford, The Univ. of Texas M.D. Anderson Cancer Ctr.; James Wang, Jon A. Schwartz, Nanospectra Biosciences, Inc.; Anil M. Shetty, John D. Hazle, The Univ. of Texas M.D. Anderson Cancer Ctr. .... [6865-19]

**Nanostructure characterization of grouping single-biotinylated nanoparticle with streptavidin by electrophoresis and atomic force microscopy**, Chih-Hsien P. Li, Cheng-An J. Lin, Che-Wei Chang, Chung Yuan Christian Univ. (Taiwan); Ralph A. Sperling, Philipps-Univ. Marburg (Germany); Ting-Ya Yang, Chennng-Jyh Ke, Chung Yuan Christian Univ. (Taiwan); Jimmy K. Li, National Cheng Kung Univ. (Taiwan); Wolfgang J. Parak, Philipps-Univ. Marburg (Germany); Walter H. Chang, Chung Yuan Christian Univ. (Taiwan) ..... [6865-20]

## Tuesday 22 January

### SESSION 1

Room: Conv. Ctr. M ..... Tues. 8:30 am to 12:00 pm

#### Micro and Nanosensors I

Session Chair: **Dan V. Nicolau**,  
The Univ. of Liverpool (United Kingdom)

8:30 am: **Keynote: Applications of biophotonics to nanoscale imaging and sensing**, Dennis L. Matthews, Univ. of California/Davis. .... [6865-01]

9:10 am: **Nanometer-thin porous membranes made of silicon: fabrication, properties, and applications (Invited Paper)**, Philippe M. Fauchet, Univ. of Rochester ..... [6865-02]

9:40 am: **Direct-write patterning of nanostructured sensory waveguides for integrated optical bioimaging applications (Invited Paper)**, Mohamad Hajji-Hassan, Hagop Djeghelian, McGill Univ. (Canada); Ebrahim Ghafar-Zadeh, Ecole Polytechnique de Montréal (Canada); Vamsy P. Chodavarapu, Mark Andrews, McGill Univ. (Canada); Daniel Therriault, Ecole Polytechnique de Montréal (Canada) ..... [6865-03]

Coffee Break ..... 10:10 to 10:40 am

10:40 am: **Keynote: Biomolecular motors challenge imaging and enable sensing**, Henry Hess, Thorsten Fischer, Ashutosh Agarwal, Parag Katira, Isaac Finger, Elizabeth Mobley, Robert Tucker, Univ. of Florida; Jacob Kerssemakers, Stefan Diez, Max Planck Institute of Molecular Cell Biology and Genetics (Germany) ..... [6865-04]

11:20 am: **Statistical analysis of the motility of nano-objects propelled by molecular motors**, Raquel C. Conceição, The Univ. of Liverpool (United Kingdom) and Univ. Nova de Lisboa (Portugal); David J. G. Bakewell, Dan V. Nicolau, The Univ. of Liverpool (United Kingdom) ..... [6865-05]

11:40 am: **Near-field subdiffractive confinement of light by a dielectric microsphere at Mie resonance**, Alexander Heifetz, Kevin Huang, Allen Taflove, Vadim Backman, Northwestern Univ. .... [6865-06]

Lunch/Exhibition Break ..... 12:00 pm

### SESSION 2

Room: Conv. Ctr. M ..... Tues. 1:00 to 4:40 pm

#### Micro and Nanosensors II

Session Chair: **Vamsy P. Chodavarapu**, McGill Univ. (Canada)

1:00 pm: **Differential near-field scanning optical microscopy based on sensor arrays (Invited Paper)**, Aydogan Ozcan, Univ. of California/Los Angeles; Ertugrul Cubukcu, Harvard Univ.; Alberto Bilanca, Wellman Ctr. for Photomedicine; Brett E. Bouma, Massachusetts General Hospital; Federico Capasso, Harvard Univ.; G. J. Tearney M.D., Massachusetts General Hospital ..... [6865-07]

1:30 pm: **Integrated high-Q microring-waveguide resonator biosensor arrays (Invited Paper)**, Igal Brener, Sandia National Labs. .... [6865-08]

2:00 pm: **Porous materials for enhanced nanoscale biological and chemical detection (Invited Paper)**, Sharon M. Weiss, Vanderbilt Univ. .... [6865-09]

2:30 pm: **Molecular interferometric imaging biosensor for the study of molecular kinetics**, Ming Zhao, Xuefeng Wang, David D. Nolte, Purdue Univ. .... [6865-10]

2:50 pm: **Plasmonic tip-enhanced Raman scattering of strained silicon with single and multiple probes**, Aaron Lewis, Rima Dekhter, Hesham Taha, Galina Fish, David Lewis, Nanonics Imaging Ltd. (Israel). .... [6865-11]

Coffee Break ..... 3:10 to 3:40 pm

3:40 pm: **Biomimicking stochastic behavior of molecular interactions by digital nano-array**, Hui-Hsin Lu, Chii-Wann Lin, National Taiwan Univ. (Taiwan); Hsiao Tzu-Chien, National Chiao Tung Univ. (Taiwan) ..... [6865-12]

4:00 pm: **A novel method of using hollow-core photonic crystal fiber as a Raman biosensor**, Majid Naji, Altaf Khetani, Univ. of Ottawa (Canada); Neil Lagali, Rejean Munger, Univ. of Ottawa (Canada) and Consultant (Canada); Hanan Anis, Univ. of Ottawa (Canada) ..... [6865-13]

4:20 pm: **The model of photo-induced conformational change in macromolecules RC**, Zabolotniy A. Michail, Andreev A. Evgen, Barabash Yuruy, Kharkianen Valeriy, Grynko Dmytry, Institute of Physics (Ukraine) ..... [6865-15]

## Wednesday 23 January

### SESSION 3

Room: Conv. Ctr. M. . . . . Wed. 8:30 am to 12:00 pm

#### Nanoparticle-Based Imaging

Session Chair: **Alexander N. Cartwright**, Univ. at Buffalo

8:30 am: **Recording nanometer scale displacements of individual membrane proteins labeled with gold beads with up to 150kHz frame rates using a CMOS camera**, Lea Fredrickson, Adrian Cheng, Jose Rodriguez, Jianwei Miao, Katsushi Arisaka, Univ. of California/Los Angeles . . . . [6865-21]

8:50 am: **Magnetic luminescent nanoparticles as internal calibration for an immunoassay for ricin**, Dosi K. Dosev, Mikaela Nichkova, Zhi-Ya Ma, Shirley Gee, Bruce D. Hammock, Ian M. Kennedy, Univ. of California/Davis. . [6865-22]

9:10 am: **Organic molecular sensing by single metal porphyrin nanoparticles**, Takayuki Uwada, Hamano Life Science Research Foundation (Japan); Yoichiro Hosokawa, Osaka Univ. (Japan) and Osaka Univ. (Japan) and Hamano Life Science Research Foundation (Japan); Noriko Takizawa, Hamano Life Science Research Foundation (Japan); Kazunori Okano, Hamano Life Science Research Foundation (Japan) and Osaka Univ. (Japan); Hiroshi M. Masuhara, Hamano Life Science Research Foundation (Japan) and Osaka Univ. (Japan) and Hamano Life Science Research Foundation (Japan) . . . . [6865-23]

9:30 am: **Utilization of functional luminescent GaN:Eu<sup>3+</sup> nanoparticles for the detection of programmed cell death**, Rostyslav O. Bilyy, Institute of Cell Biology (Ukraine); Artur P. Podhorodecki, Politechnika Wroclawska (Poland); Alexander S. Zaichenko, N. Mitina, Lviv Polytechnic National Univ. (Ukraine); Rostyslav S. Stoika, Institute of Cell Biology (Ukraine); Marcin Nyk, Jan Misiewicz, W. Streck, Politechnika Wroclawska (Poland) . . . . . [6865-24]

9:50 am: **Gold nanoshells for OCT imaging contrast from model to in-vivo study**, Elena V. Zagainova M.D., Nizhny Novgorod State Medical Academy (Russia); Marina V. Shirmanova, Institute of Applied Physics (Russia); Michail Kirillin, Univ. of Oulu (Finland); Anna G. Orlova, Irina V. Balalaeva, Vladislav A. Kamensky, Institute of Applied Physics (Russia) . . . . . [6865-25]

Coffee Break . . . . . 10:10 to 10:40 am

10:40 am: **Cell-population tracking using quantum dots in flow cytometry**, Huw D. Summers, Rachel J. Errington, Paul Smith, Sally Chappell, Cardiff Univ. (United Kingdom); Paul Rees, Martyn Brown, Swansea Univ. (United Kingdom); James F. Leary, Purdue Univ. . . . . [6865-26]

11:00 am: **Sensitivity measurements of NAOMI using layered-nanoparticle phantoms**, Daniel M. de Bruin, Massachusetts General Hospital; Dirk J. Faber, Frank D. Verbraak M.D., Ton G. van Leeuwen, Univ. van Amsterdam (Netherlands) . . . . . [6865-27]

11:20 am: **Gold nanoshell mediated hyperthermia enhances the efficacy of radiation therapy**, Parmeswaran Diagaradjane, Anil Shetty, The Univ. of Texas M.D. Anderson Cancer Ctr.; James Wang, Jon Schwartz, Nanospectra Biosciences, Inc.; Shujun Shentu, Chul H. Park, Amit Deorukhar, Andrew M. Elliot, Jason R. Stafford, Sang Cho, The Univ. of Texas M.D. Anderson Cancer Ctr.; James W. Tunnell, The Univ. of Texas at Austin; John Hazle, Sunil Krishnan, The Univ. of Texas M.D. Anderson Cancer Ctr. . . . . [6865-28]

11:40 am: **Modeling laser thermal therapy output for nanoshell heating using a natural coordinate system**, Andrew M. Elliott, Roger J. Stafford, Chun Li, John D. Hazle, The Univ. of Texas M.D. Anderson Cancer Ctr. . . . . [6865-29]



# Colloidal Quantum Dots for Biomedical Applications III

**Conference Chairs:** **Marek Osirski**, The Univ. of New Mexico; **Thomas M. Jovin**, Max-Planck-Institut für biophysikalische Chemie (Germany); **Kenji Yamamoto**, International Medical Ctr. of Japan (Japan)

**Program Committee:** **Antigoni Alexandrou**, École Polytechnique (France); **Moungi G. Bawendi**, Massachusetts Institute of Technology; **Maxime Dahan**, Lab. Kastler Brossel (France); **Alexander Eychmüller**, Technische Univ. Dresden (Germany); **Jennifer A. Hollingsworth**, Los Alamos National Lab.; **Hedi Mattoussi**, Naval Research Lab.; **Paul Mulvaney**, The Univ. of Melbourne (Australia); **Jay L. Nadeau**, McGill Univ. (Canada); **Shuming Nie**, Georgia Institute of Technology and Emory Univ.; **Wolfgang J. Parak**, Philipps-Univ. Marburg (Germany); **Sandra J. Rosenthal**, Vanderbilt Univ.; **Tania Q. Vu**, Oregon Health & Science Univ.; **Michael S. Wong**, Rice Univ.

## Saturday 19 January

### Opening Remarks

Room: Conv. Ctr. A5 ..... Sat. 8:35 to 8:40 am

Marek Osirski, The Univ. of New Mexico

### SESSION 1

Room: Conv. Ctr. A5 ..... Sat. 8:40 to 10:00 am

#### Synthesis and Characterization of Nanocrystals for Biomedical Applications

Session Chair: **Geoffrey F. Strouse**, Florida State Univ.

8:40 am: **Synthesis and applications of quantum dots and magnetic quantum dots** (*Invited Paper*), J. Y. Ying, Yuangang Zheng, N. R. Jana, S. T. Selvan, Institute of Bioengineering and Nanotechnology (Singapore) ..... [6866-01]

9:10 am: **Synthesis and functionalization of non-toxic visible-emitting nanocrystals** (*Invited Paper*), P. T. Snee, Univ. of Illinois at Chicago . [6866-02]

9:40 am: **Synthesis and characterization of scintillating lead iodide nanocrystals**, K. Sankar, B. A. Akins, T. A. Memon, Nathan J. Withers, Gennady A. Smolyakov, Marek Osinski, The Univ. of New Mexico ..... [6866-03]

Coffee Break ..... 10:00 to 10:30 am

### SESSION 2

Room: Conv. Ctr. A5 ..... Sat. 10:30 am to 12:00 pm

#### Biofunctionalization of Colloidal Nanocrystals

Session Chair: **Jay L. Nadeau**, McGill Univ. (Canada)

10:30 am: **Nanocrystal vectors for sensing, gene therapy, and cellular imaging** (*Invited Paper*), Geoffrey F. Strouse, Florida State Univ.; S. Gant, Univ. of Florida; P. B. Chase, Florida State Univ.; T. Logan, Univ. of Florida [6866-05]

11:00 am: **Design of compact multifunctional ligands to promote biocompatibility of luminescent QDs**, Kimihiro Susumu, Naval Research Lab.; Bing C. Mei, Univ. of Massachusetts/Amherst; Igor L. Medintz, Hedi Mattoussi, Naval Research Lab. .... [6866-06]

11:20 am: **Development and characterization of silk fibroin-coated quantum dots**, Bhavik Nathwani, Texas A&M Univ.; Anshu Mathur, The Univ. of Texas M.D. Anderson Cancer Ctr.; Kenith E. Meissner, Texas A&M Univ. . . . [6866-07]

11:40 am: **Design of an amphiphilic polymer for nanoparticle coating and functionalization**, Cheng-An J. Lin, Chung Yuan Christian Univ. (Taiwan); Ralph A. Sperling, Philipps-Univ. Marburg (Germany); Jimmy K. Lee, Chung Yuan Christian Univ. (Taiwan); Marco Zanella, Philipps-Univ. Marburg (Germany); Ting-Ya Yang, Pei-Yun Li, Walter H. Chang, Chung Yuan Christian Univ. (Taiwan); Wolfgang J. Parak, Philipps-Univ. Marburg (Germany) . . . . [6866-08]

Lunch/Exhibition Break ..... 12:00 to 1:20 pm

### SESSION 3

Room: Conv. Ctr. A5 ..... Sat. 1:20 to 3:00 pm

#### Resonant-Energy-Transfer-Based Nanosensing

Session Chair: **Jennifer A. Hollingsworth**, Los Alamos National Lab.

1:20 pm: **Chemiluminescent resonance energy transfer of luminescent quantum dots and its potential bioapplications** (*Invited Paper*), X. G. Huang, C. Q. Dong, J. C. Ren, Shanghai Jiao Tong Univ. (China) ..... [6866-09]

1:50 pm: **Unraveling the microscopic nature of FRET coupling between nanocrystals and molecules** (*Invited Paper*), John M. Lupton, The Univ. of Utah. .... [6866-37]

2:20 pm: **Energy transfer-based biosensing with semiconductor quantum dots: beyond organic dye acceptors**, Igor L. Medintz, Thomas Pons, Naval Research Lab.; Philip E. Dawson, The Scripps Research Institute; Hedi Mattoussi, Naval Research Lab. .... [6866-10]

2:40 pm: **Quantum dot-fluorescent protein FRET probes for protease activity assays**, Allison M. Dennis, Gang Bao, Georgia Institute of Technology ..... [6866-11]

Coffee Break ..... 3:00 to 3:30 pm

### SESSION 4

Room: Conv. Ctr. A5 ..... Sat. 3:30 to 5:40 pm

#### Molecular-Level Sensing and Imaging with Nanoparticles

Session Chair: **Wolfgang J. Parak**, Ludwig-Maximilians-Univ. (Germany)

3:30 pm: **Biosensing and imaging with quantum dots** (*Invited Paper*), J. H. Rao, M. K. So, C. J. Xu, Yunxiang Zhang, Z. Y. Xia, F. Xiao, Stanford Univ. .... [6866-12]

4:00 pm: **Auto-antibodies profiling with nanocrystal-encoded microbeads for proteomics and clinical diagnostics of cancers and autoimmune diseases** (*Invited Paper*), Igor R. Nabiev, Univ. de Reims Champagne-Ardenne (France) ..... [6866-13]

4:30 pm: **Fluorescent and magnetic nanoparticles for multimodality imaging** (*Invited Paper*), W. Mulder, Mount Sinai School of Medicine ..... [6866-14]

5:00 pm: **Non-invasive in-vivo and multi-modal ex-vivo imaging of lipoproteins labeled with nanocrystals**, Oliver T. Bruns, Univ. Medical Ctr. Hamburg-Eppendorf (Germany); H. Ittrich, K. Peldschus, Univ. Hospital Hamburg-Eppendorf (Germany); M. G. Kaul, Univ. Medical Ctr. Hamburg-Eppendorf (Germany); M. Merkel, Univ. Hospital Hamburg-Eppendorf (Germany); R. Reimer, H. Hohenberg, Heinrich-Pette-Institute (Germany); U. I. Tromsdorf, Univ. Hamburg (Germany); M. Nikolic, Consultant (Germany); Horst Weller, Univ. Hamburg (Germany); Alexander Eychmüller, Technische Univ. Dresden (Germany); J. Heeren, Consultant (Germany); U. Beisiegel, Univ. Medical Ctr. Hamburg-Eppendorf (Germany) . . . . . [6866-15]

5:20 pm: **Quantum dots conjugated with hybrid DNA-antibody ligands for multiplexed molecular profiling**, Yun Xing, Stanford Univ.; Shuming Nie, Emory Univ. .... [6866-16]

## Sunday 20 January

### SESSION 5

Room: Conv. Ctr. A5 ..... Sun. 8:30 to 10:00 am

#### Applications of Colloidal Nanocrystals in Cell Biology I

Session Chair: **Maxime Dahan**, Ecole Normale Supérieure (France)

8:30 am: **Quantum dots-based probes conjugated to Annexin V for photostable apoptosis detection and imaging** (*Invited Paper*), Séverine Le Gac, Univ. Twente (Netherlands); I. Vermes, Hospital Group Twente (Netherlands); Albert van den Berg, Univ. Twente (Netherlands) . . . . . [6866-39]

9:00 am: **Effects of illumination power and wavelength and applied potential on quantum dot intermittency and photo-enhancement**, Jay L. Nadeau, McGill Univ. (Canada); Netta Cohen, Univ. of Leeds (United Kingdom); Samuel J. Clarke, Colin Heyes, McGill Univ. (Canada) . . . . [6866-17]

9:20 am: **Specific cellular delivery and intracellular fate of quantum dot-peptide and quantum dot-polymer nano-assemblies**, J. B. Delehanty III, I. L. Medintz, D. Farrell, T. Pons, Naval Research Lab.; F. M. Brunel, P. E. Dawson, The Scripps Research Institute; H. Mattoussi, Naval Research Lab. .... [6866-18]

# Conference 6866

9:40 am: **Adhesion of water-soluble peptidic CdSe/ZnS nanocrystals onto vesicles: from hybrid vesicles to a lamellar phase.** Aurelien Dif, Univ. de Rennes I (France); Maxime Dahan, Lab. Kastler Brossel (France); Franck Artzner, Valerie Marchi-Artzner, Univ. de Rennes I (France). . . . . [6866-19]

Coffee Break . . . . . 10:00 to 10:30 am

## SESSION 6

**Room: Conv. Ctr. A5 . . . . . Sun. 10:30 am to 12:00 pm**

### Applications of Colloidal Nanocrystals in Cell Biology II

*Session Chair: Sandra J. Rosenthal, Vanderbilt Univ.*

10:30 am: **Uptake of colloidal polyelectrolyte multilayer capsules by living cells.** A. M. Javier, P. del Pino, P. R. Gil, Philipps-Univ. Marburg (Germany); M. Bedard, Oliver Kreft, Andrei G. Skirtach, G. Sukhorukov, Max-Planck-Institut für Kolloid- und Grenzflächenforschung (Germany); Wolfgang J. Parak, Philipps-Univ. Marburg (Germany) . . . . . [6866-21]

10:50 am: **Flow-cytometric analysis of the viability of cultured HEK cells exposed to quantum dot nanoparticles.** Elba E. Serrano, Desarae Gutierrez, New Mexico State Univ.; Jennifer A. Hollingsworth, Claire Sanders, Los Alamos National Lab.; David R. Sultemeier, New Mexico State Univ. . . . . [6866-22]

11:10 am: **Tracking intracellular pathways of ligand-receptor quantum dot complexes.** Tania Q. Vu, S. S. Rajan, Hongyan Liu, A. Ardeshiri, Oregon Health & Science Univ. . . . . [6866-22]

11:30 am: **Dynamics of quantum dots in angiogenic blood vessels: a fluorescence correlation spectroscopy study** (*Invited Paper*), Aisling A. Clancy, David T. Cramb, Univ. of Calgary (Canada) . . . . . [6866-38]

Lunch/Exhibition Break . . . . . 12:00 to 1:10 pm

## SESSION 7

**Room: Conv. Ctr. A5 . . . . . Sun. 1:10 to 3:00 pm**

### Applications of Colloidal Quantum Dots in Cancer Diagnostics and Therapy

*Session Chair: Kenji Yamamoto, Tokyo Medical and Dental Univ. Graduate School of Medicine and International Medical Ctr. of Japan (Japan)*

1:10 pm: **Activatable quantum dot probes for optical molecular imaging of cancer** (*Invited Paper*), Rebekah A. Drezek, Jennifer L. West, N. Rohani, Vicki L. Colvin, Rice Univ. . . . . [6866-23]

1:40 pm: **EGF-conjugated near-infrared quantum dots as nanoprobes for in-vivo imaging of EGFR expression.** Parmeswaran Diagaradjane, Jacobo M. Orenstein-Cardona, Norman Colon, Amit Deorukhkar, Shujun Shentu, Norihito Kuno, David L. Schwartz, Juri Gelovani, Sunil Krishnan, The Univ. of Texas M.D. Anderson Cancer Ctr. . . . . [6866-24]

2:00 pm: **Peptide targeting of quantum dots to human breast cancer cells.** Emily Haglund, Mary-Margaret Seale, Lisa M. Reece, Christy L. Cooper, Deepika Dhawan, Jane Stewart, Jose Ramos-Vara, Donald Bergstrom, Deborah W. Knapp, James F. Leary, Purdue Univ. . . . . [6866-25]

2:20 pm: **The use of quantum dot-conjugated antibodies to study intracellular cancer biomarkers in living and fixed cells.** Jian Ling, Southwest Research Institute . . . . . [6866-26]

2:40 pm: **Colloidal II-VI semiconductor quantum dots and cancer cells: a investigation on interaction mechanisms.** Patricia M. A. Farias, Adriana Fontes, Beate S. Santos, Artur da Cunha, Univ. Federal de Pernambuco (Brazil); Vivaldo Moura-Neto, Jane F. Amaral, Univ. Federal do Rio de Janeiro (Brazil); Diego C. N. Silva, Antonio Castro-Neto, Univ. Federal de Pernambuco (Brazil); Carlos L. Cesar, Univ. Estadual de Campinas (Brazil) . . . . . [6866-27]

Coffee Break . . . . . 3:00 to 3:30 pm

## SESSION 8

**Room: Conv. Ctr. A5 . . . . . Sun. 3:30 to 5:10 pm**

### Applications of Colloidal Quantum Dots in Neuroscience and Radiation Detection

*Session Chair: Tania Q. Vu, Oregon Health & Science Univ.*

3:30 pm: **Optimizing protocols for imaging neural cells and tissues using functionalized quantum dots** (*Invited Paper*), S. Pathak, G. A. Silva, Univ. of California/San Diego . . . . . [6866-28]

4:00 pm: **Nanoscintillators for microscopic diagnostics of biological and medical objects and medical therapy** (*Invited Paper*), Nikolay V. Klassen, V. V. Kedrov, S. Z. Shmurak, I. M. Shmyt'ko, N. P. Kobelev, O. A. Krivko, E. A. Kudrenko, G. K. Strukova, Institute of Solid State Physics (Russia) . . . [6866-29]

4:30 pm: **Targeting the serotonin receptor with antagonist conjugated quantum dots.** Ian D. Tomlinson, Jerry Chang, Hideki Iwamoto, Michael R. Warner, Louis DeFelice, Randy D. Blakely, Sandra J. Rosenthal, Vanderbilt Univ. . . . . [6866-30]

4:50 pm: **Impact of lateral mobile synaptic AMPAR probed by QD tracking.** Martin Heine, Laurent Groc, Univ. Victor Segalen Bordeaux 2 (France); Brahim Lounis, Univ. Bordeaux I (France); Gavin Rumbaugh, Richard L. Huganir, Johns Hopkins Medical Institutions; Laurent Cognet, Univ. Bordeaux I (France); Daniel Choquet, Univ. Victor Segalen Bordeaux 2 (France) . . . . . [6866-31]

## Ocean Optics Young Investigator Award

**Room: Conv. Ctr. A5 . . . . . Sun. 4:50 to 5:00 pm**

*Session Chair: Marek Osirski, The Univ. of New Mexico*

Ocean Optics Young Investigator Award will be given for the best paper presented by a leading author who is either a graduate student or has graduated within less than five years of the paper submission date. The award consists of a \$1,000 cash prize. To be eligible, manuscripts of self-nominating authors must have been received by the due date.

## Monday 21 January

### POSTERS-Monday

**Room: Conv. Ctr. A5 . . . . . Mon. 6:00 to 7:30 pm**

*All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.*

*Poster presenters may post their poster papers Monday morning starting at 10:00 am in the Civic Auditorium Complex, and will need to remove their papers immediately following the poster session that evening. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.*

**Multiphoton optical properties of core-multishell quantum dots and its biointerfacing applications.** Yan Liu, Ping Chen, Lie Lin, Guoqing Tang, Nankai Univ. (China); Ying Fu, Hans Agren, Kungliga Tekniska Högskolan (Sweden) . . . . . [6866-32]

**Development of SERS substrates using nanoparticle-based printing inks.** Kambiz Pourrezaei, Som D. Tyagi, Manuel A. Figueroa, Samuel Park, Drexel Univ. . . . . [6866-33]

**From quantum dot single-biotinylation to produce limited nanostructures by streptavidin.** Cheng-An J. Lin, Chih-Hsien P. Li, Chung Yuan Christian Univ. (Taiwan); Ralph A. Sperling, Philipps-Univ. Marburg (Germany); Ting-Ya Yang, Ching-Yun Chen, Chung Yuan Christian Univ. (Taiwan); Jimmy K. Li, National Cheng Kung Univ. (Taiwan); Wolfgang J. Parak, Philipps-Univ. Marburg (Germany); Walter H. Chang, Chung Yuan Christian Univ. (Taiwan) . . . [6866-34]

**In-vivo imaging of tumor growth and development using quantum dots.** Nayoun Won, Jungsuk Choi, Songju Oh, Jiwon Bang, Yoomi Kim, Joonghyun Kim, Sungjee Kim, Pohang Univ. of Science and Technology (South Korea) . . . . . [6866-35]

**Evidence-based toxicity of probes.** Kouki Fujioka, International Medical Ctr. of Japan (Japan); Masaki Hiruoka, Tokyo Denki Univ. (Japan); Keisuke Sato, National Institute for Material Science (Japan); Noriyoshi Manabe, Akiyoshi Hoshino, International Medical Ctr. of Japan (Japan); Kenji Hirakuri, Tokyo Denki Univ. (Japan); Kenji Yamamoto, International Medical Ctr. of Japan (Japan) . . . . . [6866-36]



# Molecular Probes for Biomedical Applications II

*Conference Chairs:* **Samuel Achilefu**, Washington Univ. in St. Louis; **Darryl J. Bornhop**, Vanderbilt Univ.; **Ramesh Raghavachari**, U.S. Food and Drug Administration

*Program Committee:* **Gabor Patonay**, Georgia State Univ.; **Rex M. Bitner**, Promega Corp.; **Richard B. Dorshow**, Tyco Healthcare

## Monday 21 January

### POSTERS-Monday

**Room: Conv. Ctr. C2 . . . . . Mon. 6:00 to 7:30 pm**

*Session Chair:* **Samuel Achilefu**, Washington Univ. in St. Louis

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Monday morning starting at 10:00 am in the Civic Auditorium Complex, and will need to remove their papers immediately following the poster session that evening. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

**Nanocrystalline rare-earth oxides for use as a novel bioluminescent probe,** Kelly L. Nash, John B. Gruber, Dhiraj K. Sardar, The Univ. of Texas at San Antonio . . . . . [6867-24]

**Synthesis and characterisation of high-brightness silica nanoparticles for biosensor applications,** Robert I. Nooney, Brian D. MacCraith, Colette M. McDonagh, Ondrej Stranik, Dublin City Univ. (Ireland) . . . . . [6867-26]

## Tuesday 22 January

### SESSION 1

**Room: Conv. Ctr. C2 . . . . . Tues. 8:10 to 10:00 am**

#### Molecular Imaging and Therapy Strategies

*Session Chair:* **Samuel Achilefu**, Washington Univ. in St. Louis

8:10 am: **Keynote: Role of optical monitoring for therapeutic enhancement of PDT,** Tayyaba Hasan, Massachusetts General Hospital . . . . . [6867-01]

8:40 am: **Multiple excitation near-infrared spectral fluorescence imaging using organic fluorophores,** Hisataka Kobayashi M.D., Yoshinori Koyama, Tristan Barrett, Yukihiko Hama, Peter L. Choyke M.D., National Institutes of Health . . . . . [6867-02]

9:00 am: **Sensitive and selective tumor imaging with novel and highly activatable fluorescence strategies,** Yasuteru Urano, The Univ. of Tokyo (Japan) . . . . . [6867-03]

9:20 am: **Multifunctional dye for two-photon microscopy, MRI and photon activation therapy using synchrotron irradiation.,** Mathieu Maurin, Patrice L. Baldeck, Univ. Joseph Fourier (France); Ali Hayek, Frederic Bolze, Institut de Physique et Chimie des Matériaux de Strasbourg (France); Jean-François Nicoud, Univ. Louis Pasteur (France); Jean-Claude Vial, Univ. Joseph Fourier (France); Boudewijn P. J. van der Sanden, Institut National de la Santé et de la Recherche Médicale (France) . . . . . [6867-04]

9:40 am: **In vivo, optical molecular imaging of VEGF for monitoring and optimization of photodynamic therapy,** Sung K. Chang, Imran Rizvi, Nicolas Solban, Tayyaba Hasan, Massachusetts General Hospital . . . . . [6867-05]

Coffee Break . . . . . 10:00 am

### SESSION 2

**Room: Conv. Ctr. C2 . . . . . Tues. 10:20 am to 12:20 pm**

#### Optical Molecular Probes and Industry

*Session Chair:* **Richard B. Dorshow**, Covidien

10:20 am: **Development of fluorescent contrast agents for optical imaging,** Joy Kovar, Amy Schutz-Geschwender, LI-COR, Inc.; Melanie Simpson, Univ. of Nebraska; Xinshe Xu, William Volchek, LI-COR, Inc.; Eva M. Sevick-Muraca, Baylor College of Medicine; Michael Olive, LI-COR, Inc. . . . . [6867-06]

10:40 am: **Click chemistry for labeling and detection of biomolecules,** Kyle R. Gee, Brian Agnew, Molecular Probes, Inc. . . . . [6867-07]

11:00 am: **A targeted molecular probe for colorectal-cancer imaging,** Toril Attramadal, Roger Bjerker, Bard Indrevol, Astri Rogstad, Ragnar Bendiksen, Andrew J. Healey, Edwin W. Johannesen, GE Healthcare Bio-Sciences (Norway) . . . . . [6867-08]

11:20 am: **Imaging efficacy of a targeted imaging agent for fluorescence endoscopy,** Andrew J. Healey, Ragnar Bendiksen, Roger Bjerke, Toril Attramadal, Stein Waagene, Anne-Marie Hvoslef, Edwin W. Johannesen, GE Healthcare Bio-Sciences (Norway) . . . . . [6867-09]

11:40 am: **Fluorescence-enhanced europium complexes for the assessment of renal glomerular filtration rate,** Raghavan Rajagopalan, Lori K. Chinen, Karen P. Galen, Kah T. Kuan, Mary E. Dyszlewski, Covidien; Hiroaki Ozaki, Hiroaki Sawai, Gunma Univ. (Japan); Raghootama S. Pandurangi, Frederick G. Jacobs, Richard B. Dorshow, Covidien . . . . . [6867-10]

12:00 pm: **New optical probes for continuous monitoring of renal function,** William Neumann, Richard Dorshow, Amruta Poreddy, Raghavan Rajagopalan, John Freskos, Jeng-Jong Shieh, Karen Galen, Rick Fitch, Martin P. Debreczeny, Lori Chinen, Covidien . . . . . [6867-11]

Lunch/Exhibition Break . . . . . 12:20 pm

### SESSION 3

**Room: Conv. Ctr. C2 . . . . . Tues. 1:20 to 3:20 pm**

#### Nanomaterials

*Session Chair:* **Darryl J. Bornhop**, Vanderbilt Univ.

1:20 pm: **Electric-field directed fabrication of biosensor devices form nanoparticles,** Michael J. Heller, Univ. of California/San Diego . . . . . [6867-12]

1:40 pm: **Plasmon-resonant gold nanorods provide spectroscopic OCT contrast in excised human breast tumors,** Amy L. Oldenburg, Univ. of Illinois at Urbana-Champaign; Matthew N. Hansen, Alexander Wei, Purdue Univ.; Stephen A. Boppart M.D., Univ. of Illinois at Urbana-Champaign . . . . . [6867-13]

2:00 pm: **Magnetic protein microspheres as dynamic contrast agents for magnetomotive optical coherence tomography,** Freddy T. Nguyen, Elizabeth M. Dibbern, Eric J. Chaney, Amy L. Oldenburg, Robabeh Rezaeiipoor, Kenneth S. Suslick, Univ. of Illinois at Urbana-Champaign; Stephen A. Boppart, Univ. of Illinois at Urbana-Champaign and Carle Foundation Hospital and Carle Clinic Association . . . . . [6867-14]

2:20 pm: **Hybrid organic/II-VI quantum dots: highly luminescent nanostructures for bioimaging,** Patricia M. Farias, Beate S. Santos, Adriana Fontes, Claudilene R. Chaves, Regina C. B. Q.Figueiredo, Ricardo C. Ferreira, Univ. Federal de Pernambuco (Brazil) . . . . . [6867-15]

2:40 pm: **Luminescent silica nanoparticles: new dyes and chemistries (Presentation Only),** Erik Herz, Andrew Burns, Ulrich Wiesner, Cornell Univ. . . . . [6867-16]

3:00 pm: **Nanoparticle-assisted optical molecular imaging (NAOMI) using biodegradable nanoparticles,** Dirk J. Faber, Univ. van Amsterdam (Netherlands); D. M. de Bruin, Massachusetts General Hospital; Maurice C. G. Aalders, Frank D. Verbraak, Ton G. C. van Leeuwen, Univ. van Amsterdam (Netherlands) . . . . . [6867-17]

Coffee Break . . . . . 3:20 pm

# Conference 6867

## SESSION 4

Room: Conv. Ctr. C2 ..... Tues. 3:40 to 5:40 pm

### Molecular Sensors and Methods

*Session Chair: Ramesh Raghavachari,*  
U.S. Food and Drug Administration

3:40 pm: **Fluorescent lifetime of near infrared dyes for measuring micropolarities in serum albumin**, Mikhail Berezin, Hyeran Lee, Walter J. Akers, Gregory Nikiforovich, Samuel Achilefu, Washington Univ. in St. Louis ..... [6867-18]

4:00 pm: **Spectroscopy of pyridone/hydroxypyridine tautomerization mechanisms in N-heterocyclic systems and their applications as potential biological probes**, Osama K. Abou-Zied, Othman I. K.Al-Shihi, Sultan Qaboos Univ. (Oman) ..... [6867-19]

4:20 pm: **Live cell imaging of mRNA expression using molecular beacons**, Wonjong Rhee, Georgia Institute of Technology; Hanjoong Jo, Emory Univ.; Gang Bao, Georgia Institute of Technology ..... [6867-20]

4:40 pm: **Real-time observation of DNA repair: 2-aminopurine as a molecular probe**, Rajagopal Krishnan, Dennis H. Oh, Univ. of California/San Francisco ..... [6867-21]

5:00 pm: **Smart probes for sensitive and specific identification of single nucleic polymorphism in PCR amplicons of Mycobacterium tuberculosis using single-molecule fluorescence spectroscopy**, Achim Friedrich, Joerg D. Hoheisel, Deutsches Krebsforschungszentrum (Germany); Markus Sauer, Univ. Bielefeld (Germany); Jens-Peter Knemeyer, Deutsches Krebsforschungszentrum (Germany); Nicole Marme, Ruprecht-Karls-Univ. Heidelberg (Germany)[6867-22]

5:20 pm: **Imaging elastic and collagen fibers with sulforhodamine B and second-harmonic generation**, Clement Ricard, Institut National de la Santé et de la Recherche Médicale (France); Jean-Claude Vial, Julien Douady, Univ. Joseph Fourier (France); Boudewijn P. J.van der Sanden, Institut National de la Santé et de la Recherche Médicale (France). ..... [6867-23]

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# Small Animal Whole-Body Optical Imaging Based on Genetically Engineered Probes

Conference Chair: **Alexander Pavlovich Savitsky**, A.N. Bach Institute of Biochemistry (Russia); **Robert E Campbell**, Univ. of Alberta (Canada) Conference Co-Chair: **Robert M. Hoffman**, AntiCancer, Inc.; **Jin Zhang**, Johns Hopkins Medical Institutions

Program Committee: **Lubov Yu. Brovko**, Univ. of Guelph (Canada); **Eiji Kobayashi**, Jichi Medical Univ.; **Qingming Luo**, Huazhong Univ. of Science and Technology (China)

## Monday 21 January

### POSTERS-Monday

Room: Conv. Ctr. L ..... Mon. 6:00 to 7:30 pm

Session Chair: **Alexander Savitsky**, A.N. Bach Institute of Biochemistry (Russia)

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Monday morning starting at 10:00 am in the Civic Auditorium Complex, and will need to remove their papers immediately following the poster session that evening. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

**Dual chase system using GFP/Luc double-Tg rats :Fate of the transplanted bone marrow cells after intra-bone marrow-bone marrow transplantation**, Kotaro Kai, Tokyo Women's Medical Univ. (Japan) and Jichii Medical School (Japan); Satoshi Teraoka, Tokyo Women's Medical Univ. (Japan); Yasushi Adachi, Susumu Ikehara, Kansai Medical Univ. (Japan); Takashi Murakami, Eiji Kobayashi, Jichi Medical Univ. (Japan) ..... [6868-26]

**Detecting and comparing the caspase-3 activation process during anticancer drug-induced tumor cells apoptosis**, Zhihong Zhang, Qingming Luo, Xiao Li, Huazhong Univ. of Science and Technology (China) ..... [6868-27]

**In-vivo and in-vitro optical imaging of ACC-M tumor cells killed by HSV-tk/GCV system**, Zhihong Zhang, Liang Wang, Qingming Luo, Huazhong Univ. of Science and Technology (China) ..... [6868-28]

**Detection of caspases-3 activation by a novel FRET probe with low sensitivity to H+**, Zhihong Zhang, Jinling Lu, Qingming Luo, Huazhong Univ. of Science and Technology (China) ..... [6868-29]

## Tuesday 22 January

### SESSION 1

Room: Conv. Ctr. L ..... Tues. 8:00 to 9:10 am

#### Spectroscopy of Fluorescent Proteins

Session Chairs: **Alexander Savitsky**, A.N. Bach Institute of Biochemistry (Russia); **Qingming Luo**, Huazhong Univ. of Science and Technology (China)

8:00 am: **Single-molecule biology in living cells (Invited Paper)**, Sunney Xie, Harvard Univ. .... [6868-01]

8:25 am: **Strong resonance enhancement of two-photon absorption in fluorescent proteins**, Mikhail A. Drobizhev, Nikolay S. Makarov, Aleksander Rebane, Thomas E. Hughes, Montana State Univ./Bozeman ..... [6868-02]

8:40 am: **Computational approaches in modeling spectra of biological chromophores**, Alexander Nemukhin, M.V. Lomonosov Moscow State Univ. (Russia) and N.M. Emanuel Institute of Biochemical Physics, Russian Academy of Sciences (Russia); Bella Grigorenko, Anastasia Bochenkova, Ksenia Bravaya, M.V. Lomonosov Moscow State Univ. (Russia); Alexander Savitsky, A.N. Bach Institute of Biochemistry (Russia) ..... [6868-03]

8:55 am: **Simulations on the kindling mechanism of the asFP595 fluorescent protein**, Bella Grigorenko, Alexander Nemukhin, M.V. Lomonosov Moscow State Univ. (Russia); Alexander Savitsky, A.N. Bach Institute of Biochemistry (Russia) ..... [6868-04]

### SESSION 2

Room: Conv. Ctr. L ..... Tues. 9:10 to 11:40 am

#### Development and Application of Indicators for the Imaging of Biochemistry In Live Cells

Session Chairs: **Robert E. Campbell**, Univ. of Alberta (Canada); **Jin Zhang**, Johns Hopkins Univ.

9:10 am: **Exploring the conformational space of FRET biosensors for improved designs**, Kevin Truong, Elizabeth Pham, Univ. of Toronto (Canada) ..... [6868-05]

9:25 am: **Genetically encoded sensors for calcium and zinc**, Amy E. Palmer, Univ. of Colorado at Boulder. .... [6868-06]

9:40 am: **In-vivo functional neuroimaging of chemosensory neurocircuit in C.elegans**, Hiroshi Suzuki, Univ. of Toronto (Canada); Rex A. Kerr, Salk Institute for Biological Studies; Laura Bianchi, Univ. of Miami; Monica Driscoll, Rutgers Univ.; William Schafer, Univ. of Cambridge (United Kingdom); Tod Thiele, Shawn Lockery, Univ. of Oregon ..... [6868-07]

9:55 am: **Dynamic visualization of signaling activities in living cells**, Qiang Ni, Michael D. Allen, Lisa M. DiPilato, Jin Zhang, Johns Hopkins Univ. [6868-08]

Coffee Break ..... 10:10 to 10:30 am

10:30 am: **Visualizing Src activities by FRET**, Yingxiao Wang, Univ. of Illinois at Urbana-Champaign and University of California, San Diego; Shu Chien, Univ. of California/San Diego ..... [6868-09]

10:45 am: **Caspase-3-independent pathways proceeding in bystander effect of HSV-tk/GCV system**, Zhihong Zhang, Juqiang Lin, Qingming Luo, Huazhong Univ. of Science and Technology (China) ..... [6868-10]

11:00 am: **Searching the fluorescent protein color palette for new FRET pairs (Invited Paper)**, Michael W. Davidson, Kristin L. Hazelwood, John D. Griffin, Anna P. Ozarowska, Patrice N. Worthy, Scott G. Olenych, Amy Guan, Florida State Univ. .... [6868-11]

11:25 am: **New genetically encoded fluorophores for multicolor live-cell imaging**, Hui-wang Ai, Robert E. Campbell, Univ. of Alberta (Canada) [6868-13]

### SESSION 3

Room: Conv. Ctr. L ..... Tues. 11:40 am to 12:50 pm

#### Small Animal Whole Body Imaging I

Session Chairs: **Robert M. Hoffman**, AntiCancer, Inc.; **Eiji Kobayashi**, Jichi Medical Univ. (Japan)

11:40 am: **Use of GFP for in vivo imaging: concepts and misconceptions (Invited Paper)**, Robert M. Hoffman, AntiCancer, Inc. .... [6868-12]

12:05 pm: **Use of a telomerase-specific replication-competent adenovirus expressing GFP (OBP-401) to label tumor cells in vivo for surgical navigation**, Hiroyuki Kishimoto, Ming Zhao, Katsuhiko Hayashi, AntiCancer, Inc.; Yasuo Urata, Oncolys BioPharma Inc. (Japan); Toshiyoshi Fujiwara, Kanazawa Univ. (Japan); Michael Bouvet, Univ. of California/San Diego; Robert M. Hoffman, AntiCancer, Inc. .... [6868-14]

12:20 pm: **Non-invasive in vivo sub cellular multicolor imaging of the tumor microenvironment and drug response in real time**, Meng Yang, Ping Jiang, AntiCancer, Inc.; Manal Al-Zaid, Univ. of California/San Diego; Robert M. Hoffman, AntiCancer, Inc. .... [6868-15]

12:35 pm: **Optical imaging of RNAi-mediated silencing of cancer**, Takahiro Ochiya, National Cancer Ctr. (Japan) ..... [6868-16]

Lunch/Exhibition Break ..... 12:50 to 2:00 pm

# Conference 6868

## SESSION 4

Room: Conv. Ctr. L ..... Tues. 2:00 to 4:35 pm

### Small Animal Whole Body Imaging II

Session Chairs: **Robert M. Hoffman**, AntiCancer, Inc.;  
**Eiji Kobayashi**, Jichi Medical Univ. (Japan)

2:00 pm: **Pretreatment with Cyclophosphamide increases intravascular proliferation of HT1080 human fibrosarcoma cells in nude mice**, Kensuke Yamauchi, Kanazawa Univ. (Japan); Meng Yang, Katsuhiko Hayashi, Ping Jiang, Mingxu Xu, AntiCancer, Inc.; Norio Yamamoto, Hiroyuki Tsuchiya, Katsuro Tomita, Kanazawa Univ. (Japan); Abdool R. Moossa, Michael Bouvet, Univ. of California/San Diego; Robert M. Hoffman, AntiCancer, Inc. .... [6868-17]

2:15 pm: **Multi-color imaging of intralymphatic pancreatic-cancer-cell trafficking using red fluorescent protein-labeled cancer cells and green fluorescent monoclonal anti-LYVE-1 antibody**, Michele McElroy, Univ. of California/San Diego; Katsuhiko Hayashi, AntiCancer, Inc.; Sharmeela Kaushal, Univ. of California/San Diego; Robert M. Hoffman, AntiCancer, Inc.; Michael Bouvet, Univ. of California/San Diego. .... [6868-18]

2:30 pm: **Direct targeting of lymph node metastasis of pancreatic cancer with a tumor-selective strain of Salmonella typhimurium**, Katsuhiko Hayashi, Ming Zhao, AntiCancer, Inc.; Kensuke Yamauchi, Norio Yamamoto, Hiroyuki Tsuchiya, Katsuro Tomita, Kanazawa Univ. (Japan); Robert M. Hoffman, AntiCancer, Inc. .... [6868-19]

2:45 pm: **In-vivo bioimaging of rats using photonics: fate of the injected bone-marrow derived cells**, Eiji Kobayashi M.D., Jichi Medical Univ. (Japan). .... [6868-20]

Coffee Break ..... 3:00 to 3:20 pm

3:20 pm: **Effects of different fixatives on red-fluorescent intensity**, Eiji Kobayashi M.D., Yuki Sato M.D., Jichi Medical Univ. (Japan) ..... [6868-21]

3:35 pm: **The use of fluorescence probes to investigate molecular and cellular mechanisms of cancer spread in living animals**, David Tarin, Univ. of California/San Diego ..... [6868-22]

3:50 pm: **Fluorescence molecular-tomography reconstruction with a priori anatomical information**, Lu Zhou, Birsan Yazici, Rensselaer Polytechnic Institute; Vasilis Ntziachristos, Massachusetts General Hospital ..... [6868-23]

4:05 pm: **Fluorescence diffuse tomography setup with single source-detector pair for detection of RFP-expressed tumors in small animals**, Ilya V. Turchin D.V.M., Institute of Applied Physics (Russia); Alexander Savitsky, A.N. Bach Institute of Biochemistry (Russia); Vladislav A. Kamensky, Anna G. Orlova, Vladimir Plehanov, Mikhail Kleshnin, Ilya I. Fiks, Marina Shirmanova, Institute of Applied Physics (Russia) ..... [6868-24]

4:20 pm: **Spectral imager-scanner for in vivo detection of fluorescent proteins**, Victor N. Bagratashvili, Institute of Laser and Information Technologies (Russia) ..... [6868-25]

### *Don't miss the weekend* **Biomedical Optics Exhibition**

*San Jose Convention Center, Exhibition Hall 1*

Saturday 19 January ..... 1:00 to 5:00 pm

Sunday 20 January ..... 10:00 am to 4:00 pm

# Plasmonics in Biology and Medicine V

Conference Chair: **Tuan Vo-Dinh**, Duke Univ.; **Joseph R. Lakowicz**, Univ. of Maryland/Baltimore

Program Committee: **Claude Boccara**, École Supérieure de Physique et de Chimie Industrielles (France); **Bruce S. Dunn**, UCLA; **Christopher D. Geddes**, Univ. of Maryland/Baltimore; **Zygmunt Karol Gryczynski**, Univ. of North Texas; **Naomi J. Halas**, Rice Univ.; **Boris Mizaikoff**, Georgia Institute of Technology; **Shuming Nie**, Emory Univ.; **Ali Serpengüzel**, Koç Univ. (Turkey); **Weihong Tan**, Univ. of Florida; **Andrew Taton**, Univ. of Minnesota; **Richard P. Van Duyne**, Northwestern Univ.; **Jeffrey I. Zink**, UCLA

## Monday 21 January

### SESSION 1

Room: Conv. Ctr. B2 ..... Mon. 8:50 to 10:10 am

#### Plasmonics and SERS

Session Chair: **Tuan Vo-Dinh**, Duke Univ.

8:50 am: **Surface-enhanced Raman spectroscopy on a surface plasmon resonance biosensor platform for gene diagnostics**, Wu Yuan, Ho-Pui Ho, Y. K. Suen, Siu-Kai Kong, Chinlon Lin, The Chinese Univ. of Hong Kong (Hong Kong China); Paras N. Prasad, Univ. at Buffalo ..... [6869-01]

9:10 am: **Multiplex detection of biomarker mRNA for breast cancer using plasmonics nanoprobes**, Hsin-Neng Wang, Fei Yan, Yan Zhang, Tuan Vo-Dinh, Duke Univ. and Consultant ..... [6869-02]

9:30 am: **A surface-enhanced Raman spectroscopy platform based on nanoshells for detection of  $\beta$ -Amyloid**, Hope T. Beier, Texas A&M Univ.; Christopher B. Cowan, Univ. of Maryland/Baltimore County; Theresa A. Good, Univ. of Maryland/Baltimore; Gerard L. CotÁ(c), Texas A&M Univ. ... [6869-03]

9:50 am: **A specially modified surface-enhanced Raman spectroscopy (SERS) substrate for biomedical applications**, Clement Yuen, Wei Zheng, Zhi W. Huang, National Univ. of Singapore (Singapore) ..... [6869-04]

Coffee Break ..... 10:10 to 10:40 am

### SESSION 2

Room: Conv. Ctr. B2 ..... Mon. 10:40 am to 12:00 pm

#### Plasmonics Biosensing

Session Chair: **Tuan Vo-Dinh**, Duke Univ.

10:40 am: **Highly sensitive single-beam phase-sensitive surface plasmon resonance biosensor with a wide dynamic range**, Shu-Yuen Wu, Ho-Pui Ho, The Chinese Univ. of Hong Kong (Hong Kong China) ..... [6869-05]

11:00 am: **Rapid DNA sensing by laser-induced gold-nanoparticle heating**, Joachim A. Stehr, Calin Hrelescu, Ludwig-Maximilians-Univ. München (Germany); Ralph A. Sperling, Philipps-Univ. Marburg (Germany) and Ludwig-Maximilians-Univ. München (Germany); Gunnar Raschke, Ludwig-Maximilians-Univ. München (Germany); Michael Wunderlich, Alfons Nichtl, Dieter Heindl, Konrad Kuerzinger, Roche Diagnostics GmbH (Germany); Wolfgang J. Parak, Philipps-Univ. Marburg (Germany) and Ludwig-Maximilians-Univ. München (Germany); Thomas A. Klar, Jochen Feldmann, Ludwig-Maximilians-Univ. München (Germany) ..... [6869-06]

11:20 am: **Plasmon-resonance coupling for monitoring membrane-receptor dynamics in living cells**, Jesse S. Aaron, The Univ. of Texas at Austin [6869-07]

11:40 am: **Highly-sensitive Surface Plasmon Resonance biosensing scheme employing phase properties of light**, Sergiy V. Patskovsky, Mathieu Maisonneuve, Michel Meunier, Andrei V. Kabashin, Ecole Polytechnique de Montréal (Canada) ..... [6869-08]

Lunch/Exhibition Break ..... 12:00 to 1:20 pm

### SESSION 3

Room: Conv. Ctr. B2 ..... Mon. 1:20 to 2:40 pm

#### Plasmonics Detection and Imaging

Session Chair: **Michael D. Gerhold**, U.S. Army Research Office

1:20 pm: **Single-molecule spectroscopy of semiconductor nanocrystals on plasmonic nanostructures**, Krishanu Ray, Univ. of Maryland School of Medicine; Ramachandram Badugu, Joseph R. Lakowicz, Univ. of Maryland/Baltimore ..... [6869-09]

1:40 pm: **Enhancement of the local electric field in the vicinity of a metal nanoparticle lying on a semi-infinite substrate**, Jungmee Kim, San José State Univ.; Leonard E. Jusinski, Sandia National Labs.; Karamjeet Arya, San José State Univ. .... [6869-10]

2:00 pm: **Two-photon luminescence imaging of biological samples with gold nanorods as contrast agents**, Nicholas J. Durr, Benjamin A. Holfeld, Timothy Larson, Danielle K. Smith, Brian A. Korgel, The Univ. of Texas at Austin; Konstantin Sokolov, The Univ. of Texas M.D. Anderson Cancer Ctr.; Adela Ben-Yakar, The Univ. of Texas at Austin ..... [6869-11]

2:20 pm: **Effective cancer laser-therapy design through the integration of nanotechnology and computational treatment planning models**, Marissa N. Rylander, Virginia Polytechnic Institute and State Univ. .... [6869-12]

### SESSION 4

Room: Conv. Ctr. B2 ..... Mon. 2:40 to 5:10 pm

#### Plasmonics Structures

Session Chair: **Michael D. Gerhold**, U.S. Army Research Office

2:40 pm: **Use of aluminum films as substrates for enhanced fluorescence in the ultraviolet-blue spectral region**, Mustafa H. Chowdhury, Univ. of Maryland Medical Ctr.; Krishanu Ray, Univ. of Maryland School of Medicine; Joseph R. Lakowicz, Univ. of Maryland/Baltimore ..... [6869-13]

3:00 pm: **Enhancing surface plasmon detection of biomolecular interactions through use of nanostructured interfaces**, Sivashankar Krishnamoorthy, Michael Himmelhaus, Fujirebio Inc. (Japan) ..... [6869-14]

Coffee Break ..... 3:20 to 3:50 pm

3:50 pm: **Nanoengineered surface-enhanced Raman scattering (SERS) substrates with patterned structures on the distal end of optical fibers**, Anuj Dhawan, Fei Yan, Yan Zhang, Duke Univ.; Michael Gerhold, U.S. Army Research Office; Tuan Vo-Dinh, Duke Univ. .... [6869-15]

4:10 pm: **Phenomenology of optical scattering from plasmonic aggregates for application to biological imaging and clinical therapeutics**, Kort Travis, Jesse Aaron, Nathan Harrison, The Univ. of Texas at Austin; Konstantin V. Sokolov, The Univ. of Texas M.D. Anderson Cancer Ctr. .... [6869-16]

4:30 pm: **Interaction of nanoparticles with localized surface plasmonic fields induced by periodic nanowires**, Seyoung Moon, Soon J. Yoon, Donghyun Kim, Hosub Lee, Kangtaek Lee, Yonsei Univ. (South Korea) [6869-17]

4:50 pm: **Nano-void plasmons for reproducible efficient SERS in mass screening applications**, Jeremy J. Baumberg, Nic Perney, Robin Cole, Sumeet Mahajan, Andrea Russell, Fabrice Birembaut, Martin Charlton, Univ. of Southampton (United Kingdom); Jacob Filik, Nicholas Stone, Gloucestershire Royal Hospital (United Kingdom); Philip N. Bartlett, Univ. of Southampton (United Kingdom) ..... [6869-18]

# Conference 6869

## POSTERS-Monday

Room: Conv. Ctr. B2 . . . . . Mon. 6:00 to 7:30 pm

Session Chair: Tuan Vo-Dinh, Duke Univ.

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**Sensitivity enhancement of a localized surface plasmon resonance biosensor using periodic nanowires**, Soon J. Yoon, Donghyun Kim, Yonsei Univ. (South Korea); Kyung M. Byun, Sung J. Kim, Seoul National Univ. of Technology (South Korea) . . . . . [6869-28]

**Fluorescence enhancement and focal volume reduction observed in FIB-milled c-shaped nano-apertures**, Yin Yuen, Stanford Univ.; Samantha Fore, Thomas Huser, Univ. of California/Davis; Lambertus Hesselink, Stanford Univ. . . . . [6869-29]

**Gold nanoparticles influence on functional activity thrombocytes in vitro**, Georgy G. Akchurin, Jr., Garif G. Akchurin, Saratov State Univ. (Russia); Vyacheslav F. Kirichuk, Alexej N. Ivanov, Saratov State Medical Univ. (Russia) . . . . . [6869-31]

**In-vitro detection of  $\beta$ -Amyloid using a nanofluidic channel SERS-based biosensor**, Melodie E. Benford, I-Hsien Chou, Hope T. Beier, Maio Wang, Jun Kameoka, Texas A&M Univ.; Theresa Good, Univ. of Maryland/Baltimore; Gerard L. Cote, Texas A&M Univ. . . . . [6869-32]

**Infrared spectroscopic imaging with high spatial resolution and high sensitivity**, Valdas Sablinskas, Vilnius Univ. (Lithuania) and Technische Univ. Dresden (Germany); Justinas Ceponkus, Vilnius Univ. (Lithuania); Gerald Steiner, Reiner Salzer, Technische Univ. Dresden (Germany) . . . . . [6869-33]

**Theoretical modeling of plasmon resonances: effect of aspect ratio in spheroidal nanoshells**, Stephen J. Norton, Tuan Vo-Dinh, Duke Univ. [6869-34]

**Measurement and monitoring of production of proteins during cell culture using plasmonic structures**, Henryk Szmecinski, Derek Smith, Michael Hanson, Govind Rao, Joseph R. Lakowicz, Univ. of Maryland/Baltimore County . . . . . [6869-35]

## Tuesday 22 January

### SESSION 5

Room: Conv. Ctr. B2 . . . . . Tues. 8:50 to 10:10 am

#### Plasmonics and Luminescence

Session Chair: Joseph R. Lakowicz, Univ. of Maryland/Baltimore

8:50 am: **Three-dimensional tracking of gold nanoparticles using multiphoton luminescence**, Dominik Marti, Patrick C. Stoller, Michael Ruosch, Martin Frenz, Jaro Ricka, Univ. Bern (Switzerland) . . . . . [6869-19]

9:10 am: **Three-dimensional microscopy of gold nanoshells in tumors using two-photon induced photoluminescence**, Jaesook Park, Arnold D. Estrada, The Univ. of Texas at Austin; Jon A. Schwartz, J. D. Payne, Nanospectra Biosciences, Inc.; Andrew K. Dunn, James W. Tunnell, The Univ. of Texas at Austin . . . . . [6869-20]

9:30 am: **FRET for Biomedical Sensor Applications: The impact of metal nanoparticles on the distance-dependence**, Aoibhéann M. Bird, Ondrej Stranik, Brian D. MacCraith, Colette McDonagh, Dublin City Univ. (Ireland) . . . . . [6869-21]

9:50 am: **Modelling electrodynamic interaction of single fluorescing molecules with complex metallo-dielectric nano-structures**, Joerg Enderlein, Eberhard Karls Univ. Tübingen (Germany) . . . . . [6869-22]

Coffee Break . . . . . 10:10 to 10:40 am

## SESSION 6

Room: Conv. Ctr. B2 . . . . . Tues. 10:40 am to 12:20 pm

#### Plasmonics Applications

Session Chair: Joseph R. Lakowicz, Univ. of Maryland/Baltimore

10:40 am: **From plasmon-field design to biomedical applications: toward complete SERS solutions**, Caterina M. Netti, Karen Todd, Mesophotonics Ltd. (United Kingdom); Karen Faulds, Duncan Graham, Ewen W. Smith, Univ. of Strathclyde (United Kingdom) . . . . . [6869-23]

11:00 am: **Plasmonic laser nano-ablation of cell membranes and solid materials**, Daniel S. Eversole, Myoung-Kyu Lee, The Univ. of Texas at Austin; Boris Luk'yanchuk, Data Storage Institute; Adela Ben-Yakar, The Univ. of Texas at Austin . . . . . [6869-24]

11:20 am: **Goos-Hänchen surface plasmon resonance sensor and TTS application**, Xiaobo Yin, Lambertus Hesselink, Stanford Univ. . . . . [6869-25]

11:40 am: **Optical biochip platform with a plasmonic structure**, Michal Trnavsky, Brian D. MacCraith, Dublin City Univ. (Ireland) . . . . . [6869-27]

12:00 pm: **Playing with plasmons, laser synthesis, and polymer-induced aggregation of metallic alloys nanoparticles**, Sébastien Besner, Ecole Polytechnique de Montréal (Canada); Françoise M. Winnik, Univ. de Montréal (Canada); Andrei V. Kabashin, Michel Meunier, Ecole Polytechnique de Montréal (Canada) . . . . . [6869-26]

# Design and Performance Validation of Phantoms Used in Conjunction with Optical Measurements of Tissue

Conference Chair: **Robert J. Nordstrom**, National Institutes of Health

Program Committee: **Anant Agrawal**, U.S. Food and Drug Administration; **Mark Faupel**, SpectRx, Inc.; **Gerald T. Fraser**, National Institute of Standards and Technology; **William W. Mantulin**, Univ. of California/Irvine; **Mary-Ann Mycek**, Univ. of Michigan; **Brian Pogue**, Dartmouth College; **Scott A. Prahl**, Providence St. Vincent Medical Ctr.; **Lihong V. Wang**, Washington Univ. in St. Louis

## Saturday 19 January

### SESSION 1

Room: Conv. Ctr. L ..... Sat. 8:50 to 10:10 am

#### Dynamic Phantoms and Engineered Tissue

Session Chairs: **Gerald T. Fraser**, National Institute of Standards and Technology; **Robert J. Nordstrom**, National Institutes of Health

8:50 am: **Validation of near infrared spectroscopic (NIRS) imaging using programmable phantoms** (*Invited Paper*), Randall L. Barbour, Rehman Ansari, Rabah Al Abdi, Harry L. Graber, Yong Xu, SUNY/Downstate Medical Ctr.; Yaling Pei, NIRx Medical Technologies, LLC. .... [6870-01]

9:20 am: **Dynamically programmable electronic phantoms**, Steven W. Brown, David W. Allen, Maritoni Litorja, National Institute of Standards and Technology ..... [6870-03]

9:40 am: **Structural and biochemical characterization of engineered tissue using FTIR spectroscopic imaging** (*Invited Paper*), Rohit Bhargava, Rong Kong, Univ. of Illinois at Urbana-Champaign ..... [6870-04]

Coffee Break ..... 10:10 am

### SESSION 2

Room: Conv. Ctr. L ..... Sat. 10:40 am to 12:00 pm

#### Design and Validation of Phantoms

Session Chairs: **William W. Mantulin**, Univ. of California/Irvine; **Robert J. Nordstrom**, National Institutes of Health

10:40 am: **Regulatory perspectives and research activities at the FDA on the use of phantoms with diagnostic devices**, Anant Agrawal, Marios A. Gavrielides, Sandy Weininger, Kish Chakrabarti, Joshua Pifer, U.S. Food and Drug Administration. .... [6870-05]

11:00 am: **Turbid-polyurethane phantoms for microscopy**, Amanda Dayton, Scott Prahl, Oregon Health & Science Univ. .... [6870-06]

11:20 am: **Fabrication and characterization of silicone-based, deformable tissue phantoms with tunable optical properties in the visible and near-infrared domain**, Frederick R. Ayers, Jr., Danny Kuo, David Cuccia, Anthony Durkin, Beckman Laser Institute and Medical Clinic. .... [6870-07]

11:40 am: **Gel phantom in selective laser phototherapy**, Yichao Chen, Ganraj Kumar, Jennifer Ellis, Univ. of Central Oklahoma; Feng Wu, Chongqing Medical Univ.; Hong Liu, Univ. of Oklahoma; Rheel A. Towner, Oklahoma Medical Research Foundation; Wei R. Chen, Univ. of Central Oklahoma ..... [6870-08]

Lunch/Exhibition Break ..... 12:00 pm

### SESSION 3

Room: Conv. Ctr. L ..... Sat. 1:00 to 3:30 pm

#### Phantoms for OCT and Fluorescence Measurements

Session Chairs: **Mary-Ann Mycek**, Univ. of Michigan; **Brian W. Pogue**, Dartmouth College

1:00 pm: **Phantom development for optical fluorescence mammography** (*Invited Paper*), Michiel van Beek, Leon Bakker, Philips Research Labs. (Netherlands); Bernhard J. Brendel, Philips Research Labs. (Germany); Henk Compen, Rik Harbers, Philips Research Labs. (Netherlands); Thomas Köhler, Philips Research Labs. (Germany); Kai Licha, Bayer Schering Pharma AG (Germany); Martin B. van der Mark, Philips Research Labs. (Netherlands); Rami Nachabe, Philips Medical Systems (Netherlands); Tim Nielsen, Philips Research Labs. (Germany); Martin Pessel, Bayer Schering Pharma AG (Germany); Marjolein van der Voort, Philips Research Labs. (Netherlands); Ronny Ziegler, Philips Research Labs. (Germany) ..... [6870-09]

1:30 pm: **Deformable and durable optical phantoms with controlled number of scatterers**, Charles-Etienne Bisillon, Industrial Materials Institute (Canada); Marie-Michèle Lanthier, Guy Lamouche, Industrial Materials Institute (Canada) and Ecole Polytechnique de Montréal (Canada); Daniel Lévesque, Industrial Materials Institute (Canada); Romain Maciejko, Ecole Polytechnique de Montréal (Canada); Jean-Pierre Monchal, Industrial Materials Institute (Canada) ..... [6870-10]

1:50 pm: **Optical phantom development for NAOMI applications**, Daniel M. de Bruin, Dirk J. Faber, Maurice C. G. Aalders, Jr., Ton G. C. van Leeuwen, Univ. van Amsterdam (Netherlands) ..... [6870-11]

2:10 pm: **A calibrated tissue phantom for small animal fluorescence imaging**, Silas J. Leavesley, J. Paul Robinson, Purdue Univ. .... [6870-12]

2:30 pm: **Novel tissue phantom for testing a dual-modality tissue diagnostic system: time-resolved fluorescence spectroscopy and high-frequency ultrasound**, Yang Sun, Vincent Liao, Univ. of California/Davis; Yinghua H. Sun, Univ. of California/Davis and Ctr. for Biophotonics Science and Technology; Jesung Park, Univ. of California/Davis; Laura Marcu, Univ. of California/Davis and Ctr. for Biophotonics Science and Technology ..... [6870-13]

2:50 pm: **An accurate homogenized tissue phantom for broad-spectrum autofluorescence studies: a tool for optimizing quantum dot based contrast agents**, Mathieu Roy, Brian C. Wilson, Princess Margaret Hospital (Canada) ..... [6870-14]

3:10 pm: **Phantoms for polarized-light exhibiting controllable scattering, birefringence, and optical activity**, Michael F. Wood, Nirmalya Gosh, Xinxin Guo, Alex Vitkin, Univ. of Toronto (Canada) ..... [6870-15]

Coffee Break ..... 3:30 pm

### SESSION 4

Room: Conv. Ctr. L ..... Sat. 4:00 to 5:20 pm

#### Scattering Simulations in Phantoms

Session Chairs: **Scott Prahl**, Providence St. Vincent Medical Ctr.; **Anant Agrawal**, U.S. Food and Drug Administration

4:00 pm: **Evaluating optical properties of isolated biological scatterers from confocal and low-coherence images**, David Levitz, Ravikant Samatham, Monica T. Hinds, Steven L. Jacques, Oregon Health & Science Univ. .... [6870-16]

4:20 pm: **Comparison of microscopic heterogeneity and macroscopic homogeneity of tissue phantoms by reflectance-mode confocal laser scanning microscopy**, Ravikant Samatham, David Levitz, Yongji Fu, Niloy Choudhury, Steven L. Jacques, Oregon Health & Science Univ. .... [6870-17]

4:40 pm: **Phantom Validation of an Imaging Elastic Scattering Spectroscopy Endoscope Model**, Erik H. Lindsley, Daniel L. Farkas, Cedars-Sinai Medical Ctr. .... [6870-18]

5:00 pm: **Comparison of time domain, frequency domain, and continuous-wave methods for the accurate determination of bulk optical properties of solid optical phantoms**, Jean-Pierre Bouchard, Jean-François Cormier, Michel Fortin, Pascal Gallant, Sébastien Leclair, Ozzy Mermut, Isabelle Noiseux, Marcia L. Vernon, Institut National d'Optique (Canada) ..... [6870-19]

**BIOS Hot Topics**  
 Convention Center J1-J4  
**Saturday 19 January · 7:00 to 9:30 pm**  
 See p. 23 for details.

# Conference 6870

## Sunday 20 January

### SESSION 5

Room: Conv. Ctr. L ..... Sun. 8:30 to 10:10 am

#### Unique Phantom Designs and Uses

Session Chairs: **William W. Mantulin**, Univ. of California/Irvine;  
**Robert J. Nordstrom**, National Institutes of Health

8:30 am: **Comparison of tissue calibration phantoms for diffuse spectroscopy and tomography**, Brian W. Pogue, Dax S. Kepshire, Shudong Jiang, Scott C. Davis, Dartmouth College. .... [6870-20]

8:50 am: **Fluence and singlet oxygen actinometer for phantoms and preclinical studies**, Carolyn Holladay, Lothar D. Lilge, Princess Margaret Hospital (Canada) ..... [6870-21]

9:10 am: **Optical phantoms for ultrasound-modulated optical tomography**, Chulhong Kim, Washington Univ. in St. Louis; Alejandro Garcia-Urbe, Texas A&M Univ.; Sri-Rajasekhar Kothapalli, Lihong V. Wang, Washington Univ. in St. Louis ..... [6870-22]

9:30 am: **Calibration of a retinal oximeter with a dynamic eye phantom**, Jessica C. Ramella-Roman, Afshin C. Nabili, Scott A. Mathews, The Catholic Univ. of America ..... [6870-23]

9:50 am: **Diffuse optical tomography and spectroscopy performance assessment: phantoms and methodology**, Nicolae Mincu, Jean Brunette, Olga Guilman, Frederic Leblond, Zahia Ichalalene, Salim Djeziri, Guobin Ma, Anader Benyamin-Seeyar, Mario Khayat, ART Advanced Research Technologies Inc. (Canada) ..... [6870-24]

### POSTERS-Monday

Monday 21 January Room: Conv. Ctr. L. .... Mon. 6:00 to 7:30 pm

Session Chair: **Robert J. Nordstrom**, National Institutes of Health

*All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.*

*Poster presenters may post their poster papers Monday morning starting at 10:00 am in the Civic Auditorium Complex, and will need to remove their papers immediately following the poster session that evening. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.*

**Static and dynamic light scattering properties of Intralipid aqueous suspension for tissue phantom preparation and calibration**, Ines Delfino, Univ. degli Studi della Tuscia (Italy); Rosario Esposito, Bruno Piccirillo, Univ. degli Studi di Napoli Federico II (Italy); Giovanni M. Gaeta D.D.S., Maria Lepore, Seconda Univ. degli Studi di Napoli (Italy) ..... [6870-25]

**Optical tissue phantoms: manufacture, characterization, usage, and stability**, Richard Y. Kwong, Bruce J. Tromberg, William W. Mantulin, Beckman Laser Institute and Medical Clinic. .... [6870-26]

## Publications of Related Interest

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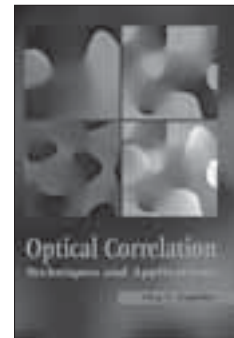
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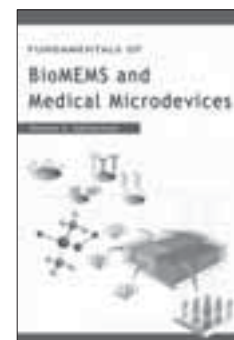
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# Daily Conference Schedule

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## LASE Special Events

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|--|--|--|--|
| <p><b>Biomedical Optics Exhibition</b><br/> <i>San Jose Convention Center,<br/>         Exhibition Hall 1</i><br/>         1:00 to 5:00 pm   10:00 am to 4:00 pm</p> | <p><b>Photonics West Exhibition</b><br/> <i>San Jose Convention Center, Exhibition Halls 1-3,<br/>         Exhibition Foyer and South Halls 1-2</i><br/>         10:00 am to 5:00 pm   10:00 am to 5:00 pm   10:00 am to 4:00 pm</p> | <p><b>SPiE Works</b> <br/>         11:00 am to 3:00 pm</p>              | <p><b>Career Fair</b><br/>         11:00 am to 3:00 pm</p>   |
|  |  | <p><b>LASE and MOEMS/<br/>         MEMS Interactive<br/>         Poster Sessions,</b><br/> <i>Civic Auditorium, 6:00<br/>         to 7:30 pm, p.17</i></p> | <p><b>LASE Plenary,</b><br/>         10:30 am to 12:30<br/>         pm, p. 24</p>  |
|  |  | <p><i>Technical<br/>         Event: Laser<br/>         Communications,</i><br/>         7:30 to 9:00 pm,<br/>         p. 25</p>                            | <p><i>LASE Conf. 6871:<br/>         Solid State Lasers<br/>         XVII: Technology and<br/>         Devices: <b>Student<br/>         Award Ceremony,</b><br/>         6:00 to 6:10 pm,<br/>         p. 25</i></p> <p><i>LASE Conf. 6873:<br/>         Fiber Lasers<br/>         V: Technology,<br/>         Systems, and<br/>         Applications:<br/> <b>Student Award<br/>         Ceremony,</b><br/>         4:50 pm, p. 25</i></p> |

## Laser Source Engineering

Program Chair: **Gregory J. Quarles, VLOC**

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| 6871 | <b>Solid State Lasers XVII: Technology and Devices</b> <i>(Clarkson, Hodgson, Shori) p. 138</i>  |
| 6872 | <b>Laser Resonators and Beam Control X</b> <i>(Kudryashov, Paxton, Ilchenko) p. 143</i>  |
| 6873 | <b>Fiber Lasers V: Technology, Systems, and Applications</b> <i>(Broeng, Headley) p. 145</i>   |
| 6874 | <b>High Energy/<br/>         Average Power<br/>         Lasers and<br/>         Intense Beam<br/>         Applications III</b> <i>(Davis, Heaven,<br/>         Schriempf) p. 149</i> |

## Nonlinear Optics

Program Chair: **Peter E. Powers, Univ. of Dayton**

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| 6875 | <b>Nonlinear Frequency Generation and Conversion: Materials, Devices, and Applications VII</b> <i>(Powers) p. 151</i> |
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Program Chair: **E. Fred Schubert**, Rensselaer Polytechnic Institute

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| 6895 <b>Zinc Oxide Materials and Devices III</b> ( <i>Teherani, Litton</i> ) p. 208 |  |   |  |  |  |
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## Laser Communication and Propagation

Program Chair: **Steve Mecherle**, Innocept Inc.

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| 6878 <b>Atmospheric Propagation of Electromagnetic Waves II</b> ( <i>Korotkova</i> ) p. 158 |  |  |  | 6877 <b>Free-Space Laser Communication Technologies XX</b> ( <i>Mecherle</i> ) p. 157 |
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## Laser Micro-/Nanoengineering and Applications

Program Chairs: **Henry Helvajian**, The Aerospace Corp.; **James S. Horwitz**, U.S. Dept. of Energy

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|  |  | 6879A <b>Laser Applications in Microelectronic and Optoelectronic Manufacturing XIII</b> ( <i>Holmes, Meunier, Arnold, Niino</i> ) p. 159 |  |   |  |
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LASE

# Conference 6871 · Room: Hilton Hotel: Almaden II

Sunday-Thursday 20-24 January 2008 • Proceedings of SPIE Vol. 6871

## Solid State Lasers XVII: Technology and Devices

*Conference Chairs:* **W. Andrew Clarkson**, Univ. of Southampton (United Kingdom); **Norman Hodgson**, Coherent, Inc.; **Ramesh K. Shori**, Naval Air Warfare Ctr.

*Program Committee:* **Martin D. Dawson**, Univ. of Strathclyde (United Kingdom); **Patrick M. Georges**, Institut d'Optique (France); **Adolf Giesen**, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); **William M. Grossman**, JDSU Corp.; **Hanna J. Hoffman**, Electro Optics Organization, Inc.; **Hans-Dieter Hoffmann**, Fraunhofer-Institut für Lasertechnik (Germany); **Guenter Huber**, Univ. Hamburg (Germany); **Helena Jelinková**, Czech Technical Univ. in Prague (Czech Republic); **Jacob MacKenzie**, Univ. of Southampton (United Kingdom); **Iain T. McKinnie**, Lockheed Martin Coherent Technologies; **Jerome V. Moloney**, The Univ. of Arizona; **Alan B. Petersen**, Spectra-Physics; **Stephen G. Post**, Air Force Research Lab.; **Narasimha S. Prasad**, NASA Langley Research Ctr.; **Wolf R. Seelert**, Coherent Luebeck GmbH (Germany); **David H. Titterton**, Defence Science and Technology Lab. (United Kingdom); **Alessandra Toncelli**, Univ. degli Studi di Pisa (Italy)

### Sunday 20 January

#### Introductory Remarks

Room: Hilton Hotel: Almaden II ..... Sun. 9:30 to 9:40 am

#### SESSION 1

Room: Hilton Hotel: Almaden II ..... Sun. 9:40 am to 12:00 pm

#### Q-switched Lasers

*Session Chair:* **Helena Jelinkova**, Czech Technical Univ. (Czech Republic)

9:40 am: **Ultra-low timing jitter passively Q-switched microchip laser**, Dirk Nodop, Jan Rothhardt, Jens Limpert, Andreas Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) ..... [6871-01]

10:00 am: **Instantaneous measurement of M-squared propagation factor in real-time**, Allen M. Cary, Jeffrey L. Guttman, Derrick W. Peterman, Photon Inc. .... [6871-02]

10:20 am: **Q-switched lasing on a weak transition: new approach**, Anatoliy Khizhnyak, Vladimir Markov, MetroLaser, Inc. .... [6871-03]

10:40 am: **Design and performance of a high-repetition-rate single-frequency Yb:YAG microlaser**, Randal L. Schmitt, Binh T. Do, Sandia National Labs. .... [6871-04]

11:00 am: **3-Dimensional simulation of the solid state lasers**, Christoph Pflaum, Matthias Wohlmut, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany) ..... [6871-05]

11:20 am: **Injection seeded Nd:YAG ring laser generating 200 mJ Q-switched pulses**, Anatoliy Khizhnyak, Frank Wu, Vladimir Markov, MetroLaser, Inc. .... [6871-06]

11:40 am: **Stabilization technique for injection seeding Nd:Yag lasers using microwave range mode beating**, Wytze E. van der Veer, Univ. of California/Irvine ..... [6871-111]

Lunch Break ..... 12:00 to 1:30 am

#### SESSION 2

Room: Hilton Hotel: Almaden II ..... Sun. 1:30 to 3:00 pm

#### Space Qualified and Stabilized Lasers I

*Session Chair:* **Ramesh K. Shori**, Naval Air Warfare Ctr.

1:30 pm: **Very high-efficiency, frequency-tripled Nd:YAG MOPA for spaceborne lidar** (*Invited Paper*), Joerg Luttmann, Kolja Nicklaus, Valentin Morasch, Shaojun Fu, Marco Hoefler, Martin Traub, Hans-Dieter Hoffmann, Fraunhofer-Institut für Lasertechnik (Germany) ..... [6871-07]

2:00 pm: **Thermal vacuum and vibration testing of the bepi colombo (mercury) laser altimeter prototype laser**, Joerg Neumann, Sven Hahn, Rafael Huss, Denis Freiburg, Christian Kolleck, Ralf Wilhelm, Dietmar Kracht, Laser Zentrum Hannover e.V. (Germany) ..... [6871-08]

2:20 pm: **Highly vibration-resistant pulsed single frequency Nd:YAG and Nd:YGG lasers with improved ramp-delay-fire frequency stabilization**, Jens Loehring, Kolja Nicklaus, Valentin Morasch, Hans D. Hoffmann, Fraunhofer-Institut für Lasertechnik (Germany); Christian Lemmerz, Deutsches Zentrum für Luft und Raumfahrt e.V. (Germany) ..... [6871-09]

2:40 pm: **Laser technology development at NASA Langley Research Center for space-based applications**, William C. Edwards, NASA Langley Research Ctr. .... [6871-10]

Coffee Break ..... 3:00 to 3:30 pm

#### SESSION 3

Room: Hilton Hotel: Almaden II ..... Sun. 3:30 pm to 5:00 pm

#### Space Qualified and Stabilized Lasers II

*Session Chair:* **Narasimha S. Prasad**, NASA Langley Research Ctr.

3:30 pm: **The lunar orbiter laser altimeter (LOLA) laser transmitter**, Anthony W. Yu, Anne-Marie Novo-Gradac, George B. Shaw, Alan Lukemier, Glenn L. Unger, Luis A. Ramos-Izquierdo, NASA Goddard Space Flight Ctr. . [6871-109]

3:50 pm: **Recent progress on single frequency lasers for space and high-altitude aircraft applications**, Floyd E. Hovis, J. Edelman, Tom Schum, J. Rudd, K. Andes, Fibertek, Inc. .... [6871-11]

4:10 pm: **Frequency stabilization of nanosecond deep-ultraviolet coherent light source with injection seeding**, Takeshi Yamamoto, Yasutomo Shiomi, Hiroshi Kumagai, Ataru Kobayashi, Osaka City Univ. (Japan) ..... [6871-12]

4:40 am: **Laser technology developments in support of ESA Earth observation missions**, Yannig Durand, Jean-Loup Bézy, Roland Meynart, European Space Research and Technology Ctr. (Netherlands) ..... [6871-110]

### Monday 21 January

#### SESSION 4

Room: Hilton Hotel: Almaden II ..... Mon. 8:30 to 10:00 am

#### Disk Lasers I

*Session Chair:* **Alan B. Petersen**, Spectra-Physics

8:30 am: **Advanced pulsed thin disk laser sources** (*Invited Paper*), Andreas Voss, Thomas Graf, Christian Stolzenburg, Univ. Stuttgart (Germany); Mikhail A. Larionov, Forschungsgesellschaft für Strahlwerkzeuge mbH (Germany); Adolf Giesen, Univ. Stuttgart (Germany) ..... [6871-13]

9:00 am: **High-power disk laser**, Rüdiger Brockmann, Kurt Mann, TRUMPF Laser GmbH & Co. KG (Germany); Holger Schlueter, David Havrilla, TRUMPF Inc. .... [6871-14]

9:20 am: **Scaling of thin disk pulse amplifiers**, Jochen Speiser, Univ. Stuttgart (Germany); Adolf Giesen, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) ..... [6871-15]

9:40 am: **Erbium-based gas-cooled disk laser**, John Vetovec, Aqwest ..... [6871-16]

Coffee Break ..... 10:00 to 10:30 am

#### SESSION 5

Room: Hilton Hotel: Almaden II ..... Mon. 10:30 to 11:40 am

#### Disk Lasers II

*Session Chair:* **Hans-Dieter Hoffmann**, Fraunhofer-Institut für Lasertechnik (Germany)

10:30 am: **Current status and development trends of disk laser technology** (*Invited Paper*), Christian Schmitz, Alexander Killi, Dirk H. Sutter, Jochen Kleinbauer, Ivo Zawischa, TRUMPF Laser GmbH & Co. KG (Germany) [6871-17]

11:00 am: **Mode dynamics and thermal lens effects of thin disk lasers**, Jens Mende, Willy L. Bohn, Adolf Giesen, Gerhard Spindler, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) ..... [6871-18]

11:20 am: **Rotary disk lasers in the UV, the visible and the infrared**, Santanu Basu, Sparkle Optics Corp. .... [6871-19]

Lunch/Exhibition Break ..... 11:40 am to 1:00 pm

**SESSION 6**

**Room: Hilton Hotel: Almaden II . . . . . Mon. 1:00 to 2:50 pm**

**Slab Lasers**

Session Chair: **Hanna J. Hoffman**, Electro Optics Organization, Inc.

1:00 pm: **Concepts, features, and developments of slab-laser oscillators and amplifiers** (*Invited Paper*), Keming Du, EdgeWave GmbH (Germany) . . . . . [6871-21]

1:30 pm: **Circular output from a high-power Nd:YLF slab laser and amplifier**, Jacob I. Mackenzie, Univ. of Southampton (United Kingdom) . . . . . [6871-22]

1:50 pm: **Development of edge pumped Yb:YAG planar waveguide lasers**, Howard J. Baker, Jesus F. Monjardin, Ian Thomson, Jesus D. Valera, Natalia Trela, Denis R. Hall, Heriot-Watt Univ. (United Kingdom) . . . . . [6871-23]

2:10 pm: **High-power slab-based Tm:YLF laser for in-band pumping of Ho:YAG**, Sic So, Jacob I. Mackenzie, David P. Shepherd, William A. Clarkson, Univ. of Southampton (United Kingdom) . . . . . [6871-24]

2:30 pm: **Pulsed passively mode locked operation of diode pumped Nd:GdVO<sub>4</sub> and Nd:YVO<sub>4</sub> in a bounce geometry**, Vaclav Kubecek, Michal Drahokoupil, Helena Jelinkova, Czech Technical Univ. in Prague (Czech Republic); Andreas Stintz, Jean-Claude M. Diels, The Univ. of New Mexico . . . . . [6871-25]

Coffee Break . . . . . 2:50 to 3:20 pm

**Note Room Change**

**SESSION 7**

**Room: Conv. Ctr. J2 . . . . . Mon. 3:20 to 5:50 pm**

**Bulk-Fiber Hybrid Lasers**

Session Chair: **Norman Hodgson**, Coherent, Inc.; **Dahv A. V. Kliner**, Sandia National Labs.

Joint session with Conference 6873: Fiber Lasers V: Technology, Systems, and Applications

3:20 pm: **Power scaling of fiber-based amplifiers seeded by microchip lasers** (*Invited Paper*), Jean-Philippe Feve, JDSU . . . . . [6871-26]

3:50 pm: **1.33 MW peak power, 60ps, 50-kHz repetition-rate pulsed microchip laser fiber amplifier system**, Dirk Nodop, Jens Limpert, Andreas Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [6873-14]

4:10 pm: **Fiber amplifier design for high-power picosecond UV generation**, Michael Kauf, Sami Hendow, Bernard Fidric, Wolfgang Gries, Spectra-Physics . . . . . [6871-27]

4:30 pm: **Hybrid fiber MOPA-bulk amplifier system for frequency conversion**, Andrei N. Starodoumov, Stuart McLean, Alexander Steinmetz, Coherent, Inc. . . . . [6871-28]

4:50 pm: **Impact of energy-transfer-upconversion on the performance of hybrid Er:YAG lasers**, Ji Won Kim, W. Andrew Clarkson, Optoelectronics Research Ctr. (United Kingdom) . . . . . [6871-29]

5:10 pm: **High-power laser with Nd:YAG single-crystal fiber grown by micro-pulling down technique**, Damien Sangla, Institut d'Optique (France) and Univ. de Claude Bernard Lyon I (France); Julien Didierjean, Institut d'Optique (France); Nicolas Aubry, Didier Perrodin, FiberCryst (France); Gaelle Lucas-Leclín, Balembois François, Institut d'Optique (France); Kheirredine Lebbou, Univ. Claude Bernard Lyon I (France); Patrick M. Georges, Institut d'Optique (France); Alain Brenier, Univ. Claude Bernard Lyon I (France); Fourmigué Jean-Marie, FiberCryst (France); Olivier Tillement, Univ. Claude Bernard Lyon I (France) . . . . . [6871-30]

5:30 pm: **Hybrid bulk/fibre MOPA system based on Yb:KYW laser**, Sergey M. Kobtsev, Tekhnoscan JSC (Russia); Sergey Kukarin, Novosibirsk State Univ. (Russia) . . . . . [6871-31]

**Tuesday 22 January**

**SESSION 8**

**Room: Hilton Hotel: Almaden II . . . . . Tues. 8:30 to 10:00 am**

**OPS Lasers and VECSELs I**

Session Chair: **Adolf Giesen**, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany)

8:30 am: **High-performance optically pumped GaSb-based semiconductor disk lasers in the 2.0µm wavelength regime** (*Invited Paper*), Marcel Rattunde, Nicola Schulz, Benno Rösener, Christian Manz, Klaus Köhler, Christoph Wild, Joachim Wagner, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany); John-Mark Hopkins, David Burns, Univ. of Strathclyde (United Kingdom) . . . . . [6871-32]

9:00 am: **VECSEL sub-cavity optimization for targeted wavelengths**, Hongbo Li, College of Optical Sciences/The Univ. of Arizona; Jörg Hader, Jerome V. Moloney, The Univ. of Arizona; Stephan W. Koch, Philipps-Univ. Marburg (Germany) . . . . . [6871-33]

9:20 am: **Interfacial misfit dislocation array-based growth of III-Sb active regions on GaAs/AlGaAs DBRs for high-power 2 µm VECSELs**, Ganesh Balakrishnan, T. J. Rotter, A. Jallipalli, L. R. Dawson, D. L. Huffaker, The Univ. of New Mexico . . . . . [6871-34]

9:40 am: **Single-frequency tunable VECSEL around the Cesium D2 line**, Benjamin Cocquelin, Gaelle Lucas-Leclín, Patrick M. Georges, Institut d'Optique (France); Isabelle Sagnes, Arnaud Garnache, Ctr. National de la Recherche Scientifique (France) . . . . . [6871-35]

Coffee Break . . . . . 10:00 to 10:30 am

**SESSION 9**

**Room: Hilton Hotel: Almaden II . . . . . Tues. 10:30 am to 12:20 pm**

**OPS Lasers and VECSELs II**

Session Chair: **W. Andrew Clarkson**, Univ. of Southampton (United Kingdom)

10:30 am: **Quantum design of active semiconductor materials for targeted wavelengths: a predictive design tool for edge emitters and OPSLs (Tutorial)** (*Presentation Only*), Jerome V. Moloney, Nonlinear Control Strategies and The Univ. of Arizona . . . . . [6871-36]

11:20 am: **New results and applications for high-power optically-pumped semiconductor lasers**, Qi-Ze Shu, Doug Anthon, Jill Berger, Andrea Caprara, Juan Chilla, Joe Drake, Lukas E. Hunziker, Arnaud Lepert, Coherent, Inc. . . . . [6871-37]

11:40 am: **Comparison of thermal management techniques for semiconductor disk lasers**, Stephanie Giet, Alan J. Kemp, David Burns, Stephane Calvez, Martin D. Dawson, Univ. of Strathclyde (United Kingdom); Soile Suomalainen, Antti Härkönen, Mircea Guina, Oleg Okhotnikov, Markus Pessa, Tampere Univ. of Technology (Finland) . . . . . [6871-38]

12:00 pm: **Ultrashort-pulse Ti:sapphire oscillators pumped by optically pumped semiconductor pump lasers**, Bojan Resan, Estelle Coadou, Aurelie Thomas, Peter Walther, Rimas Viselga, Jean-Marc Heritier, Juan Chilla, William Tulloch, Alan R. Fry, Coherent, Inc. . . . . [6871-39]

Lunch/Exhibition Break . . . . . 12:20 to 1:30 pm

LASE

# Conference 6871

## SESSION 10

Room: Hilton Hotel: Almaden II ..... Tues. 1:30 to 3:10 pm

### OPS Lasers and VECSELS III

Session Chair: William M. Grossman, JDSU

- 1:30 pm: **Green laser modules to fit laser projection out of your pocket** (*Invited Paper*), Ulrich Steegmueller, Michael Kuehnelt, Thomas Schwarz, Heiko Unold, Roland Schulz, Stefan Illek, Ines Pietzonka, OSRAM Opto Semiconductors GmbH (Germany) ..... [6871-40]
- 2:00 pm: **1W 488-nm cw air-cooled optically pumped semiconductor laser**, Vasily G. Ostroumov, Christoph Simon, Heiko Schwarze, Coherent Luebeck GmbH (Germany); Jukka Lindfors, Coherent Finland Oy (Finland); Ruediger von Elm, Wolf Seelert, Coherent Luebeck GmbH (Germany) ..... [6871-41]
- 2:20 pm: **Highly strained InGaAs/GaAs vertical-external-cavity surface-emitting laser for the generation of coherent yellow-orange light** (*Invited Paper*), Li Fan, Chris Hessenius, Mahmoud Fallahi, Jorg Hader, College of Optical Sciences/The Univ. of Arizona; Jerome V. Moloney, The Univ. of Arizona; Stephan W. Koch, Wolfgang Stolz, Philipps-Univ. Marburg (Germany) ..... [6871-42]
- 2:50 pm: **1W red light generation by intracavity doubling in a 1240 nm GaInNAs semiconductor disk laser**, Jussi Rautiainen, Antti Harkonen, Tampere Univ. of Technology (Finland); Pietari Tuomisto, Janne Konttinen, EpiCrystals, Inc. (Finland); Lasse Orsila, Mircea D. Guina, Oleg G. Okhotnikov, Tampere Univ. of Technology (Finland) ..... [6871-43]
- Coffee Break ..... 3:10 to 3:30 pm

## SESSION 11

Room: Hilton Hotel: Almaden II ..... Tues. 3:30 to 5:20 pm

### Amplifiers

Session Chair: Alan B. Petersen, Spectra-Physics

- 3:30 pm: **Ultrafast CPA-free disk laser 65W average power** (*Invited Paper*), Jochen Kleinbauer, Dirk H. Sutter, Sascha Weiler, TRUMPF Laser GmbH & Co. KG (Germany) ..... [6871-44]
- 4:00 pm: **Ultrafast Yb:KYW regenerative amplifier with combined gain spectra of the optical axes Nm and Np**, Udo Buenting, Peter Wessels, Dieter Wandt, Dietmar Kracht, Laser Zentrum Hannover e.V. (Germany) ..... [6871-45]
- 4:20 pm: **High-average power Nd:YVO<sub>4</sub> based regenerative amplifier**, David A. Cluble, Angus S. Bell, Graham Friel, Coherent Scotland Ltd. (United Kingdom) ..... [6871-46]
- 4:40 pm: **Ti:sapphire amplifier systems for scientific and industrial applications**, Julien Klein, Ruben Zadoyan, Philippe Feru, Spectra-Physics ..... [6871-47]
- 5:00 pm: **100 MW class MOPA with variable pulse duration for XUV generation**, Marco Höfer, Dominik Esser, Henrik Sipma, Fraunhofer-Institut für Lasertechnik (Germany); Markus Bartram, PicoLAS GmbH (Germany); Hans-Dieter Hoffmann, Fraunhofer-Institut für Lasertechnik (Germany) ..... [6871-49]

### POSTER-Tuesday

Room: Hilton Hotel: Almaden II ..... Tues. 6:00 to 7:30 pm

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Tuesday morning starting at 10:00 am in the Fairmont Hotel, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

**Solid state saturable absorbers for Q-switching at 1 and 1.3 μm: investigation and modeling**, Jan Šulc D.D.S., Pavel Arator, Helena Jelinkova, Czech Technical Univ. in Prague (Czech Republic); Karel Nejezchleb, Václav Škoda, Crytur Ltd. (Czech Republic); Milan R. Kokta, Saint-Gobain Crystals ..... [6871-83]

**Big solar furnace as pumping source for high-power lasers**, Shermakhamat Payziyev, Sagdilla Bakhrarov, Shavkat Klichev, Abdugappar Kasimov, NPO Akademprigor (Uzbekistan); Abdujabbar Abdurakhmanov, Abdukhakim Fazilov, Academy of Sciences of Uzbekistan (Uzbekistan) ..... [6871-82]

**Power scaling and optimum crystal orientation in continuous-wave diode-pumped Yb:KLu(WO<sub>4</sub>)<sub>2</sub> lasers**, Junhai Liu, Qingdao Univ. (China); Valentin Petrov, Xavier Mateos, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); Huaijin Zhang, Jiyang Wang, Shandong Univ. (China) ..... [6871-81]

**Ceramic Nd<sup>3+</sup>:Cr<sup>3+</sup>:YAG laser pumped by high-power concentrated solar flux**, Shermakhamat Payziyev, Sagdilla Bakhrarov, NPO Akademprigor (Uzbekistan); Hideki Yagi, Konoshima Chemical Co., Ltd. (Japan); Abdujabbar Abdurakhmanov, Academy of Sciences of Uzbekistan (Uzbekistan) . . [6871-79]

**Long-term frequency stabilisation of a CW single-frequency laser using a high-precision wavelength meter**, Sergey M. Kobtsev, Novosibirsk State Univ. (Russia); Stepan Kandrushin, Tekhnoscan JSC (Russia); Andrey Potekhin, Novosibirsk State Univ. (Russia) ..... [6871-97]

**Output characteristics of a passively Q-switched diode-laser pumped ceramic Nd:YAG laser**, Yeong-Sik Kim, Dankook Univ. (South Korea)[6871-77]

**High-peak-power diode-pumped actively Q-switched Nd:YAG/YVO<sub>4</sub> intracavity Raman laser**, Kuan-Wei Su, Y. T. Chang, Yung-Fu F. Chen, National Chiao Tung Univ. (Taiwan) ..... [6871-95]

**AlGaInAs quantum-well 1.3-μm laser by a diode-pumped actively Q-switched Nd:GdVO<sub>4</sub> laser**, S. C. Huang, K. W. Su, A. Li, S. C. Liu, Y. F. Chen, K. F. Huang, National Chiao Tung Univ. (Taiwan) ..... [6871-94]

**High-power Kerr-lens mode-locked ytterbium lasers**, Alexander A. Lagatsky, Fiona M. Bain, Christian T. A. Brown, Wilson Sibbett, Univ. of St. Andrews (United Kingdom); Viktor E. Kisel, N. Kuleshov, Belarus National Technical Univ. (Belarus) ..... [6871-96]

**High-peak-power flashlamp-pumped passively Q-switched Nd:YAG laser with AlGaInAs quantum wells as a saturable absorber**, H. C. Liang, J. Y. Huang, S. C. Huang, K. W. Su, Y. F. Chen, K. F. Huang, National Chiao Tung Univ. (Taiwan) ..... [6871-92]

**Diode pumped Tm:YAP laser for eye microsurgery**, Helena Jelinkova, Czech Technical Univ. in Prague (Czech Republic); Jiri Pasta M.D., Central Military Hospital (Czech Republic); Petr Koranda, Jan Šulc, Michal Nemeč, Pavel Cerny, Czech Technical Univ. in Prague (Czech Republic) ..... [6871-91]

**Ultrashort lasers: identifying the “perfect” pulse**, Daniel A. Bender, Mansoor Sheik-Bahae, The Univ. of New Mexico ..... [6871-86]

**Tunable pulsed forsterite laser operating at room temperature**, F. F. Wu, Tianjin Univ. (China) ..... [6871-85]

**A new compact laser source for portable LIBS applications**, Jerome Goujon, Olivier Musset, Univ. de Bourgogne (France) ..... [6871-84]

**Mid-infrared Cr<sup>2+</sup>:ZnSe random powder laser**, Changsu Kim, Dmitri V. Martyshkin, Vladimir V. Fedorov, Sergey B. Mirov, The Univ. of Alabama at Birmingham ..... [6871-88]

**Q-switched laser operation of Yb-doped NaGd(WO<sub>4</sub>)<sub>2</sub> and NaY(WO<sub>4</sub>)<sub>2</sub> crystals**, Junhai Liu, Qingdao Univ. (China); Valentin Petrov, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); Huaijin Zhang, Jiyang Wang, Minhua Jiang, Shandong Univ. (China) ..... [6871-80]

**Iron doped Cd(x)Mn(1-x)Te crystals, a new gain media for mid-IR room temperature lasers**, William T. Mallory, Jr., Vladimir V. Fedorov, Sergey B. Mirov, The Univ. of Alabama at Birmingham; Uwe H. Hömmerich, Hampton Univ.; Witold Palosz, Sudhir Trivedi, Brimrose Corp. of America ..... [6871-87]

**Two-stage concentrating systems for pumping of solar lasers**, Shermakhamat Payziyev, Shavkat Klichev, Sagdilla Bakhrarov, NPO Akademprigor (Uzbekistan); Abdujabbar Abdurakhmanov, Abdukhakim Fazilov, Academy of Sciences of Uzbekistan (Uzbekistan) ..... [6871-78]

Wednesday 23 January

SESSION 12

Room: Hilton Hotel: Almaden II .....Wed. 8:30 to 10:00 am

Ceramic Materials

Session Chair: Iain T. McKinnie,  
Lockheed Martin Coherent Technologies

8:30 am: **The synthesis and properties of rare earth doped yttria and scandia for eye-safe single crystal and ceramic lasers** (*Invited Paper*), John M. Ballato, C. McMillan, Baris Kokuoz, Joseph W. Kolis, Clemson Univ. .... [6871-50]

9:00 am: **Development of neodymium and ytterbium-doped ceramic yttria for solid state lasers**, Narasimha S. Prasad, William C. Edwards, NASA Langley Research Ctr.; Sudhir B. Trivedi, Susan Kutcher, Chen-Chia Wang, Joo-Soo Kim, Witold Palosz, Brimrose Corp. of America; Uwe Hömmerich, Hampton Univ.; Vijay Shukla, Rajendra Sadangi, Bernard Kear, Rutgers Univ. ... [6871-51]

9:20 am: **Design of transverse Nd doping profiles in transparent YAG ceramics for edge-pumped laser geometries**, Jeffrey A. Wisdom, Romain Gaume, Roger K. Route, Robert L. Byer, Stanford Univ.; Akio Ikesue, Yan Lin Aung, World Lab Co., Ltd. (Japan) ..... [6871-102]

9:40 am: **Characterization of optical quality rare earth doped polycrystalline YAG laser materials**, Jean C. Huie, Richard L. Gentilman, Thomas M. Hartnett, Raytheon Co. .... [6871-103]

Plenary Session

Room: Montgomery Theater · Wed. 10:30 am to 12:30 pm

10:30 am: **Laser Processing and Chemistry: Applications in Nanopatterning, Material Synthesis and Biotechnology** (*Invited Paper*), Dieter Bäuerle, Johannes Kepler Univ. Linz (Austria)

11:10 am: **The Long Journey from Idea to Industrial Success** (*Invited Paper*), Holger Schlueter, TRUMPF Inc.

11:50 am: **Building Coherence in Collaboration: A Case Study with the World's Most Powerful, Tunable Laser** (*Invited Paper*), H. Fred Dylla, American Institute of Physics

See p. 24 for details.

Lunch/Exhibition Break ..... 12:40 to 1:40 pm

SESSION 13

Room: Hilton Hotel: Almaden II .....Wed. 1:40 to 3:50 pm

Visible and UV Generation

Session Chair: W. Andrew Clarkson, Univ. of Southampton (United Kingdom); Rita D. Peterson, College of Optics & Photonics/Univ. of Central Florida

Joint Session with Conference 6875: Nonlinear Frequency Generation and Conversion: Materials, Devices, and Applications VII

1:40 pm: **Passively Q-switched diode pumped Nd:YAG and Nd:YVO<sub>4</sub> using (Cr<sup>3+</sup>, Ca<sup>2+</sup>):YAG and (Cr<sup>3+</sup>, Mg<sup>2+</sup>):YAG saturable absorbers** (*Invited Paper*), Yehoshua Y. Kalisky, Nuclear Research Ctr. Negev (Israel); Ofra Kalisky, Jerusalem College of Technology (Israel); Milan R. Kokta, Saint Gobain Crystals ..... [6875-36]

2:10 pm: **1W of 261-nm cw generation in a Pr<sup>3+</sup>:LiYF<sub>4</sub> laser pumped by an optically pumped semiconductor laser at 479 nm**, Vasiliy G. Ostroumov, Wolf Seelert, Coherent Luebeck GmbH (Germany) ..... [6871-52]

2:30 pm: **Fiber amplified and frequency doubled diode lasers as a highly flexible pulse source at 532nm**, Kristian Lauritsen, Martin Langkopf, Dietmar Klemme, PicoQuant GmbH (Germany); Christopher M. Kaleva, Chris Pallassis, Shirley McNeil, AdvR, Inc.; Rainer Erdmann, PicoQuant GmbH (Germany) ..... [6871-53]

2:50 pm: **Continuous wave single longitudinal mode SHG with two stages of intracavity power enhancement at fundamental frequency**, Fedor Karpushko, KLASTECH-Karpushko Laser Technologies GmbH (Germany) ..... [6871-54]

3:10 pm: **300mW of coherent light at 488nm using a generic approach**, Emir Karamehmedovic, Christian Pedersen, Martin T. Andersen, Peter Tidemand-Lichtenberg, Danmarks Tekniske Univ. (Denmark) ..... [6875-38]

3:30 pm: **Efficient UV-visible upconversion luminescence and thermal effects in terbium-ytterbium codoped fluorogermanate vitroceraic**, Artur S. Gouveia-Neto, Luciano A. Bueno, Raphael F. Nascimento, Elias A. Silva, Valberes Nascimento, Ernande B. Costa, Univ. Federal Rural de Pernambuco (Brazil); Sidney J. L.Ribeiro, Younes Messaddeq, Univ. Estadual Paulista (Brazil) ..... [6875-37]

Coffee Break ..... 3:50 to 4:20 pm

SESSION 14

Room: Hilton Hotel: Almaden II .....Wed. 4:20 to 6:30 pm

Visible and UV Lasers

Session Chair: Norman Hodgson, Coherent, Inc.

4:20 pm: **Pulse energy and pulse width control in high-power, internally frequency converted, Q-switched Nd:YAG lasers** (*Invited Paper*), Loren A. Eyres, Jeffrey Gregg, Shannon Gomes, James J. Morehead, JDSU . . . [6871-55]

4:50 pm: **Intracavity pumped Yb:SFAP crystal emitting at 985 nm and second harmonic generation**, Marc Castaing, François Balembois, Patrick M. Georges, Institut d'Optique (France); Thierry Georges, Oxsius (France); Kathleen I. Schaffers, Lawrence Livermore National Lab. .... [6871-56]

5:10 pm: **Diode pumping of Nd:ASL and its frequency doubling for blue emission around 450 nm**, David Paboeuf, Gaëlle Lucas-Leclin, Patrick M. Georges, Institut d'Optique (France); Bernd Sumpf, Götz Erbert, Ferdinand-Braun-Institut für Höchstfrequenztechnik (Germany); Cyrille Varona, Pascal Loiseau, Gerard Aka, Ecole Nationale Supérieure de Chimie de Paris (France); Bernard Ferrand, Lab. d'Electronique de Technologie de l'Information (France) ..... [6871-57]

5:30 pm: **A diode-pumped Rb laser at 398 nm**, Alan B. Petersen, Randall Lane, Spectra-Physics ..... [6871-58]

5:50 pm: **High-power, tunable, solid state blue source**, Yelena Isyanova, Peter F. Moulton, Q-Peak, Inc.; Ramesh K. Shori, Naval Air Warfare Ctr. .... [6871-105]

6:10 pm: **Narrow linewidth ring laser with frequency doubling for Ti: sapphire and dye operation**, Sven Hädrich, Sirah Laser- & Plasmatechnik GmbH (Germany); Paulus Jauenrik, Sirah Laser- & Plasmatechnik GmbH; Philippe Feru, Lee McCrumb, Newport Spectra-Physics ..... [6871-112]

Thursday 24 January

SESSION 15

Room: Hilton Hotel: Almaden II ..... Thurs. 8:40 to 10:00 am

Mid-Infrared Lasers I

Session Chair: David H. Titterton,  
Defence Science and Technology Lab. (United Kingdom)

8:40 am: **Mid-infrared tunable laser based on the Cr:ZnSe active crystal**, Petr Koranda, Helena Jelinkova, Michal Nemeč, Jan Šulc, Czech Technical Univ. (Czech Republic); Maxim E. Doroshenko, Tasoltan T. Basiev, A.M. Prokhorov General Physics Institute (Russia); Vitaly K. Komar, Andriy S. Gerasimenko, Institute for Single Crystals (Ukraine); Valerii V. Badikov, D. V. Badikov, Kuban State Univ. (Russia) ..... [6871-59]

9:00 am: **Power scaling of CW Cr:ZnSe lasers**, Igor Moskalev, Vladimir Fedorov, Sergey B. Mirov, The Univ. of Alabama at Birmingham. .... [6871-60]

9:20 am: **Tunable lasers based on diode pumped Tm-doped vanadates Tm:YVO<sub>4</sub>, Tm:GdVO<sub>4</sub>, and Tm:LuVO<sub>4</sub>**, Jan Šulc, Petr Koranda, Pavel Cerny, Helena Jelinkova, Czech Technical Univ. in Prague (Czech Republic); Yoshiharu Urata, Megaopto Co., Ltd. (Japan); Mikio Higuchi, Hokkaido Univ. (Japan); Witold Ryba-Romanowski, Radoslaw Lisiecki, Piotr Solarz, Grazina Dominiak-Dzik, Instytut Niskich Temperatur i Badan Strukturalnych (Poland); Marcin Sobczyk, Univ. of Wroclaw (Poland) ..... [6871-93]

9:40 am: **TBD**, Ramesh K. Shori, Univ. of California/Los Angeles . . . [6871-106]

Coffee Break ..... 10:00 to 10:20 am

LASE

# Conference 6871

## SESSION 16

Room: Hilton Hotel: Almaden II ..... Thurs. 10:20 am to 12:10 pm

### Mid-Infrared Lasers II

Session Chair: **Ramesh K. Shori**, Naval Air Warfare Ctr.

10:20 am: **High-power tunable external cavity quantum cascade laser in the 5-11 micron regime** (*Invited Paper*), Timothy Day, D. Arnone, S. Crivello, M. Weida, M. Pushkarsky, R. Pritchett, Daylight Solutions Inc. .... [6871-63]

10:50 am: **Vibronic-tuning of divalent cobalt-doped magnesium spinels as a saturable absorber for eye-safe lasers**, Kelly L. Nash, John B. Gruber, Dhiraj K. Sardar, The Univ. of Texas at San Antonio. .... [6871-64]

11:20 am: **Difference frequency generation based mid-infrared lasers for quantitative chemical sensing**, James J. Scherer, Joshua B. Paul, Valerii V. Ter-Mikirtychev, Hans-Jürg Jost, NovaWave Technologies, Inc. .... [6871-107]

11:40 am: **Femtosecond lasers for sensing in the infrared: taking advantage of the bandwidth** (*Invited Paper*), Irina T. Sorokina, Norwegian Univ. of Science and Technology (Norway); Evgeni Sorokin, Technische Univ. Wien (Austria); Guy Guelachvili, Nathalie Picque, Univ. Paris-Sud II (France) .... [6871-108]

Lunch Break ..... 12:10 to 1:10 pm

## SESSION 17

Room: Hilton Hotel: Almaden II ..... Thurs. 1:10 to 3:20 pm

### Applications of Solid State Lasers I

Session Chair: **William M. Grossman**, JDSU

1:10 pm: **High-speed micromachining with high-power picosecond ultraviolet lasers** (*Invited Paper*), Ralf Knappe, Achim Nebel, Lumera Laser GmbH (Germany). .... [6871-65]

1:40 pm: **Picosecond laser micromachining of advanced semiconductor logic devices**, Brian W. Baird, Jeffrey A. Albelo, Peter Y. Pirogovsky, James N. O'Brien, Electro Scientific Industries, Inc. .... [6871-66]

2:00 pm: **Fiber-based high-power picosecond UV laser for microelectronics and industrial applications**, Michael Kauf, Raj Patel, James M. Bovatsek, Wolfgang Gries, Newport Corp. .... [6871-67]

2:20 pm: **Glass processing using Q-switched ns INNOSLAB lasers**, Keming Du, EdgeWave GmbH (Germany) .... [6871-68]

2:40 pm: **Multiplume shielding effects in the ablation of electronic materials using high-repetition-rate UV DPSS laser**, Benny Naveh, Boris Kling, Zvi Kotler, Orbotech Ltd. (Israel) .... [6871-69]

3:00 pm: **Advanced Q-switched DPSS lasers for ID-card marking**, Michael Hertwig, Martin Paster, Ralf Terbrüggen, Coherent GmbH (Germany). [6871-70]

Coffee Break ..... 3:20 to 3:40 pm

## SESSION 18

Room: Hilton Hotel: Almaden II ..... Thurs. 3:40 to 6:00 pm

### Applications of Solid State Lasers II

Session Chair: **Wolf R. Seelert**, Coherent Luebeck GmbH (Germany)

3:40 pm: **Solid state laser applications in flow cytometry** (*Invited Paper*), Larry D. Duckett, BD Biosciences. .... [6871-71]

4:10 pm: **Nonlinear excitation fluorescence microscopy: past, present, and future applications of dynamic cell and tissue imaging** (*Invited Paper*), David L. Wokosin, Northwestern Univ. .... [6871-72]

4:40 pm: **Solid state laser applications in photovoltaics manufacturing**, Corey M. Dunskey, Coherent, Inc. .... [6871-73]

5:00 pm: **Tandem photonic amplifier employing a pulsed master oscillator fiber power amplifier with programmable temporal pulse shape capability**, Brian W. Baird, Xiaoyuan Peng, Wensheng Ren, David M. Hemenway, Lei Sun, Electro Scientific Industries, Inc.; Pascal Deladurantaye, Yves Taillon, Institut National d'Optique (Canada) .... [6871-74]

5:20 pm: **Optics performance at high-power levels**, Ola I. Blomster, Magnus Pålsson, Optoskand AB (Sweden); Felix Abt, Friedrich Dausinger, Forschungsgesellschaft für Strahlwerkzeuge mbH (Germany); Martin Huonker, TRUMPF Laser GmbH & Co. KG (Germany); Christoph Deininger, Technologiegesellschaft für Strahlwerkzeuge mbH (Germany) .... [6871-75]

5:40 pm: **Advances in fiber delivery of femtosecond pulses**, Tuan M. Le, Martin Hofer, Femtolasers Produktions GmbH (Austria); Juraj Darmo, Technische Univ. Wien (Austria); Gabriel Tempea, Andreas Stingl, Femtolasers Produktions GmbH (Austria) .... [6871-76]

### Student Award Ceremony

Room: Hilton Hotel, Almaden II ..... Thurs. 6:00 to 6:10 pm

Session Chair: **Norman Hodgson**, Coherent, Inc.

Prizes donated by:



### Best Student Presentation Award

We are pleased to announce that prizes in the amount of \$1,500 US and \$500 US will be awarded to the best student oral presentation and the best student poster presentation, respectively, in the conference on Solid State Laser Technology XVII: Technology and Devices, at SPIE's Photonics West Symposium. The prize money has been donated by Coherent, Inc. and the awards will be presented by Norman Hodgson, Vice President of Engineering.

### Student Paper Competition

Qualifying student presentations will be evaluated by a conference steering committee. To be eligible for consideration a student must be listed as an author on an accepted paper, must have conducted the majority of the work being presented, and must make the oral or poster presentation. The prizes will be awarded based on the quality of the presentation and not on the content of the submitted abstract. The winners of the Best Student Presentation Awards will be announced during the Student Award Session scheduled to take place on Thursday.





# Laser Resonators and Beam Control X

*Conference Chairs:* **Alexis V. Kudryashov**, Moscow State Open Univ. (Russia); **Alan H. Paxton**, Air Force Research Lab.; **Vladimir S. Ilchenko**, OEwaves, Inc.

*Program Committee:* **Jean-Claude M. Diels**, The Univ. of New Mexico; **Hans-Joachim Eichler**, Technische Univ. Berlin (Germany); **Pierre Galarneau**, Institut National d'Optique (Canada); **Thomas Graf**, Univ. Stuttgart (Germany); **James R. Leger**, Univ. of Minnesota/Twin Cities; **Andrey B. Matsko**, Jet Propulsion Lab.

## Monday 21 January

### SESSION 1

Room: Conv. Ctr. F1 ..... Mon. 8:30 to 10:05 am

#### Opening Session

*Session Chair:* **Alexis V. Kudryashov**, Moscow State Open Univ. (Russia)

8:30 am: **Gaussian to top-hat beam transformation system based on raster optics**, Yuri V. Miklyayev, Alexei S. Mikhailov, Mikhail M. Ivanenko, Vitalij N. Lissotschenko, LIMO-Lissotschenko Mikrooptik GmbH (Germany) . . . [6872-01]

8:50 am: **Femtosecond laser beam improvement: correction of parabolic mirror aberrations by means of adaptive optics**, Julia Sheldakova, Alexis V. Kudryashov, Moscow State Open Univ. (Russia); Tatyana Y. Cherezova, Active Optics Ltd. (Russia) . . . [6872-02]

9:10 am: **First principles prediction and control of lasing in microcavities** (*Invited Paper*), Hakan E. Tureci, ETH Zürich (Switzerland); Li Ge, Stefan Rotter, A. Douglas Stone, Yale Univ. . . . [6872-03]

9:35 am: **Control of high-energy UV filaments in the atmosphere** (*Invited Paper*), Jean-Claude M. Diels, Xiaozhen Xu, Olivier Chalus, Alejandro B. Aceves, Alexey Sukhinin, The Univ. of New Mexico . . . [6872-42]

Coffee Break . . . . . 10:05 to 10:30 am

### SESSION 2

Room: Conv. Ctr. F1 ..... Mon. 10:30 to 11:50 am

#### Resonators and Mode Control

*Session Chair:* **Jean-Claude M. Diels**, The Univ. of New Mexico

10:30 am: **Simulation of thin-disk Yb:YAG lasers with stable resonators and with one or two transverse modes**, Alan H. Paxton, Air Force Research Lab. . . . . [6872-04]

10:50 am: **Development of an optical resonator with conical retroreflector for generation of radially polarized optical beam**, Masamori Endo, Tokai Univ. (Japan) . . . . . [6872-05]

11:10 am: **Focus characterization for laser micromachining under real process conditions**, Otto W. Maerten, Marten Opto Consulting (Germany); Harald Schwede, Stefan Wolf, Reinhard Kramer, Volker Brandl, Primes GmbH (Germany) . . . . . [6872-07]

11:30 am: **Power scaling issues of diffusion cooled annular CO<sub>2</sub> lasers in the multi-kilowatt region**, Francisco J. Villarreal, Shadi SumRain, Jochen Deile, Viktor Granson, Peter Daniel, TRUMPF Inc. . . . . [6872-08]

Lunch Break . . . . . 11:50 am to 1:20 pm

### SESSION 3

Room: Conv. Ctr. F1 ..... Mon. 1:20 to 3:00 pm

#### Mode Control and Beam Control

*Session Chair:* **James R. Leger**, Univ. of Minnesota

1:20 pm: **High-efficient single pass SHG of an external cavity enhanced broad area laser diode using a PPLN waveguide crystal**, Andreas Jechow, Danilo Skoczowsky, Ralf Menzel, Univ. Potsdam (Germany); Marc Kelemen, m2k-laser GmbH (Germany) . . . . . [6872-09]

1:40 pm: **Problem of Shack-Hartmann wavefront sensor and interferometer use while testing strongly distorted laser wavefront**, Julia V. Sheldakova, Alexis Kudryashov, Valentina Y. Zavalova, Vadim V. Samarkin, Moscow State Open Univ. (Russia) . . . . . [6872-10]

2:00 pm: **Modal oscillation dynamics of random lasing depending on photon scattering state**, Seiji Takeda, Minoru Obara, Keio Univ. (Japan) . . . . . [6872-11]

2:20 pm: **Design of laser beam shaping optics: a simple algebraic method**, John A. McNeil, BAE Systems . . . . . [6872-12]

2:40 pm: **Simplest optical systems to decouple (detwist) general astigmatic beams**, George Nemes, ASTIGMAT; Julio Serna, Univ. Complutense de Madrid (Spain) . . . . . [6872-13]

Coffee Break . . . . . 3:00 to 3:30 pm

### SESSION 4

Room: Conv. Ctr. F1 ..... Mon. 3:30 to 5:30 pm

#### Microresonators I

*Session Chair:* **Vladimir S. Ilchenko**, OEwaves, Inc.

3:30 pm: **Optical transport in coupled spherical cavities with tunable whispering gallery modes** (*Invited Paper*), Vasily N. Astratov, Seungmoo Yang, The Univ. of North Carolina at Charlotte . . . . . [6872-15]

3:55 pm: **Slow light photonic crystal medium in optical micro-resonators** (*Invited Paper*), Damian Goldring, Tel-Aviv Univ. (Israel); Uriel Levy, The Hebrew Univ. of Jerusalem (Israel); David Mendlovic, Tel-Aviv Univ. (Israel) . . . [6872-16]

4:20 pm: **A decade of progress in microring and microdisk based photonic circuits: a personal selection** (*Invited Paper*), Otto Schwelb, Concordia Univ. (Canada) . . . . . [6872-17]

4:45 pm: **Symmetric photonic molecules formed from coupled microspheres** (*Invited Paper*), John F. Donegan, The Univ. of Dublin, Trinity College (Ireland) . . . . . [6872-18]

5:10 pm: **Erbium-doped silica-alumina glass toroidal microcavity lasers**, Chu Thi Thu Ha, Trang Nguyen Thu, Vietnamese Academy of Science and Technology (Vietnam); Bui Van Thien, Thai Nguyen Medical Univ. (Vietnam); Pham Van Hoi, Vietnamese Academy of Science and Technology (Vietnam) . . . . . [6872-19]

## Tuesday 22 January

### SESSION 5

Room: Conv. Ctr. F1 ..... Tues. 8:30 to 10:10 am

#### Microresonators II

*Session Chair:* **Pierre Galarneau**, Institut National d'Optique (Canada)

8:30 am: **Stopping light via index and loss tuning in coupled resonator systems** (*Invited Paper*), Sunil Sandhu, Michelle L. Povinelli, Shanhui Fan, Stanford Univ. . . . . [6872-21]

8:55 am: **Ultrafast low-power photonics on silicon** (*Invited Paper*), Michal F. Lipson, Cornell Univ. . . . . [6872-22]

9:20 am: **Two-dimensional whispering gallery vs. 3D whispering cave** (*Invited Paper*), Odae Kwon, Pohang Univ. of Science and Technology (South Korea) . . . . . [6872-23]

9:45 am: **MEMS-actuated tunable microdisk and microtoroidal resonators** (*Invited Paper*), Ming C. Wu, Univ. of California/Berkeley . . . . . [6872-24]

Coffee Break . . . . . 10:10 to 10:40 am

## SESSION 6

**Room: Conv. Ctr. F1 . . . . . Tues. 10:40 am to 12:20 pm**

### Microresonators III

Session Chair: **Alan H. Paxton**, Air Force Research Lab.

10:40 am: **Cavity opto-mechanics (Invited Paper)**, Kerry J. Vahala, California Institute of Technology . . . . . [6872-25]

11:05 am: **Sub-micron plasmon-based whispering gallery resonators (Invited Paper)**, Jeremy J. Baumberg, Robin M. Cole, Sumeet Mahajan, Philip N. Bartlett, Univ. of Southampton (United Kingdom) . . . . . [6872-26]

11:30 am: **Chip scale integrated microresonators for sensing applications (Invited Paper)**, Nan M. Jokerst, Sang-Yeon Cho, Lin Luan, Matthew Royal, Sabarni Palit, Duke Univ. . . . . [6872-27]

11:55 am: **Cavity (Q)ED with microsphere resonators (Invited Paper)**, Oliver Benson, Humboldt-Univ. zu Berlin (Germany); Leonardo de S Menezes, Univ. Federal de Pernambuco (Brazil) . . . . . [6872-28]

Lunch/Exhibition Break . . . . . 12:20 to 1:20 pm

## SESSION 7

**Room: Conv. Ctr. F1 . . . . . Tues. 1:20 to 3:45 pm**

### Microresonators IV

Session Chair: **Hans Joachim Eichler**, Technische Univ. Berlin (Germany)

1:20 pm: **Multiple coupled microresonator devices for advanced spectral shaping applications (Invited Paper)**, Vien Van, M. Ashok Prabhu, Univ. of Alberta (Canada) . . . . . [6872-29]

1:45 pm: **Optimization of resonant optical sensors (Invited Paper)**, Mikhail Sumetsky, OFS Fitel, LLC . . . . . [6872-30]

2:10 pm: **Investigating properties of surfaces and thin films using microsphere whispering-gallery modes (Invited Paper)**, Albert T. Rosenberger, Oklahoma State Univ. . . . . [6872-31]

2:35 pm: **Fast calculation of total quality factor of photonic-crystal-slab-based microcavity with two-dimensional finite-difference time-domain and plane-wave expansion technique**, Tao Liu, Roberto R. Panepucci, Florida International Univ. . . . . [6872-32]

2:55 pm: **Opto-fluidic ring resonator dye microlasers (Invited Paper)**, Siyka I. Shopova, Scott Lacey, Univ. of Missouri/Columbia; Po Zhang, Linn State Technical College; Hongying Zhu, Ian M. White, Xudong Fan, Univ. of Missouri/Columbia . . . . . [6872-33]

3:20 pm: **Disorder-induced high-Q cavities in photonic crystal waveguides (Invited Paper)**, Frank Vollmer, Juraj Topolancik, Harvard Univ. . . . . [6872-34]

Coffee Break . . . . . 3:45 to 4:00 pm

## SESSION 8

**Room: Conv. Ctr. F1 . . . . . Tues. 4:00 to 5:35 pm**

### Microresonators V

Session Chair: **Andrey B. Matsko**, Jet Propulsion Lab.

4:00 pm: **Kerr nonlinearity induced optical frequency comb generation in microcavities (Invited Paper)**, Tobias J. Kippenberg, Max Planck Institute of Quantum Optics (Germany) . . . . . [6872-39]

4:25 pm: **Reconfigurable silicon photonic circuits for telecommunication applications (Invited Paper)**, Tymon Barwicz, Milos A. Popovic, Fuwan Gan, Marcus S. Dahlem, Charles W. Holzwarth, Peter T. Rakich, Erich P. Ippen, Franz X. Kärtner, Henry I. Smith, Massachusetts Institute of Technology . . . . . [6872-35]

4:50 pm: **Improving quality factors of lithium niobate resonators (Invited Paper)**, Vladimir S. Ilchenko, OEwaves, Inc. . . . . [6872-36]

5:15 pm: **On the sensitivity of microwave photonic receiver based on a whispering gallery mode modulator**, Andrey B. Matsko, OEwaves, Inc. . . . . [6872-37]

## POSTERS-Tuesday

**Room: Civic Auditorium. . . . . Tues. 6:00 to 7:30 pm**

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

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**300W CW diode pumped Nd:YAG laser with improved divergence of output beam**, Igor V. Glukhikh, D. V. Efremov Scientific Research Institute of Electrophysical Apparatus (Russia); Sergey A. Dimakov, S.I. Vavilov State Optical Institute (Russia); Sergey V. Frolov, Sergey S. Polikarpov, D. V. Efremov Scientific Research Institute of Electrophysical Apparatus (Russia) . . . [6872-40]

**Control of spontaneous emission coupling factor in fiber-coupled microsphere resonators**, Hideaki Takashima, Hideki Fujiwara, Shigeki Takeuchi, Keiji Sasaki, Hokkaido Univ. (Japan); Masahide Takahashi, Kyoto Univ. (Japan) . . . . . [6872-41]

Technical Event  
**Laser Communications**  
 Tuesday January 22 2008  
 Room: Fairmont Hotel, Atherton · 7:30 to 9:00 pm  
 Chair: **Dr. Olga Korotkova**, Univ. of Miami

The technical group on Laser Communications will hold its annual meeting in conjunction with the Free-Space Laser Communication Technologies XX conference. All professionals involved in applications of free-space laser communications and supporting technologies are invited to participate in an open discussion on a variety of topics related to the challenges and advancement of the field. Members and visitors are invited to bring suggestions for discussion topics.

# Fiber Lasers V: Technology, Systems, and Applications

*Conference Chair:* **Jes Broeng**, Crystal Fibre A/S (Denmark); **Clifford Headley**, OFS Fitel, LLC *Conference Co-Chair:* **Denis V. Gapontsev**, IPG Photonics Corp.; **Dahv A. V. Kliner**, Sandia National Labs.

*Program Committee:* **Donald J. Harter**, IMRA America, Inc.; **Andreas Tünnermann**, Fraunhofer Institut für Angewandte Optik und Feinmechanik (Germany); **Richard W. Berdine**, Air Force Research Lab.; **Jay Walter Dawson**, Lawrence Livermore National Lab.; **Benjamin J. Eggleton**, The Univ. of Sydney (Australia); **Almantas Galvanauskas**, Univ. of Michigan; **Anderson Stevens Leônidas Gomes**, Univ. Federal de Pernambuco (Brazil); **Johan Nilsson**, Univ. of Southampton (United Kingdom); **Kyunghwan (Ken) Oh**, Yonsei Univ. (South Korea); **Jasbinder Singh Sanghera**, Naval Research Lab.; **Kanishka Tankala**, Nuferrn; **Ken-ichi Ueda**, The Univ. of Electro-Communications (Japan); **Robert G. Waarts**, Raydiance Inc.; **Luis A. Zenteno**, Corning Inc.; **Yoann Zaouter**, Bordeaux Univ. (France); **Benjamin G. Ward**, U.S. Air Force Academy

## Monday 21 January

### Introductory Remarks

Room: Conv. Ctr. J2 ..... Mon. 8:20 to 8:30 am

### SESSION 1

Room: Conv. Ctr. J2 ..... Mon. 8:30 to 11:20 am

#### Fiber Laser Market

*Session Chair:* **Denis V. Gapontsev**, IPG Photonics Corp.

8:30 am: **Penetration of fiber lasers into industrial market** (*Invited Paper*), Valentin P. Gapontsev, IPG Photonics Corp. .... [6873-01]

9:00 am: **The impact of fiber lasers in industrial marking and micro-fabrication applications** (*Invited Paper*), Stephen Norman, SPI Lasers plc (United Kingdom). .... [6873-02]

9:30 am: **Applications of fiber lasers beyond materials processing** (*Invited Paper*), Andrew J. W. Brown, Aculight Corp. .... [6873-03]

Coffee Break ..... 10:00 to 10:20 am

10:20 am: **Ultrafast fiber lasers and applications** (*Invited Paper*), Anatoly B. Grudinin, John R. Clowes, Fianium Ltd. (United Kingdom). .... [6873-04]

10:50 am: **High-energy laser joint technology office overview and joint high-power laser programs** (*Invited Paper*), Don D. Seeley, High Energy Laser Joint Technology Office. .... [6873-05]

### SESSION 2

Room: Conv. Ctr. J2 ..... Mon. 11:20 am to 12:50 pm

#### Fiber Designs

*Session Chair:* **Kanishka Tankala**, Nuferrn

11:20 am: **Air-clad fiber laser technology** (*Invited Paper*), Kim P. Hansen, Crystal Fibre A/S (Denmark) .... [6873-06]

11:50 am: **Measurement of bend-induced nonlinearities in large-mode-area fibers**, Jeffrey W. Nicholson, John M. Fini, Andrew D. Yablon, Paul S. Westbrook, Kenneth S. Feder, Clifford Headley, OFS Labs. .... [6873-07]

12:10 pm: **Suppression of higher order modes in large mode area amplifier fibers**, John M. Fini, OFS Labs. .... [6873-08]

12:30 pm: **Modal sensitivity analysis for single mode operation in large mode area fiber**, Benoit Sévigny, Mathieu Faucher, Yannick K. Lizé, ITF Labs. (Canada) .... [6873-09]

Lunch Break ..... 12:50 to 1:40 pm

### SESSION 3

Room: Conv. Ctr. J2 ..... Mon. 1:40 to 3:00 pm

#### Pulsed Sources

*Session Chair:* **Jay Walter Dawson**, Lawrence Livermore National Lab.

1:40 pm: **High SBS-threshold, narrowband, eyesafe pulses frequency doubled to 770.3 nm**, Matthias P. Savage-Leuchs, Christian Dilly, Aculight Corp.; Mark A. Stephen, NASA Goddard Space Flight Ctr. .... [6873-10]

2:00 pm: **50W single-mode linearly polarized high-peak-power pulsed fiber laser with tunable ns-µs pulse durations and kHz-MHz repetition rates**, Victor Khitrov, Bryce Samson, David P. Machewirth, Kanishka Tankala, Nuferrn ..... [6873-11]

2:20 pm: **Q-switched fiber lasers with controlled pulse shape**, Jean-Philippe Feve, James Morehead, Siamak Makki, Justin Franke, Martin H. Muendel, JDSU; Chiachi Wang, Guoxing Zhao, Nuferrn ..... [6873-12]

2:40 pm: **Fiber laser front end for the Advanced Radiographic Capability (ARC) on the National Ignition Facility (NIF)**, Jay W. Dawson, Henry Phan, Michael J. Messerly, Raymond J. Beach, Craig W. Siders, C.P.J. Barty, Lawrence Livermore National Lab. .... [6873-13]

Coffee Break ..... 3:00 to 3:20 pm

### SESSION 4

Room: Conv. Ctr. J2 ..... Mon. 3:20 to 5:50 pm

#### Bulk-Fiber Hybrid Lasers

*Session Chairs:* **Dahv A. V. Kliner**, Lawrence Livermore National Lab.; **Norman Hodgson**, Coherent, Inc.

Joint session with Conference 6871: Solid State Lasers XVII: Technology and Devices

3:20 pm: **Power scaling of fiber-based amplifiers seeded by microchip lasers** (*Invited Paper*), Jean-Philippe Feve, JDSU ..... [6871-26]

3:50 pm: **1.33 MW peak power, 60ps, 50-kHz repetition-rate pulsed microchip laser fiber amplifier system**, Dirk Nodop, Jens Limpert, Andreas Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) ..... [6873-14]

4:10 pm: **Fiber amplifier design for high-power picosecond UV generation**, Michael Kauf, Sami Hendow, Bernard Fidric, Wolfgang Gries, Spectra-Physics ..... [6871-27]

4:30 pm: **Hybrid fiber MOPA-bulk amplifier system for frequency conversion**, Andrei N. Starodoumov, Stuart McLean, Alexander Steinmetz, Coherent, Inc. .... [6871-28]

4:50 pm: **Impact of energy-transfer-upconversion on the performance of hybrid Er:YAG lasers**, Ji Won Kim, W. Andrew Clarkson, Optoelectronics Research Ctr. (United Kingdom) ..... [6871-29]

5:10 pm: **High-power laser with Nd:YAG single-crystal fiber grown by micro-pulling down technique**, Damien Sangla, Institut d'Optique (France) and Univ. de Claude Bernard Lyon I (France); Julien Didierjean, Institut d'Optique (France); Nicolas Aubry, Didier Perrodin, FiberCryst (France); Gaëlle Lucas-Leclin, Balembos François, Institut d'Optique (France); Kheirredine Lebbou, Univ. Claude Bernard Lyon I (France); Patrick M. Georges, Institut d'Optique (France); Alain Brenier, Univ. Claude Bernard Lyon I (France); Fourmigué Jean-Marie, FiberCryst (France); Olivier Tillement, Univ. Claude Bernard Lyon I (France) ..... [6871-30]

5:30 pm: **Hybrid bulk/fibre MOPA system based on Yb:KYW laser**, Sergey M. Kobtsev, Tekhnoscan JSC (Russia); Sergey Kukarin, Novosibirsk State Univ. (Russia) ..... [6871-31]

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## Tuesday 22 January

### SESSION 5

Room: Conv. Ctr. J2 ..... Tues. 9:00 to 10:30 am

#### IR-Sources

Session Chair: **Anderson Stevens Leônidas Gomes**,  
Univ. Federal de Pernambuco (Brazil)

- 9:00 am: **Power scaling of high-efficiency Tm-doped fiber lasers** (*Invited Paper*), Peter F. Moulton, Q-Peak, Inc. .... [6873-15]  
 9:30 am: **415W single-mode CW thulium fiber laser in all-fiber format**, Mikhail Meleshkevich, Nikolai Platonov, Denis V. Gapontsev, Anton Drozhzhin, Valentin P. Gapontsev, IPG Photonics Corp.; Vladimir Sergeev, IPG Laser GmbH (Germany). .... [6873-16]  
 9:50 am: **High-efficiency 200W polarization maintaining 2µm fiber amplifier**, Gavin P. Frith, Bryce N. Samson, Adrian L. G. Carter, David P. Machewirth, Julia Farroni, Kanishka Tankala, Nufem ..... [6873-17]  
 10:10 am: **Multiwatt, highly efficient optical parametric generation of an actively pulsed Yb-doped fiber MOPA**, Fabio Di Teodoro, Aculight Corp. .... [6873-18]  
 Coffee Break ..... 10:30 to 11:00 am

### SESSION 6

Room: Conv. Ctr. J2 ..... Tues. 11:00 am to 12:40 pm

#### Narrowlinewidth Sources and SBS Suppression

Session Chair: **Luis A. Zenteno**, Corning Inc.

- 11:00 am: **High-power Yb-doped fiber laser-based lidar for space weather**, Chad G. Carlson, Peter D. Dragic, Benedikt W. Graf, R. K. Price, James J. Coleman, Gary R. Swenson, Univ. of Illinois at Urbana-Champaign .. [6873-19]  
 11:20 am: **All-fiber 194 W single-frequency single-mode Yb-doped master-oscillator power-amplifier**, Marc D. Mermelstein, OFS Labs.; Khush Brar, OFS Fitel, LLC; Matt Andrejco, Andrew D. Yablon, OFS Labs.; Michael Fishteyn, OFS Fitel, LLC; Clifford Headley III, David J. DiGiovanni, OFS Labs. .... [6873-20]  
 11:40 am: **Power scaling monolithic PM-LMA fiber amplifiers towards 1kWatt**, Bryce N. Samson, John P. Edgecumbe, Josh Galipeau, Kanishka Tankala, Michael O'Connor, David P. Machewirth, Nufem. .... [6873-21]  
 12:00 pm: **11.2 dB SBS gain suppression in a large mode area Yb-doped optical fiber**, Marc D. Mermelstein, Matthew J. Andrejco, John M. Fini, Andrew D. Yablon, Clifford Headley III, David J. DiGiovanni, OFS Labs.; Alan H. McCurdy, OFS Fitel, LLC ..... [6873-22]  
 12:20 pm: **Suppression of stimulated Brillouin scattering in single-frequency multi-kilowatt fiber amplifiers**, Joshua E. Rothenberg, Northrop Grumman Space Technology ..... [6873-23]  
 Lunch/Exhibition Break ..... 12:40 to 2:00 pm

### SESSION 7

Room: Conv. Ctr. J2 ..... Tues. 2:00 to 4:20 pm

#### Femtosecond Lasers

Session Chair: **Donald J. Harter**, IMRA America, Inc.

- 2:00 pm: **High-energy femtosecond fiber lasers** (*Invited Paper*), Frank W. Wise, Andy Chong, William Renninger, Cornell Univ. .... [6873-24]  
 2:30 pm: **Optimization of higher order mode fibers for dispersion management of femtosecond fiber lasers**, Lars Gruner-Nielsen, OFS Fitel Denmark ApS (Denmark); Siddharth Ramachandran, OFS Labs.; Kim G. Jespersen, OFS Fitel Denmark ApS (Denmark); Samir Ghalimi, OFS Labs.; Martin Garmund, Bera Pálsdóttir, OFS Fitel Denmark ApS (Denmark) ..... [6873-25]  
 2:50 pm: **200 nJ pulse energy femtosecond Yb-doped dispersion compensation free fiber oscillator**, Buelend Ortac, Oliver Schmidt, Thomas Schreiber, Friedrich-Schiller-Univ. Jena (Germany); Ammar Hideur, Univ. de Rouen (France); Jens Limpert, Andreas Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) ..... [6873-26]  
 Coffee Break ..... 3:10 to 4:00 pm  
 3:40 pm: **High-average power femtosecond pulse generation from a Yb-doped large-mode-area microstructure fiber laser**, Ammar A. Hideur, Caroline Lecaplain, Clovis Chédot, Univ. de Rouen (France); Bülend Ortac, Jens Limpert, Friedrich-Schiller-Univ. Jena (Germany) ..... [6873-27]  
 4:00 pm: **Widely tunable femtosecond fiber laser**, Alexej A. Sysoliatin, Vladimir F. Khopin, A.M. Prokhorov General Physics Institute (Russia); Sergej Muraviev, Alexei V. Andrianov, Arcady V. Kim, Institute of Applied Physics (Russia) ..... [6873-28]

### SESSION 8

Room: Conv. Ctr. J2 ..... Tues. 4:20 to 5:40 pm

#### Fiber Damage, UV Generation and Long Period Gratings

Session Chair: **Benjamin G. Ward**, U.S. Air Force Academy

- 4:20 pm: **Rate equation model of bulk optical damage of silica, and the influence of polishing on surface optical damage of silica**, Arlee V. Smith, Binh T. Do, Sandia National Labs.; Rod L. Schuster, David R. Collier, Alpine Research Optics Corp. .... [6873-29]  
 4:40 pm: **Analytical solutions for nonlinear waveguide equation under Gaussian mode approximation**, Liang Dong, IMRA America, Inc. .... [6873-30]  
 5:00 pm: **Efficient high-power fiber-laser-produced plasma extreme UV generation using tin-doped water droplet targets**, Kai-Chung Hou, Aghapi G. Mordovanakis, John A. Nees, Almantas Galvanauskas, Univ. of Michigan ..... [6873-31]  
 5:20 pm: **Long-period gratings written in large-mode-area photonic crystal fiber**, Dirk Nodop, Sebastian Linke, Jens Limpert, Andreas Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) ..... [6873-32]

### POSTERS-Tuesday

Room: Civic Auditorium. .... Tues. 6:00 to 7:30 pm

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

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**Square-root law of turbulence-induced spectral broadening in Raman fiber lasers**, Sergey A. Babin, Dmitriy Churkin, Arsen E. Ismagulov, Sergey I. Kablukov, Evgeny V. Podivilov, Institute of Automation and Electrometry (Russia) ..... [6873-69]

**Characterization of ultra-long Raman fiber lasers**, Sergey A. Babin, Institute of Automation and Electrometry (Russia); Vassilis Karalekas, Aston Univ. (United Kingdom); Evgeny V. Podivilov, Institute of Automation and Electrometry (Russia); Vladimir K. Mezentsev, Paul Harper, Juan D. Ania-Castanon, Sergei K. Turitsyn, Aston Univ. (United Kingdom) ..... [6873-60]

**New mechanism of the mode coupling in multicore fiber lasers**, Sergey A. Babin, Institute of Automation and Electrometry (Russia); Andrey S. Kurkov, A.M. Prokhorov General Physics Institute (Russia); Sergey I. Kablukov, Ivan A. Lobach, Institute of Automation and Electrometry (Russia) ..... [6873-61]

**SBS mitigation with 'two-tone' amplification**, Timothy J. Bronder, Thomas M. Shay, Athanasios T. Gavrielides, Craig A. Robin, Chunte A. Lu, Air Force Research Lab. .... [6873-66]

**Novel multiple-frequency Q-switched fiber laser by using sampled FBG and PZT**, Xueping Cheng, Li Xia, Wai Chern TAN, Ping Shum, Nanyang Technological Univ. (Singapore); Rui Fen Wu, DSO National Labs. (Singapore) ..... [6873-71]

**High-power monolithically integrated all-fiber laser design using single-chip multimode pumps for high-reliability operation**, Mathieu Faucher, Yannick K. Lize, Roger Perreault, Eric Villeneuve, Benoit Sevigny, Alexandre Wetter, Nigel Holehouse, ITF Labs. (Canada) ..... [6873-63]

**A 2 MHz, sub-ns, low-jitter diode seeder and 36 dB Yb-fiber amplifier**, Jens Geiger, Anna Thomasch, Markus Bartram, Bernhard Zintzen, Dieter Hoffmann, Fraunhofer-Institut für Lasertechnik (Germany) ..... [6873-81]

**Speckle reduction in multimode fiber with a piezoelectric transducer in radial vibration for fiber laser marking and display applications**, Woosung Ha, Sejin Lee, Yonsei Univ. (South Korea); Yongmin Jung, Junki Kim, Kwangju Institute of Science and Technology (South Korea); Kyunghwan Oh, Yonsei Univ. (South Korea) ..... [6873-67]

Wednesday 23 January

SESSION 9

Room: Conv. Ctr. J2 .....Wed. 8:20 to 10:20 am

Fiber Fabrication and New Materials

Session Chair: Jasbinder Singh Sanghera, Naval Research Lab.

8:20 am: **High-power pulsed amplifier with low-pulse deformation, excellent beam quality and higher energy extraction using special designed ytterbium double cladding fiber having high and flat absorption with negligible photodarkening**, B. Morasse, E. Gagnon, S. Chatigny, P. de Sandro, CorActive High-Tech Inc. (Canada)..... [6873-34]

8:40 am: **Recent advances in phosphate glass fiber and its application to compact high-power fiber lasers** (*Invited Paper*), Axel Schülzgen, Lifeng Li, Shigeru Suzuki, Valery L. Temyanko, X. Zhu, College of Optical Sciences/The Univ. of Arizona; Shubin Jiang, Christine Spiegelberg, NP Photonics, Inc.; R. M. Rogojan, J. Albert, Nasser N. Peyghambarian, College of Optical Sciences/The Univ. of Arizona ..... [6873-33]

9:10 am: **Er<sup>3+</sup> and Dy<sup>3+</sup> doped Ge<sub>20</sub>Ga<sub>5</sub>Sb<sub>10</sub>Se<sub>65</sub> glass fibers for mid-IR laser sources**, Virginie Moizan, Virginie Nazabal, Jean Luc Adam, Univ. de Rennes I (France); Frederic Smektala, Univ. de Bourgogne (France); Guillaume Canat, ONERA (France); Jean Louis Doualan, Richard Moncorgé, ENSICAEN (France) ..... [6873-35]

9:30 am: **A new material for high-power laser fibers**, Andreas Langner, Gerhard F. Schötz, Mario Such, Thomas Kayser, Heraeus Quarzglas GmbH & Co. KG (Germany); Volker Reichel, Stephan Grimm, Johannes Kirchof, Institut für Photonische Technologien e.V. (Germany); Volker K. Krause, Georg Rehmann, Laserline GmbH (Germany) ..... [6873-36]

9:50 am: **Prospects for laser-DEW systems** (*Invited Paper*), David H. Titterton, Defence Science and Technology Lab. (United Kingdom) ..... [6873-37]

Plenary Session

Room: Montgomery Theater · Wed. 10:30 am to 12:30 pm

10:30 am: **Laser Processing and Chemistry: Applications in Nanopatterning, Material Synthesis and Biotechnology** (*Invited Paper*), Dieter Bäuerle, Johannes Kepler Univ. Linz (Austria)

11:10 am: **The Long Journey from Idea to Industrial Success** (*Invited Paper*), Holger Schlueter, TRUMPF Inc.

11:50 am: **Building Coherence in Collaboration: A Case Study with the World's Most Powerful, Tunable Laser** (*Invited Paper*), H. Fred Dylla, American Institute of Physics

See p. 24 for details.

Lunch/Exhibition Break ..... 12:30 to 1:50 pm

SESSION 10

Room: Conv. Ctr. J2 .....Wed. 1:50 to 3:40 pm

Coherent and Spectral Combination

Session Chair: Richard W. Berdine, Air Force Research Lab.

1:50 pm: **Passive coherent addition of lasers using planar interferometric combiners** (*Invited Paper*), Vardit Eckhouse, Amiel A. Ishaaya, Moti Fridman, Nir Davidson, Asher A. Friesem, Weizmann Institute of Science (Israel) .. [6873-38]

2:20 pm: **External and common-cavity high-spectral density beam combining of high-power fiber lasers**, Oleksiy G. Andrusyak, College of Optics & Photonics/Univ. of Central Florida; Igor V. Ciapurin, Vadim I. Smirnov, OptiGrate; George B. Venus, Leonid B. Glebov, College of Optics & Photonics/Univ. of Central Florida ..... [6873-39]

2:40 pm: **Passive coherent phasing of fiber laser arrays**, Joshua E. Rothenberg, Northrop Grumman Space Technology ..... [6873-40]

3:00 pm: **Coherent beam combining of fiber amplifier arrays and application to laser beam propagation through turbulent atmosphere**, Pierre Bourdon, Baya Bennai, Veronique Jolivet, Bernard G. Moreau, Olivier Vasseur, ONERA (France); Yves Jaouen, Ctr. National de la Recherche Scientifique (France) ..... [6873-41]

3:20 pm: **Spectral combining of pulsed fiber lasers: scaling considerations**, Oliver Schmidt, Sandro Klingebiel, Buelend Ortac, Fabian Röser, Frank Brückner, Tina Clausnitzer, Ernst-Bernhard Kley, Jens Limpert, Andreas Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) ..... [6873-42]

Coffee Break ..... 3:40 to 4:10 pm

**UV conversion of a photonic crystal fiber amplifier system**, Eric C. Honea, Matthias P. Savage-Leuchs, Pat Jones, Christian E. Dilley, Aculight Corp..... [6873-77]

**Analytical model for the design of external-cavity passively Q-switched fiber lasers**, Je-Yan Huang, H. C. Liang, Kuan-Wei Su, Yung-Fu Chen, National Chiao Tung Univ. (Taiwan)..... [6873-75]

**Coherent beam combining using optical phase lock loops**, Wei Liang, Naresh Satyan, Amnon Yariv, California Institute of Technology; Anthony Kewitsch, George Rakuljic, Telaris, Inc.; Firooz Aflatouni, Hossein Hashemi, Univ. of Southern California ..... [6873-80]

**Compact frequency doubled YB fiber laser at high PRF**, John D. Minelly, Roy D. Mead, Eric Honea, Pat Jones, Aculight Corp. .... [6873-76]

**Performance and reliability of pulsed 1060 nm laser modules**, Stefan Mohrdiek, Jörg Troger, Uli Pfeiffer, Tomas Pliska, Dominik Jaeggi, Norbert Lichtenstein, Bookham AG (Switzerland) ..... [6873-72]

**High-power femtosecond Yb-doped single-polarization photonic crystal fiber laser**, Buelend Ortac, Friedrich-Schiller-Univ. Jena (Germany); Caroline Lecaplain, Ammar Hideur, Univ. de Rouen (France); Jens Limpert, Andreas Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) ..... [6873-79]

**An actively mode-locked fiber laser**, John P. Powers, Phillip E. Pace, Naval Postgraduate School..... [6873-65]

**Frequency doubling of an agile pulsed fiber laser emitting variable optical waveforms with flexible pulse parameters**, Benoit Reid, Eugene Kosenko, Richard Murison, Pyrophotonics Lasers Inc. (Canada)..... [6873-73]

**Comparison of microchip and distributed feedback laser as a seed source for high-power eyesafe amplifiers**, Matthias P. Savage-Leuchs, Christian E. Dilley, Aculight Corp..... [6873-78]

**Comparison of photodarkening in Yb-doped fibers**, Mikko J. Söderlund, Helsinki Univ. of Technology (Finland); Simo K. Tammela, Corelase Oy (Finland); Sanna E. Yliniemi, Joan J. Montiel, Seppo K. Honkanen, Helsinki Univ. of Technology (Finland) ..... [6873-64]

**Short-length 2 μm Tm<sup>3+</sup>-doped fiber lasers**, Yulong Tang, Jianqiu Xu, Shanghai Institute of Optics and Fine Mechanics (China) ..... [6873-74]

**High-power cladding light strippers**, Alexandre Wetter, Mathieu Faucher, Benoit Sevigny, ITF Labs. (Canada) ..... [6873-70]

Technical Event

Laser Communications

Tuesday January 22 2008

Room: Fairmont Hotel, Atherton · 7:30 to 9:00 pm

Chair: Dr. Olga Korotkova, Univ. of Miami

The technical group on Laser Communications will hold its annual meeting in conjunction with the Free-Space Laser Communication Technologies XX conference. All professionals involved in applications of free-space laser communications and supporting technologies are invited to participate in an open discussion on a variety of topics related to the challenges and advancement of the field. Members and visitors are invited to bring suggestions for discussion topics.

# Conference 6873

## SESSION 11

Room: Conv. Ctr. J2 ..... Wed. 4:10 pm

### Post-Deadline Session

Session Chairs: **Clifford Headley**, OFS Labs.;  
**Jes Broeng**, Crystal Fibre A/S (Denmark)

Photonics West is the top ranked conference on High-Power Fiber Lasers and Systems. This year's conference will feature an exciting Post-Deadline session to allow novel high-quality work to be presented.

**The submission deadline for the Post-Deadline session is January 14th. Two-page submissions are required.**

Accepted papers will be printed as submitted without further revision. To submit, send word document and PDF directly to SPIE Program Coordinator Buffy Fox at buffyf@spie.org.

## Thursday 24 January

### SESSION 12

Room: Conv. Ctr. J2 ..... Thurs. 9:00 to 10:20 am

### Supercontinuum Generation, Mode Profiling, and Thermal Management

Session Chair: **Andreas Tuennermann**, Fraunhofer Institut für Angewandte Optik und Feinmechanik (Germany)

9:00 am: **Mode profiling of optical fibers at high-laser powers**, Peter C. Nielsen, David B. Petersen, Ronni B. Simonsen, Dines N. Erschens, Mads F. Lilbaek, Lars Eskildsen, Karsten Rottwitt, Hans N. Hansen, Danmarks Tekniske Univ. (Denmark) ..... [6873-44]

9:20 am: **Optimization of heat transfer in multi-kW fiber lasers**, Bernhard M. Zintzen, RWTH Aachen Univ. (Germany); Andreas Emmerich, Jens Geiger, Hans-Dieter Hoffmann, Fraunhofer-Institut für Lasertechnik (Germany); Peter Loosen, RWTH Aachen Univ. (Germany) ..... [6873-45]

9:40 am: **High-power continuous wave supercontinuum**, Burlly A. Cumberland, John C. Travers, Sergei V. Popov, James R. Taylor, Imperial College London (United Kingdom) ..... [6873-46]

10:00 am: **Highly nonlinear fibers for very wideband supercontinuum generation**, Lars Gruner-Nielsen, Bera Pálsdóttir, OFS Fitel Denmark ApS (Denmark) ..... [6873-47]

Coffee Break ..... 10:20 to 10:50 am

### SESSION 13

Room: Conv. Ctr. J2 ..... Thurs. 10:50 am to 12:30 pm

### Photodarkening

Session Chair: **Johan Nilsson**, Univ. of Southampton (United Kingdom)

10:50 am: **Photodarkening in Ytterbium co-doped silica material**, Kent E. Mattsson, Stig Nissen Knudsen, Crystal Fibre A/S (Denmark) ..... [6873-48]

11:10 am: **Measurement of high-photodarkening resistance in heavily Yb<sup>3+</sup>-doped phosphate fibers**, Yin-Wen Lee, Supriyo Sinha, Michel J. F. Digonnet, Robert L. Byer, Stanford Univ.; Shubin Jiang, NP Photonics, Inc. .... [6873-49]

11:30 am: **Reduction of photodarkening in Ytterbium doped fiber lasers**, Magnus Engholm, Lars Norin, Acreo FiberLab (Sweden) ..... [6873-50]

11:50 am: **Radiation damage effects in doped fiber materials**, Brian P. Fox, Kelly Simmons-Potter, The Univ. of Arizona; William J. Thomes, Jr., NASA Goddard Space Flight Ctr.; Dorothy C. Meister, Ray P. Bambha, Dahv A. V. Kliner, Sandia National Labs. .... [6873-51]

12:10 pm: **Photodarkening in Yb-doped silica fibers: influence of the atmosphere during preform collapsing**, Sylvia Jetschke, Sonja Unger, Anka Schwuchow, Johannes Kirchhof, Institut für Photonische Technologien e.V. (Germany) ..... [6873-52]

Lunch/Exhibition Break ..... 12:30 to 1:50 pm

## SESSION 14

Room: Conv. Ctr. J2 ..... Thurs. 1:50 to 4:50 pm

### Chirped Pulse Amplification

Session Chair: **Yoann Zaouter**, Bordeaux Univ. (France)

1:50 pm: **Carrier phase stabilization in fiber chirped pulse amplification systems (Invited Paper)**, Ingmar Hartl, Martin E. Fermann, IMRA America, Inc. .... [6873-53]

2:20 pm: **Large-mode-area Er-doped fiber chirped pulse amplification system for high-energy sub-picosecond pulses at 1.55  $\mu\text{m}$** , Tolga Yilmaz, Laurent Vaissie, Mehmetcan Akbulut, Tim Booth, Raydiance, Inc.; Jayesh Jasapara, Matthew J. Andrejco, Andrew D. Yablon, Clifford Headley III, David J. DiGiovanni, OFS Labs. .... [6873-54]

2:40 pm: **High-pulse-energy/peak-power and high-gain Er-doped pulse fiber amplifier**, Fabio Di Teodoro, Aculight Corp. .... [6873-55]

3:00 pm: **The influence of the spectral amplitude on the performance of chirped pulse large mode-area fiber amplifiers**, Damian N. Schimpf, Jens Limpert, Andreas Tünnermann, Friedrich Schiller Univ. Jena (Germany)[6873-56]

Coffee Break ..... 3:20 to 3:50 pm

3:50 pm: **Sub 30 fs pulses from 2 MHz repetition rate fiber amplifier: pumped optical parametric amplifier**, Jan Rothhardt, Steffen Hädrich, Jens Limpert, Friedrich-Schiller-Univ. Jena (Germany); Andreas Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) and Fraunhofer Institute for Applied Optics and Precision Engineering (Germany); Fabian Röser, Büilent Ortac, Friedrich-Schiller-Univ. Jena (Germany) ..... [6873-57]

4:10 pm: **Environmentally-stable wave-breaking-free mode-locked Yb-doped all-fiber laser**, Buelend Ortac, Marco Ploetner, Thomas Schreiber, Jens Limpert, Andreas Tuennermann, Friedrich-Schiller-Univ. Jena (Germany) ..... [6873-58]

4:30 pm: **High-repetition rate mode-locked ytterbium fiber laser using dichroic fiber mirrors and photonic bandgap fiber technology**, Lasse Orsila, Robert Herda, Oleg G. Okhotnikov, Tampere Univ. of Technology (Finland) ..... [6873-59]

### Student Prize - Closing announcements

Room: Conv. Ctr. J2 ..... Thurs. 4:50 pm

Prize donated by:



### Best Student Presentation Award

We are pleased to announce that a prize in the amount of \$1,000 US will be awarded to the best student oral presentation in the conference on Fiber Lasers V: Technology, Systems, and Applications at SPIE's Photonics West Symposium. This year's prize money has been donated by IPG Photonics Corp. and the award will be presented by an IPG Photonics representative.

### Student Paper Competition

Qualifying student presentations will be evaluated by a conference steering committee headed by last year's student prize winner, Yoann Zaouter. To be eligible for consideration a student must be listed as an author on an accepted paper, must have conducted the majority of the work being presented, and must make the oral presentation. The prize will be awarded based on the quality of the presentation and not on the content of the submitted abstract. Any student papers presented in the Late Breaking Developments session will also be eligible for this award. The winner of the Best Student Presentation Award will be announced during the Student Award Session.

# High Energy/Average Power Lasers and Intense Beam Applications III

Conference Chairs: **Steven J. Davis**, Physical Sciences Inc.; **Michael C. Heaven**, Emory Univ.; **J. Thomas Schriempf**, The Pennsylvania State Univ.

Program Committee: **David L. Carroll**, CU Aerospace LLC; **Jarmila Kodymova**, Fyzikální Ústav (Czech Republic); **Timothy J. Madden**, Air Force Research Lab.; **William E. McDermott**, Univ. of Denver; **Wilson Terry Rawlins**, Physical Sciences Inc.

## Monday 21 January

### SESSION 1

Room: Conv. Ctr. G ..... Mon. 8:40 to 10:30 am

#### COIL and EOIL

Session Chair: **Steven J. Davis**, Physical Sciences Inc.

8:40 am: **Research on advanced chemical and discharge oxygen-iodine lasers** (*Invited Paper*), Jarmila Kodymová, Otomar Spalek, Josef Schmiedberger, Vít Jirásek, Miroslav Censky, Fyzikální Ústav (Czech Republic) ..... [6874-01]

9:10 am: **A method for comparison of computational fluid dynamic simulation and planar laser induced fluorescence images for a supersonic flowfield**, Timothy J. Madden, Carrie Noren, Air Force Research Lab.; Luke Emmert, The Univ. of New Mexico; Michael C. Heaven, Emory Univ. . [6874-02]

9:30 am: **Prediction of I<sub>2</sub>P<sub>1/2</sub>→P<sub>3/2</sub> transition lineshapes from 3-D, time dependent simulations of chemical oxygen-iodine laser (COIL) flowfields**, Timothy J. Madden, Air Force Research Lab. .... [6874-03]

9:50 am: **Multi-pathway I<sub>2</sub> dissociation model for COIL**, Valeriy N. Azyazov, P.N. Lebedev Physical Institute (Russia); Michael C. Heaven, Emory Univ.; Sergey Y. Pichugin, P.N. Lebedev Physical Institute (Russia) ..... [6874-04]

10:10 am: **A study on an all gas-phase iodine laser-based on NCl<sub>3</sub> reaction system**, Taizo Masuda, Keio Univ. (Japan); Tomonari Nakamura, Masamori Endo, Tokai Univ. (Japan); Taro Uchiyama, Keio Univ. (Japan) ..... [6874-06]

Coffee Break ..... 10:30 to 11:00 am

### SESSION 2

Room: Conv. Ctr. G ..... Mon. 11:00 am to 12:20 pm

#### COIL and EOIL II

Session Chair: **Michael C. Heaven**, Emory Univ.

11:00 am: **Progress toward demonstration of a KW-class EOIL laser**, Alan E. Hill, Plasmatronics, Inc. and Texas A&M Univ. .... [6874-07]

11:20 am: **Production of metastable singlet oxygen in the reaction of nitric oxide with active oxygen**, Wilson T. Rawlins, Seonkyung Lee, Steven J. Davis, Physical Sciences Inc. .... [6874-08]

11:40 am: **Improved production of O<sub>2</sub>(a<sup>1</sup>Δ) in capacitively-coupled radio-frequency discharges**, Brian S. Woodard, Joseph W. Zimmerman, Univ. of Illinois at Urbana-Champaign; Joseph T. Verdeyen, David L. Carroll, T.H. Field, Gabriel F. Benavides, Andrew D. Palla, CU Aerospace LLC; Wayne C. Solomon, Univ. of Illinois at Urbana-Champaign ..... [6874-09]

12:00 pm: **EOIL power scaling in a 1-5 kW supersonic discharge-flow reactor**, Steven J. Davis, Seonkyung Lee, David B. Oakes, Julia Haney, John C. Magill, Dwane A. Paulsen, Paul Cataldi, Kristin L. Galbally-Kinney, Danthu Vu, Wilson T. Rawlins, Physical Sciences Inc. .... [6874-10]

Lunch Break ..... 12:20 to 1:40 pm

### SESSION 3

Room: Conv. Ctr. G ..... Mon. 1:40 to 2:40 pm

#### Optically Pumped Lasers

Session Chair: **Michael C. Heaven**, Emory Univ.

1:40 pm: **Hydrocarbon-free resonance transition 795-nm Rubidium laser**, Sheldon S. Q.Wu, Thomas F. Soules, Ralph H. Page, Scott C. Mitchell, Vernon K. Kanz, Raymond J. Beach, Lawrence Livermore National Lab. .... [6874-11]

2:00 pm: **Progress in alkali lasers development**, Boris V. Zhdanov, Randall J. Knize, U.S. Air Force Academy ..... [6874-12]

2:20 pm: **Diode-pumped alkali vapor lasers for high-power applications**, Jason S. Zweiback, General Atomics; William Krupke, WFK Lasers; Paul Banks, Aleksey Komashko, Justin Nash, General Atomics ..... [6874-13]

### SESSION 4

Room: Conv. Ctr. G ..... Mon. 2:40 to 3:00 pm

#### Beam Propagation

Session Chair: **Wilson Terry Rawlins**, Physical Sciences Inc.

2:40 pm: **Long-term stabilized two beam combination laser system with amplifiers using the phase controlled stimulated Brillouin scattering phase conjugate mirrors**, Hong Jin Kong, Korea Advanced Institute of Science and Technology (South Korea) ..... [6874-14]

Coffee Break ..... 3:00 to 3:30 pm

### SESSION 5

Room: Conv. Ctr. G ..... Mon. 3:30 to 4:30 pm

#### Gas Discharge Lasers

Session Chair: **David L. Carroll**, CU Aerospace LLC

3:30 pm: **Electra: durable repetitively pulsed angularly multiplexed KrF laser system** (*Invited Paper*), Matthew F. Wolford, Matthew C. Myers, John L. Giuliani, John D. Sethian, Patrick M. Burns, Frank Hegele, Reginald Jaynes, Naval Research Lab. .... [6874-16]

3:50 pm: **Small-sized gas-discharge pulse-periodical UV- and VUV-TEA lasers**, Boris A. Kozlov, Sergey M. Karabanov, Vladimir A. Korotchenko, Vladimir I. Solovoyov, Dmitriy V. Suvorov, Ryazan State Radioengineering Academy (Russia) ..... [6874-17]

4:10 pm: **Recent developments in UV laser micromachining**, Ralph F. Delmdahl, Rainer Paetzel, Coherent GmbH (Germany) ..... [6874-25]

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## Tuesday 22 January

### POSTERS-Tuesday

Room: Civic Auditorium ..... Tues. 6:00 to 7:30 pm

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Tuesday morning starting at 10:00 am in the Civic Auditorium, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

**High-intensity subpicosecond vacuum ultraviolet laser system**, Shoichi Kubodera, Masanori Kaku, Yuta Taniguchi, Akira Hosotani, Masahito Katto, Atsushi Yokotani, Univ. of Miyazaki (Japan); Noriaki Miyanaga, Kunioki Mima, Osaka Univ. (Japan) ..... [6874-21]

**Industrial application of high-power disk lasers**, Rüdiger Brockmann, Kurt Mann, TRUMPF Laser GmbH & Co. KG; Holger Schlueter, David Havrilla, TRUMPF Inc. .... [6874-22]

**Techniques of single amplified ultra-short laser pulse in high-intensity ultra-short pulse UV laser system**, Junewen Chen, Chung-Hua Univ. (Taiwan) ..... [6874-23]

### Technical Event

### Laser Communications

Tuesday January 22 2008

Room: Fairmont Hotel, Atherton · 7:30 to 9:00 pm

Chair: **Dr. Olga Korotkova**, Univ. of Miami

The technical group on Laser Communications will hold its annual meeting in conjunction with the Free-Space Laser Communication Technologies XX conference. All professionals involved in applications of free-space laser communications and supporting technologies are invited to participate in an open discussion on a variety of topics related to the challenges and advancement of the field. Members and visitors are invited to bring suggestions for discussion topics.

### Make time for the Photonics West Exhibition

San Jose Convention Center, Exhibition Halls 1-3,  
Exhibition Foyer and South Halls 1-2

Tuesday 22 January ..... 10:00 am to 5:00 pm

Wednesday 23 January ..... 10:00 am to 5:00 pm

Thursday 24 January ..... 10:00 am to 4:00 pm

See new applications in action at the  
Product Demonstrations.

See pp. 37-39 for details.



# Nonlinear Frequency Generation and Conversion: Materials, Devices, and Applications VII

Conference Chair: **Peter E. Powers**, Univ. of Dayton

Program Committee: **Darrell J. Armstrong**, Sandia National Labs.; **Pinhas Blau**, Soreq Nuclear Research Ctr. (Israel); **Majid Ebrahim-Zadeh**, Institut de Ciències Fotòniques (Spain); **Robert C. Eckardt**, Cleveland Crystals, Inc.; **Peter Günter**, ETH Zürich (Switzerland); **Richard Hammond**, U.S. Army Research Office; **Angus J. Henderson**, Aculight Corp.; **Yehoshua Y. Kalisky**, Nuclear Research Ctr. Negev (Israel); **Thomas J. Kulp**, Sandia National Labs.; **Fredrik Laurell**, Kungliga Tekniska Högskolan (Sweden); **Yun-Shik Lee**, Oregon State Univ.; **Michael Millard**, ITT Industries; **Rita D. Peterson**, Air Force Research Lab.; **Kenneth L. Schepler**, Air Force Research Lab.; **Peter G. Schunemann**, BAE Systems; **Ramesh K. Shori**, Naval Air Warfare Ctr.; **Konstantin L. Vodopyanov**, Stanford Univ.

## Tuesday 22 January

### SESSION 1

Room: Hilton Hotel: Almaden I ..... Tues. 8:00 to 10:10 am

#### Nonlinear Optical Devices I

Session Chair: **Peter E. Powers**, Univ. of Dayton

- 8:00 am: **Digital image processing for characterizing domain structure of periodically poled nonlinear crystals**, James Alverson, Univ. of Dayton and Air Force Research Lab.; Peter Powers, Univ. of Dayton; Kenneth Schepler, Air Force Research Lab. .... [6875-01]
- 8:20 am: **Measuring and predicting the amplitude and phase for three-wave interactions**, Anup R. Pandey, Joseph W. Haus, Peter E. Powers, Univ. of Dayton. .... [6875-02]
- 8:40 am: **Room temperature high-power frequency conversion in periodically poled quasi-phase matching crystals (Invited Paper)**, Mordechai Katz, Soreq Nuclear Research Ctr. (Israel) ..... [6875-03]
- 9:10 am: **Advanced thermal management for highly efficient second harmonic generation using periodically poled stoichiometric LiTaO<sub>3</sub>**, Kenji Kitamura, Hideki Hatano, Shunji Takekawa, National Institute for Materials Science (Japan) and Swing Ltd. (Japan); Oleg A. Louchev, Megaopto Co., Ltd. (Japan); Sunao Kurimura, National Institute for Materials Science (Japan) ..... [6875-04]
- 9:30 am: **Tunable second-harmonic generation devices with a microheater**, Yi Gan, Wanguo Liang, Chang-Qing Xu, McMaster Univ. (Canada) . . . [6875-05]
- 9:50 am: **High-power, high-energy ZGP OPA pumped by a 2.05-µm Ho: YLF MOPA system**, Alexey Dergachev, Q-Peak, Inc.; Darrell Armstrong, Arlee Smith, Sandia National Labs.; Thomas Drake, Marc Dubois, Lockheed Martin Aeronautics Co. .... [6875-06]
- Coffee Break ..... 10:10 to 10:40 am

### SESSION 2

Room: Hilton Hotel: Almaden I ..... Tues. 10:40 am to 12:30 pm

#### Nonlinear Optical Devices II

Session Chair: **Michael W. Millard**, ITT Industries, Inc.

- 10:40 am: **Mirrorless OPO: first steps towards unlocking the potential of counter-propagating three-wave interactions (Invited Paper)**, Valdas Pasiskevicius, Carlota Canalias, Fredrik Laurell, Kungliga Tekniska Högskolan (Sweden) ..... [6875-07]
- 11:10 am: **Single-frequency CW OPO with multiwatt output from 1.46 to 2.05 microns and 2.20 to 3.90 microns**, Angus J. Henderson, Aculight Corp. .... [6875-08]
- 11:30 am: **Quaternary nonlinear crystals of Ag<sub>x</sub>GaxGe<sub>1-x</sub>Se<sub>2</sub> with orthorhombic symmetry for the mid-infrared spectral range**, Vladimir Panyutin, Valeriy Badikov, Galina Shevrydayeva, Kuban State Univ. (Russia); Konstantin Mitin, Alexander Seryogin, SPA Astrophysica (Russia); Valentin Petrov, Frank Noack, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany) ..... [6875-09]
- 11:50 am: **Near-degenerate doubly resonant synch-pumped OPO for intracavity THz generation**, Joseph Schaar, Konstantin Vodopyanov, Martin Fejer, Jason S. Pelc, Stanford Univ. .... [6875-10]
- 12:10 pm: **Coherent tunable monochromatic terahertz-wave generation using N-Benzyl-2-methyl-4-nitroaniline (BNA) crystal**, Katsuhiko Miyamoto, Hiroaki Minamide, RIKEN, Japan (Japan); Masazumi Fujiwara, Hideki Hashimoto, Osaka City Univ. (Japan); Hiromasa Ito, RIKEN, Japan (Japan) and Tohoku Univ. (Japan) ..... [6875-11]

Lunch/Exhibition Break ..... 12:30 to 1:30 pm

### SESSION 3

Room: Hilton Hotel: Almaden I ..... Tues. 1:30 to 3:50 pm

#### Orientation-Patterned Nonlinear Optical Devices

Session Chair: **Darrell J. Armstrong**, Sandia National Labs.

- 1:30 pm: **Progress in orientation patterned GaAs for next-generation nonlinear optical devices (Invited Paper)**, Rita D. Peterson, Scott D. Lewis, Candace Lynch, David Bliss, David H. Tomich, John Carlin, Air Force Research Lab. .... [6875-12]
- 2:00 pm: **Polarization-insensitive nonlinear-optical devices**, Konstantin L. Vodopyanov, Stanford Univ. .... [6875-13]
- 2:20 pm: **Periodically oriented GaAs templates and waveguide structures for frequency conversion**, Moshe B. Oron, Sergey Shusterman, Pinhas Blau, Soreq Nuclear Research Ctr. (Israel) ..... [6875-14]
- 2:40 pm: **Highly efficient mid-infrared OPO based on low-loss orientation-patterned GaAs samples (Invited Paper)**, David Faye, Eric Lallier, Bruno Gérard, Arnaud Grisard, Thales Research & Technology (France); Christelle Kieleck, Antoine Hirth, Institut Franco-Allemand de Recherches de Saint-Louis (France) ..... [6875-15]
- 3:10 pm: **Wafer-fused orientation-patterned GaAs**, Jin Li, Univ. of Massachusetts/Lowell; David B. Fenner, Physical Sciences Inc.; Krongtip Termkoa, Univ. of Massachusetts/Lowell; Mark G. Allen, Peter F. Moulton, Physical Sciences Inc.; Candace Lynch, David F. Bliss, Air Force Research Lab.; William D. Goodhue, Univ. of Massachusetts/Lowell ..... [6875-16]
- 3:30 pm: **Optical probes of ZnSe quasi-phase matched devices**, Gary S. Kanner, Northrop Grumman Corp. .... [6875-17]
- Coffee Break ..... 3:50 to 4:20 pm

### SESSION 4

Room: Hilton Hotel: Almaden I ..... Tues. 4:20 to 6:30 pm

#### Nonlinear Optical Applications

Session Chair: **Thomas J. Kulp**, Sandia National Labs.

- 4:20 pm: **Mid-infrared QPM laser sources for high-precision atmospheric trace gas measurements (Invited Paper)**, Dirk Richter, Petter Weibring, Alan Fried, James G. Walega, National Ctr. for Atmospheric Research; Osamu Tadanaga, Masaki Asobe, Hiroyuki Suzuki, NTT Photonics Labs. (Japan) ..... [6875-18]
- 4:50 pm: **Compact, narrow-linewidth, tunable ultraviolet laser source for detecting Hg emissions**, Alexandra Hoops, Roger Farrow, Paul Schulz, Thomas Reichardt, Ray Bambha, Dahv Kliner, Sandia National Labs.. [6875-19]
- 5:10 pm: **A new compact continuous-wave green laser with line beam**, Michio Oka, Kaoru Kimura, Yuki Maeda, Koji Takahashi, Nobutake Iwase, Hitoshi Tamada, Sony Corp. (Japan) ..... [6875-20]
- 5:30 pm: **A red-green-blue coherent laser source based on quasi-phase-matched cascaded wavelength conversion in periodically-poled MgSLT**, Andy Kung, Institute of Atomic and Molecular Sciences (Taiwan) and National Chiao-Tung Univ. (Taiwan); Shih-Yu Tu, Institute of Atomic and Molecular Sciences (Taiwan) ..... [6875-21]
- 5:50 pm: **Cladding mode assisted supercontinuum generation in solid core photonic crystal fiber for biosensor application**, Yury Logvin, Altaf Khetani, Hanan Anis, Univ. of Ottawa (Canada) ..... [6875-22]
- 6:10 pm: **Optical control and switching of excitation**, David S. Bradshaw, David L. Andrews, Univ. of East Anglia Norwich (United Kingdom) . . . [6875-23]

# Conference 6875

## POSTERS-Tuesday

**Room: Civic Auditorium. . . . . Tues. 6:00 to 7:30 pm**

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Tuesday morning starting at 10:00 am in the Civic Auditorium, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

**Temperature tuned 90° phase-matched CO<sub>2</sub> laser doubling in AgGa<sub>1-x</sub>In<sub>x</sub>S<sub>2</sub> crystal**, Saumyabrata Banerjee, Kentaro Miyata, Kiyoshi Kato, Chitose Institute of Science and Technology (Japan) . . . . . [6875-42]

**Direct third-harmonic generation in BiB<sub>3</sub>O<sub>6</sub>**, Kentaro Miyata, Chitose Institute of Science and Technology (Japan); Takuya Mikami, Okamoto Optics Works, Inc. (Japan) and Chitose Institute of Science and Technology (Japan); Nobuhiro Uremura, Kiyoshi Kato, Chitose Institute of Science and Technology (Japan) . . . . . [6875-43]

**Frequency conversion of near IR lasers in Ag<sub>x</sub>Ga<sub>x</sub>Ge<sub>1-x</sub>S<sub>2</sub> and Ag<sub>x</sub>Ga<sub>x</sub>Ge<sub>1-x</sub>Se<sub>2</sub>**, Kentaro Miyata, Saumyabrata Banerjee, Chitose Institute of Science and Technology (Japan); Valentin Petrov, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); Kiyoshi Kato, Chitose Institute of Science and Technology (Japan) . . . . . [6875-45]

**Intra cavity infrared OPO using periodically poled Mg-doped stoichiometric LiTaO<sub>3</sub> for generating high-average-power**, Bum Ku Rhee, Sogang Univ. (South Korea) . . . . . [6875-46]

**Single-frequency 389-nm CW coherent light source for optical pumping of metastable 3He atoms**, Shingo Maeda, Yutaka Tabata, Hiroshi Kumagai, Ataru Kobayashi, Osaka City Univ. (Japan) . . . . . [6875-47]

**Comprehensive study of the Rayleigh length dependent SHG conversion at 488nm using a monolithic DBR tapered diode laser**, Gunnar Blume, Mirko Uebernickel, Christian Fiebig, Katrin Paschke, Arnim Ginolas, Bernd Eppich, Reiner Guether, Götz Erbert, Ferdinand-Braun-Institut für Höchstfrequenztechnik (Germany) . . . . . [6875-48]

**Nonlinear absorption properties of alkyl phthalocyanines in the femtosecond, nanosecond, and cw excitation regimes**, Sai Santosh K. Ravi, Univ. of Hyderabad (India); L. Giri Babu, Indian Institute of Chemical Technology (India); Venugopal Rao Soma, Narayana Rao Desai, Univ. of Hyderabad (India) . . . . . [6875-50]

**Pulsed self-Raman laser operation in Nd:SrMoO<sub>4</sub> at 1.57 μm**, Jan Šulc D.D.S., Helena Jelinkova, Czech Technical Univ. (Czech Republic); Karel Nejezchleb, Václav Škoda, Crytur Ltd. (Czech Republic); Tasoltan T. Basiev, Maxim E. Doroshenko, A.M. Prokhorov General Physics Institute (Russia); Ludmila I. Ivleva, Vyacheslav V. Osiko, Peter G. Zverev, General Physics Institute (Russia) . . . . . [6875-51]

**All fibre interferometric autocorrelator for measurement of optical pulse width**, Pradeep Kumar, Anil Prabhakar, Indian Institute of Technology Madras (India) . . . . . [6875-53]

**High-efficiency mid-infrared ZGP optical parametric oscillator directly pumped by a lamp-pumped, Q-switched Cr:TM:Ho:YAG laser**, A. F. Nieuwenhuis, C. J. Lee II, P. J. M. van der Slot, K.-J. Boller, Univ. Twente (Netherlands) . . . . . [6875-54]

**Parametric frequency conversion at the reflection of superposition of two few-cycle pulses from dielectrics**, Olga Mokhnatova, Sergei A. Kozlov, St. Petersburg State Univ. of Information Technologies, Mechanics and Optics (Russia) . . . . . [6875-55]

**Application of ultrabroadband THz generation for holography**, Victor G. Bespalov, Andrei A. Gorodetskiy, St. Petersburg State Univ. of Information Technologies, Mechanics and Optics (Russia) . . . . . [6875-56]

**Optical atomic clock based on lukewarm silver atoms in cells**, Jean-Philippe Loisel, Univ. de Versailles Saint-Quentin-en Yvelines (France) . . . . . [6875-57]

**Interaction of intense counter-propagating pulses consisting of few oscillations and different spectral distribution in dielectric media**, Elizaveta Buyanovskaya, Sergei A. Kozlov, St. Petersburg State Univ. of Information Technologies, Mechanics and Optics (Russia) . . . . . [6875-58]

**Type II sum frequency generation in KTP waveguides: a technique for pre and post screening**, Christopher M. Kaleva, Mark Munro, Tony Roberts, Tiejun Chang, Philip Battle, AdvR, Inc. . . . . [6875-59]

**Femtosecond laser threshold and nonlinear characterization in bulk transparent SiC materials**, Logan DesAutels, Shane B. Juhl, Marc Finet, Scott Ristich, Matthew Whitaker, Mark A. Walker, Christopher D. Brewer, Wright-Patterson Air Force Base; Peter E. Powers, Univ. of Dayton . . . . . [6875-61]

## Wednesday 23 January

### SESSION 5

**Room: Hilton Hotel: Almaden I . . . . . Wed. 8:00 to 10:00 am**

#### High-Order Nonlinear Optics

*Session Chair: Yehoshua Y. Kalisky, Nuclear Research Ctr. Negev (Israel)*

**8:00 am: Collinear acousto-optical three-wave solitary states in a two-mode medium with a square-law nonlinearity and losses**, Alexandre S. Shcherbakov, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Waldgenij Maximov, Molecular Technology GmbH (Germany); Sandra Eloisa Balderas-Mata, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) . . . . . [6875-24]

**8:20 am: Infrared-to-visible upconversion fluorescence spectroscopy in trivalent rare-earth-doped lead-magnesium-fluorophosphate glass**, Luciano A. Bueno, Univ. Federal Rural de Pernambuco (Brazil) and Instituto Grade de Ciências Básicas (Brazil); Artur d. S.Gouveia-Neto, Rafael Fonseca do Nascimento, Elias Arcanjo da Silva, Valberes do Nascimento, Ernande Barbosa da Costa, Univ. Federal Rural de Pernambuco (Brazil) . . . . . [6875-25]

**8:40 am: Measurement of the nonlinear optical properties of semiconductors using the peak-fluence scan technique**, Leonel Gonzalez, Joel Murray, General Dynamics; Vincent Cowan, Univ. of Dayton; Shekhar Guha, Air Force Research Lab. . . . . [6875-26]

**9:00 am: CW- and pulse-pumped fiber super-continuum generators**, Sergey M. Kobtsev, Sergey Smirnov, Novosibirsk State Univ. (Russia) . . . . . [6875-27]

**9:20 am: Supercontinuum generation with a microchip laser and hollow-core microstructured fiber**, Igor V. Melnikov, Optolink Ltd. (Russia) and High Q Labs., Inc. (Canada); Alexander V. Kir'yanov, Optolink Ltd. (Russia) and Ctr. de Investigaciones en Óptica, A.C. (Mexico); Vladimir P. Minkovich, Ctr. de Investigaciones en Óptica, A.C. (Mexico) . . . . . [6875-28]

**9:40 am: Investigation of three kinds of non-linear photonic crystal fibers**, Weijun Tong, Hui Feng Wei, Honghai Wang, Qingrong Han, Jie Luo, R. Matai, Yangtze Optical Fibre and Cable Co., Ltd. (China) . . . . . [6875-29]

Coffee Break . . . . . 10:00 to 10:30 am

#### Plenary Session

*Room: Montgomery Theater · Wed. 10:30 am to 12:30 pm*

- 10:30 am: **Laser Processing and Chemistry: Applications in Nanopatterning, Material Synthesis and Biotechnology** (*Invited Paper*), Dieter Bäuerle, Johannes Kepler Univ. Linz (Austria)
- 11:10 am: **The Long Journey from Idea to Industrial Success** (*Invited Paper*), Holger Schlueter, TRUMPF Inc.
- 11:50 am: **Building Coherence in Collaboration: A Case Study with the World's Most Powerful, Tunable Laser** (*Invited Paper*), H. Fred Dylla, American Institute of Physics

*See p. 24 for details.*

Lunch/Exhibition Break . . . . . 12:30 to 1:40 pm

## Session 6 runs concurrently with Session 7

## SESSION 6

Room: Hilton Hotel: Almaden I ..... Wed. 1:40 to 4:00 pm

## Ultrafast Nonlinear Optics

Session Chair: **Konstantin L. Vodopyanov**, Stanford Univ.

- 1:40 pm: **Generation and detection of THz waves for materials spectroscopy and security applications** (*Invited Paper*), Peter Günter, ETH Zürich (Switzerland) ..... [6875-30]
- 2:10 pm: **Optimization of the gain-bandwidth for noncollinear parametric amplification of ultrafast pulses**, Damian N. Schimpf, Steffen Hädrich, Jan Rothhardt, Jens Limpert, Andreas Tünnermann, Friedrich-Schiller-Univ. Jena (Germany); David Hanna, Univ. of Southampton (United Kingdom) ... [6875-31]
- 2:30 pm: **The application of the monoclinic BiB<sub>3</sub>O<sub>6</sub> nonlinear crystal in ultrafast laser technology** (*Invited Paper*), Valentin Petrov, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany) ..... [6875-32]
- 3:00 pm: **Non-linear optics with single ZnO nanowires**, Tobias Voss, Harvard Univ. and Univ. of Bremen (Germany); Geoffrey T. Svacha, Eric Mazur, Harvard Univ. .... [6875-33]
- 3:20 pm: **Observation of the photoscattering effect from supercontinuum-generating ultrahigh numerical aperture fibers**, Haohua Tu, Daniel L. Mark, Stephen A. Boppart M.D., Univ. of Illinois at Urbana-Champaign .... [6875-34]
- 3:40 pm: **Third-harmonic generation by volume Bragg grating in photo-thermo-refractive glass irradiated by IR femtosecond pulses**, Leo Siiman, Julien Lumeau, Leonid B. Glebov, College of Optics & Photonics/Univ. of Central Florida; Lionel Canioni, Univ. Bordeaux I (France) ..... [6875-35]

## Note Room Change

## SESSION 7

Room: Hilton Hotel: Almaden II ..... Wed. 1:40 to 3:50 pm

## Visible and UV Generation

Session Chairs: **Rita D. Peterson**, College of Optics & Photonics/Univ. of Central Florida; **W. Andrew Clarkson**, Univ. of Southampton (United Kingdom)

Joint Session with Conference 6871: Solid State Lasers XVII: Technology and Devices

- 1:40 pm: **Passively Q-switched diode pumped Nd:YAG and Nd:YVO<sub>4</sub> using (Cr<sup>4+</sup>,Ca<sup>2+</sup>):YAG and (Cr<sup>4+</sup>,Mg<sup>2+</sup>):YAG saturable absorbers** (*Invited Paper*), Yehoshua Y. Kalisky, Nuclear Research Ctr. Negev (Israel); Ofra Kalisky, Jerusalem College of Technology (Israel); Milan R. Kokta, Saint Gobain Crystals ..... [6875-36]
- 2:10 pm: **1W of 261-nm cw generation in a Pr<sup>3+</sup>:LiYF<sub>4</sub> laser pumped by an optically pumped semiconductor laser at 479 nm**, Vasily G. Ostroumov, Wolf Seelert, Coherent Luebeck GmbH (Germany) ..... [6871-52]
- 2:30 pm: **Fiber amplified and frequency doubled diode lasers as a highly flexible pulse source at 532nm**, Kristian Lauritsen, Martin Langkopf, Dietmar Klemme, PicoQuant GmbH (Germany); Christopher M. Kaleva, Chris Pallassis, Shirley McNeil, AdvR, Inc.; Rainer Erdmann, PicoQuant GmbH (Germany) ..... [6871-53]
- 2:50 pm: **Continuous wave single longitudinal mode SHG with two stages of intracavity power enhancement at fundamental frequency**, Fedor Karpushko, KLASTECH-Karpushko Laser Technologies GmbH (Germany) ..... [6871-54]
- 3:10 pm: **300mW of coherent light at 488nm using a generic approach**, Emir Karamehmedovic, Christian Pedersen, Martin T. Andersen, Peter Tidemand-Lichtenberg, Danmarks Tekniske Univ. (Denmark) ..... [6875-38]
- 3:30 pm: **Efficient UV-visible upconversion luminescence and thermal effects in terbium-ytterbium codoped fluorogermanate vitroc ceramic**, Artur S. Gouveia-Neto, Luciano A. Bueno, Raphael F. Nascimento, Elias A. Silva, Valberes Nascimento, Ernande B. Costa, Univ. Federal Rural de Pernambuco (Brazil); Sidney J. L.Ribeiro, Younes Messaddeq, Univ. Estadual Paulista (Brazil) ..... [6875-37]

## Thursday 24 January

## SESSION 8

Room: Hilton Hotel: Almaden I ..... Thurs. 9:00 to 10:00 am

## Harmonic Generation

Session Chair: **Peter E. Powers**, Univ. of Dayton

- 9:00 am: **Solid-state 488-nm laser based on external-cavity frequency doubling of a multi-longitudinal mode semiconductor laser**, Vincent Issier, Boris M. Kharlamov, Thomas Kraft, Andy Miller, David Simons, James Wong, Simon Wong, Andre W. Wong, Kuo-chou Tai, Nicolas Guerin, Daniel Zou, Victor V. Rossin, Marc von Gunten, William Minford, Andy Hulse, Colette M. Paillet-Allison, Krishnan Parameswaran, Evgeny Churin, Robert G. Waarts, JDSU ..... [6875-39]
- 9:20 am: **159 mW blue light by single pass second harmonic generation with 52% conversion efficiency using a PPLN waveguide crystal and a cw DFB laser**, Andreas Jechow, Danilo Skoczowsky, Ralf Menzel, Univ. Potsdam (Germany); Sandra Stry, Joachim Sacher, Sacher Lasertechnik GmbH (Germany) ..... [6875-40]
- 9:40 am: **Characterization of GRIIRA properties in LiNbO<sub>3</sub> and LiTaO<sub>3</sub> with different composition and doping**, Junji Hirohashi, Tsuyoshi Tago, Osamu Nakamura, Akio Miyamoto, Yasunori Furukawa, Oxide NIMS Corp. (Japan) ..... [6875-63]

# High-Power Diode Laser Technology and Applications VI

Conference Chair: **Mark S. Zediker**, Nuvonyx Inc.

Program Committee: **Friedrich G. Bachmann**, Rofin-Sinar Laser GmbH (Germany); **Jason Farmer**, nLight Corp.; **Stefan W. Heinemann**, Fraunhofer USA Inc.; **Volker K. Krause**, Laserline GmbH (Germany); **Erik P. Zucker**, JDSU Corp.

## Monday 21 January

### SESSION 1

Room: Conv. Ctr. J3 ..... Mon. 8:30 am to 12:20 pm

#### Advanced Mounting, Cooling, and Beam Formation

Session Chair: **Stefan W. Heinemann**, Fraunhofer USA Inc.

8:30 am: **A high-brightness QCW diode laser pump source using a pre-aligned grin lens array and refractive beam correction phaseplate**, Roy McBride, Howard J. Baker, PowerPhotonic, Ltd. (United Kingdom); Jean-Luc Neron, Sead Doric, Doric Lenses Inc. (Canada); Cristina Mariottini, Enzo G. Nava, Emanuele G. Stucchi, Paolo Milanese, CESI (Italy) ..... [6876-01]

8:50 am: **Improved cooling for high-power laser diodes**, John Vetrovec, Aqwest ..... [6876-04]

9:10 am: **Active cooling solutions for high-power laser diodes stacks**, Yoram Karni, Genadi Klumel, Moshe Levy, Yuri Berk, Yaakov Openheim, Yaakov Gridish, Hila Sagy, SCD-Semiconductor Devices (Israel) .... [6876-02]

9:30 am: **8xx nm kW conduction cooled athermal QCW diode arrays with both electrically conductive and insulating submounts**, Jihua Du, Hailong Zhou, David Schleuning, Vivek Agrawal, John Morales, Thomas Hasenberg, Murray Reed, Coherent, Inc. .... [6876-03]

9:50 am: **Enhanced microchannel cooling for high-power semiconductor diode lasers**, Joseph Dix, Amir Jokar, Washington State Univ.; Robert J. Martinsen, Jason Farmer, nLight Corp. .... [6876-05]

Coffee Break ..... 10:10 to 10:40 am

10:40 am: **Composite-copper, low-thermal-resistance heat sinks for laser-diode bars, mini-bars and single-emitter devices**, Robert Miller, Daming Liu, Mike Horsinka, Touyen Nguyen, Kiran Kuppaswamy, Terrance Towe, Hanxuan Li, Myra Berube, James Harrison, Edmund Wolak, Spectra-Physics Semiconductor Lasers ..... [6876-06]

11:00 am: **Next-generation microchannel coolers**, Ryan Feeler, Ed Stephens, Northrop Grumman Corp. .... [6876-07]

11:20 am: **Thermal resistance in dependence of diode laser packages**, Michael Leers, Konstantin M. Boucke, Fraunhofer-Institut für Lasertechnik (Germany); Manfred Goetz, Electrovac Curamik GmbH (Germany); Andreas Meyer, Curamik Electronics GmbH (Germany); Marc Kelemen, Nico Lehmann, m2k-laser GmbH (Germany) ..... [6876-08]

11:40 am: **Passive cooling effects on the power and beam quality of low and high fill-factor 937 nm 1 cm arrays**, John L. Hostetler, John Jiang, Radosveta Radionova, TRUMPF Photonics; Stephan Strohmaier, Christoph Tillkorn, TRUMPF Laser GmbH & Co. KG (Germany); Viorel Negoita, Nicholas Usechak, Robert Roff, Carl Miester, Thilo Vethake, Ulrich Bonna, TRUMPF Photonics; Martin Huonker, TRUMPF Laser GmbH & Co. KG (Germany); Friedhelm Dorsch, TRUMPF Photonics ..... [6876-09]

12:00 pm: **Beam shaping of high-power diode lasers benefits from asymmetrical refractive microlens arrays**, Oliver Homburg, Andreas Bayer, Thomas Mitra, Jens Meinschien, Lutz Aschke, LIMO-Lissotschenko Mikrooptik GmbH (Germany) ..... [6876-10]

Lunch Break ..... 12:20 to 1:30 pm

### SESSION 2

Room: Conv. Ctr. J3 ..... Mon. 1:30 to 5:40 pm

#### High-Power Laser Diode Bars and Arrays

Session Chair: **Erik P. Zucker**, JDSU

1:30 pm: **Recent developments for BAR and BASE: setting the trends**, Norbert Lichtenstein, Julien Boucart, Christopher Button, Martin Krejci, Yvonne Manz, Juergen Mueller, Susanne Pawlik, Boris Sverdlov, Bernd Valk, Stefan Weiss, Bookham AG (Switzerland) ..... [6876-11]

1:50 pm: **High-power vertical-cavity surface-emitting laser arrays**, Jean-Francois Seurin, Chuni L. Ghosh, Viktor Khalfin, Aleksandr Miglo, Guoyang Xu, James D. Wynn, Prachi Pradhan, L. Arthur D'Asaro, Princeton Optronics, Inc. .... [6876-12]

2:10 pm: **High-power diode lasers for 1.9 to 2.2 μm wavelength range**, Marc T. Kelemen, m2k-laser GmbH (Germany); Marcel Rattunde, Fraunhofer Institut für Angewandte Festkörperphysik (Germany); Jürgen Gilly, Rudolf Moritz, m2k-laser GmbH (Germany); Johannes Schmitz, Joachim Wagner, Fraunhofer Institut für Angewandte Festkörperphysik (Germany) ..... [6876-13]

2:30 pm: **High-brightness and high-efficiency: optimized high-power diode laser bars**, Ralf Huelsewede, Haike Schulze, Juergen Sebastian, JENOPTIK Diode Lab. GmbH (Germany); Petra Hennig, Dominic Schröder, Jens Meusel, JENOPTIK Laserdiode GmbH (Germany) ..... [6876-14]

2:50 pm: **High-efficiency, high-power diode laser chips, bars and stacks**, Hanxuan Li, Frank Reinhardt, Irving Chyr, Xu Jin, Kiran Kuppaswamy, Terry Towe, Denny Brown, Robert Miller, Touyen Ngugen, Oscar Romero, Thomas Truchan, Jeffrey Mott, James Harrison, Spectra-Physics Semiconductor Lasers ..... [6876-15]

Coffee Break ..... 3:10 to 3:40 pm

3:40 pm: **10 W high-efficiency high-brightness tapered diode lasers at 976 nm**, Ralf Ostendorf, Gudrun Kaufel, Rudolf Moritz, Michael Mikulla, Günter Weimann, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany); Márc Tibor Kelemen, Jürgen Gilly, m2k-laser GmbH (Germany) ..... [6876-16]

4:00 pm: **8xx-10xx nm highly efficient single emitter pumps**, Alexander Ovtchinnikov, Valentin Gapontsev, Igor Berishev, Ivan Hernandez, Alexey Komissarov, Nikolay Moshogov, Oleg Raisky, Pavel Trubenko, Glenn Ellis, IPG Photonics Corp. .... [6876-17]

4:20 pm: **Stable and compact mounting scheme for > 1kW QCW diode laser stacks at 940nm**, Christian Fiebig, Wolfgang Pittroff, Bernd Eppich, Götz Erbert, Ferdinand-Braun-Institut für Höchstfrequenztechnik (Germany) [6876-18]

4:40 pm: **High-reliable qcw laser bars and stacks**, Eckard Deichsel, Dominic Schröder, Jens Meusel, JENOPTIK Laserdiode GmbH (Germany); Ralf Hüselwede, Jürgen Sebastian, JENOPTIK Diode Lab. GmbH (Germany); Petra Hennig, JENOPTIK Laserdiode GmbH (Germany) ..... [6876-19]

5:00 pm: **12W CW operation of 640nm-band laser diode array**, Naoyuki Shimada, Kimitaka Shibata, Yoshihiko Hanamaki, Tsuneo Hamaguchi, Tetsuya Yagi, Mitsubishi Electric Corp. (Japan) ..... [6876-20]

5:20 pm: **650 nm tapered lasers with 1 W maximum output power and nearly diffraction limited beam quality at 500 mW**, Bernd Sumpf, Pawel Adamiec, Martin Zorn, Philipp Froese, Jörg Fricke, Peter Ressel, Hans Wenzel, Markus Weyers, Götz Erbert, Günther Tränkle, Ferdinand-Braun-Institut für Höchstfrequenztechnik (Germany) ..... [6876-21]

**SESSION 3**

**Room: Conv. Ctr. J3 . . . . . Mon. 5:40 to 6:20 pm**

**Laser Diode Bar Reliability I**

*Session Chair: Robert J. Martinsen, nLight Corp.*

5:40 pm: **The reliability of multistriple laser diodes**, Ed Wolak, Kiran Kuppuswamy, Spectra-Physics Semiconductor Lasers; Bernard Fidric, Spectra-Physics . . . . . [6876-22]

6:00 pm: **Emitter resolved analysis of packaged laser bars**, Thomas Westphalen, Michael Leers, Christian Scholz, Konstantin Boucke, Fraunhofer-Institut für Lasertechnik (Germany) . . . . . [6876-23]

**Tuesday 22 January**

**SESSION 4**

**Room: Conv. Ctr. J3 . . . . . Tues. 8:00 to 9:40 am**

**Laser Diode Bar Reliability II**

*Session Chair: Robert J. Martinsen, nLight Corp.*

8:00 am: **High-reliability level on single-mode 980-1060 nm laser diodes for telecommunication and industrial applications**, Jérôme van de Castelee, Mauro Bettiati, Vincent Cargemel, Philippe Pagnod-Rossiaux, Patrick Garabédian, Laurent Raymond, Dominique Laffitte, Stéphane Fromy, Didier Chambonnet, Jean-Pierre Hirtz, François Laruelle, 3S PHOTONICS SA (France) . . . . . [6876-24]

8:20 am: **Passively cooled diode lasers in the cw power range of 120 to 200W**, Dirk Lorenzen, Petra Hennig, JENOPTIK Laserdiode GmbH (Germany) . . . . . [6876-25]

8:40 am: **Investigation of catastrophic degradation in high-power multimode InGaAs strained quantum well single emitters**, Yongkun Sin, Nathan Presser, Brendan Foran, Maribeth Mason, Steven C. Moss, The Aerospace Corp. . . . . [6876-26]

9:00 am: **Reliable operation of high-efficiency (>70%) 8xx- and 9xx-nm diode lasers**, Paul O. Leisher, Mike Grimshaw, Ling Bao, Weimin Dong, Jun Wang, Steve Patterson, Damian Wise, Mark DeFranza, Shiguo Zhang, Suhit Das, Raymond K. Price, Jake Bell, Jason Farmer, Mark DeVito, Robert Martinsen, nLight Corp. . . . . [6876-27]

9:20 am: **Reliable operation of 650 nm broad area lasers and bars**, Bernd Sumpf, Martin Zorn, Jörg Fricke, Peter Ressel, Hans Wenzel, Götz Erbert, Markus Weyers, Günther Tränkle, Ferdinand-Braun-Institut für Höchstfrequenztechnik (Germany) . . . . . [6876-28]

**SESSION 5**

**Room: Conv. Ctr. J3 . . . . . Tues. 9:40 am to 12:00 pm**

**Diode Laser Systems and Pump Modules I**

*Session Chair: Volker K. Krause, Laserline GmbH (Germany)*

9:40 am: **Next generation high-brightness diode lasers enable new industrial applications** (*Invited Paper*), Andre Timmermann, Peter Bruns, Jens Meinschien, LIMO-Lissotschenko Mikrooptik GmbH (Germany) . . . . . [6876-29]

10:10 am: **High-brightness line generators and fiber-coupled sources based on low-smile laser diode arrays**, Jason P. Watson, Hailong Zhou, David A. Schleuning, Coherent, Inc.; Petteri Lavikko, Tapani Alander, Coherent Finland Oy (Finland); Dicky Lee, Paul H. Lovato, Heiko Winhold, Mike Griffin, Sherry Tolman, Thomas C. Hasenberg, Murray K. Reed, Coherent, Inc. . . . . [6876-30]

Coffee Break . . . . . 10:30 to 11:00 am

11:00 am: **1.8kW diode laser system for fiber-delivery using brightness-enhanced diode stacks and a novel final beam shaper**, Howard J. Baker, Jesus F. Monjardin, Denis R. Hall, Heriot-Watt Univ. (United Kingdom); Roy McBride, PowerPhotonic, Ltd. (United Kingdom) . . . . . [6876-31]

11:20 am: **High-efficient fiber coupling of laser diode bars with > 50% electro-optical efficiency out of the fiber core**, Markus Revermann, Udo Fornahl, Jens Meinschien, LIMO-Lissotschenko Mikrooptik GmbH (Germany) . . . . . [6876-32]

11:40 am: **High-brightness, fiber-coupled diode laser development at Coherent**, S. David Roh, Daniel M. Grasso, Coherent Direct Diode Systems. . . . . [6876-33]

Lunch/Exhibition Break . . . . . 12:00 to 1:00 pm

**SESSION 6**

**Room: Conv. Ctr. J3 . . . . . Tues. 1:00 to 2:20 pm**

**Diode Laser Systems and Pump Modules II**

*Session Chair: Volker K. Krause, Laserline GmbH (Germany)*

1:00 pm: **High-brightness fiber laser pump sources based on single emitters and multiple single emitters**, Torsten Scheller, Lars Wagner, Juergen Wolf, Guido F. Bonati, JENOPTIK Laserdiode GmbH (Germany) . . . . . [6876-34]

1:20 pm: **325nm semiconductor laser system as a substitute to HeCd gaslasers**, Reto Haering, Thorsten Schmitt, Andreas W. Able, Frank Lison, Wilhelm G. Kaenders, TOPTICA Photonics AG (Germany); Goetz Erbert, Bernd Sumpf, Ferdinand-Braun-Institut für Höchstfrequenztechnik (Germany)[6876-35]

1:40 pm: **High-power, fiber-coupled stack arrays for pump applications**, Oscar D. Romero, C.-H. Chen, J. Harrison, T. Towe, S. Ginter, H. Li, I. Chyr, J. Johnson, J. Egan, K. Dinh, Spectra-Physics Semiconductor Lasers [6876-36]

2:00 pm: **High-power, high-efficiency fiber-coupled multimode laser-diode pump module (800-1000nm) with high-reliability**, Prasad Yalamanchili, Victor Rossin, Kuochou Tai, Xiangdong Qiu, Richard Duesterberg, Vincent Wong, Jay Skidmore, Sukhbir Bajwa, Kurtis Duncan, David Venables, Rafael Verbera, YuZhong Dai, Erik Zucker, JDSU . . . . . [6876-37]

**SESSION 7**

**Room: Conv. Ctr. J3 . . . . . Tues. 2:20 to 6:20 pm**

**Results of the German National Funding Initiative BRIOLAS (BRilliant diODE LASers)**

*Session Chair: Friedrich G. Bachmann, Rofin-Sinar Laser GmbH (Germany)*

2:20 pm: **Design and assembly of a miniaturized high-power laser bar to 50-µm fiber coupling module** (*Invited Paper*), Erik Beckert, Peter Schreiber, Thomas Burkhardt, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); Ekkard Werner, JENOPTIK Laserdiode GmbH (Germany) . [6876-38]

2:50 pm: **50 W passively cooled, fiber coupled diode laser at 976 nm for pumping fiber lasers using fiber bundles with 100 µm input port**, Christian Wessling, Jens Geiger, Stefan Hengesbach, Martin Traub, Hans-Dieter Hoffmann, Fraunhofer-Institut für Lasertechnik (Germany) . . . . . [6876-39]

3:10 pm: **Brilliant high-power diode laser based on broad area lasers** (*Invited Paper*), Volker K. Krause, Arnd Koesters, Laserline GmbH (Germany); Harald Koenig, Uwe Strauss, OSRAM Opto Semiconductors GmbH (Germany) . . . . . [6876-40]

3:30 pm: **Brilliant high-power laser bars for industrial applications**, Uwe Strauss, Harald König, Günther Grönninger, Peter Brick, Martin Reufer, OSRAM Opto Semiconductors GmbH (Germany); Frank Bugge, Götz Ebert, Ferdinand-Braun-Institut für Höchstfrequenztechnik (Germany); Michael Stoiber, Jens Biesenbach, Dilas Diodenlaser GmbH (Germany); Dirk Lorenzen, Petra Hennig, JENOPTIK Laserdiode GmbH (Germany) . . . . . [6876-41]

Coffee Break . . . . . 3:50 to 4:20 pm

4:20 pm: **Diffraction optical elements fabricated for beam shaping of high-power diode lasers**, Edgar Pawlowski, Ralf Biertümpfel, Helge Vogt, SCHOTT AG (Germany) . . . . . [6876-42]

4:40 pm: **A comprehensive reliability study of high-power 808 nm laser diodes mounted with AuSn and indium**, Heiko Kissel, Gabriele Seibold, Jens Biesenbach, Dilas Diodenlaser GmbH (Germany); Guenther Groenninger, Gerhard Herrmann, Uwe Strauss, OSRAM Opto Semiconductors GmbH (Germany) . . . . . [6876-43]

5:00 pm: **Screening of high-power diode laser bars in terms of stresses and thermal profiles**, Jens W. Tomm, Mathias Ziegler, Tram Q. Tien, Fritz Weik, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); Petra Henning, Jens Meusel, JENOPTIK Laserdiode GmbH (Germany); Heiko Kissel, Gabriele Seibold, Jens Biesenbach, DILAS Diodenlaser GmbH (Germany); Guenther Groenninger, Gerhard Herrmann, Uwe Strauss, OSRAM Opto Semiconductors GmbH (Germany) . . . . . [6876-44]

5:20 pm: **Accurate determination of absolute temperatures of GaAs-based high-power diode lasers**, Mathias Ziegler, Jens W. Tomm, Fritz Weik, Thomas Elsaesser, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); Christian Monte, Jörg Hollandt, Physikalisch-Technische Bundesanstalt (Germany); Heiko Kissel, Gabriele Seibold, Jens Biesenbach, DILAS Diodenlaser GmbH (Germany) . . . . . [6876-45]

5:40 pm: **Diode laser modules based on new developments in tapered and broad area diode laser bars**, Bernd Köhler, Sandra Ahlert, Thomas Brand, Matthias Haag, Heiko Kissel, Gabriele Seibold, Michael Stoiber, Jens Biesenbach, DILAS Diodenlaser GmbH (Germany); Wolfgang Reill, Günther Grönninger, Martin Reufer, Harald König, Uwe Strauss, OSRAM Opto Semiconductors GmbH (Germany); Holger Theesfeld, Reinhold Dinger, Rofin-Sinar Laser GmbH (Germany) . . . . . [6876-46]

6:00 pm: **High-power laser bars with emission in the red spectral range for medical applications**, Konstantin M. Boucke, Wolfgang Brandenburg, Fraunhofer-Institut für Lasertechnik (Germany); Wolfgang Schmid, Martin Mueller, Uwe Strauss, OSRAM Opto Semiconductors GmbH (Germany) . . . . . [6876-47]

## POSTERS-Tuesday

**Room: Civic Auditorium. . . . . Tues. 6:00 to 7:30 pm**

*All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.*

*Poster presenters may post their poster papers Tuesday morning starting at 10:00 am in the Civic Auditorium, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.*

**Tunable DFB semiconductor lasers with active feedback for frequency stability**, Bradley Bobbs, Armando Montalvo, Sabeus, Inc. . . . . [6876-55]

**400 mW red external cavity diode laser with tunability over 4nm around 635 nm**, Nico Vogler, Fachhochschule Brandenburg (Germany); Volker Raab, Optikexpertisen (Germany) . . . . . [6876-56]

**Fiber coupled air-cooled high-power diode laser systems**, Daniel Bartoschewski, LIMO-Lissotschenko Mikrooptik GmbH (Germany) . . [6876-57]

*Technical Event*  
**Laser Communications**  
 Tuesday January 22 2008

*Room: Fairmont Hotel, Atherton · 7:30 to 9:00 pm*

*Chair: Dr. Olga Korotkova, Univ. of Miami*

The technical group on Laser Communications will hold its annual meeting in conjunction with the Free-Space Laser Communication Technologies XX conference. All professionals involved in applications of free-space laser communications and supporting technologies are invited to participate in an open discussion on a variety of topics related to the challenges and advancement of the field. Members and visitors are invited to bring suggestions for discussion topics.

## Wednesday 23 January

### SESSION 8

**Room: Conv. Ctr. J3 . . . . . Wed. 8:00 to 10:20 am**

### High Brightness and Narrow Linewidth Laser Diodes

Session Chair: **Robert J. Martinsen**, nLight Corp.

8:00 am: **High-efficiency single-mode fiber coupling of frequency stabilized tapered lasers**, Mark Haverkamp, Gerd Kochem, Konstantin Boucke, Fraunhofer-Institut für Lasertechnik (Germany) . . . . . [6876-48]

8:20 am: **Advances in high-brightness semiconductor lasers**, Paul T. Rudy, Jeff Ungar, Robert Lammert, Mark Osowski, Wentao Hu, S. Oh, Tom Stakelon, QPC Lasers, Inc. . . . . [6876-49]

8:40 am: **High-power, high-brightness, single emitter laser diodes at axcel photonics**, Wei Gao, Zuntu Xu, Lisen Cheng, Kejian Luo, Kun Shen, Andre Mastrovito, Axcel Photonics, Inc. . . . . [6876-50]

9:00 am: **High-power laser diodes and bars for efficient optical pumping of rubidium vapor medium**, Alex Gourevitch, George Venus, College of Optics & Photonics/Univ. of Central Florida; Vadim Smirnov, OptiGrate; Leonid Glebov, College of Optics & Photonics/Univ. of Central Florida . . . . . [6876-51]

9:20 am: **Emission wavelength stabilization in broad area lasers coupled to fiber Bragg gratings**, Boris Sverdlov, Stefan Mohrdiek, Nicolai Matuschek, Susanne Pawlik, Norbert Lichtenstein, Bookham AG (Switzerland) . . . [6876-52]

9:40 am: **Wavelength-stabilized and spectrally narrowed, high-power, high-efficiency 808 nm and 975 nm diode laser pumps**, Manoj Kanskar, Jason Cai, Haiyan An, Chris Galstad, Eric Stiers, Yiping He, Alfalight, Inc. . . . . [6876-53]

10:00 am: **4W frequency stabilized 976nm tapered diode lasers**, Patrick Friedmann, Jürgen Gilly, Stefan Moritz, Marc T. Kelemen, m2k-laser GmbH (Germany) . . . . . [6876-54]

### Plenary Session

*Room: Montgomery Theater · Wed. 10:30 am to 12:30 pm*

10:30 am: **Laser Processing and Chemistry: Applications in Nanopatterning, Material Synthesis and Biotechnology** (*Invited Paper*), Dieter Bäuerle, Johannes Kepler Univ. Linz (Austria)

11:10 am: **The Long Journey from Idea to Industrial Success** (*Invited Paper*), Holger Schlueter, TRUMPF Inc.

11:50 am: **Building Coherence in Collaboration: A Case Study with the World's Most Powerful, Tunable Laser** (*Invited Paper*), H. Fred Dylla, American Institute of Physics

*See p. 24 for details.*

# Free-Space Laser Communication Technologies XX

Conference Chair: **Steve Mecherle**, Innocept Inc.

Program Committee: **David L. Begley**, Ball Aerospace & Technologies Corp.; **Don M. Boroson**, MIT Lincoln Lab.; **Robert T. Carlson**, BAE Systems (Canada); **Florian X. David**, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); **Frederic M. Davidson**, Johns Hopkins Univ.; **Wayne R. Fenner**, The Aerospace Corp.; **Hamid Hemmati**, Jet Propulsion Lab.; **Eric J. Korevaar**, MRV Communications Inc.; **Yoshisada Koyama**, National Institute of Information and Communications Technology (Japan); **Robert Lange**, Tesat-Spacecom GmbH & Co. KG (Germany); **Donald J. Nicholson**, Air Force Research Lab.; **Vladimir V. Nikulin**, Binghamton Univ.; **Zoran Sodnik**, European Space Agency (Netherlands); **Morio Toyoshima**, National Institute of Information and Communications Technology (Japan); **Shiro Yamakawa**, Japan Aerospace Exploration Agency (Japan)

## Thursday 24 January

### SESSION 1

Room: Hilton Hotel: Santa Clara II ..... Thurs. 8:00 to 9:40 am

#### Experiment Systems

- 8:00 am: **In-orbit verification of an optical 5.65 Gbps inter-satellite communication link**, Robert Lange, Berry Smutny, Tesat-Spacecom GmbH & Co. KG (Germany) ..... [6877-01]
- 8:20 am: **Direct-detection free-space laser transceiver test-bed**, Michael A. Krainak, Jeffrey Chen, Philip Dabney, Jeffrey Ferrara, Wai Fong, Anthony Martino, Jan McGarry, Stephen Merkwitz, Caleb Principe, Xiaoli Sun, Thomas Zagwodzki, NASA Goddard Space Flight Ctr. .... [6877-02]
- 8:40 am: **Development and test results of a lasercom testbed for the pointing, acquisition, and tracking (PAT) subsystem of satellite-to-satellite laser communications link**, Shinhak Lee, Jennifer N. Sembera, Christopher B. Dunbar, The Aerospace Corp. .... [6877-03]
- 9:00 am: **Results of recent beam propagation experiments at the OCTL**, Keith E. Wilson, Joseph M. Kovalik, Abhijit Biswas, W. Tom Roberts, Jet Propulsion Lab. .... [6877-04]
- 9:20 am: **Mobile free space optical communication system**, Xian Wang, Xiaomin Jin, Chi-Yeh Hsu, California Polytechnic State Univ. .... [6877-05]

### SESSION 2

Room: Hilton Hotel: Santa Clara II ..... Thurs. 9:40 to 11:20 am

#### System Analysis

- 9:40 am: **Prospects for improvement of deep-space optical links by 30-dB**, Hamid Hemmati, Abhijit Biswas, Jet Propulsion Lab.; Don Boroson, MIT Lincoln Lab. .... [6877-06]
- 10:00 am: **Synchronization of array-based photon counting laser communications links**, Farzana Khatri, Don Boroson, MIT Lincoln Lab. .... [6877-07]
- Coffee Break ..... 10:20 to 10:40 am
- 10:40 am: **Implementation concepts for a data transfer protocol for the high-data rate slow-fading free-space optical channel**, Bernhard Epple, Clara Serrano, DLR Standort Oberpfaffenhofen (Germany) ..... [6877-08]
- 11:00 am: **Performance of a wavelength-diversified FSO tracking algorithm for real-time battlefield communications**, Mouhammad K. Al-Akkoumi, Univ. of Oklahoma; Alan Harris, Univ. of North Florida; Robert C. Huck, James J. Sluss, Jr., Univ. of Oklahoma ..... [6877-09]

### SESSION 3

Room: Hilton Hotel: Santa Clara II ..... Thurs. 11:20 am to 12:20 pm

#### Atmospheric Effects on Optical Communication I

- 11:20 am: **Bit error distribution measurements in the atmospheric optical fading channel**, Michal Kubicek, Brno Univ. of Technology (Czech Republic); Hennes Henniger, DLR Standort Oberpfaffenhofen (Germany) ..... [6877-10]
- 11:40 am: **Estimation-based mitigation of dynamic optical turbulence: an experimental study**, Rahul M. Khandekar, Vladimir V. Nikulin, Binghamton Univ. .... [6877-11]
- 12:00 pm: **Characterization of RF signal transmission using FSO links considering atmospheric effects**, Mohammad S. Alam, Pham T. Dat, Kamugisha R. Kazaura, Kazuhiko Wakamori, Toshiji Suzuki, Kazunori Omae, Mitsuiji Matsumoto, Waseda Univ. (Japan); Yuji Aburakawa, Koichi Takahashi, Takuya Nakamura, Takeshi Higashino, Katsutoshi Tsukamoto, Shozo Komaki, Osaka Univ. (Japan) ..... [6877-12]
- Lunch Break ..... 12:20 to 1:30 pm

### SESSION 4

Room: Hilton Hotel: Santa Clara II ..... Thurs. 1:30 to 2:30 pm

#### Atmospheric Effects on Optical Communication II

- 1:30 pm: **Multilayer error protection on simplex links**, Hennes Henniger, DLR Standort Oberpfaffenhofen (Germany) ..... [6877-13]
- 1:50 pm: **Line-of-sight data transmission system based on mid-IR quantum cascade laser**, Marian A. Taslavov, Valentin B. Simeonov, Hubert Van Den Bergh, Ecole Polytechnique Fédérale de Lausanne (Switzerland) .... [6877-14]
- 2:10 pm: **An error protection protocol for user-transparent bridging of fast ethernet data over the optical fading channel in an aeronautical environment**, Bernhard Epple, DLR Standort Oberpfaffenhofen (Germany); Kimon Karras, Technological Educational Institute of Piraeus (Greece); Hennes Henniger, DLR Standort Oberpfaffenhofen (Germany) ..... [6877-15]

### SESSION 5

Room: Hilton Hotel: Santa Clara II ..... Thurs. 2:30 to 3:30 pm

#### Free-Space Optics

- 2:30 pm: **Design and evaluation of optical antenna module suitable for radio-on free-space optics link system for ubiquitous wireless**, Koichi Takahashi, Olympus Corp. (Japan); Takeshi Higashino, Takuya Nakamura, Yuji Aburakawa, Katsutoshi Tsukamoto, Shozo Komaki, Osaka Univ. (Japan); Kazuhiko Wakamori, Toshiji Suzuki, Kamugisha Kazaura, Alam M. Shah, Kazunori Omae, Mitsuiji Matsumoto, Waseda Univ. (Japan); Yuichi Miyamoto, Hamamatsu Photonics K.K. (Japan) ..... [6877-16]
- 2:50 pm: **Remote six-axis deformation sensing with optical vortex beams**, Seichi Sato, Ikumatsu Fujimoto, Toru Kurihara, Shigeru Ando, The Univ. of Tokyo (Japan) ..... [6877-17]
- 3:10 pm: **Spectral anomalies of pulsed Bessel beams focused by a dispersive lens**, Liuzhan Pan, Chaoliang Ding, Luoyang Normal College (China); Xiao Yuan, Huazhong Univ. of Science and Technology (China) ..... [6877-18]
- Coffee Break ..... 3:30 to 4:00 pm

### SESSION 6

Room: Hilton Hotel: Santa Clara II ..... Thurs. 4:00 to 5:00 pm

#### Modulation Techniques

- 4:00 pm: **Pulse position modulation/demodulation for high-data rates**, Kevin M. Birnbaum, William H. Farr, Jet Propulsion Lab. .... [6877-19]
- 4:20 pm: **High-reliability differential phase shift keying demodulator for space communication**, Yannick K. Lize, Alexandre Wetter, Pierre Poirier, Benoit Sévigny, Mathieu Faucher, Nigel Holehouse, ITF Labs. (Canada) ..... [6877-20]
- 4:40 pm: **Spectral slicing of femtosecond pulses using semiconductor modulator arrays**, Dan A. Yanson, Stewart D. McDougall, Ian Baker, John H. Marsh, Intense Ltd. (United Kingdom); Andreas Sizmman, Ronald Holzwarth, Menlo Systems GmbH (Germany); Michael Jost, Iain McKenzie, European Space Research and Technology Ctr. (Netherlands); Michael Strain, Univ. of Glasgow (United Kingdom) ..... [6877-21]

### SESSION 7

Room: Hilton Hotel: Santa Clara II ..... Thurs. 5:00 to 5:40 pm

#### Acquisition, Pointing and Tracking

- 5:00 pm: **Development of reprogrammable high-frame-rate detector devices for laser communication pointing, acquisition and tracking**, Terita Norton, Kenneth A. Conner, Richard Covington, Hung Ngo, Christine Rink, The Aerospace Corp. .... [6877-22]
- 5:20 pm: **A tracking system for mobile FSO**, Mouhammad K. Al-Akkoumi, Hakki H. Refai, James J. Sluss, Jr., Univ. of Oklahoma ..... [6877-23]

# Conference 6878

Monday-Tuesday 21-22 January 2008 • Proceedings of SPIE Vol. 6878

## Atmospheric Propagation of Electromagnetic Waves II

Conference Chair: **Olga Korotkova**, Univ. of Miami

Program Committee: **Larry C. Andrews**, Univ. of Central Florida; **Yahya Kemal Baykal**, Çankaya Univ. (Turkey); **Aristide C. Dogariu**, College of Optics & Photonics/Univ. of Central Florida; **Frank D. Eaton**, Air Force Research Lab.; **Greg Gbur**, The Univ. of North Carolina at Charlotte; **Alex S. Mahalov**, Arizona State Univ.; **Steve Mecherle**, Innocept Inc.; **Ronald L. Phillips**, Univ. of Central Florida; **Jennifer C. Ricklin**, Defense Advanced Research Projects Agency; **Robert K. Tyson**, The Univ. of North Carolina at Charlotte; **Jixiong Pu**, Hua Qiao Univ. (China)

### Monday 21 January

#### SESSION 1

Room: Conv. Ctr. F2 ..... Mon. 8:30 to 10:00 am

#### Propagation of Electromagnetic Fields in the Atmosphere: Theory and Simulations

Session Chair: **Olga Korotkova**, Univ. of Miami

8:30 am: **Recent results on optical scintillation in the presence of beam wander** (*Invited Paper*), Larry C. Andrews, Univ. of Central Florida; Ronald L. Phillips, Florida Space Institute. .... [6878-01]

9:00 am: **Propagation characteristics of partially coherent vortex beams in a turbulent atmosphere**, Jixiong Pu, Tao Wang, Ziyang Chen, Hua Qiao Univ. (China) ..... [6878-02]

9:20 am: **Coherent and partially coherent vortex beams in turbulence**, Greg Gbur, The Univ. of North Carolina at Charlotte. .... [6878-03]

9:40 am: **Spectral changes in electromagnetic stochastic beams**, Olga Korotkova, Univ. of Miami; Jixiong Pu, Hua Qiao Univ. (China); Emil Wolf, Univ. of Rochester ..... [6878-04]

Coffee Break ..... 10:00 to 10:30 am

#### SESSION 2

Room: Conv. Ctr. F2 ..... Mon. 10:30 am to 12:40 pm

#### Models and Measurements of Atmospheric Turbulence

Session Chair: **Olga Korotkova**, Univ. of Miami

10:30 am: **Ensemble forecasting of high-impact stratospheric optical turbulence** (*Invited Paper*), Alex S. Mahalov, Arizona State Univ. .... [6878-05]

11:00 am: **Preliminary high-data-rate optical turbulence profile observations using a balloon-ring platform and their impact on laser propagation**, Frank D. Eaton, Air Force Research Lab.; Demos T. Kyrakis, R-Cubed, Inc.; Don Black, Wiley Black, Ridgeline, LLC; Robert A. Black, R-Cubed, Inc. .... [6878-06]

11:20 am: **The balloon ring: a high-performance, low-cost, instrumentation platform for measuring atmospheric turbulence profiles**, Demos T. Kyrakis, R-Cubed, Inc.; Frank D. Eaton, Air Force Research Lab.; Don Black, Wiley Black, Ridgeline, LLC; Robert A. Black, R-Cubed, Inc. .... [6878-07]

11:40 am: **The design and calibration of a high-performance, lightweight instrumentation system for the measurement of atmospheric optical turbulence**, Wiley Black, Don Black, Ridgeline, LLC; Demos T. Kyrakis, R-Cubed, Inc.; Frank D. Eaton, Air Force Research Lab.; Robert A. Black, R-Cubed, Inc. .... [6878-08]

12:00 pm: **Miraging effects in the marine layer across Chesapeake Bay**, Carlos O. Font-Jimenez, Naval Research Lab.; Cheree Armstrong, Norfolk State Univ.; G. Charmaine Gilbreath, Michele R. Suite, Harris R. Burris, Naval Research Lab. .... [6878-09]

12:20 pm: **A first principles atmospheric propagation & characterization tool: the laser environmental effects definition and reference (LEEDR)**, Steven T. Fiorino, Richard Bartell, Matthew Krizo, Gregory Caylor, Kenneth Moore, Thomas Harris, Salvatore Cusumano, Air Force Institute of Technology ..... [6878-10]

Lunch Break ..... 12:40 to 2:00 pm

#### SESSION 3

Room: Conv. Ctr. F2 ..... Mon. 2:00 to 3:40 pm

#### Mitigation of Atmospheric Effects in Communication and Imaging Systems, Adaptive Optics

Session Chair: **Olga Korotkova**, Univ. of Miami

2:00 pm: **Decibels versus dollars: long-range atmospheric optical communications on a tight budget** (*Invited Paper*), Christopher Long, Consultant (Australia); Michael Groth, Tasmanian State Environmental Protection Authority (Australia); Clinton Turner, Consultant. .... [6878-11]

2:20 pm: **Forming through turbulent atmosphere a point-source beacon on a non-cooperative extended target**, Anatoliy Khizhnyak, Vladimir B. Markov, MetroLaser, Inc. .... [6878-12]

2:40 pm: **An all-optical image sharpness sensor for propagation and imaging**, Kristin N. Walker, Robert K. Tyson, The Univ. of North Carolina at Charlotte ..... [6878-13]

3:00 pm: **Spectroscopic analysis of fluorescent aerosols with a compact chamber**, Bernard J. Déry, Univ. Laval (Canada) and Defence Research and Development Canada (Canada); Jean-Robert Simard, Defence Research and Development Canada (Canada); Réal Vallée, Univ. Laval (Canada) ... [6878-14]

3:20 pm: **Simulations of mesospheric sodium guidestar radiance**, John M. Telle, Jack D. Drummond, Paul D. Hillman, Craig A. Denman, Air Force Research Lab. .... [6878-15]

### Tuesday 22 January

#### POSTERS-Tuesday

Room: Civic Auditorium ..... Tues. 6:00 to 7:30 pm

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

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**Propagation of Gauss-Bessel beams in turbulent atmosphere**, Jixiong Pu, Baosuan Chen, Hua Qiao Univ. (China) ..... [6878-16]

**Changes in the polarization, the coherence, and the spectrum, of partially coherent electromagnetic Hermite-Gaussian beams in turbulence**, Xiaoling Ji, Xiaowen Chen, Sichuan Normal Univ. (China) ..... [6878-17]

**The effect of the jet-stream and gravity waves on the spreading of laser beams in up/down links traversing upper layers of turbulent atmosphere**, Olga Korotkova, Univ. of Miami; Nathan Farwell, Univ. of Rochester. . [6878-19]

**The spectral degree of coherence of stochastic electromagnetic beams propagating in the turbulent atmosphere**, Victor L. Gamiz, Air Force Research Lab.; Olga Korotkova, Univ. of Miami; Emil Wolf, Univ. of Rochester . [6878-20]



# Laser Applications in Microelectronic and Optoelectronic Manufacturing XIII

*Conference Chairs:* **Andrew S. Holmes**, Imperial College London (United Kingdom); **Michel Meunier**, École Polytechnique de Montréal (Canada); **Craig B. Arnold**, Princeton Univ.; **Hiroyuki Niino**, National Institute of Advanced Industrial Science and Technology (Japan)

*Program Committee:* **Carmen N. Afonso**, Consejo Superior de Investigaciones Científicas (Spain); **Benjamin J. Eggleton**, The Univ. of Sydney (Australia); **Bo Gu**, GSI Group Inc.; **Hideo Hosono**, Tokyo Institute of Technology (Japan); **Jürgen Ihlemann**, Laser Laboratorium Gottingen e.V. (Germany); **Fumitaka Mafune**, The Univ. of Tokyo (Japan); **Scott A. Mathews**, The Catholic Univ. of America; **Alberto Piqué**, Naval Research Lab.; **Koji Sugioka**, The Institute of Physical and Chemical Research (Japan); **Malek Tabbal**, American Univ. of Beirut (Lebanon); **Vadim P. Veiko**, St. Petersburg State Univ. of Information Technologies, Mechanics and Optics (Russia); **David A. Willis**, Southern Methodist Univ.

## Monday 21 January

### Opening Remarks

Room: Conv. Ctr. J4 ..... Mon. 8:55 to 9:00 am

*Session Chair:* **Andrew S. Holmes**,  
Imperial College London (United Kingdom)

### SESSION 1

Room: Conv. Ctr. J4 ..... Mon. 9:00 to 10:30 am

#### Laser Processing - A 20-year Perspective—PART I

*Session Chair:* **Andrew S. Holmes**,  
Imperial College London (United Kingdom)

9:00 am: **Laser microfabrication in industry - perspectives on the past, present and future** (*Invited Paper*), Malcolm C. Gower, Nanophoton Technologies (United Kingdom) ..... [6879A-01]

9:45 am: **Perspectives on laser material processing in the micro and nanometer domains** (*Invited Paper*), Henry Helvagian, The Aerospace Corp. .... [6879A-02]

Coffee Break ..... 10:30 to 11:00 am

### SESSION 2

Room: Conv. Ctr. J4 ..... Mon. 11:00 am to 12:00 pm

#### Laser Processing - A 20-year Perspective—PART II

*Session Chairs:* **Craig B. Arnold**, Princeton Univ.; **Michel Meunier**,  
École Polytechnique de Montréal (Canada)

#### Panel Discussion

#### New challenges and opportunities for laser processing in manufacturing

*Panel Moderators:* **Craig B. Arnold**, Princeton Univ.; **Michel Meunier**,  
École Polytechnique de Montréal (Canada)

*Panelists:* **Dieter Bäuerle**, Johannes Kepler Univ. Linz (Austria);  
**Bo Gu**, GSI Group Inc.; **Richard F. Haglund**, Vanderbilt Univ.;  
**Koji Sugioka**, The Institute of Physical and Chemical Research (Japan)

Lunch Break ..... 12:00 to 1:30 pm

### SESSION 3

Room: Conv. Ctr. J4 ..... Mon. 1:30 to 3:30 pm

#### Fundamentals of Laser-Material Interaction

*Session Chair:* **Michel Meunier**,  
Ecole Polytechnique de Montréal (Canada)

1:30 pm: **Fundamental studies of UV laser induced particle emissions from insulators** (*Invited Paper*), J. Thomas Dickinson, Kenichi Kimura, Stephen C. Langford, Washington State Univ. .... [6879A-04]

2:00 pm: **Photoinduced phase transitions in solids with strongly correlated electrons** (*Invited Paper*), Matteo Rini, Lawrence Berkeley National Lab. .... [6879A-05]

2:30 pm: **Phase explosion and Marangoni flow effects during laser micromachining of thin metal films**, David A. Willis, Mohammad Hendijanifard, Southern Methodist Univ. .... [6879A-06]

2:50 pm: **Mechanistic studies of the emission products from polytetrafluoroethylene (PTFE) under 157-nm excimer laser irradiation**, Sharon John, John Leraas, Steve C. Langford, J. Thomas Dickinson, Washington State Univ. .... [6879A-07]

3:10 pm: **Debris generation from CO<sub>2</sub> and Nd:YAG laser-produced tin plasmas for EUV light source**, Daisuke Nakamura, Akihiko Takahashi, Tatsuo Okada, Kyushu Univ. (Japan) ..... [6879A-08]

Coffee Break ..... 3:30 to 4:00 pm

### SESSION 4

Room: Conv. Ctr. J4 ..... Mon. 4:00 to 5:30 pm

#### Laser Processing of Dielectrics and Semiconductors

*Session Chair:* **Mamoru Yoshimoto**, Tokyo Institute of Technology (Japan)

4:00 pm: **Laser microprocessing of glass and ceramic materials** (*Invited Paper*), Denis R. Hall, Enrique Mendez, Krzysztof Nowak, Roy McBride, Howard J. Baker, Heriot-Watt Univ. (United Kingdom) ..... [6879A-09]

4:30 pm: **Fabrication of Se supersaturated Si by pulsed laser mixing**, Malek Tabbal, American Univ. of Beirut (Lebanon); Franklin Zhao, David N. Woolf, Micheal J. Aziz, Harvard Univ. .... [6879A-10]

4:50 pm: **Surface microstructures of silica glass by laser-induced backside wet etching**, Hiroyuki Niino, Tadatake Sato, Aiko Narazaki, Yoshizo Kawaguchi, Ryozo Kurosaki, National Institute of Advanced Industrial Science and Technology (Japan) ..... [6879A-12]

5:10 pm: **Selective area bandgap engineering of InGaAsP/InP quantum well microstructures with an infrared laser rapid thermal annealing technique**, Radoslaw Stanowski, Salim Bouaziz, Jan J. Dubowski, Univ. de Sherbrooke (Canada) ..... [6879A-13]

## Tuesday 22 January

### Note Room Change

### SESSION 5

Room: Conv. Ctr. B3 ..... Tues. 8:30 to 10:00 am

#### Fundamentals of Ultrafast Laser-Material Interactions

*Session Chair:* **J. Thomas Dickinson**, Washington State Univ.

Joint Session with Conference 6881: Commercial and Biomedical Applications of Ultrafast Lasers VIII

8:30 am: **Laser ablation using ultra-high power throughout nano-apertures** (*Invited Paper*), Lambertus Hesselink, Stanford Univ. .... [6879A-14]

9:00 am: **Femtosecond laser-nanostructured substrates for single-molecule surface-enhanced Raman spectroscopy** (*Invited Paper*), Eric D. Diebold, Eric Mazur, Harvard Univ. .... [6881-44]

9:30 am: **Surface functionalization using ultrafast pulses for industrial applications** (*Invited Paper*), Eric Audouard, Univ. Jean Monnet Saint-Etienne (France) ..... [6879A-15]

Coffee Break ..... 10:00 to 10:30 am

# Conference 6879A

## SESSION 6

Room: Conv. Ctr. B3 ..... Tues. 10:30 am to 12:20 pm

### Femtosecond Ablation

Session Chair: **Eric Audouard**,  
Univ. Jean Monnet Saint-Etienne (France)

Joint Session with Conference 6881: Commercial and Biomedical Applications of Ultrafast Lasers VIII

- 10:30 am: **Nanoparticle dynamics after pulsed laser irradiation** (*Invited Paper*), Anton Plech, Univ. Konstanz (Germany) ..... [6879A-16]
- 11:00 am: **Femtosecond laser ablation of bundled single wall carbon nanotubes and the resulting plasmonic nanoablation of glass**, Adela Ben-Yakar, Samuel X. Guo, The Univ. of Texas at Austin ..... [6879A-17]
- 11:20 am: **Laser-induced alloying and size control of metal nanoparticles using femtosecond supercontinuum generation**, Sebastien Besner, Simon Archambault, Andrei V. Kabashin, Michel Meunier, Ecole Polytechnique de Montréal (Canada) ..... [6881-26]
- 11:40 am: **Bio-photosensitizer colloidal silicon nanoparticles produced by femtosecond laser ablation in liquid**, David Rioux, Andrei V. Kabashin, Ecole Polytechnique de Montréal (Canada); Lothar D. Lilge, Sacha Douplik, Univ. of Toronto (Canada); Michel Meunier, Ecole Polytechnique de Montréal (Canada) ..... [6881-27]
- 12:00 pm: **Shallow hole drilling with ultrashort pulse lasers**, Benjamin R. Campbell, Vladimir V. Semak, Thomas M. Lehecka, Jeffrey G. Thomas, The Pennsylvania State Univ. .... [6879A-18]
- Lunch/Exhibition Break ..... 12:20 to 1:20 pm

## SESSION 7

Room: Conv. Ctr. B3 ..... Tues. 1:20 to 3:30 pm

### Photonic Devices

Session Chair: **Alexander Szameit**,  
Friedrich-Schiller-Univ. Jena (Germany)

Joint Session with Conference 6881: Commercial and Biomedical Applications of Ultrafast Lasers VIII

- 1:20 pm: **Ultrafast laser direct writing of resonant photonic devices** (*Invited Paper*), Michael J. Withford, Graham D. Marshall, Martin Ams, Nemanja Jovanovic, Peter Dekker, Alexander Fuerbach, James A. Piper, Macquarie Univ. (Australia) ..... [6879A-19]
- 1:50 pm: **Direct writing of waveguide devices in fused silica glass using high-repetition-rate fiber laser**, Shane M. Eaton, Univ. of Toronto (Canada); Jörn Bonse, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); Haibin Zhang, Mi Li Ng, Stephen Ho, Tariq Rafique, Wei-Jen Chen, Jianzhao Li, Univ. of Toronto (Canada); Arkadi Rosenfeld, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); Peter R. Herman, Univ. of Toronto (Canada) ..... [6881-29]
- 2:10 pm: **Polarization control in femtosecond laser writing of waveguide directional couplers**, Wei-Jen Chen, Shane M. Eaton, Shicong Yang, Peter R. Herman, Univ. of Toronto (Canada) ..... [6881-30]
- 2:30 pm: **Three-dimensional integration of micro-optics in bulk silica glass by femtosecond direct writing: potential for industrial applications**, Kazuyuki Nakaya, Daisuke Shibata, Yoshihito Hatazawa, Kazuhiko Sunakawa, Yoichi Yaguchi, Namiki Precision Jewel Co., Ltd. (Japan); Kazuyuki Hirao, Kyoto Univ. (Japan) ..... [6881-31]
- 2:50 pm: **Femtosecond laser direct writing of buried diffractive optical elements in fused silica**, Mi Li Ng, Shane M. Eaton, Debashis Chanda, Peter R. Herman, Univ. of Toronto (Canada) ..... [6879A-20]
- 3:10 pm: **3D integration of microfluidics and micro-optics inside photosensitive glass by femtosecond laser direct writing for photonic biosensing**, Koji Sugioka, Zhongke Wang, Katsumi Midorikawa, The Institute of Physical and Chemical Research (RIKEN) (Japan) ..... [6879A-21]
- Coffee Break ..... 3:30 to 4:00 pm

## SESSION 8

Room: Conv. Ctr. B3 ..... Tues. 4:00 to 6:10 pm

### Optical Waveguides

Session Chair: **Stefan Nolte**, Friedrich-Schiller-Univ. Jena (Germany)

Joint Session with Conference 6881: Commercial and Biomedical Applications of Ultrafast Lasers VIII

- 4:00 pm: **Ultrafast laser microwelding for transparent and heterogeneous materials** (*Invited Paper*), Kazuyoshi Itoh, Takayuki Tamaki, Osaka Univ. (Japan) ..... [6881-32]
- 4:30 pm: **Influence of the beam-focus size on femtosecond laser-induced damage threshold in fused silica**, Nicolas Sanner, Univ. de la Méditerranée (France); Benoît Bussièrre, Univ. de la Méditerranée (France) and Amplitude Technologies (France); Philippe C. Delaporte, Tatiana Itina, Alexis Leray, Marc Sentis, Olivier P. Utéza, Univ. de la Méditerranée (France) ..... [6881-33]
- 4:50 pm: **Efficient frequency doubling in fs-laser written waveguides in PPLN and BBO**, Felix Dreisow, Jens Thomas, Jonas Burghoff, Friedrich-Schiller-Univ. Jena (Germany); Antonio Ancona, Univ. degli Studi di Bari (Italy); Matthias Heinrich, Stefan Nolte, Friedrich-Schiller-Univ. Jena (Germany); Andreas Tuennermann, Friedrich-Schiller-Univ. Jena (Germany) and Fraunhofer Institut für Angewandte Optik und Feinmechanik (Germany) ..... [6881-34]
- 5:10 pm: **High-speed manufacturing of periodical surface and in-volume nanostructures by fs-laser direct writing**, Jens Gottmann, Dirk Wortmann, RWTH Aachen (Germany) ..... [6879A-22]
- 5:30 pm: **Nondestructive sub-micron resolution spatial characterization of fused-silica specimens exposed to low-energy femtosecond laser pulses**, Yves Bellouard, Technische Univ. Eindhoven (Netherlands); Ali A. Said, Mark Dugan, Philippe Bado, Translume, Inc. .... [6881-35]
- 5:50 pm: **Delivery of femtosecond pulses by hollow-core optical fiber**, Yuji Matsuura, Tohoku Univ. (Japan) ..... [6881-61]

## POSTERS-Tuesday

Room: Civic Auditorium. .... Tues. 6:00 to 7:30 pm

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Tuesday morning starting at 10:00 am in the Civic Auditorium, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

- Combined nanoprobe for zond microscopy: laser technology for processing and testing**, Vadim P. Veiko, St. Petersburg State Univ. of Information Technologies, Mechanics and Optics (Russia) ..... [6879A-11]
- Laser alteration of mechanical properties of photostructurable glass-ceramic**, Janet A. Stillman, Jack W. Judy, Univ. of California/Los Angeles; Henry Helvajian, The Aerospace Corp. .... [6879A-38]
- Direct photo-etching of PMMA by focused EUV radiation from a compact EUV source**, Frank Barkusky, Armin Bayer, Christian Peth, Klaus Mann, Laser-Lab. Göttingen e.V. (Germany) ..... [6879A-39]
- Temporal and spectral analysis of laser induced plasma in the ablation process of flexible printed circuit board**, Hoonchul Ryoo, Seok Kim, Jae W. Hahn, Yonsei Univ. (South Korea) ..... [6879A-41]
- Precision microfabrication of AlN and Al<sub>2</sub>O<sub>3</sub> ceramics by femtosecond laser ablation**, Sung Hoon Kim, T. Balasubramni, Gwangju Institute of Science and Technology (South Korea); Ik-Bu Sohn, Yong-Chul Noh, Jongmin Lee, Gwangju Institute of Science and Technology (South Korea) and Advanced Photonics Research Institute (South Korea); Jee Bum Lee, Chonnam National Univ. Medical School (South Korea) and Research Ctr. for Biophotonics (South Korea); SungHo Jeong, Gwangju Institute of Science and Technology (South Korea) ..... [6879A-42]

**Nano-textured surfaces and nanomaterials generated by interfering femtosecond laser processing**, Yoshiki Nakata, Osaka Univ. (Japan)..... [6879A-43]

**Direct laser patterning of silver nanoparticle films deposited on glass**, Myeongkyu Lee, Hyunkwon Shin, Hyunjun Kim, Yonsei Univ. (South Korea) ..... [6879A-44]

**Surface and bulk micro- and nano-structuring with nanojoule femtosecond laser pulses at high-repetition rate**, Philipp Becker, Ronan Le Harzic, Daniel Sauer, Frank Bauerfeld, Karsten König, Fraunhofer-Institut für Biomedizinische Technik (Germany) ..... [6879A-45]

**Characterization of absorbance losses using a high-resolution Hartmann-Shack wavefront sensor in the DUV (EUV) spectral range**, Armin Bayer, Frank Barkusky, Uwe Leinhos, Torsten Miede, Christian Peth, Bernd Schäfer, Klaus Mann, Laser-Lab. Göttingen e.V. (Germany)..... [6879A-46]

**A novel optical data destruction system using a high-power diode laser: system design and test results**, Taeyoung J. Choi, Thomas D. Milster, Warren L. Bletscher, Delbert Hansen, College of Optical Sciences/The Univ. of Arizona..... [6879A-47]

**Bubble dynamics in laser excited nanoparticle suspensions**, Anton Plech, Vassilios Kotaidis, Andreas Siems, Univ. Konstanz (Germany) ..... [6879A-48]

**Laser direct write printing of small molecules for organic electronics**, Nick Kattamis, Ethan Deyle, C. Crouch, N. McDaniel, Stefan Bernhard, Craig B. Arnold, Princeton Univ. .... [6879A-49]

*Technical Event*  
**Laser Communications**  
 Tuesday January 22 2008  
 Room: Fairmont Hotel, Atherton · 7:30 to 9:00 pm  
 Chair: **Dr. Olga Korotkova**, Univ. of Miami

The technical group on Laser Communications will hold its annual meeting in conjunction with the Free-Space Laser Communication Technologies XX conference. All professionals involved in applications of free-space laser communications and supporting technologies are invited to participate in an open discussion on a variety of topics related to the challenges and advancement of the field. Members and visitors are invited to bring suggestions for discussion topics.

## Wednesday 23 January

### SESSION 9

**Room: Conv. Ctr. J4 .....Wed. 8:10 to 10:00 am**

#### Industrial Applications

*Session Chair: Malcolm C. Gower,*  
 Nanophoton Technologies (United Kingdom)

8:10 am: **Large scale laser microstructuring of gravure print rollers** (*Invited Paper*), Guido Hennig, Karl-Heinz Selbmann, Silke Pfinninger, Johannes Brendel, MDC Max Daetwyler AG (Switzerland); Stephan Bruening, Schepers GmbH (Germany)..... [6879A-23]

8:40 am: **Anisotropic transformation of the beam quality of DPSS lasers for shaping of a narrow line focus for laser crystallization of Si**, Alexei S. Mikhailov, Yuri V. Miklyaev, Mikhail M. Ivanenko, Vitalij N. Lissotschenko, LIMO Lissotschenko Mikrooptik GmbH (Germany) ..... [6879A-24]

9:00 am: **Multifunctional microoptical elements for laser beam homogenizing and beam shaping**, Andreas Bich, Jürgen Rieck, Reinhard Voelkel, Kenneth J. Weible, SUSS MicroOptics SA (Switzerland); Maik Zimmermann, Matthias Rank, Michael H. Schmidt, Bayerisches Laserzentrum GmbH (Germany)..... [6879A-25]

9:20 am: **Line length scalable high-power diode laser with power densities >100kW/cm<sup>2</sup> for industrial applications**, Markus Revermann, Andreas Bayer, Jens Meinschien, LIMO-Lissotschenko Mikrooptik GmbH (Germany) [6879A-26]

9:40 am: **Pulsed laser ablation of polymers for display and microelectronic applications**, James E. A. Pedder, Oerlikon Optics UK Ltd. (United Kingdom) and Imperial College London (United Kingdom); Andrew S. Holmes, Imperial College London (United Kingdom); Heather J. Booth, Oerlikon Optics UK Ltd. .... [6879A-27]

Coffee Break ..... 10:00 to 10:30 am

### Plenary Session

*Room: Montgomery Theater · Wed. 10:30 am to 12:30 pm*

10:30 am: **Laser Processing and Chemistry: Applications in Nanopatterning, Material Synthesis and Biotechnology** (*Invited Paper*), Dieter Bäuerle, Johannes Kepler Univ. Linz (Austria)

11:10 am: **The Long Journey from Idea to Industrial Success** (*Invited Paper*), Holger Schlueter, TRUMPF Inc.

11:50 am: **Building Coherence in Collaboration: A Case Study with the World's Most Powerful, Tunable Laser** (*Invited Paper*), H. Fred Dylla, American Institute of Physics  
*See p. 24 for details.*

Lunch/Exhibition Break ..... 12:30 to 1:50 pm

### Note Room Change

#### SESSION 10

**Room: Conv. Ctr. J1 .....Wed. 1:50 to 3:00 pm**

#### Laser Processing for Energy Devices

*Session Chair: Craig B. Arnold, Princeton Univ.*

Joint Session with Conference 6880: Laser-Based Micro- and Nano-Packaging and Assembly (LBMP-V)

1:50 pm: **Lasers in energy device manufacturing** (*Invited Paper*), Andreas Ostendorf, Laser Zentrum Hannover e.V. (Germany) ..... [6880-10]

2:20 pm: **Enhanced processes and productivity for photovoltaics by scaling average and peak power of lasers**, Uwe Stute, Sascha Weiler, TRUMPF Laser GmbH & Co. KG (Germany); Juergen Stollhof, TRUMPF Laser Technology Ctr.; Severin Massa, Simone Buettner, Birgit Faisst, TRUMPF Laser GmbH & Co. KG (Germany) ..... [6879A-28]

2:40 pm: **Applications for pulsed and continuous wave fiber lasers in the photovoltaic industry**, Anthony P. Hoult, SPI Lasers plc ..... [6879A-29]

Coffee Break ..... 3:00 to 3:30 pm

#### SESSION 11

**Room: Conv. Ctr. J4 .....Wed. 3:30 to 5:20 pm**

#### Laser Deposition and Modification Processes

*Session Chair: Hiroyuki Niino, National Institute of Advanced Industrial Science and Technology (Japan)*

3:30 pm: **Nanoscale growth control of functional thin films on atomically surface-controlled substrates by laser MBE** (*Invited Paper*), Mamoru Yoshimoto, Wakana Hara, Tokyo Institute of Technology (Japan) ... [6879A-31]

4:00 pm: **Laser-induced air breakdown-based nanofabrication to produce ZNO-based random lasing spots**, Andrei V. Kabashin, Michel Meunier, Ecole Polytechnique de Montréal (Canada); Wladimir I. Marine, Univ. de la Méditerranée-Aix Marseille II (France)..... [6879A-32]

4:20 pm: **Excimer laser induced melting and resolidification of copper and silver thin films**, Rong Zhong, Andreas Kulovits, Jorg Wiezorek, John P. Leonard, Univ. of Pittsburgh ..... [6879A-33]

4:40 pm: **Effects of laser wavelength, fluence and pulse duration on infrared pulsed laser deposition of conducting and semiconducting polymers**, Stephen L. Johnson, Vanderbilt Univ.; Hee K. Park, AppliFlex LLC; John A. Kozub, Richard F. Haglund, Jr., Vanderbilt Univ. .... [6879A-34]

5:00 pm: **Low-temperature resonant infrared laser ablation of thermosetting polymers**, Nicole L. Dygert, Anthony P. Gies, Richard F. Haglund, Jr., Vanderbilt Univ. .... [6879A-35]

# Conference 6879A

**Thursday 24 January**

**Note Room Change**

**SESSION 12**

**Room: Conv. Ctr. J1 ..... Thurs. 1:40 to 3:30 pm**

**Laser Direct-Write Processing**

*Session Chair: Wilhelm Pfleging,*  
Forschungszentrum Karlsruhe (Germany)

Joint Session with Conference 6880: Laser-Based Micro-  
and Nano-Packaging and Assembly (LBMP-V)

1:40 pm: **Laser direct writing of SiO<sub>2</sub>/TiO<sub>2</sub> sol-gel films to fabricate stripe optical waveguides** (*Invited Paper*), Xiaoyan Zeng, Aikui Li, Zemin Wang, Jiajun Liu, Huazhong Univ. of Science and Technology (China); Hongda Chen, ChunXia Wang, Institute of Semiconductors (China) ..... [6880-26]

2:10 pm: **Laser sintering of direct write silver nano-ink conductors for microelectronic applications**, Adeyl Khan, Nicholas Rasmussen, Valery Marinov, Orven F. Swenson, North Dakota State Univ. .... [6879A-36]

2:30 pm: **Laser direct micromachining with TopHat-converted single mode lasers**, Oliver Homburg, Frank Toennissen, Thomas Mitra, Vitalij N. Lissotschenko, LIMO-Lissotschenko Mikrooptik GmbH (Germany) . . . [6880-27]

2:50 pm: **Laser micromachining of branching networks**, DongHyuck Kam, Univ. of Michigan; Lawrence Shah, IMRA America, Inc.; Jyotirmoy Mazumder, Univ. of Michigan. .... [6880-28]

3:10 pm: **Laser direct printing of electronic materials with thin film characteristics**, Alberto Piqué, Raymond C. Y. Auyeung, Naval Research Lab.; Thomas Bailey, Xianhai Chen, Lydia J. Young, Photon Dynamics, Inc. .... [6879A-37]



# Conference 6879B · Room: Hilton Hotel: Santa Clara I

Thursday 24 January 2008 • Part of Proceedings of SPIE Vol. 6879:  
Photon Processing in Microelectronics and Photonics VII

## Synthesis and Photonics of Nanoscale Materials VI

*Conference Chairs:* **David B. Geohegan**, Oak Ridge National Lab.; **Frank Träger**, Univ. Kassel (Germany); **Jan J. Dubowski**, Univ. de Sherbrooke (Canada)

*Program Committee:* **Steven R. J. Brueck**, The Univ. of New Mexico; **J. Thomas Dickinson**, Washington State Univ.; **Costas P. Grigoropoulos**, Univ. of California/Berkeley; **Richard F. Haglund**, Vanderbilt Univ.; **Tony F. Heinz**, Columbia Univ.; **Ilko K. Ilev**, U.S. Food and Drug Administration; **Vladimir M. Shalaev**, Purdue Univ.; **Eli S. Simova**, National Research Council Canada (Canada); **Xianfan Xu**, Purdue Univ.

### Thursday 24 January

#### SESSION 1

**Room: Hilton Hotel: Santa Clara I. . . . . Thurs. 8:00 to 10:00 am**

*Session Chair:* **David B. Geohegan**, Oak Ridge National Lab.

8:00 am: **Nanoscale spectroscopy with optical antennas** (*Invited Paper*), Palash Bharadwaj, Lukas Novotny, Univ. of Rochester . . . . . [6879B-51]

8:40 am: **Generation and applications of regular arrays of gold nanoparticles**, Rodica Morarescu, Frank Hubenthal, Frank Träger, Univ. Kassel (Germany) . . . . . [6879B-52]

9:00 am: **Nanometer scale surface modification of single crystals under UV laser irradiation**, J. Thomas Dickinson, Kenichi Kimura, Steven Langford, Washington State Univ. . . . . [6879B-53]

9:20 am: **Optical properties of core-shell gold-silver and silver-gold nanoparticles for some laser wavelengths**, Victor K. Pustovalov, Belarussian Institute of System Analysis (Belarus); Karsten Koenig, Fraunhofer-Institut für Biomedizinische Technik (Germany); Liudmila Astafyeva, B.I. Stepanov Institute of Physics (Belarus); Wolfgang Fritzsche, Institut für Photonische Technologien e.V. (Germany) . . . . . [6879B-54]

9:40 am: **Distributions of laser radiation intensity inside gold nanoparticles during laser irradiation**, Victor K. Pustovalov, Belarussian Institute of System Analysis (Belarus); Karsten Koenig, Fraunhofer-Institut für Biomedizinische Technik (Germany); Liudmila Astafyeva, B.I. Stepanov Institute of Physics (Belarus) . . . . . [6879B-55]

Coffee Break . . . . . 10:00 to 10:30 pm

#### SESSION 2

**Room: Hilton Hotel: Santa Clara I. . . . . Thurs. 10:30 am to 12:30 pm**

*Session Chair:* **Jan J. Dubowski**, Univ. de Sherbrooke (Canada)

10:30 am: **Plasmonic surfaces for photonic applications** (*Invited Paper*), Joachim R. Krenn, Karl-Franzens-Univ. Graz (Austria) . . . . . [6879B-56]

11:10 am: **Dephasing time and damping mechanisms of the surface-plasmon polariton in gold nanoparticles**, Nils Borg, Christian Hendrich, Frank Hubenthal, Frank Träger, Univ. Kassel (Germany) . . . . . [6879B-57]

11:30 am: **Control of the surface-plasmon resonance in metal-oxide composite nanoparticle arrays**, Richard F. Haglund, Jr., Jae Yong Suh, Eugene Donev, Davon Ferrara, Kevin A. Tetz, Vanderbilt Univ. . . . . [6879B-58]

11:50 am: **Production of oriented elliptical nanovoids in glass by electric field assisted dissolution of metallic nanoparticles**, Gerhard Seifert, Andrei Stalmashonak, Heinrich Graener, Martin-Luther Univ. Halle-Wittenberg (Germany); Michael Leitner, Bogdan Sepiol, Univ. Wien (Austria) . . . [6879B-59]

12:10 pm: **Laser direct write near-field nanopatterning using optically trapped microspheres**, Euan J. R. B. McLeod, Craig B. Arnold, Princeton Univ. . . . . [6879B-60]

Lunch/Exhibition Break . . . . . 12:30 to 1:30 pm

#### SESSION 3

**Room: Hilton Hotel: Santa Clara I. . . . . Thurs. 1:30 to 3:30 pm**

*Session Chair:* **Frank Träger**, Univ. Kassel (Germany)

1:30 pm: **Resonance Raman studies of exciton behavior in single-walled carbon nanotubes** (*Invited Paper*), Stephen K. Doorn, Los Alamos National Lab. . . . . [6879B-61]

2:10 pm: **Effects of ultrafast laser irradiation on the optical properties and purity of solid single-walled carbon nanotube membranes**, David J. Styers-Barnett, Matthew P. Garrett, Iliia N. Ivanov, Alexander A. Puzetzy, Bin Zhou, Hui Hu, David B. Geohegan, Oak Ridge National Lab. . . . . [6879B-62]

2:30 pm: **Laser irradiation of metal-catalyst films for enhanced growth of vertically aligned carbon nanotube arrays by chemical vapor deposition**, Alexander A. Puzetzy, David B. Geohegan, David J. Styers-Barnett, Jeremy J. Jackson, Christopher M. Rouleau, Gyula Eres, Iliia N. Ivanov, Oak Ridge National Lab. . . . . [6879B-63]

2:50 pm: **Formation of nanocarbon and composite materials by laser vaporization of graphite and eleven metals**, Fumio Kokai, Akira Koshio, Keita Kobayashi, Hiroshi Deno, Mie Univ. (Japan) . . . . . [6879B-64]

3:10 pm: **Mid-IR photoluminescence and lasing of chromium doped II-VI quantum dots**, Dmitri V. Martyshkin, Changsu Kim, Igor S. Moskalev, Vladimir V. Fedorov, Sergey B. Mirov, The Univ. of Alabama at Birmingham . . [6879B-65]

Coffee Break . . . . . 3:30 to 4:00 pm

#### SESSION 4

**Room: Hilton Hotel: Santa Clara I. . . . . Thurs. 4:00 to 6:20 pm**

*Session Chair:* **Richard F. Haglund**, Vanderbilt Univ.

4:00 pm: **Large-area nanophotonics by interferometric lithography** (*Invited Paper*), Steven R. J. Brueck, The Univ. of New Mexico . . . . [6879B-66]

4:40 pm: **Pulsed laser deposition of permanent magnetic thin film**, Antonio Morone, Consiglio Nazionale delle Ricerche (Italy); Luigi Allocca, Istituto Motori CNR (Italy); Massimo Valentino, Consiglio Nazionale delle Ricerche (Italy); Umberto Gambardella, Lab. SUPERMAT (Italy) . . . . . [6879B-67]

5:00 pm: **Observation of self-assembled periodic nano-structures induced by femtosecond laser in both ablation and deposition regimes**, Mingzhen Tang, Haitao Zhang, Tsinghua Her, The Univ. of North Carolina at Charlotte . . . . . [6879B-68]

5:20 pm: **Femtosecond PLD for nanoparticle films**, Matthew S. Rogers, Costas P. Grigoropoulos, Samuel S. Mao, Univ. of California/Berkeley. . . . . [6879B-69]

5:40 pm: **Laser assisted selective area thiolation of (001) GaAs**, Gregory M. Marshall, Univ. de Sherbrooke (Canada); Ximing Ding, Univ. de Sherbrooke; Farid Bensebaa, National Research Council Canada; Jan J. Dubowski, Univ. de Sherbrooke (Canada) . . . . . [6879B-70]

LASE

# Conference 6880 · Room: Conv. Ctr. J1

Tuesday-Thursday 22-24 January 2008 • Proceedings of SPIE Vol. 6880

## Laser-Based Micro- and Nano-Packaging and Assembly II

*Conference Chairs:* **Wilhelm Pfleging**, Forschungszentrum Karlsruhe (Germany); **Yongfeng Lu**, Univ. of Nebraska/Lincoln; **Kunihiko Washio**, Paradigm Laser Research Ltd (Japan)

*Conference Co-Chair:* **Willem Hoving**, XiO Photonics bv (Netherlands); **Amako Jun**, Seiko Epson Corp. (Japan)

*Program Committee:* **Friedrich G. Bachmann**, Rofin-Sinar Laser GmbH (Germany); **Dieter Bäuerle**, Johannes Kepler Univ. Linz (Austria); **Shaochen Chen**, The Univ. of Texas/Austin; **Costas P. Grigoropoulos**, Univ. of California/Berkeley; **Bo Gu**, GSI Group Inc.; **Richard F. Haglund**, Vanderbilt Univ.; **Matthew Henry**, Powerlase Ltd. (United Kingdom); **Martin F. Jensen**, Danish Technological Institute (Denmark); **Udo Klotzbach**, Fraunhofer-Institut für Werkstoff- und Strahltechnik (Germany); **Sergey I. Kudryashov**, P.N. Lebedev Physical Institute (Russia); **Xinbing Liu**, Panasonic Technologies Co.; **Tomoaki Matsushima**, Matsushita Electric Works, Ltd. (Japan); **Andreas Ostendorf**, Laser Zentrum Hannover e.V. (Germany); **Marius Przybylski**, ATL Lasertechnik GmbH (Germany); **Gurinder P. Singh**, Hitachi Global Storage Technologies; **Koji Sugioka**, The Institute of Physical and Chemical Research (Japan)

### Tuesday 22 January

#### SESSION 1

Room: Conv. Ctr. J1 ..... Tues. 1:40 to 3:40 pm

#### Advanced Technologies

*Session Chair:* **Amako Jun**, Seiko Epson Corp. (Japan)

1:40 pm: **Beam shaping effects in two photon polymerization of hybrid material systems** (*Invited Paper*), Richard J. Winfield, Tyndall National Institute (Ireland); Belal Bhuian, Tyndall National Institute (Ireland) and Dept of Microelectronic Engineering, Univ. College Cork, Butler Bldg, N Mall, Cork (Ireland); Shane A. O'Brien, Tyndall National Institute (Ireland); Gabriel M. Crean, Tyndall National Institute (Ireland) and Dept of Microelectronic Engineering, Univ. College Cork, Butler Bldg, N Mall, Cork (Ireland). ..... [6880-01]

2:10 pm: **Precision laser processing for microelectronics and fiber optic manufacturing** (*Invited Paper*), Andrew G. Webb, OpTek US; Mike Osborne, OpTek Systems (United Kingdom) ..... [6880-02]

2:40 pm: **Laser alloying and cladding of ceramic and glas-ceramic surfaces using nanoscaled metal-oxid powders**, Magnus Rohde, Sabine Schreck, Sophia Sachse, Forschungszentrum Karlsruhe (Germany). ..... [6880-03]

3:00 pm: **Saw + LMJ: a hybrid semiconductor dicing solution**, Bernold Richerzhagen, Synova SA (Switzerland); Notker Kling, Synova USA Inc.; Keith Stay, Synova SA (Switzerland). ..... [6880-04]

3:20 pm: **Nanoscale Raman characterization of residual stress in Si nanostructures fabricated by laser-assisted scanning tunneling microscope**, Kaijun Yi, Yongfeng Lu, Univ. of Nebraska/Lincoln . . . . [6880-05]

#### Technical Event

#### Laser Communications

Tuesday January 22 2008

Room: Fairmont Hotel, Atherton · 7:30 to 9:00 pm

Chair: **Dr. Olga Korotkova**, Univ. of Miami

The technical group on Laser Communications will hold its annual meeting in conjunction with the Free-Space Laser Communication Technologies XX conference. All professionals involved in applications of free-space laser communications and supporting technologies are invited to participate in an open discussion on a variety of topics related to the challenges and advancement of the field. Members and visitors are invited to bring suggestions for discussion topics.

### Wednesday 23 January

#### SESSION 2

Room: Conv. Ctr. J1 ..... Wed. 8:30 to 10:00 am

#### Displays and Lighting Devices

*Session Chair:* **Willem Hoving**, XiO Photonics (Netherlands)

8:30 am: **Laser-induced cleavage of LCD glass as full-body cutting** (*Invited Paper*), Norio Karube, Kojiro Karube, LEMI CO., LTD. (Japan) [6880-06]

9:00 am: **Laser scribing method based on laser melting alteration**, Shohei Nagatomo, Laser Solutions Co., Ltd. (Japan) ..... [6880-07]

9:20 am: **Far rear surface focusing of femtosecond laser pulses for dicing display glass plates**, Farid Ahmed, Chul-Ki Min, Man-seop Lee, Information and Communications Univ. (South Korea) ..... [6880-08]

9:40 am: **Joining of thin glass-on-glass and on silicon by welding using ultra-fast IR-high-repetition rate laser radiation**, Alexander Horn, Ilja Mingareev, Alexander Werth, Martin Kachel, RWTH Aachen (Germany)[6880-09]

Coffee Break ..... 10:00 to 10:30 am

#### Plenary Session

Room: Montgomery Theater · Wed. 10:30 am to 12:30 pm

10:30 am: **Laser Processing and Chemistry: Applications in Nanopatterning, Material Synthesis and Biotechnology** (*Invited Paper*), Dieter Bäuerle, Johannes Kepler Univ. Linz (Austria)

11:10 am: **The Long Journey from Idea to Industrial Success** (*Invited Paper*), Holger Schlueter, TRUMPF Inc.

11:50 am: **Building Coherence in Collaboration: A Case Study with the World's Most Powerful, Tunable Laser** (*Invited Paper*), H. Fred Dylla, American Institute of Physics

See p. 24 for details.

Lunch/Exhibition Break ..... 12:30 to 1:50 pm

**SESSION 3**

**Room: Conv. Ctr. J1 ..... Wed. 1:50 to 3:00 pm**

**Laser Processing for Energy Devices**

*Session Chair: Craig B. Arnold, Princeton Univ.*

Joint Session with Conference 6879A: Laser Applications in Microelectronic and Optoelectronic Manufacturing XIII

1:50 pm: **Lasers in energy device manufacturing** (*Invited Paper*), Andreas Ostendorf, Laser Zentrum Hannover e.V. (Germany) ..... [6880-10]

2:20 pm: **Enhanced processes and productivity for photovoltaics by scaling average and peak power of lasers**, Uwe Stute, Sascha Weiler, TRUMPF Laser GmbH & Co. KG (Germany); Juergen Stollhof, TRUMPF Laser Technology Ctr.; Severin Massa, Simone Buettner, Birgit Faisst, TRUMPF Laser GmbH & Co. KG (Germany) ..... [6879A-28]

2:40 pm: **Applications for pulsed and continuous wave fiber lasers in the photovoltaic industry**, Anthony P. Hault, SPI Lasers plc ..... [6879A-29]

Coffee Break ..... 3:00 to 3:30 pm

**SESSION 4**

**Room: Conv. Ctr. J1 ..... Wed. 3:30 to 5:10 pm**

**Biotechnical and Microfluidic Devices**

*Session Chair: Kunihiko Washio, Paradigm Laser Research Ltd (Japan)*

3:30 pm: **Short-pulse metal structuring: a method for modifying surface adhesion properties** (*Invited Paper*), Peter Balling, Bjarke H. Christensen, Jeppe Byskov-Nielsen, Dang Q. S.Le, Aarhus Univ. (Denmark) . . . . . [6880-11]

4:00 pm: **Patterning of polystyrene by UV-laser radiation for the fabrication of devices for patch clamping**, Wilhelm Pflöging, Forschungszentrum Karlsruhe (Germany); Marius Przybylski, ATL Lasertechnik GmbH (Germany); Alexander Welle, Forschungszentrum Karlsruhe (Germany); Sandra Wilson, Forschungszentrum Karlsruhe (Germany) and Cranfield Univ. (United Kingdom) . . . . . [6880-12]

4:20 pm: **Nano-aquarium for dynamic observation of aquatic microorganisms fabricated by femtosecond laser direct writing of photostructurable glass** (*Invited Paper*), Yasutaka Hanada, Koji Sugioka, Hiroyuki Kawano, Ikuko Ishikawa, Atsushi Miyawaki M.D., Katsumi Midorikawa, The Institute of Physical and Chemical Research (RIKEN) (Japan) . . . . . [6880-14]

4:40 pm: **Nano-structuring of polymer surfaces by multibeam laser interference for application in microfluidics**, Thomas Klotzbücher, André Radke, Abdi Tunayar, Oliver Haverbeck, Elena Weinbender, Ines Frese, Jens Wuesten, Jan Claussen, Peter Detemple, Institut für Mikrotechnik Mainz GmbH (Germany) ..... [6880-15]

**Thursday 24 January**

**SESSION 5**

**Room: Conv. Ctr. J1 ..... Thurs. 8:30 to 10:20 am**

**Bonding and Packaging**

*Session Chair: Friedrich G. Bachmann, Rofin-Sinar Laser GmbH (Germany)*

8:30 am: **Optoelectronic packaging based on laser joining** (*Invited Paper*), Ramona Eberhardt, Erik Beckert, Thomas Burkhardt, Steffen Böhme, Andreas Tünnermann, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) ..... [6880-16]

9:00 am: **Laser-based microbonding of VCSELs using arrayed beams from a fiber laser**, Kimio Nagasaka, Amako Jun, Eiichi Fujii, Seiko Epson Corp. (Japan) . . . . . [6880-17]

9:20 am: **Modification of an ophthalmic laser for micro-joining on MEMS**, A. B. Wedding, Hung-Yao Hsu, Univ. of South Australia (Australia) . . . . . [6880-18]

9:40 am: **Wetting and adhesion of active braze metals on SiC in laser brazing processes**, Isabelle J. Suedmeyer, Magnus Rohde, Forschungszentrum Karlsruhe (Germany) . . . . . [6880-19]

10:00 am: **Laser assisted packaging and assembly of MEMS devices**, Rahul Agarwal, Scott Samson, Univ. of South Florida; Sunny Kedia, SRI International. . . . . [6880-20]

Coffee Break ..... 10:20 to 10:50 am

**SESSION 6**

**Room: Conv. Ctr. J1 ..... Thurs. 10:50 am to 12:40 pm**

**Thin Film and Nanomaterials**

*Session Chair: Yongfeng Lu, Univ. of Nebraska/Lincoln*

10:50 am: **Pulsed-laser deposition of oxides: high-Tc superconductors and piezoelectrics** (*Invited Paper*), Johannes D. Pedarnig, Johannes Kepler Univ. Linz (Austria) . . . . . [6880-21]

11:20 am: **Interactions between pulsed-laser-induced plasmas and ECR microwave plasmas**, Junyi Tang, Jian Sun, Jie Shao, Fudan Univ. (China); Hao Ling, Xiaokang Shen, Univ. of Nebraska/Lincoln; Aiming Wu, Zhaosong Gong, JiaDa Wu, Fudan Univ. (China); Yongfeng Lu, Univ. of Nebraska/Lincoln . . . . . [6880-22]

11:40 am: **Mechanism of resonant infrared ablation of polymers: effects of temperature-dependent vibrational linewidths**, Richard F. Haglund, Jr., Vanderbilt Univ.; Daniel M. Bubbs, Rutgers Univ.; Stephen L. Johnson, Vanderbilt Univ.; Michael R. Papantonakis, Naval Research Lab.; Ali Sezer, California Univ. of Pennsylvania; Kenneth E. Schriver, Vanderbilt Univ. . . . . [6880-23]

12:00 pm: **C<sub>2</sub> and CH rotational temperatures in diamond growth using CO<sub>2</sub> laser-assisted combustion flames**, T. Gebre, J. Sun, Hao Ling, Yaoxuan Han, M. Zhao, Yongfeng Lu, Univ. of Nebraska/Lincoln . . . . . [6880-24]

12:20 pm: **Laser-assisted chemical vapor deposition of self-aligned carbon nanotubes**, M.M. Samani, Y.S. Zhou, Yongfeng Lu, Univ. of Nebraska/Lincoln . . . . . [6880-25]

Lunch/Exhibition Break ..... 12:40 to 1:40 pm



# Conference 6880

## SESSION 7

Room: Conv. Ctr. J1 ..... Thurs. 1:40 to 3:30 pm

### Laser Direct-Write Processing

Session Chair: **Wilhelm Pfleging**,  
Forschungszentrum Karlsruhe (Germany)

Joint Session with Conference 6879A: Laser Applications in  
Microelectronic and Optoelectronic Manufacturing XIII

1:40 pm: **Laser direct writing of SiO<sub>2</sub>/TiO<sub>2</sub> sol-gel films to fabricate stripe optical waveguides** (*Invited Paper*), Xiaoyan Zeng, Aikui Li, Zemin Wang, Jiajun Liu, Huazhong Univ. of Science and Technology (China); Hongda Chen, ChunXia Wang, Institute of Semiconductors (China) ..... [6880-26]

2:10 pm: **Laser sintering of direct write silver nano-ink conductors for microelectronic applications**, Adeyl Khan, Nicholas Rasmussen, Valery Marinov, Orven F. Swenson, North Dakota State Univ. .... [6879A-36]

2:30 pm: **Laser direct micromachining with TopHat-converted single mode lasers**, Oliver Homburg, Frank Toennissen, Thomas Mitra, Vitalij N. Lissotschenko, LIMO-Lissotschenko Mikrooptik GmbH (Germany)... [6880-27]

2:50 pm: **Laser micromachining of branching networks**, DongHyuck Kam, Univ. of Michigan; Lawrence Shah, IMRA America, Inc.; Jyotirmoy Mazumder, Univ. of Michigan. .... [6880-28]

3:10 pm: **Laser direct printing of electronic materials with thin film characteristics**, Alberto Piqué, Raymond C. Y. Auyeung, Naval Research Lab.; Thomas Bailey, Xianhai Chen, Lydia J. Young, Photon Dynamics, Inc. .... [6879A-37]

### **Make time for the Photonics West Exhibition**

*San Jose Convention Center, Exhibition Halls 1-3,  
Exhibition Foyer and South Halls 1-2*

Tuesday 22 January ..... 10:00 am to 5:00 pm  
Wednesday 23 January ..... 10:00 am to 5:00 pm  
Thursday 24 January ..... 10:00 am to 4:00 pm

**See new applications in action at the  
Product Demonstrations.**

*See pp. 37-39 for details.*



# Commercial and Biomedical Applications of Ultrafast Lasers VIII

Conference Chairs: **Joseph Neev**, JYNI Inc.; **Stefan Nolte**, Friedrich-Schiller-Univ. Jena (Germany); **Alexander Heisterkamp**, Laser Zentrum Hannover e.V. (Germany); **Christopher B. Schaffer**, Cornell Univ.

Program Committee: **Samer Banna**, Brookhaven National Lab.; **Adela Ben-Yakar**, The Univ. of Texas/Austin; **James E. Carey**, Harvard Univ.; **Donald J. Harter**, IMRA America, Inc.; **Chandrashekhar J. Joshi**, UCLA; **Daniel J. Kane**, Southwest Sciences, Inc.; **Eric D. Mazur**, Harvard Univ.; **Nozomi Nishimura**, Cornell Univ.; **Minoru Obara**, Keio Univ. (Japan); **Andreas Ostendorf**, Laser Zentrum Hannover e.V. (Germany); **Levi Schachter**, Technion-Israel Institute of Technology (Israel); **Brent C. Stuart**, Lawrence Livermore National Lab.; **Alexander Szameit**, Friedrich-Schiller-Univ. Jena (Germany); **Philbert S. Tsai**, Univ. of California/San Diego; **Alfred Vogel**, Univ. zu Lübeck (Germany)

SPIE and the organizers gratefully acknowledge the following conference sponsors:



## Sunday 20 January

### Opening remarks

Room: Conv. Ctr. B3 ..... Sun. 1:40 to 1:45 pm

### SESSION 1

Room: Conv. Ctr. B3 ..... Sun. 1:45 to 3:15 pm

### Ultrafast Lasers in Cell Biology

Session Chair: **Christopher B. Schaffer**, Cornell Univ.

1:45 pm: **Laser scissors in cell biology: then and now** (*Invited Paper*), Michael W. Berns, Univ. of California/Irvine ..... [6881-01]

2:15 pm: **Nanoprocessing of substrates for cell biology**, Wataru Watanabe, National Institute of Advanced Industrial Science and Technology (Japan); Karsten Koenig, Fraunhofer-Institut für Biomedizinische Technik (Germany) ..... [6881-02]

2:35 pm: **Numerical modelling of nonlinear plasma formation in high-NA micromachining of transparent materials and biological cells using ultrashort laser pulses**, Cord L. Arnold, Alexander Heisterkamp, Wolfgang A. Ertmer, Holger Lubatschowski, Laser Zentrum Hannover e.V. (Germany) ..... [6881-03]

2:55 pm: **Applications of femtosecond laser ablation to neuroscience in C. elegans**, Samuel H. Chung, Damon A. Clark, Christopher V. Gabel, Aravinthan D. T. Samuel, Eric D. Mazur, Harvard Univ. .... [6881-06]

Coffee Break ..... 3:15 to 3:45 pm

### SESSION 2

Room: Conv. Ctr. B3 ..... Sun. 3:45 to 4:45 pm

### Ultrafast Lasers in Imaging

Session Chair: **Alexander Heisterkamp**, Laser Zentrum Hannover e.V. (Germany)

3:45 pm: **Femtosecond laser microsurgery system controlled by optical coherence tomography**, Ole Massow, Laser Zentrum Hannover e.V. (Germany); Fabian G. Will, Rowiak GmbH (Germany); Holger Lubatschowski, Laser Zentrum Hannover e.V. (Germany) and Rowiak GmbH (Germany)[6881-04]

4:05 pm: **OCT controlled vocal cord femtosecond laser microsurgery**, Kathrin Alexandrov, Medizinische Hochschule Hannover (Germany); Henning Wisweh, Laser Zentrum Hannover e.V. (Germany) and Medizinische Hochschule Hannover (Germany); Ann-Kristin Hueller, Ulrich Merkel, Medizinische Hochschule Hannover (Germany); Holger Lubatschowski, Laser Zentrum Hannover e.V. (Germany) ..... [6881-05]

4:25 pm: **Ultrafast Yb:KGW laser for multimodal biomedical imaging with reduced photodamage**, Richard Cisek, Adam Tuer, Nicole Prent, Univ. of Toronto (Canada); Arkady Major, Univ. of Manitoba (Canada); Virginijus Barzda, Univ. of Toronto (Canada) ..... [6881-06]



## Monday 21 January

### SESSION 3

Room: Conv. Ctr. B3 ..... Mon. 8:30 to 10:30 am

#### Laser-Plasma-Accelerator

Session Chair: **Samer Banna**, Brookhaven National Lab.

8:30 am: **Laser-plasma generated very high-energy electrons in radiation therapy of the prostate** (*Invited Paper*), Colleen DesRosiers, Indiana Univ. School of Medicine; Chandrashekar J. Joshi, Univ. of California/Los Angeles; Vadim Moskvina, Mark Langer, Indiana Univ. School of Medicine. .... [6881-07]

9:00 am: **Laser-driven plasma accelerators: prospects for medical applications** (*Invited Paper*), Chandrashekar J. Joshi, Univ. of California/Los Angeles ..... [6881-08]

9:30 am: **Medical applications with electron beam generated by laser plasma accelerators** (*Invited Paper*), Victor Malka, Jerome Faure, Yannick Glinec, C. Rechatin, Ecole Nationale Supérieure de Techniques Avancées (France); T. Fuchs, U. Oelfke, H. Szymanowski, German Cancer Research Ctr. (Germany) ..... [6881-09]

10:00 am: **Application of miniature plasma slow-wave structures to direct laser acceleration** (*Invited Paper*), Howard Milchberg, Andrew M. York, Brian Layer, Univ. of Maryland/College Park ..... [6881-10]

Coffee Break ..... 10:30 to 11:00 am

### SESSION 4

Room: Conv. Ctr. B3 ..... Mon. 11:00 am to 12:00 pm

#### Laser Vacuum Accelerator

Session Chair: **Chandrashekar J. Joshi**, Univ. of California/Los Angeles

11:00 am: **Optical passive and active acceleration structures: a tutorial** (*Invited Paper*), Levi Schachter, Technion-Israel Institute of Technology (Israel) ..... [6881-11]

11:30 am: **First experimental demonstration of PASER: particle acceleration by stimulated emission of radiation** (*Invited Paper*), Samer Banna, Brookhaven National Lab.; Valery Berezovsky, Consultant; Levi Schachter, Technion-Israel Institute of Technology (Israel) ..... [6881-12]

#### Round Table Panel Discussion

Room: Conv. Ctr. B3 ..... Mon. 12:00 to 12:45 pm

#### Perspectives of laser based accelerators in medicine and biology

Panel Moderators: **Levi Schachter**, Technion-Israel Institute of Technology (Israel); **Chandrashekar J. Joshi**, Univ. of California/Los Angeles; **Colleen DesRosiers**, Indiana Univ. School of Medicine; **Victor Malka**, Ecole Nationale Supérieure de Techniques Avancées (France); **Howard M. Milchberg**, Univ. of Maryland/College Park; **Samer Banna**, Brookhaven National Lab.

Lunch Break ..... 12:45 to 2:00 pm

### SESSION 5

Room: Conv. Ctr. B3 ..... Mon. 2:00 to 3:30 pm

#### Novel Ultrafast Laser Sources

Session Chair: **Donald J. Harter**, IMRA America, Inc.

2:00 pm: **Recirculation injection by nonlinear gating for high-power laser pulses** (*Invited Paper*), Igor Jovanovic, Purdue Univ. .... [6881-14]

2:30 pm: **Parabolic fiber amplifier beyond the gain bandwidth limits**, Dimitris Papadopoulos, Institut d'Optique (France); Yoann Zaouter, Amplitude Systemes (France); Marc Hanna, Frederic Druon, Institut d'Optique (France); Eric P. Mottay, Amplitude Systemes (France); Eric Cormier, Univ. Bordeaux I (France); Patrick M. Georges, Institut d'Optique (France) ..... [6881-15]

2:50 pm: **Industrial ultrafast internal engraving laser system for anti-counterfeiting applications**, Eric P. Mottay, Amplitude Systemes (France); Axel Kupiziewicz, Laser Engineering Applications S.A. (Belgium); Gerard Detroux, KS Techniques S.A. (Belgium); Xavier Costet, Costet S.A. (France); Adrian Simmons, Total Brand Security Ltd. (United Kingdom); Ulisse Vivarelli, Solos (Italy); Philippe C. Lemaire, Univ. de Liège (Belgium); John Lopez, Univ. Bordeaux I (France) ..... [6881-16]

3:10 pm: **Sub picosecond CPA-free high-power ultrafast regenerative amplifier**, Clemens Hoenninger, Martin Delaigue, Antoine Courjaud, Eric P. Mottay, Amplitude Systemes (France) ..... [6881-17]

Coffee Break ..... 3:30 to 4:00 pm

### SESSION 6

Room: Conv. Ctr. B3 ..... Mon. 4:00 to 6:20 pm

#### Novel Ultrafast Laser Sources II

Session Chair: **Daniel J. Kane**, Southwest Sciences, Inc.

4:00 pm: **Ultrafast amplified fiber laser for laser-wire measurements in particle accelerators**, Yoann Zaouter, Clemens Hoenninger, Eric P. Mottay, Amplitude Systemes (France); Laura Corner, Nicolas Delerue, Univ. of Oxford (United Kingdom) ..... [6881-18]

4:20 pm: **Everything you've always wanted to know about an ultrashort pulse but thought was immeasurable** (*Invited Paper*), Rick P. Trebino, Pablo Gabolde, Pamela R. Bowlan, Selcuk Akturk, Georgia Institute of Technology ..... [6881-19]

4:50 pm: **High-resolution, linear spatio-temporal measurements with spatially-resolved spectral interferometry** (*Invited Paper*), Thomas A. Planchon, Wafa Amir, Jeffrey A. Squier, Charles G. Durfee III, Colorado School of Mines ..... [6881-20]

5:20 pm: **Femtosecond lasers: overcoming metastable phase states in and imaging of fluid inclusions**, Patrick C. Stoller, Univ. Bern (Switzerland); Yves Krueger, Labor fuer Fluideinschluss-Analytik (Switzerland); Jaroslav Ricka, Martin Frenz, Univ. Bern (Switzerland) ..... [6881-21]

5:40 pm: **Extremely simple ultrashort-pulse compressor**, Selcuk Akturk, Xun Gu, Mark Kimmel, Aliakbar Jafarpour, Rick Trebino, Swamp Optics LLC ..... [6881-22]

6:00 pm: **Electronically controlled optical sampling using 100 MHz repetition rate fiber lasers**, Florian Tauser, Christian Rausch, Jan H. Posthumus, Frank Lison, TOPTICA Photonics AG (Germany) ..... [6881-23]

Tuesday 22 January

SESSION 7

Room: Conv. Ctr. B3 ..... Tues. 8:30 to 10:00 am

Fundamentals of Ultrafast Laser-Material Interactions

Session Chair: J. Thomas Dickinson, Washington State Univ.

Joint Session with Conference 6879A: Laser Applications in Microelectronic and Optoelectronic Manufacturing XIII

- 8:30 am: **Laser ablation using ultra-high power throughout nano-apertures** (*Invited Paper*), Lambertus Hesselink, Stanford Univ. .... [6879A-14]
- 9:00 am: **Femtosecond laser-nanostructured substrates for single-molecule surface-enhanced Raman spectroscopy** (*Invited Paper*), Eric D. Diebold, Eric Mazur, Harvard Univ. .... [6881-44]
- 9:30 am: **Surface functionalization using ultrafast pulses for industrial applications** (*Invited Paper*), Eric Audouard, Univ. Jean Monnet Saint-Etienne (France) ..... [6879A-15]
- Coffee Break ..... 10:00 to 10:30 am

SESSION 8

Room: Conv. Ctr. B3 ..... Tues. 10:30 am to 12:20 pm

Femtosecond Ablation

Session Chair: Eric Audouard, Univ. Jean Monnet Saint-Etienne (France)

Joint Session with Conference 6879A: Laser Applications in Microelectronic and Optoelectronic Manufacturing XIII

- 10:30 am: **Nanoparticle dynamics after pulsed laser irradiation** (*Invited Paper*), Anton Plech, Univ. Konstanz (Germany) ..... [6879A-16]
- 11:00 am: **Femtosecond laser ablation of bundled single wall carbon nanotubes and the resulting plasmonic nanoablation of glass**, Adela Ben-Yakar, Samuel X. Guo, The Univ. of Texas at Austin ..... [6879A-17]
- 11:20 am: **Laser-induced alloying and size control of metal nanoparticles using femtosecond supercontinuum generation**, Sebastien Besner, Simon Archambault, Andrei V. Kabashin, Michel Meunier, Ecole Polytechnique de Montréal (Canada) ..... [6881-26]
- 11:40 am: **Bio-photosensitizer colloidal silicon nanoparticles produced by femtosecond laser ablation in liquid**, David Rioux, Andrei V. Kabashin, Ecole Polytechnique de Montréal (Canada); Lothar D. Lilge, Sacha Douplik, Univ. of Toronto (Canada); Michel Meunier, Ecole Polytechnique de Montréal (Canada) ..... [6881-27]
- 12:00 pm: **Shallow hole drilling with ultrashort pulse lasers**, Benjamin R. Campbell, Vladimir V. Semak, Thomas M. Lehecka, Jeffrey G. Thomas, The Pennsylvania State Univ. .... [6879A-18]
- Lunch/Exhibition Break ..... 12:20 to 1:20 pm

SESSION 9

Room: Conv. Ctr. B3 ..... Tues. 1:20 to 3:30 pm

Photonic Devices

Session Chair: Alexander Szameit, Friedrich-Schiller-Univ. Jena (Germany)

Joint Session with Conference 6879A: Laser Applications in Microelectronic and Optoelectronic Manufacturing XIII

- 1:20 pm: **Ultrafast laser direct writing of resonant photonic devices** (*Invited Paper*), Michael J. Withford, Graham D. Marshall, Martin Ams, Nemanja Jovanovic, Peter Dekker, Alexander Fuerbach, James A. Piper, Macquarie Univ. (Australia) ..... [6879A-19]
- 1:50 pm: **Direct writing of waveguide devices in fused silica glass using high-repetition-rate fiber laser**, Shane M. Eaton, Univ. of Toronto (Canada); Jörn Bonse, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); Haibin Zhang, Mi Li Ng, Stephen Ho, Tariq Rafique, Wei-Jen Chen, Jianzhao Li, Univ. of Toronto (Canada); Arkadi Rosenfeld, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); Peter R. Herman, Univ. of Toronto (Canada) ..... [6881-29]

- 2:10 pm: **Polarization control in femtosecond laser writing of waveguide directional couplers**, Wei-Jen Chen, Shane M. Eaton, Shicong Yang, Peter R. Herman, Univ. of Toronto (Canada) ..... [6881-30]
- 2:30 pm: **Three-dimensional integration of micro-optics in bulk silica glass by femtosecond direct writing: potential for industrial applications**, Takayuki Nakaya, Daisuke Shibata, Yoshihito Hatazawa, Kazuhiko Sunakawa, Yoichi Yaguchi, Namiki Precision Jewel Co., Ltd. (Japan); Kazuyuki Hirao, Kyoto Univ. (Japan) ..... [6881-31]
- 2:50 pm: **Femtosecond laser direct writing of buried diffractive optical elements in fused silica**, Mi Li Ng, Shane M. Eaton, Debashis Chanda, Peter R. Herman, Univ. of Toronto (Canada) ..... [6879A-20]
- 3:10 pm: **3D integration of microfluidics and micro-optics inside photosensitive glass by femtosecond laser direct writing for photonic biosensing**, Koji Sugioka, Zhongke Wang, Katsumi Midorikawa, The Institute of Physical and Chemical Research (RIKEN) (Japan) ..... [6879A-21]
- Coffee Break ..... 3:30 to 4:00 pm

SESSION 10

Room: Conv. Ctr. B3 ..... Tues. 4:00 to 6:10 pm

Optical Waveguides

Session Chair: Stefan Nolte, Friedrich-Schiller-Univ. Jena (Germany)

Joint Session with Conference 6879A: Laser Applications in Microelectronic and Optoelectronic Manufacturing XIII

- 4:00 pm: **Ultrafast laser microwelding for transparent and heterogeneous materials** (*Invited Paper*), Kazuyoshi Itoh, Takayuki Tamaki, Osaka Univ. (Japan) ..... [6881-32]
- 4:30 pm: **Influence of the beam-focus size on femtosecond laser-induced damage threshold in fused silica**, Nicolas Sanner, Univ. de la Méditerranée (France); Benoît Bussière, Univ. de la Méditerranée (France) and Amplitude Technologies (France); Philippe C. Delaporte, Tatiana Itina, Alexis Leray, Marc Sentis, Olivier P. Utéza, Univ. de la Méditerranée (France) ..... [6881-33]
- 4:50 pm: **Efficient frequency doubling in fs-laser written waveguides in PPLN and BBO**, Felix Dreisow, Jens Thomas, Jonas Burghoff, Friedrich-Schiller-Univ. Jena (Germany); Antonio Ancona, Univ. degli Studi di Bari (Italy); Matthias Heinrich, Stefan Nolte, Friedrich-Schiller-Univ. Jena (Germany); Andreas Tuennermann, Friedrich-Schiller-Univ. Jena (Germany) and Fraunhofer Institut für Angewandte Optik und Feinmechanik (Germany) ..... [6881-34]
- 5:10 pm: **High-speed manufacturing of periodical surface and in-volume nanostructures by fs-laser direct writing**, Jens Gottmann, Dirk Wortmann, RWTH Aachen (Germany) ..... [6879A-22]
- 5:30 pm: **Nondestructive sub-micron resolution spatial characterization of fused-silica specimens exposed to low-energy femtosecond laser pulses**, Yves Bellouard, Technische Univ. Eindhoven (Netherlands); Ali A. Said, Mark Dugan, Philippe Bado, Translume, Inc. .... [6881-35]
- 5:50 pm: **Delivery of femtosecond pulses by hollow-core optical fiber**, Yuji Matsuura, Tohoku Univ. (Japan) ..... [6881-61]

POSTERS-Tuesday

Room: Civic Auditorium. .... Tues. 6:00 to 7:30 pm

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Tuesday morning starting at 10:00 am in the Civic Auditorium, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

- A tunable phase mask for the inscription of chirped fiber Bragg gratings**, Christian Voigtländer, Jens Thomas, Elodie Wikszak, Stefan Nolte, Andreas Tuennermann, Friedrich-Schiller-Univ. Jena (Germany) ..... [6881-54]

LASE

## Technical Event

### Laser Communications

Tuesday January 22 2008

Room: Fairmont Hotel, Atherton · 7:30 to 9:00 pm

Chair: **Dr. Olga Korotkova**, Univ. of Miami

The technical group on Laser Communications will hold its annual meeting in conjunction with the Free-Space Laser Communication Technologies XX conference. All professionals involved in applications of free-space laser communications and supporting technologies are invited to participate in an open discussion on a variety of topics related to the challenges and advancement of the field. Members and visitors are invited to bring suggestions for discussion topics.

**Interference effects of supercontinuum pulses by fundamental and second harmonic of femtosecond laser in bulk media**, Vitaly N. Krylov, Sergei Kozlov, Victor Bespalov, Michail Bakhtin, Sergei Putilin, Georgii Lukomsky, Yuri Shpolyanskiy, Evgenii Novoselov, St. Petersburg State Univ. of Information Technologies, Mechanics and Optics (Russia) . . . . . [6881-39]

## Wednesday 23 January

### SESSION 11

Room: Conv. Ctr. B3 . . . . . Wed. 8:00 to 10:00 am

#### Optical Waveguides II

Session Chair: **Joseph Neev**, JYN Industries Inc.

8:00 am: **Mask-less lithography for fabrication of optical waveguides**, Mykhaylo Dubov, Seriampalayam R. Natarajan, John A. R. Williams, Ian Bennion, Aston Univ. (United Kingdom) . . . . . [6881-36]

8:20 am: **Structural modifications in Er-Yb doped phosphate glass induced by femtosecond laser waveguide writing**, Luke B. Fletcher, Jonathan J. Witcher, Wilbur J. Reichman, Univ. of California/Davis; James M. Bovatsek, Alan Y. Arai, IMRA America, Inc.; Denise M. Krol, Univ. of California/Davis. [6881-37]

8:40 am: **Efficient second harmonic generation in femtosecond laser written optical waveguides on periodically poled lithium niobate**, Roberto Osellame, Nicola Chiodo, Mirko Lobino, Marco Marangoni, Giulio Cerullo, Roberta Ramponi, Politecnico di Milano (Italy); Henry T. Bookey, Robert R. Thomson, Nicholas Psaila, Ajoy K. Kar, Heriot-Watt Univ. (United Kingdom) . . . . . [6881-38]

9:00 am: **Inscription and characterization of microstructures in silicate, FOTURANTM and tellurite glasses by femtosecond laser direct writing**, Krishna C. Vishnubhatla, Sai Santosh K. Ravi, Univ. of Hyderabad (India); Shiva K. Prasad, S. R. P. Prasad, National Geophysical Research Institute (India); Narayana Rao Desai, Venugopal R. Soma, Univ. of Hyderabad (India) [6881-40]

9:20 am: **Micro-Raman mapping of microgratings in 'BACCARAT' glass directly written using femtosecond laser**, Krishna C. Vishnubhatla, Univ. of Hyderabad (India) and Univ. degli Studi di Trento (Italy); Sai Santosh K. Ravi, Univ. of Hyderabad (India); Shivakiran N. B. Bhaktha, Univ. des Sciences et Technologies de Lille (France); Andrea Chiappini, Alessandro Chiasera, Univ. degli Studi di Trento (Italy); Jacky Laureyns, Univ. des Sciences et Technologies de Lille (France); Maurizio Ferrari, Maurizio Mattarelli, Maurizio Montagna, Univ. degli Studi di Trento (Italy); Sylvia Turrell, Univ. des Sciences et Technologies de Lille (France); Venugopal R. Soma, Narayana R. Desai, Univ. of Hyderabad (India) . . . . . [6881-41]

9:40 am: **Electron density measurements associated with femtosecond laser modification in glass**, Jonathan J. Witcher, Luke B. Fletcher, Denise M. Krol, Univ. of California/Davis . . . . . [6881-42]

### Plenary Session

Room: Montgomery Theater · Wed. 10:30 am to 12:30 pm

10:30 am: **Laser Processing and Chemistry: Applications in Nanopatterning, Material Synthesis and Biotechnology** (*Invited Paper*), Dieter Bäuerle, Johannes Kepler Univ. Linz (Austria)

11:10 am: **The Long Journey from Idea to Industrial Success** (*Invited Paper*), Holger Schlueter, TRUMPF Inc.

11:50 am: **Building Coherence in Collaboration: A Case Study with the World's Most Powerful, Tunable Laser** (*Invited Paper*), H. Fred Dylla, American Institute of Physics

See p. 24 for details.

Lunch/Exhibition Break . . . . . 12:30 to 1:30 pm

### SESSION 12

Room: Conv. Ctr. B3 . . . . . Wed. 1:30 to 3:30 pm

#### Surface Structuring for Photovoltaics and Enhanced Detection

Session Chair: **James Carey**, SiOnyx, Inc.

1:30 pm: **High-photoconductive gain and broad spectral sensitivity enabled by femtosecond laser doping of silicon** (*Invited Paper*), Eric D. Mazur, Harvard Univ. . . . . [6881-43]

2:00 pm: **Selective structuring of thin-film solar cells by ultrafast laser ablation** (*Invited Paper*), Heinz P. Huber, Frank Herrnberger, Munich Univ. of Applied Sciences (Germany); Sandra Zoppel, Fachhochschule Vorarlberg GmbH (Austria) . . . . . [6881-45]

2:30 pm: **High-speed scribing of flat-panel display glasses by use of a 100-kHz, 10-W femtosecond laser** (*Invited Paper*), Masanao Kamata, Tomohiro Imahoko, Norihiro Inoue, Tetsumi Sumiyoshi, Hitoshi Sekita, Cyber Laser Inc. (Japan); Minoru Obara, Keio Univ. (Japan) . . . . . [6881-46]

3:00 pm: **Femtosecond laser for black silicon and photovoltaic cells** (*Invited Paper*), Thierry Sarnet, Univ. de la Méditerranée-Aix Marseille II (France); Mathieu Halbwx, Institut de Chimie et des Matériaux Paris-Est (France); Rémi Torres, Philippe Delaporte, Marc Sentis, Univ. de la Méditerranée-Aix Marseille II (France); Santo Martinuzzi, Vanessa Vervisch, Univ. Paul Cézanne (France); Frank Torregrosa, Hasnaa Etienne, Laurent Roux, Ion Beam Services (France); Stéphane Bastide, Institut de Chimie et des Matériaux Paris-Est (France) . . . . . [6881-47]

Coffee Break . . . . . 3:30 to 4:00 pm

### SESSION 13

Room: Conv. Ctr. B3 . . . . . Wed. 4:00 to 6:20 pm

#### Micromachining

Session Chair: **Nozomi Nishimura**, Cornell Univ.

4:00 pm: **Ultrafast laser 5-D microscopy for controlling 3-D laser nanoprocessing**, Jianzhao Li, Haibin Zhang, Shane M. Eaton, Peter R. Herman, Univ. of Toronto (Canada) . . . . . [6881-48]

4:20 pm: **Efficient micromachining with high-average-power picosecond lasers**, Sascha Weiler, Severin Massa, Simone Buettner, Uwe Stute, Birgit Faisst, TRUMPF Laser GmbH & Co. KG (Germany) . . . . . [6881-49]

4:40 pm: **High-speed fabrication of microfluidic channels using a MHz repetition rate femtosecond laser**, Roberto Osellame, Valeria A. Maselli, Rebeca Martinez Vazquez, Roberta Ramponi, Giulio Cerullo, Politecnico di Milano (Italy) . . . . . [6881-50]

5:00 pm: **Ultrafast laser induced controllable jet in liquid**, Sergey Oshemkov, Pixar Technology Ltd. (Israel); Lev Dvorkin, Lasermax Engineering Ltd. (Israel); Vladimir J. Dmitriev, Pixar Technology Ltd. (Israel) . . . . . [6881-51]

5:20 pm: **Adaptive control of laser filamentation**, Robert J. Levis, Temple Univ. . . . . [6881-52]

5:40 pm: **Laser micro-structuring of stainless steel with an ultrashort pulse fiber amplified microchip laser**, Antonio Ancona, Univ. degli Studi di Bari (Italy) and Friedrich-Schiller-Univ. Jena (Germany); Dirk Nodop, Jens Limpert, Stefan Nolte, Friedrich-Schiller-Univ. Jena (Germany); Andreas Tuennermann, Friedrich-Schiller-Univ. Jena (Germany) and Fraunhofer Institut für Angewandte Optik und Feinmechanik (Germany) . . . . . [6881-53]

6:00 pm: **Processing of natural diamond using nanosecond and picosecond lasers-relative merits and demerits**, S. K. Sudheer, Bharat Kakadia, Vellore

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# MOEMS/ MEMS<sup>2008</sup>

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## *Micro & Nanofabrication*

**Conference + Courses:** 19–24 January 2008

**BiOS Exhibition:** January 19–20 2008

**Photonics West Exhibition:** January 22–24 2008

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## Micro/Nanofabrication

## Devices/Applications/Reliability

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# Daily Conference Schedule

| Saturday   | Sunday     | Monday     | Tuesday    | Wednesday  | Thursday   |
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| 19 January | 20 January | 21 January | 22 January | 23 January | 24 January |

## MOEMS/MEMS Special Events

|  |   |  |
|--|---|--|
| <b>Biomedical Optics Exhibition</b><br><i>San Jose Convention Center, Exhibition Hall 1</i><br>1:00 to 5:00 pm   10:00 am to 4:00 pm | <b>MOEMS-MEMS Plenary Session,</b><br>9:00 am to Noon,<br>p. 26 | <b>Photonics West Exhibition</b><br><i>San Jose Convention Center, Exhibition Halls 1-3, Exhibition Foyer and South Halls 1-2</i><br>10:00 am to 5:00 pm   10:00 am to 5:00 pm   10:00 am to 4:00 pm |
|--|---|--|

*Panel Discussion: Progress and Prospects in Microfluidics, 8:00 to 9:30 pm, p. 27*


**SPIE Works**  
 11:00 am to 3:00 pm | **Career Fair**  
 11:00 am to 3:00 pm

**LASE and MOEMS/MEMS Interactive Poster Sessions,**  
 Civic Auditorium, 6:00 to 7:30 pm, p. 17

## Micro/Nanofabrication

6882 **Micromachining and Microfabrication Process Technology XII** (*Maier, Resnick, Chiao*) p. 173

6883 **Advanced Fabrication Technologies for Micro/Nano Optics and Photonics** (*Suleski, Schoenfeld, Wang*) p. 174

## Devices/Applications/Reliability

6884 **Reliability, Packaging, Testing, and Characterization of MEMS/MOEMS VII** (*Hartzell, Ramesham*) p. 177

6885 **MEMS/MOEMS Components and Their Applications V Special Focus Topics: Transducers at the Micro-Nano Interface** (*Tadigadapa, Parviz, Henning*) p. 179

6886 **Microfluidics, BioMEMS, and Medical Microsystems VI** (*Wang, Vauchier*) p. 181

6887 **MOEMS and Miniaturized Systems VII** (*Dickensheets, Schenk*) p. 183

6888 **MEMS Adaptive Optics II** (*Olivier, Bifano, Kubby*) p. 185

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# Micromachining and Microfabrication Process Technology XII

Conference Chairs: **Mary-Ann Maher**, SoftMEMS; **Jung-Chih Chiao**, The Univ. of Texas/Arlington; **Paul J. Resnick**, Sandia National Labs.

Program Committee: **Mu Chiao**, The Univ. of British Columbia (Canada); **Debabani Choudhury**, HRL Labs., LLC; **Eric Donzier**, Schlumberger (United Kingdom); **David A. Koester**, MCNC; **Sanjay Krishna**, The Univ. of New Mexico; **Tamal Mukherjee**, Carnegie Mellon Univ.; **Yu-Chuan Su**, National Tsing Hua Univ. (Taiwan); **T. C. Yih**, Oakland Univ.; **Nan Zhang**, General MEMS Corp.

## Tuesday 22 January

### POSTERS-Tuesday

Room: Civic Auditorium. . . . . Tues. 6:00 to 7:30 pm

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Tuesday morning starting at 10:00 am in the Civic Auditorium, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

**The effect of size on the etch rates of structures fabricated from photostructurable glass-ceramic**, Janet A. Stillman, The Aerospace Corp. and Univ. of California/ Los Angeles; Jack W. Judy, Univ. of California/Los Angeles; Henry Helvajian, The Aerospace Corp. . . . . [6882-18]

**Effect of formulation variables on the formation of cholesterol nanoparticles of clozapine prepared by solvent evaporation method**, Nirav V. Patel, Anand Pharmacy College/Gujarat (India); Rajnikant C. Patel, KB Raval College Of Pharmacy/Ahmedabad (India); Mayur P. Patel, Alembic Ltd. (India). . . . . [6882-19]

**Dry film process development for electroplating and lift-off of metal layers**, Phaninder R. Kanikella, Matthew J. O'Keefe, Chang-Soo Kim, Univ. of Missouri/Rolla . . . . . [6882-20]

**Electrical properties of thin epoxy-based polymer layers filled with n-carbon black particles**, Marijan Macek, Univ. v Ljubljani (Slovenia); Marta Klansek Gunde, Nina Hauptman, National Institute of Chemistry Slovenia (Slovenia). . . . . [6882-21]

## Wednesday 23 January

### SESSION 1

Room: Hilton Hotel: Santa Clara I/II . . . . . Wed. 9:00 to 10:20 am

#### Bio-devices

Session Chair: **Nan Zhang**, General MEMS Corp.

9:00 am: **BioMEMS-enabling technologies for POC testing**, Nan Zhang, General MEMS Corp. . . . . [6882-01]

9:20 am: **Advances in CLIPP for the fabrication of surface modified micro-fluidic**, Michael P. C.Watts, Optical Associates, Inc.; Robert Sebra, Univ. of Colorado at Boulder; Helen Simms, Univ. of Colorado at Boulder; Kristi Ansteh, Univ of Colorado at Boulder . . . . . [6882-02]

9:40 am: **Fabrication of silicon nanowall chips for DNA binding yield enhancement**, Ramana M. Badam, Institute of Microelectronics (Singapore); Raghavan Uppili, SiMEMS Pte Ltd. (Singapore); Balasubramanian Narayanan, Institute of Microelectronics (Singapore). . . . . [6882-03]

10:00 am: **Microfabricated needles for transdermal delivery of macromolecules and nanoparticles: fabrication methods and transport studies**, Rajnikant C. Patel, KB Raval College Of Pharmacy/Gujarat (India); Nirav V. Patel, Anand Pharmacy College/Gujarat (India) . . . . . [6882-04]

Coffee Break . . . . . 10:20 to 10:50 am

### SESSION 2

Room: Hilton Hotel: Santa Clara I/II . . . . . Wed. 10:50 am to 12:50 pm

#### MEMS and MOEMS

Session Chair: **Mary-Ann Maher**, SoftMEMS

10:50 am: **Micromachining of a fiber-to-waveguide coupler using grayscale lithography and through-wafer etch**, Thomas E. Dillon, Shouyuan Shi, Janusz Murakowski, Dennis W. Prather, Univ. of Delaware . . . . . [6882-05]

11:10 am: **Laser beam shaping for micromaterial processing using a liquid crystal display**, Fabian Friederich, Ulrich Klug, Mark Boyle, Laser Zentrum Hannover e.V. (Germany) . . . . . [6882-06]

11:30 am: **A novel fabrication technology for anti-reflex wafer-level vacuum packaged microscanning mirrors**, Marten Oldsen, Ulrich Hofmann, Hans-Joachim Quenzer, Kai Gruber, Bernd Wagner, Fraunhofer Institut für Siliziumtechnologie (Germany) . . . . . [6882-07]

11:50 am: **Parallel kinematic mechanism-based monolithic XY micro-positioning stage**, Deepkishore Mukhopadhyay, Jingyan Dong, Placidus M. Ferreira, Univ. of Illinois at Urbana-Champaign . . . . . [6882-08]

12:10 pm: **Microinductors integrated on silicon for dc-dc converters**, Taoufik El Mastouli, Jean-Pierre Laur, Lab. d'Analyse et d'Architecture des Systèmes (France) and Paul Sabatier Univ. (France); Jean-Louis Sanchez, Lab. d'Analyse et d'Architecture des Systèmes (France) . . . . . [6882-09]

12:30 pm: **Electrodeposition of Au for self-assembling 3D microstructures**, Michail E. Kiziroglou, Anisha G. Mukherjee, Imperial College London (United Kingdom); Richard W. Moseley, Microsaic Systems Ltd. (United Kingdom); Paul Taylor, SemeFab (Scotland) Ltd. (United Kingdom); Suneat Pranonsatit, Andrew S. Holmes, Eric M. Yeatman, Imperial College London (United Kingdom) . . . . . [6882-10]

Lunch/Exhibition Break . . . . . 12:50 to 2:20 pm

### SESSION 3

Room: Hilton Hotel: Santa Clara I/II . . . . . Wed. 2:20 to 5:10 pm

#### Etching and Lithography

Session Chair: **Harold D. Stewart**, Sandia National Labs.

2:20 pm: **Microcantilever force sensor fabricated by femtosecond laser micromachining**, Panos S. Shiakolas, Nitin Uppal, Mohammad Mayyas, The Univ. of Texas at Arlington . . . . . [6882-11]

2:40 pm: **Fabrication of buried channel waveguides in polydimethylsiloxane (PDMS) using proton beam writing (PBW): Applications for fluorescence detection in microfluidic channels**, Chammika N. B.Udalagama, Sook Fun Chan, Sureerat Homhuan, Andrew A. Bettiol, Frank Watt, National Univ. of Singapore (Singapore) . . . . . [6882-12]

3:00 pm: **MEMS post-processing of MPW dies using BSOI carrier wafers**, Anisha G. Mukherjee, Michail E. Kiziroglou, Andrew S. Holmes, Eric M. Yeatman, Imperial College London (United Kingdom) . . . . . [6882-13]

Coffee Break . . . . . 3:20 to 3:50 pm

3:50 pm: **Microstructures with rounded concave and sharp-edged convex corners in a single step wet anisotropic etching**, Prem Pal, Kazuo Sato, Nagoya Univ. (Japan); Miguel Gosálvez, Helsinki Univ. of Technology (Finland); Mitsuhiro Shikida, Nagoya Univ. (Japan) . . . . . [6882-14]

4:10 pm: **TACD tool for innovative MEMS and MOEMS: an all-in-one solution**, U. Triltsch, Stephanus Büttgenbach, Technische Univ. Braunschweig (Germany) . . . . . [6882-15]

4:30 pm: **Sensitivity and stress of composite Si-micro/macro porous silicon**, Sujatha L. Narayanan, Enakshi Bhattacharya, Indian Institute of Technology Madras (India) . . . . . [6882-16]

4:50 pm: **Three dimensional waveguide fabrication in PMMA using femtosecond laser micromachining system**, Panos S. Shiakolas, Nitin Uppal, Mohsin Rizwan, The Univ. of Texas at Arlington . . . . . [6882-17]

MOEMS-MEMS

# Advanced Fabrication Technologies for Micro/Nano Optics and Photonics

Conference Chairs: **Thomas J. Suleski**, The Univ. of North Carolina at Charlotte; **Winston V. Schoenfeld**, College of Optics & Photonics/Univ. of Central Florida; **Jian Jim Wang**, NanoNuvo Corp.

Program Committee: **John M. Ballato**, Clemson Univ.; **Gregg T. Borek**, MEMS Optical, Inc.; **Stefano Cabrini**, Lawrence Berkeley National Lab.; **Matthew A. Davies**, The Univ. of North Carolina at Charlotte; **Erez Hasman**, Technion-Israel Institute of Technology (Israel); **Aaron R. Hawkins**, Brigham Young Univ.; **Tsinghua Her**, The Univ. of North Carolina at Charlotte; **Dwayne L. LaBrake**, Molecular Imprints, Inc.; **Alan D. Kathman**, Tessera North America; **Shanalyn A. Kemme**, Sandia National Labs.; **Ernst-Bernhard Kley**, Friedrich-Schiller-Univ. Jena (Germany); **Stephen M. Kuebler**, College of Optics & Photonics/Univ. of Central Florida; **Akhlesh Lakhtakia**, The Pennsylvania State Univ.; **Uriel Levy**, The Hebrew Univ. of Jerusalem (Israel); **Patrick P. Naulleau**, SUNY/Univ. at Albany; **Yuzo Ono**, Ritsumeikan Univ. (Japan); **Dennis W. Prather**, Univ. of Delaware; **John A. Rogers**, Univ. of Illinois at Urbana-Champaign; **Markus Rossi**, Heptagon Oy (Finland); **Raymond C. Rumpf**, Prime Research, LC; **Georg von Freymann**, Forschungszentrum Karlsruhe (Germany); **Michael P. C. Watts**, Impattern Solutions; **Wei Wu**, Hewlett-Packard Labs.

## Monday 21 January

### Plenary Session

Room: Conv. Ctr. A7/A8 · Mon. 9:00 am to 12:00 pm

- 9:00 to 9:10 am: **Welcome and opening remarks**
  - 9:10 to 10:00 am: **MEMS Reliability – Coming of Age (Invited Paper)**, Michael R. Douglass, Texas Instruments Inc.
  - 10:00 to 10:20 am: **Coffee Break**
  - 10:20 to 11:10 am: **Optically Transduced MEMS/NEMS Resonators (Invited Paper)**, Harold Craighead, Cornell Univ.
  - 11:10 to Noon: **High-Resolution Displays, One Pixel at a Time (Invited Paper)**, Randy Sprague, Microvision, Inc.
- See p. 26 for details.

### SESSION 1

Room: Hilton Hotel: San Carlos I/II. . . . . Mon. 1:30 to 3:00 pm

#### Micro- and Nanoreplication I

Session Chair: **Thomas J. Suleski**, The Univ. of North Carolina at Charlotte

- 1:30 pm: **Fabrication of nanophotonic structures for information processing (Invited Paper)**, Sean M. Spillane, Qianfan Xu, David A. Fattal, Wei Wu, Hewlett-Packard Labs.; Pavel Kornilovich, Hewlett-Packard Co.; Raymond G. Beausoleil, Hewlett-Packard Labs. . . . . [6883-01]
- 2:00 pm: **Formation of anti-reflective structure on the surface of optical glass by molding**, Kazuhiro Yamada, Makoto Umetani, Takamasa Tamura, Yasuhiro Tanaka, Matsushita Electric Industrial Co., Ltd. (Japan); Junji Nishii, National Institute of Advanced Industrial Science and Technology (Japan) . . . . . [6883-02]
- 2:20 pm: **Fabrication of plasmonic waveguides by nanoimprint and UV-lithography**, Rasmus B. Nielsen, Anders Kristensen, Alexandra E. Boltasseva, Danmarks Tekniske Univ. (Denmark); Sergey I. Bozhevolnyi, Valentyn S. Volkov, Aalborg Univ. (Denmark) . . . . . [6883-03]
- 2:40 pm: **Advances in roll to roll manufacturing of optics**, Michael P. C. Watts, Impattern Solutions . . . . . [6883-04]
- Coffee Break . . . . . 3:00 to 3:30 pm

### SESSION 2

Room: Hilton Hotel: San Carlos I/II. . . . . Mon. 3:30 to 5:00 pm

#### Nanofabrication I

Session Chair: **Stephen M. Kuebler**, College of Optics & Photonics/Univ. of Central Florida

- 3:30 pm: **Silicon photonic wire circuits for on-chip optical interconnects (Invited Paper)**, William M. J. Green, Fengnian Xia, Solomon Assefa, Michael J. Rooks, Lidija Sekaric, Yuri G. A. Vlasov, IBM Thomas J. Watson Research Ctr. . . . . [6883-05]
- 4:00 pm: **Metamaterials for “free space on a chip” applications**, Uriel Levy, Univ. of California/San Diego; Maxim Abashin, Del Mar Photonics, Inc.; Kazuhiro Ikeda, Yeshiaahu Fainman, Univ. of California/San Diego . . . . . [6883-06]
- 4:20 pm: **Fabrication techniques for creating a thermally isolated TM-FPA (thermal microphotonic focal plane array)**, Michael J. Shaw, Michael Watts, Gregory N. Nielson, Sandia National Labs. . . . . [6883-07]
- 4:40 pm: **Sub-10 nm zone plates using the overlay nanofabrication processes**, Weilun Chao, Univ. of California/Berkeley; Erik H. Anderson, Lawrence Berkeley National Lab.; David T. Attwood, Univ. of California/Berkeley and University of California Berkeley . . . . . [6883-08]

## Tuesday 22 January

### SESSION 3

Room: Hilton Hotel: San Carlos I/II. . . . . Tues. 8:30 to 10:00 am

#### Micro- and Nanoreplication II

Session Chair: **Jian Jim Wang**, NanoNuvo Corp.

- 8:30 am: **Nanoimprint lithography for nanomechanical optical structures (Invited Paper)**, Lars Montelius, Gang Luo, Dan Hessman, Sara G. Nilsson, Ivan Maximov, Mariusz Graczyk, David Adolph, Lunds Univ. (Sweden); Tao Zhu, Zhongfan Liu, Peking Univ. (China); Hongqi Xu, Lunds Tekniska Högskola (Sweden) . . . . . [6883-09]
- 9:00 am: **High-volume applications of wafer-scale optics**, Markus Rossi, Heptagon Oy (Switzerland) . . . . . [6883-10]
- 9:20 am: **Microtransfer molding of SU-8 micro-optics**, Aaron Cannistra, The Univ. of North Carolina at Charlotte; Pradeep Srinivasan, College of Optics & Photonics/Univ. of Central Florida; Eric G. Johnson, Thomas J. Suleski, The Univ. of North Carolina at Charlotte . . . . . [6883-11]
- 9:40 am: **Step and flash imprint process integration techniques for photonic crystal patterning: template replication through wafer patterning irrespective of tone**, Michael L. Miller, Cindy Brooks, David Lentz, Gary F. Doyle, Douglas J. Resnick, Dwayne L. LaBrake, Molecular Imprints, Inc. . . . . [6883-12]
- Coffee Break . . . . . 10:00 to 10:30 am



**SESSION 4**

**Room: Hilton Hotel: San Carlos I/II. . . . . Tues. 10:30 to 11:50 am**

**Micro- and Nano-Optics**

Session Chair: **Shanalyn A. Kemme**, Sandia National Labs.

10:30 am: **Nonplanar surface structures of inorganic optical materials fabricated by femtosecond laser lithography**, Hiroaki Nishiyama, Mizue Mizoshiri, Osaka Univ. (Japan); Junji Nishii, National Institute of Advanced Industrial Science and Technology (Japan); Yoshinori Hirata, Osaka Univ. (Japan). . . . . [6883-13]

10:50 am: **Spin-on-glass smoothing of diamond turned optics for use in the extreme ultraviolet regime**, Farhad H. Salmassi, Patrick P. Naulleau, Eric M. Gullikson, Lawrence Berkeley National Lab. . . . . [6883-14]

11:10 am: **Free-form machining for micro-imaging systems**, Michael L. Barkman, Brian Dutterer, Matthew A. Davies, Thomas J. Suleski, The Univ. of North Carolina at Charlotte . . . . . [6883-15]

11:30 am: **Hollow waveguide optimization for fluorescence based detection**, Evan J. Lunt, Brian S. Phillips, Cory J. Jones, Aaron R. Hawkins, Brigham Young Univ.; Philip Measor, Sergei Kuehn, Holger Schmidt, Univ. of California/Santa Cruz . . . . . [6883-17]

Lunch/Exhibition Break . . . . . 11:50 to 1:30 pm

**SESSION 5**

**Room: Hilton Hotel: San Carlos I/II. . . . . Tues. 1:30 to 3:00 pm**

**3-D Nanofabrication**

Session Chair: **Uriel Levy**, The Hebrew Univ. of Jerusalem (Israel)

1:30 pm: **Three-dimensional recording inside dielectrics for photonic applications (Invited Paper)**, Saulius Juodkazis, Hiroaki Misawa, Hokkaido Univ. (Japan). . . . . [6883-18]

2:00 pm: **Fabrication of variable effective refractive index artificial media**, Pradeep Srinivasan, College of Optics & Photonics/Univ. of Central Florida; Eric G. Johnson, The Univ. of North Carolina at Charlotte. . . . . [6883-19]

2:20 pm: **Layer-by-layer three-dimensional chiral photonic crystals**, Georg von Freymann, Forschungszentrum Karlsruhe (Germany); Michael Thiel, Martin Wegener, Univ. Karlsruhe (Germany) . . . . . [6883-20]

2:40 pm: **Metallo-dielectric nanophotonic materials via direct laser writing and electroless metallization**, Stephen M. Kuebler, Yun-Sheng Chen, Amir Tal, College of Optics & Photonics/Univ. of Central Florida . . . . . [6883-21]

Coffee Break . . . . . 3:00 to 3:30 pm

**SESSION 6**

**Room: Hilton Hotel: San Carlos I/II. . . . . Tues. 3:30 to 5:00 pm**

**Materials: Deposition & Etching**

Session Chair: **Winston V. Schoenfeld**, College of Optics & Photonics/Univ. of Central Florida

3:30 pm: **Low-refractive index materials: A new class of materials for photonic applications (Invited Paper)**, E. Fred Schubert, Jong Kyu Kim, Rensselaer Polytechnic Institute. . . . . [6883-22]

4:00 pm: **A new approach for antireflective fused-silica surfaces by statistical nanostructures**, Marcel Schulze, Hans-Jörg Fuchs, Ernst-Bernhard Kley, Friedrich-Schiller-Univ. Jena (Germany); Andreas Tünnermann, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) and Friedrich-Schiller-Univ. Jena (Germany) . . . . . [6883-24]

4:20 pm: **Grayscale homogenizers in calcium fluoride**, Jeffrey S. Lawrence, Lamarr R. Simmons, John G. Smith, Andrew Stockham, Gregg T. Borek, MEMS Optical, Inc.; Matthias Cumme, Roman Kleindienst, JENOPTIK Laser, Optik Systeme GmbH (Germany) . . . . . [6883-25]

4:40 pm: **Spectroscopic ellipsometry characterization of silicon/silicon-dioxide superlattices for photoluminescence and electroluminescence**, Tim Creazzo, Lindsay M. Prather, Brandon Redding, Shouyuan Shi, Dennis W. Prather, Univ. of Delaware. . . . . [6883-26]

**POSTERS-Tuesday**

**Room: Civic Auditorium. . . . . Tues. 6:00 to 7:30 pm**

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Tuesday morning starting at 10:00 am in the Civic Auditorium, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

**A fabrication technique for microlens array with high fill-factor and small radius of curvature**, Hsin-Ta Hsieh, Guo-Dung J. Su, National Taiwan Univ. (Taiwan). . . . . [6883-36]

**Design of axially superresolving phase pupil filter for high-numerical aperture applications**, Toufic Jabbour, Stephen M. Kuebler, College of Optics & Photonics/Univ. of Central Florida. . . . . [6883-37]

**Experiments and characterization of two photon polymerization using 1 KHz femtosecond laser system**, Panos S. Shiakolas, Nitin Uppal, The Univ. of Texas at Arlington . . . . . [6883-38]

**Enhancing direct-write laser control techniques for bimetallic grayscale photomasks**, Glenn H. Chapman, James M. Dykes, Calin Plesa, Simon Fraser Univ. (Canada). . . . . [6883-39]

**Fabrication of 3D polymer photonic crystals for near-IR applications**, Peng Yao, Liang Qiu, Shouyuan Shi, Garrett J. Schneider, Dennis W. Prather, Univ. of Delaware; Ahmed S. Sharkawy, Eric J. Kelmelis, EM Photonics, Inc. . . . . [6883-40]

**Wednesday 23 January**

**SESSION 7**

**Room: Hilton Hotel: San Carlos I/II. . . . . Wed. 8:30 to 10:00 am**

**Nanofabrication II**

Session Chair: **Georg von Freymann**, Forschungszentrum Karlsruhe (Germany)

8:30 am: **Stretchable polymer photonic crystals (Invited Paper)**, Jeremy J. Baumberg, Univ. of Cambridge (United Kingdom); Otto Pursiainen, Univ. of Southampton (United Kingdom); Benjamin Viel, Peter Spahn, Tilmann E. Ruhl, Technische Univ. Darmstadt (Germany) . . . . . [6883-27]

9:00 am: **Fabrication and testing of plasmonic optimized transmission coatings**, Alvaro A. Cruz-Cabrera, Lorena I. Basilio, David W. Peters, Joel R. Wendt, Shanalyn A. Kemme, Sandia National Labs.; Sally Samora, L&M Technologies, Inc. . . . . [6883-28]

9:20 am: **Fabrication approaches for metallo-dielectric plasmonic waveguides**, Maziar P. Nezhad, Univ. of California/San Diego; Steve Zamek, Ben-Gurion Univ. of the Negev (Israel); Lin Pang, Yeshiahu Fainman, Univ. of California/San Diego . . . . . [6883-29]

9:40 am: **Bottom-up tailoring of photonic nanofibers**, Frank Balzer, Morten Madsen, Horst-Günter Rubahn, Syddansk Univ. (Denmark) . . . . . [6883-30]

Coffee Break . . . . . 10:00 to 10:30 am

MOEMS-MEMS

# Conference 6883

## SESSION 8

Room: Hilton Hotel: San Carlos I/II. . . . . Wed. 10:30 am to 12:10 pm

### Applications

*Session Chair:* **Aaron R. Hawkins**, Brigham Young Univ.

10:30 am: **Highly dispersive dielectric transmission gratings with 100% diffraction efficiency**, Tina Clausnitzer, Thomas Kämpfe, Frank Brückner, Roland Heinze, Ernst-Bernhard Kley, Friedrich-Schiller-Univ. Jena (Germany); Andreas Tünnermann, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) and Friedrich-Schiller-Univ. Jena (Germany) [6883-31]

10:50 am: **Spiral zone plate imaging for soft x-ray microscopy**, Anne E. Sakdinawat, Yanwei Liu, Univ. of California/Berkeley. . . . . [6883-32]

11:10 am: **Tailored surfaces for managing thermal emission: plasmon/ photon coupling using subwavelength diffractive optics technology**, Shanalyn A. Kemme, Alvaro A. Cruz-Cabrera, Rob A. Ellis, David W. Peters, Tony Carter, Sally Samora, Sandia National Labs. . . . . [6883-33]

11:30 am: **100% reflectivity from a monolithic dielectric microstructured surface**, Frank Brückner, Holger Hartung, Tina Clausnitzer, Ernst-Bernhard Kley, Friedrich-Schiller-Univ. Jena (Germany); Andreas Tünnermann, Fraunhofer Institut für Angewandte Optik und Feinmechanik (Germany) and Friedrich-Schiller-Univ. Jena (Germany). . . . . [6883-34]

11:50 am: **Coherent thermal-source formed by periodic microcavities**, Nir Dahan, Avi Niv, Gabriel Biener, Yuri Gorodetski, Vladimir Kleiner, Erez Hasman, Technion-Israel Institute of Technology (Israel). . . . . [6883-35]

### **Make time for the Photonics West Exhibition**

*San Jose Convention Center, Exhibition Halls 1-3,  
Exhibition Foyer and South Halls 1-2*

Tuesday 22 January . . . . . 10:00 am to 5:00 pm  
Wednesday 23 January . . . . . 10:00 am to 5:00 pm  
Thursday 24 January . . . . . 10:00 am to 4:00 pm

**See new applications in action at the  
Product Demonstrations.**

*See pp. 37-39 for details.*

# Reliability, Packaging, Testing, and Characterization of MEMS/ MOEMS VII

Conference Chair: **Allyson L. Hartzell**, Exponent Inc.; **Rajeshuni Ramesham**, Jet Propulsion Lab.

Conference Co-Chair: **James L. Zunino**, U.S. Army Armament Research, Development and Engineering Ctr.

Program Committee: **Enakshi Bhattacharya**, Indian Institute of Technology Madras (India); **Jason O. Clevenger**, Exponent Inc.; **Christopher K. Harrison**, Schlumberger Ltd.; **Albert K. Henning**, Nanolnk, Inc.; **Maurice S. Karpman**, Analog Devices; **Richard C. Kullberg**, Asana Techne LLC; **Olivier N. Pierron**, Georgia Institute of Technology; **Herbert R. Shea**, Ecole Polytechnique Fédérale de Lausanne (Switzerland); **Danelle M. Tanner**, Sandia National Labs.

## Monday 21 January

### Plenary Session

Room: Conv. Ctr. A7/A8 · Mon. 9:00 am to 12:00 pm

- 9:00 to 9:10 am: **Welcome and opening remarks**
  - 9:10 to 10:00 am: **MEMS Reliability – Coming of Age (Invited Paper)**, Michael R. Douglass, Texas Instruments Inc.
  - 10:00 to 10:20 am: **Coffee Break**
  - 10:20 to 11:10 am: **Optically Transduced MEMS/NEMS Resonators (Invited Paper)**, Harold Craighead, Cornell Univ.
  - 11:10 to Noon: **High-Resolution Displays, One Pixel at a Time (Invited Paper)**, Randy Sprague, Microvision, Inc.
- See p. 26 for details.*

### SESSION 1

Room: Hilton Hotel: University ..... Mon. 1:40 to 3:10 pm

#### MEMS Reliability

Session Chair: **Danelle M. Tanner**, Sandia National Labs.

- 1:40 pm: **Understanding and improving longevity in RF MEMS capacitive switches (Invited Paper)**, Chuck Goldsmith, David Forehand, Derek Scarbrough, MEMtronics Corp.; Zheng Peng, Cris Palego, James C. M.Hwang, Lehigh Univ.; Jason O. Clevenger, Exponent Inc. .... [6884-01]
- 2:10 pm: **Experimental study of electrical breakdown in MEMS devices with micrometer scale gaps**, Patrick Carazzetti, Ecole Polytechnique Fédérale de Lausanne; Philippe Renaud, Herbert R. Shea, Ecole Polytechnique Fédérale de Lausanne (Switzerland) .... [6884-02]
- 2:30 pm: **Degradation evaluation of microelectromechanical thermal actuators**, Jack K. Luo, Univ. of Bolton (United Kingdom); Yongqing Fu, John A. Williams, Univ. of Cambridge (United Kingdom); S. Mark Spearing, Univ. of Southampton (United Kingdom); William I. Milne, Univ. of Cambridge (United Kingdom) .... [6884-03]
- 2:50 pm: **An integrated AFM/Raman tool for local stress measurements of MEMS devices**, Aaron Lewis, Rima Dekhter, Nanonics Imaging Ltd. (Israel); Noel Axelrod, The Hebrew Univ. of Jerusalem (Israel); Artium Khatchatourians, Nanonics Imaging Ltd. (Israel) .... [6884-04]
- Coffee Break ..... 3:10 to 3:30 pm

### Reliability Panel

Room: Hilton Hotel: University ..... Mon. 3:30 to 4:20 pm

Panel Moderator: **Jason O. Clevenger**, Exponent Inc.

Panelists: **Michael R. Douglass**, Texas Instruments Inc.; **Herbert R. Shea**, Ecole Polytechnique Fédérale de Lausanne (Switzerland)

### SESSION 2

Room: Hilton Hotel: University ..... Mon. 4:20 to 6:10 pm

#### MEMS/MNT Analytical Techniques

Session Chair: **Jason O. Clevenger**, Exponent Inc.

- 4:20 pm: **FIB sectioning and imaging on the micron to nanometer scale and it's application to MEMS (Invited Paper)**, Michael W. Phaneuf, Fibics Inc. (Canada) ..... [6884-05]
- 4:50 pm: **Development of nondestructive testing/evaluation methodology for MEMS**, James L. Zunino III, Donald R. Skelton, U.S. Army Armament Research, Development and Engineering Ctr.; Ryan T. Marinis, Adam R. Klemptner, Peter Hefti, Ryszard J. Pryputniewicz, Worcester Polytechnic Institute ..... [6884-06]
- 5:10 pm: **Measurement of thin films and interfacial surface roughness using SWLI**, Michael Conroy, Taylor Hobson Ltd. (United Kingdom) ..... [6884-07]
- 5:30 pm: **Reliability of MEMS devices in shock and vibration overload situations**, Steffen Kurth, Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (Germany); Alexey V. Shaporin, Karla Hiller, Christian Kaufmann, Technische Univ. Chemnitz (Germany); Thomas Gessner, Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (Germany) [6884-08]
- 5:50 pm: **Mechanics of post initiation stiction repair of microcantilevers using structural vibrations**, Amit A. Savkar, Kevin D. Murphy, Univ. of Connecticut ..... [6884-29]

## Tuesday 22 January

### SESSION 3

Room: Hilton Hotel: University ..... Tues. 8:50 to 10:20 am

#### MEMS in Homeland Security and Space Applications

Session Chair: **Hua Chen**, Schlumberger Ltd.

- 8:50 am: **A perspective on the reliability of MEMS-based components for telecommunications (Keynote) (Invited Paper)**, John C. McNulty, DfR Solutions LLC ..... [6884-09]
- 9:20 am: **Reliability testing and analysis of MEMS-based safety and arming devices for munition fuzes**, James L. Zunino III, Donald R. Skelton, U.S. Army Armament Research, Development and Engineering Ctr.; Charles H. Robinson, U.S. Army Armament Research, Development and Engineering Ctr. . . [6884-10]
- 9:40 am: **Interferometric characterization of MOEMS devices in cryogenic environment for astronomical instrumentation**, Frédéric Zamkotsian, Emmanuel Grassi, Lab. d'Astrophysique de Marseille (France); Severin Waldis, Univ. de Neuchâtel (Switzerland); Rudy Barette, Patrick Lanzoni, Christophe Fabron, Lab. d'Astrophysique de Marseille (France); Wilfried Noell, Nicolaas F. de Rooij, Univ. de Neuchâtel (Switzerland) ..... [6884-11]
- 10:00 am: **Qualification testing of engineering camera and platinum resistance thermometer sensors for MSL project under extreme temperatures to assess reliability and to enhance mission assurance**, Rajeshuni Ramesham, Justin N. Maki, Gordon C. Cucullu, Jet Propulsion Lab. .... [6884-12]
- Coffee Break ..... 10:20 to 10:40 am

## SESSION 4

Room: Hilton Hotel: University . . . . . Tues. 10:40 am to 12:30 pm

### MEMS Assembly

Session Chair: **Richard C. Kullberg**, Asana Techne LLC

10:40 am: **Measuring MEMS through silicon caps** (*Invited Paper*), Mathew Hazel, Maurice S. Karpman, Analog Devices, Inc. . . . . [6884-13]

11:10 am: **Characterization of microresistance welding with electro-thermal actuator for micro assembly**, Chun-Wei Chang, Wensyang Hsu, National Chiaou Tung Univ. (Taiwan). . . . . [6884-14]

11:30 am: **Characterization of low-temperature wafer bonding based on Ag-In system**, Riko I. Made, Institute of Microelectronics (Singapore) and Nanyang Technological Univ. (Singapore); Chee Lip Gan, Nanyang Technological Univ. (Singapore); Chengkuo Lee, National Univ. of Singapore (Singapore) and Institute of Microelectronics (Singapore); Li Ling Yan, Aibin Yu, Seung Uk Yoon, John H. Lau, Institute of Microelectronics (Singapore)[6884-15]

11:50 am: **Microfabricated implantable flowmeter**, Sheng Liu, Hee C. Lim, New Jersey Institute of Technology; James L. Zunino III, U.S. Army Armament Research, Development and Engineering Ctr.; Reginald C. Farrow, Gordon A. Thomas, John F. Federici, New Jersey Institute of Technology . . . . . [6884-16]

12:10 pm: **Photosensitive etch protection coating for silicon wet-etch applications**, Jyoti Dalvi-Malhotra, Xing-Fu Zhong, Curtis E. Planje, Brewer Science, Inc. . . . . [6884-17]

Lunch/Exhibition Break . . . . . 12:30 to 1:30 pm

## SESSION 5

Room: Hilton Hotel: University . . . . . Tues. 1:30 to 4:20 pm

### MEMS Packaging

Session Chair: **Rajeshuni Ramesham**, Jet Propulsion Lab.

1:30 pm: **MEMS as low-cost high-volume semiconductor solutions it's all in the packaging and assembly** (*Keynote*), Joe Brown, Markus Lutz, Aaron Partridge, Pavan O. Gupta, Eric Radza, SiTime Corp. . . . . [6884-18]

2:00 pm: **Measuring mass flows in hermetically sealed MEMS & MOEMS to ensure device reliability**, Richard C. Kullberg, Daniel J. Rossiter, Oneida Research Services, Inc. . . . . [6884-19]

2:20 pm: **A new model for vacuum quality and lifetime prediction in hermetic vacuum bonded MEMS**, Antonio Bonucci, Sara Guadagnuolo, Andrea Conte, Moraja Marco, SAES Getters S.p.A. (Italy) . . . . . [6884-20]

2:40 pm: **Quantitative characterization of true leak rate of micro to nanoliter packages**, Bongtae Han, Univ. of Maryland/College Park. . . . . [6884-21]

Coffee Break . . . . . 3:00 to 3:20 pm

3:20 pm: **The challenges of designing and processing extreme low-G MEMS accelerometers**, Thomas P. Swiler, Uma Krishnamoorthy, Peggy J. Clews, Michael S. Baker, Danelle M. Tanner, Sandia National Labs. . . . . [6884-22]

3:40 pm: **Low-temperature vacuum hermetic wafer-level package for uncooled microbolometer FPA's**, Sonia Garcia Blanco, Yan Desroches, Hubert Jerominek, Patrice A. Topart, Institut National d'Optique (Canada) . . . . . [6884-23]

4:00 pm: **DesiPaste® for hermetically sealed device packaging**, Mandy Erdmann, Sud-Chemie AG (Germany); Amol Kirtikar, Sud-Chemie; Rajeshuni Ramesham, Jet Propulsion Lab. . . . . [6884-24]

## SESSION 6

Room: Hilton Hotel: University . . . . . Tues. 4:20 to 5:40 pm

### MEMS Characterization and Simulation

Session Chair: **Herbert Shea**, École Polytechnique Fédérale de Lausanne (Switzerland)

4:20 pm: **An electrical approach to measure undercut and final beam thickness in a micromachined cantilever beam**, Somashekara Bhat, Enakshi Bhattacharya, Indian Institute of Technology Madras (India) . . . . . [6884-25]

5:00 pm: **Support for microsystems simulation: Are we watching the clock?**, Colin K. Drummond, ASM International . . . . . [6884-27]

5:20 pm: **Confocal optical system design with stray light filter and scan by DMD**, Yi-Chin Fang, National Kaohsiung First Univ. of Science and Technology (Taiwan) . . . . . [6884-28]

## POSTERS-Tuesday

Room: Hilton Hotel: University . . . . . Tues. 6:00 to 7:30 pm

*All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.*

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**Uncertainty analysis on optical testing with a Shack-Hartmann sensor and a point source**, Donw Won Kang, Jae W. Hahn, Jin Seok Lee, Yonsei Univ. (South Korea); Ho-Soon Yang, Korea Research Institute of Standards and Science (South Korea). . . . . [6884-26]

# MEMS/MOEMS Components and Their Applications V Special Focus Topics: Transducers at the Micro-Nano Interface

Conference Chairs: **Srinivas A. Tadigadapa**, The Pennsylvania State Univ.; **Babak Amir Parviz**, Univ. of Washington; **Albert K. Henning**, Nanolnk, Inc.

Program Committee: **Rosaria Ferrigno**, Univ. Claude Bernard Lyon 1 (France); **Hongrui Jiang**, Univ. of Wisconsin/Madison; **Huikai Xie**, Univ. of Florida; **Christian A. Zorman**, Case Western Reserve Univ.; **Wanjun Wang**, Louisiana State Univ.; **Marcel W. Pruessner**, Naval Research Lab.; **Rudra Pratap**, Indian Institute of Science (India); **Henry Hess**, Univ. of Florida

## Monday 21 January

### Plenary Session

Room: Conv. Ctr. A7/A8 · Mon. 9:00 am to 12:00 pm

- 9:00 to 9:10 am: **Welcome and opening remarks**
- 9:10 to 10:00 am: **MEMS Reliability – Coming of Age** (*Invited Paper*), Michael R. Douglass, Texas Instruments Inc.
- 10:00 to 10:20 am: **Coffee Break**
- 10:20 to 11:10 am: **Optically Transduced MEMS/NEMS Resonators** (*Invited Paper*), Harold Craighead, Cornell Univ.
- 11:10 to Noon: **High-Resolution Displays, One Pixel at a Time** (*Invited Paper*), Randy Sprague, Microvision, Inc.

See p. 26 for details.

### SESSION 1

Room: Hilton Hotel: Plaza ..... Mon. 2:00 to 2:45 pm

#### Keynote Presentation

Session Chair: **Babak Amir Parviz**, Univ. of Washington

2:00 pm: **Energy transport and conversion in nanostructured materials and devices** (*Keynote Presentation*), Arun Majumdar, Univ. of California/Berkeley..... [6885-01]

### SESSION 2

Room: Hilton Hotel: Plaza ..... Mon. 2:45 to 4:35 pm

#### Quantum Design

Session Chair: **Babak Amir Parviz**, Univ. of Washington

2:45 pm: **Controlling quantum dynamics phenomena** (*Invited Paper*), Herschel Rabitz, Princeton Univ..... [6885-02]

Coffee Break ..... 3:15 to 3:35 pm

3:35 pm: **Frontiers in device engineering: Synthesis for non-intuitive design** (*Invited Paper*), A. F. J. Levi, Univ. of Southern California ..... [6885-03]

4:05 pm: **The quantum limit for electrical amplifiers: can we reach it?** (*Invited Paper*), Alex Rimberg, Dartmouth College ..... [6885-04]

#### Panel Discussion

Room: Hilton Hotel: Plaza ..... Mon. 4:35 to 5:20 pm

Panel Moderator: **Babak Amir Parviz**, Univ. of Washington

Panelists: **Herschel Rabitz**, Princeton Univ.; **Anthony F. J. Levi**, Univ. of Southern California; **Alex Rimberg**, Dartmouth College

The panel explores new opportunities offered in device design by taking advantage of quantum mechanical effects. The panelist will address the following issues among others. Active audience participation in the discussion is highly encouraged.

**What quantum effects can be used to build unusual devices?**

**Where do quantum mechanical effects manifest themselves effectively?**

**What are the best platforms for deploying quantum devices (heterostructures, quantum dots, custom-designed molecules, nanotubes, etc)?**

**What are the efficient approaches to design quantum devices, compute their behavior, and predict their performance?**

## Tuesday 22 January

### SESSION 3

Room: Hilton Hotel: Plaza ..... Tues. 8:30 to 11:30 am

#### Photonic Biosensing and Microoptics

Conference Chair: **Srinivas A. Tadigadapa**, The Pennsylvania State Univ.

8:30 am: **Controlled assembly of gold nanoparticles using De Novo designed polypeptide scaffolds** (*Invited Paper*), Bo Liedberg, Daniel Aili, Karin Enander, Linköpings Univ. (Sweden); Lars Baltzer, Uppsala Univ. (Sweden) ..... [6885-05]

9:00 am: **A microfluidic chemical/biological sensor based on dissolvable membrane incorporating gold nanoparticles and optical absorption**, Chi-Wei Lo, Hongrui Jiang, Univ. of Wisconsin/Madison ..... [6885-06]

9:20 am: **A dual-reflective electrothermal MEMS micromirror for full circumferential scanning endoscopic imaging**, Lei Wu, Huikai Xie, Univ. of Florida ..... [6885-07]

9:40 am: **Self-assembled single-digit micro-display on plastic**, Ehsan Saeedi, Samuel S. Kim, Babak A. Parviz, Univ. of Washington ..... [6885-08]

Coffee Break ..... 10:00 to 10:30 am

10:30 am: **Metal-semiconductor-metal (MSM) photodetectors based on single-walled carbon nanotube film-silicon Schottky contacts**, Ashkan Behnam, Univ. of Florida and Stanford Univ.; Jason L. Johnson, Yongho Choi, Univ. of Florida; M. Günhan Ertoşun, Stanford Univ.; Zhuangchun Wu, Andrew G. Rinzier, Univ. of Florida; Pawan Kapur, Krishna C. Saraswat, Stanford Univ.; Ant Ural, Univ. of Florida ..... [6885-09]

10:50 am: **Reduced order thermal modeling of a one-dimensional electrothermally actuated micromirror device**, Sagnik Pal, Kemiao Jia, Huikai Xie, Univ. of Florida ..... [6885-10]

11:10 am: **Manufacturing fiber optic guide using PDMS and measuring optical characteristics of flow cell**, Jooran Yang M.D., Sunghyun Kim, Sekwang Park, Kyungpook National Univ. (South Korea) ..... [6885-11]

Lunch/Exhibition Break ..... 11:30 am to 1:00 pm

### SESSION 4

Room: Hilton Hotel: Plaza ..... Tues. 1:00 to 1:40 pm

#### Resonant Sensors

Conference Chair: **Albert K. Henning**, Nanolnk, Inc.

1:00 pm: **Compact modeling of inertial and rarefaction effects on quality factor of MEMS torsional structures in continuum to molecular flows**, Rudra Pratap, Ashok K. Pandey, Indian Institute of Science (India) ... [6885-12]

1:20 pm: **A mechanistic model for adsorption-induced change in resonance response of submicron cantilevers**, Hamed Sadeghian, Technische Univ. Delft (Netherlands) and Microelectronics Dept, Delft Univ. of Technology (Netherlands); Hans F. Goosen, André Bossche, Fred van Keulen, Technische Univ. Delft (Netherlands) ..... [6885-13]

# Conference 6885

## SESSION 5

Room: Hilton Hotel: Plaza . . . . . Tues. 1:40 to 3:30 pm

### Power in Microscale and Physical Transducers

Conference Chair: **Srinivas A. Tadigadapa**,  
The Pennsylvania State Univ.

- 1:40 pm: **Template-based massively parallel assembly for microchip solid state cooling application** (*Invited Paper*), Rajashree Baskaran, Intel Corp. . . . . [6885-15]
- 2:10 pm: **Thermopower measurement of freestanding nanowires using a MEMS workbench**, Nicolas B. Duarte, Hugo Romero, Peter C. Eklund, Srinivas A. Tadigadapa, The Pennsylvania State Univ. . . . . [6885-16]
- 2:30 pm: **Circuit requirement for MEMS-based mechanical-to-electrical power conversion**, Hoseong Kim, Haejung Kim, Seongmook Khang, Chung-Ang Univ. (South Korea); Yoonpyo Lee, Korea Institute of Science and Technology (South Korea). . . . . [6885-17]
- 2:50 pm: **A active giant magneto-resistive-sensor with current interface for anti-rock break system on vehicle**, Se Hoon Kim, Sekwang Park, Kyungpook National Univ. (South Korea). . . . . [6885-18]
- 3:10 pm: **Temperature compensation of constant current mode microflow sensor using GIC circuit**, Dongwoo Han, Sekwang Park, Kyungpook National Univ. (South Korea) . . . . . [6885-20]

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# Microfluidics, BioMEMS, and Medical Microsystems VI

Conference Chair: **Wanjun Wang**, Louisiana State Univ.; **Claude Vauchier**, Commissariat à l'Energie Atomique (France)

Program Committee: **Holger Becker**, Microfluidic ChipShop GmbH (Germany); **Jin-Woo Choi**, Louisiana State Univ.; **Bruce K. Gale**, The Univ. of Utah; **Yu-Cheng Lin**, National Cheng Kung Univ. (Taiwan); **Yuehe Lin**, Pacific Northwest National Lab.; **Ian Papautsky**, Univ. of Cincinnati; **Anne Pepin**, Lab. de Photonique et de Nanostructures (France); **Albert van den Berg**, Univ. Twente (Netherlands); **Bernhard H. Weigl**, MicroPlumbers Microsciences LLC

## Monday 21 January

### Plenary Session

Room: Conv. Ctr. A7/A8 · Mon. 9:00 am to 12:00 pm

- 9:00 to 9:10 am: **Welcome and opening remarks**
- 9:10 to 10:00 am: **MEMS Reliability – Coming of Age (Invited Paper)**, Michael R. Douglass, Texas Instruments Inc.
- 10:00 to 10:20 am: **Coffee Break**
- 10:20 to 11:10 am: **Optically Transduced MEMS/NEMS Resonators (Invited Paper)**, Harold Craighead, Cornell Univ.
- 11:10 to Noon: **High-Resolution Displays, One Pixel at a Time (Invited Paper)**, Randy Sprague, Microvision, Inc.  
*See p. 26 for details.*

Panel Discussion on:

### Progress and Prospects in Microfluidics

Monday 21 January 2008 · 8:00 to 9:30 pm

Moderators: **Albert K. Henning**, Nanolnk, Inc.; **Wanjun Wang**, Louisiana State Univ.

Panelists: **Steven A. Soper**, Louisiana State University; **Michele Palmieri**, STMicroelectronics (Italy); **Robert Haushalter**, Parallel Synthesis Technologies, Inc.; **Rolfe C. Anderson**, Trillium Precision Surgical, Inc.  
*See p. 27 for details.*

## Tuesday 22 January

### SESSION 1

Room: Hilton Hotel: Santa Clara I/II ..... Tues. 8:30 to 10:00 am

#### Microfluidics and BioMEMS Applications

Session Chair: **Wanjun Wang**, Louisiana State Univ.

- 8:30 am: **Develops the "In-Check" platform for diagnostic applications (Invited Paper)**, Michele Palmieri, STMicroelectronics (Italy) ..... [6886-01]
- 9:00 am: **Cytometric biochips with optically active surfaces for spatial engineering of fluorescence excitation**, Huw D. Summers, Rachel J. Errington, Paul Smith, Cardiff Univ. (United Kingdom); Daniel R. Matthews, Kings College London (United Kingdom); James F. Leary, Purdue Univ. .... [6886-02]
- 9:20 am: **Non-instrumented nucleic-acid amplification assay**, Bernhard H. Weigl, Gonzalo Domingo, Paul LaBarre, Jay Gerlach, PATH ..... [6886-03]
- 9:40 am: **Latex immunoagglutination assay for bovine viral diarrhea utilizing forward light scattering in microfluidic device**, Brian Heinze, The Univ. of Arizona; Jae Young Song D.V.M., National Veterinary Research Quarantine Service (South Korea); Jeong-Yeol Yoon, The Univ. of Arizona ..... [6886-05]
- Coffee Break ..... 10:00 to 10:30 am

### SESSION 2

Room: Hilton Hotel: Santa Clara I/II ..... Tues. 10:30 to 11:50 am

#### BioMEMS Sensors

Session Chair: **Ian Papautsky**, Univ. of Cincinnati

- 10:30 am: **Microfabricated implantable flowmeter for CSF shunts**, Sheng Liu, Hee C. Lim, New Jersey Institute of Technology; James L. Zunino III, U.S. Army Armament Research, Development and Engineering Ctr.; John F. Federici, Gordon A. Thomas, Reginald C. Farrow, New Jersey Institute of Technology ..... [6886-07]
- 10:50 am: **Highly integrated microfluidic sensors**, Dan E. Angelescu, Hua Chen, Jacques Jundt, Helene Berthet, Schlumberger Ltd.; Bruno Mercier, Frederic Marty, Groupe ESIEE (France) ..... [6886-08]
- 11:10 am: **Novel 3D micromirror for miniature optical bio-probe SiOB assembly**, Janak Singh, Yingshun Xu, Teo H. S. Jason, C. S. Premachandran, Institute of Microelectronics (Singapore); Nanguang Chen, National Univ. of Singapore (Singapore) ..... [6886-10]
- 11:30 am: **A nanofluidic system for massively parallel implementation of the polymerase chain reaction (PCR)**, Colin Brenan, BioTrove, Inc. .... [6886-37]
- Lunch/Exhibition Break ..... 11:50 am to 1:00 pm

### SESSION 3

Room: Hilton Hotel: Santa Clara I/II ..... Tues. 1:00 to 2:00 pm

#### BioMEMS Sensors II

Session Chair: **Ian Papautsky**, Univ. of Cincinnati

- 1:00 pm: **A MEMS-based Coulter counter for cell sizing**, Madhuri Korampally, James D. Benson, John K. Critser, Mahmoud F. Almasri, Univ. of Missouri/Columbia ..... [6886-11]
- 1:20 pm: **Detection of bacterial cells based on microchannel gating**, Mehdi Javanmard, AmirAli H. Talasaz, Mohsen Nemat-Gorgani, Roger Fabian W. Pease, Mostafa Ronaghi, Ronald W. Davis, Stanford Univ. .... [6886-12]
- 1:40 pm: **Portable CE-system with contactless conductivity detection in an injection molded polymer chip for on-site food analysis**, Holger Becker, Microfluidic ChipShop GmbH (Germany); Holger Mühlberger, Werner Hoffmann, Forschungszentrum Karlsruhe (Germany); Thomas Clemens, CLEMENS GmbH (Germany); Richard Klemm, Claudia Gärtner, Microfluidic ChipShop GmbH (Germany) ..... [6886-39]

### SESSION 4

Room: Hilton Hotel: Santa Clara I/II ..... Tues. 2:00 to 3:00 pm

#### BioMEMS Devices and Microfabrication Technologies I

Session Chair: **Wanjun Wang**, Louisiana State Univ.

- 2:00 pm: **Microchips fabricated by femtosecond laser micromachining in glass for observation of aquatic microorganism**, Yasutaka Hanada, Koji Sugioka, Hiroyuki Kawano, Ikuko Ishikawa, Atsushi Miyawaki M.D., Katsumi Midorikawa, The Institute of Physical and Chemical Research (RIKEN) (Japan) ..... [6886-13]
- 2:20 pm: **Femtosecond laser microfabrication of optical waveguides in commercial microfluidic lab-on-a-chip**, Roberto Osellame, Rebeca Martinez Vazquez, Roberta Ramponi, Giulio Cerullo, Politecnico di Milano (Italy); Chaitanya Dongre, Ronald Dekker, Hugo J. W. M. Hoekstra, Markus Pollnau, Univ. Twente (Netherlands) ..... [6886-14]
- 2:40 pm: **Fluorocarbon films using pulsed PECVD for microfluidic lab-on-a-chip**, Erik T. Peterson, Thomas D. Mantei, Ian Papautsky, Univ. of Cincinnati ..... [6886-15]
- Coffee Break ..... 3:00 to 3:30 pm

## SESSION 5

Room: Hilton Hotel: Santa Clara I/II . . . . . Tues. 3:30 to 4:30 pm

### BioMEMS Devices and Microfabrication Technologies II

Session Chair: **Holger Becker**,  
Microfluidic ChipShop GmbH (Germany)

- 3:30 pm: **Application concepts for complementary micro-pneumatic devices and circuits**, Albert K. Henning, Aquarian Microsystems . . . [6886-16]  
 3:50 pm: **Hybrid polymer fabrication process for electro-enzymatic glucose sensor**, Jasbir N. Patel, Bozena Kaminska, Bonnie L. Gray, Byron D. Gates, Simon Fraser Univ. (Canada) . . . . . [6886-17]  
 4:10 pm: **Microfabrication of an integrated optical cell counter for cytometry application**, Guocheng Shao, Wanjun Wang, Louisiana State Univ. . . . . [6886-18]

## SESSION 6

Room: Hilton Hotel: Santa Clara I/II . . . . . Tues. 4:30 to 6:10 pm

### Microfluidics and BioMEMS Devices and Components

Session Chair: **Claude M. Vauchier**, Commissariat à l'Énergie Atomique (France)

- 4:30 pm: **Chaotic passive micromixers with microstructures placed on the top and bottom floors of channel**, Jyh-Jian Chen, National Pingtung Univ. of Science and Technology (Taiwan); Yu-Jin Lai, Jenn-Der Lin, National Chiao Tung Univ. (Taiwan) . . . . . [6886-19]  
 4:50 pm: **A novel approach on fluid dispensing for a DNA/RNA extraction chip package**, Ling Xie, C. S. Premachandran, Michelle Chew, Institute of Microelectronics (Singapore); Diao Xu, Qiang Yao, Institute of High Performance Computing (Singapore); Pinjal Damaruganath, Institute of Microelectronics (Singapore) . . . . . [6886-20]  
 5:10 pm: **Development and characterization of a microheater array device for real-time DNA mutation detection**, Layne D. Williams, The Univ. of Utah; Murat Okandan, Sandia National Labs.; Alex Chagovetz, Steve Blair, The Univ. of Utah . . . . . [6886-21]  
 5:30 pm: **Connecting interface for modularization of digital microfluidics**, Hanping Yang, Shih-Kang Fan, Wensyang Hsu, National Chiao Tung Univ. (Taiwan) . . . . . [6886-22]  
 5:50 pm: **Spiral microfluidic nanoparticle separators**, Ali Asgar S. Bhagat, Sathyakumar S. Kuntaegowdanahalli, Ian Papautsky, Univ. of Cincinnati . . . . . [6886-23]

## Posters-Tuesday

Room: Civic Auditorium. . . . . Tues. 6:00 to 7:30 pm

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

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- Analysis of propulsion mechanisms for microswimming robots**, Mustafa Koz, Fatih A. Tabak, Serhat Yesilyurt, Sabanci Univ. (Turkey) . . . . . [6886-25]  
**Dissolved oxygen sensing using organometallic dyes deposited within a microfluidic environment**, Qiu-Lan Chen, Ho-Pui Ho, L. Jin, B. W.Chu, M.J. Li, Vivian W.Yam, The Chinese Univ. of Hong Kong (Hong Kong China) . . [6886-26]  
**Flexible enclosure for fluidic sealing of microcomponents**, Takaya Ueda, Bonnie L. Gray, Simon Fraser Univ. (Canada) . . . . . [6886-27]  
**Mechanical assembly and magnetic actuation of polydimethylsiloxane-iron composite interconnects for microfluidic systems**, Seema Jaffer, Bonnie L. Gray, Derek G. Sahota, Michael H. Sjoerdsma, Simon Fraser Univ. (Canada) . . . . . [6886-28]  
**Development of an evaporation-based microfluidic sample concentrator**, Nigel R. Sharma, Anatoly Lukyanov, Ron L. Bardell, Lynn Seifried, Mingchao Shen, MicroPlumbers Microsciences LLC . . . . . [6886-29]  
**Analysis of surface-tension-driven blood flow using spectral domain optical coherence tomography**, Yeh-Chan Ahn, Univ. of California/Irvine; Salvatore Cito, Ioanis Katakis, Jordi Pallares, Univ. Rovira i Virgili (Spain); Zhongping Chen, Univ. of California/Irvine . . . . . [6886-30]  
**On-board pneumatic valves for multiplexed applications in microfluidic devices**, Leanna Levine, Jackie Goldstein, ALine, Inc. . . . . [6886-31]  
**Process development for waveguide chemical sensors with integrated polymeric sensitive layers**, Raghu Amberkar, Zhan Gao, David Henthorn, Univ. of Missouri-Rolla; Jongwon Park, Chang-Soo Kim, Univ. of Missouri/Rolla . . . . . [6886-32]  
**Femtosecond laser writing for selective chemical etching and optical device integration in 3D optofluidic systems**, Stephen Ho, Mi Li Ng, Shane M. Eaton, Haibin Zhang, Cheng Chuan Qu, Peter R. Herman, J. Stewart Aitchison, Univ. of Toronto (Canada) . . . . . [6886-33]  
**Evaluation of passive planar microfluidic devices for mixing of particle flows**, K. Teal Wurm, Ali Asgar S. Bhagat, Ian Papautsky, Univ. of Cincinnati . . . . . [6886-34]  
**Interdigitated array microelectrode capacitive sensor for detection of Paraffinophilic Mycobacteria**, Andrew Sampson, Erik T.Peterson, Ian Papautsky, Univ. of Cincinnati . . . . . [6886-35]  
**General 3D microporous structures fabricated with two-photon laser machining**, Yihong Liu, Laura J. Pyrak-Nolte, David D. Nolte, Purdue Univ. . . . . [6886-36]  
**Pyrosequencing on a microfluidic fiberoptic-faceplate integrated with CMOS image sensor**, Sanket Goel, Helmy Eitoukhy, Ali Agah, Peter Griffin, Mohsen Nemat-Gorgani, Baback Gharizadeh, Ronald W. Davis, Mostafa Ronaghi, Stanford Univ. . . . . [6886-38]  
**Using a T-junction microfluidic chip for manipulating the UV-photopolymerized microparticles and their utilization as a potential microcapsule**, Chia-Hsien Yeh, Keng-Shiang Huang, Shian-Chin Lai, Yu-Cheng Lin, National Cheng Kung Univ. (Taiwan) . . . . . [6886-04]

### Make time for the Photonics West Exhibition

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- Tuesday 22 January . . . . . 10:00 am to 5:00 pm  
 Wednesday 23 January . . . . . 10:00 am to 5:00 pm  
 Thursday 24 January . . . . . 10:00 am to 4:00 pm

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See pp. 37-39 for details.



# Conference 6887 · Room: Hilton Hotel: University

Tuesday-Wednesday 22-23 January 2008 • Proceedings of SPIE Vol. 6887

## MOEMS and Miniaturized Systems VII

Conference Chair: **David L. Dickensheets**, Montana State Univ./Bozeman; **Harald Schenk**, Fraunhofer-Institute for Photonic Microsystems (Germany)

Program Committee: **Susanne Arney**, Lucent Technologies/Bell Labs.; **Jean-Christophe Eloy**, Yole Développement (France); **Wilfried Noell**, Univ. de Neuchâtel (Switzerland); **Yong-Hwa Park**, SAMSUNG Advanced Institute of Technology (South Korea); **Wibool Piyawattanametha**, Stanford Univ. and NECTEC; **Hakan Ürey**, Koç Univ. (Turkey)

### Tuesday 22 January

#### POSTERS-Tuesday

Room: Civic Auditorium. . . . . Tues. 6:00 to 7:30 pm

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

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**Mobile flat mirrors for micro-optical scanners**, Gabriela Molar-Velazquez, Francisco J. Renero-Carrillo, Wilfrido Calleja-Arriaga, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico). . . . . [6887-20]

**New approach for MEMS scanning mirror for laser projection systems**, Heinrich Grueger, Jens Knobbe, Michael Scholles, Harald Schenk, Hubert K. Lakner, Fraunhofer-Institut für Photonische Mikrosysteme (Germany) [6887-21]

### Wednesday 23 January

#### SESSION 1

Room: Hilton Hotel: University . . . . . Wed. 8:30 to 10:10 am

#### Display Applications

Session Chair: **Harald Schenk**,

Fraunhofer-Institut für Photonische Mikrosysteme (Germany)

8:30 am: **A novel diffractive micro-optical modulator for mobile projection display applications** (*Invited Paper*), Sang Kyeong Yun, Jong Hyeong Song, SeungDo An, InJae Yeo, YunJoon Choi, YeongGoo Lee, HeungWoo Park, KyuBum Han, Haeng Seok Yang, Victor Yurlov, Ihar Shyshkin, Anatoliy Lapchuk, HeeYeoun Kim, JaeWook Jang, JeHong Kyoung, JeongSuong Yang, SangKee Yoon, ChangSu Park, JongPil Cheong, YoungNam Hwang, KiSuk Woo, SeungWon Ryu, SeungWoo Lee, ChongMann Koh, YoungKi Paek, DaeHo Bae, HyunKee Lee, JaeHoon Lee, YungHo Ryu, HaeYeon Hwang, ChungMo Yang, OhkKun Lim, DongHyun Park, SeHwan An, JunHee Bae, SungMin Cho, BackSoon Go, SeokKee Hong, HoPhil Jung, SangJin Kim, KiUn Lee, JiHyun Park, JuHwan Yang, GiYoung Byun, SungHo Byun, YoungJin Cho, ChunGi Kim, JuHong Kim, SunKi Kim, SungIl Lee, WhaHyung Lee, KwanYoung Oh, SungKyung Oh, WooChul Shin, ByungKi Song, SAMSUNG Electro-Mechanics Co., Ltd. (South Korea) . . . . . [6887-01]

9:00 am: **Two dimensional microscanners with large horizontal-vertical scanning frequency ratio for high-resolution laser projectors** (*Invited Paper*), Shu-Ting Hsu, Fraunhofer-Institut für Photonische Mikrosysteme (Germany) . . . . . [6887-02]

9:30 am: **Slow scanning electromagnetic MEMS scanner for laser display**, Hee-Moon Jeong, Yong-Hwa Park, Hyun-Ku Jeong, Yong-Chul Cho, Seok-Mo Chang, Jun-O Kim, Seok-Jin Kang, Jun-Sik Hwang, Jin-Ho Lee, SAMSUNG Advanced Institute of Technology (South Korea) . . . . . [6887-03]

9:50 am: **Flat electrowetting optics and displays**, Jason C. Heikenfeld, Univ. of Cincinnati . . . . . [6887-04]

Coffee Break . . . . . 10:10 to 10:40 am

#### SESSION 2

Room: Hilton Hotel: University . . . . . Wed. 10:40 am to 12:00 pm

#### Optical Assembly and Packaging

Session Chair: **Wibool Piyawattanametha**, Stanford Univ. and NECTEC (Thailand)

10:40 am: **Wafer-level vacuum packaged resonant micro-scanning-mirrors for compact laser projection displays** (*Invited Paper*), Ulrich Hofmann, Marten Oldsen, Hans-Joachim Quenzer, Bernd Wagner, Fraunhofer Institute for Silicon Technology (Germany) . . . . . [6887-05]

11:10 am: **Development of wafer level packaged scanning micromirrors** (*Invited Paper*), Aibin Yu, Institute of Microelectronics (Singapore); Jayaraj Thillaigovindan, National Univ. of Singapore (Singapore); Li Ling Yan, Institute of Microelectronics (Singapore); Riko I. Made, Chee Lip Gan, Nanyang Technological Univ. (Singapore); Qing Xin Zhang, Seung Uk Yoon, John H. Lau, Institute of Microelectronics (Singapore); Chengkuo Lee, National Univ. of Singapore (Singapore) and Institute of Microelectronics (Singapore) . . [6887-06]

11:40 am: **A biocompatible miniaturized package housing for a 3D micro-mirror-based optical bioprobe for OCT (optical coherence tomography) application**, C.S. Premachandran, Ahmad Khairyanto, Kelvin Chen, Janak Singh, Institute of Microelectronics (Singapore) . . . . . [6887-07]

Lunch/Exhibition Break . . . . . 12:00 to 1:00 pm

#### SESSION 3

Room: Hilton Hotel: University . . . . . Wed. 1:00 to 2:00 pm

#### Imaging Applications

Session Chair: **David L. Dickensheets**, Montana State Univ./Bozeman

1:00 pm: **Advanced artificial compound-eye imaging systems**, Andreas Brückner, Jacques Duparré, Andreas H. Bräuer, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany). . . . . [6887-08]

1:20 pm: **MEMS-based optoelectronic system for distance measurement applicable for panorama cameras**, Michael Schaulin, Technische Univ. Dresden (Germany); Ludmilla Kleinmann, Jens Knobbe, Hubert K. Lakner, Uwe Schelinski, Michael Scholles, Kristof Seidl, Fraunhofer-Institut für Photonische Mikrosysteme (Germany); Hans-Jörg Schönherr, KST GmbH Kamera & System Technik (Germany) . . . . . [6887-09]

1:40 pm: **Micromirrors for multi-object spectroscopy: optical and cryogenic characterization**, Severin Waldis, Univ. de Neuchâtel (Switzerland); Frédéric Zamkotsian, Patrick Lanzoni, Lab. d'Astrophysique de Marseille (France); Wilfried Noell, Nicolaas F. de Rooij, Univ. de Neuchâtel (Switzerland) . [6887-10]

#### SESSION 4

Room: Hilton Hotel: University . . . . . Wed. 2:00 to 3:10 pm

#### Microspectrometers and Optical Filters

Session Chair: **Wilfried Noell**, Univ. de Neuchâtel (Switzerland)

2:00 pm: **A porous silicon thermally tunable optical filter** (*Invited Paper*), Da Song, Natalya Tokranova, Alison Gracias, James Castracane, SUNY/Univ. at Albany . . . . . [6887-11]

2:30 pm: **Dual-detector optical MEMS spectrum analyzer: advances, applications, and prospects**, Thomas Otto, Ray Saupe, Thomas Gessner, Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (Germany); Volker Stock, Alexander Weiss, Technische Univ. Chemnitz (Germany) . . . . . [6887-12]

2:50 pm: **Pushbroom NIR hyperspectral imager using MOEMS scanning grating chips**, F. Zimmer, T. Eglhoff, H. Grueger, M. Mueller, H. Schenk, Fraunhofer-Institut für Photonische Mikrosysteme (Germany) . . . . . [6887-13]

Coffee Break . . . . . 3:10 to 3:40 pm

MOEMS-MEMS

# Conference 6887

## SESSION 5

Room: Hilton Hotel: University . . . . .Wed. 3:40 to 5:20 pm

### MOEM Components and Systems I

Session Chair: **Thilo Sandner**, Fraunhofer-Institut für Photonische Mikrosysteme (Germany); **Sonia Garcia Blanco**, Institut National d'Optique (Canada)

3:40 pm: **3D MOEMS-based optical micro-bench platform for the miniaturization of sensing devices**, Sonia Garcia Blanco, Jean-Sol Caron, Sebastien Leclair, Hubert Jerominek, Patrice A. Topart, Institut National d'Optique (Canada) . . . . . [6887-14]

4:00 pm: **Novel optical viscosity sensor using laser-induced capillary wave**, Akira Ebisui, Yoshihiro Taguchi, Yuji Nagasaka, Keio Univ. (Japan) . . . [6887-15]

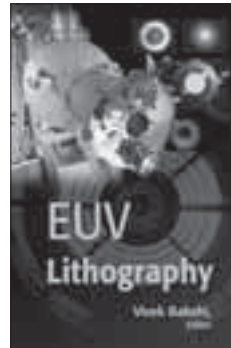
4:20 pm: **Radiation-pressure effects upon a micromirror in a high-finesse optical cavity**, Antoine Heidmann, CNRS (France) and Ecole Normale Supérieure (France) and Univ. Pierre et Marie Curie (France); Olivier Arcizet, Chiara Molinelli, Tristan Briant, Pierre-Francois Cohadon, Univ. Pierre et Marie Curie (France) . . . . . [6887-16]

4:40 pm: **One-axis metallic electrostatic micromirror array**, Karthik Tondapu, Qi Cheng, Mahmoud F. Almasri, Univ. of Missouri/Columbia. . . . . [6887-17]

5:00 pm: **Design and implementation of wafer transporting system for photolithographer**, Kai Wang, Tsinghua Univ. (China) . . . . . [6887-19]

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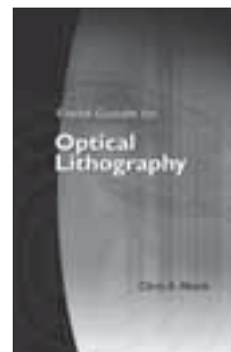
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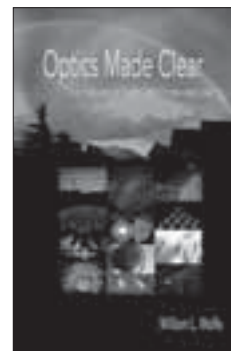
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### Optics Made Clear: The Nature of Light and How We Use It

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# Conference 6888 · Room: Conv. Ctr. F1/F2

Tuesday-Thursday 22-24 January 2008 • Proceedings of SPIE Vol. 6888

## MEMS Adaptive Optics II

Conference Chairs: **Scot S. Olivier**, Lawrence Livermore National Lab.; **Thomas G. Bifano**, Boston Univ.; **Joel A. Kubby**, Univ. of California/Santa Cruz

Program Committee: **William D. Cowan**, Sandia National Labs.; **Christopher J. Dainty**, National Univ. of Ireland/Galway (Ireland); **Donald T. Gavel**, Univ. of California/Santa Cruz; **Andreas Gehner**, Fraunhofer-Institut für Photonische Mikrosysteme (Germany); **Wenhan Jiang**, Institute of Optics and Electronics (China); **Alexis V. Kudryashov**, Moscow State Open Univ. (Russia); **Sergio Raffaele Restaino**, Naval Research Lab.; **Ulrich Wittrock**, Univ. Münster (Germany)

SPIE and the organizers gratefully acknowledge the following sponsor of the conference on MEMS Adaptive Optics II

**Center for Adaptive Optics**

### Tuesday 22 January

#### Posters-Tuesday

Room: Civic Auditorium. . . . . Tues. 6:00 to 7:30 pm

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

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**Turbulence compensation using micromirror arrays: the array design**, William C. Sweatt, Michael T. Valley, Sandia National Labs. . . . . [6888-32]

### Wednesday 23 January

#### SESSION 1

Room: Conv. Ctr. F1/F2. . . . . Wed. 8:30 am to 12:00 pm

#### Applications I

8:30 am: **Characterisation of MEMS mirrors for use in atmospheric and ocular wavefront correction** (Invited Paper), M. Nicholas Devaney, Derek J. Coburn, Christopher Coleman, Christopher J. Dainty, Eugenie Dalimier, Thomas D. Farrell, David Lara, David Mackey, Ruth Mackey, National Univ. of Ireland/Galway (Ireland). . . . . [6888-01]

9:00 am: **MEMS in adaptive optics scanning laser ophthalmology: achievements and challenges** (Invited Paper), Alfredo Dubra, Imperial College London (United Kingdom); Daniel C. Gray, William Merigan, Jessica I. Morgan, David R. Williams, Univ. of Rochester. . . . . [6888-02]

9:30 am: **Villages: an on-sky visible wavelength astronomy AO experiment using a MEMS deformable mirror** (Invited Paper), Donald T. Gavel, Scott A. Severson, Univ. of California Observatories; Brian J. Bauman, Lawrence Livermore National Lab.; Daren R. Dillon, Marco R. Reinig, Christopher Lockwood, Univ. of California Observatories; Dave W. Palmer, Lawrence Livermore National Lab.; Kathleen M. Morzinski, Stephen M. Ammons, Elinor L. Gates, Bryant Grigsby, Univ. of California Observatories. . . . . [6888-03]

Coffee Break . . . . . 10:00 to 10:30 am

10:30 am: **Towards isotropic ultrahigh resolution OCT using pancorrection** (Invited Paper), Wolfgang Drexler, Cardiff Univ. (United Kingdom). . . . [6888-04]

11:00 am: **The Naval Research Laboratory MEMS adaptive optics program** (Invited Paper), Sergio R. Restaino, Jonathan R. Andrews, Ty Martinez, Christopher C. Wilcox, Naval Research Lab. . . . . [6888-05]

11:30 am: **AO-OCT with dual wavefront correctors** (Invited Paper), John S. Werner, Univ. of California/Davis Medical Ctr. . . . . [6888-06]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

#### SESSION 2

Room: Conv. Ctr. F1/F2. . . . . Wed. 1:30 to 2:30 pm

#### Applications II

1:30 pm: **Use adaptive optics to increase non-linear imaging signal in mouse bone marrow**, Yaopeng Zhou, Thomas Bifano, Boston Univ.; Charles P. Lin, Massachusetts General Hospital . . . . . [6888-07]

1:50 pm: **Applying adaptive optics to wide-field microscopy**, Peter A. Kner, Univ. of California/San Francisco; Zvi Kam, Weizmann Institute of Science (Israel); David A. Agard, John W. Sedat, Univ. of California/San Francisco. . . . . [6888-08]

2:10 pm: **Image-based adaptive optics for imaging and microscopy**, Martin J. Booth, Delphine Debarre, Tony Wilson, Univ. of Oxford (United Kingdom). . . . . [6888-09]

#### SESSION 3

Room: Conv. Ctr. F1/F2. . . . . Wed. 2:30 to 5:00 pm

#### Systems I

2:30 pm: **High-resolution MEMS AO for stellar interferometry**, Shanti Rao, James K. Wallace, Mike Shao, Jet Propulsion Lab.; Rocco Samuele, Northrop Grumman Space Technology . . . . . [6888-10]

2:50 pm: **Performance of a MEMS reflective wavefront sensor**, Jonathan R. Andrews, Naval Research Lab.; Scott W. Teare, New Mexico Institute of Mining and Technology; Sergio R. Restaino, Naval Research Lab.; Ty Martinez, Air Force Research Lab.; Christopher C. Wilcox, Naval Research Lab.; David V. Wick, William D. Cowan, Olga B. Spahn, Brett E. Bagwell, Sandia National Labs. . . . . [6888-11]

3:10 pm: **A novel method of creating a surface micromachined 3D optical assembly for MEMS-based, miniaturized FT-IR spectrometers**, David Reyes, Elliot R. Schildkraut, Jinhong Kim, Petros A. Kotidis, Daniel J. Cavicchio, Spectra Optics/Block Engineering . . . . . [6888-12]

Coffee Break . . . . . 3:30 to 4:00 pm

4:00 pm: **Fast calibration techniques for adaptive compensation for a wide-field microscope**, Janice Castillo, Thomas G. Bifano, Boston Univ. . . . [6888-13]

4:20 pm: **Compact MEMS-based adaptive optics optical coherence tomography for clinical use**, Diana C. Chen, Scot S. Olivier, Steven M. Jones, Lawrence Livermore National Lab.; Robert J. Zawadzki, Univ. of California/Davis Medical Ctr.; Julia W. Evans, Lawrence Livermore National Lab.; Stacey S. Choi, John S. Werner, Univ. of California/Davis Medical Ctr. . . . . [6888-14]

4:40 pm: **Performance of a MEMS-based AO-OCT system**, Julia W. Evans, Lawrence Livermore National Lab.; Robert J. Zawadzki, Univ. of California/Davis Medical Ctr.; Steve M. Jones, Lawrence Livermore National Lab.; Samelia O. Okpodu, Univ. of California/Davis Medical Ctr.; Scot S. Olivier, Lawrence Livermore National Lab.; John S. Werner, Univ. of California/Davis Medical Ctr. . . . . [6888-15]

MOEMS-MEMS

**Thursday 24 January**

**SESSION 4**

**Room: Conv. Ctr. F1/F2. . . . . Thurs. 8:40 to 10:00 am**

**Systems II**

- 8:40 am: **MEMS adaptive optics for the Gemini Planet Imager: control methods and validation**, Lisa A. Poyneer, Lawrence Livermore National Lab.; Daren R. Dillon, Sandrine J. Thomas, Univ. of California Observatories [6888-16]
- 9:00 am: **High-contrast imaging testbed**, Kevin L. Baker, Dennis A. Silva, Lisa A. Poyneer, Bruce A. Macintosh, Brian J. Bauman, Dave W. Palmer, Tane P. Remington, Mario Delgado-Lariz, Lawrence Livermore National Lab. [6888-17]
- 9:20 am: **Amplitude variations on an ExAO testbed using MEMS device**, Sandrine J. Thomas, Univ. of California Observatories; Julia W. Evans, Donald W. Phillion, Lawrence Livermore National Lab.; Donald T. Gavel, Daren R. Dillon, Univ. of California Observatories; Bruce A. Macintosh, Lawrence Livermore National Lab. . . . . [6888-18]
- 9:40 am: **Synthesis of approximate zonal controllers for MEMS DM**, Andres R. Guesalaga, Pontificia Univ. Católica de Chile (Chile); Dani Guzman, Univ. of Durham (United Kingdom); Michal Kowalczyk, Univ. de Chile (Chile); Richard M. Myers, Ray M. Sharples, Timothy J. Morris, Alastair G. Basden, Christopher D. Saunter, Univ. of Durham (United Kingdom). . . . . [6888-19]
- Coffee Break . . . . . 10:00 to 10:30 am

**SESSION 5**

**Room: Conv. Ctr. F1/F2. . . . . Thurs. 10:30 am to 12:00 pm**

**Devices I**

- 10:30 am: **MEMS active optics update (Invited Paper)**, William D. Cowan, Sandia National Labs. . . . . [6888-20]
- 11:00 am: **Towards a compact "plug and play" MEMS deformable mirror system**, Michael A. Helmbrecht, Carl Kempf, Nathan Doble, Iris AO, Inc. . . . . [6888-21]
- 11:20 am: **Wavefront fitting characterization of a piston-tip-tilt segmented MEMS deformable mirror**, Michael A. Helmbrecht, Carl Kempf, Nathan Doble, Iris AO, Inc. . . . . [6888-22]
- 11:40 am: **MEMS deformable membrane mirror with integrated control electronics**, Fergal P. Shevlin, Dyoptyka Ltd. (Ireland) . . . . . [6888-23]
- Lunch Break . . . . . 12:00 to 1:30 pm

**SESSION 6**

**Room: Conv. Ctr. F1/F2. . . . . Thurs. 1:30 to 5:00 pm**

**Devices II**

- 1:30 pm: **Precise open-loop control of MEMS deformable mirror shape (Invited Paper)**, Thomas G. Bifano, Jason B. Stewart, Alioune Diouf, Boston Univ. . . . . [6888-24]
- 2:00 pm: **Nonlinear plate equation analysis for the design of large stroke deformable mirror**, Oscar A. Azucena, Jr., Joel A. Kubby, Univ. of California/Santa Cruz. . . . . [6888-25]
- 2:20 pm: **Simulation and interferometer results of MEMS deformable mirrors**, Bautista R. Fernandez, Joel A. Kubby, Univ. of California/Santa Cruz. . . . . [6888-26]
- 2:40 pm: **Characterizing MEMS deformable mirrors for open-loop operation: high-resolution measurements of thin-plate behavior**, Kathleen M. Morzinski, Univ. of California Observatories; Andrew P. Norton, Univ. of California/Santa Cruz; Daren R. Dillon, Donald T. Gavel, Univ. of California Observatories . . . . . [6888-27]
- Coffee Break . . . . . 3:00 to 3:30 pm
- 3:30 pm: **Closed-loop AO demonstration of MEMS SLM with piston, tip and tilt control**, Harold Dyson, Flavio Pardo, Roland Ryf, Vladimir A. Aksyuk, Robert E. Frahm, Arman Gasparyan, Rick Papazian, David A. Ramsey, Maria E. Simon, Susanne Arney, Lucent Technologies/Bell Labs. . . . . [6888-28]
- 3:50 pm: **Electrostatic actuator array fabricated using anodic wafer bonding for MEMS deformable mirror control**, Alioune Diouf, Jason B. Stewart, Mike Gingras, Thomas G. Bifano, Boston Univ. . . . . [6888-29]
- 4:10 pm: **A 4096 element continuous facesheet MEMS deformable mirror for high-contrast imaging**, Steven A. Cornelissen, Boston Micromachines Corp.; Thomas G. Bifano, Boston Univ.; Paul A. Bierden, Boston Micromachines Corp. . . . . [6888-30]
- 4:30 pm: **TBD (Invited Paper)**, Samuel Bucourt, Imagine Optic (France) . . . . . [6888-31]

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# Daily Conference Schedule

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## OPTO Special Events

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| <p><b>Biomedical Optics Exhibition</b><br/> <i>San Jose Convention Center,<br/>         Exhibition Hall 1</i><br/>         1:00 to 5:00 pm   10:00 am to 4:00 pm</p> | <p><b>Photonics West Exhibition</b><br/> <i>San Jose Convention Center, Exhibition Halls 1-3,<br/>         Exhibition Foyer and South Halls 1-2</i><br/>         10:00 am to 5:00 pm   10:00 am to 5:00 pm   10:00 am to 4:00 pm</p> |
|  |   |
|  | <p><b>Career Fair</b><br/>         11:00 am to 3:00 pm</p>   |
|  | <div style="width: 48%;"> <p><b>OPTO Plenary Session, 8:30 to 10:00 am, p. 28</b></p> </div> <div style="width: 48%;"> <p><b>OPTO Interactive Poster Session, Civic Auditorium, 6:00 to 7:30 pm, p. 17</b></p> </div>                |

## Optoelectronic Materials and Devices

Program Chair: James G. Grote, Air Force Research Lab.

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| 6890 | Optical Components and Materials V (Digonnet, Jiang, Glesener, Dries) p. 193                 |
|      | 6891 Organic Photonic Materials and Devices X (Nelson, Kajzar, Kaino) p. 196                 |
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|      | 6893 Terahertz Technology and Applications (Linden, Sadwick) p. 203                          |
|      | 6894 Gallium Nitride Materials and Devices III (Morkoc, Litton) p. 204                       |
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## Photonic Integration

Program Chair: Yakov Sidorin, Photineer Technology Group

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| 6896 | Integrated Optics: Devices, Materials, and Technologies XII (Greiner, Waechter) p. 210 |
| 6897 | Optoelectronic Integrated Circuits X (Eldada, Lee) p. 213                              |
| 6898 | Silicon Photonics III (Kubby, Reed) p. 216   |
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## Nanotechnologies in Photonics

Program Chair: Ali Adibi, Georgia Institute of Technology

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Program Chair: **Zameer U. Hasan**, Temple Univ.

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Program Chair: **E. Fred Schubert**, Rensselaer Polytechnic Institute

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## Physics and Simulation of Optoelectronic Devices XVI

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### Monday 21 January

#### Opening Remarks

Room: Conv. Ctr. K ..... Mon. 8:20 to 8:25 am  
Marek Osinski, The Univ. of New Mexico

#### SESSION 1

Room: Conv. Ctr. K ..... Mon. 8:25 to 10:10 am

#### Wide-Bandgap Lasers and LEDs

Session Chair: **Marek Osinski**, The Univ. of New Mexico

8:25 am: **GaN-based nonpolar/semipolar laser diodes and LEDs (Keynote)** (*Invited Paper*), Shuji Nakamura, Steven P. DenBaars, James S. Speck, Univ. of California/Santa Barbara ..... [6889-01]

9:10 am: **Optical gain and spontaneous emission of strain-compensated InGaN-AlGaIn quantum wells including carrier screening effect**, Hongping Zhao, Ronald A. Arif, Yik-Khooon Ee, Nelson Tansu, Lehigh Univ. .... [6889-02]

9:30 am: **Thick InGaIn growth on several crystal planes of ZnO substrate by metalorganic vapor phase epitaxy**, Yohjiro Kawai, Shinya Ohsuka, Motoaki Iwaya, Satoshi Kamiyama, Hiroshi Amano, Isamu Akasaki, Meijo Univ. (Japan)..... [6889-03]

9:50 am: **Effect of interface polarization charge on the performance of III-N light emitting diode**, Paul H. Shen, Meredith L. Reed, Eric D. Readinger, Michael Wraback, Army Research Lab. .... [6889-04]

Coffee Break ..... 10:10 to 10:40 am

#### SESSION 2

Room: Conv. Ctr. K ..... Mon. 10:40 am to 12:00 pm

#### Photovoltaic Devices

Session Chair: **Hiroshi Amano**, Meijo Univ. (Japan)

10:40 am: **Present and future of super high efficiency multi-junction solar** (*Invited Paper*), Masafumi Yamaguchi, Toyota Technological Institute (Japan); Tatsuya Takamoto, Sharp Corp. (Japan); Kenji Araki, Toyota Technological Institute (Japan) and Daido Steel Co., Ltd. (Japan)..... [6889-05]

11:10 am: **Dilute nitride quantum confined solar cells** (*Invited Paper*), Alex Freundlich, A. Fotkadjikis, Andenet Alemu, Univ. of Houston; Lekhnath Bhusal, National Renewable Energy Lab. .... [6889-06]

11:40 am: **Impact of photon recycling and spontaneous emission coupling on multi-junction solar cell design**, Song-Nan Wu, Shui-Qing Yu, Ding Ding, Shane R. Johnson, Yong-Hang Zhang, Arizona State Univ..... [6889-07]

### Tuesday 22 January

#### OPTO 2008 Plenary Session

Session Chairs: **Ali Adibi**, Georgia Institute of Technology;  
**James G. Grote**, Air Force Research Lab.

Room: Conv. Ctr. A7/A8 · 8:30 to 10:00 am

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Nanophotonics: from Photonic Crystals to Plasmonics** (*Presentation Only*), Eli Yablonovitch, Univ. of California/Berkeley

9:20 am: **Organic "Plastic" Optoelectronic Devices** (*Presentation Only*), Niyazi Serdar Sariciftci, Johannes Kepler Univ. Linz (Austria)

See p. 28 for details.

Coffee Break ..... 10:00 to 10:30 am

#### SESSION 3

Room: Conv. Ctr. C4 ..... Tues. 10:30 to 11:50 am

#### Nonlinear Dynamics and Chaos in Semiconductor Lasers

Session Chair: **Bernd Witzigmann**, ETH Zürich (Switzerland)

10:30 am: **All-optical noninvasive control of semiconductor lasers** (*Invited Paper*), Sylvia Schikora, Hans-Jürgen Wünsche, Fritz Henneberger, Humboldt-Univ. zu Berlin (Germany)..... [6889-08]

11:00 am: **Evidence for carrier density grating formation in a semiconductor laser subject to variably rotated polarization feedback** (*Invited Paper*), Lev Khaykovich, N. Gross, T. Galfsky, Z. Shotan, I. Kanter, Michael Rosenbluh, Bar-Ilan Univ. (Israel) ..... [6889-09]

11:30 am: **Nonlinear dynamics and chaotic behavior observed in laterally coupled diode lasers**, Rui Santos, Horacio Lamela, Univ. Carlos III de Madrid (Spain) ..... [6889-10]

Lunch/Exhibition Break ..... 11:50 am to 1:20 pm

#### SESSION 4

Room: Conv. Ctr. C4 ..... Tues. 1:20 to 3:00 pm

#### Physics of Low-Dimensional Structures and Devices

Session Chair: **Yasuhiko Arakawa**, The Univ. of Tokyo (Japan)

1:20 pm: **Slow light in quantum dot and quantum well semiconductor optical amplifiers** (*Invited Paper*), Shun Lien Chuang, Piotr K. Kondratko, Univ. of Illinois at Urbana-Champaign ..... [6889-11]

1:50 pm: **Nonlinear excitations of semiconductor quantum wells with intense terahertz fields** (*Invited Paper*), Johannes Steiner, Mackillo Kira, Stephan W. Koch, Philipps-Univ. Marburg (Germany) ..... [6889-12]

2:20 pm: **Temperature dependence of radiative and Auger losses in quantum well lasers**, Jörg Hader, Jerome V. Moloney, College of Optical Sciences/The Univ. of Arizona; Stephan W. Koch, Philipps-Univ. Marburg (Germany) ..... [6889-13]

2:40 pm: **Quantum optical input-output relations in semiconductor heterostructures**, Mauro F. Pereira, Jr., Sheffield Hallam Univ. (United Kingdom)..... [6889-14]

Coffee Break ..... 3:00 to 3:30 pm



**SESSION 5**

**Room: Conv. Ctr. C4 . . . . . Tues. 3:30 to 5:10 pm**

**Physics and Simulation of VCSELS and Disk Lasers**

*Session Chair: Shun Lien Chuang,*  
Univ. of Illinois at Urbana-Champaign

- 3:30 pm: **Optically injection-locked VCSELS: physics and applications** (*Invited Paper*), Xiaoxue Zhao, Connie J. Chang-Hasnain, Univ. of California/Berkeley. . . . . [6889-15]
- 4:00 pm: **Ultra-high-speed electrooptically-modulated VCSELS: modeling and experimental results** (*Invited Paper*), Vitaly A. Shchukin, VI Systems GmbH (Germany) and Technische Univ. Berlin (Germany); Friedhelm Hopfer, Matthias Kuntz, Alex Mutig, Andre Strittmatter, Technische Univ. Berlin (Germany); Nikolai N. Ledentsov, VI Systems GmbH (Germany) and Technische Univ. Berlin (Germany); Dieter Bimberg, Technische Univ. Berlin (Germany); Holger Quast, VI Systems GmbH (Germany) . . . . . [6889-16]
- 4:30 pm: **A robust electro-opto-thermal coupling scheme for semiconductor laser simulation**, Rafael Santschi, Synopsys Switzerland, LLC (Switzerland); Hektor Meier, ETH Zürich (Switzerland); Adrian Bregy, Stefan Odermatt, Synopsys Switzerland, LLC (Switzerland) . . . . . [6889-17]
- 4:50 pm: **Picosecond dynamics of 1040-nm semiconductor disk lasers**, Sangam Chatterjee, Swantje Horst, Philipps-Univ. Marburg (Germany); Wolfgang Diehl, Peter Brick, OSRAM Opto Semiconductors GmbH (Germany); Kristian Hantke, Wolfgang Stolz, Eckhard Kühn, Angela D. Thraenhardt, Stephan W. Koch, Wolfgang W. Rühle, Philipps-Univ. Marburg (Germany) . . . . . [6889-18]

**Wednesday 23 January**

**SESSION 6**

**Room: Conv. Ctr. C4 . . . . . Wed. 8:40 to 10:00 am**

**Physics of Quantum Dot/Dash Lasers and Amplifiers**

*Session Chair: Toshihiko Baba,* Yokohama National Univ. (Japan)

- 8:40 am: **Compact quantum-dot-based ultrafast lasers** (*Invited Paper*), Wilson Sibbett, Univ. of St. Andrews (United Kingdom); Edward U. Rafalov, Univ. of Dundee (United Kingdom) . . . . . [6889-47]
- 9:10 am: **Recent developments in InP-based quantum dashes for directly modulated lasers and semiconductor amplifiers** (*Invited Paper*), François Lelarge, Romain Brenot, B. Rousseau, F. Martin, Francis Poingt, L. Legouezigou, O. Le Gouezigou, F. Pommereau, A. Accard, M. Caligaro, D. Make, Patrick Resneau, Beatrice Dagens, Frederic Van Dijk, Michel M. Krakowski, Guang-Hua Duan, Alcatel-Thales III-V Lab. (France) . . . . . [6889-20]
- 9:40 am: **Giant nonlinear gain coefficient of an InAs/AlGaInAs quantum dot laser**, Aaron J. Moscho, Christopher M. Dziak, The Univ. of New Mexico; Michael L. Fanto, Air Force Research Lab.; Nader A. Naderi, Yan Li, The Univ. of New Mexico; Vassilios I. Kovanis, Air Force Research Lab.; Luke F. Lester, The Univ. of New Mexico . . . . . [6889-21]
- Coffee Break . . . . . 10:00 to 10:30 am

**SESSION 7**

**Room: Conv. Ctr. C4 . . . . . Wed. 10:30 am to 12:00 pm**

**Surface Plasmon Devices**

*Session Chair: Cun-Zheng Ning,* Arizona State Univ.

- 10:30 am: **Plasmonic quantum cascade lasers** (*Invited Paper*), Luke R. Wilson, D. A. Austin, The Univ. of Sheffield (United Kingdom); M. Bahriz, V. Moreau, Raffaele Colombelli, R. J. Palomo, Univ. Paris-Sud (France); Andrew B. Krysa, John W. Cockburn, John S. Roberts, The Univ. of Sheffield (United Kingdom) . . . . . [6889-48]
- 11:00 am: **Energy transfer and spaser in semiconductor quantum dots on metal nanoparticles** (*Invited Paper*), Mark I. Stockman, Georgia State Univ. . . . . [6889-22]
- 11:30 am: **Field localization using resonant plasmonic structures** (*Invited Paper*), Boris A. Slutsky, Liang Feng, Lin Pang, Amit Mizrahi, Maziar P. Nezhad, Yeshaiahu Fainman, Univ. of California/San Diego . . . . . [6889-23]
- Lunch/Exhibition Break . . . . . 12:00 to 1:40 pm

**SESSION 8**

**Room: Conv. Ctr. C4 . . . . . Wed. 1:40 to 3:00 pm**

**Photonics with Single-Quantum-Dot Devices**

*Session Chair: Fritz Henneberger,*  
Humboldt-Univ. zu Berlin (Germany)

- 1:40 pm: **Entangled light from semiconductor quantum dots and nanowires** (*Invited Paper*), Nikolay Akopian, E. Meiroum, N. Lindner, E. Poem, David Gershoni, Technion-Israel Institute of Technology (Israel); Valéry Zwiller, L. Kouwenhoven, Technische Univ. Delft (Netherlands) . . . . . [6889-50]
- 2:10 pm: **Single electron control in high Q micropillar cavities** (*Invited Paper*), Dirk Bouwmeester, Univ. of California/Santa Barbara and Huygens Lab./Leiden Univ. (Netherlands); Matthew T. Rakher, Nick G. Stoltz, Larry A. Coldren, Pierre M. Petroff, Univ. of California/Santa Barbara . . . . . [6889-19]
- 2:40 pm: **Resonantly excited emissions from a GaAs quantum dot and an exciton dipole moment**, Keiji Kuroda, National Institute for Materials Science (Japan); Takashi Kuroda, National Institute for Materials Science (Japan) and PRESTO-JST (Japan); Kazuaki Sakoda, National Institute for Materials Science (Japan) and Univ. of Tsukuba (Japan); Giyuu Kido, Nobuyuki Koguchi, National Institute for Materials Science (Japan) . . . . . [6889-24]
- Coffee Break . . . . . 3:00 to 3:30 pm

**SESSION 9**

**Room: Conv. Ctr. C4 . . . . . Wed. 3:30 to 5:00 pm**

**Nanoscale Devices**

*Session Chair: Nikolai N. Ledentsov,*  
Technische Univ. Berlin (Germany)

- 3:30 pm: **Optical nanoantennae** (*Invited Paper*), Vladimir M. Shalaev, R. Bakker, Alexander V. Kildishev, A. Boltasseva, Vladimir P. Drachev, Z. Liu, Hsiao-Kuan Yuan, Purdue Univ. . . . . [6889-49]
- 4:00 pm: **Dipole lasing stimulated by nanoantenna** (*Invited Paper*), Igor E. Protsenko, Alexander V. Uskov, K. E. Krotova, P.N. Lebedev Physical Institute (Russia) and Advanced Energy Technology LTD (Russia); Eoin P. O'Reilly, Tyndall National Institute (Ireland) . . . . . [6889-25]
- 4:30 pm: **Surface- and edge-emitting nanoscale semiconductor lasers** (*Invited Paper*), Farhan Rana, Christina Manolatu, Cornell Univ. . . . . [6889-26]

**POSTERS-Wednesday**

**Room: Civic Auditorium. . . . . Wed. 6:00 to 7:30 pm**

*All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.*

*Poster presenters may post their poster papers Wednesday morning starting at 10:00 am in the Civic Auditorium, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.*

- Characterization of the carrier transports in quaternary AlInGaIn multiple quantum well light-emitting diodes**, Cheng-Kang Wang, Chang Gung Univ. (Taiwan); Yen-Chun Lin, Chang Gung Univ. (Tajikistan); Han-Yu Tsai, Chia-Hui Fang, Ta-Chuan Kuo, Wei-Jen Chen, Hui-Tang Shen, Jen-Cheng Wang, Ya-Fen Wu, Tzer-En Nee, Chang Gung Univ. (Taiwan) . . . . . [6889-43]
- Modeling of photovoltaic effect in graded-band-gap p-n structures with carrier lifetime inhomogeneity**, Bogdan S. Sokolovsky, Ivan Franko National Univ. of L'viv (Ukraine) . . . . . [6889-44]
- A novel acousto-optic tunable filter for use in hyperspectral imaging systems**, Caroline J. Stedham, Gooch & Housego UK Ltd. (United Kingdom) and Heriot-Watt Univ. (United Kingdom); Mike Draper, Jon Ward, Gooch & Housego UK Ltd. (United Kingdom); Elliott Wachman, ChromoDynamics Inc.; Chris Pannell, Optronics Labs., Inc. . . . . [6889-46]

OPTO

## Thursday 24 January

### SESSION 10

Room: Conv. Ctr. C4 ..... Thurs. 8:30 to 10:10 am

#### Photonic Crystal Devices

Session Chair: Jelena Vuckovic, Stanford Univ.

8:30 am: **High-power one-, two-, and three-dimensional photonic crystal edge-emitting laser diodes for ultrahigh brightness applications** (*Invited Paper*), Nikita Y. Gordeev, Mikhail V. Maximov, A.F. Ioffe Physico-Technical Institute (Russia); Robert M. Duboc, U. Ben-Ami, PBC Lasers Ltd. (Israel); Vitaly A. Shchukin, Thorsten Kettler, Nikolai N. Ledentsov, Dieter Bimberg, Technische Univ. Berlin (Germany). ..... [6889-27]

9:00 am: **Electrically-pumped photonic crystal lasers** (*Invited Paper*), Yong-Hee Lee, Min-Kyo Seo, Hong-Gyu Park, Myung-Ki Kim, Seok-Hoon Kim, Korea Advanced Institute of Science and Technology (South Korea). ..... [6889-28]

9:30 am: **Novel concepts in photonic crystal light emitting diodes**, Claude Weisbuch, Ecole Polytechnique (France) and Genewave S.A.S. (France) and Univ. of California/Santa Barbara; Aurélien David, Elison Matioli, Brendan J. Moran, Kelly C. McGroddy, Sarah L. Keller, Evelyn L. Hu, Shuji Nakamura, James S. Speck, Steven P. DenBaars, Univ. of California/Santa Barbara ..... [6889-29]

9:50 am: **All-optical signal processing in photonic crystals covered with fast nonlinear materials**, Eugene Y. Glushko, Institute of Semiconductor Physics (Ukraine); Alexander E. Glushko, Macquarie Univ. (Australia) and V. Lashkariov Institute of Semiconductor Physics (Ukraine); Ivan S. Maksymov, Univ. Rovira i Virgili (Spain) ..... [6889-30]

Coffee Break ..... 10:10 to 10:30 am

### SESSION 11

Room: Conv. Ctr. C4 ..... Thurs. 10:30 am to 12:00 pm

#### Photonic Crystal Nanocavity Devices

Session Chair: Claude Weisbuch, Univ. of California/Santa Barbara

10:30 am: **Controlled light emission from quantum dots with 2D and 3D photonic crystal nanocavity** (*Invited Paper*), Yasuhiko Arakawa, Satoshi Iwamoto, Masahiro Nomura, Kanna Aoki, The Univ. of Tokyo (Japan). [6889-31]

11:00 am: **Ultrafast photonic crystal nanocavity lasers and optical switches** (*Invited Paper*), Jelena Vuckovic, Dirk R. Englund, Ilya Fushman, Bryan Ellis, Stanford Univ.; Hatice Altug, Boston Univ. .... [6889-32]

11:30 am: **Physics and simulation of photonic crystal Purcell light emitters** (*Invited Paper*), Bernd Witzigmann, Friedhard Römer, ETH Zürich (Switzerland) ..... [6889-33]

Lunch/Exhibition Break ..... 12:00 to 1:40 pm

### SESSION 12

Room: Conv. Ctr. C4 ..... Thurs. 1:40 to 3:00 pm

#### Mid-Infrared Devices

Session Chair: Stephan W. Koch, Philipps-Univ. Marburg (Germany)

1:40 pm: **Physical modeling of mid-infrared quantum cascade lasers** (*Invited Paper*), Paul Harrison, Dragan Indjin, Zoran Ikonc, Rob W. Kelsall, Craig A. Evans, Jim McTavish, Univ. of Leeds (United Kingdom). ..... [6889-40]

2:10 pm: **Strain-compensated AlAs-InGaAs quantum-cascade lasers with emission wavelength 3-5  $\mu\text{m}$**  (*Invited Paper*), W. Ted Masselink, Humboldt-Univ. zu Berlin (Germany) ..... [6889-39]

2:40 pm: **Efficient and low-noise mid/far-infrared detection using second-order nonlinearities in a resonant semiconductor quantum well heterostructure**, Aleksander K. Wojcik, Feng Xie, Alexey A. Belyanin, Texas A&M Univ.; Junichiro Kono, Rice Univ.; Fow-Sen Choa, Univ. of Maryland/Baltimore County. .... [6889-41]

Coffee Break ..... 3:00 to 3:30 pm

### SESSION 13

Room: Conv. Ctr. C4 ..... Thurs. 3:30 to 5:00 pm

#### Physics of Ring Lasers and Diode Laser Frequency Stabilization

Session Chair: Paul Hongen Shen, Army Research Lab.

3:30 pm: **Monolithic InP-based passively modelocked semiconductor ring lasers at 1.5  $\mu\text{m}$**  (*Invited Paper*), Erwin A. Bente, Martijn J. R. Heck, Yohan Barbarin, Richard Nötzel, Meint K. Smit, Technische Univ. Eindhoven (Netherlands) ..... [6889-35]

4:00 pm: **Highly unidirectional Y-junction-coupled S-section ring lasers**, Nathan J. Withers, Omar K. Qassim, Gennady A. Smolyakov, Peter G. Eliseev, Marek Osinski, The Univ. of New Mexico ..... [6889-36]

4:20 pm: **Semiconductor laser frequency-stabilization: influence of multiposition temperature controls**, Mitsusuke Yanagisawa, Kenji Nakano, Sinya Maehara, Takashi Sato, Takao Maruyama, Masashi Okawa, Niigata Univ. (Japan); Seiji Kawamura, National Astronomical Observatory of Japan (Japan). .... [6889-37]

4:40 pm: **Frequency stabilization of an external cavity diode laser: countermeasure against atmospheric temperature variations**, Yuta Minabe, Kohei Doi, Toshiya Kaizaka, Takashi Sato, Takeo Maruyama, Masashi Ohkawa, Tadashi Tamura, Niigata Univ. (Japan) ..... [6889-38]



# Optical Components and Materials V

*Conference Chairs:* **Michel J. F. Digonnet**, Stanford Univ.; **Shibin Jiang**, AdValue Photonics, Inc.; **John W. Glesener**, Northrop Grumman Electro-Optical Systems; **J. Christopher Dries**, CeeK Systems

*Program Committee:* **Jean-Luc Adam**, Univ. de Rennes I (France); **Dan Hu**, Spectra-Physics Semiconductor Lasers; **Animesh Jha**, Univ. of Leeds (United Kingdom); **Jacques Lucas**, Univ. de Rennes I (France); **John R. Marcianite**, Rochester Photonics Corp.; **Yasutake Ohishi**, Toyota Technological Institute (Japan); **Barrett G. Potter**, The Univ. of Arizona; **Giancarlo C. Righini**, Istituto di Fisica Applicata Nello Carrara (Italy); **Stan M. Smith**, U.S. Army Space and Missile Defense Command; **Feng Song**, Nankai Univ. (China); **Setsuhisa Tanabe**, Kyoto Univ. (Japan); **Ji Wang**, Corning Inc.; **John M. Zavada**, U.S. Army Research Office

## Monday 21 January

### SESSION 1

Room: Conv. Ctr. E ..... Mon. 8:20 to 9:50 am

#### Rare-Earth Doped Materials

*Session Chair:* **Michel J. F. Digonnet**, Stanford Univ.

- 8:20 am: **Rare earth doped crystals for quantum information devices** (*Invited Paper*), Olivier Guillot-Noël, Ecole Nationale Supérieure de Chimie de Paris (France) ..... [6890-01]
- 8:50 am: **Visible emission of Tb<sup>3+</sup>-Yb<sup>3+</sup> co-doped fluorophosphate glasses**, Yusuke Arai, Toyota Technological Institute (Japan); Tatsuya Yamashita, Toyota Technological Institute (Japan) and Toyota Central Research and Development Labs., Inc. (Japan); Shin Horiguchi, Takenobu Suzuki, Yasutake Ohishi, Toyota Technological Institute (Japan) ..... [6890-02]
- 9:10 am: **Upconversion processes of Er<sup>3+</sup> in ZrO<sub>2</sub>-CaO eutectic crystals**, Rolindes Balda, Joaquin M. Fernandez, Univ. del País Vasco (Spain); Rosa I. Merino, J. I. Peña, Victor M. Orera, Univ. de Zaragoza (Spain) ..... [6890-04]
- 9:30 am: **Using film nanostructure to control photoluminescence angular emission profiles**, Michael T. Taschuk, James Gospodyn, Jeremy Sit, Michael Brett, Univ. of Alberta (Canada) ..... [6890-05]
- Coffee Break ..... 9:50 to 10:20 am

### SESSION 2

Room: Conv. Ctr. E ..... Mon. 10:20 am to 12:30 pm

#### Glass Photonic Devices

*Session Chair:* **Shibin Jiang**, AdValue Photonics, Inc.

- 10:20 am: **High-performance double-clad fibers by all-vapor-doping OVD process** (*Invited Paper*), Ji Wang, Corning Inc. .... [6890-06]
- 10:50 am: **Submicron embossing of novel photonic glasses for photonic integrated circuits**, Angela B. Seddon, WeiJian Pan, David Furniss, Helen L. Rowe, Phillip Sewell, Trevor M. Benson, The Univ. of Nottingham (United Kingdom) ..... [6890-07]
- 11:10 am: **Photonic properties of erbium activated coated microspheres**, Yoann Jestin, Cristina Armellini, Andrea Chiappini, Alessandro Chiasera, Univ. degli Studi di Trento (Italy); Yannick Dumeige, Ecole Nationale Supérieure des Sciences Appliquées et de Technologie (France); Maurizio Ferrari, Univ. degli Studi di Trento (Italy); Patrice Féron, Laura Ghisa, Ecole Nationale Supérieure des Sciences Appliquées et de Technologie (France); Enrico Moser, Univ. degli Studi di Trento (Italy); Gualtiero Nunzi Conti, Giancarlo Righini, Istituto di Fisica Applicata Nello Carrara (Italy) ..... [6890-08]
- 11:30 am: **Tellurite glass micro-superspheres as broadband Raman resonator**, Yusuke Arai, Guanshi Qin, Takenobu Suzuki, Yasutake Ohishi, Toyota Technological Institute (Japan); Tetsuji Yano, Shuichi Shibata, Tokyo Institute of Technology (Japan) ..... [6890-09]
- 11:50 am: **Phase-shifted volume Bragg gratings in photo-thermo-refractive glass**, Julien H. Lumeau, College of Optics & Photonics/Univ. of Central Florida; Vadim I. Smirnov, OptiGrate; Leonid B. Glebov, College of Optics & Photonics/Univ. of Central Florida ..... [6890-10]
- 12:10 pm: **Chalcogenide films for photosensitive band-pass filters and opto-chemical sensors application**, Virginie Nazabal, Univ. de Rennes I (France); Michel Cathelinaud, Institut Fresnel (France); Frédéric Charpentier, Univ. de Rennes I (France); Wee-Dong Shen, Institut Fresnel (France); Petr Nemeč, Univ. Pardubice (Czech Republic); Hervé Lhermite, Joel Charrier, Fabien Grasset, Univ. de Rennes I (France); Michel Lequime, Institut Fresnel (France); Miloslav Frumar, Univ. Pardubice (Czech Republic); Jean-Luc Adam, Univ. de Rennes I (France) ..... [6890-11]
- Lunch Break ..... 12:30 to 1:40 pm

### SESSION 3

Room: Conv. Ctr. E ..... Mon. 1:40 to 3:20 pm

#### Detector Technologies I

*Session Chair:* **John W. Glesener**, Northrop Grumman Corp.

- 1:40 pm: **Surface state detection in nanoscale silicon waveguides**, Tom W. Baehr-Jones, Michael Hochberg, Axel Scherer, Jingqing Huang, California Institute of Technology ..... [6890-12]
- 2:00 pm: **AlGaAsSb/InGaAsSb photovoltaic transistors and high-efficiency solar cell with nano-antenna structures**, Chunchen Lin, Oleg V. Sulima, Nikolai N. Faleev, Shouyuan Shi, Krishna Swaminathan, Dennis W. Prather, Univ. of Delaware ..... [6890-13]
- 2:20 pm: **Making bulk-conductive glass microchannel plates**, Jay J. Yi, Shanghai Photonic Fiber Engineering, Ltd. (China); Lihong Niu, Shenzhen Univ. (China) ..... [6890-14]
- 2:40 pm: **Realization of a ROIC for 288x4 PV-IR detectors**, Yasar Gurbuz, Huseyin Kayahan, Arzu Ergintav, Omer Ceylan, Ayhan Bozkurt, Sabanci Univ. (Turkey) ..... [6890-15]
- 3:00 pm: **Development of high-speed InGaAs linear array and camera for OCT and machine vision**, Robert Brubakker, Douglas S. Malchow, Kevin Flynn, SUI, Goodrich Corp. .... [6890-16]
- Coffee Break ..... 3:20 to 3:50 pm

### SESSION 4

Room: Conv. Ctr. E ..... Mon. 3:50 to 6:00 pm

#### Lasers and Amplifiers

*Session Chair:* **Robert Dahlgren**, Silicon Valley Photonics, Ltd.

- 3:50 pm: **Bi-doped optical fibers: a new active medium for NIR lasers and amplifiers** (*Invited Paper*), Evgeny M. Dianov, General Physics Institute (Russia) ..... [6890-17]
- 4:20 pm: **281-mW green light emission by frequency doubling of a high-power 1060-nm DBR semiconductor laser diode** (*Invited Paper*), Hong K. Nguyen, Martin H. Hu, Yabo Li, Kechang Song, Nick J. Visovsky, Sean Coleman, Chung-En Zah, Corning Inc. .... [6890-18]
- 4:50 pm: **Single frequency narrow divergence asymmetric photonic molecular laser** (*Invited Paper*), Lei Xu, Fudan Univ. (China) ..... [6890-19]
- 5:20 pm: **Power scaling for narrow linewidth pulsed fiber lasers at around 1.55 um based on highly Er/Yb co-doped phosphate glass fiber**, Wei Shi, Matthew Leigh, Zhidong Yao, Jie Zong, Shibin Jiang, NP Photonics, Inc. .... [6890-20]
- 5:40 pm: **White light and three-color (RGB) generation by upconversion in fluorogermanate glass for solid state three-dimensional displays**, Artur S. Gouveia-Neto, Luciano A. Bueno, Raphael F. Nascimento, Elias da Silva, Valberes B. Nascimento, Ernande B. Costa, Univ. Federal Rural de Pernambuco (Brazil) ..... [6890-21]

## Tuesday 22 January

### OPTO 2008 Plenary Session

Session Chairs: **Ali Adibi**, Georgia Institute of Technology;  
**James G. Grote**, Air Force Research Lab.

Room: Conv. Ctr. A7/A8 · 8:30 to 10:00 am

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Nanophotonics: from Photonic Crystals to Plasmonics**  
(Presentation Only), Eli Yablonovitch, Univ. of California/Berkeley

9:20 am: **Organic "Plastic" Optoelectronic Devices** (Presentation Only),  
Niyazi Serdar Sariciftci, Johannes Kepler Univ. Linz (Austria)

See p. 28 for details.

Coffee Break ..... 10:00 to 10:30 am

### SESSION 5

Room: Conv. Ctr. E ..... Tues. 10:30 to 11:50 am

#### Detector Technologies II

Session Chair: **John W. Glesener**, Northrop Grumman Corp.

10:30 am: **Improvement in light sensitivity of an ultrahigh-speed high-sensitivity CCD with a microlens array**, Tetsuya Hayashida, Hiroshi Ohtake, Jun Yonai, Kazuya Kitamura, Toshiki Arai, Taiichiro Kurita, Kenkichi Tanioka, Hirota Maruyama, Japan Broadcasting Corp. (Japan); Takeharu G. Etoh, Kinki Univ. (Japan); Seiichiro Kitagawa, Kouei Hatade, Takehiko Yamaguchi, Hiroyuki Takeuchi, Nalux Co., Ltd. (Japan); Katsuhiko Iida, Nano Control Co., Ltd. (Japan); Tetsuo Yoshida, Hitachi Kokusai Electric Inc. (Japan); Harry van Kuijk, DALSA Corp. .... [6890-22]

10:50 am: **Single-photon avalanche photodiode with improved structure using an innovative current bias mode scheme**, Yonglin Gu, Fow-Sen Choa, Stewart Wu, Univ. of Maryland/Baltimore County; Xiucheng Wu, AdTech Optics, Inc.; Feng Yan, Univ. of Maryland/Baltimore County; Peter Su, Michael A. Krainak, NASA Goddard Space Flight Ctr. .... [6890-23]

11:10 am: **Ion implantation of B ions into CdHgTe/CdZnTe substrate and determination of optimum optical characteristics for making diode p-n structures in narrow-band-gap semiconductor material CdHgTe/CdZnTe.**, Ruslana S. Udovitska, Genadiy V. Kalisty, Vladimir V. Fedulov, Institute of Semiconductor Physics (Ukraine) .... [6890-24]

11:30 am: **Measuring the reflectance and the internal quantum efficiency of silicon and InGaAs/InP photodiodes in the near-infrared range**, Joaquin Campos Acosta, Consejo Superior de Investigaciones Científicas (Spain); Ana L. Muñoz, Alexandre S. Shcherbakov, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Alicia A. Pons, Consejo Superior de Investigaciones Científicas (Spain) .... [6890-50]

Lunch/Exhibition Break ..... 11:50 am to 1:30 pm

### SESSION 6

Room: Conv. Ctr. E ..... Tues. 1:30 to 4:20 pm

#### Optical Components

Session Chair: **Shibin Jiang**, NP Photonics, Inc.

1:30 pm: **Responsivity modulation of thin-film CdS by means of lock-in technique**, Krishna P. Acharya, Bruno Ullrich, Bowling Green State Univ. .... [6890-26]

1:50 pm: **Ultrafast high-resolution laser beam deflection with an array of electro-optical crystals**, Alexei S. Mikhailov, Yuri Miklyaev, Mikhail M. Ivanenko, Vitalij Lissotschenko, LIMO-Lissotschenko Mikrooptik GmbH (Germany) .... [6890-27]

2:10 pm: **All-optical 4-bit Gray code to binary coded decimal converter**, Young Jin Jung, Seoul National Univ. (South Korea); Seok Lee, Korea Institute of Science and Technology (South Korea); Namkyoo Park, Seoul National Univ. (South Korea) .... [6890-28]

2:30 pm: **Titanium oxide/nickel oxide multilayer reflector for attosecond soft x rays**, Yusuke Masuda, Toshihiko Fujimoto, Hiroshi Kumagai, Ataru Kobayashi, Osaka City Univ. (Japan) .... [6890-29]

Coffee Break ..... 2:50 to 3:20 pm

3:20 pm: **Using highly dispersive fiber for wavelength-tunable true-time delay**, Olukayode K. Okusaga, Univ. of Maryland/Baltimore County; Weimin Zhou, Army Research Lab. .... [6890-30]

3:40 pm: **Broad tuning range filtering system with Optune interferometers**, Nicolae Miron, Roctest Ltd. (Canada) .... [6890-31]

4:00 pm: **Fabrication of holey-fiber-based optical patch cords with bending insensitivity and their feasible reliability**, Young-Geun Han, Hanyang Univ. (South Korea) .... [6890-32]

## Wednesday 23 January

### Posters-Wednesday

Room: Civic Auditorium ..... Wed. 6:00 to 7:30 pm

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

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**Low-temperature luminescence of Er<sup>3+</sup> ions in calcium niobium gallium garnet disordered crystals**, Taiju Tsuboi, Silviu Polosan, Kyoto Sangyo Univ. (Japan); Kiyoshi Shimamura, National Institute for Materials Science (Japan); Hyo Jin Seo, Pukyong National Univ. (South Korea) .... [6890-34]

**All-fiber green amplifier using Er<sup>3+</sup>-doped fluoride fiber**, Guanshi Qin, Tatsuya Yamashita, Yusuke Arai, Takenobu Suzuki, Yasutake Ohishi, Toyota Technological Institute (Japan) .... [6890-35]

**Theoretical characteristics of optical polarizing films using oblique metal island films with distributed island shape**, Kazutaka Baba, Yu Kakinuma, Sendai National College of Technology (Japan) .... [6890-36]

**Photochromic cored fibers**, Bilal A. Alvi, Sir Syed Univ. of Engineering & Technology (Pakistan) .... [6890-37]

**Carbon nanotube-doped tellurite glasses**, Italo O. Mazali, Enver F. Chillce, Eugenio Rodriguez, Gilberto J. Jacob, Oswaldo L. Alves, Carlos L. César, Luiz C. Barbosa, Univ. Estadual de Campinas (Brazil) .... [6890-38]

**Simultaneous 853-nm + 1533-nm amplification and wavelength conversion between 1533-nm and 853-nm in Er<sup>3+</sup>-doped fluoride fiber**, Guanshi Qin, Yasutake Ohishi, Toyota Technological Institute (Japan) .... [6890-39]

**Spectral tag method for enhancing FBG multiplexing capability**, S. J. Baik, J. Y. Son, G. J. Kim, K. S. Lee, D. Y. Park, K. S. Choi, J. S. Youn, J. M. Kim, Y. S. Kim, K. Im, Chonnam National Univ. (South Korea) .... [6890-40]

**Fabrication of patterned mirror modules for generating laser line beams**, Changyun Lee, Taegyung Kim, Sansyu Hong, Baekyun Kim, SAMSUNG Electro-Mechanics Co., Ltd. (South Korea) .... [6890-41]

**Photoluminescence and Raman scattering from Er-implanted InGaAs**, Tomoyuki Arai, Shin-ichiro Uekusa, Meiji Univ. (Japan); Kyoichi Kinoshita, Japan Aerospace Exploration Agency (Japan) .... [6890-42]

**Optical properties of Yb-doped laser fibers in dependence on codopants and preparation conditions**, Sonja Unger, Anka Schwuchow, Sylvia Jetschke, Volker Reichel, Johannes Kirchhof, Institut für Photonische Technologien e.V. (Germany) .... [6890-43]

**Preparing of nanocrystalline PbS thin films by chemical bath deposition (CBD)**, Dara Jamshidi Kalantari, K.N. Toosi Univ. of Technology (Iran); Anahita Goshtasbi, Islamic Azad Univ. (Iran) .... [6890-44]

**Potential dynamic range in a scheme of the acousto-optical spectrometer providing light beam apodization for a large-aperture crystalline cell with linear acoustic losses**, Alexandre S. Shcherbakov, Abraham Luna-Castellanos, Eduardo Tepichin-Rodriguez, Sandra E. Balderas-Mata, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) .... [6890-45]

**Erbium-doped photo-thermo-refractive glass**, Nikolay V. Nikonov, Viktor A. Tsekhomsky, Alexander I. Ignatiev, Vladimir A. Aseev, St. Petersburg Institute of Fine Mechanics and Optics (Russia) .... [6890-46]

- Nitrogen-ion-implanted planar optical waveguides in Er-doped tellurite,** István Bányász, Magyar Tudományos Akadémia Szilárdtestfizikai és Optikai (Hungary); Simone Berneschi, Istituto di Fisica Applicata Nello Carrara (Italy); Miklós Fried, Magyar Tudományos Akadémia Szilárdtestfizikai és Optikai (Hungary); Ilaria Cacciari, Istituto di Fisica Applicata Nello Carrara (Italy); Tivadar Lohner, Research Institute for Technical Physics and Materials Science (Hungary); Gualtiero Nunzi-Conti, Istituto di Fisica Applicata Nello Carrara (Italy); Ferenc Pászti, Research Institute for Technical Physics and Materials Science (Hungary); Stefano Pelli, Giancarlo C. Righini, Istituto di Fisica Applicata Nello Carrara (Italy); Andrea Watterich, Magyar Tudományos Akadémia Szilárdtestfizikai és Optikai (Hungary); Zsolt Zolnai, Research Institute for Technical Physics and Materials Science (Hungary). . . . . [6890-47]
- Fabrication of fs laser-assisted optical self-writing waveguide,** Cai Bin, Kyoji Komatus, Sugihara Okihiro, Kaino Toshikuni, Tohoku Univ. (Japan); Kagami Manabu, Tsuchimori Masaaki, Matusi Takayuki, Toyota Central Research and Development Labs., Inc. (Japan). . . . . [6890-48]
- Robust automotive sensors,** Cliff G. M.De Loch, Melexis Microelectronic Systems (Belgium). . . . . [6890-49]
- GaN metal-semiconductor-metal ultraviolet photodetectors with Schottky contacts of rare-earth metal oxides,** Jong-Lam Lee, Jun Ho Son, Gwan Ho Jung, Pohang Univ. of Science and Technology (South Korea); Jong Kyu Kim, Rensselaer Polytechnic Institute . . . . . [6890-51]
- Spectroscopic studies and AFM analysis of Er<sup>3+</sup>-doped yttrium oxide nanoparticles,** Darayas N. Patel, Christopher C. Perry, Oakwood College . . . . . [6890-52]

**Make time for the  
Photonics West Exhibition**  
*San Jose Convention Center, Exhibition Halls 1-3,  
Exhibition Foyer and South Halls 1-2*

Tuesday 22 January . . . . . 10:00 am to 5:00 pm  
Wednesday 23 January . . . . . 10:00 am to 5:00 pm  
Thursday 24 January. . . . . 10:00 am to 4:00 pm

**See new applications in action at the  
Product Demonstrations.**  
*See pp. 37-39 for details.*



## Organic Photonic Materials and Devices X

*Conference Chairs:* **Robert L. Nelson**, Air Force Research Lab.; **Francois Kajzar**, Univ. d'Angers (France); **Toshikuni Kaino**, Tohoku Univ. (Japan)

*Conference Co-Chair:* **Nakjoong Kim**, Hanyang Univ. (South Korea)

*Program Committee:* **Chantal Andraud**, Ecole normale supérieure de Lyon (France); **Werner J. Blau**, The Univ. of Dublin, Trinity College (Ireland); **Sophie Brasselet**, Ecole normale supérieure de Cachan (France); **Christoph Bubeck**, Max-Planck-Institut für Polymerforschung (Germany); **Darnell E. Diggs**, Air Force Research Lab.; **Alain F. Fort**, Institut de Physique et Chimie des Matériaux de Strasbourg (France); **James G. Grote**, Air Force Research Lab.; **Makoto Hikita**, NTT Advanced Technology Corp. (Japan); **F. Kenneth Hopkins**, Air Force Research Lab.; **Alex K. -Y. Jen**, Univ. of Washington; **Junji Kido**, Yamagata Univ. (Japan); **Jang-Joo Kim**, Seoul National Univ. (South Korea); **Isabelle N. Ledoux-Rak**, Ecole normale supérieure de Cachan (France); **Charles Y. C. Lee**, Air Force Office of Scientific Research; **Kwang-Sup Lee**, Hannam Univ. (South Korea); **Misoon Mah**, Air Force Research Lab.; **Seth R. Marder**, Georgia Institute of Technology; **Robert A. Norwood**, College of Optical Sciences/The Univ. of Arizona; **Jean-Michel Nunzi**, Queens Univ. (Canada); **Susanna Orlic**, Technische Univ. Berlin (Germany); **Ileana Rău**, Politehnica Univ. Bucharest (Romania); **Devanand K. Shenoy**, Defense Advanced Research Projects Agency; **Kenneth D. Singer**, Case Western Reserve Univ.; **Don J. Smith**, U.S. Air Force (United Kingdom); **Rebecca E. Taylor**, Lockheed Martin Corp.; **Toshiyuki Watanabe**, Sumiden Opcom (Japan); **Jeong-Weon Wu**, Ewha Womans Univ. (South Korea)

### Tuesday 22 January

#### OPTO 2008 Plenary Session

*Session Chairs:* **Ali Adibi**, Georgia Institute of Technology;  
**James G. Grote**, Air Force Research Lab.

*Room:* Conv. Ctr. A7/A8 · 8:30 to 10:00 am

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Nanophotonics: from Photonic Crystals to Plasmonics** (*Presentation Only*), Eli Yablonovitch, Univ. of California/Berkeley

9:20 am: **Organic "Plastic" Optoelectronic Devices** (*Presentation Only*), Niyazi Serdar Sariciftci, Johannes Kepler Univ. Linz (Austria)

See p. 28 for details.

Coffee Break ..... 10:00 to 10:30 am

#### SESSION 1

**Room: Marriott Hotel:**  
**San Jose Ballroom Salon II ..... Tues. 10:30 am to 12:15 pm**

##### Multiphoton Absorption

*Session Chair:* **Robert L. Nelson**, Air Force Research Lab.

10:30 am: **Two-photon 3D stereolithography (Keynote)**, Kwang-Sup Lee, Hannam Univ. (South Korea) ..... [6891-01]

11:10 am: **Two-photon absorption from the visible to the infra-red for optical limiting and biological imaging** (*Invited Paper*), Cyril Barsu, Camille Girardot, Pierre-Antoine Bouit, Alexandre Picot, Anthony D'Aléo, Yann Bretonnière, Gilles Lemerrier, Olivier Maury, Chantal Andraud, Ecole Normale Supérieure de Lyon (France) ..... [6891-02]

11:35 am: **Two-photon absorption in cross-shaped chromophores with phenylene-vinylene backbones**, Mariacristina Rumi, Georgia Institute of Technology; Stephanie J. K.Pond, The Univ. of Arizona; Joseph W. Perry, Georgia Institute of Technology; Timo Meyer-Friedrichsen, Qing Zhang, Maximilienne Bishop, Yadong Zhang, The Univ. of Arizona; Stephen Barlow, Seth R. Marder, Georgia Institute of Technology ..... [6891-03]

11:55 am: **Two-photon absorption standards in the 550-1600-nm excitation range**, Nikolay S. Makarov, Mikhail A. Drobizhev, Aleksander Rebane, Montana State Univ./Bozeman. .... [6891-04]

Lunch/Exhibition Break ..... 12:15 to 1:30 pm

#### SESSION 2

**Room: Marriott Hotel: San Jose Ballroom Salon II ... Tues. 1:30 to 3:00 pm**

##### Nonlinear Optics

*Session Chair:* **Ileana Rău**, Univ. Politehnica Bucuresti (Romania)

1:30 pm: **Novel nonlinear optical polymers and their applications in information technology** (*Invited Paper*), Robert A. Norwood, Nasser N. Peyghambarian, College of Optical Sciences/The Univ. of Arizona ... [6891-05]

1:55 pm: **Molecular self-assembly and controlled lattice hardening for electro-optic coefficients beyond 450 pm/V** (*Invited Paper*), Alex K. Y. Jen, Univ. of Washington ..... [6891-06]

2:20 pm: **On the importance of rotational contribution in NLO properties characterization**, Francois Kajzar, Univ. d'Angers (France); Ileana Rau, Politehnica Univ. Bucharest (Romania); Georges Boudebs, Adeline Humeau, Univ. d'Angers (France) ..... [6891-07]

2:40 pm: **Photostability of nonlinear optical polymers**, Sebastiaimpillai G. Raymond, Delower Bhuiyan, Hongsheng Wang, Andrew M. R. Beaudin, Andrew J. Kay, Industrial Research Ltd. (New Zealand) ..... [6891-08]

Coffee Break ..... 3:00 to 3:30 pm

#### SESSION 3

**Room: Marriott Hotel: San Jose Ballroom Salon II ... Tues. 3:30 to 5:20 pm**

##### Materials

*Session Chair:* **François Kajzar**, Univ. d'Angers (France)

3:30 pm: **Monte Carlo kinetic study of chromophore distribution in poled guest-host system** (*Invited Paper*), Antoni C. Mitus, Grzegorz Pawlik, Politehnica Wroclawska (Poland); Ileana Rau, Politehnica Univ. Bucharest (Romania); Francois Kajzar, Univ. d'Angers (France); Chantal Andraud, Ecole Normale Supérieure de Lyon (France) ..... [6891-16]

3:55 pm: **Relaxation study on organic thin films for optoelectronics applications** (*Invited Paper*), Ileana Rău, Politehnica Univ. Bucharest (Romania) ..... [6891-10]

4:20 pm: **Optical properties of novel octaazapthalocyanine derivative**, Hacene Manaa, Abdalla Almolla, Saad Makhseed, Fadi Ibrahim, Kuwait Univ. (Kuwait) ..... [6891-11]

4:40 pm: **Optical properties of calixarene polymers**, Taeho Kim, Kyoji Komatsu, Okihito Sugihara, Toshikuni Kaino, Tohoku Univ. (Japan); Hiroto Kudo, Tadatomi Nishikubo, Kanagawa Univ. (Japan) ..... [6891-12]

5:00 pm: **Microemulsion: a new method for functionalization of materials for optical applications**, Maria Mihaly, Aurelia Meghea, Univ. Politehnica Bucuresti (Romania); Ileana Rau, Politehnica Univ. Bucharest (Romania) ..... [6891-13]

**Wednesday 23 January**

**SESSION 4**

**Room: Marriott Hotel:  
San Jose Ballroom Salon II . . . . . Wed. 8:30 to 10:00 am**

**Applications**

*Session Chair: Toshikuni Kaino, Tohoku Univ. (Japan)*

8:30 am: **90-degree-bent with R=1mm optical fiber technique for optical interconnection** (*Invited Paper*), Masahiro Morimoto, The Furukawa Electric Co., Ltd. (Japan) . . . . . [6891-46]

8:55 am: **Development of an optically gated optical switch using organic dye: apply to local telecommunication technology** (*Invited Paper*), Takashi Hiraga, Ichiro Ueno, National Institute of Advanced Industrial Science and Technology (Japan); Hiroshi Nagaeda, Noriyasu Shiga, Trimatiz, Ltd. (Japan); Hirofumi Watanabe, Shiroh Futaki, Inter Energy Co., Ltd. (Japan); Norio Tanaka, Dainichiseika Color & Chemicals Manufacturing Co., Ltd. (Japan) . . . . . [6891-15]

9:20 am: **Optical information recording in biopolymer-based material**, Jaroslaw Mysliwiec, Anna Kochalska, Andrzej Miniewicz, Politechnika Wroclawska (Poland) . . . . . [6891-09]

9:40 am: **Optical limiting properties of single-walled carbon nanotube dispersions in amide solvents**, Jun Wang, Werner J. Blau, Trinity College Dublin (Ireland) . . . . . [6891-17]

Coffee Break . . . . . 10:00 to 10:20 am

**SESSION 5**

**Room: Marriott Hotel:  
San Jose Ballroom Salon II . . . . . Wed. 10:20 am to 12:10 pm**

**Bio- and Nanomaterials**

*Session Chair: Kwang-Sup Lee, Hannam Univ. (South Korea)*

10:20 am: **Advanced design of opto-electronic systems for enhanced performance and economic feasibility (Keynote)**, Dennis W. Prather, Univ. of Delaware . . . . . [6891-18]

11:00 am: **Biopolymer-based materials for photonics and electronics** (*Invited Paper*), James G. Grote, Air Force Research Lab. . . . . [6891-19]

11:25 am: **A surface-mediated bonding for rational design of molecular self-assemblies: toward nanophotonics** (*Invited Paper*), David Bléger, David Kreher, Fabrice Mathevet, André-Jean Attias, Univ. Pierre et Marie Curie (France); Guillaume Schull, Ludovic Douillard, Céline Fiorini, Fabrice Charra, Commissariat à l'Energie Atomique (France) . . . . . [6891-20]

11:50 am: **Thermo-optic coefficients of hybrid polymer with titanium dioxide nanoparticles**, Yu Kurata, Masamichi Tokutake, Kyoji Komatsu, Okihiro Sugihara, Tohoku Univ. (Japan); Nobuyuki Kambe, NanoGram Corp.; Toshikuni Kaino, Tohoku Univ. (Japan) . . . . . [6891-21]

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

**SESSION 6**

**Room: Marriott Hotel: San Jose Ballroom Salon II . . . Wed. 1:30 to 3:00 pm**

**Optical Waveguide**

*Session Chair: Robert A. Norwood,  
College of Optical Sciences/The Univ. of Arizona*

1:30 pm: **Polymer-based long-range surface plasmon polariton waveguides for flexible O-PCB applications** (*Invited Paper*), Myung-Hyun Lee, Sungkyunkwan Univ. (South Korea) . . . . . [6891-47]

1:55 pm: **Recent progress of polymer optical waveguides** (*Invited Paper*), Junya Kobayashi, Nippon Telegraph and Telephone Corp. (Japan) . . . [6891-23]

2:20 pm: **Thermally stable multimode polymer optical waveguide fabricated by single-step photo-patterning of fluorinated polyimide/epoxy composites**, Yuichi Urano, Ningjuan Chen, Tokyo Institute of Technology (Japan); Kaichiro Nakano, Katsumi Maeda, NEC Corp. (Japan); Shinji Ando, Tokyo Institute of Technology (Japan) . . . . . [6891-24]

2:40 pm: **Polysilane-based 3D waveguides for optical interconnects**, Kohei Ogura, Takeshi Oka, Emi Watanabe, Kazunori Aoi, Hiroshi Tsushima, Nippon Paint Co., Ltd. (Japan); Hiroaki Okano, Shuji Suzuki, Hirose Electric Co., Ltd. (Japan); Seiki Hiramatsu, Mitsubishi Electric Corp. (Japan) . . . . . [6891-25]

Coffee Break . . . . . 3:00 to 3:30 pm

**SESSION 7**

**Room: Marriott Hotel: San Jose Ballroom Salon II . . . Wed. 3:30 to 5:40 pm**

**Miscellaneous**

*Session Chair: Andrzej Mitus, Politechnika Wroclawska (Poland)*

3:30 pm: **Polymer slab waveguides for cubic nonlinear optics** (*Invited Paper*), Christoph Bubeck, Max-Planck-Institut für Polymerforschung (Germany); Ayi Bahtiar, Univ. Padjadjaran (Indonesia); Taek Ahn, Korea Research Institute of Chemical Technology (South Korea); Hans-Heinrich Hoerhold, Friedrich-Schiller-Univ. Jena (Germany); Kaloian Koynov, Max-Planck-Institut für Polymerforschung (Germany) . . . . . [6891-26]

3:55 pm: **Novel polarizer based on fiber/resin composites for liquid crystal displays** (*Invited Paper*), Toshiyuki Watanabe, Kenro Totani, Hideki Hayashi, Tokyo Univ. of Agriculture and Technology (Japan) . . . . . [6891-27]

4:20 pm: **Transparent conductive electrode for organic light-emitting diode fabricated at room temperature**, Xuejun Lu, Univ. of Massachusetts/Lowell; Xuliang Han, Brewer Science, Inc. . . . . [6891-28]

4:40 pm: **Effect of ionizing radiation on infrared polarizers based on conductive polymer**, Robert Boye, Cody M. Washburn, Sandia National Labs.; Sally Samora, L&M Technologies, Inc.; Shanayn A. Kemme, David R. Wheeler, Daniel Buller, Sandia National Labs. . . . . [6891-29]

5:00 pm: **HRTEM analysis of bulk heterojunction morphologies with novel solvation**, Richard M. Beal, Alexandros Stavrinadis, Jason Smith, Hazel E. Assender, Andrew A. R.Watt, Univ. of Oxford (United Kingdom) . . . . . [6891-30]

5:20 pm: **Interface modification of photo-aligned polyimide films**, Dong Myung Shin, Hong-ik Univ. (South Korea) . . . . . [6891-31]

**Posters-Wednesday**

**Room: Civic Auditorium. . . . . Wed. 6:00 to 7:30 pm**

*All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.*

*Poster presenters may post their poster papers Wednesday morning starting at 10:00 am in the Civic Auditorium, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.*

**Characterization of polymer amplifier with large core fabricated using a dye vapor**, Hiroyuki Mochizuki, Toshiko Mizokuro, Kensuke Murai, National Institute of Advanced Industrial Science and Technology (Japan) . . . . . [6891-41]

**Improved photovoltaic effect of energy transfer-based organic solar cells by water-soluble polythiophene**, Jihua Yang, Thuc-Quyen T. Nguyen, Univ. of California/Santa Barbara . . . . . [6891-42]

**Electro-optic polymer composite materials**, Robert L. Nelson, Air Force Research Lab. . . . . [6891-44]

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# Conference 6891

## Thursday 24 January

### SESSION 8

Room: Marriott Hotel:  
San Jose Ballroom Salon II ..... Thurs. 8:15 to 10:00 am

#### Active Materials

Session Chair: **James G. Grote**, Air Force Research Lab.

8:15 am: **Hybrid polymer-based waveguide amplifiers for optical telecommunications** (*Invited Paper*), Isabelle N. Ledoux-Rak, Laurent Badie, Anh Quoc Le Quang, Chi Thanh Nguyen, Joseph Zyss, Ecole Normale Supérieure de Cachan (France); Ariel Kigel, Efrat Lifshitz, Technion-Israel Institute of Technology (Israel) ..... [6891-32]

8:40 am: **Luminescent plastic waveguides and microlasers**, Martin Djiango, Takeyuki Kobayashi, Werner J. Blau, Trinity College Dublin (Ireland); Bin Cai, Kyoji Komatsu, Toshikuni Kaino, Tohoku Univ. (Japan) ..... [6891-33]

9:00 am: **Fabrication and evaluation of all-optical 1\_2 Y-branch waveguide switch using photochromic amorphous molecular materials**, Yoshihiko Narisawa, Kyoji Komatsu, Okihiko Sugihara, Tohoku Univ. (Japan); Takahiro Tanino, Hideyuki Nakano, Osaka Univ. (Japan); Yasuyuki Shirota, Fukui Univ. of Technology (Japan); Toshikuni Kaino, Tohoku Univ. (Japan) ..... [6891-34]

9:20 am: **High-sensitivity chemical vapor sensor based on carbon nanotube networks**, Xuejun Lu, Univ. of Massachusetts/Lowell; Xuliang Han, Brewer Science, Inc. .... [6891-35]

9:40 am: **Transient and steady-state photoconductivity of pentacene thin films**, Jianbo Gao, Frank A. Hegmann, Univ. of Alberta (Canada) .... [6891-36]

Coffee Break ..... 10:00 to 10:30 am

### SESSION 9

Room: Marriott Hotel:  
San Jose Ballroom Salon II ..... Thurs. 10:30 am to 12:40 pm

#### Nanomaterials

Session Chair: **Christoph Bubeck**,  
Max-Planck-Institut für Polymerforschung (Germany)

10:30 am: **Laser fabrication and crystallization of nano materials (Keynote)** (*Invited Paper*), Hiroshi M. Masuhara, Hamano Life Science Research Foundation (Japan) ..... [6891-37]

11:10 am: **Gold and silver nanospheres doped liquids and liquid crystals for all-time-scale passive optical switching applications** (*Invited Paper*), Iam Choon Khoo, The Pennsylvania State Univ. .... [6891-38]

11:35 am: **Applications of organic nanocrystals fabricated by the reprecipitation method** (*Invited Paper*), Hitoshi Kasai, Tohoku Univ. (Japan) ..... [6891-39]

12:00 pm: **Surface plasmon resonance properties of ordered arrays of hybrid nanostructured materials fabricated by self-assembly processes**, Dong Ha Kim, Wen Bo Zhao, Ewha Womans Univ. (South Korea); Juan Peng, Wolfgang Knoll, Max-Planck-Institut für Polymerforschung (Germany) [6891-40]

12:20 pm: **Nanoscale characterization of the surface-enhanced Raman effect of silver-silicon nanocomposite materials**, Christopher C. Perry, Darayas N. Patel, Oakwood College; James Mitchell, Howard Univ... [6891-45]

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# Ultrafast Phenomena in Semiconductors and Nanostructure Materials XII

Conference Chair: **Jin-Joo Song**, Univ. of California/San Diego; **Kong-Thon Tsen**, Arizona State Univ.

Conference Co-Chair: **Markus Betz**, Technische Univ. of München (Germany); **Abdulkhakem Y. Elezzabi**, Univ. of Alberta (Canada)

Program Committee: **Serge Bidnyk**, Enablence Inc. (Canada); **Majed Chergui**, Ecole Polytechnique Fédérale de Lausanne (Switzerland); **David S. Citrin**, Georgia Institute of Technology; **Yujie J. Ding**, Lehigh Univ.; **Arthur J. Fischer**, Sandia National Labs.; **Jan A. Gaj**, Univ. of Warszawski (Poland); **Harald W. Giessen**, Univ. of Stuttgart (Germany); **Costas P. Grigoropoulos**, Univ. of California/Berkeley; **Robert A. Kaindl**, Lawrence Berkeley National Lab.; **Dai-sik Kim**, Seoul National Univ. (South Korea); **Christoph Lienau**, Carl von Ossietzky Univ. of Oldenburg (Germany); **Torsten Meier**, Univ. of Paderborn (Germany); **Evgenii E. Narimanov**, Purdue Univ.; **Janet L. Pan**, Yale Univ.; **Chi-Kuang Sun**, National Taiwan Univ. (Taiwan); **Fabrice Vallee**, Univ. of Bordeaux I (France); **Chih-Chung Yang**, National Taiwan Univ. (Taiwan)

## Sunday 20 January

### SESSION 1

Room: Marriott Hotel: San Jose Ballroom Salon V . . . . Sun. 8:00 to 9:52 am

#### Carrier and Exciton Dynamics I

Session Chairs: **Markus Betz**, Technische Univ. München (Germany); **Yujie J. Ding**, Lehigh Univ.

8:00 am: **Multidimensional snapshots of electron dynamics and couplings in semiconductors** (*Invited Paper*), Xiaoqin Li, The Univ. of Texas at Austin; Tianhao Zhang, Univ. of Colorado at Boulder; Alan Bristow, Colorado State Univ.; Steven T. Cundiff, Univ. of Colorado at Boulder; Richard P. Mirin, National Institute of Standards and Technology . . . . . [6892-01]

8:28 am: **Exciton qubits: from Rabi oscillations toward optoelectronic quantum gates** (*Invited Paper*), Artur Zrenner, Stefan Stuffer, Patrik Ester, Steffen Michaelis de Vasconcellos, Marc C. Huebner, Lydia Lackmann, Univ. Paderborn (Germany); Max Bichler, Walter Schottky Institute (Germany) . . . . . [6892-02]

8:56 am: **Spontaneous buildup of a phase-locked zero-state and pi-state in an array exciton-polariton condensates** (*Invited Paper*), Chih-Wei Lai, Yoshi Yamamoto, Stanford Univ. . . . . [6892-03]

9:24 am: **Ultrafast piezospectroscopy in semiconductor nanostructures** (*Invited Paper*), Andrey V. Akimov, Alexey Scherbakov, A.F. Ioffe Physico-Technical Institute (Russia); Thorsten Berstermann, Dmitri Yakovlev, Manfred Bayer, Univ. Dortmund (Germany) . . . . . [6892-04]

Coffee Break . . . . . 9:52 to 10:15 am

### SESSION 2

Room: Marriott Hotel: San Jose Ballroom Salon V . . Sun. 10:15 to 11:59 am

#### Phonons

Session Chair: **Kong-Thon Tsen**, Arizona State Univ.; **Thomas Dekorsy**, Univ. of Konstanz (Germany)

10:15 am: **Dynamics of LO phonons in InN studied by subpicosecond time-resolved Raman spectroscopy** (*Invited Paper*), Kong-Thon Tsen, Arizona State Univ.; Juliann G. Kiang, Armed Forces Radiobiology Research Institute; D. K. Ferry, Arizona State Univ. . . . . [6892-05]

10:43 am: **Quantum confinement effects on the optical phonons of PbTe quantum dots in telluride glasses**, Gilberto J. Jacob V.D.M., Eugenio Gimenes, Luiz C. Barbosa, Carlos L. Cesar, Univ. Estadual de Campinas (Brazil) . . . . . [6892-06]

11:03 am: **Hot phonon effects from GaN films to high-electron mobility transistors** (*Invited Paper*), Yujie J. Ding, Lehigh Univ. . . . . [6892-07]

11:31 am: **Theory of electron-phonon interactions on nanoscales: semiconductor surfaces and two dimensional electron gases** (*Invited Paper*), Andreas Knorr, Norbert Bücking, Stefan Butscher, Marten Richter, Technische Univ. Berlin (Germany); Peter Kratzer, Matthias Scheffler, Fritz-Haber-Institut der Max-Planck-Gesellschaft (Germany) . . . . . [6892-08]

Lunch Break . . . . . 11:59 am to 1:20 pm

### SESSION 3

Room: Marriott Hotel: San Jose Ballroom Salon V . . . . Sun. 1:20 to 3:40 pm

#### Nanostructures and Nanophotonics I

Session Chairs: **Majed Chergui**, Ecole Polytechnique Fédérale de Lausanne (Switzerland); **Andreas Knorr**, Technische Univ. Berlin (Germany)

1:20 pm: **Optical spectroscopy and dynamics in carbon nanotubes** (*Invited Paper*), Tony F. Heinz, Columbia Univ. . . . . [6892-09]

1:48 pm: **Ultrafast spectroscopy on photonic metamaterials** (*Invited Paper*), Martin Wegener, Univ. Karlsruhe (Germany); Costas M. Soukoulis, Iowa State Univ.; Stefan Linden, Univ. Karlsruhe (Germany) . . . . . [6892-10]

2:16 pm: **Ultrafast dynamic control of the Q factor in a photonic crystal nanocavity** (*Invited Paper*), Susumu Noda, Yoshinori Tanaka, Takashi Asano, Kyoto Univ. (Japan) . . . . . [6892-11]

2:44 pm: **Resonant tunnelling diodes beyond quasi-bound-state lifetime limit** (*Invited Paper*), Michael Feiginov, Dibakar Roy Chowdhury, Technische Univ. Darmstadt (Germany) . . . . . [6892-12]

3:12 pm: **Coherent acoustic phonons in nanostructures** (*Invited Paper*), Thomas Dekorsy, Univ. of Konstanz (Germany) . . . . . [6892-13]

Coffee Break . . . . . 3:40 to 4:00 pm

### SESSION 4

Room: Marriott Hotel: San Jose Ballroom Salon V . . . . Sun. 4:00 to 5:52 pm

#### Nanostructures and Nanophotonics II

Session Chair: **Martin Wegener**, Forschungszentrum Karlsruhe (Germany); **Artur Zrenner**, Univ. Paderborn (Germany)

4:00 pm: **Ultrafast spectroscopy of multiexcitons in nanocrystal quantum dots in relation to lasing and solar-energy conversion** (*Invited Paper*), Victor I. Klimov, Los Alamos National Lab. . . . . [6892-14]

4:28 pm: **Ultrafast spectroscopy of quantum dots and devices** (*Invited Paper*), Jordi Gomis, Sabine Dommers, Vasily V. Temnov, Ulrike Woggon, Univ. Dortmund (Germany) . . . . . [6892-15]

4:56 pm: **Sub-picosecond polychromatic photoluminescence studies of CdSe and PbSe nanodots** (*Invited Paper*), Majed Chergui, Camilla Bonati, Andrea Cannizzo, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [6892-16]

5:24 pm: **Ultrafast processes in metal-dielectric and metal-semiconductor nanostructures** (*Invited Paper*), Mark I. Stockman, Georgia State Univ. . . . . [6892-17]

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# Conference 6892

## Monday 21 January

### SESSION 5

Room: Marriott Hotel: San Jose Ballroom Salon V . . Mon. 8:00 to 10:04 am

#### Nanostructures and Nanophotonics III

Session Chairs: **Fabrice Vallee**, Univ. Claude Bernard Lyon 1 (France); **Jacek Kasprzak**, Cardiff Univ. (United Kingdom)

8:00 am: **From cells to embryos: the application of femtosecond laser pulses for altering cellular material in complex biological systems** (*Invited Paper*), Vikram Kohli, Abdulhakem Y. Elezzabi, Univ. of Alberta (Canada) . . . . . [6892-18]

8:28 am: **Ultrafast response of semiconductor nanocrystals to high-photon energy absorption: multiexcitons from a single photon** (*Invited Paper*), Richard D. Schaller, Milan Sykora, Jeffrey M. Pietryga, Victor I. Klimov, Los Alamos National Lab. . . . . [6892-19]

8:56 am: **Time-resolved acoustic vibration of metal nano-objects: ensemble and single particle**, Natalia Del Fatti, Fabrice Vallee, Univ. Claude Bernard Lyon 1 (France). . . . . [6892-20]

9:16 am: **Optical switching and femtosecond dynamics in composite metal-vanadium dioxide nanostructures** (*Invited Paper*), Richard F. Haglund, Jr., Eugene U. Donev, Leonard C. Feldman, Vanderbilt Univ.; René Lopez, Univ. of North Carolina/Chapel Hill; Jae Yong Suh, Vanderbilt Univ. . . . . [6892-21]

9:44 am: **Novel approach to polariton-polariton interactions and its application to semiconductor microcavities**, Marc-André Dupertuis, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Monique Combescot, Odile Betbeder-Matibet, Univ. Pierre et Marie Curie (France) . . . . . [6892-22]

Coffee Break . . . . . 10:04 to 10:30 am

### SESSION 6

Room: Marriott Hotel:  
San Jose Ballroom Salon V . . . . . Mon. 10:30 am to 12:22 pm

#### Spins and Spintronics

Session Chairs: **Stephan W. Koch**, Philipps-Univ. Marburg (Germany); **Martin Aeschlimann**, Univ. Kaiserslautern (Germany)

10:30 am: **Optical control of electron spin coherence in semiconductor quantum wells** (*Invited Paper*), Hailin Wang, Univ. of Oregon . . . . . [6892-23]

10:58 am: **Femtosecond opto-magnetism** (*Invited Paper*), Alexey Kimel, Radboud Univ. Nijmegen (Netherlands) . . . . . [6892-24]

11:26 am: **Ultrafast enhancement of ferromagnetism via photoexcited holes in a (III,Mn)V semiconductor** (*Invited Paper*), Jigang Wang, Ingrid Cotoros, Daniel Chemla, Lawrence Berkeley National Lab. and Univ. of California/Berkeley; Xinyu Liu, Jacek K. Furdyna, Univ. of Notre Dame . . . . . [6892-25]

11:54 am: **Spinplasmonics** (*Invited Paper*), Abdulhakem Y. Elezzabi, Corey A. Baron, Univ. of Alberta (Canada); Mark Johnson, Naval Research Lab. [6892-26]

Lunch Break . . . . . 12:22 to 1:45 pm

### SESSION 7

Room: Marriott Hotel: San Jose Ballroom Salon V . . Mon. 1:45 to 3:39 pm

#### Special Topics I

Session Chair: **Abdulhakem Y. Elezzabi**, Univ. of Alberta (Canada); **John M. Zavada**, U.S. Army Research Office

1:45 pm: **Active plasmonic components and metamaterials (Keynote)** (*Invited Paper*), Harry A. Atwater, Jr., California Institute of Technology [6892-27]

2:15 pm: **Attosecond nonlinear optics by high-order harmonics** (*Invited Paper*), Katsumi Midorikawa, The Institute of Physical and Chemical Research (RIKEN) (Japan) . . . . . [6892-28]

2:43 pm: **Excitons and many-electron effects in the optical response of one-dimensional nanostructures: tubes, wires, and ribbons** (*Invited Paper*), Steven G. Louie, Univ. of California/Berkeley and Lawrence Berkeley National Lab. . . . . [6892-29]

3:11 pm: **Plasmon-enhanced spectroscopy of single organic semiconductor molecules** (*Invited Paper*), John M. Lupton, The Univ. of Utah. . . . . [6892-30]

Coffee Break . . . . . 3:39 to 4:00 pm

### SESSION 8

Room: Marriott Hotel: San Jose Ballroom Salon V . . . Mon. 4:00 to 5:52 pm

#### Nanostructures and Nanophotonics IV

Session Chairs: **Chi-Kuang Sun**, National Taiwan Univ. (Taiwan); **Steven G. Louie**, Univ. of California/Berkeley

4:00 pm: **Adaptive subwavelength control of nano-optical fields** (*Invited Paper*), Michael K. Bauer, Univ. of Kiel (Germany) . . . . . [6892-31]

4:28 pm: **Ultrafast spectroscopy of a single metal nanoparticle** (*Invited Paper*), Fabrice Vallee, Univ. Claude Bernard Lyon 1 (France) . . . . . [6892-32]

4:56 pm: **Subwavelength discrete solitons in nonlinear metamaterials** (*Invited Paper*), Xiang Zhang, Yongmin Liu, Dentcho A. Genov, Univ. of California/Berkeley; Guy Bartal, Trellis Photonics Ltd. (Israel) . . . . . [6892-33]

5:24 pm: **Ultrafast nonlinear spectroscopy of individual quantum dots: imaging and coherent coupling** (*Invited Paper*), Jacek Kasprzak, Cardiff Univ. (United Kingdom); Brian Patton, Univ. of Oxford (United Kingdom); Wolfgang Langbein, Cardiff Univ. (United Kingdom). . . . . [6892-34]

## Tuesday 22 January

### OPTO 2008 Plenary Session

Session Chairs: **Ali Adibi**, Georgia Institute of Technology; **James G. Grote**, Air Force Research Lab.

Room: Conv. Ctr. A7/A8 · 8:30 to 10:00 am

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Nanophotonics: from Photonic Crystals to Plasmonics** (*Presentation Only*), Eli Yablonovitch, Univ. of California/Berkeley

9:20 am: **Organic "Plastic" Optoelectronic Devices** (*Presentation Only*), Niyazi Serdar Sariciftci, Johannes Kepler Univ. Linz (Austria)

See p. 28 for details.

Coffee Break . . . . . 10:00 to 10:30 am

### SESSION 9

Room: Marriott Hotel:  
San Jose Ballroom Salon V . . . . . Tues. 10:20 am to 12:12 pm

#### Special Topics II

Session Chairs: **Jin-Joo Song**, Univ. of California/San Diego; **Tony F. Heinz**, Columbia Univ.

10:20 am: **AFOSR electronics and photonics activities** (*Invited Paper*), Donald J. Silversmith, Air Force Office of Scientific Research . . . . . [6892-35]

10:48 am: **ONR nanoelectronics overview** (*Invited Paper*), Chagaan Baatar, Office of Naval Research. . . . . [6892-36]

11:16 am: **Optical and magnetic properties of GaMnN and GaErN thin films** (*Invited Paper*), John M. Zavada, U.S. Army Research Office; Neeraj Nepal, North Carolina State Univ. . . . . [6892-37]

11:44 am: **Kinetics of polariton Bose-Einstein condensation: toward a thermal equilibrium polariton quantum fluid** (*Invited Paper*), Vincenzo Savona, Davide Sarchi, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [6892-38]

Lunch/Exhibition Break . . . . . 12:20 to 1:40 pm

### SESSION 10

Room: Marriott Hotel: San Jose Ballroom Salon V . . . Tues. 1:40 to 3:10 pm

#### Applications

Session Chair: **Donald J. Silversmith**, Air Force Office of Scientific Research

1:40 pm: **Decoherence during electrical read-out of phosphorus donor qubits in silicon** (*Invited Paper*), Martin S. Brandt, Walter Schottky Institute (Germany) . . . . . [6892-40]

2:10 pm: **Imaging ultrafast laser material interactions** (*Invited Paper*), Samuel Mao, Univ. of California/Berkeley . . . . . [6892-41]

2:40 pm: **Silicon-based nonlinear optical devices for high-speed optical communications** (*Invited Paper*), Haisheng Rong, Simon Ayotte, Shengbo Xu, Oded Cohen, Mario J. Paniccia, Intel Corp. . . . . [6892-39]

Coffee Break . . . . . 3:10 to 3:30 pm

**SESSION 11**

**Room: Marriott Hotel:  
San Jose Ballroom Salon V . . . . . Tues. 3:30 to 5:50 pm**

**Widgap Semiconductors**

*Session Chairs:* **Chih-Chung Yang**, National Taiwan Univ. (Taiwan);  
**Kong-Thon Tsen**, Arizona State Univ.

- 3:30 pm: **Kinetics of capture, relaxation and recombination in ZnO- and GaN-based nano-structures: nm-spatially- and ps-time-resolved cathodoluminescence spectroscopy** (*Invited Paper*), Juergen Christen, Otto-von-Guericke-Univ. Magdeburg (Germany) . . . . . [6892-42]
- 4:00 pm: **Time-resolved behaviors of surface plasmons in coupling with an InGaN/GaN quantum well** (*Invited Paper*), Cheng-Yen Chen, Yen-Cheng Lu, Kun-Ching Shen, Dong-Ming Yeh, Chi-Feng Huang, Chih-Chung Yang, National Taiwan Univ. (Taiwan) . . . . . [6892-43]
- 4:30 pm: **Four-wave mixing spectroscopy of ultraviolet excitons in GaN** (*Invited Paper*), Yasunori Toda, Hokkaido Univ. (Japan) . . . . . [6892-44]
- 5:00 pm: **Ultrafast spectroscopy of Zn-Se-Te multilayers with type-II ZnTe/ZnSe quantum dots**, Maurice C. Cheung, Ian R. Sellers, Univ. at Buffalo; Igor L. Kuskovsky, Queens College/CUNY; Alexander N. Cartwright, Bruce D. McCombe, Univ. at Buffalo . . . . . [6892-45]
- 5:20 pm: **Picosecond time resolved cathodoluminescence: a tool to probe carrier dynamics in nanostructures** (*Invited Paper*), Jean-Daniel Ganiere, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [6892-46]

**Wednesday 23 January**

**SESSION 12**

**Room: Marriott Hotel:  
San Jose Ballroom Salon V . . . . . Wed. 8:00 to 10:00 am**

**THz Spectroscopy and Applications I**

*Session Chairs:* **Abdulhakem Y. Elezzabi**, Univ. of Alberta (Canada); **Mischa Bonn**, FOM Institute for Atomic and Molecular Physics (Netherlands)

- 8:00 am: **Resonant-enhanced dipolar interaction between THz-photons and confined acoustic phonons in nanostructures** (*Invited Paper*), Chi-Kuang Sun, National Taiwan Univ. (Taiwan) . . . . . [6892-47]
- 8:30 am: **Terahertz plasmonics** (*Invited Paper*), Rene Beigang, Fraunhofer-Institut für Physikalische Messtechnik (Germany); Benjamin Reinhard, Univ. of Kaiserslautern (Germany); Garik Torosyan, Fraunhofer-Institut für Physikalische Messtechnik (Germany); Oliver Paul, Univ. of Kaiserslautern (Germany)[6892-48]
- 9:00 am: **Terahertz-pulse emission through excitation of surface plasmons in metallic nanostructures** (*Invited Paper*), Gregor H. Welsh, Klaas Wynne, Univ. of Strathclyde (United Kingdom) . . . . . [6892-49]
- 9:30 am: **Dynamical THz response of semiconductors under ultrafast optical excitation** (*Invited Paper*), Stephan W. Koch, Mackillo Kira, Philipps-Univ. Marburg (Germany) . . . . . [6892-50]
- Coffee Break . . . . . 10:00 to 10:20 am

**SESSION 13**

**Room: Marriott Hotel:  
San Jose Ballroom Salon V . . . . . Wed. 10:20 to 11:50 am**

**THz Spectroscopy and Applications II**

*Session Chair:* **Chagaan Baatar**, Office of Naval Research

- 10:20 am: **Photonic crystal fibers for THz applications** (*Invited Paper*), Maksim A. Skorobogatiy, Alexandre Dupuis, Alireza Hassani, Ning Guo, Ecole Polytechnique de Montréal (Canada) . . . . . [6892-51]
- 10:50 am: **Dynamics of carriers in semiconductor nanocrystals: cooling and multiplication** (*Invited Paper*), Mischa Bonn, FOM Institute for Atomic and Molecular Physics (Netherlands) . . . . . [6892-53]
- 11:20 am: **Semiconductor superlattices: from coherent carrier dynamics to novel THz amplifiers and lasers** (*Invited Paper*), Hartmut G. Roskos, Johann Wolfgang Goethe-Univ. Frankfurt am Main (Germany) . . . . . [6892-52]
- Lunch/Exhibition Break . . . . . 11:50 am to 1:20 pm

**SESSION 14**

**Room: Marriott Hotel: San Jose Ballroom Salon V . . . Wed. 1:20 to 3:10 pm**

**Surface and Interface**

*Session Chair:* **Rene Beigang**, Fraunhofer-Institut für Physikalische Messtechnik (Germany)

- 1:20 pm: **Carrier-envelope phase-controlled laser-surface interactions** (*Invited Paper*), Peter Dombi, Research Institute for Solid-State Physics and Optics (Hungary) . . . . . [6892-54]
- 1:50 pm: **Optical second-harmonic spectroscopy of silicon nano-interfaces** (*Invited Paper*), Michael C. Downer, The Univ. of Texas at Austin . . . . . [6892-55]
- 2:20 pm: **Energy-resolved spin dynamics at semiconductor surfaces** (*Invited Paper*), Martin Aeschlimann, Univ. Kaiserslautern (Germany) . . . . . [6892-56]
- 2:50 pm: **Electron relaxation dynamics at the In-rich (100) surface of InP**, Jodi Szarko, Liana Socaciu-Siebert, Antje Neubauer, Thomas Hannappel, Rainer Eichberger, Hahn-Meitner-Institut Berlin GmbH (Germany) . . . [6892-57]
- Coffee Break . . . . . 3:10 to 3:30 pm

**SESSION 15**

**Room: Marriott Hotel: San Jose Ballroom Salon V . . . Wed. 3:30 to 6:05 pm**

**Carrier and Exciton Dynamics II**

*Session Chairs:* **Juergen Christen**, Otto-von-Guericke-Univ. Magdeburg (Germany); **Markus Betz**, Technische Univ. München (Germany)

- 3:30 pm: **All-optical injection of ballistic electrical currents in unbiased silicon** (*Invited Paper*), Markus Betz, Technische Univ. München (Germany) and Univ. of Toronto (Canada) . . . . . [6892-58]
- 3:55 pm: **Ultrafast response and carrier dynamics of near-infrared semiconductor laser systems** (*Invited Paper*), Sangam Chatterjee, Christoph Lange, Swantje Horst, Philipps-Univ. Marburg (Germany); Wolfgang Diehl, OSRAM Opto Semiconductors GmbH (Germany); Galina Khitrova, Hyatt M. Gibbs, The Univ. of Arizona; Peter Brick, OSRAM Opto Semiconductors GmbH (Germany); Angela Thraenhardt, Stephan W. Koch, Wolfgang W. Rühle, Philipps-Univ. Marburg (Germany) . . . . . [6892-59]
- 4:25 pm: **Characterization of nonlinear loss and four-wave mixing in submicron silicon-on-oxide waveguides**, Jingqing Huang, Tom Baehr-Jones, Michael Hochberg, Axel Scherer, California Institute of Technology . . [6892-60]
- 4:45 pm: **Coherent optical processes of semiconductors studied via two-dimensional Fourier transform spectroscopy** (*Invited Paper*), Alan D. Bristow, Tianhao Zhang, Steven T. Cundiff, Univ. of Colorado at Boulder . . . . . [6892-61]
- 5:15 pm: **Exciton-exciton interactions in semiconductor nanocrystals** (*Invited Paper*), Marc Achermann, Univ. of Massachusetts/Amherst . . [6892-62]
- 5:45 pm: **Direct observation of Landau damping with coherent plasmons in InSb**, Denis V. Seletskiy, Michael Hasselbeck, Mansoor Sheik-Bahae, Ralph Dawson, The Univ. of New Mexico . . . . . [6892-63]

OPTO

# Conference 6892

## Posters-Wednesday

**Room: Civic Auditorium. . . . .Wed. 6:00 to 7:30 pm**

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Wednesday morning starting at 10:00 am in the Civic Auditorium, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

**Transfer time for perpendicular transport of photoexcited carriers in step-graded multiple quantum wells**, Kenzo Fujiwara, Satoru Machida, Kyushu Institute of Technology (Japan) . . . . . [6892-64]

**PbTe quantum dots grown by femtosecond laser ablation**, Eugenio Rodriguez, Univ. Estadual de Campinas (Brazil); Daniel Biggemann, Lab. Nacional de Luz Sincrotron (Brazil); Lourdes Moya, Carlos L. César, Luiz C. Barbosa, Dailto Silva, Alfonso Schrank, Carlos Roberto Souza Filho, Elson Paiva de Oliveira, Univ. Estadual de Campinas (Brazil) . . . . . [6892-65]

**Threshold property of the coherent interaction between ultrashort optical pulses and a two-level quasi-resonant system in a single-mode transversally multidomained semiconductor laser waveguide**, Alexandre S. Shcherbakov, Ana Luz Munoz Zurita, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Sergey A. Némov, St.-Petersburg State Polytechnical Univ. (Russia); Joaquin Campos Acosta, Consejo Superior de Investigaciones Científicas (Spain) . . . . . [6892-66]

### **Make time for the Photonics West Exhibition**

*San Jose Convention Center, Exhibition Halls 1-3,  
Exhibition Foyer and South Halls 1-2*

Tuesday 22 January . . . . . 10:00 am to 5:00 pm  
Wednesday 23 January . . . . . 10:00 am to 5:00 pm  
Thursday 24 January . . . . . 10:00 am to 4:00 pm

**See new applications in action at the  
Product Demonstrations.**

*See pp. 37-39 for details.*

# Terahertz Technology and Applications

Conference Chair: **Kurt J. Linden**, Spire Corp.; **Laurence P. Sadwick**, The Univ. of Utah

Program Committee: **Antao Chen**, Univ. of Washington; **R. Jennifer Hwu**, INNOSYS Inc.; **John A. Murphy**, National Univ. of Ireland/Maynooth (Ireland); **Konstantin L. Vodopyanov**, Stanford Univ.

## Wednesday 23 January

### POSTERS-Wednesday

Room: Civic Auditorium. . . . . Wed. 6:00 to 7:30 pm

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

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**Conjugate polymer induced enhancement of THz radiation in semiconductors**, Jenn-Shyong Hwang, Hui-Ching Lin, Kuang-I Lin, Yan-Ten Lu, Tzung-Fang Guo, Jer-Wei Chang, National Cheng Kung Univ. (Taiwan) . . . . . [6893-12]

## Thursday 24 January

### SESSION 1

Room: Conv. Ctr. B3 . . . . . Thurs. 8:10 to 11:20 am

#### Terahertz Sources, Generation, and Detection

Session Chairs: **Kurt J. Linden**, Spire Corp.; **Antao Chen**, Univ. of Washington

8:10 am: **Dendrimer waveguide-based high-efficiency terahertz source**, Anis Rahman, Applied Research & Photonics, Inc. . . . . [6893-01]

8:30 am: **Optical analysis of InAs/GaAs quantum dot molecules**, Prasoon Pancholi, Valeria G. Stoleru, Anup Pancholi, Univ. of Delaware. . . . . [6893-02]

8:50 am: **Can any design support an effective nanostructure lasing for a few THz?** (Invited Paper), Leonid D. Shvartsman, Boris Laikhtman, The Hebrew Univ. of Jerusalem (Israel) . . . . . [6893-03]

9:10 am: **Terahertz reflection spectroscopy for the detection of explosives**, Megan R. Leahy-Hoppa, Michael J. Fitch, Robert Osiander, The Johns Hopkins Univ. Applied Physics Lab. . . . . [6893-23]

9:30 am: **Widely tunable (0.5-3.5 THz) narrow-bandwidth source of THz radiation based on frequency down-conversion in periodically structured GaAs**, Joseph Schaar, Konstantin Vodopyanov, Paulina Kuo, Martin Fejer, Stanford Univ. . . . . [6893-05]

9:50 am: **Optimum power scaling on efficient generation of quasi-single-cycle terahertz pulses** (Invited Paper), Yujie J. Ding, Lehigh Univ. . . . . [6893-06]

Coffee Break . . . . . 10:20 to 10:40 am

10:40 am: **Terahertz imaging and spectroscopy based on HEB heterodyne detection**, Eyal Gerech, Lixing You, National Institute of Standards and Technology . . . . . [6893-07]

11:00 am: **Creation of a compact receiver using a terahertz quantum cascade laser and Schottky diode**, Erik W. Young, Mark Lee, Christopher A. Ablett, Michael J. Cich, John L. Reno, Michael C. Wanke, Sandia National Labs. . . . . [6893-08]

### SESSION 2

Room: Conv. Ctr. B3 . . . . . Thurs. 11:20 am to 12:00 pm

#### Terahertz Materials, Metamaterials, and Spectroscopy I

Session Chairs: **John Anthony Murphy**, National Univ. of Ireland/Maynooth (Ireland); **Laurence P. Sadwick**, The Univ. of Utah

11:20 am: **Terahertz metamaterials with proton beam writing**, Sher-Yi Chiam, Andrew A. Bettiol, Frank Watt, National Univ. of Singapore (Singapore) . . . . . [6893-09]

11:40 am: **Time- and angular-resolved terahertz spectroscopy**, Corey A. Baron, Abdulhakem Elezzabi, Univ. of Alberta (Canada) . . . . . [6893-10]

Lunch/Exhibition Break . . . . . 12:00 to 1:50 pm

### SESSION 3

Room: Conv. Ctr. B3 . . . . . Thurs. 1:50 to 2:10 pm

#### Terahertz Materials, Metamaterials, and Spectroscopy II

Session Chairs: **John Anthony Murphy**, National Univ. of Ireland/Maynooth (Ireland); **Laurence P. Sadwick**, The Univ. of Utah

1:50 pm: **Effect of surface scattering on terahertz time-domain spectroscopy of chemicals**, Mohammad H. Arbab, Antao Chen, Zhen Zhou, Eric Thorsos, Dale Winebrenner, Univ. of Washington; Lisa Zurk, Portland State Univ. . . . . [6893-13]

### SESSION 4

Room: Conv. Ctr. B3 . . . . . Thurs. 2:10 to 5:40 pm

#### Terahertz Imaging and Instrumentation

Session Chairs: **Konstantin L. Vodopyanov**, Stanford Univ.; **R. Jennifer Hwu**, INNOSYS Inc.; **Laurence P. Sadwick**, The Univ. of Utah

2:10 pm: **Analysis of two ALMA front-end receiver channels using physical optics**, Mark R. Whale, National Univ. of Ireland/Maynooth (Ireland); Andrey Baryshev, SRON Nationaal Instituut voor Ruimteonderzoek (Netherlands) . . . . . [6893-14]

2:30 pm: **Prediction and measurement of aberrations in terahertz optical systems**, Tully Peacocke, National Univ. of Ireland/Maynooth (Ireland) [6893-15]

2:50 pm: **THz computational holography process optimization**, Andrei A. Gorodetsky, St. Petersburg State Univ. of Information Technologies, Mechanics and Optics (Russia); Victor G. Bespalov, S.I. Vavilov State Optical Institute (Russia) . . . . . [6893-16]

Coffee Break . . . . . 3:10 to 3:30 pm

3:30 pm: **Gaussian beam-mode analysis of phase gratings**, Robert May, John A. Murphy, Marcin Gradziel, Creidhe O'Sullivan, National Univ. of Ireland/Maynooth (Ireland) . . . . . [6893-17]

3:50 pm: **Accuracy and linearity of time-domain THz measurements of wet- and dry-paint film thickness**, David J. Cook, Seonkyung Lee, Scott J. Sharpe, Mark G. Allen, Physical Sciences Inc. . . . . [6893-18]

4:10 pm: **Optical phase measurement and dynamic stabilization for a transmitted 80-GHz microwave photonic ultralow phase noise reference through single-mode fiber under controlled bending motion**, Sarmad H. Albanna, National Radio Astronomy Observatory. . . . . [6893-19]

4:30 pm: **1.56 terahertz 2-frames-per-second standoff imaging**, Thomas M. Goyette, Jason C. Dickinson, Univ. of Massachusetts/Lowell; Kurt J. Linden, William R. Neal, Spire Corp.; Cecil S. Joseph, William J. Gorgeatt, Jerry Waldman, Robert H. Giles, Univ. of Massachusetts/Lowell; William E. Nixon, U.S. Army National Ground Intelligence Ctr. . . . . [6893-20]

4:50 pm: **Advanced nanoelectronic architectures for THz-based biological agent detection** (Invited Paper), Dwight L. Woolard, U.S. Army Research Office; James O. Jensen, U.S. Army Edgewood Chemical Biological Ctr. . . . . [6893-21]

5:20 pm: **Real-time imaging using a 3.4-THz quantum cascade laser and infrared microbolometer camera**, Barry N. Behnken, Gamani Karunasiri, Naval Postgraduate School; Danielle Chamberlin, Peter Robrish, Agilent Technologies, Inc.; Jérôme Faist, Univ. de Neuchâtel (Switzerland) . . . . . [6893-22]

OPTO

## Gallium Nitride Materials and Devices III

*Conference Chair:* **Hadis Morkoç**, Virginia Commonwealth Univ.; **Cole W. Litton**, Air Force Research Lab. - retired

*Conference Co-Chairs:* **Jen-Inn Chyi**, National Central Univ. (Taiwan); **Yasushi Nanishi**, Ritsumeikan Univ. (Japan); **Euijoon Yoon**, Seoul National Univ. (South Korea)

*Program Committee:* **Alison A. Baski**, Virginia Commonwealth Univ.; **Tzer-Perng Chen**, Epistar Corp. (Taiwan); **Shigefusa F. Chichibu**, Tohoku Univ. (Japan); **Nicolas Grandjean**, École Polytechnique Fédérale de Lausanne (Switzerland); **Izabella Grzegory**, Instytut Wysokich Cisnien (Poland); **Hideo Kawanishi**, Kogakuin Univ. (Japan); **Yong-Tae Moon**, LG Electronics Inc. (South Korea); **Takashi Mukai**, Nichia Chemical (Japan); **Ok-Hyun Nam**, SAMSUNG Electro-Mechanics (South Korea); **Kitt Reinhardt**, Air Force Office of Scientific Research; **Donald J. Silversmith**, Air Force Office of Scientific Research; **Yan-Kuin Su**, National Cheng Kung Univ. (Taiwan)

### Monday 21 January

#### SESSION 1

Room: Conv. Ctr. A6 ..... Mon. 8:10 to 10:00 am

##### Growth I

*Session Chair:* **Jen-Inn Chyi**, National Central Univ. (Taiwan)

8:10 am: **Lattice-matched AlInN alloys for short-wavelength photonics devices** (*Invited Paper*), Nicolas Grandjean, Jean-François Carlin, Eric Feltin, Gabriel Christmann, Sylvain Nicolay, Dobri Simeonov, Antonino Castiglia, Julien Dorsaz, Raphael Butté, Ecole Polytechnique Fédérale de Lausanne (Switzerland) ..... [6894-01]

8:40 am: **Impact of anisotropy on dislocation properties in nitrides with nonpolar growth planes**, Roland Kroeger, Tanya Paskova, Univ. Bremen (Germany) ..... [6894-02]

9:00 am: **MOCVD coalescence overgrowth of GaN nano-columns**, Tsung-Yi Tang, National Taiwan Univ. (Taiwan); Kent L. Averett, John Albrecht, Air Force Research Lab.; Wen-Yu Shiao, Yung-Sheng Chen, Chih-Chung Yang, National Taiwan Univ. (Taiwan) ..... [6894-03]

9:20 am: **Selective growth of GaN nanowalls with InGaN quantum well by RF plasma assisted molecular beam epitaxy**, Akihiko Kikuchi, Katsumi Kishino, Takayuki Hoshino, Shunsuke Ishizawa, Hiroto Sekiguchi, Sophia Univ. (Japan) ..... [6894-04]

9:40 am: **A thick GaN growth using GaN/Si(111) template by hydride vapor phase epitaxy (HVPE)**, Doo-Soo Kim, Ho-Jun Lee, Young-Jin Kim, DongKun Lee II, Bo-Young Lee, Siltron Inc. (South Korea) ..... [6894-05]

Coffee Break ..... 10:00 to 10:20 am

#### SESSION 2

Room: Conv. Ctr. A6 ..... Mon. 10:20 to 11:40 am

##### Growth II

*Session Chair:* **Nicolas Grandjean**,  
École Polytechnique Fédérale de Lausanne (Switzerland)

10:20 am: **Modeling and experimental validation of RPCVD-based nitride film growth**, Conor N. Martin, K. Scott A. Butcher, Marie Wintrebert-Fouquet, Alanna J. Fernandes, Patrick P.Chen, Tim P. Dabbs, BluGlass, Ltd. (Australia); Robert J. Carman, Macquarie Univ. (Australia) ..... [6894-06]

10:40 am: **Epitaxial lateral overgrowth of GaN on AlGaIn(111)Si micropillar array fabricated by microsphere lithography**, Guan-Ting Chen, Chia-Hua Chan, Hsueh-Hsing Liu, Chia-Hung Huo, Nai-Wei Shiu, National Central Univ. (Taiwan); Mao-Nan Chang, National Nano Device Labs. (Taiwan); Chii-Chang Chen, Jen-Inn Chyi, National Central Univ. (Taiwan) ..... [6894-07]

11:00 am: **The influence of two-step growth method on structural properties of epitaxial InN layer grown on sapphire substrate by MOCVD**, Keon-Hun Lee, Hee Jin Kim, Seoul National Univ. (South Korea); Hyunseok Na, Korea Univ. (South Korea); Dong Hyuk Kim, Seung Soo Oh, Sung Hyun Park, Sung Hyun Park, Seoul National Univ. (South Korea); Tae-Yeon Seong, Korea Univ. (South Korea); Euijoon Yoon, Seoul National Univ. (South Korea) [6894-08]

11:20 am: **Nanopatterning and selective area epitaxy of GaN on Si substrate**, Lianshan Wang, Huazhong Univ. of Science and Technology (China); Soo Jin Chua, Sudhiranjan Tripathy, Keyan Zang, Benzong Wang, Jinghua Teng, Institute of Materials Research and Engineering (Singapore) ... [6894-09]

Lunch Break ..... 11:40 am to 1:00 pm

#### SESSION 3

Room: Conv. Ctr. A6 ..... Mon. 1:00 to 2:20 pm

##### Growth and Characterization

*Session Chair:* **Euijoon Yoon**,  
Seoul National Univ. of Technology (South Korea)

1:00 pm: **Investigation of charge trapping at the oxide/semiconductor interface for MBE-grown GaN films**, Alison A. Baski, James C. Moore, Michael A. Reshchikov, Jinqiao Xie, Hadis Morkoc, Virginia Commonwealth Univ. .... [6894-10]

1:20 pm: **Microscopic luminescence characterization of GaN/InGaN micro-disk LEDs on silicon**, Juergen Christen, Frank Bertram, Alexander Franke, Otto-von-Guericke-Univ. Magdeburg (Germany); Armin Dadgar, Alois J. Krost, AZZURRO Semiconductors AG (Germany) and Otto-von-Guericke-Univ. Magdeburg (Germany); K.X. Lin, S.L. Teo, Sudhiranjan Tripathy, National Univ. of Singapore (Singapore) ..... [6894-11]

1:40 pm: **Defect and emission distributions in bulk GaN grown in polar and nonpolar directions: a comparative analysis**, Tanya Paskova, Kyma Technologies, Inc. and Kyma Technologies, Inc.; Andrew Hanser, Edward Preble, Keith Evans, Kyma Technologies, Inc.; Roland Kroeger, Univ. Bremen (Germany); Filip Tuomisto, Helsinki Univ. of Technology (Finland); Plamen P. Paskov, Bo Monemar, Linköpings Univ. (Sweden) ..... [6894-12]

2:00 pm: **Microscopic recombination dynamics in high-quality, fully coalesced a-plane GaN ELO structures investigated by ps-time-resolved cathodoluminescence microscopy**, Barbara Bastek, Frank Bertram, Juergen Christen, Otto-von-Guericke-Univ. Magdeburg (Germany); Tim Wernicke, Markus Weyers, Ferdinand-Braun-Institut für Höchstfrequenztechnik (Germany); Michael Kneissl, Ferdinand-Braun-Institut für Höchstfrequenztechnik (Germany) and Technische Univ. Berlin (Germany) ..... [6894-13]

#### SESSION 4

Room: Conv. Ctr. A6 ..... Mon. 2:20 to 4:20 pm

##### Characterization

*Session Chair:* **Cole W. Litton**, Air Force Research Lab.

2:20 pm: **Luminescence microscopy of InGaN single-quantum well on GaN pyramids** (*Invited Paper*), Juergen Christen, Frank Bertram, Sebastian Metzner, Barbara Bastek, Alexander Franke, Otto-von-Guericke-Univ. Magdeburg (Germany); Michael Jetter, T. Tsifotidis, Peter Michler, Univ. Stuttgart (Germany) ..... [6894-14]

Coffee Break ..... 2:50 to 3:20 pm

3:20 pm: **Photoluminescence study of near-surface GaN/AlN superlattices**, Plamen P. Paskov, Bo Monemar, Linköpings Univ. (Sweden); Motoaki Iwaya, Satoshi Kamiyama, Hiroshi Amano, Isamu Akasaki, Meijo Univ. (Japan) [6894-15]

3:40 pm: **Irradiation study on GaN by 248-nm KrF excimer laser**, Han-Yi Lu, Cheng-Yi Liu, National Central Univ. (Taiwan) ..... [6894-16]

4:00 pm: **Temperature dependent photo- and electro-reflectance spectra of InGaIn/GaN multiple quantum well structure**, Donghoon Kang, June-Sik Park, Dong-yul Lee, Sangsu Hong, SAMSUNG Electro-Mechanics Co., Ltd. (South Korea) ..... [6894-17]

**Tuesday 22 January**

**OPTO 2008 Plenary Session**

Session Chairs: **Ali Adibi**, Georgia Institute of Technology;  
**James G. Grote**, Air Force Research Lab.

Room: Conv. Ctr. A7/A8 · 8:30 to 10:00 am

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Nanophotonics: from Photonic Crystals to Plasmonics** (*Presentation Only*), Eli Yablonovitch, Univ. of California/Berkeley

9:20 am: **Organic "Plastic" Optoelectronic Devices** (*Presentation Only*), Niyazi Serdar Sariciftci, Johannes Kepler Univ. Linz (Austria)

See p. 28 for details.

Coffee Break ..... 10:00 to 10:30 am

**SESSION 5**

Room: Conv. Ctr. A6 ..... Tues. 10:20 am to 12:10 pm

**SPIN and Photon Propagation**

Session Chair: **Peter H. Handel**, Univ. of Missouri/St. Louis

10:20 am: **Ferromagnetism in nitrides: from single impurities to multicomponent functional systems** (*Invited Paper*), Alberta Bonanni, Johannes Kepler Univ. Linz (Austria) ..... [6894-18]

10:50 am: **Dynamics of intervalley transitions and propagation of coherent acoustic phonons in GaN single crystals studied by femtosecond pump-probe spectroscopy**, Roman Sobolewski, Shuai Wu, Jie Zhang, Univ. of Rochester; Janusz Karpinski, Andrej Belousov, ETH Zürich (Switzerland) ..... [6894-19]

11:10 am: **Band structure model of electron and hole mediated ferromagnetism in GaN** (*Invited Paper*), Su-Huai Wei, National Renewable Energy Lab. .... [6894-20]

11:40 am: **Spin-orbit coupling in AlGaIn/AlN/GaN heterostructures with a polarization induced two-dimensional electron gas** (*Invited Paper*), Cagliyan Kurdak, Hailing Cheng, Univ. of Michigan; Necmi Biyikli, Ümit Özgür, Hadis Morkoc, Virginia Commonwealth Univ.; Vladimir I. Litvinov, WaveBand Corp. .... [6894-21]

Lunch/Exhibition Break ..... 12:10 to 1:30 pm

**SESSION 6**

Room: Conv. Ctr. A6 ..... Tues. 1:30 to 3:40 pm

**Lasers**

Session Chair: **Juergen Christen**, Otto-von-Guericke-Univ. Magdeburg (Germany)

1:30 pm: **Defects and degradation of high-power pure-blue nitride-based laser diodes** (*Invited Paper*), Shigetaka Tomiya, Sony Corp. (Japan); Osamu Goto, Sony Shiroishi Semiconductor (Japan); Masao Ikeda, Sony Corp. (Japan) ..... [6894-22]

2:00 pm: **Degradation modes of high-power InGaIn/GaN laser diodes on low-defect GaN substrates** (*Invited Paper*), Min Soo Noh, HeeSuk Song, Jina Jeon, Chong Cook Kim, Yoon-Ho Choi, LG Electronics Inc. (South Korea) ..... [6894-23]

2:30 pm: **Coherent polariton emission and lasing in GaN microcavities at room temperature** (*Invited Paper*), Jeremy J. Baumberg, Univ. of Cambridge (United Kingdom); Giorgio Baldassarri, Stavros Christopoulos, Alastair Grundy, Pavlos G. Lagoudakis, Alexey Kavokin, Univ. of Southampton (United Kingdom); Gabriel Christmann, Raphael Butte, Eric Feltin, Jean-Francois Carlin, Nicolas Grandjean, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . [6894-24]

3:00 pm: **16-nm tuning range of blue InGaIn laser diodes carried out by 200 K temperature increase**, Katarzyna A. Komorowska, Przemek Wisniewski, Instytut Wysokich Cisnien (Poland); Robert Czernecki, TopGaIn Ltd. (Poland); Pawel Prystawko, Instytut Wysokich Cisnien (Poland); Michal Leszczynski, Instytut Wysokich Cisnien (Poland) and TopGaIn Ltd. (Poland); Tadeusz Suski, Instytut Wysokich Cisnien (Poland); Iza Grzegory, TopGaIn Ltd. (Poland); Sylwester A. Porowski, Instytut Wysokich Cisnien (Poland); Szymon Grzanka, TopGaIn Ltd. (Poland); Tomasz Swietlik, Lucja Marona, Instytut Wysokich Cisnien (Poland); Tadeusz Stacewicz, Univ. Warszawski (Poland); Piotr Perlin, Instytut Wysokich Cisnien (Poland) and TopGaIn Ltd. (Poland) ..... [6894-25]

3:20 pm: **Why InGaIn laser-diode degradation is accompanied by the improvement of its thermal stability?**, Piotr Perlin, Lucja Marona, Przemek Wisniewski, Mike Leszczynski, Prystawko Pawel, Izabella Grzegory, Tadek Suski, Sylwester A. Porowski, Instytut Wysokich Cisnien (Poland); Robert Czernecki, TopGaIn Ltd. (Poland); Andrzej Czerwinski, Mariusz Pluska, Jacek Ratajczak, Instytut Technologii Elektronowej (Poland) ..... [6894-26]

Coffee Break ..... 3:40 to 4:00 pm

**SESSION 7**

Room: Conv. Ctr. A6 ..... Tues. 4:00 to 5:50 pm

**Detectors, Lighting, and LEDs**

Session Chair: **Johnson C.S. Ku**, Arima Optoelectronics Corp. (Taiwan)

4:00 pm: **High-frequency operation of a GaN/AlN-based intersubband photodetector in the telecommunication wavelength range** (*Invited Paper*), Daniel Hofstetter, Esther Baumann, Fabrizio R. Giorgetta, Univ. de Neuchâtel (Switzerland); Fabien Guillot, Eva Monroy, Commissariat à l'Energie Atomique (France) ..... [6894-27]

4:30 pm: **Research challenges to ultra-efficient inorganic solid state lighting** (*Invited Paper*), Michael E. Coltrin, Jeffrey Y. Tsao, Sandia National Labs. .... [6894-28]

5:00 pm: **AlGaIn multiple quantum well based deep-UV light-emitting diodes** (*Invited Paper*), Asif M. Khan, Univ. of South Carolina ..... [6894-29]

5:30 pm: **Bluish-green semipolar GaInN/GaN light emitting diode on {1-101} GaN side facets**, Thomas Wunderer, Joachim Hertkorn, Frank Lipski, Peter Brueckner, Ferdinand Scholz, Martin Feneberg, Martin Schirra, Klaus Thonke, Andrey Chuvinin, Ute A. Kaiser, Univ. Ulm (Germany) ..... [6894-30]

**Wednesday 23 January**

**SESSION 8**

Room: Conv. Ctr. A6 ..... Wed. 8:10 to 9:50 am

**LEDs I**

Session Chair: **Seong-Ju Park**, Gwangju Institute of Science and Technology (South Korea)

8:10 am: **RGB LED with smart control in the backlight and lighting** (*Invited Paper*), Johnson C.Ku, Arima Optoelectronics Corp. (Taiwan) ..... [6894-31]

8:40 am: **Highly reliable and ultra-bright GaN vertical LED on metal alloy substrate** (*Invited Paper*), Jiunn-Yi Chu, Chen-Fu Chu, Chao-Chen Cheng, Wen-Huan Liu, Hao-Chun Cheng, Feng-Hsu Fan, Jui-Kang Yen, Semi-Photonics Co., Ltd. (Taiwan); Chuong A. Tran, Trung Doan, SemiLEDs Corp. .... [6894-32]

9:10 am: **Optical properties of ultra thin in-rich InGaIn/GaN multiple-quantum well light-emitting diodes**, Sung Hyun Park, Hee Jin Kim, Soon-Yong Kwon, Pilkyung Moon, Suk Choi, Seoul National Univ. of Technology (South Korea); Seung-Hwan Park, Catholic Univ. of Daegu (South Korea); Taehoon Chung, Jong Hyeob Beak, Korea Photonics Technology Institute (South Korea); Euijoon Yoon, Seoul National Univ. of Technology (South Korea) ..... [6894-33]

9:30 am: **Influence of Si substrate orientation on the performance of GaN-based thin film LEDs grown by MOVPE**, Fabian Schulze, Otto-von-Guericke-Univ. Magdeburg (Germany); Armin Dadgar, Otto-von-Guericke-Univ. Magdeburg (Germany) and AZZURRO Semiconductors AG (Germany); J. Blaessing, M. Wieneke, Lars Reissmann, A. Diez, S. Fritze, Otto-von-Guericke-Univ. Magdeburg (Germany); Oliver Schulz, AZZURRO Semiconductors AG (Germany); Juergen Christen, Otto-von-Guericke-Univ. Magdeburg (Germany); Alois J. Krost, Otto-von-Guericke-Univ. Magdeburg (Germany) and AZZURRO Semiconductors AG (Germany) ..... [6894-34]

Coffee Break ..... 9:50 to 10:10 am

OPTO

## SESSION 9

Room: Conv. Ctr. A6 .....Wed. 10:10 to 11:50 am

### LEDs II

Session Chair: **Cheolsoo Sone**,  
SAMSUNG Electro-Mechanics Co., Ltd. (South Korea)

10:10 am: **Present status of transparent conducting oxide thin-film development for transparent electrode applications** (*Invited Paper*), Toshihiro Miyata, Tadatsugu Minami, Kanazawa Institute of Technology (Japan) [6894-35]

10:40 am: **High-power GaN LED chip with low-thermal resistance** (*Invited Paper*), Cheng Ta Kuo, Tzer-Peng Chen, M.H. Hsieh, EPISTAR Corp. (Taiwan) ..... [6894-36]

11:10 am: **On-chip surge protection for GaN-power LEDs by ZnO thin film varistor**, Liann-be Chang, Yuan-Shun Chang, Ming-Jer Jeng, Chang Gung Univ. (Taiwan) ..... [6894-37]

11:30 am: **Fabrication of thin-GaN LED chip by using MOCVD LED epilayers on nature-etched sapphire**, Yiju Chen, Cheng-Yi Liu, National Central Univ. (Taiwan) ..... [6894-38]

Lunch/Exhibition Break ..... 11:50 am to 1:10 pm

## SESSION 10

Room: Conv. Ctr. A6 .....Wed. 1:10 to 3:20 pm

### LEDs III

Session Chair: **Cheng Ta Kuo**, EPISTAR Corp. (Taiwan)

1:10 pm: **Recent status of white LEDs and nitride LDs** (*Invited Paper*), Takashi Mukai, Takashi Miyoshi, Tomoya Yanamoto, Tokuya Kozaki, Shin-ichi Nagahama, Yukio Narukawa, Masahiko Sano, Takao Yamada, Nichia Corp. (Japan) ..... [6894-39]

1:40 pm: **High-power GaN-based light emitting diode: recent developments and applications** (*Invited Paper*), Cheolsoo Sone, Sukho Yoon, Jeong Wook Lee, Kwang-Ki Choi, Hyunsoo Kim, Hyungkun Kim, Tan Sakong, Jung-Hye Chae, Yongjo Park, SAMSUNG Electro-Mechanics Co., Ltd. (South Korea) ..... [6894-40]

2:10 pm: **High-efficiency high-power III nitride-based light-emitting diodes** (*Invited Paper*), Satoshi W. Watanabe, Philips Lumileds Lighting Co. . [6894-41]

2:40 pm: **True-blue InGaN lasers for low-power laser projection**, Uwe Strauss, Stephan Lutgen, Adrian Avramescu, Volker Kümmler, Georg Brüderl, Dimitri Dini, Christoph Eichler, Alfred Lell, OSRAM Opto Semiconductors GmbH (Germany) ..... [6894-42]

3:00 pm: **Investigation of cross-sectional potential distribution in GaN-based field effect transistors by Kelvin probe force microscopy**, Masamitsu Kaneko, Akihiro Hinoki, Tsutomu Araki, Akira Suzuki, Yasushi Nanishi, Ritsumeikan Univ. (Japan) ..... [6894-43]

Coffee Break ..... 3:20 to 3:40 pm

## SESSION 11

Room: Conv. Ctr. A6 .....Wed. 3:40 to 5:30 pm

### LEDs IV

Session Chair: **Takashi Mukai**, Nichia Corp. (Japan)

3:40 pm: **Deep-UV LEDs: physics and applications** (*Invited Paper*), Michael S. Shur, Rensselaer Polytechnic Institute; Remis Gaska, Sensor Electronic Technology, Inc. .... [6894-44]

4:10 pm: **Light output improvement of InGaN light-emitting diodes by using wet-etched stripe-patterned sapphire substrates** (*Invited Paper*), Jen-Inn Chyi, Chang-Chi Pan, Chi-Hsun Hsieh, Gung-Yen Lee, Tsung-Xian Lee, Ching-Cherng Sun, National Central Univ. (Taiwan) ..... [6894-45]

4:40 pm: **Surface plasmons and photonic crystals for high-efficiency GaN light-emitting diodes** (*Invited Paper*), Seong-Ju Park, Gwangju Institute of Science and Technology (South Korea) ..... [6894-46]

5:10 pm: **AZO films with Al nano-particles to improve the light-extraction efficiency of GaN-based light-emitting diodes**, Ching-Ting Lee, Hsin-Ying Lee, Ying-Hung Chou, National Cheng Kung Univ. (Taiwan) ..... [6894-47]

## POSTERS-Wednesday

Room: Civic Auditorium .....Wed. 6:00 to 7:30 pm

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Wednesday morning starting at 10:00 am in the Civic Auditorium, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

**GaN Schottky and metal-semiconductor-metal photodetectors with in situ SiNx nano-network**, Jennette N. Mateo, Andy Xie, Hadis Morkoc, Ümit Özgür, Virginia Commonwealth Univ. .... [6894-63]

**Comparative study of electroluminescence efficiency of blue (In,Ga)N and red GaAs quantum-well diodes**, Kenzo Fujiwara, Takayuki Inada, Hiroyuki Jimi, Kyushu Institute of Technology (Japan) ..... [6894-64]

**Infrared reflectance of optical phonon modes in AlGaIn epitaxial layers grown on sapphire substrates**, Jun-Rong Chen, Tien-Chang Lu, Gen-Sheng Huang, Tsung-Shine Ko, Hao-Chung Kuo, Shing-Chung Wang, National Chiao Tung Univ. (Taiwan) ..... [6894-65]

**Atomic-layer deposition of high-quality Al<sub>x</sub>Ga<sub>1-x</sub>N/GaN multiple quantum wells by MOCVD**, Ming-Hua Lo, Tien-Chang Lu, Hao-Chung Kuo, Shing-Chung Wang, Jun-Rong Chen, Tsung-Shine Ko, Zhen-Yu Li, Gen-Sheng Huang, National Chiao Tung Univ. (Taiwan) ..... [6894-66]

**AlGaIn/SiC heterojunction bipolar transistor**, Yahya I. Alivov, Qian Fan, Xianfeng Ni, Serguei A. Chevtchenko, Virginia Commonwealth Univ.; Ishwara B. Bhat, Rensselaer Polytechnic Institute; Hadis Morkoc, Virginia Commonwealth Univ. .... [6894-67]

**Growth and magneto-transport characterization of Al<sub>x</sub>Ga<sub>1-x</sub>N/AlN/GaN heterostructures grown by pendeo-epitaxy**, Necmi Biyikli, Jinqiao Xie, Xianfeng Ni, Yi Fu, Hadis Morkoc, Virginia Commonwealth Univ.; Hailing Cheng, Cagliyan Kurdak, Univ. of Michigan ..... [6894-68]

**Performance enhancements for green InGaIn/GaN multiple quantum well light-emitting diodes by hydrogenation reductions**, Yen-Chun Lin, Han-Yu Tsai, Cheng-Kang Wang, Chia-Hui Fang, Ta-Chuan Kuo, Wei-Jen Chen, Hui-Tang Shen, Jen-Cheng Wang, Ya-Fen Wu, Tzer-En Nee, Chang Gung Univ. (Taiwan) ..... [6894-69]

**Improvement of the luminescent properties in green InGaIn/GaN multiple-quantum well light-emitting diodes**, Han-Yu Tsai, Yen-Chun Lin, Cheng-Kang Wang, Chia-Hui Fang, Ta-Chuan Kuo, Wei-Jen Chen, Hui-Tang Shen, Jen-Cheng Wang, Ya-Fen Wu, Tzer-En Nee, Chang Gung Univ. (Taiwan) . [6894-70]

**Epitaxial lateral overgrowth of (1-100) m-plane GaN on m-plane 6H-SiC by metalorganic chemical vapor deposition**, Xianfeng Ni, Ümit Özgür, Hadis Morkoc, Virginia Commonwealth Univ.; Robert P. Devaty, Wolfgang J. Choyke, Univ. of Pittsburgh; Lin Zhou, David J. Smith, Arizona State Univ. .... [6894-71]

**Effects of strain on the photoluminescence of GaN/AlGaIn heterostructure**, Amal Elgawadi, Jerzy S. Krasinski, Oklahoma State Univ.; Gordon Gainer, Vladimir A. Dmitriev, Technologies and Devices International, Inc. .... [6894-72]

**Improving the luminescence of InGaIn/GaN MQWs blue LEDs by an InGaIn strain modulation layer**, Yung-Hsiang Lin, Chang-Gung Univ. (Taiwan); Ray-Ming Lin, Chang Gung Univ. (Taiwan); Pei-Wen Liu, Yi-Lun Chou, Yuan-Chieh Lu, Chang-Gung Univ. (Taiwan) ..... [6894-73]

**Current development of bright blue and green LEDs**, Hoki Kwon, Bong-Koo Kim, Jong-Wook Kim, Yong-Tae Moon, Johngeon Shin, Jeong-Soo Lee, Jeong-Soon Yim, Sung-Ryong Cho, LG Electronics Inc. (South Korea); Dae Sung Kang, Chang-Hoon Oh, LG Innotek (South Korea); Weon Guk Jeong, Sungkyunkwan Univ. (South Korea) ..... [6894-74]

**Comparative study of deep levels in GaN grown on different templates**, Jing Nie, Serguei A. Chevtchenko, Jinqiao Xie, Xianfeng Ni, Hadis Morkoc, Virginia Commonwealth Univ. .... [6894-75]

**Evolution of surface morphology of polar and nonpolar GaN thin films during photoelectrochemical etching**, Jacob H. Leach, Ümit Özgür, Xianfeng Ni, Jinqiao Xie, Hadis Morkoc, Virginia Commonwealth Univ. .... [6894-76]



**Comparison of various gate dielectrics on the performance of AlGaIn/GaN HFETs**, Fan Qian, Jacob H. Leach, Mo Wu, Bo Xiao, Xing Gu, Hadis Morkoc, Virginia Commonwealth Univ.; Peter H. Handel, Univ. of Missouri/St. Louis ..... [6894-77]

**High-performance GaN ultraviolet avalanche photodiodes fabricated on free-standing bulk GaN substrates**, Russell D. Dupuis, Dongwon Yoo, Jae-Hyun Ryou, Jae Limb, Yun Zhang, Shyh-Chiang Shen, Clarissa A. Horne, Georgia Institute of Technology ..... [6894-78]

**Investigations of nonpolar and polar InGaIn/GaN multiple quantum wells**, Xianfeng Ni, Jacob H. Leach, Ümit Özgür, Hadis Morkoc, Virginia Commonwealth Univ. .... [6894-79]

**Thursday 24 January**

**SESSION 12**

**Room: Conv. Ctr. A6 ..... Thurs. 8:10 to 9:50 am**

**LEDs V**

Session Chair: **Jiunn-Yi Chu**, Semi-Photonics Co., Ltd. (Taiwan)

8:10 am: **InGaIn MQW green LEDs using p-InGaIn and p-InGaIn/p-GaN superlattices as p-type layers** (*Invited Paper*), Russell D. Dupuis, Jae Limb, Jianping Liu, Jae-Hyun Ryou, Clarissa A. Horne, Dongwon Yoo, Georgia Institute of Technology ..... [6894-48]

8:40 am: **High efficient InGaIn/GaN LEDs with double-sided textured surfaces and omni-directional mirror structure via epilayer transferring technology** (*Invited Paper*), Dong-Sing Wu, Shao-Hua Huang, Ray-Hua Horng, National Chung Hsing Univ. (Taiwan) ..... [6894-49]

9:10 am: **Development of UV-photocathodes using GaIn film on Si substrate**, Shunro Fuke, Shizuoka Univ. (Japan); Masatomo Sumiya, National Institute for Materials Science (Japan); Tokuaki Nihashi, Minoru Hagino, Hamamatsu Photonics K.K. (Japan); Masayuki Matsumoto, Hamamatsu Corp.; Masahiro Sato, Kohji Ohtsuka, Sanken Electric Co., Ltd. (Japan) .... [6894-50]

9:30 am: **1/f noise in nitride-based spintronic devices**, Peter H. Handel, Amanda M. Truong, Univ. of Missouri/St. Louis ..... [6894-51]

Coffee Break ..... 9:50 to 10:10 am

**SESSION 13**

**Room: Conv. Ctr. A6 ..... Thurs. 10:10 to 11:50 am**

**FETs I**

Session Chair: **Yasushi Nanishi**, Ritsumeikan Univ. (Japan)

10:10 am: **Reliability modeling of high voltage AlGaIn/GaN and GaAs field-effect transistors** (*Invited Paper*), Robert J. Trew, North Carolina State Univ. .... [6894-52]

10:40 am: **Progress in GaIn devices performances and reliability** (*Invited Paper*), Paul Saunier, TriQuint Semiconductors ..... [6894-53]

11:10 am: **High temperature performance measurement and analysis of GaIn HEMT**, Bashirul A. Polash, Hasina F. Huq, The Univ. of Texas-Pan American ..... [6894-54]

11:30 am: **Use of quantum 1/f noise formulas in the reliability characterization of nitride-based heterostructures**, Peter H. Handel, Univ. of Missouri/St. Louis; Hadis Morkoc, Virginia Commonwealth Univ. .... [6894-55]

Lunch/Exhibition Break ..... 11:50 am to 1:10 pm

**SESSION 14**

**Room: Conv. Ctr. A6 ..... Thurs. 1:10 to 3:00 pm**

**FETs II**

Session Chair: **Robert J. Trew**, North Carolina State Univ.

1:10 pm: **Millimeter-wave GaIn HFET technology** (*Invited Paper*), Masataka Higashiwaki, National Institute of Information and Communications Technology (Japan); Takashi Mimura, Fujitsu Labs. (Japan) and National Institute of Information and Communications Technology (Japan); Toshiaki Matsui, National Institute of Information and Communications Technology (Japan). . . . [6894-56]

1:40 pm: **Status of GaIn HEMT performance and reliability** (*Invited Paper*), Daniel S. Green, RF Micro Devices ..... [6894-57]

2:10 pm: **Piezoelectric quantum 1/f noise in nitride-based heterostructures** (*Invited Paper*), Peter H. Handel, Univ. of Missouri/St. Louis and UMSL Ctr for Nanoscience; Hadis Morkoc, Virginia Commonwealth Univ.; Amanda M. Truong, Univ. of Missouri/St. Louis ..... [6894-58]

2:40 pm: **Double recessed AlInGaIn-InGaIn-GaN metal-oxide heterostructure field-effect transistors**, Asif M. Khan, Univ. of South Carolina ..... [6894-59]

Coffee Break ..... 3:00 to 3:20 pm

**SESSION 15**

**Room: Conv. Ctr. A6 ..... Thurs. 3:20 to 4:40 pm**

**FETs III**

Session Chair: **Hadis Morkoc**, Virginia Commonwealth Univ.

3:20 pm: **Recent progress on GaIn-based MOSFETs for power-switching applications** (*Invited Paper*), Hirota Otake, Hiroaki Ohta, Kentaro Chikamatsu, Tatsuya Fujishima, Hidemi Takasu, Rohm Co., Ltd. (Japan); Yasushi Nanishi, Ritsumeikan Univ. (Japan). . . . [6894-60]

3:50 pm: **Recent progress of GaIn electronic devices for wireless communication system** (*Invited Paper*), Toshihide Kikkawa, Kenji Imanishi, Naoki Hara, Hisao Shigematsu, Kazukiyo Joshin, Fujitsu Co. (Japan). . [6894-61]

4:20 pm: **Nearly lattice-matched AlInN/GaN heterostructure field effect transistor**, Jinqiao Xie, Xianfeng Ni, Mo Wu, Jacob H. Leach, Ümit Özgür, Hadis Morkoc, Virginia Commonwealth Univ. .... [6894-62]



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## Zinc Oxide Materials and Devices III

Conference Chair: **Ferechteh Hosseini Teherani**, Nanovation SARL (France); **Cole W. Litton**, Air Force Research Lab. - retired

Program Committee: **Jean-Jacques Delaunay**, The Univ. of Tokyo (Japan); **David C. Look**, Wright State Univ.; **Tatsuo Okada**, Kyushu Univ. (Japan); **Manijeh Razeghi**, Northwestern Univ.; **David Rogers**, Univ. de Technologie de Troyes (France); **Jin-Joo Song**, Univ. of California/San Diego

### Sunday 20 January

#### Introduction

Room: Conv. Ctr. C2 ..... Sun. 9:05 to 9:20 am

Session Chair: **Ferechteh Hosseini Teherani**,  
Nanovation SARL (France)

#### SESSION 1

Room: Conv. Ctr. C2 ..... Sun. 9:20 am to 12:10 pm

#### ZnO Properties and Doping

Session Chairs: **Cole W. Litton**, Air Force Research Lab.;  
**Ken Nakahara**, Rohm Co., Ltd. (Japan)

9:20 am: **Lattice dynamics of homoepitaxial ZnO** (*Invited Paper*), Axel Hoffmann, Markus R. Wagner, P. Zimmer, Ute Haboek, Technische Univ. Berlin (Germany) ..... [6895-02]

9:45 am: **Sb-doped ZnO epitaxial films and optoelectronic devices** (*Invited Paper*), Jianlin Liu, Univ. of California/Riverside ..... [6895-07]

Coffee Break ..... 10:10 to 10:30 am

10:30 am: **Ultrafast reflectivity dynamics of highly excited bulk ZnO**, Tina Shih, Harvard Univ.; Tobias Voss, Univ. Bremen (Germany) and Harvard Univ.; Eric D. Mazur, Harvard Univ. .... [6895-04]

10:55 am: **Homoepitaxial undoped and doped ZnO thin films grown by pulsed laser deposition**, Michael Lorenz, Gerald Wagner, Holger von Wenckstern, Matthias A. Brandt, Andreas Rahm, Heidemarie Schmidt, Christian Czekalla, Gabriele Benndorf, Holger Hochmuth, Marius Grundmann, Univ. Leipzig (Germany) ..... [6895-05]

11:20 am: **Plasma-assisted epitaxial growth of nitrogen-doped and high-quality ZnO thin films** (*Invited Paper*), Satoshi Yamauchi, Ibaraki Univ. (Japan) ..... [6895-12]

11:45 am: **Comprehensive review on various doping mechanisms of ZnO thin film with different dopants** (*Invited Paper*), Sang Yeol Lee, Korea Institute of Science and Technology (South Korea) ..... [6895-31]

Lunch Break ..... 12:10 to 1:10 pm

#### SESSION 2

Room: Conv. Ctr. C2 ..... Sun. 1:10 to 6:00 pm

#### ZnO Thin Film Growth and Devices

Session Chairs: **Donald J. Silversmith**, Air Force Office of Scientific Research; **Manijeh Razeghi**, Northwestern Univ.

1:10 pm: **Perspectives of the current future prospects of ZnO electronics and photonics in terms of technical challenges, competing materials systems, and exploitation strategies** (*Invited Paper*), Donald J. Silversmith, Air Force Office of Scientific Research. .... [6895-32]

1:45 pm: **Investigation of nitrogen doping of ZnO thin films grown by pulse laser deposition** (*Invited Paper*), David Rogers, Nanovation SARL (France) ..... [6895-03]

2:10 pm: **Advantages of ZnO substrates for growth of group III nitrides** (*Invited Paper*), Hiroshi Fujioka, Kohei Ueno, The Univ. of Tokyo (Japan); Atsushi Kobayashi, The Univ. of Tokyo (China); Hidetaka Amanai, Satoru Nagao, Hideyoshi Horie, Mitsubishi Chemical Corp. (Japan) ..... [6895-08]

2:35 pm: **Homoepitaxial growth of ZnO by MOVPE** (*Invited Paper*), Alois J. Krost, Sören Heinze, A. Diez, J. Bläsing, A. Krtschil, Armin Dadgar, Otto-von-Guericke-Univ. Magdeburg (Germany) ..... [6895-09]

Coffee Break ..... 3:00 to 3:20 pm

3:20 pm: **(Zn,Cd)O/ZnO hetero- and quantum well structures for light-emitting applications** (*Invited Paper*), Fritz Henneberger, Humboldt-Univ. zu Berlin (Germany) ..... [6895-11]

3:45 pm: **MgZnO homoepitaxial films grown by molecular beam epitaxy**, Hiroyuki Yuji, Ken Nakahara, Kentaro Tamura, S. Akasada, A. Sasaki, Rohm Co., Ltd. (Japan); H. Amaike, Atushi Tsukazaki, T. Onuma, Shigefusa F. Chichibu, Atsushi Tsukazaki, Akira Ohtomo, Masashi Kawasaki, Tohoku Univ. (Japan) ..... [6895-10]

4:10 pm: **Next steps in ZnO-based devices**, Jeff Nause, Cermet, Inc. [6895-13]

4:40 pm: **Growth and characterization of ZnO for optoelectronic applications** (*Invited Paper*), Jizhi Zhang, Gene Cantwell, ZN Technology, Inc.; Jin-Joo Song, Univ. of California/San Diego; Yicheng Lu, Rutgers Univ. .... [6895-06]

5:10 pm: **Unresolved issues in bulk and thin-film ZnO** (*Invited Paper*), David C. Look, Wright State Univ. .... [6895-01]

5:40 pm: **Lasing characteristic of ZnO nanostructures**, Takafumi Yao, Sang Hyun Lee, Takenari Goto, Hiroshi Miyazaki, Tohoku Univ. (Japan) ... [6895-34]

### Monday 21 January

#### SESSION 3

Room: Conv. Ctr. C2 ..... Mon. 8:20 am to 12:10 pm

#### ZnO Thin Film Based Devices I

Session Chairs: **David C. Look**, Wright State Univ.;  
**Jianlin Liu**, Univ. of California/Riverside

8:20 am: **ZnO hybrid microcavities grown by plasma assisted molecular beam epitaxy**, Ryoko Shimada, Jinqiao Xie, Vitaliy Avrutin, Ümit Özgür, Hadis Morkoç, Virginia Commonwealth Univ. .... [6895-19]

8:45 am: **Demonstration of an ultraviolet optically pumped 3<sup>rd</sup> order ZnO-based distributed feedback laser**, Daniel Hofstetter, Yargo C. Bonetti, Univ. de Neuchâtel (Switzerland); Abdel-Hamid El-Shaer, Technische Univ. Braunschweig (Germany); Andrey S. Bakin, Andreas Waag, Technical Univ. of Braunschweig (Germany); Ruediger Schmidt-Grund, Univ. Leipzig (Germany) ..... [6895-18]

9:10 am: **Homoepitaxial MgZnO grown by molecular beam epitaxy toward ultraviolet light-emitting diodes** (*Invited Paper*), Ken Nakahara, Hiroyuki Yuji, Kentaro Tamura, Shunsuke Akasaka, A. Sasaki, Yoshifumi Nishimoto, D. Takamizu, T. Fujii, T. Tanabe, Hidemi Takasu, Rohm Co., Ltd. (Japan); H. Amaike, T. Onuma, Shigefusa F. Chichibu, Atushi Tsukazaki, Akira Ohtomo, Masashi Kawasaki, Tohoku Univ. (Japan) ..... [6895-17]

9:45 am: **ZnO: the low-cost approach to the growth of GaN**, Ferechteh H. Teherani, Nanovation SARL (France) ..... [6895-16]

Coffee Break ..... 10:10 to 10:30 am

10:30 am: **Control of native point defects, chemical reactions, and surface morphology for ZnO electrical contacts** (*Invited Paper*), Leonard J. Brillson, H. L. Mosbacker, Danie Doust, Michelle Kramer, The Ohio State Univ.; Zhaoqiang L. Fang, Wright State Univ.; David C. Look, Wright State Univ. and Air Force Research Lab.; Gene Cantwell, J. Zhang, ZN Technology, Inc.; J. J. Song, ZN Technology, Inc. and Univ. of California/San Diego ... [6895-20]

11:10 am: **ZnO cone-shaped blue light emitting diodes** (*Invited Paper*), Akihiko Murai, Daniel B. Thompson, Umesh K. Mishra, Shuji Nakamura, Steven P. DenBaars, Univ. of California/Santa Barbara ..... [6895-15]

11:40 am: **Light-emitting diodes based on n-ZnO nanowires** (*Invited Paper*), Magnus Willander, Linköpings Univ. (Sweden) ..... [6895-23]

Lunch Break ..... 12:10 to 1:30 pm

## SESSION 4

Room: Conv. Ctr. C2 ..... Mon. 1:30 to 5:25 pm

**ZnO Thin Film Based Devices II**Session Chairs: **Jeff Nause**, Cermet, Inc.;  
**David Rogers**, Nanovation SARL (France)

- 1:30 pm: **Rational synthesis, doping, and optoelectronic application of zinc oxide nanowires** (*Invited Paper*), Deli Wang, Univ. of California/San Diego ..... [6895-27]
- 1:55 pm: **Nanostructured ZnO for biosensor applications** (*Invited Paper*), Vinay Gupta, Univ. of Delhi (India) ..... [6895-24]
- 2:20 pm: **Low-temperature wet chemical synthesis of ZnO nano-micro structures for use in gas sensing**, Jean-Jacques Delaunay, Kentaro Mikuniya, Masaki Shuzo, Ichiro Yamada, The Univ. of Tokyo (Japan); Naoki Ohashi, National Institute for Materials Science (Japan) ..... [6895-22]
- 2:45 pm: **Controlled growth of ZnO nanowire by nanoparticle-assisted laser-ablation deposition**, Tatsuo Okada, Kyushu Univ. (Japan) .... [6895-21]
- Coffee Break ..... 3:10 to 3:30 pm
- 3:30 pm: **Photoluminescence spectroscopy of ZnO nanowires embedded in polymers**, Jan P. Richters, Tobias Voss, Lars Wischmeier, Ilja Rückmann, Jürgen Gutowski, Univ. Bremen (Germany) ..... [6895-28]
- 3:55 pm: **ZnO nanowires for solid state lightening: from epitaxy and collective integration to optical and electrical characterization**, Philippe Gilet, Eddy Romain-Latu, Yvan Robin, Patrice Noel, Pierre Ferret, Matthieu Lafossas, Amelie Maisse, Serge Gidon, Milan Rosina, François Levy, Alexei Chelnokov, Commissariat à l'Energie Atomique (France) ..... [6895-26]
- 4:20 pm: **Phosphorous doped ZnO nanowires: acceptor-related cathodoluminescence and p-type conducting FET-characteristics**, Bingqiang Cao, Michael Lorenz, Andreas Rahm, Holger von Wenckstern, Christian Czekalla, Jörg Lenzner, Gabriele Benndorf, Marius Grundmann, Univ. Leipzig (Germany) ..... [6895-25]
- 4:45 pm: **P-type ZnO thin films via phosphorus doping**, David Norton, Hyun-Sik Kim, Li-Chai Tien, Stephen Pearton, Fan Ren, Univ. of Florida . . . [6895-35]
- 5:05 pm: **Investigation of transition metal doped ZnO diluted magnetic semiconductor properties by electric field effect**, Emilio Bellingeri, Luca Pellegrino, M. Biasotti, Ilaria Pallecchi, G. Canu, Andrea Gerbi, M. Vignolo, Antonio S. Siri, Daniele Marre, CNR-INFN LAMIA (Italy) and Univ. degli Studi di Genova (Italy); S. Rusponi, A. Lehnert, Ecole Polytechnique Fédérale de Lausanne (Switzerland); F. Nolting, Paul Scherrer Institut (Switzerland) [6895-36]

## Wednesday 23 January

## POSTERS-Wednesday

Room: Civic Auditorium. .... Wed. 6:00 to 7:30 pm

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Wednesday morning starting at 10:00 am in the Civic Auditorium, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

- Effect of ion damage on optical properties of ZnO films grown by plasma assisted MBE**, Vitaliy Avrutin, Michael A. Reshchikov, Jing Nie, Natalia Izyumskaya, Ryoko Shimada, Ümit Özgür, Virginia Commonwealth Univ.; John V. Foreman, Henry O. Everitt, U.S. Army Aviation and Missile Research, Development and Engineering Ctr.; Cole W. Litton, Air Force Research Lab.; Hadis Morkoc, Virginia Commonwealth Univ. .... [6895-14]
- Growth of ZnO nanowires catalyzed by Au**, David Rogers, Nanovation SARL (France) ..... [6895-29]
- Doping of MOVPE grown homoepitaxial ZnO-layers**, Sören Heinze, A. Diez, J. Blaesing, A. Krtschil, Armin Dadgar, Thomas Hempel, Juergen Christen, Alois J. Krost, Otto-von-Guericke-Univ. Magdeburg (Germany) ..... [6895-30]
- Sacrificial ZnO template approach for chemical lift-off of GaN from sapphire substrates**, David Rogers, Ferechteh H. Teherani, Nanovation SARL (France); Abdallah Ougazzaden, Georgia Tech Lorraine (France); T. Moudakir, Ctr. National de la Recherche Scientifique (France); Thomas Aggerstam, Kungliga Tekniska Högskolan (Sweden); Manijeh Razeghi, Northwestern Univ.; Olivier Durand, Guy Garry, Thales Research & Technology (France); D. McGruther, J. N. Chapman, Univ. of Glasgow (United Kingdom) . . . [6895-33]

## Integrated Optics: Devices, Materials, and Technologies XII

*Conference Chair:* **Christoph M. Greiner**, LightSmyth Technologies, Inc.; **Christoph A. Waechter**, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany)

*Conference Co-Chair:* **Jean-Emmanuel Broquin**, École Nationale Supérieure d'Electronique et de Radioélectrique de Grenoble (France); **Yakov Sidorin**, Photineer Technology Group

*Program Committee:* **John V. Badding**, The Pennsylvania State Univ.; **Trevor Mark Benson**, The Univ. of Nottingham (United Kingdom); **Pierre Berini**, Univ. of Ottawa (Canada); **Xudong Fan**, Univ. of Missouri/Columbia; **Helmut Heidrich**, Fraunhofer-Institut für Nachrichtentechnik Heinrich-Hertz-Institut (Germany); **Robert L. Nelson**, Air Force Research Lab.; **Gualtiero Nunzi Conti**, Istituto di Fisica Applicata Nello Carrara (Italy) and Centro Studi e Ricerche Enrico Fermi (Italy)

### Monday 21 January

#### SESSION 1

**Room: Marriott Hotel:**

**San Jose Ballroom Salon I . . . . . Mon. 10:30 am to 12:00 pm**

#### Modeling

*Session Chair:* **Christoph A. Wächter**, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany)

10:30 am: **Advanced FEM analysis of optical waveguides: algorithms and applications** (*Invited Paper*), Frank Schmidt, Sven Burger, Jan Pomplun, Lin Zschiedrich, Zuse Institute Berlin (Germany) . . . . . [6896-01]

11:00 am: **Quasi-normal mode analysis of coupled optical defect cavities (photonic molecules) in finite 1D photonic crystals**, Milan Maksimovic, Manfred Hammer, E. van Groesen, Univ. Twente (Netherlands) . . . . . [6896-02]

11:20 am: **Optimal design of vertically emitting circular Bragg disk resonator lasers**, Xiankai Sun, California Institute of Technology; Jacob Scheuer, Tel-Aviv Univ. (Israel); Amnon Yariv, California Institute of Technology . . . . . [6896-03]

11:40 am: **Thermal radiation antennas made of multilayer structures containing negative index metamaterials**, Milan Maksimovic, Manfred Hammer, E. van Groesen, Univ. Twente (Netherlands) . . . . . [6896-04]

Lunch Break . . . . . 12:00 to 1:40 pm

#### SESSION 2

**Room: Marriott Hotel:**

**San Jose Ballroom Salon I . . . . . Mon. 1:40 to 3:00 pm**

#### Glass Waveguides and Devices

*Session Chair:* **Jean-Emmanuel Broquin**, École Nationale Supérieure d'Electronique et de Radioélectrique de Grenoble (France)

1:40 pm: **Hybrid neodymium-doped passively Q-switched waveguide laser made by ion exchange**, Rafael Salas, Lionel Bastard, Jean-Emmanuel Broquin, Minatec (France) . . . . . [6896-06]

2:00 pm: **Optical waveguide gratings in chalcogenide glass**, Christi K. Madsen, Alex Xia, Texas A&M Univ. . . . . [6896-07]

2:20 pm: **Realization of Ag+/Na+ ion-exchanged surface and buried waveguides on germanate glasses**, Jérôme Grelin, Jean-Emmanuel Broquin, Elise Ghibaudo, Ecole Nationale Supérieure d'Electronique et de Radioélectrique de Grenoble (France). . . . . [6896-08]

2:40 pm: **Single-step burst writing of high-strength Bragg grating waveguides in bulk fused silica glass for high temperature optical sensing**, Haibin Zhang, Stephen Ho, Shane M. Eaton, Mi-Li Ng, Jianzhao Li, Peter R. Herman, Univ. of Toronto (Canada). . . . . [6896-09]

Coffee Break . . . . . 3:00 to 3:30 pm

#### SESSION 3

**Room: Marriott Hotel:**

**San Jose Ballroom Salon I . . . . . Mon. 3:30 to 4:50 pm**

#### WG Engineering and Nanofabrication

*Session Chair:* **Robert L. Nelson**, Air Force Research Lab.

3:30 pm: **Modeling and fabrication of large-area nano-scale optical devices**, Eric J. Kelmelis, Ahmed Sharkawy, EM Photonics, Inc.; Peng Yao, Univ. of Delaware; John Humphrey, EM Photonics, Inc.; Dennis Prather, Univ. of Delaware . . . . . [6896-10]

3:50 pm: **Ultra-compact polymer and silicon modulator design based on photonic crystal ring resonators**, Zexuan Qiang, Weidong Zhou, The Univ. of Texas at Arlington; Richard A. Soref, Air Force Research Lab.; Zhenqiang Ma, Univ. of Wisconsin/Madison . . . . . [6896-13]

4:10 pm: **Taper control of radially-symmetric gradient-index waveguides in photopolymer**, Robert R. McLeod, Amy C. Sullivan, Univ. of Colorado at Boulder . . . . . [6896-11]

4:30 pm: **Multiphoton photochemical fabrication of optical components and interconnects for the production of multi-optical component assemblies**, Aaron Lewis, Avraham Israel, Hebrew Univ. (Israel) . . . . . [6896-12]

### Tuesday 22 January

#### OPTO 2008 Plenary Session

*Session Chairs:* **Ali Adibi**, Georgia Institute of Technology; **James G. Grote**, Air Force Research Lab.

*Room: Conv. Ctr. A7/A8 · 8:30 to 10:00 am*

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Nanophotonics: from Photonic Crystals to Plasmonics** (*Presentation Only*), Eli Yablonovitch, Univ. of California/Berkeley

9:20 am: **Organic "Plastic" Optoelectronic Devices** (*Presentation Only*), Niyazi Serdar Sariciftci, Johannes Kepler Univ. Linz (Austria)

*See p. 28 for details.*

Coffee Break . . . . . 10:00 to 10:30 am

#### SESSION 4

**Room: Marriott Hotel:**

**San Jose Ballroom Salon I . . . . . Tues. 10:30 am to 12:20 pm**

#### Diffraction Photonics

*Session Chair:* **Christoph M. Greiner**, LightSmyth Technologies, Inc.

10:30 am: **High efficiency diffractive light couplers for light guides** (*Invited Paper*), Pasi Laakkonen, Nanocomp Ltd. (Finland); Samuli Siitonen, Markku Kuittinen, Joensuu Yliopisto (Finland) . . . . . [6896-14]

11:00 am: **Waveguide devices based on mode conversion cavities**, Jacob B. Khurgin, Johns Hopkins Univ. . . . . [6896-15]

11:20 am: **Engineering the spectral response of waveguide Bragg gratings patterned by DUV nanolithography**, Christoph M. Greiner, Dmitri lazikov, Thomas Mossberg, LightSmyth Technologies, Inc.; Anthony Ticknor, Brian McGinnis, Romanas Narevich, NeoPhotonics . . . . . [6896-16]

Wednesday 23 January

SESSION 7

Room: Marriott Hotel: San Jose Ballroom Salon I . . . Wed. 8:40 to 10:00 am

Fiber Communication

Session Chair: Trevor Mark Benson,  
The Univ. of Nottingham (United Kingdom)

8:40 am: **Noise reduction for fiber optic NTSC signal transmission**, Furukawa Rei, Keiji Uehara, Keio Univ. (Japan); Satoshi Takahashi, Akihiro Tagaya, Japan Science and Technology Agency (Japan); Yasuhiro Koike, Keio Univ. (Japan) . . . . . [6896-29]

9:00 am: **Cost effective optical coupling for enhanced rate polymer optical fiber communication**, Jayakrishnan Chandrappan, Institute of Microelectronics (Singapore) . . . . . [6896-30]

9:20 am: **A novel modulation format based on the change of an optical spectrum shape**, Alexander V. Shamray, Alexander Kozlov, Igor Ilichev, Mikhail P. Petrov, A.F. Ioffe Physico-Technical Institute (Russia) . . . . . [6896-31]

9:40 am: **Effect of extrinsic perturbation by transverse pressure, bending and tension birefringence**, Chandrakant M. Jadhao, G.S. College of Khamgaon (India); Deepak S. Dhote, Brijlal Biyani Science College of Amravati (India) . . . . . [6896-32]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 8

Room: Marriott Hotel:  
San Jose Ballroom Salon I . . . . . Wed. 10:30 am to 12:30 pm

Integration Concepts

Session Chair: Yakov Sidorin, Photineer Technology Group

10:30 am: **III-V silicon heterogeneous integration for integrated transmitters and receivers** (*Invited Paper*), Dries Van Thourhout, IMEC (Belgium) . . [6896-23]

11:00 am: **Monolithic integration of the direct band gap material Ga(NAsP) on Si substrate**, Bernardette Kunert, Igor Németh, Timothy B. Adams, Kerstin Volz, Wolfgang Stolz, Philipps-Univ. Marburg (Germany) . . . . . [6896-34]

11:20 am: **Design, fabrication and integration of glass waveguides on a silicon platform**, Juejun Hu, Massachusetts Institute of Technology; Nathan Carlie, Clemson Univ.; Ning-Ning Feng, Massachusetts Institute of Technology; Laeticia Petit, Clemson Univ.; Anuradha Agarwal, Massachusetts Institute of Technology; Kathleen Richardson, Clemson Univ.; Lionel Kimerling, Massachusetts Institute of Technology. . . . . [6896-35]

11:40 am: **SION, SiO<sub>2</sub>:Ge and triplex technologies for large-scale integration circuits: a comparison**, Andrea Melloni, Francesco Morichetti, Raffaella Costa, Giuseppe Cusmai, Politecnico di Milano (Italy) . . . . . [6896-36]

12:00 pm: **Hybrid and monolithic planar light wave circuits** (*Invited Paper*), Ray T. Chen, The Univ. of Texas at Austin . . . . . [6896-37]

Lunch/Exhibition Break . . . . . 12:30 to 2:00 pm

SESSION 9

Room: Marriott Hotel: San Jose Ballroom Salon I . . . . Wed. 2:00 to 3:30 pm

Measurement and Sensorics I

Session Chair: Xudong Fan, Univ. of Missouri/Columbia

2:00 pm: **Polymer microring resonators and their sensor applications** (*Invited Paper*), L. Jay Guo, Univ. of Michigan . . . . . [6896-38]

2:30 pm: **Temperature insensitive refractometer with open top ridge waveguides**, Xiaoli Dai, Communications Research Ctr. Canada (Canada) . . . . . [6896-39]

2:50 pm: **Integrated Raman spectroscopy**, Jorg Hubner, Danmarks Tekniske Univ. (Denmark); Thomas A. Anhoj, Serstech AB (Sweden); Sarah Pedersen, Danmarks Tekniske Univ. (Denmark); Dan A. Zauner, Ignis Photonyx A/S (Denmark); Anders M. Jorgensen, AllSun A/S (Denmark); Gabriela Blagoi, Ole Hansen, Danmarks Tekniske Univ. (Denmark) . . . . . [6896-40]

3:10 pm: **Miniaturized opto-fluidic ring resonator for sensitive label-free viral detection**, Hongying Zhu, Ian M. White, Jonathan D. Suter, Univ. of Missouri/Columbia; Mohammed Zourob, Biophage Pharma Inc. (Canada); Xudong Fan, Univ. of Missouri/Columbia . . . . . [6896-41]

Coffee Break . . . . . 3:30 to 4:00 pm

11:40 am: **Ultra-compact silicon-on-insulator waveguide microspectrometer with sub-wavelength gratings**, Przemek J. Bock, Univ. of Ottawa (Canada) and National Research Council Canada (Canada); Pavel Cheben, Siegfried Janz, Dan-Xia Xu, National Research Council Canada (Canada); Trevor J. Hall, Univ. of Ottawa (Canada) . . . . . [6896-17]

12:00 pm: **Waveguide Bragg gratings with tailored spectral chirps induced by tapered core profiles**, Min-Su Kim, Jung-Jin Ju, Seung-Koo Park, Electronics and Telecommunications Research Institute (South Korea); Myung-Hyun Lee, Sungkyunkwan Univ. (South Korea) . . . . . [6896-18]

Lunch/Exhibition Break . . . . . 12:20 to 1:30 pm

SESSION 5

Room: Marriott Hotel: San Jose Ballroom Salon I . . . . Tues. 1:30 to 3:00 pm

Plasmonics

Session Chair: Pierre Berini, Univ. of Ottawa (Canada)

1:30 pm: **Plasmonics: catalyzing a revolution in chip technology** (*Invited Paper*), Mark L. Brongersma, Stanford Univ. . . . . [6896-19]

2:00 pm: **Surface plasmon-polariton mode amplification in long-range waveguides**, Israel De Leon, Pierre Berini, Univ. of Ottawa (Canada) . [6896-20]

2:20 pm: **Gain-induced switching in metal-dielectric-metal plasmonic waveguides**, Zongfu Yu, Georgios Veronis, Mark L. Brongersma, Shanhui Fan, Stanford Univ. . . . . [6896-21]

2:40 pm: **Waveguide-ring resonator-based photonic components utilizing channel plasmon polaritons**, Valentyn S. Volkov, Sergey I. Bozhevolnyi, Aalborg Univ. (Denmark) . . . . . [6896-22]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 6

Room: Marriott Hotel: San Jose Ballroom Salon I . . . . Tues. 3:30 to 5:40 pm

Ring Resonators

Session Chair: Gualtiero Nunzi-Conti, Istituto di Fisica Applicata Nello Carrara (Italy) and Centro Studi e Ricerche Enrico Fermi (Italy)

3:30 pm: **The emerging field of optomechanics** (*Invited Paper*), Kerry J. Vahala, California Institute of Technology. . . . . [6896-23]

4:00 pm: **Linear and nonlinear control of polarization state using microring**, Gennady Shvets, Chris R. Fietz, The Univ. of Texas at Austin . . . . . [6896-24]

4:20 pm: **Development of versatile waveguide-coupled optofluidic microring resonator devices**, Ian M. White, Scott Lacey, John Gohring, Xudong Fan, Univ. of Missouri/Columbia . . . . . [6896-25]

4:40 pm: **Tunable ring resonators for silicon Raman laser and amplifier applications**, Jonathan Doylend, Oded Cohen, Mindy Lee, Omri Raday, Shengbo Xu, Vanessa Sih, Haisheng Rong, Mario Paniccia, Intel Corp. [6896-26]

5:00 pm: **Waferbonded active/passive vertically coupled microring lasers**, Michael Hamacher, Helmut Heidrich, Ute Troppenz, Fraunhofer-Institut für Nachrichtentechnik Heinrich-Hertz-Institut (Germany); Dimitris Syvridis, Dimitris Alexandropoulos, Spyros Mikroulis, Alexandros Kapsalis, Univ. of Athens (Greece); Chyng Wen Tee, Kevin Williams, Univ. of Cambridge (United Kingdom); Viorel Dragoi, EV Group E. Thallner GmbH (Austria); Marin Alexe, Max-Planck-Institut für Mikrostrukturphysik (Germany); Dana Christea, Mihai Kusko, National Institute for Research and Development in Microtechnologies (Romania) . . . . . [6896-27]

5:20 pm: **Simulation of integrated coupled nonlinear microring resonators all-optical pulse restorer**, Yannick Dumeige, Laura Ghisa, Ngan Nguyen Thi Kim, Patrice Féron, Ecole Nationale Supérieure des Sciences Appliquées et de Technologie (France) . . . . . [6896-28]

OPTO

## SESSION 10

Room: Marriott Hotel: San Jose Ballroom Salon I . . . Wed. 4:00 to 5:10 pm

### Measurement and Sensorics II

Session Chair: **Jean-Emmanuel Broquin**, Ecole Nationale Supérieure d'Electronique et de Radioélectrique de Grenoble (France)

4:00 pm: **Optical field probing in photonic structures by atomic force microscopy** (*Invited Paper*), Sylvain Blaize, Gilles Lérondel, Aurélien Bruyant, Renaud Bachelot, Pascal Royer, Univ. de Technologie de Troyes (France) . . . . . [6896-42]

4:30 pm: **A compact SWIFTS spectrograph with a leaky loop structure**, Bruno Martin, Alain Morand, Pierre Benech, Minatec (France); Gregory Leblond, Univ. de Technologie de Troyes (France); Etienne Le Coarer, Lab. d'Astrophysique de l'Observatoire de Grenoble (France); Sylvain Blaize, Gilles Lérondel, Univ. de Technologie de Troyes (France) . . . . . [6896-44]

4:50 pm: **Integrated waveguide mixer/splitter for lab-on-a-chip applications**, Sanket Goel, James N. McMullin, Univ. of Alberta (Canada) . . . . . [6896-56]

## POSTERS-Wednesday

Room: Civic Auditorium . . . . . Wed. 6:00 to 7:30 pm

*All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.*

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**Innovative design of cassegrain solar concentrator system for indoor illumination utilizing chromatic aberration to filter out ultraviolet and infrared in sunlight**, Allen J. Whang, Bo-Yi Wu, Yi-Yung Chen, National Taiwan Univ. of Science and Technology (Taiwan) . . . . . [6896-45]

**Analysis of light guiding property in light piped based solar concentrator**, Allen J. Whang, National Taiwan Univ. of Science and Technology (Taiwan); Chun-Hsien Chuang, National Taiwan Univ. of Science and Technology; Yi-Yung Chen, National Taiwan Univ. of Science and Technology (Taiwan) . . . . . [6896-46]

**Light collection system unit design via mathematical modeling approach**, Allen J. Whang, Chen-Ming Yu, Jr., Yi-Yung Chen, National Taiwan Univ. of Science and Technology (Taiwan) . . . . . [6896-47]

**Innovative design of parabolic reflector light guiding structure**, Allen J. Whang, Chun-Hsien Tso, Yi-Yung Chen, National Taiwan Univ. of Science and Technology (Taiwan) . . . . . [6896-48]

**Simultaneous confinement of light and fluidics using photonic crystal cladding waveguide**, Yasha Yi, Massachusetts Institute of Technology; Shoji Akiyama, Shin-Etsu Chemical Co., Ltd. (Japan) . . . . . [6896-49]

**SOI microring resonator with wide free spectral range**, Xuan Wang, Magdalena S. Nawrocka, Tao Liu, Roberto R. Panepucci, Florida International Univ. . . . . [6896-50]

**Photorefractive axicons**, Marcos R. R. Gesualdi, Éfeso S. Grigio, Michel Z. Rached, Univ. Federal do ABC (Brazil); Mikiya Muramatsu, Univ. de São Paulo (Brazil) . . . . . [6896-51]

**The modeling of MMI structures for signal processing applications**, Thanh T. Le, L. W. Cahill, La Trobe Univ. (Australia) . . . . . [6896-52]

**A radix 5 base for transmission and storage of information**, Bradley S. Tice, Advanced Human Design . . . . . [6896-53]

**Optoelectronic oscillator moving toward solutions based on polymer materials**, Lam-Duy Nguyen, Bernard A. Journet, Joseph Zyss, Ecole Normale Supérieure de Cachan (France) . . . . . [6896-54]

**Improving the beam quality in LMA fibers**, Emil P. Voiculescu, Univ. Tehnica Cluj-Napocã (Romania); Mircea Hotoleanu, Liekki Oy (Finland); Gabor Csipkes, Univ. Tehnica Cluj-Napocã (Romania) . . . . . [6896-55]

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# Optoelectronic Integrated Circuits X

Conference Chair: **Louay A. Eldada**, DuPont Photonics Technologies; **Ei-Hang Lee**, Inha Univ. (South Korea)

Program Committee: **Yung Jui Chen**, Univ. of Maryland/Baltimore County; **Larry A. Coldren**, Univ. of California/Santa Barbara; **Yeshiahu Fainman**, Univ. of California/San Diego; **Alexei L. Glebov**, Finisar Corp.; **Hans Joachim Heider**, Technische Univ. Hamburg-Harburg (Germany); **Ghassan E. Jabbour**, Arizona State Univ.; **Richard M. Osgood**, Columbia Univ.; **Manijeh Razeghi**, Northwestern Univ.; **Giancarlo C. Righini**, Istituto di Fisica Applicata Nello Carrara (Italy); **Robert Scarmozzino**, RSoft Design Group, Inc.

## Monday 21 January

### SESSION 1

Room: Conv. Ctr. K ..... Mon. 1:00 to 3:00 pm

#### Trends in OEICs

Session Chair: **Louay A. Eldada**, DuPont Photonics Technologies

1:00 pm: **Silicon integrated photonics: is it the answer?** (*Invited Paper*), P. Daniel Dapkus, Anthony F. J. Levi, Univ. of Southern California. . . . [6897-01]

1:30 pm: **High-index-contrast chalcogenide waveguides** (*Invited Paper*), Christi K. Madsen, Texas A&M Univ. . . . . [6897-02]

2:00 pm: **Photosensitivity in phosphate glasses and its use for integrated optic and fiber lasers** (*Invited Paper*), Seppo K. Honkanen, Helsinki Univ. of Technology (Finland); Axel Schülzgen, College of Optical Sciences/The Univ. of Arizona; Jacques Albert, Carleton Univ. (Canada) . . . . . [6897-03]

2:30 pm: **Ultra-high resolution and compact volume holographic spectrometers** (*Invited Paper*), Ali Adibi, Georgia Institute of Technology . . . . . [6897-04]

Coffee Break . . . . . 3:00 to 3:20 pm

### SESSION 2

Room: Conv. Ctr. K ..... Mon. 3:20 to 6:20 pm

#### Nanoengineered OEICs

Session Chair: **Ei-Hang Lee**, Inha Univ. (South Korea)

3:20 pm: **Photonic crystal, photonic wire and metamaterial technology and devices** (*Invited Paper, Presentation Only*), Richard M. De La Rue, Univ. of Glasgow (United Kingdom) . . . . . [6897-05]

3:50 pm: **Nanophotonics and plasmonics for integrated optical systems** (*Invited Paper*), Maziar P. Nezhad, Yeshiahu Fainman, Univ. of California/San Diego . . . . . [6897-06]

4:20 pm: **Metamaterial nanophotonics: a new paradigm for optical nanocircuits** (*Invited Paper*), Nader Engheta, Univ. of Pennsylvania. . [6897-07]

4:50 pm: **Propagation of long-range surface-plasmon-polaritons in an asymmetric double-metal waveguide**, Seok-Ho Song, Yanghyun Joo, Myongjin Jeong, Junseop Lee, Hanyang Univ. (South Korea); Suntak Park, Electronics and Telecommunications Research Institute (South Korea) [6897-08]

5:10 pm: **Analysis of a novel surface plasmon resonance sensor with waveguide-typed mirror**, Geum-Yoon Oh, Doo-Gun Kim, Woon-Kyung Choi, Young-Wan Choi, Chung-Ang Univ. (South Korea) . . . . . [6897-09]

5:30 pm: **Coupling performance of waveguide grating couplers with non-uniform duty ratio**, Jeong-Su Yang, Jun-Ho Sung, Beom-Hoan O, Seung Gol Lee, Ei-Hang Lee, Inha Univ. (South Korea) . . . . . [6897-10]

5:50 pm: **Two-dimensional photonic-crystal fabrication and results in silicon and GaN** (*Invited Paper*), Huub W. Salemink, Technische Univ. Delft (Netherlands) . . . . . [6897-11]

## Tuesday 22 January

### OPTO 2008 Plenary Session

Session Chairs: **Ali Adibi**, Georgia Institute of Technology; **James G. Grote**, Air Force Research Lab.

Room: Conv. Ctr. A7/A8 · 8:30 to 10:00 am

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Nanophotonics: from Photonic Crystals to Plasmonics** (*Presentation Only*), Eli Yablonovitch, Univ. of California/Berkeley

9:20 am: **Organic "Plastic" Optoelectronic Devices** (*Presentation Only*), Niyazi Serdar Sariciftci, Johannes Kepler Univ. Linz (Austria)

See p. 28 for details.

Coffee Break . . . . . 10:00 to 10:30 am

### SESSION 3

Room: Conv. Ctr. K ..... Tues. 10:30 am to 12:00 pm

#### Hybrid OEICs

Session Chair: **Ei-Hang Lee**, Inha Univ. (South Korea)

10:30 am: **Convergence and integration: enabling drivers** (*Invited Paper*), Simon Wingar, National Research Council Canada (Canada) . . . . . [6897-12]

11:00 am: **Chip scale integrated planar photonics** (*Invited Paper*), Nan M. Jokerst, Sang-Yeon Cho, Martin A. Brooke, Duke Univ. . . . . [6897-13]

11:30 am: **Integrated optical isolation: advances and perspective** (*Invited Paper*), Richard M. Osgood, Jr., Iwei Hsieh, Jerry I. Dadap, Jr., Nicolae C. Panoiu, Columbia Univ. . . . . [6897-14]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

### SESSION 4

Room: Conv. Ctr. B2 ..... Tues. 1:30 to 3:10 pm

#### Optical Interconnect Technologies I

Session Chair: **Alexei L. Glebov**, Finisar Corp.

Joint Session with Conference 6899: Photonics Packaging, Integration, and Interconnects VIII

1:30 pm: **Low-cost high-density optical parallel link modules and optical backplane for the last 1-meter regime applications** (*Invited Paper*), Takashi Mikawa, National Institute of Advanced Industrial Science and Technology (Japan) . . . . . [6899-01]

2:00 pm: **Fully embedded optical interconnects based on optical bus architecture for large-size printed circuit boards** (*Invited Paper*), Alan X. Wang, Omega Optics, Inc. . . . . [6899-02]

2:30 pm: **E<sub>n</sub>Y<sub>2-x</sub>SiO<sub>5</sub> nanocrystals for efficient high gain per length material**, Kiseok Suh, Heeyoung Go, Joonghoon Shin, Korea Advanced Institute of Science and Technology (South Korea) . . . . . [6897-15]

2:50 pm: **Roadmap for optical interconnects: consumer handhelds to high-performance computers**, Louay A. Eldada, DuPont Photonics Technologies . . . . . [6897-16]

Coffee Break . . . . . 3:10 to 3:30 pm

OPTO

## SESSION 5

Room: Conv. Ctr. B2 ..... Tues. 3:30 to 5:10 pm

### Optical Interconnect Technologies II

Session Chair: **Louay A. Eldada**, DuPont Photonics Technologies

Joint Session with Conference 6899: Photonics Packaging, Integration, and Interconnects VIII

3:30 pm: **Comparison of bandwidth limits for on-card electrical and optical interconnects for 100 Gb/s and beyond** (*Invited Paper*), Petar K. Pepeljugoski, Mark B. Ritter, Jeffrey A. Kash, Fuad E. Doany, Clint Schow, Young Kwark, Lei Shan, Christian Baks, IBM Thomas J. Watson Research Ctr. .... [6897-17]

4:00 pm: **Driver-receiver combined optical transceivers modules for bidirectional optical interconnection** (*Invited Paper*), Hyo-Hoon Park, Sae-Kyoung Kang, Do-Won Kim, Tae-Woo Lee, Information and Communications Univ. (South Korea) ..... [6897-18]

4:30 pm: **Toward flexible routing schemes for polymer optical interconnects integrated on printed circuit boards**, Nina Hendrickx, Geert Van Steenberge, Erwin Bosman, Univ. Gent (Belgium); Jürgen Van Erps, Hugo Thienpont, Vrije Univ. Brussel (Belgium); Peter Van Daele, Univ. Gent (Belgium) ..... [6899-03]

4:50 pm: **Demonstration of end-to-end interboard optical interconnects using flexible polymer optical bus**, Yin-Jung Chang, Intel Corp.; Daniel Guidotti, Lixi Wan, Gee-Kung Chang, Georgia Institute of Technology [6899-04]

## Wednesday 23 January

## SESSION 6

Room: Conv. Ctr. K ..... Wed. 8:00 to 10:20 am

### Silicon OEICs

Session Chair: **El-Hang Lee**, Inha Univ. (South Korea)

8:00 am: **Spontaneous Raman emission in silicon** (*Invited Paper*), Bahram Jalali, Univ. of California/Los Angeles. .... [6897-19]

8:30 am: **Monolithic integration of photonic and electronic circuits in a CMOS process** (*Invited Paper*), Attila Mekis, Sherif Abdalla, Behnam Analui, Steffen Gloeckner, Drew Guckenberger, Roger Koumans, Daniel Kucharski, Yi Liang, Gianlorenzo Masini, Sina Mirsaidi, Adithyaram Narasimha, Thierry Pinguet, Vikram Sadagopan, Brian Welch, Joe White, Jeremy Witzens, Luxtera Inc. .... [6897-20]

9:00 am: **Silicon microspheres for integrated photonics** (*Invited Paper*), Ali Serpengüzel, Koç Univ. (Turkey) ..... [6897-21]

9:30 am: **Materials and devices for compact optical amplification in Si photonics** (*Invited Paper*), Jung H. Shin, Monn-Seung Yang, Jee-Soo Chang, Shin-Young Lee, Kiseok Suh, Korea Advanced Institute of Science and Technology (South Korea); Philippe M. Fauchet, Han G. Yoo, Yijing Fu, Univ. of Rochester ..... [6897-22]

10:00 am: **Fabrication and characterization of Er doped silicon-rich-silicon nitride(SRSN) microdisks**, Jee-Soo Chang, Myung-Ki Kim, Yong-Hee Lee, Joonghoon Shin, Korea Advanced Institute of Science and Technology (South Korea) ..... [6897-23]

Coffee Break ..... 10:20 to 10:40 am

## SESSION 7

Room: Conv. Ctr. K ..... Wed. 10:40 am to 12:30 pm

### Polymer and Organic-Inorganic OEICs

Session Chair: **Louay A. Eldada**, DuPont Photonics Technologies

10:40 am: **Integration of silicon photonics with nonlinear optical polymers** (*Invited Paper*), Axel Scherer, California Institute of Technology ..... [6897-24]

11:10 am: **Hard and flexible optical printed circuit board (O-PCB) using micro/nano-imprinting of polymer optical waveguides** (*Invited Paper*), El-Hang Lee, Inha Univ. (South Korea) ..... [6897-25]

11:40 am: **Polymer waveguide photonic integrated circuits** (*Invited Paper*), Toshikuni Kaino, Tohoku Univ. (Japan) ..... [6897-26]

12:10 pm: **Polymer-cladded athermal high-index-contrast waveguides**, W. Ye, M. Jurgens, L. C. Kimerling, Massachusetts Institute of Technology; L. A. Eldada, DuPont Photonics Technologies; R. Sun, Massachusetts Institute of Technology; P. Dong, Cornell Univ. .... [6897-42]

Lunch/Exhibition Break ..... 12:30 to 1:30 pm

## SESSION 8

Room: Conv. Ctr. K ..... Wed. 1:30 to 3:10 pm

### Sensing and Imaging OEICs

Session Chair: **Mario Dagenais**, Univ. of Maryland/College Park

1:30 pm: **Type-II InAs/GaSb superlattices focal plane arrays** (*Invited Paper*), Manijeh Razeghi, Pierre-Yves Delaunay, Binh Minh Nguyen, Darin M. Hoffman, Andrew D. Hood, Northwestern Univ. .... [6897-27]

2:00 pm: **Comparison of the optical performance of bare image sensor die and sensors packaged at the wafer level and protected by a cover glass**, Giles Humpston, Tessera, Inc. .... [6897-28]

2:20 pm: **Mega-pixel PQR laser chips for interconnect, ITS, and biocell-tweezers OEIC** (*Invited Paper*), Odae Kwon, Pohang Univ. of Science and Technology (South Korea) ..... [6897-29]

2:50 pm: **Design of a silicon micro-ring resonator for improved optical bio-sensing sensitivity and selectivity**, Hyun-Shik Lee, Beom-Hoan O, Seung-Gol Lee, El-Hang Lee, Inha Univ. (South Korea) ..... [6897-30]

Coffee Break ..... 3:10 to 3:30 pm

## SESSION 9

Room: Conv. Ctr. K ..... Wed. 3:30 to 5:10 pm

### Switching and Modulation OEICs

Session Chair: **Manijeh Razeghi**, Northwestern Univ.

3:30 pm: **Semiconductor optical amplifier switch matrices for optical header recognition** (*Invited Paper*), Mario Dagenais, Geunmin Ryu, Si-Hyung Cho, Simarjeet Saini, Univ. of Maryland/College Park; Farzam Toudeh-Fallah, Paul Donner, Russ Gyurek, Cisco Systems Inc. .... [6897-31]

4:00 pm: **Metro area network optical routers and technologies: FOADM, BOADM, ROADM, and TOADM** (*Invited Paper*), Louay A. Eldada, DuPont Photonics Technologies ..... [6897-32]

4:30 pm: **10 GHz dual loop opto-electronic oscillator without RF-amplifiers**, Weimin Zhou, Olukayode Okusaga, Army Research Lab.; David Howe, Craig Nelson, National Institute of Standards and Technology; Gary M. Carter, Univ. of Maryland/Baltimore County ..... [6897-33]

4:50 pm: **Transmission experiment of broadband optical feedforward transmitter in radio-over-fiber system**, Yon Tae Moon, Jun Woo Jang, Woon-Kyung Choi, Young-Wan Choi, Chung-Ang Univ. (South Korea) ..... [6897-34]



**Posters-Wednesday**

**Room: Civic Auditorium. . . . . Wed. 6:00 to 7:30 pm**

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Wednesday morning starting at 10:00 am in the Civic Auditorium, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

**Photonic crystal based GE-PON triplexer using point defects**, Dae-Seo Park, Inha Univ. (South Korea) and Optics and Photonics Elite Research Academy (South Korea); Beom-Hoan O, Se-Geun Park, El-Hang Lee, Seung Gol Lee, Inha Univ. (South Korea) . . . . . [6897-35]

**Research of different structure integrated photodetector and its OEIC in standard CMOS technology**, Xiang Cheng, Xiamen Univ. (China); Jiantao Bian, Jiangsu Polytechnic Univ. (China); Wei Chen, Chao Chen, Xiamen Univ. (China) . . . . . [6897-36]

**Bio-signal processing using a novel lock-in detection technique for the portable bio-optical systems**, In-Il Jung, Young-Wan Choi, Doo-Gun Kim, Woonk-Kyung Choi, Do-Gyun Kim, Chung-Ang Univ. (South Korea) . . [6897-37]

**Fabrication and characterization of multilayer porous silicon filter considered the natural-drifts**, Hae-Dong Yim, Chul-Hyun Choi, Min Woo Lee, Bo-Soon Kim, Jun-Ho Sung, Beom-Hoan O, Seung Gol Lee, Se-Geun Park, El-Hang Lee, Inha Univ. (South Korea) . . . . . [6897-38]

**Fabrication of high quality silicon mold by Cl<sub>2</sub>-based dry etching**, Bo-Soon Kim, Jun-Ho Sung, Min-Woo Lee, Chul-Hyun Choi, Hae-Dong Yim, El-Hang Lee, Se-Geun Park, Seung-Gol Lee, Beom-Hoan O, Inha Univ. (South Korea) . . . . . [6897-39]

**Design of polarizing beam splitter using maximum bandwidth photonic bandgap**, Dong-Jin Lee, Jun-Ho Sung, Chul-Hyun Choi, Min-Woo Lee, Bo-Soon Kim, Jeong-Su Yang, El-Hang Lee, Se-Geun Park, Seung-Gol Lee, Beom-Hoan O, Inha Univ. (South Korea) . . . . . [6897-40]

**The effect of the KOH and KOH/IPA etching on the surface roughness of the silicon mold to be used for polymer waveguide imprinting**, Shinmo An, Hyun-Shik Lee, Seung-Gol Lee, Beom-Hoan O, Se-Guen Park, El-Hang Lee, Inha Univ. (South Korea) . . . . . [6897-41]

**Make time for the  
Photonics West Exhibition**  
San Jose Convention Center, Exhibition Halls 1-3,  
Exhibition Foyer and South Halls 1-2

Tuesday 22 January . . . . . 10:00 am to 5:00 pm  
Wednesday 23 January . . . . . 10:00 am to 5:00 pm  
Thursday 24 January . . . . . 10:00 am to 4:00 pm

**See new applications in action at the  
Product Demonstrations.**  
See pp. 37-39 for details.



# Silicon Photonics III

Conference Chair: **Joel A. Kubby**, Univ. of California/Santa Cruz; **Graham T. Reed**, Univ. of Surrey (United Kingdom)

Program Committee: **L. W. Cahill**, La Trobe Univ. (Australia); **Philippe M. Fauchet**, Univ. of Rochester; **Cary Gunn**, Luxtera Inc.; **Siegfried Janz**, National Research Council Canada (Canada); **Andrew Peter Knights**, McMaster Univ. (Canada); **Laura Maria Lechuga**, Ctr. Nacional de Microelectrónica (Spain); **Sebania Libertino**, Istituto per la Microelettronica e Microsistemi (Italy); **Mario J. Paniccia**, Intel Corp.; **Andrew W. Poon**, Hong Kong Univ. of Science and Technology (Hong Kong China); **Dan-Xia Xu**, National Research Council Canada (Canada)

## Monday 21 January

### SESSION 1

Room: Conv. Ctr. A1 ..... Mon. 8:10 am to 12:10 pm

#### EPIC

Session Chair: **Joel A. Kubby**, Univ. of California/Santa Cruz

8:10 am: **Photonic crystal slow light devices in silicon** (*Invited Paper*), Thomas F. Krauss, Univ. of St. Andrews (United Kingdom) ..... [6898-55]

8:50 am: **Optical modulation techniques for analog signal processing** (*Invited Paper*), Douglas M. Gill, Mahmoud S. Rasras, Kun-Yii Tu, Young-Kai Chen, Alice E. White, Sanjay S. Patel, Alcatel-Lucent; Anthony Kopa, Alyssa B. Apsel, Cornell Univ.; Daniel N. Carothers, Andrew T. Pomerene, Robert Komoscai, James Beattie, BAE Systems North America; Mark A. Beals, Jurgen Michel, Jifeng Liu, Lionel C. Kimerling, Massachusetts Institute of Technology ..... [6898-52]

9:30 am: **Process flow innovations for active photonic device ontegration in CMOS** (*Invited Paper*), Mark A. Beals, Jurgen Michel, Jifeng Liu, Donghwan H. Ahn, Daniel K. Sparacin, Rong Sun, Ching-yin Hong, Lionel C. Kimerling, Massachusetts Institute of Technology; Andrew Pomerene, Daniel Carothers, James Beattie, BAE Systems; Anthony Kopa, Alyssa Apsel, Cornell Univ.; Mahmoud Rasras, Douglas M. Gill, Sanjay S. Patel, Kun-Yii Tu, Young K. Chen, Alice E. White, Alcatel-Lucent ..... [6898-03]

Coffee Break ..... 10:10 to 10:30 am

10:30 am: **40-Gbps monolithically integrated transceivers in CMOS photonics** (*Invited Paper*), Thierry J. Pinguet, Behnam Analui, Steffen Gloeckner, Gianlorenzo Masini, Vikram Sadagopan, Luxtera Inc. .... [6898-01]

11:10 am: **Photonic analog-to-digital conversion with electronic-photonic integrated circuits** (*Invited Paper*), Franz X. Kärtner, Reja Amataya, Mohammad Aranghini, Hyunil Byun, Jeff Chen, Marcus Dahlem, Nicole DiLello, Fuwan Gan, Charles W. Holzwarth, Judy L. Hoyt, Erich P. Ippen, Anatoly Khilo, Jungwon Kim, Ali Motamedi, Matthew J. Park, Jason S. Orcutt, Michael H. Perrott, Milos A. Popovic, Rajeev J. Ram, Henry I. Smith, Guirong Zhou, Massachusetts Institute of Technology ..... [6898-02]

11:50 am: **Modeling the responsivity of defect mediated detectors suitable for highly integrated silicon photonic devices**, Andrew P. Knights, D. Logan, Paul E. Jessop, McMaster Univ. (Canada); Russell M. Gwilliam, Univ. of Surrey (United Kingdom) ..... [6898-54]

Lunch Break ..... 12:10 to 1:30 pm

### SESSION 2

Room: Conv. Ctr. A1 ..... Mon. 1:30 to 3:10 pm

#### Integration

Session Chair: **Joel A. Kubby**, Univ. of California/Santa Cruz

1:30 pm: **Ge photodetector integrated in CMOS photonic circuits** (*Invited Paper*), Gianlorenzo Masini, Giovanni Capellini, Jeremy Witzens, Cary Gunn, Luxtera Inc. .... [6898-04]

2:10 pm: **Toward long wave optoelectronic integration** (*Invited Paper*), Richard A. Soref, Air Force Research Lab. .... [6898-05]

2:50 pm: **Efficient Si modulator with recessed electrodes**, Dawei Zheng, B. Thomas Smith, Mehdi Asghari, Kotura, Inc. .... [6898-06]

Coffee Break ..... 3:10 to 3:30 pm

### SESSION 3

Room: Conv. Ctr. A1 ..... Mon. 3:30 to 5:30 pm

#### Modulators

Session Chair: **Graham T. Reed**, Univ. of Surrey (United Kingdom)

3:30 pm: **Circular grating resonators as nanophotonic modulators** (*Invited Paper*), Nikolaj Moll, Sophie Schönenberger, Thilo Stöferle, Rainer F. Mahrt, Bert J. Offrein, IBM Zürich Research Lab. (Switzerland); Thorsten Wahlbrink, Jens Bolten, Thomas Mollenhauer, Christian Moormann, AMO GmbH (Germany) ..... [6898-07]

4:10 pm: **Evolution of optical modulators in silicon and novel ways of fabrication** (*Invited Paper*), Frederic Y. Gardes, Graham T. Reed, Goran Z. Mashanovich, Univ. of Surrey (United Kingdom); Andrew P. Knights, McMaster Univ. (Canada) ..... [6898-08]

4:50 pm: **High-speed silicon modulator and photonic integration** (*Invited Paper*), Ansheng Liu, Intel Corp. .... [6898-09]

## Tuesday 22 January

### OPTO 2008 Plenary Session

Session Chairs: **Ali Adibi**, Georgia Institute of Technology; **James G. Grote**, Air Force Research Lab.

Room: Conv. Ctr. A7/A8 · 8:30 to 10:00 am

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Nanophotonics: from Photonic Crystals to Plasmonics** (*Presentation Only*), Eli Yablonovitch, Univ. of California/Berkeley

9:20 am: **Organic "Plastic" Optoelectronic Devices** (*Presentation Only*), Niyazi Serdar Sariciftci, Johannes Kepler Univ. Linz (Austria)

See p. 28 for details.

Coffee Break ..... 10:00 to 10:30 am

### SESSION 4

Room: Conv. Ctr. A1 ..... Tues. 10:30 am to 12:10 pm

#### Emitters

Session Chair: **Philippe M. Fauchet**, Univ. of Rochester

10:30 am: **Increasing the efficiency of P+NP injection-avalanche Si CMOS LED's (450nm-750nm) by means of depletion layer profiling and reach through techniques**, Lukas W. Snyman, Tshwane Univ. of Technology (South Africa); Monuko du Plessis, Univ. of Pretoria (South Africa) ..... [6898-10]

10:50 am: **Engineering the spontaneous emission of silicon quantum dots**, Rohan D. Kekatpure, Mark L. Brongersma, Stanford Univ. .... [6898-11]

11:10 am: **Stark effect at dislocations in Si for modulation of a 1.5-µm light emitter**, Martin Kittler, IHP Microelectronics (Germany) ..... [6898-12]

11:30 am: **Influence of nanocrystal distribution on electroluminescence from Si<sup>+</sup>-implanted SiO<sub>2</sub> thin films**, Liang Ding, Nanyang Technological Univ. (Singapore) ..... [6898-13]

11:50 am: **A comparative study on the dielectric functions of isolated Si nanocrystals and densely-stacked Si nanocrystal layer embedded in SiO<sub>2</sub> synthesized with ion implantation**, Liang Ding, Nanyang Technological Univ. (Singapore) ..... [6898-14]

Lunch/Exhibition Break ..... 12:10 to 1:30 pm

**SESSION 5**

**Room: Conv. Ctr. A1 . . . . . Tues. 1:30 to 3:30 pm**

**Silicon Photonics I**

*Session Chair: Philippe M. Fauchet, Univ. of Rochester*

Joint session with Conference 6909: Novel In-Plane Semiconductor Lasers VII

1:30 pm: **A monolithic integrated low-threshold Raman silicon laser** (*Invited Paper*), Haisheng Rong, Shengbo Xu, Intel Corp.; Oded Cohen, Omri Raday, Intel Corp. (Israel); Mario J. Paniccia, Intel Corp. . . . . [6898-15]

2:00 pm: **Silicon nanocrystals and Er coupled to silicon nanocrystals for lasers and amplifiers** (*Invited Paper*), Nicola Daldosso, Lorenzo Pavesi, Zeno Gaburro, Univ. degli Studi di Trento (Italy) . . . . . [6898-16]

2:30 pm: **Monolithically integrated III-Sb diode lasers on miscut Si substrates** (*Invited Paper*), Diana L. Huffaker, Ganesh Balakrishnan, Univ. of California/Los Angeles; A. Jallipalli, M. N. Kutty, S. Huang, Larry R. Dawson, The Univ. of New Mexico . . . . . [6909-21]

3:00 pm: **On-chip integration of quantum dot lasers with waveguides and modulators on Si** (*Invited Paper*), Pallab K. Bhattacharya, Jun Yang, Univ. of Michigan . . . . . [6909-22]

Coffee Break . . . . . 3:30 to 4:00 pm

**SESSION 6**

**Room: Conv. Ctr. A1 . . . . . Tues. 4:00 to 5:30 pm**

**Silicon Photonics II**

*Session Chair: Mario J. Paniccia, Intel Corp.*

Joint session with Conference 6909: Novel In-Plane Semiconductor Lasers VII

4:00 pm: **Electrically injected InP microdisk lasers integrated with nanophotonic SOI circuits** (*Invited Paper*), Joris Van Campenhout, Univ. Gent (Belgium); Pedro Rojo-Romeo, Philippe Regreny, Christian Seassal, Ecole Centrale de Lyon (France); Dries Van Thourhout, Univ. Gent (Belgium); Léa Di Cioccio, Commissariat à l'Energie Atomique (France); Chrystelle Lagahe-Blanchard, TRACIT Technologies (France); Jean-Marc Fedeli, Commissariat à l'Energie Atomique (France); Roel G. Baets, Univ. Gent (Belgium) . . . . [6898-17]

4:30 pm: **Recess integration of micro-cleaved laser diode platelets with dielectric waveguides on silicon** (*Invited Paper*), Clifton G. Fonstad, Jr., Joseph Rumpfer, Edward Barkley, Shaya Famenini, James Perkins, Massachusetts Institute of Technology. . . . . [6909-23]

5:00 pm: **Integrated AlGaInAs-silicon evanescent racetrack laser and photodetector** (*Invited Paper*), Alexander W. Fang, Univ. of California/Santa Barbara; Richard Jones, Intel Corp.; Hyundai Park, Univ. of California/Santa Barbara; Oded Cohen, Omri Raday, Intel Corp. (Israel); Mario J. Paniccia, Intel Corp.; John E. Bowers, Univ. of California/Santa Barbara . . . . . [6898-18]

**Wednesday 23 January**

**SESSION 7**

**Room: Conv. Ctr. A1 . . . . . Wed. 8:10 to 10:10 am**

**Waveguides I**

*Session Chair: Andrew W. Poon, Hong Kong Univ. of Science and Technology (Hong Kong China)*

8:10 am: **Strategies for realization of strong-confinement microphotonic devices** (*Invited Paper*), Tymon Barwicz, Massachusetts Institute of Technology and IBM Thomas J. Watson Research Ctr.; Milos A. Popovic, Michael R. Watts, Peter T. Rakich, Charles W. Holzwarth, Franz X. Kärtner, Erich I. Ippen, Henry I. Smith, Massachusetts Institute of Technology . . . . . [6898-19]

8:50 am: **Segmented and slotted waveguides for high-speed electro-optic modulation**, Guangxi Wang, Tom W. Baehr-Jones, Michael Hochberg, Jingqing Huang, Axel Scherer, California Institute of Technology. . . . . [6898-20]

9:10 am: **Photon confinement in multislot waveguides**, Yijing Fu, Dan Railey, Han G. Yoo, Philippe M. Fauchet, Univ. of Rochester . . . . . [6898-21]

9:30 am: **Proton beam writing of waveguides in bulk silicon**, Ee Jin Teo, Andrew A. Bettiol, National Univ. of Singapore (Singapore); Pengyuan Yang, Graham T. Reed, Univ. of Surrey (United Kingdom); Mark B. H. Breese, National Univ. of Singapore (Singapore) . . . . . [6898-22]

9:50 am: **Sub-micron optical waveguides for silicon photonics formed via the local oxidation of silicon (LOCOS)**, Frederic Y. Gardes, Graham T. Reed, Univ. of Surrey (United Kingdom); Andrew P. Knights, McMaster Univ. (Canada); Goran Z. Mashanovich, David Thomson, Univ. of Surrey (United Kingdom); Paul E. Jessop, McMaster Univ. (Canada); Lynda K. Rowe, Carleton Univ. (Canada); Sarah M. McFaul, Doug M. Bruce, McMaster Univ. (Canada); N. Garry Tarr, Carleton Univ. (Canada) . . . . . [6898-23]

Coffee Break . . . . . 10:10 to 10:30 am

**SESSION 8**

**Room: Conv. Ctr. A1 . . . . . Wed. 10:30 am to 12:10 pm**

**Waveguides II**

*Session Chair: Andrew W. Poon, Hong Kong Univ. of Science and Technology (Hong Kong China)*

10:30 am: **Fiber on a chip: nonlinear optics for data communication via silicon photonic wires** (*Invited Paper*), Richard M. Osgood, Jr., Xiaogang Chen, Iwei Hsieh, Jerry I. Dadap, Jr., Nicolae C. Panoiu, Columbia Univ.; William M. J.Green, Yurii G. A.Vlasov, IBM Thomas J. Watson Research Ctr. . . . [6898-24]

11:10 am: **Silicon waveguides for the mid-infrared wavelength region**, Goran Z. Mashanovich, Pengyuan Yang, Univ. of Surrey (United Kingdom); Stevan Stankovic, Univ. of Belgrade (Serbia and Montenegro); Ee Jin Teo, National Univ. of Singapore (Singapore); Jasna V. Crnjanski, Univ. of Belgrade (Serbia and Montenegro); Georg Pucker, Fondazione Bruno Kessler (Italy); William R. Headley III, Univ. of Surrey (United Kingdom); Andrew A. Bettiol, Mark B. H. Breese, National Univ. of Singapore (Singapore); Graham T. Reed, Univ. of Surrey (United Kingdom) . . . . . [6898-25]

11:30 am: **Leakage studies on SOI slot waveguide structures**, Paul Müllner, Norman Finger, Rainer Hainberger, ARC Seibersdorf Research GmbH (Austria) . . . . . [6898-26]

11:50 am: **Low-temperature amorphous silicon based photonic crystal technology**, Khadijeh Bayat, Sujeet K. Chaudhuri, Saffiedin Safavi-Naeini, Univ. of Waterloo (Canada). . . . . [6898-27]

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

**SESSION 9**

**Room: Conv. Ctr. A1 . . . . . Wed. 1:30 to 3:10 pm**

**Waveguides III**

*Session Chair: L. W. Cahill, La Trobe Univ. (Australia)*

1:30 pm: **Silicon microsphere photonics**, Ali Serpengüzel, Koç Univ. (Turkey) . . . . . [6898-28]

1:50 pm: **Optical solitons in a silicon waveguide**, Jidong Zhang, Qiang Lin, Giovanni Piredda, Robert W. Boyd, Govind P. Agrawal, Philippe M. Fauchet, Univ. of Rochester. . . . . [6898-29]

2:10 pm: **Nonlinear optics in silicon-polymer systems**, Michael Hochberg, California Institute of Technology and Univ. of Washington; Tom W. Baehr-Jones, Guangxi Wang, Axel Scherer, California Institute of Technology[6898-30]

2:30 pm: **Vertically integrated multimode interferometers for 3D photonic circuits in SOI**, Chris J. Brooks, Andrew P. Knights, Paul E. Jessop, McMaster Univ. (Canada) . . . . . [6898-31]

2:50 pm: **Experimental demonstration of waveguide-coupled corner-cut square resonators**, Elton Marchena, Shouyuan Shi, Dennis W. Prather, Univ. of Delaware . . . . . [6898-32]

Coffee Break . . . . . 3:10 to 3:30 pm

OPTO

# Conference 6898

## SESSION 10

Room: Conv. Ctr. A1 ..... Wed. 3:30 to 5:30 pm

### Interconnects

Session Chair: **L. W. Cahill**, La Trobe Univ. (Australia)

3:30 pm: **A nanophotonic interconnect for high-performance many-core computation** (*Invited Paper*), Raymond G. Beausoleil, Hewlett-Packard Labs. .... [6898-33]

4:10 pm: **Cascaded active silicon microresonator array cross-connect circuits for WDM networks-on-chip** (*Invited Paper*), Andrew W. Poon, Fang Xu, Xianshu Luo, Hong Kong Univ. of Science and Technology (Hong Kong China) ..... [6898-34]

4:50 pm: **Power efficient photonic networks on chip** (*Invited Paper*), Keren Bergman, Columbia Univ. .... [6898-35]

## POSTERS-Wednesday

Room: Civic Auditorium. .... Wed. 6:00 to 7:30 pm

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Wednesday morning starting at 10:00 am in the Civic Auditorium, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

**Porous silicon surface feature size estimation using the reflectance spectrum**, Christopher G. Lowrie, Susan K. Earles, Florida Institute of Technology ..... [6898-46]

**Optical properties of  $\beta$ -FeSi<sub>2</sub> on Si (100) inclined substrate**, Shin-Ichiro Uekusa, Hiroyasu Takada, Meiji Univ. (Japan) ..... [6898-47]

**Silicon photomultiplier technology comparison**, J. Carlton Jackson, SensL (Ireland) ..... [6898-48]

**Optoelectronic Si-Ge-Sn based device**, Radek Roucka, Shui-Qing Yu, John Tolle, Yanyan Fang, Song-Nan Wu, Jose Menendez, John Kouvetakis, Arizona State Univ. .... [6898-49]

## Thursday 24 January

## SESSION 11

Room: Conv. Ctr. A1 ..... Thurs. 8:10 to 10:10 am

### Detectors

Session Chair: **Graham T. Reed**, Univ. of Surrey (United Kingdom)

8:10 am: **Ion implantation in silicon waveguides for nonlinear effective length enhancement and power monitoring applications** (*Invited Paper*), Hon K. Tsang, The Chinese Univ. of Hong Kong (Hong Kong China). .... [6898-36]

8:50 am: **Ge on Si photodetectors integrated with Si waveguides** (*Invited Paper*), Laurent Vivien, Mathieu Rouviere, Univ. Paris-Sud II (France); Jean-Marc Fedeli, Commissariat à l'Energie Atomique (France); Delphine Marris-Morini, Eric Cassan, Juliette Mangeney, Paul Crozat, Univ. Paris-Sud II (France); Jean-François Damlencourt, Commissariat à l'Energie Atomique (France); Xavier Le Roux, Univ. Paris-Sud II (France); Loubna El Melhaoui, Commissariat à l'Energie Atomique (France); Suzanne C. Laval, Univ. Paris-Sud II (France) ..... [6898-37]

9:30 am: **Silicon evanescent photodetectors** (*Invited Paper*), Hyundai Park, Alexander W. Fang, Univ. of California/Santa Barbara; Richard Jones, Intel Corp.; Oded Cohen, Intel Corp. (Israel); Mario J. Paniccia, Intel Corp.; John E. Bowers, Univ. of California/Santa Barbara ..... [6898-38]

Coffee Break ..... 10:10 to 10:30 am

## SESSION 12

Room: Conv. Ctr. A1 ..... Thurs. 10:30 to 11:50 am

### Lab-on-a-Chip I

Session Chair: **Adam S. Densmore**, National Research Council Canada (Canada)

10:30 am: **Fabrication methods for compact atomic spectroscopy** (*Invited Paper*), Aaron R. Hawkins, John F. Hulbert, Brandon T. Carroll, Brigham Young Univ.; Bin Wu, Holger Schmidt, Univ. of California/Santa Cruz ..... [6898-39]

11:10 am: **Hydrogen sensor using optical reflectance from porous silicon with a palladium thin film**, Christopher G. Lowrie, Florida Institute of Technology ..... [6898-40]

11:30 am: **Fluorescence correlation spectroscopy of single molecules on an optofluidic chip** (*Invited Paper*), Holger Schmidt, Sergei Kuehn, Mikhail I. Rudenko, David W. Deamer, Univ. of California/Santa Cruz; Evan J. Lunt, Brian S. Phillips, Aaron R. Hawkins, Brigham Young Univ. .... [6898-41]

Lunch/Exhibition Break ..... 12:10 to 1:30 pm

## SESSION 13

Room: Conv. Ctr. A1 ..... Thurs. 1:30 to 3:10 pm

### Lab-on-a-Chip II

Session Chair: **Graham T. Reed**, Univ. of Surrey (United Kingdom)

1:30 pm: **Lab-on-a-chip systems with integrated optics for biochemical applications** (*Invited Paper*), Klaus B. Mogensen, Pedro S. Nunes, Omar Gustafsson, Jörg P. Kutter, Danmarks Tekniske Univ. (Denmark) .... [6898-42]

2:10 pm: **Spotter-compatible SOI waveguide devices for biomolecular sensing**, Adam S. Densmore, Dan-Xia Xu, Philip Waldron, Siegfried Janz, Jens H. Schmid, Andre Delage, Pavel Cheben, Jean Lapointe, National Research Council Canada (Canada) ..... [6898-43]

2:30 pm: **Sample preparation and analysis in silicon devices** (*Invited Paper*), Jeffrey S. Erickson, Marie J. Archer, L. R. Hilliard, Peter B. Howell, David A. Stenger, Frances S. Ligler, Baochuan Lin, Naval Research Lab. .... [6898-44]

Coffee Break ..... 3:10 to 3:30 pm

## SESSION 14

Room: Conv. Ctr. A1 ..... Thurs. 3:30 to 4:30 pm

### Lab-on-a-Chip III

Session Chair: **Adam S. Densmore**, National Research Council Canada (Canada)

3:30 pm: **Integrated optical biosensors and biochips based on porous silicon nanotechnology** (*Invited Paper*), Ivo Rendina, Luca De Stefano, Consiglio Nazionale delle Ricerche (Italy) ..... [6898-45]

4:10 pm: **Fabrication and characterization of a thermo-mechanically tunable grating-assisted suspended waveguide filter**, Christopher R. Raum, Robert C. Gauthier, Niall Tait, Carleton Univ. (Canada) ..... [6898-53]

# Photonics Packaging, Integration, and Interconnects VIII

Conference Chair: **Alexei L. Glebov**, Finisar Corp.; **Ray T. Chen**, The Univ. of Texas at Austin

Program Committee: **Christoph Berger**, IBM Zürich Research Lab. (Switzerland); **Gee-Kung Chang**, Georgia Institute of Technology; **Allen M. Earman**, Novalux Inc.; **Felix Frischkorn**, ficonTEC GmbH (Germany); **Michael Haney**, Defense Advanced Research Projects Agency; **Ruth Houbertz**, Fraunhofer-Institut für Silicatforschung (Germany); **Ken-ichi Kitayama**, Osaka Univ. (Japan); **Victor X. Liu**, nLight Photonics Corp.; **Y. S. Liu**, National Tsing Hua Univ. (Taiwan); **Michael N. Lovellette**, Naval Research Lab.; **Hyo-Hoon Park**, Information and Communications Univ. (South Korea); **Yakov G. Soskind**, David H. Pollock Consultants, Inc.; **Tetsuzo Yoshimura**, Tokyo Univ. of Technology (Japan)

## Tuesday 22 January

### OPTO 2008 Plenary Session

Session Chairs: **Ali Adibi**, Georgia Institute of Technology; **James G. Grote**, Air Force Research Lab.

Room: Conv. Ctr. A7/A8 · 8:30 to 10:00 am

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Nanophotonics: from Photonic Crystals to Plasmonics (Presentation Only)**, Eli Yablonovitch, Univ. of California/Berkeley

9:20 am: **Organic "Plastic" Optoelectronic Devices (Presentation Only)**, Niyazi Serdar Sariciftci, Johannes Kepler Univ. Linz (Austria)

See p. 28 for details.

Coffee Break ..... 10:00 to 10:30 am

### SESSION 1

Room: Conv. Ctr. B2 ..... Tues. 1:30 to 3:10 pm

#### Optical Interconnect Technologies I

Session Chair: **Alexei L. Glebov**, Finisar Corp.

Joint Session with Conference 6897: Optoelectronic Integrated Circuits XII

1:30 pm: **Low-cost high-density optical parallel link modules and optical backplane for the last 1-meter regime applications (Invited Paper)**, Takashi Mikawa, National Institute of Advanced Industrial Science and Technology (Japan) ..... [6899-01]

2:00 pm: **Fully embedded optical interconnects based on optical bus architecture for large-size printed circuit boards (Invited Paper)**, Alan X. Wang, Omega Optics, Inc. .... [6899-02]

2:30 pm: **E<sub>rx</sub>Y<sub>2</sub>-xSiO<sub>5</sub> nanocrystals for efficient high gain per length material**, Kiseok Suh, Heeyoung Go, Joonghoon Shin, Korea Advanced Institute of Science and Technology (South Korea) ..... [6897-15]

2:50 pm: **Roadmap for optical interconnects: consumer handhelds to high-performance computers**, Louay A. Eldada, DuPont Photonics Technologies ..... [6897-16]

Coffee Break ..... 3:10 to 3:30 pm

### SESSION 2

Room: Conv. Ctr. B2 ..... Tues. 3:30 to 5:10 pm

#### Optical Interconnect Technologies II

Session Chair: **Louay A. Eldada**, DuPont Photonics Technologies

Joint Session with Conference 6897: Optoelectronic Integrated Circuits XII

3:30 pm: **Comparison of bandwidth limits for on-card electrical and optical interconnects for 100 Gb/s and beyond (Invited Paper)**, Petar K. Pepeljugoski, Mark B. Ritter, Jeffrey A. Kash, Fuad E. Doany, Clint Schow, Young Kwark, Lei Shan, Christian Baks, IBM Thomas J. Watson Research Ctr. .... [6897-17]

4:00 pm: **Driver-receiver combined optical transceivers modules for bidirectional optical interconnection (Invited Paper)**, Hyo-Hoon Park, Sae-Kyoung Kang, Do-Won Kim, Tae-Woo Lee, Information and Communications Univ. (South Korea) ..... [6897-18]

4:30 pm: **Toward flexible routing schemes for polymer optical interconnects integrated on printed circuit boards**, Nina Hendrickx, Geert Van Steenberge, Erwin Bosman, Univ. Gent (Belgium); Jürgen Van Erps, Hugo Thienpont, Vrije Univ. Brussel (Belgium); Peter Van Daele, Univ. Gent (Belgium) ..... [6899-03]

4:50 pm: **Demonstration of end-to-end interboard optical interconnects using flexible polymer optical bus**, Yin-Jung Chang, Intel Corp.; Daniel Guidotti, Lixi Wan, Gee-Kung Chang, Georgia Institute of Technology [6899-04]

## Wednesday 23 January

### SESSION 3

Room: Conv. Ctr. B2 ..... Wed. 8:20 to 10:10 am

#### Alignment, Coupling, and Assembly

Session Chair: **Christoph Berger**, IBM Zürich Research Lab. (Switzerland)

8:20 am: **Design and analysis of 3D stacked optoelectronics on optical printed circuit boards (Invited Paper)**, John H. Lau, Ramana V. Pamidighantam, Sik Pong B. Lee, Teck G. Lim, Jing Zhang, Chee Wei Tan, Jayakrishnan Chandrappan, Jing Li, Yi Yoon Chai, Haridas Kuruvetil, Yee Mong Khoo, Geri E. Tangdiongga, Institute of Microelectronics (Singapore) ..... [6899-05]

8:50 am: **Full-automatic packaging of a hybrid-transceiver module**, Felix Frischkorn, Joern Miesner, Sebastian Glass, ficonTEC GmbH (Germany) ..... [6899-06]

9:10 am: **Taper couplers for effective coupling between laser and silicon waveguide with large allowable tolerance**, Jing Zhang, Bryan S. Lee, Bijan Li, Jayakrishnan Chandrappan, Pamidighantam V. Ramana, Lau H. Shing, Institute of Microelectronics (Singapore); Dim-Lee Kwong, The Univ. of Texas at Austin ..... [6899-07]

9:30 am: **Design of fluidic self-assembly bonds for precise component positioning**, Vivek Ramadoss, Nathan B. Crane, Univ. of South Florida[6899-08]

9:50 am: **Surface-mount optical interconnects**, Edward J. Palen, PalenSolutions Consulting ..... [6899-09]

Coffee Break ..... 10:10 to 10:30 am

### SESSION 4

Room: Conv. Ctr. B2 ..... Wed. 10:30 am to 12:10 pm

#### Materials and Fabrication

Session Chair: **Ruth Houbertz**, Fraunhofer-Institut für Silicatforschung (Germany)

10:30 am: **Polymer waveguide fabrication with 3D structure by two-photon absorption assisted polymerization (Invited Paper)**, Toshikuni Kaino, Tohoku Univ. (Japan) ..... [6899-10]

11:00 am: **Flexible film waveguide with excellent bending properties (Invited Paper)**, Yuichi Hashiguchi, Yukio Maeda, JSR Corp. (Japan) ..... [6899-11]

11:30 am: **Electro-optic waveguides with conjugated polymer films fabricated by the carrier-gas-type organic CVD for chip-scale optical interconnects**, Kotaro Matsumoto, Tetsuzo Yoshimura, Tokyo Univ. of Technology (Japan) ..... [6899-44]

11:50 am: **Small-Core ORMOCER(r) waveguide devices for optical board applications**, Steffen Uhlig, Ruth Houbertz, Fraunhofer-Institut für Silicatforschung (Germany); Alexei L. Glebov, Michael G. Lee, Fujitsu Labs. of America ..... [6899-13]

Lunch/Exhibition Break ..... 12:10 to 1:30 pm

OPTO

# Conference 6899

## SESSION 5

Room: Conv. Ctr. B2 ..... Wed. 1:30 to 3:10 pm

### Micro-optics in Packaging

Session Chair: **Felix Frischkorn**, ficonTEC GmbH (Germany)

1:30 pm: **Wafer-level optics and packaging** (*Invited Paper*), James E. Morris, Tessera North America ..... [6899-14]

2:00 pm: **Light coupling in micro-optic systems: past, present, and trends** (*Invited Paper*), Yakov G. Soskind, David H. Pollock Consultants, Inc. [6899-15]

2:30 pm: **Optical design of 4-channel TOSA/ROSA for CWDM applications**, Geri E. Tangdiongga, Institute of Microelectronics (Singapore) and Hitachi Cable, Ltd. (Japan); Teck Guan Lim, Jing Li, Chee Wei Tan, Pamidighantam V. Ramana, Joey Yi Yoon Chai, Institute of Microelectronics (Singapore); Seiji Maruo, Hitachi Cable, Ltd. (Japan); John H. Lau, Institute of Microelectronics (Singapore) ..... [6899-16]

2:50 pm: **SUB-based static diffractive optical elements: wafer-level integration with VCSEL arrays**, Alison Gracias, Natalya Tokranova, James Castracane, Univ. at Albany ..... [6899-17]

Coffee Break ..... 3:10 to 3:30 pm

## SESSION 6

Room: Conv. Ctr. B2 ..... Wed. 3:30 to 5:30 pm

### Packaging of Communication Devices

Session Chair: **Allen M. Earman**, Novalux Inc.

3:30 pm: **Fast response organic light-emitting diode for visible optical communication** (*Invited Paper*), Takeshi Fukuda, Fujikura Ltd. (Japan) ..... [6899-18]

4:00 pm: **Packaging of room-temperature continuously operated quantum cascade lasers** (*Invited Paper*), Gloria Höfler, Mariano Troccoli, Argos Tech, LLC ..... [6899-19]

4:30 pm: **Automatic tester for high-power diode-laser bars**, Joern Miesner, Felix Frischkorn, Niels Uhlig, ficonTEC GmbH (Germany) ..... [6899-20]

4:50 pm: **Assembly of optical MUX/DEMUX on silicon optical bench with high placement accuracies**, Chee Wei Tan, Teck Guan Lim, Jing Li, Tangdiongga G. Endrio, Yi Yoon Chai, Institute of Microelectronics (Singapore); Seiji Maruo, Hitachi Cable, Ltd. (Japan); Pamidighantam V. Ramana, John H. Lau, Institute of Microelectronics (Singapore) ..... [6899-21]

5:10 pm: **3.125-Gbps multichannel electrical transmission line design for CWDM**, Teck G. Lim D.V.M., Yee M. Khoo, Jing Li, Yi Y. Chai, Chee W. Tan, Ramana V. Pamidighantam, John H. Lau, Institute of Microelectronics (Singapore); Seiji Maruo, Hitachi Cable, Ltd. (Japan) ..... [6899-22]

### Posters-Wednesday

Room: Civic Auditorium ..... Wed. 6:00 to 7:30 pm

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**Advances in photonics thermal management and packaging materials**, Carl H. Zweben, Advanced Thermal Materials and Composites Consultant [6899-12]

**Light coupling and component assembly in board-level optical interconnect systems**, Alexei L. Glebov, Michael Lee, Fujitsu Labs. America ..... [6899-40]

**Short-reach flexible optical interconnection using embedded edge-emitting lasers and edge-viewing detectors**, Shu-Hao Fan, Daniel Guidotti, Claudio Estevez, Gee-Kung Chang, Georgia Institute of Technology ..... [6899-41]

**Optical design of a miniature semi-integrated tunable laser on a silicon optical bench**, Ramana V. Pamidighantam, Jing Li, Jayakrishnan Chandrappan, Teck G. Lim, Jing Zhang, Hon-Shing Lau, Dim Lee Kwong, Institute of Microelectronics (Singapore) ..... [6899-42]

**Cost-effective optical coupling for polymer optical fiber communication**, Jayakrishnan Chandrappan, Institute of Microelectronics (Singapore) [6899-43]

## Thursday 24 January

### SESSION 7

Room: Conv. Ctr. B2 ..... Thurs. 8:20 to 10:10 am

### Si Integration for Optoelectronics

Session Chair: **Hyo-Hoon Park**, Information and Communications Univ. (South Korea)

8:20 am: **A high-speed 850-nm optical receiver by integrating Si photodiode and CMOS IC** (*Invited Paper*), Yue-ming Hsin, Wei-Kuo Huang, Yu-Chang Liu, Pai-En Yan, National Central Univ. (Taiwan); Wei-Zen Chen, National Chiao Tung Univ. (Taiwan) ..... [6899-23]

8:50 am: **20dB-enhanced coupling to slot photonic crystal waveguide based on multimode interference**, Xiaonan Chen, The Univ. of Texas at Austin; Wei Jiang, Omega Optics, Inc.; Ray T. Chen, The Univ. of Texas at Austin ..... [6899-24]

9:10 am: **Fabrication of a silicon optical bench for a miniature 4-channel TOSA**, Jing Li, Teck Guan Lim, Pamidighantam V. Ramana, Yee Mong Khoo, Chee Wei Tan, Yi Yoon Chai, Damaruganath Pinjala, Institute of Microelectronics (Singapore); Seiji Maruo, Hitachi Cable, Ltd. (Japan); John Hon Shing Lau, Dim Lee Kwong, Institute of Microelectronics (Singapore) ..... [6899-25]

9:30 am: **Multichannel clock and data recovery circuit for chip-to-chip optical interconnects**, Hieu T. Ngo, Tae-Woo Lee, Hyo-Hoon Park, Information and Communications Univ. (South Korea) ..... [6899-26]

9:50 am: **Development of a low-cost 2.5-Gbps SFF optical transceiver using 0.18 $\mu$ m CMOS ICs**, Yi Yoon Chai, Jing Zhang, Ramana V. Pamidighantam, Guan Jie Yap, Hon-Shing Lau, Institute of Microelectronics (Singapore) ..... [6899-27]

Coffee Break ..... 10:10 to 10:30 am

### SESSION 8

Room: Conv. Ctr. B2 ..... Thurs. 10:30 am to 12:10 pm

### Parallel Optical Links

Session Chair: **Alexei L. Glebov**, Finisar Corp.

10:30 am: **Waveguide-coupled parallel optical transceiver technology for Tb/s-class chip-to-chip data transmission** (*Invited Paper*), Fuad E. Doany, Clint L. Schow, Jeffrey A. Kash, Christian Baks, Russell Budd, Daniel M. Kuchta, Petar Pepeljugin, IBM Thomas J. Watson Research Ctr.; Roger Dangel, Folkert Horst, Bert J. Offrein, IBM Research GmbH (Switzerland) . . . . [6899-28]

11:00 am: **16-channel optical backplane bus for high-performance computing** (*Invited Paper*), Jonathan W. Ellis, Advanced Communications Concepts, Inc. .... [6899-29]

11:30 am: **Merging parallel optics packaging and surface-mount technologies**, Christophe H. Kopp, Marion Volpert, Julien Routin, Commissariat à l'Énergie Atomique (France); Stephane Bernabe, Cyrille Rossat, Myriam Tournaire, Regis Hamelin, Intexys Photonics (France) ..... [6899-30]

11:50 am: **A hybrid optical package with an 8-channel 18GT/s CMOS transceiver for chip-to-chip optical interconnect**, Edris M. Mohammed, Jason Liao, Alexandra Kern, Daoquiang D. Lu, Henning Braunisch, Thomas Thomas, Sami Hyvonen, Sam Palermo, Ian Young, Intel Corp. .... [6899-31]

Lunch/Exhibition Break ..... 12:10 to 1:30 pm

## SESSION 9

Room: Conv. Ctr. B2 . . . . . Thurs. 1:30 to 3:10 pm

## Optical Interconnects I

Session Chair: **Ray T. Chen**, The Univ. of Texas at Austin

1:30 pm: **Integration challenges for optical interconnects** (*Invited Paper*), Andrew C. Alduino, Hai-Feng Liu, Abazar Mireshghi, Henning Braunsch, Christine Krause, Mario Paniccia, Intel Corp. . . . . [6899-32]

2:00 pm: **A duplex 10 Gb/s serial active optical cable for short reach applications** (*Invited Paper*), Lewis B. Aronson, James Douma, Greta Light, Don Ice, The-Linh Nguyen, Finisar Corp. . . . . [6899-45]

2:30 pm: **Integration of optical I/O with organic-chip packages**, Bert Jan Offrein, Christoph Berger, Laurent Dellmann, Peter Dill, Folkert Horst, IBM Zurich Research Lab. (Switzerland); Giulio Macario, Stefano Oggioni, IBM Vercate (Italy); Martin L. Schmatz, IBM Zurich Research Lab. (Switzerland); Mauro Spreafico, IBM Vercate (Italy). . . . . [6899-33]

2:50 pm: **Optical waveguide films with two-layer skirt-type core end facets for beam-leakage reduction at 45-degree mirrors**, Tetsuzo Yoshimura, Kazuhiro Ogushi, Yohei Kitabayashi, Kaneyuki Naito, Yosuke Miyamoto, Masayoshi Miyazaki, Tokyo Univ. of Technology (Japan). . . . . [6899-35]

Coffee Break . . . . . 3:10 to 3:40 pm

## SESSION 10

Room: Conv. Ctr. B2 . . . . . Thurs. 3:40 to 5:40 pm

## Optical Interconnects II

Session Chair: **Tetsuzo Yoshimura**,  
Tokyo Univ. of Technology (Japan)

3:40 pm: **Polymer optical motherboard technology** (*Invited Paper*), Norbert Keil, Crispin Zawadzki, Huihai Yao, Norbert Grote, Martin Schell, Heinrich-Hertz-Institut für Nachrichtentechnik Berlin GmbH (Germany). . . . . [6899-37]

4:10 pm: **VCSELs, WDM arrays, and high-density optical interconnects** (*Invited Paper*), Julian Cheng, OptiComp Corp. . . . . [6899-38]

4:40 pm: **Stable and ultrahigh-efficiency optical transmitter using a VCSEL-direct-bonded connection block**, Do-Won Kim, Tae-Woo Lee, Mu Hee Cho, Hyo-Hoon Park, Information and Communications Univ. (South Korea)[6899-39]

5:00 pm: **Modules and deflection elements for electro-optical boards based on thin-glass technology**, Martin J. R. Franke, Axel Beier, Siemens AG (Germany); Peter Demmer, Siemens AG; Henning Schröder, Norbert Arndt-Staufenbiel, Fraunhofer Institut für Zuverlässigkeit und Mikrointegration (Germany); Roland Mödinger, ERNI Electronics GmbH (Germany); Jan Kostelnik, Frank Ebling, Würth Elektronik GmbH & Co. KG (Germany); Steffan Intemann, ULM Photonics GmbH (Germany); Ingolf Schlosser, AEMtec GmbH (Germany); Elmar Griese, Thomas Kühler, Univ. Siegen (Germany) . . . . . [6899-36]

5:20 pm: **Hybrid fiber and free-space couplers for polymer integrated optical circuits**, Robert R. McLeod, Univ. of Colorado at Boulder; Michael C. Cole, Charles D. Anderson, InPhase Technologies; Matthew S. Kirchner, Keith Kamysiak, Univ. of Colorado at Boulder; Michael G. Gleeson, Univ. College Dublin (Ireland). . . . . [6899-34]

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# Conference 6900 · Room: Conv. Ctr. B1

Sunday-Wednesday 20-23 January 2008 • Proceedings of SPIE Vol. 6900

## Quantum Sensing and Nanophotonic Devices V

Conference Chair: **Rengarajan Sudharsanan**, Spectrolab, Inc.; **Christopher Jelen**, Northrop Grumman Corp.

Program Committee: **Gail J. Brown**, Air Force Research Lab.; **Sarath D. Gunapala**, Jet Propulsion Lab.; **Mark A. Itzler**, Princeton Lightwave Corp.; **Hooman Mohseni**, Northwestern Univ.; **Vaidya Nathan**, Air Force Research Lab.; **Manijeh Razeghi**, Northwestern Univ.; **Robert R. Rice**, Northrop Grumman Space Technology; **Antoni Rogalski**, Wojskowa Akademia Techniczna (Poland); **Marija Strojnik-Scholl**, Ctr. de Investigaciones en Óptica, A.C.; **Ferechteh Hosseini Teherani**, Nanovation SARL (France)

### Sunday 20 January

#### Welcoming Remarks

Room: Conv. Ctr. B1 ..... Sun. 9:30 to 9:40 am

Session Chair: **Manijeh Razeghi**, Northwestern Univ.

#### SESSION 1

Room: Conv. Ctr. B1 ..... Sun. 9:40 am to 12:00 pm

#### Quantum Sources I

Session Chair: **Christopher Louis Jelen**, Northrop Grumman Corp.

9:40 am: **Physics challenges for near- and mid-infrared semiconductor diode lasers** (*Invited Paper*), Stephen J. Sweeney, Univ. of Surrey (United Kingdom) ..... [6900-01]

10:10 am: **Robust single-mode emission from mid-IR interband cascade lasers** (*Invited Paper*), Chulsoo Kim, Mijin Kim, Chadwick L. Canedy, William W. Bewley, Diane C. Larrabee, Jill A. Nolde, J. R. Lindle, Igor Vurgaftman, Jerry R. Meyer, Naval Research Lab. .... [6900-02]

10:40 am: **Interband GaSb-based lasers and LED for spectra region above 2µm** (*Invited Paper*), Gregory L. Belenky, Leon Shterengas, S. Sushalkin, G. Kipshidze, Michael V. Kisin, Dimitrii Donetski, Stony Brook Univ. .... [6900-03]

11:10 am: **Type-II superlattices and quantum cascade lasers for MWIR and LWIR free space communications**, Andrew D. Hood, Manijeh Razeghi, Northwestern Univ. .... [6900-04]

11:30 am: **Ballistic transport and luminescence from semiconductor nanowires, heterostructures and quantum dots** (*Invited Paper*), Venkatesh Narayanamurti, Harvard Univ. .... [6900-50]

Lunch Break ..... 12:00 to 1:30 pm

#### SESSION 2

Room: Conv. Ctr. B1 ..... Sun. 1:30 to 3:10 pm

#### Quantum Sources II

Session Chair: **Robert R. Rice**, Northrop Grumman Space Technology

1:30 pm: **GaNAsP/InP distributed feedback and distributed reflector lasers with fine wirelike active regions** (*Invited Paper*), Shigehisa Arai, Tokyo Institute of Technology (Japan) ..... [6900-06]

2:00 pm: **Recent advances in long-wavelength quantum dot based lasers** (*Invited Paper*), Ramdane Abderrahim, Lab. de Photonique et de Nanostructures (France) ..... [6900-07]

2:30 pm: **Controlled emission of polarized infrared light by a nanocavity equipped optical source**, Katsumoto Ikeda, Nalux Co., Ltd. (Japan); Hideki T. Miyazaki, Takeshi Kasaya, National Institute for Materials Science (Japan); Kazuya Yamamoto, Yasuaki Inoue, Kayoko Fujimura, Tomohiro Kanakugi, Makoto Okada, Kouei Hatade, Nalux Co., Ltd. (Japan) ..... [6900-08]

2:50 pm: **Electrically pumped photonic crystal distributed feedback quantum cascade lasers**, Yanbo Bai, Steven Slivken, Shaban R. Darvish, P. Sung, Manijeh Razeghi, Northwestern Univ. .... [6900-09]

Coffee Break ..... 3:10 to 3:30 pm

#### SESSION 3

Room: Conv. Ctr. B1 ..... Sun. 3:30 to 5:20 pm

#### Quantum Sources III

Session Chair: **Ferechteh Hosseini Teherani**, Nanovation SARL (France)

3:30 pm: **Overview of quantum cascade laser research at the Center for Quantum Devices** (*Invited Paper*), Steven Slivken, Allan J. Evans, Jean Nguyen, Yanbo Bai, P. Sung, Shaban R. Darvish, Wei Zhang, Manijeh Razeghi, Northwestern Univ. .... [6900-10]

4:00 pm: **Toward regulated photon generation from semiconductor quantum dots and their applications** (*Invited Paper*), Ikuo Suemune, Hidekazu Kumano, Yujiro Hayashi, Yasuhiro Idutsu, Masafumi Jo, Hokkaido Univ. (Japan) ..... [6900-11]

4:30 pm: **TlInGaAsN novel semiconductors and temperature-stable lasing wavelength laser diodes** (*Invited Paper*), Hajime Asahi, Shigehiko Hasegawa, Astushi Fujiwara, D. Krishnamurthy, Osaka Univ. (Japan) ..... [6900-12]

5:00 pm: **Mid-infrared vertical-cavity surface emitting lasers**, Gunther Springholz, Thomas Schwarzl, M. Eibelhuber, Wolfgang Heiss, Johannes Kepler Univ. Linz (Austria); H. Pascher, J. Fürst, Univ. Bayreuth (Germany) . . [6900-52]

### Monday 21 January

#### SESSION 4

Room: Conv. Ctr. B1 ..... Mon. 8:10 to 10:00 am

#### Superlattices and Quantum Detectors I

Session Chair: **Manijeh Razeghi**, Northwestern Univ.

8:10 am: **Type-II strained layer superlattice: a potential infrared (IR) sensor material for space** (*Invited Paper*), Meimei Z. Tidrow, Anthony Novello, Missile Defense Agency; Lucy Zheng, Institute for Defense Analyses; James C. Fraser, Space Dynamics Lab.; Hugo Weichel, Computer Sciences Corp.; Sandeep T. Vohra, SPARTA, Inc. .... [6900-13]

9:00 am: **Recent advances in type-II InAs/GaSb superlattices LWIR detectors and focal plane arrays** (*Invited Paper*), Manijeh Razeghi, Pierre-Yves Delaunay, Binh Minh Nguyen, Darin M. Hoffman, Andrew D. Hood, Yajun Wei, Northwestern Univ.; Vaidya Nathan, Air Force Research Lab.; Meimei Z. Tidrow, Missile Defense Agency; John M. Pellegrino, Army Research Lab.; Donald J. Silversmith, Air Force Office of Scientific Research ..... [6900-14]

9:30 am: **Novel routes in heteroepitaxy and selective area growth for nanophotonics** (*Invited Paper*), Sebastian Lourduodoss, Fredrik Olsson, Kungliga Tekniska Högskolan (Sweden) ..... [6900-15]

Coffee Break ..... 10:00 to 10:30 am



**SESSION 5**

**Room: Conv. Ctr. B1 . . . . . Mon. 10:30 am to 12:10 pm**

**Superlattices and Quantum Detectors II**

Session Chair: **Gail J. Brown**, Air Force Research Lab.

10:30 am: **Type II InSb/InAs quantum dot structures grown by molecular beam epitaxy using Sb<sub>2</sub> and As<sub>2</sub> fluxes** (*Invited Paper*), Anthony Krier, Peter Carrington, Valeriy M. Smirnov, Qian Zhuang, V. A. Solov'ev, Lancaster Univ. (United Kingdom); K. T. Lai, Stephanie K. Haywood, The Univ. of Hull (United Kingdom); Sergey V. Ivanov, A.F. Ioffe Physico-Technical Institute (Russia) . . . . . [6900-16]

11:00 am: **Advantages of quantum cascade detectors** (*Invited Paper*), Vincent Berger, Univ. Paris 7-Denis Diderot (France) . . . . . [6900-17]

11:30 am: **Recent progress in type-II antimonide LWIR photodetectors**, Igor Vurgaftman, Edward H. Aifer, Chadwick L. Canedy, J. G. Tischler, Jerry R. Meyer, E. M. Jackson, Naval Research Lab. . . . . [6900-18]

11:50 am: **A different angle on InAs/GaSb superlattice**, Frank Szmulowicz, Univ. of Dayton Research Institute; Heather J. Haugan, Universal Technology Corp.; Said Elhamri, Univ. of Dayton; Bruno Ullrich, Bowling Green State Univ.; Gail J. Brown, William C. Mitchel, Air Force Research Lab. . . . . [6900-19]

Lunch Break . . . . . 12:10 to 1:30 pm

**SESSION 6**

**Room: Conv. Ctr. B1 . . . . . Mon. 1:30 to 3:10 pm**

**Superlattices and Quantum Detectors III**

Session Chair: **Sarath D. Gunapala**, Jet Propulsion Lab.

1:30 pm: **High-performance focal plane array based on type-II InAs/GaSb superlattice heterostructures** (*Invited Paper*), Pierre-Yves Delaunay, Northwestern Univ. . . . . [6900-20]

2:00 pm: **III-nitride photon counting avalanche photodiodes** (*Invited Paper*), Ryan P. McClintock, Jose L. Pau Vizcaino, Kathryn A. Minder, Can Bayram, Manijeh Razeghi, Northwestern Univ. . . . . [6900-21]

2:30 pm: **Broadband photoresponse from InAs and InGaAs quantum dots in a graded well for mid- and long-wavelength infrared detection**, Brandon S. Passmore, Jiang Wu, Omar Manasreh, Vasyly P. Kunets, Gregory J. Salamo, Univ. of Arkansas . . . . . [6900-22]

2:50 pm: **Demonstration of interface-scattering-limited electron mobilities in InAs/GaSb superlattices**, Frank Szmulowicz, Univ. of Dayton Research Institute; S. Elhamri, Univ. of Dayton; Heather J. Haugan, Universal Technology Corp.; Gail J. Brown, William C. Mitchel, Air Force Research Lab. . . . [6900-23]

Coffee Break . . . . . 3:10 to 3:30 pm

**SESSION 7**

**Room: Conv. Ctr. B1 . . . . . Mon. 3:30 to 5:20 pm**

**Superlattices and Quantum Detectors IV**

Session Chair: **Marija Strojnik**, Ctr. de Investigaciones en Óptica, A.C.

3:30 pm: **MBE grown HgTe/CdTe superlattices for IR focal plane arrays** (*Invited Paper*), Sivalingam Sivananthan, Univ. of Illinois at Chicago . . . [6900-24]

4:00 pm: **Impact ionization in infrared HgCdTe alloys and superlattices** (*Invited Paper*), Christopher H. Grein, EPIR Technologies, Inc. . . . . [6900-25]

4:30 pm: **Progress in MOVPE-growth of InGaN and InN** (*Invited Paper*), Takashi Matsuoka, Tohoku Univ. (Japan) . . . . . [6900-26]

5:00 pm: **Growth of high quality Type II InAs/GaSb superlattice on GaAs substrate**, Binh Minh Nguyen, Manijeh Razeghi, Northwestern Univ. . . [6900-27]

**Tuesday 22 January**

**OPTO 2008 Plenary Session**

Session Chairs: **Ali Adibi**, Georgia Institute of Technology; **James G. Grote**, Air Force Research Lab.

Room: *Conv. Ctr. A7/A8* · 8:30 to 10:00 am

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Nanophotonics: from Photonic Crystals to Plasmonics** (*Presentation Only*), Eli Yablonovitch, Univ. of California/Berkeley

9:20 am: **Organic "Plastic" Optoelectronic Devices** (*Presentation Only*), Niyazi Serdar Sariciftci, Johannes Kepler Univ. Linz (Austria)

See p. 28 for details.

Coffee Break . . . . . 10:00 to 10:30 am

**SESSION 8**

**Room: Conv. Ctr. B1 . . . . . Tues. 10:30 am to 12:10 pm**

**Novel Sensors I**

Session Chair: **Antoni Rogalski**, Wojskowa Akademia Techniczna (Poland)

10:30 am: **The challenges of II-VI and III-V sensor technology (Keynote)** (*Invited Paper*), Joseph G. Pellegrino, U.S. Army Night Vision & Electronic Sensors Directorate. . . . . [6900-28]

11:10 am: **CMOS-compatible high-frequency infrared photodiodes** (*Invited Paper*), Michael W. Geis, Steven J. Spector, Matthew E. Grein, Robert T. Schuelein, Jung U. Yoon, Donna M. Lennon, Sandra J. Deneault, Theodore M. Lyszczarz, MIT Lincoln Lab.; Fuwan Gan, Franz X. Kaertner, Massachusetts Institute of Technology . . . . . [6900-29]

11:40 am: **Design approaches for digitally dominated active-pixel sensors: leveraging Moore's Law scaling in focal plane readout design** (*Invited Paper*), Brian M. Tyrrell, Robert Berger, Curtis Colonero, Joseph Costa, Michael W. Kelly, Eric J. Ringdahl, Kenneth I. Schultz, James Wey, MIT Lincoln Lab. . . . . [6900-30]

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

**SESSION 9**

**Room: Conv. Ctr. B1 . . . . . Tues. 1:30 to 3:00 pm**

**Novel Sensors II**

Session Chair: **Vaidya Nathan**, Air Force Research Lab.

1:30 pm: **Opportunities of magnetic semiconductors in design** (*Invited Paper*), Margaret Dobrowolska, Univ. of Notre Dame . . . . . [6900-31]

2:00 pm: **Semiconductor scintillator for gamma-radiation detection based on the Burstein shift** (*Invited Paper*), Serge Luryi, Stony Brook Univ. . [6900-32]

2:30 pm: **Recent advances and applications of mid-infrared-based trace gas sensor technology** (*Invited Paper*), Frank K. Tittel, Yury A. Bakhrin, Anatoliy A. Kosterev, Rafal Lewicki, Stephen G. So, Gerard Wysocki, Robert F. Curl, Rice Univ. . . . . [6900-33]

Coffee Break . . . . . 3:00 to 3:30 pm

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# Conference 6900

## SESSION 10

Room: Conv. Ctr. B1 ..... Tues. 3:30 to 5:20 pm

### Novel Sensors III

*Session Chair: Hooman Mohseni, Northwestern Univ.*

3:30 pm: **Silicon microspheres for sensing** (*Invited Paper*), Ali Serpengüzel, Koç Univ. (Turkey) ..... [6900-34]

4:00 pm: **Hybrid organic inorganic nano-quantum sensors**, Yossi Paltiel, Sergy Shusterman, Soreq Nuclear Research Ctr. (Israel); Ron Naaman, T. Aqua, Weizmann Institute of Science (Israel); Uri Banin D.V.M., Assaf Aharoni D.V.M., The Hebrew Univ. of Jerusalem (Israel) ..... [6900-35]

4:20 pm: **Development of nanophotonic beam structures as optical NEMS sensors**, Chengkuo Lee, National Univ. of Singapore (Singapore) and Institute of Microelectronics (Singapore); Jayaraj Thillaigovindan, Rohit Radhakrishnan, National Univ. of Singapore (Singapore); Jing Li, Pinjala Damaruqanath, John H. Lau, Institute of Microelectronics (Singapore) ..... [6900-36]

4:40 pm: **APD response VIS/SWIR detectors at CMOS voltages using laser processed silicon**, Nathaniel J. McCaffrey, SiOnyx, Inc. .... [6900-51]

5:00 pm: **A quantum cascade laser based room temperature system for sensitive detection of ammonia and ethylene**, Jagadeeshwari Manne, Wolfgang Jäger, John Tulip, Univ. of Alberta (Canada) ..... [6900-53]

## Wednesday 23 January

### SESSION 11

Room: Conv. Ctr. B1 ..... Wed. 9:00 to 10:10 am

#### Quantum Cryptography and Imaging

9:00 am: **Quantum key distribution for secure communication: are we entangled yet?** (*Invited Paper*), Anton Zavriyev, MagiQ Technologies, Inc. .... [6900-39]

9:30 am: **Near-field characterization of extraordinary optical transmission in sub-wavelength aperture arrays**, Aaron Lewis, Michael Mrejen, Hesham Taha, Abraham Israel, Mila Palchan, The Hebrew Univ. of Jerusalem (Israel) ..... [6900-40]

9:50 am: **Subdiffraction optical imaging by high-spatial-resolution photodetectors and Fourier signal processing**, Milad Hashemi, Michael C. Hegg, Lih Y. Lin, Univ. of Washington. .... [6900-41]

Coffee Break ..... 10:10 to 10:30 am

## SESSION 12

Room: Conv. Ctr. B1 ..... Wed. 10:30 am to 12:20 pm

### Single Photon Detector I

*Session Chair: Mark A. Itzler, Princeton Lightwave, Inc.*

10:30 am: **Current, emerging, and future detector technologies for low-light sensing** (*Invited Paper*), J. Carlton Jackson, SensL (Ireland) ..... [6900-42]

11:00 am: **Multiplexed photon counting detectors** (*Invited Paper*), Sergey V. Polyakov, Alan L. Migdall, National Institute of Standards and Technology; Valentina Schettini, Ivo Pietro Degiovanni, Giorgio Brida, Stefania Castelletto, Istituto Nazionale di Ricerca Metrologica (Italy) ..... [6900-43]

11:30 am: **Superconductive nanowire single-photon detectors** (*Invited Paper*), Karl K. Berggren, Massachusetts Institute of Technology . . . . [6900-44]

12:00 pm: **High-efficiency 1.55  $\mu$ m Geiger-mode single-photon counting avalanche photodiodes operating near 0oC**, Ping Yuan, Joseph C. Boisvert, Rengarajan Sudharsanan, Takahiro Isshiki, Paul A. McDonald, Spectrolab, Inc.; Michael Salisbury, Boeing SVS, Inc.; Mingguo Liu, Joe C. Campbell, Univ. of Virginia. .... [6900-45]

Lunch/Exhibition Break ..... 12:20 to 2:00 pm

## SESSION 13

Room: Conv. Ctr. B1 ..... Wed. 2:00 to 3:40 pm

### Single Photon Detector II

*Session Chair: Rengarajan Sudharsanan, Spectrolab, Inc.*

2:00 pm: **Time-of-flight sensing using time-correlated single-photon counting** (*Invited Paper*), Gerald S. Buller, Heriot-Watt Univ. (United Kingdom) ..... [6900-46]

2:30 pm: **Large-area low-jitter silicon single photon avalanche diodes** (*Invited Paper*), Massimo Ghioni, Politecnico di Milano (Italy) and Micro Photon Devices (Italy); Angelo Gulinatti, Ivan Rech, Politecnico di Milano (Italy); Piera Maccagnani, Consiglio Nazionale delle Ricerche (Italy); Sergio D. Cova, Politecnico di Milano (Italy) and Micro Photon Devices (Italy) ..... [6900-47]

3:00 pm: **Single-photon avalanche photodiodes for near-infrared photon counting**, Mark A. Itzler, Xudong Jiang, Rafael Ben-Michael, Krystyna Slomkowski, Princeton Lightwave, Inc. .... [6900-48]

3:20 pm: **A novel quenching circuit to reduce afterpulsing of single photon avalanche diodes**, Mingguo Liu, Chong Hu, Joe C. Campbell, Univ. of Virginia; Zhong Pan, Mark M. Tashima, JDSU ..... [6900-49]

# Photonic Crystal Materials and Devices VII

Conference Chairs: **Ali Adibi**, Georgia Institute of Technology; **Shawn-Yu Lin**, Rensselaer Polytechnic Institute; **Axel Scherer**, California Institute of Technology

Program Committee: **Douglas C. Allan**, Corning Inc.; **Shanhui Fan**, Stanford Univ.; **Maryanne C. J. Large**, The Univ. of Sydney (Australia); **Susumu Noda**, Kyoto Univ. (Japan); **Masaya Notomi**, NTT Basic Research Labs. (Japan); **Ekmel Özbay**, Bilkent Univ. (Turkey); **Dennis W. Prather**, Univ. of Delaware; **William J. Wadsworth**, Univ. of Bath (United Kingdom); **Yong Xu**, Virginia Polytechnic Institute and State Univ.; **Eli Yablonovitch**, Univ. of California/Los Angeles

## Monday 21 January

### SESSION 1

Room: Conv. Ctr. A2 ..... Mon. 9:00 to 10:20 am

#### Special Review Session:

#### Present and Future of Photonic Crystals

Session Chair: **Ali Adibi**, Georgia Institute of Technology

9:00 am: **From VCSELs to silicon photonics** (*Invited Paper*), Axel Scherer, California Institute of Technology ..... [6901-01]

9:40 am: **Photonic band gap materials: engineering the fundamental properties of light** (*Invited Paper*), Sajeev John, Univ. of Toronto (Canada) ..... [6901-02]

Coffee Break ..... 10:20 to 10:50 am

### SESSION 2

Room: Conv. Ctr. A2 ..... Mon. 10:50 am to 12:00 pm

#### Dispersive and Nonlinear Properties of Photonic Crystals

Session Chair: **Axel Scherer**, California Institute of Technology

10:50 am: **Negative refraction and subwavelength focusing using left-handed composite metamaterials** (*Invited Paper*), Ekmel Özbay, Bilkent Univ. (Turkey) ..... [6901-03]

11:20 am: **Repetitive phase shifts of signal pulses induced by optical nonlinearity in a photonic crystal waveguide with quantum dots**, Nobuhiko Ozaki, Yoshinori Kitagawa, Yoshiaki Takata, Tsukuba Univ. (Japan); Naoki Ikeda, National Institute for Materials Science (Japan); Shunsuke Ohkouchi, NEC Corp. (Japan); Yoshinori Watanabe, Akio Mizutani, Tsukuba Univ. (Japan); Yoshimasa Sugimoto, National Institute for Materials Science (Japan); Kiyoshi Asakawa, Tsukuba Univ. (Japan) ..... [6901-04]

11:40 am: **Multilevel diffractive optics for single-laser exposure fabrication of telecom-band three-dimensional photonic crystals**, Debashis Chanda, Ladan E. Abolghasemi, Mi Li Ng, Peter R. Herman, Univ. of Toronto (Canada) ..... [6901-06]

Lunch Break ..... 12:00 to 1:30 pm

### SESSION 3

Room: Conv. Ctr. A2 ..... Mon. 1:30 to 3:00 pm

#### Novel Effects and Applications in Photonic Crystal Structures I

Session Chair: **Ekmel Özbay**, Bilkent Univ. (Turkey)

1:30 pm: **Design and applications of strongly dispersive photonic crystal structures** (*Invited Paper*), Babak Momeni, Georgia Institute of Technology ..... [6901-52]

2:00 pm: **High-efficient incandescent-lighting source using metallic photonic crystal**, Yong-Sung Kim, Shawn-Yu Lin, Allan S. P.Chang, Rensselaer Polytechnic Institute; Jae-Hwang Lee, Kai-Ming Ho, Iowa State Univ. [6901-08]

2:20 pm: **Spatial coherence of the thermal electromagnetic fields from a dielectric thin film**, Wah Tung Lau, Jung-Tsung Shen, Georgios Veronis, Shanhui Fan, Stanford Univ. .... [6901-09]

2:40 pm: **Enhanced coherency of thermal emission by coupled resonant cavities supporting surface waves**, Nir Dahan, Avi Niv, Gabriel Biener, Yuri Gorodetski, Vladimir Kleiner, Erez Hasman, Technion-Israel Institute of Technology (Israel) ..... [6901-10]

Coffee Break ..... 3:00 to 3:30 pm

### SESSION 4

Room: Conv. Ctr. A2 ..... Mon. 3:30 to 5:20 pm

#### Novel Effects and Applications in Photonic Crystal Structures II

Session Chair: **Shawn-Yu Lin**, Rensselaer Polytechnic Institute

3:30 pm: **Review of phononic crystals, devices, and prospects** (*Invited Paper*), Abdelkrim Khelif, Institut Femto-ST (France) ..... [6901-11]

4:00 pm: **Imaging beyond the diffraction limit with two-dimensional photonic crystals and left-handed metamaterials**, Koray Aydin, Ekmel Özbay, Bilkent Univ. (Turkey) ..... [6901-12]

4:20 pm: **Surface waves and surface solitons in complex multilayer structures**, Natalia Malkova, Garnett W. Bryant, National Institute of Standards and Technology; Xiaosheng Wang, Zhigang Chen, San Francisco State Univ. .... [6901-14]

4:40 pm: **Quantum optics of a quantum dot embedded in a photonic crystal cavity**, Sina Khorasani, Sharif Univ. of Technology (Iran); Ali Adibi, Georgia Institute of Technology ..... [6901-15]

5:00 pm: **Fano-resonance enhanced infrared absorption for infrared photodetectors**, Zexuan Qiang, Weidong Zhou, Mingyu Lu, The Univ. of Texas at Arlington; Gail J. Brown, Air Force Research Lab. .... [6901-13]

## Tuesday 22 January

### OPTO 2008 Plenary Session

Session Chairs: **Ali Adibi**, Georgia Institute of Technology; **James G. Grote**, Air Force Research Lab.

Room: Conv. Ctr. A7/A8 · 8:30 to 10:00 am

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Nanophotonics: from Photonic Crystals to Plasmonics** (*Presentation Only*), Eli Yablonovitch, Univ. of California/Berkeley

9:20 am: **Organic "Plastic" Optoelectronic Devices** (*Presentation Only*), Niyazi Serdar Sariciftci, Johannes Kepler Univ. Linz (Austria)

See p. 28 for details.

Coffee Break ..... 10:00 to 10:30 am

### SESSION 5

Room: Conv. Ctr. A2 ..... Tues. 10:30 am to 12:00 pm

#### Photonic Crystal Cavities and Light Emitters

Session Chair: **Babak Momeni**, Georgia Institute of Technology

10:30 am: **Photonic crystal chips for optical interconnects and quantum information processing** (*Invited Paper*), Jelena Vuckovic, Dirk R. Englund, Ilya Fushman, Andrei Faraon, Bryan Ellis, Hatice Altug, Stanford Univ. ... [6901-16]

11:00 am: **Spectral and spatial-emission properties of photonic crystal cavities**, Friedhard Römer, ETH Zürich (Switzerland); Laurent Balet, Andrea Fiore, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Bernd Witzigmann, ETH Zürich (Switzerland) ..... [6901-17]

11:20 am: **Reconfigurable photonic crystal laser**, Myung-Ki Kim, Korea Advanced Institute of Science and Technology (South Korea); In-Kag Hwang, Chonnam National Univ. (South Korea); Yong-Hee Lee, Korea Advanced Institute of Science and Technology (South Korea) ..... [6901-18]

OPTO

11:40 am: **Purcell effect of GaAs quantum dots embedded in a photonic crystal microcavity**, Kazuaki Sakoda, Takashi Kuroda, Takaaki Mano, Tetsuyuki Ochiai, Nobuyuki Koguchi, Naoki Ikeda, Yoshimasa Sugimoto, National Institute for Materials Science (Japan); Shunsuke Ohkouchi, NEC Corp. (Japan); Kiyoshi Asakawa, Univ. of Tsukuba (Japan) ..... [6901-19]  
Lunch/Exhibition Break ..... 12:00 to 1:30 pm

## SESSION 6

**Room: Conv. Ctr. A2 ..... Tues. 1:30 to 3:00 pm**

### Modeling and Simulation of Photonic Crystal Structures I

Session Chair: **Shanhui Fan**, Stanford Univ.

1:30 pm: **A tale of two limits: fundamental properties of photonic-crystal fibers** (*Invited Paper*), Steven G. Johnson, Massachusetts Institute of Technology ..... [6901-20]  
2:00 pm: **Form birefringent anisotropic photonic crystal exhibiting external-field anomalies**, Michael A. Fiddy, John O. Schenk, Yang Cao, The Univ. of North Carolina at Charlotte ..... [6901-21]  
2:20 pm: **Analyzing light localization using Iwasawa-canonical transfer matrices**, Glen J. Kessel, Univ. of Southern Indiana ..... [6901-22]  
2:40 pm: **Analysis of scattering losses in photonic crystal structures using a Green's function-based approach**, Charles M. Reinke, Ali Asghar Eftekhar, X. G. Zhang, Babak Momeni, Ali Adibi, Georgia Institute of Technology ..... [6901-23]  
Coffee Break ..... 3:00 to 3:30 pm

## SESSION 7

**Room: Conv. Ctr. A2 ..... Tues. 3:30 to 5:20 pm**

### Modeling and Simulation of Photonic Crystal Structures II

Session Chair: **Steven G. Johnson**, Massachusetts Institute of Technology

3:30 pm: **New developments in photonic crystal theory** (*Invited Paper*), Shanhui Fan, Stanford Univ. .... [6901-24]  
4:00 pm: **Effects of incrementally applied disorder to a triangular lattice creating a 12-fold quasi-crystal**, Scott R. Newman, Robert C. Gauthier, Carleton Univ. (Canada) ..... [6901-26]  
4:20 pm: **High-angular sensitivities of photonic crystals: rigorous analysis and applications to sensing and beam steering**, Wei Jiang, Rutgers Univ. and The Univ. of Texas at Austin ..... [6901-27]  
4:40 pm: **Calculation of density of states for a spatially separable permittivity profile**, Amir Hossein Baradaran Ghasemi, Shahid Beheshti Univ. (Iran); Sina Khorasani, Sharif Univ. of Technology (Iran) ..... [6901-28]  
5:00 pm: **Evolution of defect modes in photonic crystals-gap edge asymptotics**, Lindsay C. Botten, Kokou B. Dossou, Christopher G. Poulton, Univ. of Technology/Sydney (Australia); Sahand Mahmoodian, Ross C. McPhedran, C. M. de Sterke, The Univ. of Sydney (Australia) ..... [6901-25]

# Wednesday 23 January

## SESSION 8

**Room: Conv. Ctr. A2 ..... Wed. 8:00 to 10:00 am**

### Optofluidics and Photonic Crystal Fibers

Session Chair: **Ali Adibi**, Georgia Institute of Technology

8:00 am: **Post-processed and reconfigurable photonic crystal cavities via selective fluid infiltration** (*Invited Paper*), Benjamin J. Eggleton, CUDOS, The Univ. of Sydney (Australia) ..... [6901-29]  
8:30 am: **The different guidance mechanisms in hollow-core PCF** (*Invited Paper*), Fetah A. Benabid, Univ. of Bath (United Kingdom) ..... [6901-30]  
9:00 am: **Hollow fibers for compact infrared gas sensors**, Armin Lambrecht, Susanne Hartwig, Johannes G. Herbst, Jürgen Wöllenstein, Fraunhofer-Institut für Physikalische Messtechnik (Germany) ..... [6901-31]  
9:20 am: **Elaboration and characterization of chalcogenide photonic crystal fibers for applications in telecom, 3-5, and 8-12 micron windows**, Frederic Desevedavy, Patrick Houizot, Johann Troles, Univ. de Rennes I (France); Frederic Smektala, Univ. de Bourgogne (France); Laurent Brilland, Nicholas Traynor, PERFOS (France); Gilles Renversez, Univ. Paul Cézanne (France) ..... [6901-32]  
9:40 am: **Analyses of bending losses in photonic crystal fibers using FDTD algorithm**, Ngoc Hai Vu, In-Kag Hwang, Chonnam National Univ. (South Korea) ..... [6901-33]  
Coffee Break ..... 10:00 to 10:30 am

## SESSION 9

**Room: Conv. Ctr. A2 ..... Wed. 10:30 am to 12:00 pm**

### Fabrication of Photonic Crystal Structures I

Session Chair: **Paul V. Braun**, Univ. of Illinois at Urbana-Champaign

10:30 am: **Progress on fabrication of three-dimensional nanostructures** (*Invited Paper*), Martin Wegener, Georg von Freymann, Univ. Karlsruhe (Germany) and DFG-Ctr. for Functional Nanostructures (Germany) and Forschungszentrum Karlsruhe (Germany) ..... [6901-34]  
11:00 am: **Preparation of metallo-dielectric photonic crystals by multiphoton direct laser writing**, Stephen M. Kuebler, Amir Tal, Yun-Sheng Chen, College of Optics & Photonics/Univ. of Central Florida ..... [6901-35]  
11:20 am: **Defect inscription and observation in 3D photonic band-gap opal templates**, Mark Boyle, Johannes Zinn, Andre Neumeister, Laser Zentrum Hannover e.V. (Germany); Wendel Wohleben, Reinhold J. Leyrer, BASF Aktiengesellschaft (Germany) ..... [6901-36]  
11:40 am: **Design and laser fabrication of 2D diffractive optical elements for telecom-band 3D photonic crystals**, Ladan E. Abolghasemi, Debashis Chanda, Peter R. Herman, Univ. of Toronto (Canada) ..... [6901-37]  
Lunch/Exhibition Break ..... 12:00 to 1:30 pm

## SESSION 10

**Room: Conv. Ctr. A2 ..... Wed. 1:30 to 3:10 pm**

### Fabrication of Photonic Crystal Structures II

Session Chair: **Martin Wegener**, Univ. Karlsruhe (Germany)

1:30 pm: **Enhancing photonic crystals through electrochemistry, optical manipulation, and DNA-directed assembly** (*Invited Paper*), Paul V. Braun, Univ. of Illinois at Urbana-Champaign ..... [6901-38]  
2:00 pm: **Characterization of photonic crystal structures using near-field techniques** (*Invited Paper*), Ali Asghar Eftekhar, Georgia Institute of Technology ..... [6901-39]  
2:30 pm: **Polymer nanocomposite infiltration of silicon photonic crystals**, Savas Tay, Jayan Thomas, College of Optical Sciences/The Univ. of Arizona; Babak Momeni, Peter J. Hotchkiss, Murtaza Askari, Simon Jones, Seth R. Marder, Ali Adibi, Georgia Institute of Technology; Robert A. Norwood, College of Optical Sciences/The Univ. of Arizona; Nasser Peghambarian, The Univ. of Arizona. .... [6901-40]  
2:50 pm: **The study for fabricating two-dimensional photonic crystal by soft lithography technology and optical mensuration of superprism phenomena**, Sasa Zhang, Shandong Univ. (China) ..... [6901-41]  
Coffee Break ..... 3:10 to 3:30 pm

## SESSION 11

Room: Conv. Ctr. A2 . . . . .Wed. 3:30 to 5:40 pm

## Photonic Crystal Waveguides

Session Chair: Robert A. Norwood,  
College of Optical Sciences/The Univ. of Arizona

- 3:30 pm: **Efficient coupling via mode matching in photonic crystal waveguides and cavities** (*Invited Paper*), Yurii G. A. Vlasov, IBM Thomas J. Watson Research Ctr. . . . . [6901-42]
- 4:00 pm: **Engineering of the planar photonic crystal waveguide modes**, Amir H. Atabaki, Ehsan Shah Hosseini, Georgia Tech Research Institute; Ali Adibi, Georgia Institute of Technology . . . . . [6901-43]
- 4:20 pm: **Three-dimensional photonic crystal waveguides by unit cell-size modulation**, Lingling Tang, Tomoyuki Yoshie, Duke Univ. . . . . [6901-44]
- 4:40 pm: **Theoretical investigation of the nonlocalized propagating mode beyond waveguide cutoff in metalodielectric woodpile photonic crystals**, Minfeng Chen, Allan S. P. Chang, Shawn-Yu Lin, Zu-Po Yang, James A. Bur, Yong S. Kim, Rensselaer Polytechnic Institute; Hung-chun Chang, National Taiwan Univ. (Taiwan) . . . . . [6901-45]
- 5:00 pm: **Efficient coupling of light into the planar photonic crystal waveguides in the slow group velocity regime**, Murtaza Askari, Babak Momeni, Ali Adibi, Georgia Institute of Technology . . . . . [6901-46]
- 5:20 pm: **Coupling between refractive waveguides and two-dimensional photonic crystal Bloch modes**, Emmanuel Drouard, Lydie Ferrier, Xavier Letartre, Pedro Rojo-Romeo, Pierre Viktorovitch, Ecole Centrale de Lyon (France) and Institut des Nanotechnologies de Lyon (France) and Consultant (France) . . . . . [6901-47]

## POSTERS-Wednesday

Room: Civic Auditorium. . . . .Wed. 6:00 to 7:30 pm

*All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.*

*Poster presenters may post their poster papers Wednesday morning starting at 10:00 am in the Civic Auditorium, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.*

- Giant nonlinear optical effects in nonlinear photonic crystals: nonlinear analogue of Borrmann effect**, Oleg A. Aktsipetrov, Tatiana V. Murzina, M.V. Lomonosov Moscow State Univ. (Russia); Mitsuteru Inoue, Toyohashi Univ. of Technology (Japan) . . . . . [6901-48]
- Tunable ferroelectric photonic crystals**, Oleg A. Aktsipetrov, Tatiana V. Murzina, Irina Kolmichek, Fedor Y. Sychev, M.V. Lomonosov Moscow State Univ. (Russia) . . . . . [6901-49]
- Optics of triangular Mie particles in ultrathin Ag films**, Channappayya S. Sunandana, M. Gnanavel, Univ. of Hyderabad (India) . . . . . [6901-50]
- Perfectly periodic photonic quasi-crystals**, Robert C. Gauthier, Carleton Univ. (Canada) . . . . . [6901-51]

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# Quantum Dots, Particles, and Nanoclusters V

*Conference Chairs:* **Kurt G. Eyink**, Air Force Research Lab.; **Frank Szmulowicz**, Univ. of Dayton Research Institute; **Diana L. Huffaker**, The Univ. of New Mexico

*Program Committee:* **Pallab K. Bhattacharya**, Univ. of Michigan; **C. Jeffrey Brinker**, Sandia National Labs.; **Dennis G. Deppe**, The Univ. of Texas/Austin; **Alfred W. B. Forchel**, Univ. Würzburg (Germany); **Lingjie Jay Guo**, Univ. of Michigan; **Axel Hoffmann**, Technische Univ. Berlin (Germany); **Yong-Hee Lee**, Korea Advanced Institute of Science and Technology (South Korea); **Luke F. Lester**, The Univ. of New Mexico; **James A. Lott**, Air Force Institute of Technology; **Manijeh Razeghi**, Northwestern Univ.; **Kevin L. Silverman**, National Institute of Standards and Technology

## Monday 21 January

### SESSION 1

Room: Conv. Ctr. M ..... Mon. 8:30 to 10:20 am

#### Semiconducting Nanostructures

- 8:30 am: **Ab-initio calculation of optical properties of quantum dots and wires** (*Invited Paper*), Lin-Wang Wang, Lawrence Berkeley National Lab. .... [6902-01]
- 9:00 am: **Dielectric constant reduction in silicon nanostructures**, Han G. Yoo, Philippe M. Fauchet, Univ. of Rochester ..... [6902-02]
- 9:20 am: **Quantum confined stark effect in quantum dot subbands**, Xuejun Lu, Univ. of Massachusetts/Lowell ..... [6902-03]
- 9:40 am: **Length dependencies of in-plane polarizations anisotropy in GaInAsP/InP quantum-wire structures fabricated by dry etching and regrowth process**, Dhanorm Plumwongrot, Yosuke Tamura, Yoshifumi Nishimoto, Munetaka Kurokawa, Tokyo Institute of Technology (Japan); Takeo Maruyama, Tokyo Institute of Technology (Japan) and Core Research for Evolutional Science and Technology, and the Japan Science and Technology Agency (Japan); Nobuhiko Nishiyama, Tokyo Institute of Technology (Japan); Shigehisa Arai, Tokyo Institute of Technology (Japan) and Core Research for Evolutional Science and Technology, and the Japan Science and Technology Agency (Japan) ..... [6902-04]
- 10:00 am: **PbTe quantum dots in tellurite-glass microstructure optical fiber**, Gilberto J. Jacob V.D.M., Luis C. Barbosa, Eugenio Gimenez, Carlos H. Brito, Carlos L. Cesar, Univ. Estadual de Campinas (Brazil) ..... [6902-05]
- Coffee Break ..... 10:20 to 10:50 am

### SESSION 2

Room: Conv. Ctr. M ..... Mon. 10:50 am to 12:00 pm

#### Metallic Nanostructures

- 10:50 am: **Theoretical modeling of clusters, nanoparticles, and quantum dots** (*Invited Paper*), Igor Vasiliev, New Mexico State Univ. .... [6902-06]
- 11:20 am: **Geometry-dependent plasmon resonances of metallic nanostructures for enhancement of localized electromagnetic fields around the nano-structures**, Michael D. Gerhold, U.S. Army Research Office; Anuj Dhawan, Duke Univ.; Gianluca Lazzi, North Carolina State Univ.; Tuan Vo-Dinh, Duke Univ. .... [6902-07]
- 11:40 am: **Dynamics of exchange interactions in a one-dimensional magnetic quantum dot chain**, Rajamani Amuda, Brinda Arumugam, PSG College of Technology (India) ..... [6902-09]
- Lunch Break ..... 12:00 to 1:30 pm

### SESSION 3

Room: Conv. Ctr. M ..... Mon. 1:30 to 3:00 pm

#### Nanostructures for Photonic Applications I

- 1:30 pm: **Area-selective MBE growth of InAs quantum dots on GaAs through the SiO<sub>2</sub> mask with 20-nm pores** (*Invited Paper*), Azar Alizadeh, GE Global Research; M. Blumin, I. Savelyev, Harry E. Ruda, Univ. of Toronto (Canada); V. Watkins, K. Conway, L. Denault, S. Taylor, Christopher F. Keimel, D. Hays, GE Global Research; Edit L. Braunstein, Lockheed Martin Co. [6902-10]
- 2:00 pm: **Light-current curve of a tunneling-injection quantum dot laser**, Dae-Seob Han, Levon V. Asryan, Virginia Polytechnic Institute and State Univ. .... [6902-11]
- 2:20 pm: **Modulation and thermal properties of tunnel-coupled InAs QD 1.13 μm VCSELs**, Vadim E. Tokranov, Michael Yakimov, Jobert Van Eijsden, Serge R. Oktyabrsky, Univ. at Albany ..... [6902-12]
- 2:40 pm: **Effect of GaP strain compensation on the performance of InAs/GaAs intermediate band solar cells**, Ramesh B. Laghumavarapu, Mohamed A. R.El-Emawy, Noppadon Nuntawong, Aaron J. Moscho, Luke F. Lester, Diana L. Huffaker, The Univ. of New Mexico ..... [6902-13]
- Coffee Break ..... 3:00 to 3:30 pm

### SESSION 4

Room: Conv. Ctr. M ..... Mon. 3:30 to 4:50 pm

#### Nanostructures for Photonic Applications II

- 3:30 pm: **Bright and color-saturated emission from blue light emitting diodes based on solution-processed colloidal nanocrystal quantum dots**, Jian Xu, Zhao Tan, Fan Zhang, The Pennsylvania State Univ. .... [6902-14]
- 3:50 pm: **Properties of CdSe-based quantum dot LEDs for single-photon emission**, Arne Gust, Carsten Kruse, Detlef Hommel, Univ. Bremen (Germany); Robert Arians, Tilmar Kümmell, Gerd Bacher, Univ. of Duisburg-Essen (Germany) ..... [6902-15]
- 4:10 pm: **Quantum key distribution using a semiconductor quantum dot source emitting at telecommunication wavelength**, Philip M. Intallura, Toshiba Research Europe Ltd. (United Kingdom) and Univ. of Cambridge (United Kingdom); Martin B. Ward, Oleg Z. Karimov, Zhiliang Yuan, Toshiba Research Europe Ltd. (United Kingdom); Paola Atkinson, Univ. of Cambridge (United Kingdom); Patrick See, Toshiba Research Europe Ltd. (United Kingdom); David A. Ritchie, Univ. of Cambridge (United Kingdom); Andrew J. Shields, Toshiba Research Europe Ltd. (United Kingdom) ..... [6902-16]
- 4:30 pm: **Optical transition pathways in type-II Ga(As)Sb quantum dots**, Tomasz J. Ochalski, K. Gradkowski, D. P. Williams, Eoin P. O'Reilly, Guillaume Huyet, Tyndall National Institute (Ireland); J. Tatebayashi, A. Khoshakhlagh, G. Balakrishnan, L. R. Dawson, Diana L. Huffaker, The Univ. of New Mexico. .... [6902-17]

# Advanced Optical Concepts in Quantum Computing, Memory, and Communication

Conference Chairs: **Zameer U. Hasan**, Temple Univ.; **Alan E. Craig**, Montana State Univ./Bozeman; **Philip Robert Hemmer**, Texas A&M Univ.

Program Committee: **Aleks K. Rebane**, Montana State Univ./Bozeman; **Charles M. Santori**, Hewlett-Packard Labs.; **Selim M. Shahriar**, Northwestern Univ.; **Alan Eli Willner**, Univ. of Southern California

## Wednesday 23 January

### SESSION 1

Room: Conv. Ctr. D .....Wed. 8:30 to 10:10 am

#### Novel Optical Memories and Devices I

Session Chair: **Stefan Kröll**, Lunds Tekniska Högskola (Sweden)

8:30 am: **Advance multilayer optical memories (Invited Paper)**, Sadik C. Esener, Univ. of California/San Diego ..... [6903-01]

9:10 am: **Challenges for high-density spectral storage (Invited Paper)**, Zameer U. Hasan, Temple Univ. .... [6903-02]

9:40 am: **High-speed optical ranging based on dispersed ultrashort pulses (Invited Paper)**, Robert E. Saperstein, Nikola Alic, S. Zamek, Kazuhiro Ikeda, Yeshaiahu Fainman, Univ. of California/San Diego. .... [6903-03]

Coffee Break ..... 10:10 to 10:30 am

### SESSION 2

Room: Conv. Ctr. D ..... Wed. 10:30 am to 12:20 pm

#### Novel Optical Memories and Devices II

Session Chair: **Zameer U. Hasan**, Temple Univ.

10:30 am: **Ultrafast coherent transients and time-space holography in inhomogeneously broadened two-photon absorbing medium (Invited Paper)**, Aleksander Rebane, Mikhail A. Drobizhev, Nikolay S. Makarov, Montana State Univ./Bozeman ..... [6903-04]

11:00 am: **Spectroscopy of colloidal silicon nanoparticles (Invited Paper)**, Alan E. Craig, Montana State Univ./Bozeman ..... [6903-05]

11:30 am: **Electron-microscopy and spectroscopy of thin films for spectral storage**, Francisco J. Bezares, Zameer U. Hasan, Temple Univ. .... [6903-06]

11:50 am: **Photon echo quantum memory (Invited Paper)**, Wolfgang Tittel, Univ. of Calgary (Canada) ..... [6903-07]

Lunch/Exhibition Break ..... 12:20 to 1:30 pm

### SESSION 3

Room: Conv. Ctr. D .....Wed. 1:30 to 3:00 pm

#### Quantum Information and Processing

Session Chair: **Aleksander Rebane**, Montana State Univ./Bozeman

1:30 pm: **Quantum dot-photonic crystal chips for quantum information processing (Invited Paper)**, Jelena Vuckovic, Stanford Univ. .... [6903-08]

2:00 pm: **Long-distance high data rate quantum communication**, Durdu Guney, David A. Meyer, Univ. of California/San Diego ..... [6903-09]

2:20 pm: **Optimum design of FP-FBG filter for phase-coded quantum key distribution scheme**, Pradeep Kumar, Anil Prabhakar, Indian Institute of Technology Madras (India) ..... [6903-10]

2:40 pm: **Design of single-photon Mach-Zehnder interferometer based devices for quantum information processing**, Hubert Seigneur, Michael Luenberger, Winston V. Schoenfeld, College of Optics & Photonics/Univ. of Central Florida. .... [6903-11]

Coffee Break ..... 3:00 to 3:30 pm

### SESSION 4

Room: Conv. Ctr. D .....Wed. 3:30 to 5:20 pm

#### Quantum Computing

Session Chair: **Zameer U. Hasan**, Temple Univ.

3:30 pm: **Solid state quantum computing (Invited Paper)**, Stefan Kröll, Lunds Tekniska Högskola (Sweden) ..... [6903-12]

4:00 pm: **Optical spin manipulation for quantum processing (Invited Paper)**, Hailin Wang, Univ. of Oregon ..... [6903-13]

4:30 pm: **Cavity QED (Invited Paper)**, Kevin J. Hennessey, Swiss Federal Institute of Technology (Switzerland) ..... [6903-14]

5:00 pm: **Logical gates on trapped modes in photonic crystals with nonlinear coating**, Eugene Y. Glushko, Institute of Semiconductor Physics (Ukraine) ..... [6903-15]

#### Posters-Wednesday

Room: Civic Auditorium. ....Wed. 6:00 to 7:30 pm

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

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**Device-independent quantum key distribution**, Alexander Ling, Matthew Peloso, Antia Lamas-Linares, Christian Kurtsiefer, National Univ. of Singapore (Singapore) ..... [6903-27]

# Conference 6903

## Thursday 24 January

### SESSION 5

Room: Conv. Ctr. D ..... Thurs. 8:30 to 10:30 am

#### Quantum Computing with Spins

Session Chair: **Charles M. Santori**, Hewlett-Packard Labs.

- 8:30 am: **Manipulating spins and coherence with microcavities** (*Invited Paper*), David D. Awschalom, Univ. of California/Santa Barbara ..... [6903-16]
- 9:00 am: **Toward measurement based quantum computing using solid state spins** (*Invited Paper*), Jason Smith, Univ. of Oxford (United Kingdom) [6903-17]
- 9:30 am: **Optically connected quantum spin registers in diamond** (*Invited Paper*), M. V. Gurudev Dutt, Harvard Univ. .... [6903-18]
- 10:00 am: **Quantum spin memories and dot lattice polaritons in planar microcavities** (*Invited Paper*), Carlo Piermarocchi, Michigan State Univ. .... [6903-19]
- Coffee Break ..... 10:30 to 10:50 am

### SESSION 6

Room: Conv. Ctr. D ..... Thurs. 10:50 am to 12:40 pm

#### Materials for Quantum Computing I

Session Chair: **Philip Robert Hemmer**, Texas A&M Univ.

- 10:50 am: **Optical initialization of a single hole spin in a quantum dot** (*Invited Paper*), Richard J. Warburton, Heriot-Watt Univ. (United Kingdom) ... [6903-20]
- 11:20 am: **Toward photonic quantum information processing in diamond** (*Invited Paper*), Kai-Mei Fu, Hewlett-Packard Labs. .... [6903-21]
- 11:50 am: **Optical detection of impurity nuclear spins in 28Si** (*Invited Paper*), Michael L. W. Thewalt, Simon Fraser Univ. (Canada) ..... [6903-22]
- 12:20 pm: **Defects in diamond: coupling of spins and photons** (*Invited Paper*), Joerg Wrachtrup, Univ. Stuttgart (Germany) ..... [6903-23]
- Lunch/Exhibition Break ..... 12:40 to 2:00 pm

### SESSION 7

Room: Conv. Ctr. D ..... Thurs. 2:00 to 4:10 pm

#### Materials for Quantum Computing II

Session Chair: **Alan E. Craig**, Montana State Univ./Bozeman

- 2:00 pm: **Spin states in coherently coupled quantum dots** (*Invited Paper*), Daniel G. Gammon, Naval Research Lab. .... [6903-24]
- 2:30 pm: **Using spins in semiconductors toward the goals of quantum communications and optical communications** (*Invited Paper*), Thomas A. Kennedy, Naval Research Lab. .... [6903-25]
- 3:00 pm: **Photonic bandgap based quantum computers and networks** (*Invited Paper*), Durdu Guney, David A. Meyer, Univ. of California/San Diego ..... [6903-26]
- 3:30 pm: **Quantum dots on sub-quantum wells** (*Invited Paper*), Ekaterina E. Orlova, Technische Univ. Delft (Netherlands) ..... [6903-29]
- 3:50 pm: **Entangled atom-field and atom-atom states in a collective two-atom models**, Margarita S. Rusakova, Eugeny K. Bashkurov, Samara State Univ. (Russia) ..... [6903-30]



# Advances in Slow and Fast Light

Conference Chairs: **Selim M. Shahriar**, Northwestern Univ.; **Philip Robert Hemmer**, Texas A&M Univ.; **John R. Lowell**, Defense Advanced Research Projects Agency

Program Committee: **Raymond G. Beausoleil**, Hewlett-Packard Labs.; **Alan E. Craig**, Montana State Univ./Bozeman; **Shanhui Fan**, Stanford Univ.; **Mehmet Fatih Yanik**, Massachusetts Institute of Technology; **Daniel J. Gauthier**, Duke Univ.; **John C. Howell**, Univ. of Rochester; **M. Suhail Zubairy**, Texas A&M Univ.

## Monday 21 January

### SESSION 1

Room: Conv. Ctr. N ..... Mon. 1:30 to 3:10 pm

#### Slow/Fast Light in Waveguides, SOA, and Metamaterials

Session Chair: **Selim M. Shahriar**, Northwestern Univ.

1:30 pm: **Slow and fast light in semiconductor waveguides for applications in microwave photonics** (*Invited Paper*), Jesper Mørk, Filip Öhman, Yaohui Chen, Mike van der Poel, Kresten Yvind, Danmarks Tekniske Univ. [6904-01]

1:55 pm: **Tunable all-optical delays in waveguides** (*Invited Paper*), Alexander L. Gaeta, Cornell Univ. [6904-02]

2:20 pm: **TeraHertz fast light in semiconductor optical amplifiers** (*Invited Paper*), Connie J. Chang-Hasnain, Univ. of California/Berkeley [6904-03]

2:45 pm: **Slow light in metamaterial heterostructures** (*Invited Paper*), Ortwin Hess, Univ. of Surrey (United Kingdom) [6904-04]

Coffee Break ..... 3:10 to 3:30 pm

### SESSION 2

Room: Conv. Ctr. N ..... Mon. 3:30 to 5:35 pm

#### Slow/Fast Light in Fibers and Photonic Crystals

Session Chair: **Philip Robert Hemmer**, Texas A&M Univ.

3:30 pm: **Single atoms on an optical nanofiber: novel work system for slowing and freezing light** (*Invited Paper*), Kohzo Hakuta, The Univ. of Electro-Communications (Japan) [6904-05]

3:55 pm: **Optical measurement of the phase shift introduced by a slow-light medium based on coupled erbium-doped fiber resonators**, Yannick Dumeige, Laura Ghisa, Stéphane Trébaol, Ngan Nguyen Thi Kim, Patrice Féron, Ecole Nationale Supérieure des Sciences Appliquées et de Technologie and Univ. de Rennes 1 (France) [6904-06]

4:10 pm: **Quantum interference spectroscopy in vapors and trapped atoms with nanofibers** (*Invited Paper*), Kenneth Salit, Gour S. Pati, M. Salit, S. Spillane, R. Beausoleil, Prem Kumar, M. S. Shahriar, Northwestern Univ. [6904-07]

4:35 pm: **Tunable delay lines using slow light for Gbit/s data signal** (*Invited Paper*), Alan E. Willner, Univ. of Southern California [6904-09]

5:00 pm: **Slow light generation in a resonance photonic crystal**, Igor V. Melnikov, Optolink Ltd. (Russia) and High Q Labs. Inc. (Canada) [6904-10]

5:15 pm: **Fundamental aspects of slow light in atomic and artificial dielectric structures**, Amnon Yariv, California Institute of Technology [6904-11]

## Tuesday 22 January

### OPTO 2008 Plenary Session

Session Chairs: **Ali Adibi**, Georgia Institute of Technology; **James G. Grote**, Air Force Research Lab.

Room: Conv. Ctr. A7/A8 · 8:30 to 10:00 am

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Nanophotonics: from Photonic Crystals to Plasmonics** (*Presentation Only*), Eli Yablonovitch, Univ. of California/Berkeley

9:20 am: **Organic "Plastic" Optoelectronic Devices** (*Presentation Only*), Niyazi Serdar Sariciftci, Johannes Kepler Univ. Linz (Austria)

See p. 28 for details.

Coffee Break ..... 10:00 to 10:30 am

### SESSION 3

Room: Conv. Ctr. N ..... Tues. 10:30 am to 12:10 pm

#### Slow Light in Vapor

Session Chair: **Jacob B. Khurgin**, Johns Hopkins Univ.

10:30 am: **Optimizing slow and stored light for multidisciplinary applications** (*Invited Paper*), Ronald L. Walsworth, Harvard-Smithsonian Ctr. for Astrophysics [6904-12]

10:55 am: **Coherent backscattering: new approaches and recent experiments** (*Invited Paper*), Marlan O. Scully, Texas A&M Univ. [6904-13]

11:20 am: **Quantum interference effects in rubidium vapor on a chip** (*Invited Paper*), Holger Schmidt, Bin Wu, Univ. of California/Santa Cruz; John Hulbert, Aaron Hawkins, Brigham Young Univ. [6904-14]

11:45 am: **Stopped light in hot rubidium vapors** (*Invited Paper*), John C. Howell, Univ. of Rochester [6904-15]

Lunch/Exhibition Break ..... 12:10 to 1:30 pm

### SESSION 4

Room: Conv. Ctr. N ..... Tues. 1:30 to 3:10 pm

#### Slow Light for Quantum Information Processing

Session Chair: **Alan E. Craig**, Montana State Univ./Bozeman

1:30 pm: **Generation of subnatural linewidth biphotons** (*Invited Paper*), Shengwang Du, Stanford Univ. [6904-16]

1:55 pm: **Applications of slow light to classical and quantum information technology** (*Invited Paper*), Raymond G. Beausoleil, Hewlett-Packard Labs. [6904-17]

2:20 pm: **Quantum and nonlinear optics with nanowire surface plasmons** (*Invited Paper*), Darrick E. Chang, Harvard Univ. [6904-18]

2:45 pm: **Optical and RF EIT for imaging single NV centers** (*Invited Paper*), Philip R. Hemmer, Texas A&M Univ. [6904-19]

Coffee Break ..... 3:10 to 3:30 pm

OPTO

# Conference 6904

## SESSION 5

Room: Conv. Ctr. N . . . . . Tues. 3:30 to 5:40 pm

### Novel Ideas and Applications for Slow/Fast Light

Session Chair: **Holger Schmidt**, Univ. of California/Santa Cruz

3:30 pm: **CHI<sup>2</sup> and slow light** (*Invited Paper*), Jacob B. Khurgin, Johns Hopkins Univ. . . . . [6904-20]

3:55 pm: **Simultaneous generation of slow and fast light for Raman coupled beams**, Gour S. Pati, M. Salit, Kenneth Salit, Shih Tseng, M. S. Shahriar, Northwestern Univ. . . . . [6904-21]

4:10 pm: **Slow and fast light using non-EIT schemes** (*Invited Paper*), Girish S. Agarwal, Physical Research Lab. (India) . . . . . [6904-22]

4:35 pm: **Sealing techniques for on-chip atomic vapor cells**, John F. Hulbert, Brandon T. Carroll, Aaron R. Hawkins, Brigham Young Univ.; Bin Wu, Holger Schmidt, Univ. of California/Santa Cruz . . . . . [6904-23]

4:50 pm: **Rotation sensing using active and passive coupled microcavities slow-light structures** (*Invited Paper*), Jacob Scheuer, California Institute of Technology . . . . . [6904-24]

5:15 pm: **Density matrix descriptions for electromagnetically induced transparency and related pump-probe optical phenomena in moving atomic systems** (*Invited Paper*), Verne L. Jacobs, Naval Research Lab. . . . . [6904-25]

## Wednesday 23 January

### SESSION 6

Room: Conv. Ctr. N . . . . . Wed. 8:10 to 10:05 am

### Slow Light in Photonic Crystals and Plasmonics

Session Chair: **Robert W. Boyd**, Univ. of Rochester

8:10 am: **Dynamic manipulation of light in photonic crystals** (*Invited Paper*), Shanhui Fan, Stanford Univ. . . . . [6904-26]

8:35 am: **Useful slow light in photonic crystal devices** (*Invited Paper*), Toshihiko Baba, Yokohama National Univ. (Japan) . . . . . [6904-27]

9:00 am: **Photonic crystal couplers for slow light** (*Invited Paper*), Andrey A. Sukhorukov, The Australian National Univ. (Australia) . . . . . [6904-28]

9:25 am: **Slow modes of photonic crystal slab waveguide**, Khadijeh Bayat, Sujeet K. Chaudhuri, Safieddin Safavi-Naeini, Univ. of Waterloo (Canada) . . . . . [6904-29]

9:40 am: **Slow and backward waves in plasmonics** (*Invited Paper*), Meir Orenstein, Technion-Israel Institute of Technology (Israel) . . . . . [6904-30]

Coffee Break . . . . . 10:05 to 10:30 am

### SESSION 7

Room: Conv. Ctr. N . . . . . Wed. 10:30 am to 12:10 pm

### Interferometry and Optical Delays with Slow/Fast Light

Session Chair: **Shanhui Fan**, Stanford Univ.

10:30 am: **Applications of slow and fast light in optical telecommunications and in interferometry** (*Invited Paper*), Robert W. Boyd, Univ. of Rochester . . . . . [6904-31]

10:55 am: **Distortionless tunable optical delay line based on soliton phenomena in optical fibers** (*Invited Paper*), Akihiro Maruta, Osaka Univ. (Japan) . . . . . [6904-32]

11:20 am: **Cavity solitons all-optical delay line: an alternative to slow light** (*Invited Paper*), Jorge R. Tredicce, Univ. de Nice Sophia Antipolis (France) . . . . . [6904-33]

11:45 am: **Breaking the delay-bandwidth limit in photonic structures** (*Invited Paper*), Michal F. Lipson, Cornell Univ. . . . . [6904-34]

### Make time for the Photonics West Exhibition

San Jose Convention Center, Exhibition Halls 1-3, Exhibition Foyer and South Halls 1-2

Tuesday 22 January . . . . . 10:00 am to 5:00 pm

Wednesday 23 January . . . . . 10:00 am to 5:00 pm

Thursday 24 January . . . . . 10:00 am to 4:00 pm

See new applications in action at the Product Demonstrations.

See pp. 37-39 for details.

# Complex Light and Optical Forces II

Conference Chair: **David L. Andrews**, Univ. of East Anglia Norwich (United Kingdom)

Conference Co-Chair: **Enrique J. Galvez**, Colgate Univ.; **Gerard Nienhuis**, Univ. Leiden (Netherlands)

Program Committee: **Nicholas P. Bigelow**, Univ. of Rochester; **Wolfgang A. Ertmer**, Univ. Hannover (Germany); **Jean-Marc R. Fournier**, École Polytechnique Fédérale de Lausanne (Switzerland); **Jesper Glückstad**, Risø National Lab. (Denmark); **David G. Grier**, New York Univ.; **Miles J. Padgett**, Univ. of Glasgow (United Kingdom); **Halina H. Rubinsztein-Dunlop**, The Univ. of Queensland (Australia); **Ewan M. Wright**, College of Optical Sciences/The Univ. of Arizona

## Monday 21 January

### SESSION 1

Room: Conv. Ctr. D ..... Mon. 8:40 to 10:00 am

#### Optical Forces and Angular Momentum

Session Chair: **Enrique J. Galvez**, Colgate Univ.

8:40 am: **Optical forces torques on dielectric media** (*Invited Paper*), Stephen M. Barnett, Univ. of Strathclyde (United Kingdom); Rodney Loudon, Univ. of Essex (United Kingdom); Miles J. Padgett, Univ. of Glasgow (United Kingdom) ..... [6905-01]

9:20 am: **Resonance energy transfer and interface forces: Quantum electrodynamic analysis**, David S. Bradshaw, Justo Rodriguez, David L. Andrews, Univ. of East Anglia Norwich (United Kingdom) ..... [6905-02]

9:40 am: **Orbital angular momentum in astigmatic and rotating cavity modes**, Gerard Nienhuis, Steven J. M. Habraken, Univ. Leiden (Netherlands) ..... [6905-03]

Coffee Break ..... 10:00 to 10:30 am

### SESSION 2

Room: Conv. Ctr. D ..... Mon. 10:30 am to 12:10 pm

#### Singular Optics

Session Chair: **David L. Andrews**, Univ. of East Anglia Norwich (United Kingdom)

10:30 am: **Dynamic singular optics** (*Invited Paper*), Marat S. Soskin, V&#1072;silij I. Vasil'ev, Institute of Physics (Ukraine) ..... [6905-05]

11:10 am: **Vortex sheets in optical and coherence fields**, Wei Wang, Kentaro Chiba, The Univ. of Electro-Communications (Japan); Steen G. Hanson, Danmarks Tekniske Univ. (Denmark); Mitsuo Takeda, The Univ. of Electro-Communications (Japan) ..... [6905-06]

11:30 am: **Generation of high-quality higher-order Laguerre-Gaussian beams using liquid crystal on silicon spatial light modulator**, Yoshiyuki Ohtake, Taro Ando, Naoya Matsumoto, Takashi Inoue, Norihiro Fukuchi, Haruyasu Itoh, Naohisa Mukohzaka, Tsutomu Hara, Hamamatsu Photonics K.K. (Japan) ..... [6905-07]

11:50 am: **Holographic optical tweezers with real-time hologram calculation using a phase-only modulating LCOS-based SLM at 1064 nm**, Andreas Hermerschmidt, Sven Krüger, HOLOEYE Photonics AG (Germany); Tobias Haist, Susanne Zwick, Michael Warber, Wolfgang Osten, Institut für Technische Optik (Germany) ..... [6905-08]

Lunch Break ..... 12:10 to 1:30 pm

### SESSION 3

Room: Conv. Ctr. D ..... Mon. 1:30 to 2:50 pm

#### Nano-Optics

Session Chair: **Gerard Nienhuis**, Univ. Leiden (Netherlands)

1:30 pm: **Light manipulation by use of inhomogeneous anisotropic subwavelength structures** (*Invited Paper*), Erez Hasman, Technion-Israel Institute of Technology (Israel) ..... [6905-09]

2:10 pm: **Optimal filter size for image projection using generalized phase contrast**, Peter J. L. Rodrigo, Darwin Palima, Carlo Amadeo C. Alonzo, Jesper Glückstad, Danmarks Tekniske Univ. (Denmark) ..... [6905-10]

2:30 pm: **From Gaussian beams to optical landscapes: phase-only apertures based on the generalized phase contrast method**, Darwin Palima, Carlo-Amadeo C. Alonzo, Peter J. L. Rodrigo, Jesper Glückstad, Danmarks Tekniske Univ. (Denmark) ..... [6905-11]

Coffee Break ..... 2:50 to 3:20 pm

### SESSION 4

Room: Conv. Ctr. D ..... Mon. 3:20 to 5:00 pm

#### Optical Vortices

Session Chair: **Jesper Glückstad**, Danmarks Tekniske Univ. (Denmark)

3:20 pm: **Optical vortex steering in paraxial beams** (*Invited Paper*), Mark R. Dennis, Univ. of Southampton (United Kingdom) ..... [6905-12]

4:00 pm: **Vortex dynamics due to Gouy phase**, Sean Baumann, Enrique J. Galvez, Lauren H. MacMillan, Colgate Univ. .... [6905-13]

4:20 pm: **Rotating photons**, Steven J. van Enk, Univ. of Oregon; Gerard Nienhuis, Univ. Leiden (Netherlands) ..... [6905-14]

4:40 pm: **Fine spectroscopy of semiconductor atoms for controlling nuclear spins**, Yasutomo Shiomi, Takeshi Yamamoto, Hiroshi Kumagai, Ataru Kobayashi, Osaka City Univ. (Japan) ..... [6905-16]

## Tuesday 22 January

### OPTO 2008 Plenary Session

Session Chairs: **Ali Adibi**, Georgia Institute of Technology; **James G. Grote**, Air Force Research Lab.

Room: Conv. Ctr. A7/A8 · 8:30 to 10:00 am

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Nanophotonics: from Photonic Crystals to Plasmonics** (*Presentation Only*), Eli Yablonovitch, Univ. of California/Berkeley

9:20 am: **Organic "Plastic" Optoelectronic Devices** (*Presentation Only*), Niyazi Serdar Sariciftci, Johannes Kepler Univ. Linz (Austria)

See p. 28 for details.

Coffee Break ..... 10:00 to 10:30 am

### SESSION 5

Room: Conv. Ctr. D ..... Tues. 10:30 to 11:50 am

#### Optical Manipulation

Session Chair: **Enrique J. Galvez**, Colgate Univ.

10:30 am: **New studies and applications with optical vortices** (*Invited Paper*), Kishan Dholakia, Univ. of St. Andrews (United Kingdom) ..... [6905-17]

11:10 am: **Optical binding: potential energy landscapes and QED**, Justo Rodriguez, Luciana C. Dávila Romero, David L. Andrews, Univ. of East Anglia Norwich (United Kingdom) ..... [6905-18]

11:30 am: **Optical manipulation of silicon nanowires on silicon nitride waveguides**, Delphine Neel, Getin Stephane, Jean M. Fedeli, Lab. d'Electronique de Technologie de l'Information (France); Thierry Baron, Pascal Gentile, Commissariat à l'Energie Atomique (France); Pierre Ferret, Lab. d'Electronique de Technologie de l'Information (France) ..... [6905-19]

# Conference 6905

## Wednesday 23 January

### POSTERS-Wednesday

Room: Civic Auditorium . . . . .Wed. 6:00 to 7:30 pm

*All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.*

*Poster presenters may post their poster papers Wednesday morning starting at 10:00 am in the Civic Auditorium, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.*

**Optical trapping of high-index particles suspended in high-index fluids,**  
Jennifer M. Harwell, College of Optical Sciences/The Univ. of Arizona; Olga B. Spahn, Sandia National Labs.; Grover A. Swartzlander, Jr., College of Optical Sciences/The Univ. of Arizona; Grant D. Grossetete, Stephen W. Howell, Stephen J. Martin, Jeffrey B. Martin, Sandia National Labs. . . . . [6905-20]

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# Conference 6906 · Room: Conv. Ctr. N

Sunday-Monday 20-21 January 2008 • Proceedings of SPIE Vol. 6906

## Quantum Electronics Metrology

Conference Chair: **Alan E. Craig**, Montana State Univ./Bozeman; **Selim M. Shahriar**, Northwestern Univ.

Program Committee: **Hwang Lee**, Louisiana State Univ.; **Lute Maleki**, Jet Propulsion Lab.

### Sunday 20 January

#### SESSION 1

Room: Conv. Ctr. N ..... Sun. 8:30 to 10:00 am

##### Quantum Ensemble Metrology

Session Chair: **Alan E. Craig**, Montana State Univ./Bozeman

8:30 am: **What's new with NOON states?** (*Invited Paper*), Jonathan P. Dowling, Louisiana State Univ. .... [6906-01]

9:00 am: **Playing the quantum harp: multipartite squeezing and entanglement of harmonic oscillators** (*Invited Paper*), Olivier Pfister, Univ. of Virginia; Nicolas C. Menicucci, The Univ. of Queensland (Australia) and Princeton Univ.; Steven T. Flammia, The Univ. of New Mexico; Hussain Zaidi, Matthew Pysher, Univ. of Virginia ..... [6906-02]

9:30 am: **Quantum metrology with cold atoms** (*Invited Paper*), Igor Teper, Jongmin Lee, Gert Vrijsen, Mark Kasevich, Stanford Univ. .... [6906-04]

Coffee Break ..... 10:00 to 10:30 am

#### SESSION 2

Room: Conv. Ctr. N ..... Sun. 10:30 am to 12:00 pm

##### Quantum Metrology Tools

Session Chair: **Jonathan P. Dowling**, Louisiana State Univ.

10:30 am: **Quantum metrology tools** (*Invited Paper*), Prem Kumar, Northwestern Univ. .... [6906-05]

11:00 am: **Toward real-time detection of trace biological and chemical agents in the atmosphere using quantum coherent spectroscopy** (*Invited Paper*), Marlan O. Scully, Texas A&M Univ. .... [6906-06]

11:30 am: **Sub-wavelength imaging with Dopplerons** (*Invited Paper*), Philip R. Hemmer, M. Suhail Zubairy, Texas A&M Univ. .... [6906-07]

Lunch Break ..... 12:00 to 1:10 pm

#### SESSION 3

Room: Conv. Ctr. N ..... Sun. 1:10 to 3:10 pm

##### Quantum Mechanics in Metrology

Session Chair: **Selim M. Shahriar**, Northwestern Univ.

1:10 pm: **Exponentially enhanced quantum metrology** (*Invited Paper*), Samuel L. Braunstein, The Univ. of York (United Kingdom); Shasanka M. Roy, Tata Institute of Fundamental Research (India) ..... [6906-08]

1:40 pm: **The effects of path absorption on phase sensitivity with entangled states** (*Invited Paper*), Yang Gao, Hwang Lee, Louisiana State Univ. . . [6906-09]

2:10 pm: **Generation of superpositions and entanglements of coherent states with applications to quantum metrology** (*Invited Paper*), Christopher C. Gerry, Lehman College. .... [6906-10]

2:40 pm: **Phase detection at the quantum limit** (*Invited Paper*), Dirk Bouwmeester, Univ. of California/Santa Barbara ..... [6906-11]

Coffee Break ..... 3:10 to 3:30 pm

#### SESSION 4

Room: Conv. Ctr. N ..... Sun. 3:30 to 6:00 pm

##### Clocks

Session Chair: **Philip Robert Hemmer**, Texas A&M Univ.

3:30 pm: **Clock comparison below 10E-16** (*Invited Paper*), Anders Brusch, National Institute of Standards and Technology; Luca Lorini, Istituto Nazionale di Ricerca Metrologica (Italy); David B. Hume, Till Rosenband, Wayne M. Itano, David J. Wineland, Tara M. Fortier, Scott A. Diddams, Jason E. Stalnaker, Nathan R. Newbury, William C. Swann, Steven R. Jefferts, Thomas P. Heavner, Thomas E. Parker, James C. Bergquist, National Institute of Standards and Technology ..... [6906-12]

4:00 pm: **Study of Raman-Ramsey fringes for enhanced precision in a chip scale Rb clock** (*Invited Paper*), Gour S. Pati, Kenneth Salit, M. S. Shahriar, Northwestern Univ. .... [6906-13]

4:30 pm: **End-resonance clock and all-photon clock** (*Invited Paper*), Yuan-Yu Jau, William Happer, Fei Gong, Princeton Univ.; Alan M. Braun, Martin H. Kwakernaak, Sarnoff Corp. .... [6906-14]

5:00 pm: **Applications of magnetometry with nonlinear magneto-optical rotation** (*Invited Paper*), James M. Higbie, Dmitry Budker, Eric Corsini, Univ. of California/Berkeley ..... [6906-15]

5:30 pm: **Neutral atom optical clock with high precision and accuracy** (*Invited Paper*), Martin M. Boyd, Andrew D. Ludlow, Tanya Zelevinsky, Seth M. Foreman, Sebastian Blatt, Gretchen K. Campbell, Thomas Zanon, Marcio H. Miranda, M. Martin, Jun Ye, Univ. of Colorado at Boulder. .... [6906-16]

### Monday 21 January

#### SESSION 5

Room: Conv. Ctr. N ..... Mon. 8:10 to 10:10 am

##### Interferometric Metrology

Session Chair: **Hwang Lee**, Louisiana State Univ.

8:10 am: **Realistic constraints on photonic quantum interferometry** (*Invited Paper*), Gerald N. Gilbert, Michael D. Hamrick, Yaakov S. Weinstein, The MITRE Corp. .... [6906-17]

8:40 am: **Coherence length measurement of a laser using slow light** (*Invited Paper*), Ryan M. Camacho, Praveen K. Setu, John C. Howell, Univ. of Rochester ..... [6906-18]

9:10 am: **Anomalous-dispersion enhanced active sagnac interferometry for gravitational wave detection** (*Invited Paper*), M. S. Shahriar, M. Salit, Kenneth Salit, K. Richardson, Gour S. Pati, Northwestern Univ. .... [6906-19]

9:40 am: **Observation of radiation-pressure effects and back-action cancellation in interferometric measurements** (*Invited Paper*), Antoine Heidmann, CNRS (France) and Ecole Normale Supérieure (France) and Univ. Pierre et Marie Curie (France); Thomas Caniard, Pierre Verlot, Tristan Briant, Pierre-Francois Cohadon, Univ. Pierre et Marie Curie (France) ..... [6906-20]

Coffee Break ..... 10:10 to 10:30 am

#### SESSION 6

Room: Conv. Ctr. N ..... Mon. 10:30 am to 12:00 pm

##### Single Photons

Session Chair: **John C. Howell**, Univ. of Rochester

10:30 am: **Generation, propagation, and detection of quantum states of light** (*Invited Paper*), Robert W. Boyd, Univ. of Rochester ..... [6906-21]

11:00 am: **Solid state devices for single-photon generation** (*Invited Paper*), Charles M. Santori, Hewlett-Packard Labs. .... [6906-22]

11:30 am: **Single-photon sensor** (*Invited Paper*), Alan E. Craig, Montana State Univ./Bozeman ..... [6906-23]

# Laser Refrigeration of Solids

Conference Chair: **Richard I. Epstein**, Los Alamos National Lab.; **Mansoor Sheik-Bahae**, The Univ. of New Mexico

Program Committee: **Rolf H. Binder**, College of Optical Sciences/The Univ. of Arizona; **Zameer U. Hasan**, Temple Univ.; **Jacob B. Khurgin**, Johns Hopkins Univ.; **Yong-Hang Zhang**, Arizona State Univ.

## Wednesday 23 January

### POSTERS-Wednesday

Room: Civic Auditorium. . . . . Wed. 6:00 to 7:30 pm

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

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**Nanosecond time-resolved spectroscopy measurement for studies of semiconductor electroluminescence refrigeration**, Hong-Xue Liu, Shui-Qing Yu, Ding Ding, Shane R. Johnson, Yong-Hang Zhang, Arizona State Univ. . . . . [6907-18]

**Light propagation effects in the theory of optical refrigeration of semiconductors**, Greg Rupper, Nai-Hang Kwong, Baijie Gu, Rolf H. Binder, College of Optical Sciences/The Univ. of Arizona. . . . . [6907-19]

**Temperature dependence of photoluminescence decay in new GaAs heterostructures for laser cooling**, Edward Soto, Chengao Wang, Mansoor Sheik-Bahae, Michael P. Hasselbeck, The Univ. of New Mexico; Richard I. Epstein, Los Alamos National Lab.; John F. Geisz, National Renewable Energy Lab. . . . . [6907-20]

**Fabrication and optimization of high extraction-efficiency semiconductor optical structures for electroluminescence refrigeration**, Shui-Qing Yu, Ding Ding, Nicholas A. Rider, Jiang-Bo Wang, Shane R. Johnson, Yong-Hang Zhang, Arizona State Univ. . . . . [6907-21]

## Thursday 24 January

### SESSION 1

Room: Conv. Ctr. C1 . . . . . Thurs. 8:10 to 10:10 am

#### Semiconductor Cooling I

8:10 am: **GaNP and AlGaAs as Passivation for GaAs Laser Cooling Structures** (*Invited Paper*), Kevin J. Malloy, The Univ. of New Mexico [6907-01]

8:40 am: **Parametric study of external quantum efficiency in GaAs heterostructures for laser cooling**, Chengao Wang, Edward Soto, Michael P. Hasselbeck, Mansoor Sheik-Bahae, The Univ. of New Mexico; Richard I. Epstein, Los Alamos National Lab.; John F. Geisz, National Renewable Energy Lab. . . . . [6907-02]

9:00 am: **Near-field fluorescence lifetime imaging of semiconductor interfaces used in laser cooling**, Daniel A. Bender, Mansoor Sheik-Bahae, The Univ. of New Mexico . . . . . [6907-03]

9:20 am: **Theory of luminescence and optical refrigeration in p-doped semiconductors** (*Invited Paper*), Greg Rupper, Nai-Hang Kwong, Baijie Gu, Rolf H. Binder, College of Optical Sciences/The Univ. of Arizona . . . . . [6907-04]

9:50 am: **Fundamental limits of luminescence extraction and its impact on semiconductor luminescence refrigeration**, Shane R. Johnson, Ding Ding, Shui-Qing Yu, Yong-Hang Zhang, Arizona State Univ. . . . . [6907-05]

Coffee Break . . . . . 10:10 to 10:30 am

### SESSION 2

Room: Conv. Ctr. C1 . . . . . Thurs. 10:30 am to 12:00 pm

#### Semiconductor Cooling II

10:30 am: **Role of band-tail states in laser cooling of semiconductors** (*Invited Paper*), Jacob B. Khurgin, Johns Hopkins Univ. . . . . [6907-06]

11:00 am: **Electroluminescence refrigeration in semiconductors light-emitting devices** (*Invited Paper*), Yong-Hang Zhang, Shui-Qing Yu, Ding Ding, Shane R. Johnson, Hongxue Liu, Song-Nan Wu, Arizona State Univ. . . . . [6907-07]

11:30 am: **Nanogap experiments for laser cooling** (*Invited Paper*), Andreas Stintz, The Univ. of New Mexico; Richard I. Epstein, Los Alamos National Lab.; Mansoor Sheik-Bahae, Kevin J. Malloy, Michael P. Hasselbeck, Stephen T. Boyd, The Univ. of New Mexico. . . . . [6907-08]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

### SESSION 3

Room: Conv. Ctr. C1 . . . . . Thurs. 1:30 to 3:10 pm

#### Rare-Earth Cooling

1:30 pm: **Synthesis of ultrapure ZBLAN glass for laser refrigeration** (*Invited Paper*), Markus P. Hehlen, Los Alamos National Lab.; Wendy M. Patterson, The Univ. of New Mexico . . . . . [6907-09]

2:00 pm: **Cooling of rare-earth doped YLF using cavity enhanced resonant absorption** (*Invited Paper*), Denis V. Seletskiy, Michael P. Hasselbeck, Mansoor Sheik-Bahae, The Univ. of New Mexico; Richard I. Epstein, Los Alamos National Lab.; Stefano Bigotta, Mauro Tonelli, Univ. di Pisa (Italy) . . . . . [6907-10]

2:30 pm: **Computer modeling and analysis of thermal link performance for an optical refrigerator**, Kevin Byram, David Mar, John Parker, Steven Von der Porten, John Hankinson, Chris Lee, Kai Mayeda, Richard C. Haskell, Qimin Yang, Harvey Mudd College; Scott R. Greenfield, Richard I. Epstein, Los Alamos National Lab. . . . . [6907-11]

2:50 pm: **Designs and optical tests of thermal links for an optical refrigerator**, John Parker, David Mar, John Hankinson, Steven Von der Porten, Kevin Byram, Chris Lee, Kai Mayeda, Richard C. Haskell, Qimin Yang, Harvey Mudd College; Scott R. Greenfield, Richard I. Epstein, Los Alamos National Lab. . . . . [6907-12]

Coffee Break . . . . . 3:10 to 3:30 pm

### SESSION 4

Room: Conv. Ctr. C1 . . . . . Thurs. 3:30 to 5:40 pm

#### Novel Concepts in Cooling

3:30 pm: **Strong dispersive coupling of a mechanical resonator to an optical cavity** (*Invited Paper*), Jack Harris, Yale Univ. . . . . [6907-13]

4:00 pm: **Quantum refrigerator in the quest for the absolute zero temperature** (*Invited Paper*), Ronnie B. Kosloff, Tova Feldmann, Yair Rezek, The Hebrew Univ. of Jerusalem (Israel) . . . . . [6907-14]

4:30 pm: **Laser refrigeration in erbium based solid state materials** (*Invited Paper*), Zameer U. Hasan, Temple Univ. . . . . [6907-15]

5:00 pm: **Screening of Yb-ZBLAN samples using differential luminescence thermometry**, Scott R. Greenfield, Scott J. Pendleton, Markus P. Hehlen, Richard I. Epstein, Los Alamos National Lab. . . . . [6907-16]

5:20 pm: **Power generation by thermally assisted electroluminescence: like laser cooling, but different**, Benjamin D. Buckner, MetroLaser, Inc.; Shane R. Johnson, Arizona State Univ.; Bauke Heeg, MetroLaser, Inc.; Yong-Hang Zhang, Arizona State Univ. . . . . [6907-17]

# Vertical-Cavity Surface-Emitting Lasers XII

Conference Chair: **Chun Lei**, Intel Corp.; **James K. Guenter**, Finisar Corp.

Program Committee: **Kent D. Choquette**, Univ. of Illinois at Urbana-Champaign; **Luke A. Graham**, Picolight, Inc.; **Karlheinz H. Gulden**, Bookham, Inc. (Switzerland); **Hong Q. Hou**, EMCORE Corp.; **Kevin L. Lear**, Colorado State Univ.; **Duane A. Louderback**, OptiComp Corp.; **John Gerard McInerney**, National Univ. of Ireland/Cork (Ireland); **Krassimir P. Panayotov**, Vrije Univ. Brussel (Belgium); **Dieter Wiedenmann**, ULM Photonics GmbH (Germany)

## Wednesday 23 January

### SESSION 1

Room: Conv. Ctr. C3 ..... Wed. 8:30 to 10:10 am

#### Commercial VCSELs

Session Chair: **Chun Lei**, Intel Corp.

8:30 am: **LW VCSELs for SFP+ Applications** (*Invited Paper*), Luke A. Graham, Jack L. Jewell, Kevin D. Maranowski, Max V. Crom, Stewart A. Feld, Joseph M. Smith, James G. Beltran, Thomas R. Fanning, Melinda Schnoes, Matthew Gray, David Droege, Vera Koleva, JDSU ..... [6908-01]

9:00 am: **Volume production of polarization-controlled single-mode VCSELs**, Martin Grabherr, Roger King, Roland Jäger, Dieter Wiedenmann, ULM Photonics GmbH (Germany) ..... [6908-02]

9:20 am: **A VCSEL on every desk: the success of laser mice** (*Invited Paper*), Laura M. Giovane, Jeong-Ki Hwang, Raymond Selomulya, Li-Cheng Tai, An-Nien Cheng, Mark Kriss, Avago Technologies Ltd. .... [6908-03]

9:50 am: **Developments at Finisar AOC**, James K. Guenter, Jim A. Tatum, David T. Mathes, Bobby Hawkins, Finisar Corp. .... [6908-04]

Coffee Break ..... 10:10 to 10:30 am

### SESSION 2

Room: Conv. Ctr. C3 ..... Wed. 10:30 am to 12:10 pm

#### High-Power VCSELs and High-Speed VCSELs

Session Chair: **Kent D. Choquette**, Univ. of Illinois at Urbana-Champaign

10:30 am: **High-power vertically emitting visible lasers for projection displays**, James J. Dudley, Glen P. Carey, Renata Carico, Renato Dato, Allen M. Earman, Michael J. Finander, Giorgio Giarretta, John Green, Sascha Hallstein, Jurgen H. Hoffer, Frank Hu, Mitch Jansen, Chris Kocot, Joachim J. Krueger, Aram Mooradian, Gregory T. Niven, Yae Okuno, Ashish Tandon, Arvydas Umbrasas, Novalux Inc. .... [6908-05]

10:50 am: **Monolithic 2D high-power arrays of long-wavelength VCSELs**, Werner H. E. Hofmann, Markus Görblich, Walter Schottky Institute (Germany); Markus Ortsiefer, Vertilas GmbH (Germany); Gerhard Böhm, Markus-Christian Amann, Walter Schottky Institute (Germany) ..... [6908-06]

11:10 am: **High-power high-efficiency 2D VCSEL arrays** (*Invited Paper*), Jean-Francois Seurin, Chuni L. Ghosh, Viktor Khalfin, Aleksandr Miglo, Guoyang Xu, James D. Wynn, Prachi Pradhan, L. Arthur D'Asaro, Princeton Optronics, Inc. .... [6908-07]

11:40 am: **Development of high-speed VCSELs at Emcore** (*Invited Paper*), Neinyi Li, Doug Collins, EMCORE Corp.; Daniel Kuchta, Fuad E. Doany, Clint L. Schow, IBM Thomas J. Watson Research Ctr. .... [6908-22]

Lunch/Exhibition Break ..... 12:10 to 1:30 pm

### SESSION 3

Room: Conv. Ctr. C3 ..... Wed. 1:30 to 2:50 pm

#### Microstructured VCSELs

Session Chair: **Luke A. Graham**, JDS Uniphase Corp.

1:30 pm: **Polarization-stable monolithic VCSELs** (*Invited Paper*), Rainer Michalzik, Johannes-Michael Ostermann, Ulm Univ. (Germany); Pierluigi Debernardi, Politecnico di Torino (Italy) ..... [6908-08]

2:00 pm: **Endlessly single-mode photonic-crystal vertical-cavity surface-emitting lasers**, Kent D. Choquette, Univ. of Illinois at Urbana-Champaign ..... [6908-09]

2:20 pm: **Photonic crystals for long-wavelength single-mode VCSELs** (*Invited Paper*), Dan Birkedal, Svend Bischoff, Søren Jacobsen, Michael Juhl, Francis P. Romstad, Alight Technologies A/S (Denmark) ..... [6908-10]

Coffee Break ..... 2:50 to 3:30 pm

### SESSION 4

Room: Conv. Ctr. C3 ..... Wed. 3:30 to 4:30 pm

#### Longer Wavelength VCSEL Characteristics

Session Chair: **James K. Guenter**, Finisar Corp.

3:30 pm: **Singlemode 1.1 μm InGaAs quantum well microstructured photonic crystal VCSELs**, Renaud Stevens, Philippe Gilet, Alexandre Larrue, Laurent Grenouillet, Nicolas Olivier, Philippe Grosse, Karen Gilbert, Raphael Teyssyre, Alexei Tchelnokov, Commissariat À l'Énergie Atomique (France) ..... [6908-11]

3:50 pm: **Characteristics of GaInNAsSb/GaAs VCSELs operating near 1.55 μm**, James A. Gupta, National Research Council Canada (Canada); Stephane Calvez, Nicolas Laurand, Jelmer Weda, David Burns, Univ. of Strathclyde (United Kingdom); Daniel Poitras, Geof C. Aers, National Research Council Canada (Canada) ..... [6908-12]

4:10 pm: **Spectral behavior of long-wavelength VCSEL**, Alexandre Bacou, Angélique Rissons Blanquet, Jean-Claude Mollier, Ecole Nationale Supérieure de l'Aéronautique et de l'Espace (France) ..... [6908-13]

## Thursday 24 January

### SESSION 5

Room: Conv. Ctr. C3 ..... Thurs. 8:30 to 10:00 am

#### VCSEL Applications

Session Chair: **Martin Grabherr**, ULM Photonics GmbH (Germany)

8:30 am: **Red VCSELs for consumer applications**, Geoffrey Duggan, David A. Barrow, Tim Calvert, Markus Maute, Vincent Hung, Brian McGarvey, John D. Lambkin, Torsten Wipiejewski, FireComms Ltd. (Ireland) ..... [6908-14]

8:50 am: **VCSEL array-based light-exposure system for laser printing** (*Invited Paper*), Naotaka Mukoyama, Hiromi Otoma, Jun Sakurai, Nobuaki Ueki, Hideo Nakayama, Fuji Xerox Co., Ltd. (Japan) ..... [6908-15]

9:20 am: **VCSEL-based miniature laser-Doppler interferometer**, Joseph Pankert, Philips Lighting B.V. (Netherlands); Armand Pruijmbom, Philips Electronics Netherlands B.V. (Netherlands); Holger Moench, Philips Research Labs. (Germany) ..... [6908-16]

9:40 am: **Modeling and characterization of VCSEL-based avionic full-duplex ethernet (AFDX) gigabit links**, Khadijetou S. Ly, Airbus S.A.S. (France); Angélique Rissons Blanquet, Ecole Nationale Supérieure de l'Aéronautique et de l'Espace (France); Eddie Gambardella, Airbus S.A.S. (France); Jean-Claude Mollier, Ecole Nationale Supérieure de l'Aéronautique et de l'Espace (France) ..... [6908-17]

Coffee Break ..... 10:00 to 10:30 am

OPTO

# Conference 6908

## SESSION 6

Room: Conv. Ctr. C3 ..... Thurs. 10:30 to 11:50 am

### VCSEL Characteristics

Session Chair: James J. Dudley, Novalux Inc.

10:30 am: **Beam properties of bottom-emitting 980-nm VCSELs**, Jinjiang Cui, Yongqiang Ning, Te Li, Yan Zhang, Guangyu Liu, Biao Peng, Yanfang Sun, Li Qin, Lijun Wang, Changchun Institute of Optics, Fine Mechanics and Physics (China) ..... [6908-18]

10:50 am: **Abnormal PL spectrum in InGaN MQW vertical cavity**, Jung-Tang Chu, National Chiao Tung Univ. (Taiwan); Yuh-Jen Cheng, Academia Sinica (Taiwan); Hao-Chung Kuo, Tien-Chang Lu, Shing-Chung Wang, National Chiao Tung Univ. (Taiwan) ..... [6908-19]

11:10 am: **High-frequency resonance-free loss modulation in a dual-cavity VCSEL**, Jobert van Eisdén, Michael Yakimov, Vadim E. Tokranov, Manasa Varanasi, Oleg Romyantsev, Serge R. Oktyabrsky, Univ. at Albany; Edris M. Mohammed, Ian A. Young, Intel Corp. .... [6908-20]

11:30 am: **GainNAsSb/GaAs vertical cavity surface-emitting lasers (VCSELs): current challenges and techniques to realize multiple-wavelength laser arrays at 1.55  $\mu$ m**, Mathilde Gobet, Hopil Bae, Tomas Sarmiento, James S. Harris, Stanford Univ. .... [6908-21]

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# Novel In-Plane Semiconductor Lasers VII

Conference Chair: **Alexey A. Belyanin**, Texas A&M Univ.; **Peter M. Smowton**, Cardiff Univ. (United Kingdom)

Program Committee: **Yasuhiko Arakawa**, The Univ. of Tokyo (Japan); **Dan Botez**, Univ. of Wisconsin/Madison; **David P. Bour**, BridgeLux Corp.; **Federico Capasso**, Harvard Univ.; **Gary A. Evans**, Photodigm Inc.; **Claire Gmachl**, Princeton Univ.; **Michael Kneissl**, Technische Univ. Berlin (Germany); **Hui Chun Liu**, National Research Council Canada (Canada); **Luke J. Mawst**, Univ. of Wisconsin/Madison; **Carmen Mermelstein**, Reute (Germany); **Jerry R. Meyer**, Naval Research Lab.; **Jesper Mørk**, Danmarks Tekniske Univ. (Denmark); **Mario J. Paniccia**, Intel Corp.; **Johann Peter Reithmaier**, Univ. Kassel (Germany)

## Monday 21 January

### SESSION 1

Room: Conv. Ctr. B4 ..... Mon. 8:10 to 10:10 am

#### Quantum Dots and InGaAsN

Session Chair: **Peter M. Smowton**, Cardiff Univ. (United Kingdom)

8:10 am: **Wavelength stabilized high-power quantum dot lasers** (*Invited Paper*), Johann P. Reithmaier, Univ. Kassel (Germany); Wolfgang Kaiser, Ralph Debusmann, Alfred W. Forchel, Univ. Würzburg (Germany). . . . [6909-01]

8:40 am: **High-performance 1300-nm InAs/GaAs quantum dot lasers**, Hui-Yun Liu, Mark Hopkinson, R. A. Hogg, K. M. Groom, D. J. Mowbray, The Univ. of Sheffield (United Kingdom). . . . [6909-02]

9:00 am: **High-performance quantum dot-distributed feedback laser diodes around 1.15µm**, Johannes Koeth, Marc Fischer, Michael Legge, Jochen Seufert, Ralph Werner, Nanoplus GmbH (Germany). . . . [6909-03]

9:20 am: **High-performance 1.3-µm GainNAs quantum well lasers on GaAs** (*Invited Paper*), Shumin Wang, Chalmers Tekniska Högskola (Sweden); Yongqiang Wei, Univ. of Cambridge (United Kingdom); Göran Adolfsson, Johan S. Gustavsson, Chalmers Tekniska Högskola (Sweden); Xiaodong Wang, Institute of Semiconductors (China); Mahdad Sadeghi, Anders G. Larsson, Chalmers Tekniska Högskola (Sweden). . . . [6909-04]

9:50 am: **Efficiency limiting processes in long wavelength (1.5 µm)**, Stephen J. Sweeney, Daniel G. McConville, Alfred R. Adams, Univ. of Surrey (United Kingdom); Henning Riechert, Qimonda AG (Germany); Stanko Tomic, Univ. of Surrey (United Kingdom). . . . [6909-05]

Coffee Break ..... 10:10 to 10:30 am

### SESSION 2

Room: Conv. Ctr. B4 ..... Mon. 10:30 am to 12:30 pm

#### Quantum Dots and Modelocking

Session Chair: **Shumin Wang**, Chalmers Tekniska Högskola (Sweden)

10:30 am: **From quantum dots to vertical nanorods: engineering composition and strain in the growth direction** (*Invited Paper, Presentation Only*), Andrea Fiore, Technische Univ. Eindhoven (Netherlands); Lianhe Li, Philipp Ridha, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Gilles Patriarche, Ctr. National de la Recherche Scientifique (France). . . . [6909-06]

11:00 am: **Reconfigurable monolithic quantum dot passively mode-locked lasers** (*Invited Paper*), Luke F. Lester, Yongchun Xin, Yan Li, The Univ. of New Mexico; Vassilios I. Kovanis, Air Force Research Lab. . . . [6909-07]

11:30 am: **Monolithic mode-locked quantum dot lasers** (*Invited Paper*), Richard V. Penty, Mark G. Thompson, Ian H. White, Univ. of Cambridge (United Kingdom). . . . [6909-08]

12:00 pm: **Low-noise monolithic mode-locked semiconductor lasers through low-dimensional structures** (*Invited Paper*), Kresten Yvind, David Larsson, Jesper Mørk, Jørn M. Hvam, Danmarks Tekniske Univ. (Denmark); Mark Thomson, Richard V. Penty, Ian H. White, Univ. of Cambridge (United Kingdom). . . . [6909-09]

Lunch Break ..... 12:30 to 1:30 pm

### SESSION 3

Room: Conv. Ctr. B4 ..... Mon. 1:30 to 3:10 pm

#### Integration

Session Chair: **Johann Peter Reithmaier**, Univ. Kassel (Germany)

1:30 pm: **High-performance DFB Laser arrays for tunable laser and parallel link applications** (*Invited Paper*), Bardia Pezeshki, Gideon W. Yoffe, Santur Corp. . . . [6909-10]

2:00 pm: **Reduction of RIE-induced damage on lasing properties of GainAsP/InP DQW lasers fabricated by 2-step growths**, Dhanorm Plumwongrot, Munetaka Kurokawa, Tadashi Okumura, Yoshifumi Nishimoto, Tokyo Institute of Technology (Japan); Takeo Maruyama, Tokyo Institute of Technology (Japan) and JST-CREST (Japan); Nobuhiko Nishiyama, Tokyo Institute of Technology (Japan); Shigehisa Arai, Tokyo Institute of Technology (Japan) and JST-CREST (Japan). . . . [6909-11]

2:20 pm: **Three-guide coupled rectangular ring lasers with total internal reflection mirrors**, Doo Gun Kim, Woon-Kyung Choi, In-Il Jung, Geum-Yoon Oh, Young-Wan Choi, Chung-Ang Univ. (South Korea); Jong Chang Yi, Hong-ik Univ. (South Korea); Nadir Dagli, Univ. of California/Santa Barbara. . . [6909-12]

2:40 pm: **Large scale InP photonic integrated circuits in optical transport networks** (*Invited Paper*), Radhakrishnan Nagarajan, Infinera. . . . [6909-13]

Coffee Break ..... 3:10 to 3:40 pm

### SESSION 4

Room: Conv. Ctr. B4 ..... Mon. 3:40 to 5:00 pm

#### Nitrides

Session Chair: **David P. Bour**, BridgeLux Corp.; **Michael Kneissl**, Technische Univ. Berlin (Germany)

3:40 pm: **A GaN-based surface-emitting laser with 45-degree inclined mirror in horizontal cavity**, Masao Kawaguchi, Satoshi Tamura, Masaaki Yuri, Daisuke Ueda, Matsushita Electric Industrial Co., Ltd. (Japan) . . . . [6909-14]

4:00 pm: **Characterization of AllInGaN-based 405-nm distributed feedback laser diodes** (*Invited Paper*), Shingo Masui, Kazutaka Tsukayama, Tomoya Yanamoto, Tokuya Kozaki, Shin-ichi Nagahama, Takashi Mukai, Nichia Corp. (Japan). . . . [6909-15]

4:30 pm: **Fabrication and characterization of nonpolar m-plane InGaN LEDs and LDs** (*Invited Paper*), Kuniyoshi Okamoto, Taketoshi Tanaka, Masashi Kubota, Hiroki Tsujimura, Satoshi Nakagawa, Rohm Co., Ltd. (Japan); Sigefusa F. Chichibu, Tohoku Univ. (Japan); Hiroaki Ohta, Rohm Co., Ltd. (Japan). . . . [6909-16]

OPTO

## Tuesday 22 January

### OPTO 2008 Plenary Session

Session Chairs: **Ali Adibi**, Georgia Institute of Technology;  
**James G. Grote**, Air Force Research Lab.

Room: *Conv. Ctr. A7/A8 · 8:30 to 10:00 am*

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Nanophotonics: from Photonic Crystals to Plasmonics** (*Presentation Only*), Eli Yablonovitch, Univ. of California/Berkeley

9:20 am: **Organic "Plastic" Optoelectronic Devices** (*Presentation Only*), Niyazi Serdar Sariciftci, Johannes Kepler Univ. Linz (Austria)

*See p. 28 for details.*

Coffee Break ..... 10:00 to 10:30 am

### SESSION 5

Room: *Conv. Ctr. B4 ..... Tues. 10:30 am to 12:20 pm*

#### THz Lasers

Session Chair: **Dan Botez**, Univ. of Wisconsin/Madison

10:30 am: **High-temperature and high-power operation of terahertz quantum-cascade lasers** (*Invited Paper*), Sushil Kumar, Alan W. Lee, Qi Qin, Massachusetts Institute of Technology; Benjamin S. Williams, Univ. of California/Los Angeles; Qing Hu, Massachusetts Institute of Technology; John L. Reno, Sandia National Labs. .... [6909-17]

11:00 am: **Progress in quantum cascade lasers** (*Invited Paper*), Jerome Faist, ETH Zürich (Switzerland) ..... [6909-18]

11:30 am: **Terahertz source based on intracavity difference-frequency generation in quantum cascade lasers** (*Invited Paper*), Mikhail A. Belkin, Harvard Univ.; Alexey A. Belyanin, Texas A&M Univ.; Federico Capasso, Harvard Univ. .... [6909-19]

12:00 pm: **Time-resolved investigation of heat-transport dynamics in THz quantum-cascade lasers**, Miriam Serena Vitiello, Vincenzo Spagnolo, Gaetano Scamarcio, Cinzia Di Franco, Univ. degli Studi di Bari (Italy) ..... [6909-20]

Lunch/Exhibition Break ..... 12:20 to 1:30 pm

### SESSION 6

Room: *Conv. Ctr. A1 ..... Tues. 1:30 to 3:30 pm*

#### Silicon Photonics I

Joint Session with Conference 6898: Silicon Photonics III

1:30 pm: **A monolithic integrated low-threshold Raman silicon laser** (*Invited Paper*), Haisheng Rong, Shengbo Xu, Intel Corp.; Oded Cohen, Omri Raday, Intel Corp. (Israel); Mario J. Paniccia, Intel Corp. .... [6898-15]

2:00 pm: **Silicon nanocrystals and Er coupled to silicon nanocrystals for lasers and amplifiers** (*Invited Paper*), Nicola Daldosso, Lorenzo Pavesi, Zeno Gaburro, Univ. degli Studi di Trento (Italy) ..... [6898-16]

2:30 pm: **Monolithically integrated III-Sb diode lasers on miscut Si substrates** (*Invited Paper*), Diana L. Huffaker, Ganesh Balakrishnan, Univ. of California/Los Angeles; A. Jallipalli, M. N. Kutty, S. Huang, Larry R. Dawson, The Univ. of New Mexico ..... [6909-21]

3:00 pm: **On-chip integration of quantum dot lasers with waveguides and modulators on Si** (*Invited Paper*), Pallab K. Bhattacharya, Jun Yang, Univ. of Michigan ..... [6909-22]

Coffee Break ..... 3:30 to 4:00 pm

### SESSION 7

Room: *Conv. Ctr. A1 ..... Tues. 4:00 to 5:30 pm*

#### Silicon Photonics II

Joint Session with Conference 6898: Silicon Photonics III

4:00 pm: **Electrically injected InP microdisk lasers integrated with nanophotonic SOI circuits** (*Invited Paper*), Joris Van Campenhout, Univ. Gent (Belgium); Pedro Rojo-Romeo, Philippe Regreny, Christian Seassal, Ecole Centrale de Lyon (France); Dries Van Thourhout, Univ. Gent (Belgium); Léa Di Cioccio, Commissariat à l'Energie Atomique (France); Chrystelle Lagahe-Blanchard, TRACIT Technologies (France); Jean-Marc Fedeli, Commissariat à l'Energie Atomique (France); Roel G. Baets, Univ. Gent (Belgium) ..... [6898-17]

4:30 pm: **Recess integration of micro-cleaved laser diode platelets with dielectric waveguides on silicon** (*Invited Paper*), Clifton G. Fonstad, Jr., Joseph Rumpler, Edward Barkley, Shaya Famenini, James Perkins, Massachusetts Institute of Technology. .... [6909-23]

5:00 pm: **Integrated AlGaInAs-silicon evanescent racetrack laser and photodetector** (*Invited Paper*), Alexander W. Fang, Univ. of California/Santa Barbara; Richard Jones, Intel Corp.; Hyundai Park, Univ. of California/Santa Barbara; Oded Cohen, Omri Raday, Intel Corp. (Israel); Mario J. Paniccia, Intel Corp.; John E. Bowers, Univ. of California/Santa Barbara ..... [6898-18]

## Wednesday 23 January

### SESSION 8

Room: *Conv. Ctr. B4 ..... Wed. 8:10 to 10:00 am*

#### High Brightness

Session Chair: **Gary A. Evans**, Photodigm Inc.

8:10 am: **High-brightness diode lasers with very narrow divergence** (*Invited Paper*), Götz Ebert, Frank Bugge, Joerg Fricke, Karl-Heinz Hasler, Hans Wenzel, Guenther Traenkle, Ferdinand-Braun-Institut für Höchstfrequenztechnik (Germany) ..... [6909-24]

8:40 am: **Highly reliable, high-brightness 915-nm laser diodes for fiber laser applications**, Zuntu Xu, Wei Gao, Lisen Cheng, Kejian Luo, Kun Shen, Andre Mastrovito, Axcel Photonics, Inc. .... [6909-25]

9:00 am: **Asymmetric Al-free active-region laser structure for high-brightness tapered lasers at 975 nm**, Nicolas Michel, Michel Lecomte, Olivier Parillaud, Michel M. Krakowski, Thales Research & Technology (France); Jose-Manuel Garcia-Tijero, Ignacio Esquivias, Univ. Politécnica de Madrid (Spain) ..... [6909-26]

9:20 am: **High-reliability, high-power arrays of 808-nm single-mode diode-lasers employing various quantum well structures**, Bocang Qiu, Olek P. Kowalski, Stewart D. McDougall, Xuefeng Liu, John H. Marsh, Intense Ltd. (United Kingdom) ..... [6909-27]

9:40 am: **Grazing incidence slab semiconductor laser (GRISL)**, Anish K. Goyal, Robin K. Huang, Leo J. Missaggia, MIT Lincoln Lab. .... [6909-28]

Coffee Break ..... 10:00 to 10:30 am

### SESSION 9

Room: *Conv. Ctr. B4 ..... Wed. 10:30 am to 12:20 pm*

#### Mid-IR Lasers

Session Chair: **Claire F. Gmachl**, Princeton Univ.

10:30 am: **InAs-based quantum-cascade lasers** (*Invited Paper*), Alexei N. Baranov, Roland Teissier, Jan Devenson, Olivier Cathabard, Univ. Montpellier II (France) ..... [6909-29]

11:00 am: **Short-wavelength quantum cascade lasers** (*Invited Paper*), John W. Cockburn, Dmitri Revin, The Univ. of Sheffield (United Kingdom) . . [6909-30]

11:30 am: **Fiber-coupled, GaSb-based diode-laser modules for the 2.X- $\hat{1}/4\text{m}$  wavelength range**, Christian Mann, Marcel Rattunde, Eva Geerlings, Johannes Schmitz, Gudrun Kaufel, Joachim Wagner, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany) ..... [6909-31]

11:50 am: **Interband cascade laser progress** (*Invited Paper*), William W. Bewley, Chad L. Canedy, Mijin Kim, Chul Soo Kim, Jill A. Nolde, Diane C. Larrabee, J. R. Lindle, Igor Vurgaftman, Jerry R. Meyer, Naval Research Lab. .... [6909-32]

Lunch/Exhibition Break ..... 12:20 to 1:30 pm

**SESSION 10**

**Room: Conv. Ctr. B4 . . . . . Wed. 1:30 to 3:20 pm**

**Quantum Cascade Lasers I**

*Session Chair: Jerry R. Meyer, Naval Research Lab.*

- 1:30 pm: **Plasmonic quantum-cascade laser antennas for chem/bio imaging** (*Invited Paper*), Federico Capasso, Harvard Univ. . . . . [6909-33]
- 2:00 pm: **Bloch gain in quantum cascade lasers** (*Invited Paper*), Romain Terazzi, Tobias Gresch, Marcella Giovannini, Nicolas Hoyler, Univ. de Neuchâtel (Switzerland); Norihiko Sekine, National Institute of Information and Communications Technology (Japan); Jérôme Faist, Univ. de Neuchâtel (Switzerland) . . . . . [6909-34]
- 2:30 pm: **Intracavity amplitude modulation of quantum-cascade lasers using intersubband absorption in the active region under reverse bias**, Richard Maulini, Arkadiy Lyakh, Alexei G. Tsekoun, Rowel Go, C. Kumar N. Patel, Pranalytica, Inc. . . . . [6909-35]
- 2:50 pm: **Merging THz QC lasers with telecom and microwave technology** (*Invited Paper*), Carlo Sirtori, Univ. Paris 7-Denis Diderot (France); Stefano Barbieri, TeraView Ltd. (United Kingdom); Sukhdeep S. Dhillon, Thales Research & Technology (France). . . . . [6909-36]
- Coffee Break . . . . . 3:20 to 3:40 pm

**SESSION 11**

**Room: Conv. Ctr. B4 . . . . . Wed. 3:40 to 5:50 pm**

**Quantum Cascade Lasers II**

*Session Chair: Mikhail A. Belkin, Harvard Univ.*

- 3:40 pm: **On the coherence/incoherence of electron transport in semiconductor heterostructure optoelectronic devices** (*Invited Paper*), Paul Harrison, Dragan Indjin, Ivana Savic, Zoran Ikonc, Craig Evans, Nenad V. Vukmirovic, Rob W. Kelsall, Jim McTavish, Univ. of Leeds (United Kingdom); Vita Milanovic, Univ. of Belgrade (Serbia and Montenegro) . . . . . [6909-37]
- 4:10 pm: **Multiple optical transitions quantum-cascade lasers** (*Invited Paper*), Claire Gmachl, Anthony J. Hoffman, Stephan Schartner, Kale J. Franz, Stefan Menzel, Scott S. Howard, Daniel M. Wasserman, Princeton Univ. . . . . [6909-38]
- 4:40 pm: **Multimode regimes and instabilities in quantum-cascade lasers** (*Invited Paper*), Franz X. Kaertner, Ariel Gordon, Massachusetts Institute of Technology . . . . . [6909-39]
- 5:10 pm: **Electron-lattice interaction and modeling of the thermal properties of mid-IR quantum-cascade lasers**, Vincenzo Spagnolo, Miriam Serena Vitiello, Antonia Lops, Gaetano Scamarcio, Univ. degli Studi di Bari (Italy) . . . . . [6909-40]
- 5:30 pm: **Coherent coupling of mid-infrared quantum cascade lasers**, Leonard K. Hoffmann, Christophe A. Hurni, Stephan Schartner, Maximilian Austerer, Elvis Mujagic, Michele Nobile, Werner Schrenk, Aaron M. Andrews, Pavel Klang, Gottfried Strasser, Technische Univ. Wien (Austria); Mykhaylo P. Semtsiv, W. Ted Masselink, Humboldt-Univ. zu Berlin (Germany) . . . . [6909-41]

**Thursday 24 January**

**SESSION 12**

**Room: Conv. Ctr. B4 . . . . . Thurs. 8:10 to 10:10 am**

**High Power**

*Session Chair: Luke J. Mawst, Univ. of Wisconsin/Madison*

- 8:10 am: **Photonic crystal based lasers for high single mode output power** (*Invited Paper*), Martin Kamp, Univ. Würzburg (Germany); Holger Hofmann, Univ. Würzburg; Alfred W. Forchel, Univ. Würzburg (Germany). . . . . [6909-42]
- 8:40 am: **High brightness quantum well and quantum dot tapered lasers** (*Invited Paper*), Michel M. Krakowski, Nicolas Michel, Imen Hassiaoui, Michel Calligaro, Michel Lecomte, Olivier Parillaud, Alcatel-Thales III-V Lab. (France); Wolfgang Kaiser, Alfred W. B. Forchel, Univ. Würzburg (Germany); Emil-Mihai Pavlescu, Johann P. Reithmaier, Univ. Kassel (Germany) . . . . . [6909-53]
- 9:10 am: **Master oscillator power amplifier 3D-assemblies based on grating coupled laser diodes**, Oleg V. Smolski, The Univ. of North Carolina at Charlotte; Jason K. O'Daniel, College of Optics & Photonics/Univ. of Central Florida; Eric G. Johnson, The Univ. of North Carolina at Charlotte; Paul O. Leisher, nLight Corp.; Paul A. Crump, Ferdinand-Braun-Institut für Höchstfrequenztechnik (Germany) . . . . . [6909-44]
- 9:30 am: **Diffraction coupling of tapered lasers in a very compact external talbot cavity**, Imen Hassiaoui, Nicolas Michel, Michel Lecomte, Olivier Parillaud, Michel Calligaro, Michel M. Krakowski, Jean-Pierre Huignard, Thales Research & Technology (France); Gilbert L. Bourdet, Ecole Polytechnique (France) . . . . . [6909-45]
- 9:50 am: **High-power coupled tapered-laser arrays with 100% fill-factor emission facet**, Dan A. Yanson, Intense Ltd. (United Kingdom) . . . . [6909-46]
- Coffee Break . . . . . 10:10 to 10:30 am

**SESSION 13**

**Room: Conv. Ctr. B4 . . . . . Thurs. 10:30 am to 12:10 pm**

**Applications Driven**

*Session Chair: Andrea Fiore,*

*École Polytechnique Fédérale de Lausanne (Switzerland)*

- 10:30 am: **700-730-nm InGaAsP quantum well ridge-waveguide lasers**, Etsuko Nomoto, Takafumi Taniguchi, Tsukuru Ohtoshi, Hitachi, Ltd. (Japan); Shinji Sasaki, Kazunori Saito, Hiroshi Hamada, Hideki Hara, Opnext Japan, Inc. (Japan). . . . . [6909-47]
- 10:50 am: **Chirped comb generation in frequency shifted feedback DFB lasers**, Paul S. Spencer, Jon Paul, Yanhua Hong, K. A. Shore, Univ. of Wales Bangor (United Kingdom) . . . . . [6909-48]
- 11:10 am: **High-power DFB lasers for D1 and D2 caesium absorption spectroscopy and atomic clocks**, Andreas Klehr, Hans Wenzel, Olaf Brox, Frank Bugge, Goetz Erbert, Thanh P. Nguyen, Guenther Traenkle, Ferdinand-Braun-Institut für Höchstfrequenztechnik (Germany) . . . . . [6909-49]
- 11:30 am: **Narrow linewidth and demonstration of saturation spectra of the Cesium at 852 nm with high-power Al-free DFB laser diodes**, Vincent Ligeret, Shailendra Bansropun, Michel Lecomte, Michel Calligaro, Olivier Parillaud, Michel M. Krakowski, Thales Research & Technology (France); David Holleville, Observatoire de Paris (France) . . . . . [6909-50]
- 11:50 am: **Integrated 1060-nm MOPA pump source for high-power green light emitters in display technology**, Olaf Brox, Ferdinand-Braun-Institut für Höchstfrequenztechnik (Germany); Jörg Wiedmann, Friedemann Scholz, eagleyard Photonics GmbH (Germany); Frank Bugge, Jörg Fricke, Andreas Klehr, Ferdinand-Braun-Institut für Höchstfrequenztechnik (Germany); Thomas Laurent, eagleyard Photonics GmbH (Germany); Peter Ressel, Hans Wenzel, Götz Erbert, Guenther Traenkle, Ferdinand-Braun-Institut für Höchstfrequenztechnik (Germany) . . . . . [6909-52]

OPTO

# Light-Emitting Diodes: Research, Manufacturing, and Applications XII

Conference Chair: **Klaus P. Streubel**, OSRAM Opto Semiconductors GmbH; **Heonsu Jeon**, Seoul National Univ. (South Korea)

Program Committee: **Gerd Bacher**, Univ. Duisburg-Essen (Germany); **John C. Carrano**, Luminex Corp.; **Michael Heuken**, AIXTRON AG (Germany); **Markus Klein**, OSRAM Opto Semiconductors GmbH (Germany); **Michael R. Krames**, Philips Lumileds Lighting Co.; **Kurt J. Linden**, Spire Corp.; **E. Fred Schubert**, Rensselaer Polytechnic Institute; **Jerry A. Simmons**, Sandia National Labs.; **Ross P. Stanley**, Ctr. Suisse d'Electronique et de Microtechnique SA (Switzerland); **Li-Wei Tu**, National Sun Yat-Sen Univ. (Taiwan); **H. Walter Yao**, Advanced Micro Devices, Inc.; **John M. Zavada**, U.S. Army Research Office

## Tuesday 22 January

### OPTO 2008 Plenary Session

Session Chairs: **Ali Adibi**, Georgia Institute of Technology; **James G. Grote**, Air Force Research Lab.

Room: Conv. Ctr. A7/A8 · 8:30 to 10:00 am

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Nanophotonics: from Photonic Crystals to Plasmonics** (*Presentation Only*), Eli Yablonovitch, Univ. of California/Berkeley

9:20 am: **Organic "Plastic" Optoelectronic Devices** (*Presentation Only*), Niyazi Serdar Sariciftci, Johannes Kepler Univ. Linz (Austria)

See p. 28 for details.

Coffee Break ..... 10:00 to 10:30 am

### SESSION 1

Room: Conv. Ctr. A3 ..... Tues. 10:30 am to 12:30 pm

#### LED Status Overview

Session Chair: **Klaus P. Streubel**, OSRAM Opto Semiconductors GmbH

10:30 am: **Status and outlook for high-power light-emitting diodes for solid-state lighting** (*Invited Paper*), Michael R. Krames, Philips Lumileds Lighting Co. .... [6910-01]

11:00 am: **Development of ZnO-based LEDs** (*Invited Paper*), Henry W. White, Bong J. Kim, Univ. of Missouri/Columbia; Yungryel Ryu, Tae-Seok Lee, Jorge A. Lubguban, MOXtronics, Inc. .... [6910-02]

11:30 am: **High-power InGaN LEDs: present status and future prospects** (*Invited Paper*), Berthold Hahn, OSRAM Opto Semiconductors GmbH (Germany) .... [6910-03]

12:00 pm: **Recent developments in high brightness LEDs** (*Invited Paper*), Tzer-Perng Chen, EPISTAR Corp. (Taiwan) .... [6910-04]

Lunch/Exhibition Break ..... 12:30 to 1:40 pm

### SESSION 2

Room: Conv. Ctr. A3 ..... Tues. 1:40 to 3:10 pm

#### Organic LEDs

Session Chair: **Markus Klein**, OSRAM Opto Semiconductors GmbH (Germany)

1:40 pm: **Intrinsic OLED emitter properties and their effect on device performance** (*Invited Paper*), Christoph A. Wächter, Fraunhofer Institut für Angewandte Optik und Feinmechanik (Germany); Norbert Danz, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); Dirk Michaelis, Michael Flämmich, Andreas H. Bräuer, Fraunhofer Institut für Angewandte Optik und Feinmechanik (Germany); Malte C. Gather, Univ. of Cologne (Germany); Klaus Meerholz, Univ. zu Köln (Germany) .... [6910-05]

2:10 pm: **Optical analysis of down-conversion OLEDs**, Benjamin C. Krummacker, Markus Klein, Norwin von Malm, OSRAM Opto Semiconductors GmbH (Germany); Albrecht Winnacker, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany) .... [6910-06]

2:30 pm: **Tuning of the radiative rate in deep blue emitting phosphorescent complexes for OLED applications**, Stephan Haneder, Enrico Da Como, Andrey L. Rogach, Ludwig-Maximilians-Univ. München (Germany); John M. Lupton, The Univ. of Utah; Jochen Feldmann, Ludwig-Maximilians-Univ. München (Germany); Evelyn Fuchs, Klaus Kahle, Oliver Molt, Ingo Muenster, Christian Lennartz, Christian D. Schildknecht, Gerhard Wagenblast, BASF Aktiengesellschaft (Germany) .... [6910-07]

2:50 pm: **Novel conjugated polymers with stabilized blue emission**, Hongskuh Suh, Youngeup Jin, Jinwoo Kim, Jaehong Kim, Suhee Song, Pusan National Univ. (South Korea); Sun Hee Kim, Kwanghee Lee, Gwangju Institute of Science and Technology (South Korea) .... [6910-08]

Coffee Break ..... 3:10 to 3:30 pm

### SESSION 3

Room: Conv. Ctr. A3 ..... Tues. 3:30 to 5:40 pm

#### LED Fabrication and Measurement

Session Chair: **Kurt J. Linden**, Spire Corp.

3:30 pm: **The development and property research of LED alloy electrode**, Choug-Baw Lin, Cheng-Yi Liu, National Central Univ. (Taiwan) .... [6910-09]

3:50 pm: **Thermal stability study on ITO/Ag reflective bi-layer on P-GaN**, Yung Hsun Lin, Cheng-Yi Liu, National Central Univ. (Taiwan) .... [6910-10]

4:10 pm: **Novel approach for LED luminous intensity measurement**, Ronald F. Rykowski, Radiant Imaging, Inc. .... [6910-11]

4:30 pm: **Current spreading enhancement by using a current modification layer and current spreading characteristics in thin-GaN LED**, Pen-Ko Chou, Cheng-Yi Liu, National Central Univ. (Taiwan) .... [6910-12]

4:50 pm: **Effect of stress level of GaN epi-layer on the electrical and optical properties of thin-GaN LED**, Chia-Lun Chang, Cheng-Yi Liu, National Central Univ. (Taiwan) .... [6910-14]

5:10 pm: **Champaigne-glass type (Al)InGaN-based nanocolumn LEDs emitting from ultraviolet to red** (*Invited Paper*), Katsumi Kishino, Akihiko Kikuchi, Hiroto Sekiguchi, Shunsuke Ishizawa, Sophia Univ. (Japan) . [6910-20]

## Wednesday 23 January

### SESSION 4

Room: Conv. Ctr. A3 ..... Wed. 8:10 to 10:20 am

#### GaN Growth

8:10 am: **Secrets of GaN substrates properties for high luminosity of InGaN quantum wells** (*Invited Paper*), Mike Leszczynski, UNIPRESS (Poland) and TopGaN (Poland) .... [6910-15]

8:40 am: **GaN on silicon: growth and devices on (111), (100), and (110)** (*Invited Paper*), Alois J. Krost, Otto-von-Guericke-Univ. Magdeburg (Germany) .... [6910-16]

9:10 am: **HVPE for GaN substrates** (*Invited Paper*), Markus Weyers, Eberhard Richter, Christian Hennig, Günther Tränkle, Ferdinand-Braun-Institut für Höchstfrequenztechnik (Germany) .... [6910-17]

9:40 am: **Reduced blue shift during current injection in an InGaN/GaN quantum-well light-emitting diode of prestrained growth**, Chih-Feng Lu, Chi-Feng Huang, Cheng-Yen Chen, Chih-Chung Yang, National Taiwan Univ. (Taiwan) .... [6910-18]

10:00 am: **Advances in MOCVD production tools for SSL**, Christof Sommerhalter, AIXTRON Inc. / Genus; Ruediger Schreiner, Bernd Schineller, Michael Heuken, AIXTRON AG (Germany) .... [6910-19]

Coffee Break ..... 10:20 to 10:40 am

**SESSION 5**

**Room: Conv. Ctr. A3 . . . . .Wed. 10:40 to 11:40 am**

**Novel LED Structure I**

*Session Chair: Heonsu Jeon, Seoul National Univ. (South Korea)*

10:40 am: **Light enhancement by the formation of a ceramic honeycomb nano-structure on the n-GaN surface of thin-GaN LEDs**, Ching-Liang Lin, Cheng-Yi Liu, National Central Univ. (Taiwan) . . . . . [6910-21]

11:00 am: **Comparison of numerical modeling and experiments of InGaN quantum wells light emitting diodes with SiO<sub>2</sub> / polystyrene microlens arrays**, Yik-Khoon Ee, Pisisit Kumnorkaew, Hua Tong, Ronald A. Arif, James F. Gilchrist, Nelson Tansu, Lehigh Univ. . . . . [6910-22]

11:20 am: **Light extraction from encapsulated GaN-based LEDs by nanoimprint of different micro-patterns**, Kui Bao, Bei Zhang, Xiang Ning Kang, Tao Dai, Chang Xiong, Guoyi Zhang, Yong Chen, Peking Univ. (China) . . . . . [6910-23]

Lunch/Exhibition Break . . . . . 11:40 am to 1:30 pm

**SESSION 6**

**Room: Conv. Ctr. A3 . . . . .Wed. 1:30 to 3:00 pm**

**Novel LED Structure II**

*Session Chair: Ross P. Stanley, Ctr. Suisse d'Electronique et de Microtechnique SA (Switzerland)*

1:30 pm: **Hybrid colloidal nanocrystal-organics based LEDs** (*Invited Paper*), Giuseppe Gigli, Univ. degli Studi di Lecce (Italy); Aurora Rizzo, CNR-INFM (Italy) and ISUFI, Univ. del Salento (Italy) . . . . . [6910-24]

2:00 pm: **GaN-based light emitting diodes with large area surface nano-structures by anodic aluminum oxide templates**, Tao Dai, Bei Zhang, Xiang Ning Kang, Kui Bao, Wenzhu Zhao, Dongsheng Xu, Zizhao Gan, Peking Univ. (China) . . . . . [6910-25]

2:20 pm: **GaN-based light-emitting diode integrated with photonic crystal patterns and sidewall deflectors for improved light extraction**, Joonhee Lee, Dong-uk Kim, Sihan Kim, Sungmo Ahn, Heonsu Jeon, Seoul National Univ. (South Korea) . . . . . [6910-26]

2:40 pm: **Submicron-thick microcavity InGaN light emitting diodes**, Yong-Seok Choi, Michael Iza, Elison Matioli, Gregor Koblmüller, James S. Speck, Claude Weisbuch, Evelyn L. Hu, Univ. of California/Santa Barbara . . . [6910-27]

Coffee Break . . . . . 3:00 to 3:30 pm

**SESSION 7**

**Room: Conv. Ctr. A3 . . . . .Wed. 3:30 to 5:40 pm**

**LED Application**

*Session Chair: Gerd Bacher, Univ. Duisburg-Essen (Germany)*

3:30 pm: **LEDs for lighting? Any others?** (*Invited Paper*), Gil-Han Park, Samsung Electro-Mechanics Co. (South Korea) . . . . . [6910-28]

4:00 pm: **Surgical retractor with RGB-white LEDs**, Jun-ichi Shimada M.D., Kazuhiro Ito, Kyoto Prefectural Univ. of Medicine (Japan); Daishiro Kato, Nantan General Hospital (Japan); Yoichi Kawakami, Kyoto Univ. (Japan) . . . . [6910-29]

4:20 pm: **Smart LED light source driver for machine vision systems**, Miran Bürmen, Franjo Pernus, Bostjan Likar, Univ. v Ljubljani (Slovenia) . . . [6910-30]

4:40 pm: **High-power LED illumination system for photosynthetic and growth research on pot plant canopies**, Birgitte Thestrup, Carsten Dam-Hansen, Danmarks Tekniske Univ. (Denmark); Janni B. Lund, Eva Rosenqvist, Københavns Univ. (Denmark) . . . . . [6910-31]

5:00 pm: **ePaper**, Dhananjay V. Gadre, Sulochana Dhar, Vasudev Lal, Univ. of Delhi (India); Anshul Kumar, Indian Institute of Technology Delhi (India) [6910-32]

5:20 pm: **(AlGaIn)N UV LEDs for integrated metal-oxide based ozone sensors**, Michael Kunzer, Thorsten Passow, Wilhelm Schirmacher, Wilfried Pletschen, Klaus Köhler, Joachim Wagner, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany); Chunyu Wang, Volker Cimalla, Oliver Ambacher, Technische Univ. Ilmenau (Germany) . . . . . [6910-33]

**Posters-Wednesday**

**Room: Civic Auditorium. . . . .Wed. 6:00 to 7:30 pm**

*All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.*

*Poster presenters may post their poster papers Wednesday morning starting at 10:00 am in the Civic Auditorium, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.*

**Spectroscopic characteristics of blue and ultraviolet organic emitters**, Taiju Tsuboi, Kyoto Sangyo Univ. (Japan); Chin-Ti Chen, Academia Sinica (Taiwan) . . . . . [6910-48]

**The density function theory analysis for multicolor organic light emitting diode with IrQ(ppy)<sub>2</sub>-5Cl**, Silviu Polosan, National Institute for Materials Physics (Romania); Taiju Tsuboi, Kyoto Sangyo Univ. (Japan); Tahsin J. Chow, Academia Sinica (Taiwan) . . . . . [6910-49]

**Energy transfers of phosphorescent organic materials in highly doped and neat films**, Taiju Tsuboi, Kyoto Sangyo Univ. (Japan) . . . . . [6910-50]

**Peculiarities of light emission in p-n structures based on graded-band-gap semiconductors**, Bogdan S. Sokolovsky, Volodymyr K. Pysarevsky, Roman M. Kovtun, Ivan Franko National Univ. of L'viv (Ukraine) . . . . . [6910-51]

**Stability of electroluminescent conjugated polymer with fluoro groups in vinylene units**, Jaeyeon Jung, Youngeup Jin, Suhee Song, Jaehong Kim, Jinwoo Kim, Hongsuk Suh, Pusan National Univ. (South Korea) . . . . [6910-52]

**The color tuning of PPV derivative by substituted tetrakis-ethylhexyloxy groups**, Youngran Goo, Youngeup Jin, Suhee Song, Jin Young Kim, Pusan National Univ. (South Korea); Kwanghee Lee, Gwangju Institute of Science and Technology (South Korea); Hongsuk Suh, Pusan National Univ. (South Korea) . . . . . [6910-53]

**Thursday 24 January**

**SESSION 8**

**Room: Conv. Ctr. A3 . . . . .Thurs. 8:10 to 10:00 am**

**ZnO and Phosphors**

*Session Chair: Li-Wei Tu, National Sun Yat-Sen Univ. (Taiwan)*

8:10 am: **Fabrication of ZnO nanostructures and its applications to photonic devices** (*Invited Paper*), Takafumi Yao, Tohoku Univ. (Japan) [6910-34]

8:40 am: **ZnO nanorods for photonics** (*Invited Paper*), Andreas Waag, Technische Univ. Braunschweig (Germany) . . . . . [6910-35]

9:10 am: **Phosphors for solid state lighting** (*Invited Paper*), Martin Zachau, Daniel Becker, Tim Fiedler, Frank Jermann, Franz Zwaschka, OSRAM GmbH (Germany) . . . . . [6910-36]

9:40 am: **Effect of thickness and concentration on temperature of phosphor in white-light-emitting diodes**, Chun Chin Tsai, Ming-Hung Chen, Yuan-Tsun Lo, National Sun Yat-Sen Univ. (Taiwan); Yi-Cheng Hsu, National Pingtung Univ. of Science and Technology (Taiwan); Chao Wei Lee, Industrial Technology Research Institute (Taiwan); Wood-Hi Cheng, National Sun Yat-Sen Univ. (Taiwan) . . . . . [6910-37]

Coffee Break . . . . . 10:00 to 10:20 am

OPTO

# Conference 6910

## SESSION 9

Room: Conv. Ctr. A3 ..... Thurs. 10:20 am to 12:10 pm

### LED Properties

*Session Chair: Michael Heuken, AIXTRON AG (Germany)*

10:20 am: **M-plane GaN-based light emitting diode structure grown on LiAlO<sub>2</sub> by MOVPE** (*Invited Paper, Presentation Only*), Mitch M.Chou, National Sun Yat-Sen Univ. (Taiwan); Y. Dikme, H. Behmenburg, Ch. Giesen, Michael Heuken, AIXTRON AG (Germany) ..... [6910-38]

10:50 am: **Broad spectrum superluminescence diodes utilizing internal optical pumping of additional gain regions and separate quasi-Fermi levels**, Benjamin C. Green, Shui-Qing Yu, Jiang-Bo Wang, Arizona State Univ.; Xun Li, McMaster Univ. (Canada); Yong-Hang Zhang, Arizona State Univ. . . . [6910-39]

11:10 am: **Radiative efficiency and spontaneous recombination rate of staggered InGaN quantum wells light emitting diodes emitting at 420-510 nm**, Ronald A. Arif, Hongping Zhao, Yik-Khoon Ee, Nelson Tansu, Lehigh Univ. .... [6910-40]

11:30 am: **Investigation of process parameters towards high efficiency silicon light-emitting diodes**, Dae Hoon Pak, Univ. of California/Los Angeles; Liping P. Ren, Global Nanosystems, Inc.; Jaime Peretzman, Grant Z. Pan, Univ. of California/Los Angeles ..... [6910-41]

11:50 am: **Analysis of AlGaIn/GaN multi-quantum barrier for high efficiency LED**, Zhiqiang L. Li, Z. M. Simon Li, Crosslight Software Inc. (Canada) [6910-42]

Lunch/Exhibition Break ..... 12:10 to 1:30 pm

## SESSION 10

Room: Conv. Ctr. A3 ..... Thurs. 1:30 to 2:50 pm

### LED Packaging

*Session Chair: E. Fred Schubert, Rensselaer Polytechnic Institute*

1:30 pm: **High-performance encapsulants for ultra-high brightness LEDs**, Garo Khanarian, Kathy Auld, David Conner, Jay Gregory, David W. Mosley, Angelo Pedicini, David Thorsen, Morris Wills, Xian-Qian Liu, Ethan S. Simon, Rohm and Haas Co. .... [6910-44]

1:50 pm: **Advances in LED packaging and thermal management materials**, Carl H. Zweben, Advanced Thermal Materials and Composites Consultant ..... [6910-45]

2:10 pm: **Thin-GaN LED on diamond coated Si substrates**, Robert Chen, Cheng-Yi Liu, National Central Univ. (Taiwan); Johnny Liu, Kinik Co., Ltd. (Taiwan) ..... [6910-46]

2:30 pm: **Novel chip coating approaches to improve white LED technology**, Paul Hartmann, Marko Schweighart, TridonicAtco Optoelectronics GmbH (Austria); Christian Sommer, Franz-Peter Wenzl, Ernst Zinterl, JOANNEUM RESEARCH GmbH (Austria); Hans Hoschopf, Peter Pachler, Stefan Tasch, TridonicAtco Optoelectronics GmbH (Austria) ..... [6910-47]

# Emerging Liquid Crystal Technologies III

Conference Chair: **Liang-Chy Chien**, Kent State Univ.

Program Committee: **Dick J. Broer**, Technische Univ. Eindhoven (Netherlands); **Vladimir G. Chigrinov**, Hong Kong Univ. of Science and Technology (Hong Kong China); **Harry James Coles**, Univ. of Cambridge (United Kingdom); **Gregory P. Crawford**, Brown Univ.; **Andy Ying-Guey Fuh**, National Cheng Kung Univ. (Taiwan); **Wolfgang Haase**, Technische Univ. Darmstadt (Germany); **Jun-ichi Hanna**, Tokyo Institute of Technology (Japan); **Heinz-Siegfried R. Kitzerow**, Univ. Paderborn (Germany); **Shunsuke Kobayashi**, Tokyo Univ. of Science (Japan); **Seung Hee Lee**, Chonbuk National Univ. (South Korea); **Akihiro Mochizuki**, Nano Loa Inc.; **Kristiaan Neyts**, Univ. Gent (Belgium); **Ci-Ling Pan**, National Chiao Tung Univ. (Taiwan); **Richard L. Sutherland**, Science Applications International Corp.; **Shin-Tson Wu**, College of Optics & Photonics/Univ. of Central Florida

## Sunday 20 January

### SESSION 1

Room: Conv. Ctr. C3 ..... Sun. 8:30 to 10:00 am

#### Liquid Crystal Displays

Session Chair: **Liang-Chy Chien**, Kent State Univ.

8:30 am: **A single surface-induced rewritable grating effect in a dye-doped liquid crystal binary structure in a hybrid aligned configuration** (*Invited Paper*), Sin-Doo Lee, Seoul National Univ. of Technology (South Korea); Hak-Rin Kim, Kyungpook National Univ. (South Korea); Eunje Jang, Seoul National Univ. of Technology (South Korea). . . . . [6911-01]

9:00 am: **In-plane switching of a twisted-nematic liquid crystal cell for single-cellgap transfective display** (*Invited Paper*), Tae-Hoon Yoon, Gak Seok Lee, Jae-Chang Kim, Pusan National Univ. (South Korea); Dae Lim Park, Hwang Seong Soo, Dae Hyun Kim, Sung Il Park, LG Philips LCD (South Korea) [6911-03]

9:30 am: **Liquid crystal surface alignments by using films composed of magnetic nanoparticles** (*Invited Paper*), Ru-Pin Pan, Hsin-Ying Wu, Cho-Fan Hsieh, National Chiao Tung Univ. (Taiwan). . . . . [6911-04]

Coffee Break . . . . . 10:00 to 10:30 am

### SESSION 2

Room: Conv. Ctr. C3 ..... Sun. 10:30 am to 12:20 pm

#### Electro-optical and Photonic Materials

Session Chair: **Dick J. Broer**,

Technische Univ. Eindhoven (Netherlands)

10:30 am: **Extraordinary properties of nematic and isotropic phases of bent-core liquid crystals** (*Invited Paper*), Antal I. Jakli, EnkhAmgalan Dorjgotov, John E. Harden, Jr., J. T. Gleeson, Samuel Sprunt, D. Wiant, K. Neupane, S. Sharma, Kent State Univ.; Nándor Éber, Katalin Fodor-Csorba, Research Institute for Solid State Physics and Optics (Hungary). . . . . [6911-05]

11:00 am: **Effects of functionalized metal and semiconductor nanoparticles in nematic liquid crystal phases** (*Invited Paper*), Torsten Hegmann, Hao Qi, Brandy Kinkead, Univ. of Manitoba (Canada). . . . . [6911-06]

11:30 am: **Designing chromonic mesogens for the fabrication of anisotropic optical materials** (*Invited Paper*), Suk-Wah Tam-Chang, Liming Huang, Gyan Aryal, Wonwoo Seo, Delfin Mahinay, Univ. of Nevada/Reno . . . . . [6911-07]

12:00 pm: **Flexible and reflective polarizer-free liquid crystal displays using dye-doped liquid crystal gels**, Yi-Hsin Lin, Jhih-Ming Yang, National Chiao Tung Univ. (Taiwan); Shie-Chang Jeng, Yan-Rung Lin, Chi-Chang Liao, Industrial Technology Research Institute (Taiwan) . . . . . [6911-08]

Lunch Break . . . . . 12:20 to 1:40 pm

### SESSION 3

Room: Conv. Ctr. C3 ..... Sun. 1:40 to 3:10 pm

#### Actuators, Micropumps, and Robots

Session Chair: **Slobodan Zumer**, Univ. v Ljubljani (Slovenia)

1:40 pm: **3D-structured liquid crystal networks formed by a dichroic photoinitiator initiated photopolymerization** (*Invited Paper*), Dirk J. Broer, Blanca Serrano-Ramon, Technische Univ. Eindhoven (Netherlands); Charlotte Kjellander, Philips Research Eindhoven (Netherlands); Shabnam Zakerhamidi, Cees W. Bastiaansen, Technische Univ. Eindhoven (Netherlands) . . . . . [6911-09]

2:10 pm: **Modeling liquid crystal elastomers: actuators, pumps, and robots** (*Invited Paper*), Robin L. B. Selinger, Badel L. Mbang, Jonathan V. Selinger, Kent State Univ. . . . . [6911-10]

2:40 pm: **A photochromic main-chain liquid crystalline polymer and its photo-stimulated actuating properties** (*Invited Paper*), Myung-Hoon Lee, Chonbuk National Univ. (South Korea) and Kent State Univ.; Hyong J. Choi, Kwang-Un Jeong, Chonbuk National Univ. (South Korea); Liang-Chy Chien, Kent State Univ. . . . . [6911-11]

Coffee Break . . . . . 3:10 to 3:30 pm

### SESSION 4

Room: Conv. Ctr. C3 ..... Sun. 3:30 to 5:20 pm

#### Lasing, Tweezing, and Nanoparticle Assemblies

Session Chair: **Ru-Pin Pan**, National Chiao Tung Univ. (Taiwan)

3:30 pm: **Nematic colloidal assemblies: towards photonic crystals and metamaterials** (*Invited Paper*), Slobodan Zumer, Univ. v Ljubljani (Slovenia) and Jozef Stefan Institute (Slovenia); Igor Musevic, Jozef Stefan Institute (Slovenia) and Univ. v Ljubljani (Slovenia); Miha Ravnik, Univ. v Ljubljani (Slovenia); Miha Skarabot, Jozef Stefan Institute (Slovenia); Igor Poberaj, Dusan Babic, Univ. v Ljubljani (Slovenia); Uros Tkalec, Jozef Stefan Institute (Slovenia) . . . . . [6911-12]

4:00 pm: **Laser action in liquid crystals: from random to periodic** (*Invited Paper*), Giuseppe Strangi, Univ. degli Studi della Calabria (Italy) . . . . . [6911-13]

4:30 pm: **Optically controlled polymer films with large and high-speed deformation ability** (*Invited Paper*), Uladzimir Hrozhyk, Svetlana V. Serak, Nelson V. Tabirian, BEAM Engineering for Advanced Measurements Co.; Timothy J. White, Timothy J. Bunning, Air Force Research Lab. . . . . [6911-14]

5:00 pm: **Optimization of dyes in chiral nematic liquid crystal lasers**, Carrie Gillespie, Stephen M. Morris, Harry J. Coles, Univ. of Cambridge (United Kingdom) . . . . . [6911-15]



# Conference 6911

## Monday 21 January

### SESSION 5

Room: Conv. Ctr. C3 ..... Mon. 10:30 am to 12:30 pm

#### THz Filters and Fresnel Lenses

Session Chair: **Sin-Doo Lee**,  
Seoul National Univ. of Technology (South Korea)

10:30 am: **Birefringent terahertz filters using nematic liquid crystals** (*Invited Paper*), Ci-Ling Pan, Ru-Pin Pan, I-Chen Ho, Cho-Fan Hsieh, Chao-Yuan Chen, National Chiao Tung Univ. (Taiwan) ..... [6911-16]

11:00 am: **Photonics and flexible display applications of phase-separated liquid crystals** (*Invited Paper*), Se-Jin Jang, Yoonseuk Choi, Hanyang Univ. (South Korea); Min Young Jin, Image Lab Corp. (South Korea); Jong-Wook Jung, LG Philips LCD (South Korea); Jae-Hoon Kim, Hanyang Univ. (South Korea) ..... [6911-17]

11:30 am: **Polarization-independent Fresnel lens based on dye-doped liquid crystal** (*Invited Paper*), Andy Y. Fuh, Liang-Chen Lin, Hong-Chang Jau, Tsung-Hsien Lin, National Cheng Kung Univ. (Taiwan) ..... [6911-18]

12:00 pm: **Tunable optical properties of photonic crystals and semiconductor microdisks using liquid crystals** (*Invited Paper*), K. A. Piegdon, Univ. Duisburg-Essen (Germany); Heinrich Matthias, Univ. Paderborn (Germany); C. Meier, Univ. Duisburg-Essen (Germany); Heinz-Siegfried Kitzerow, Univ. Paderborn (Germany) ..... [6911-19]

Lunch/Exhibition Break ..... 12:30 to 1:50 pm

### SESSION 6

Room: Conv. Ctr. C3 ..... Mon. 1:50 to 3:10 pm

#### Polymer/Liquid Crystal Composites

Session Chair: **Andy Y. Fuh**, National Cheng Kung Univ. (Taiwan)

1:50 pm: **Electro-optical properties of holographically patterned polymer stabilized cholesteric liquid crystals** (*Invited Paper*), Lalgudi V. Natarajan, Science Applications International Corp. and Air Force Research Lab.; Eric R. Beckel, Teledyne Scientific and Imaging and Air Force Research Lab.; Vincent P. Tondiglia, Science Applications International Corp. and Air Force Research Lab.; Jeremy M. Wofford, James R. Voss, Air Force Research Lab.; Richard L. Sutherland, Science Applications International Corp. and Air Force Research Lab.; Timothy J. Bunning, Air Force Research Lab. .... [6911-20]

2:20 pm: **Dynamics and morphology of polymer stabilized liquid crystals**, Lanfang Li, Otilia C. Catanescu, Liang-Chy Chien, Kent State Univ. ... [6911-22]

2:40 pm: **Electrically switchable optical vortex generated by a computer-generated hologram recorded in polymer-dispersed liquid crystals** (*Invited Paper*), Yanjun Liu, Xiaowei Sun, Qin Wang, Dan Luo, Nanyang Technological Univ. (Singapore) ..... [6911-23]

Coffee Break ..... 3:10 to 3:30 pm

### SESSION 7

Room: Conv. Ctr. C3 ..... Mon. 3:30 to 4:30 pm

#### Organic Solar Cells

Session Chair: **Robin L. B. Selinger**, Kent State Univ.

3:30 pm: **Novel columnar LCs for a new generation of organic solar cells** (*Invited Paper*), Harald Bock, Eric Grelet, Noémie Buffet, Ctr. National de la Recherche Scientifique (France); Isabelle Seguy, Pierre Destruel, Univ. Paul Sabatier (France) ..... [6911-24]

4:00 pm: **Liquid crystals for photovoltaics and photoconductors** (*Invited Paper*), Mary O'Neill, M. Carrasco-Orozco, W. C. Tsoi, M. Al Khalifah, M. O. Piepenbrock, T. Stirner, Stephen M. Kelly, M. P. Aldred, P. Vlachos, S. P. Kitney, D. Dong, The Univ. of Hull (United Kingdom) ..... [6911-25]

### SESSION 8

Room: Conv. Ctr. C3 ..... Mon. 4:30 to 5:00 pm

#### Display Substrates Fabrication Process

Session Chair: **Antal I. Jakli**, Kent State Univ.

4:30 pm: **Patterning of indium-tin-oxide by projection photoablation and lift-off process for fabrication of flat-panel displays** (*Invited Paper*), Junghun Chae, Univ. of Illinois at Urbana-Champaign; Sreeram Appasamy, Anvik Corp.; Kanti Jain, Univ. of Illinois at Urbana-Champaign. .... [6911-27]

## Tuesday 22 January

### OPTO 2008 Plenary Session

Session Chairs: **Ali Adibi**, Georgia Institute of Technology;  
**James G. Grote**, Air Force Research Lab.

Room: Conv. Ctr. A7/A8 · 8:30 to 10:00 am

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Nanophotonics: from Photonic Crystals to Plasmonics** (*Presentation Only*), Eli Yablonovitch, Univ. of California/Berkeley

9:20 am: **Organic "Plastic" Optoelectronic Devices** (*Presentation Only*), Niyazi Serdar Sariciftci, Johannes Kepler Univ. Linz (Austria)

See p. 28 for details.

Coffee Break ..... 10:00 to 10:30 am

### SESSION 9

Room: Conv. Ctr. C3 ..... Tues. 1:30 to 2:10 pm

#### Novel Technology for Projection Displays

Session Chair: **Ming Hsien Wu**, Hamamatsu Corp.

1:30 pm: **Dynamic optics for very wide angle projection displays**, Fergal P. Shevlin, Dyoptika Ltd. (Ireland) ..... [6911-28]

1:50 pm: **Establish a six-primary color display**, Ou-Yang Mang, Jia-Hao Li, Shih-Wei Huang, National Central Univ. (Taiwan); Yi-Ting Kuo, National Chiao-Tung Univ. (Taiwan) ..... [6911-29]

### SESSION 10

Room: Conv. Ctr. C3 ..... Tues. 2:10 to 3:10 pm

#### Advanced Light Source, Laser Projection Technology, and the Related

Session Chair: **Ming Hsien Wu**, Hamamatsu Corp.

2:10 pm: **Increased collection efficiency of LIFI high intensity electrodeless light source**, Abdeslam Hafidi, Richard Gilliard, Marc DeVincentis, Markus Duelli, Luxim Corp. .... [6911-30]

2:30 pm: **Effective speckle reduction in laser projection displays**, Akio Furukawa, Norihiro Ohse, Yoshifumi Sato, Daisuke Imanishi, Kazuya Wakabayashi, Satoshi Ito, Koshi Tamamura, Shoji Hirata, Sony Corp. (Japan) ..... [6911-31]

2:50 pm: **Recent advancements in system design for miniaturized MEMS-based laser projectors**, Michael Scholles, Klaus Frommhagen, Christian Gerwig, Jens Knobbe, Hubert K. Lakner, Dirk Schlebusch, Markus Schwarzenberg, Uwe Vogel, Fraunhofer-Institut für Photonische Mikrosysteme (Germany) ..... [6911-32]

Coffee Break ..... 3:10 to 3:30 pm



**SESSION 11**

**Room: Conv. Ctr. C3 . . . . . Tues. 3:30 to 5:30 pm**

**3D Projection Displays**

Session Chair: **Ming Hsien Wu**, Hamamatsu Corp.

3:30 pm: **Full-color interactive holographic projection system for large 3D scene reconstruction**, Norbert Leister, Armin Schwerdtner, Gerald Fütterer, Steffen Buschbeck, SeeReal Technologies GmbH (Germany) . . . . . [6911-33]

3:50 pm: **3D display using two-photon absorption**, Ganbat Baasantseren, Nam Kim, Jin-Seon Yun, Chungbuk National Univ. (South Korea); Kwon-Yeon Lee, Sunchon National Univ. (South Korea) . . . . . [6911-34]

4:10 pm: **Optical design of 3D volumetric projection for stereoscopic content in domed theaters**, Mark J. Prusten, Optical Design Labs. . . [6911-35]

4:30 pm: **New markets and new lightsources for projection** (*Invited Paper*), Holger Moench, Philips Research Labs. (Germany) . . . . . [6911-36]

4:50 pm: **LED light source for projection displays** (*Invited Paper*), George X. Ouyang, Kenneth K. Li, Wavien, Inc. . . . . [6911-37]

5:10 pm: **Lifetime extension of arc lamps using dual paraboloid reflectors for projection displays**, Kenneth K. Li, Wavien, Inc. . . . . [6911-38]

**Holography Technical Event**

**Room: . . . . . Tues. 7:30 to 9:00 pm**

*Chair:* **Hans I. Bjelkhagen**, OpTIC (United Kingdom)

In 1948 Dennis Gabor realized that the wavefront emanating from each point of a scene could be recorded by causing it to interfere with a background wave, converting phase difference into an intensity difference. The wavefront could be reconstructed by illuminating the recorded information with coherent light. Gabor termed this process holography, or whole record.

The Holography Technical Event is involved with the whole record of research, engineering, and applications in holographic optical elements, nondestructive testing, computer-generated holography, materials and processing, commercial and artistic applications of holography, and standardization issues.

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Exhibition Foyer and South Halls 1-2*

Tuesday 22 January . . . . . 10:00 am to 5:00 pm

Wednesday 23 January . . . . . 10:00 am to 5:00 pm

Thursday 24 January . . . . . 10:00 am to 4:00 pm

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Product Demonstrations.**

*See pp. 37-39 for details.*



## Practical Holography XXII: Materials and Applications

Conference Chair: **Hans I. Bjelkhagen**, OpTIC (United Kingdom); **Raymond K. Kostuk**, The Univ. of Arizona

Program Committee: **Jean-Marc R. Fournier**, École Polytechnique Fédérale de Lausanne (Switzerland); **Gerald L. Heidt**, Wasatch Photonics, Inc.; **Toshio Honda**, Chiba Univ. (Japan); **Fujio Iwata**, Toppan Printing Co., Ltd. (Japan); **Tung H. Jeong**, Lake Forest College; **Gaylord E. Moss**, MossOptics; **Albert O. Okorogu**, The Aerospace Corp.; **Nadya O. Reingand**, Celight, Inc.; **Martin John Richardson**, De Montfort Univ. (United Kingdom); **Christopher W. Slinger**, QinetiQ (United Kingdom); **Fred D. Unterseher**, Columbia Career Ctr.; **Ichirou Yamaguchi**, Gunma Univ. (Japan); **Toyohiko Yatagai**, Univ. of Tsukuba (Japan)

### Sunday 20 January

#### SESSION 1

Room: Marriott Hotel:

San Jose Ballroom Salon II .....Sun. 9:10 am to 12:10 pm

#### Recording Materials

Session Chair: **Jean-Marc R. Fournier**,  
École Polytechnique Fédérale de Lausanne (Switzerland)

9:10 am: **Applications of liquid crystal polymer composite films for photolithographic fabrication of 3D structures**, Anna E. Fox, Adam K. Fontecchio, Drexel Univ. .... [6912-01]

9:30 am: **Dichromated gelatin holograms with triphenyl dyes**, Gloria Páez-Trujillo, Arturo Olivares-Pérez, Israel Fuentes-Tapia, María P. Hernández-Garay, Rosangela C. Fontanilla-Urdaneta, Nildia Y. Mejias-Brizuela, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) .... [6912-02]

9:50 am: **Dichromated polyvinyl alcohol films doped with organic colorants**, Gloria Páez-Trujillo, Arturo Olivares-Pérez, Israel Fuentes-Tapia, Nildia Y. Mejias-Brizuela, María P. Hernández-Garay, Rosangela C. Fontanilla-Urdaneta, E. Amigon-De Leon, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) .... [6912-03]

Coffee Break ..... 10:10 to 10:30 am

10:30 am: **Optical properties of organic conductive composite films by holographic storage**, María de la Paz Hernandez-Garay, Rosangela Fontanilla-Urdaneta, Arturo Olivares-Perez, Israel Fuentes-Tapia, Nildia Y. Mejias-Brizuela, Gloria Paez-Trujillo, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) .... [6912-04]

10:50 am: **Diffraction efficiency study of holographic gratings in dichromated poly(vinyl alcohol) NiCl<sub>2</sub>·6H<sub>2</sub>O doped**, Rosangela C. Fontanilla-Urdaneta, María P. Hernández-Garay, Arturo Olivares-Pérez, Gloria Paéz-Trujillo, Israel Fuentes-Tapia, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) .... [6912-05]

11:10 am: **New trends on photopolymers**, Manuel Ortuno, Elena Fernandez, Sergi Gallego, Andres Marquez, Cristian Neipp, Inmaculada Pascual, Augusto Belendez, Univ. de Alicante (Spain) .... [6912-06]

11:30 am: **Crystal beginnings II: the mind map of holography**, Martin J. Richardson, De Montfort Univ. (United Kingdom) .... [6912-53]

11:50 am: **Fabrication of ultra-fine-grain silver halide recording material for color holography**, Hans I. Bjelkhagen, Peter G. Crosby, OpTIC (United Kingdom); Darran Green, Consultant (United Kingdom); Evangelos Mirilis, Nicholas J. Phillips, OpTIC (United Kingdom) .... [6912-08]

Lunch Break ..... 12:10 to 1:50 pm

#### SESSION 2

Room: Marriott Hotel: San Jose Ballroom Salon II . . . . Sun. 1:50 to 4:30 pm

#### Techniques and Applications

Session Chair: **Gerald L. Heidt**, Wasatch Photonics, Inc.

1:50 pm: **Multiplexing volume holographic gratings for a spectral-spatial imaging system**, Yuan Luo, The Univ. of Arizona; P. J. Gelsinger, College of Optical Sciences/The Univ. of Arizona; George Barbastathis, Massachusetts Institute of Technology; Jennifer K. Barton, Raymond K. Kostuk, The Univ. of Arizona ..... [6912-09]

2:10 pm: **Propagation vector analysis of digital holography and its application for three-dimensional angle measurement**, Lingfeng Yu, Univ. of California/Irvine; Giancarlo Pedrini, Wolfgang Osten, Univ. Stuttgart (Germany) ..... [6912-10]

2:30 pm: **Mixed domain digital speckle photography based metrology systems to determine three dimensional displacements**, Jennifer E. Ward, National Univ. of Ireland/Dublin (Ireland); Damien P. Kelly, Technische Univ. Wien (Austria); John T. Sheridan, National Univ. of Ireland/Dublin (Ireland) ..... [6912-11]

2:50 pm: **Broadband diffuser for an IR illumination system**, Robert E. Hutchins, Tessera, Inc.; Steven C. Tidwell, Aculight Corp.; Jessica L. Wargats, Tessera, Inc. .... [6912-12]

Coffee Break ..... 3:10 to 3:30 pm

3:30 pm: **Ultra-high-speed holographic correlation system for face recognition using three-dimensional databases**, Eriko Watanabe, Tomoko Ohtsu, Kashiko Kodate, Japan Women's Univ. (Japan) ..... [6912-13]

3:50 pm: **New applications of photo-thermo-refractive glass for holography**, Vasile K. Rotaru, College of Optics & Photonics/Univ. of Central Florida ..... [6912-14]

4:10 pm: **Research of the file system of volume holographic storage based on virtual storage layer**, Fei Wu, Yi F. Ling, Changsheng Xie, Huazhong Univ. of Science and Technology (China) .... [6912-15]

### Monday 21 January

#### SESSION 3

Room: Marriott Hotel:

San Jose Ballroom Salon II ..... Mon. 9:10 am to 12:10 pm

#### Display and Color Holography

Session Chair: **Toshio Honda**, Chiba Univ. (Japan)

9:10 am: **Progress in holographic video displays based on guided-wave acousto-optic devices**, V. Michael Bove, Jr., Daniel Smalley, Quinn Y. J. Smithwick, James Barabas, MIT Media Lab. .... [6912-16]

9:30 am: **Horizontal resolution enhanced hologram to increase horizontal viewing angle**, Yuki Hayashi, Yasuhiro Takaki, Tokyo Univ. of Agriculture and Technology (Japan) ..... [6912-17]

9:50 am: **Luminous presence**, Paula H. Dawson, Univ. of New South Wales (Australia) ..... [6912-18]

Coffee Break ..... 10:10 to 10:30 am

- 10:30 am: **Adaptive rapid algorithm for holographical display based on SLM**, Xiaoxi Chen, Zhejiang Univ. (China). . . . . [6912-19]
- 10:50 am: **Effects of nonlinear characteristics of LCD panel on image reconstruction in electro-holography**, Kunihiro Sato, Katsuyuki Tsuji, Univ. of Hyogo (Japan) . . . . . [6912-20]
- 11:10 am: **Electronic generation of holograms by using depth maps of real scenes**, Ryutarō Oi, Kenji Yamamoto, Makoto Okui, National Institute of Information and Communications Technology (Japan). . . . . [6912-21]
- 11:30 am: **High-density recording of full-color full-parallax holographic stereogram**, Shingo Maruyama, Toppan Printing Co., Ltd. (Japan); Masahiro Yamaguchi, Yuji Ono, Tokyo Institute of Technology (Japan) . . . . . [6912-22]
- 11:50 am: **A method to increase the hologram viewing angle by the beam reconfiguration**, Naoyuki Ohmura, Kang Hoonjong, Takeshi Yamaguchi, Hiroshi Yoshikawa, Nihon Univ. (Japan) . . . . . [6912-23]
- Lunch Break . . . . . 12:10 to 2:10 pm

**SESSION 4**

**Room: Marriott Hotel: San Jose Ballroom Salon II Mon. 2:10 to 4:30 pm**

**Digital and Computer Generated Holography**

*Session Chair: Christopher W. Slinger, QinetiQ Ltd. (United Kingdom)*

- 2:10 pm: **Capabilities of diffractive optical elements for real-time holographic displays**, Stephan Reichelt, Jean-Christophe Olaya, Hagen Sahn, Norbert Leister, Armin Schwerdtner, SeeReal Technologies GmbH (Germany) . . . . . [6912-24]
- 2:30 pm: **Half-zone-plate processing for objects at the both sides of hologram display**, Kenji Yamamoto, Ryutarō Oi, Tomoyuki Mishina, Makoto Okui, National Institute of Information and Communications Technology (Japan). . . . . [6912-25]
- 2:50 pm: **Gratings with shift as jamproof method for synthesis of hologram with single diffractive order**, Eugene V. Braginetz, National Taras Shevchenko Univ. of Kyiv (Ukraine); Vladimir I. Giryk, Optronics, Ltd. (Ukraine); Sergey A. Kostyukevich, Institute of Semiconductor Physics (Ukraine); Vitaly N. Kurashov, National Taras Shevchenko Univ. of Kyiv (Ukraine) . . . . . [6912-26]
- Coffee Break . . . . . 3:10 to 3:30 pm
- 3:30 pm: **Development of a fully functioning digital hologram system**, Miguel Alcaraz Rivera, José Javier Báez Rojas, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Der-Kuan Kang, Holotec Inc. . . . . [6912-27]
- 3:50 pm: **Large holographic displays for real-time applications**, Armin Schwerdtner, Ralf Haeussler, Norbert Leister, SeeReal Technologies GmbH (Germany) . . . . . [6912-28]
- 4:10 pm: **One-shot digital holography for recording color 3D images**, Hiroyuki Toge, Hideto Fujiwara, Kunihiro Sato, Univ. of Hyogo (Japan) [6912-29]

**Tuesday 22 January**

**OPTO 2008 Plenary Session**

*Session Chairs: Ali Adibi, Georgia Institute of Technology; James G. Grote, Air Force Research Lab.*

*Room: Conv. Ctr. A7/A8 · 8:30 to 10:00 am*

- 8:30 am: **Introduction and Opening Remarks**
- 8:40 am: **Nanophotonics: from Photonic Crystals to Plasmonics** (*Presentation Only*), Eli Yablonovitch, Univ. of California/Berkeley
- 9:20 am: **Organic "Plastic" Optoelectronic Devices** (*Presentation Only*), Niyazi Serdar Sariciftci, Johannes Kepler Univ. Linz (Austria)

*See p. 28 for details.*

Coffee Break . . . . . 10:00 to 10:30 am

**Holography Technical Event**

**Room: . . . . . Tues. 7:30 to 9:00 pm**

*Chair: Hans I. Bjelkhagen, OpTIC (United Kingdom)*

In 1948 Dennis Gabor realized that the wavefront emanating from each point of a scene could be recorded by causing it to interfere with a background wave, converting phase difference into an intensity difference. The wavefront could be reconstructed by illuminating the recorded information with coherent light. Gabor termed this process holography, or whole record.

The Holography Technical Event is involved with the whole record of research, engineering, and applications in holographic optical elements, nondestructive testing, computer-generated holography, materials and processing, commercial and artistic applications of holography, and standardization issues.

**Wednesday 23 January**

**POSTERS-Wednesday**

**Room: Civic Auditorium. . . . . Wed. 6:00 to 7:30 pm**

*All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.*

*Poster presenters may post their poster papers Wednesday morning starting at 10:00 am in the Civic Auditorium, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.*

- Development of a simple user-friendly commercial digital holographic microscope**, Oi Choo Chee, Vijay Raj Singh, Eddy Sim, Ngee Ann Polytechnic (Singapore); Anand K. Asundi, Nanyang Technological Univ. (Singapore) . . . . . [6912-30]
- Volume holograms in polyvinyl alcohol with CuCl<sub>2</sub> (2H<sub>2</sub>O)**, María de la Paz Hernández-Garay, Rosangela Fontanilla-Urdaneta, Arturo Olivares-Perez, Israel Fuentes-Tapia, Reyna Baltazar-Arroyo, Gloria Paez-Trujillo, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico). . . . . [6912-31]
- Hydrophobic sugar holograms**, Nildia Y. Mejias-Brizuela, Arturo Olivares-Perez, María P. Hernández-Garay, Israel Fuentes-Tapia, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico). . . . . [6912-32]
- Voltage effect in holographic gratings by organic conductive materials**, Rosangela C. Fontanilla-Urdaneta, María P. Hernández-Garay, Arturo Olivares-Pérez, Gloria Paéz-Trujillo, Israel Fuentes-Tapia, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico). . . . . [6912-33]
- A new interleaving algorithm for holographic disc**, Fan Chen, Diqing Hu, Changsheng Xie, Wei Hu, Huazhong Univ. of Science and Technology (China) . . . . . [6912-34]
- Holograms with corn honey and erioglaucine dye**, Nildia Y. Mejias-Brizuela, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Abel Grande-Grande, Instituto Tecnológico Superior de Atlixco (Mexico) and Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Arturo Olivares-Perez, Gloria Paez-Trujillo, Israel Fuentes-Tapia, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) . . . . . [6912-35]
- Efficient formation of surface relief grating (SRG) on an azo polymer film by gold nano particles**, Sung-Kwan Na, Jung-Sung Kim, Seok-Ho Song, Cha-Hwan Oh, Hanyang Univ. (South Korea). . . . . [6912-36]
- Hologram in thermoplastic nail varnish**, Santa Toxqui-López, Arturo Olivares-Pérez, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Armando Hernández, Benemérita Univ. Autónoma de Puebla (Mexico) . . . . . [6912-37]
- Holograms with egg albumin**, Paty Perez-Salinas, Nildia Y. Mejias-Brizuela, Arturo Olivares-Perez, Ericka L. Ponce-Lee, Israel Fuentes-Tapia, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico). . . . . [6912-38]
- Multiplexing holograms for data page storage as a holographic memory in a PVA/AA photopolymer**, Elena Fernandez, Manuel Ortuño, Sergi Gallego, Celia García, Andrés Márquez, Augusto Beléndez, Inmaculada V. Pascual, Univ. de Alicante (Spain). . . . . [6912-39]

OPTO

# Conference 6912

**Double recording of holographic data storage using polarization multiplex in photopolymer**, Hyeon S. Jeong, Nam Kim, Chungbuk National Univ. (South Korea); Seok Hee Jeon, Incheon Univ. (South Korea). . . . . [6912-40]

**Secure holographic storage using single phase encoding**, Tien V. Vu, Nam Kim, Chungbuk National Univ. (South Korea); Sang-Keun Gil, Univ. of Suwon (South Korea); Eun-Kyong Kim, Yonsei Univ. (South Korea) . . . . . [6912-41]

**Real-time interferometric characterization of a PVA based photopolymer**, Andrés Márquez, Sergi Gallego, David Mendez, Manuel Ortuño, Elena Fernández, Mariela L. Alvarez, Cristian Neipp, Augusto Beléndez, Inmaculada Pascual, Univ. de Alicante (Spain). . . . . [6912-42]

**Quality evaluation of Lippmann-type hologram using CGH**, Tsuyoshi Yamauchi, Tomoki Yasuda, Makio Kurashige, Mitsuru Kitamura, Masachika Watanabe, Kenji Ueda, Dai Nippon Printing Co., Ltd. (Japan) . . . . . [6912-43]

**Theoretical model of the diffraction efficiency of norland optical adhesive and crystal violet as temperature function**, Mauricio Ortiz-Gutiérrez, Laura Aparicio Ixta, Univ. Michoacana de San Nicolás de Hidalgo (Mexico); Juan Carlos Ibarra Torres, Univ. de Guadalajara (Mexico); Mario Pérez-Cortes, Univ. Autónoma de Yucatán (Mexico) . . . . . [6912-44]

**Enlargement of visual field with a LCD in computer generated holograms**, Yoshiaki Yabe, Yuji Sakamoto, Hokkaido Univ. (Japan). . . . . [6912-45]

**Digital holographic interference analysis using a 2-step phase-shifting technique**, Sang Keun Gil, Univ. of Suwon (South Korea); Seokhee Jeon, Univ. of Incheon (South Korea); Jongrae Jeong, Suwon Science College (South Korea) . . . . . [6912-46]

**Computer-generated cylindrical rainbow hologram**, Takeshi Yamaguchi, Tomohiko Fujii, Hiroshi Yoshikawa, Nihon Univ. (Japan) . . . . . [6912-47]

**Electro-holography system using small particle 3D screen**, Koki Sato, Hongming Zhao, Shonan Institute of Technology (Japan); Kunihiko Takano, Tokyo Metropolitan College of Industrial Technology (Japan) . . . . . [6912-48]

**Efficient generation of computer generated holographic video using novel look-up table**, Eun Soo Kim, Jung-Hoon Yoon, Seung-Cheol Kim, Kwangwoon Univ. (South Korea) . . . . . [6912-49]

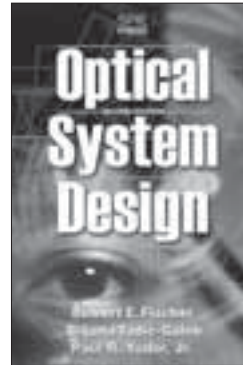
**Resolution analysis of CGH generated by sub-image array of integral imaging**, Eun Soo Kim, Sang-Hyun Lee, Seung-Cheol Kim, Kwangwoon Univ. (South Korea). . . . . [6912-50]

**Phase modulation in holographic gratings recorder in Norland 65 and crystal violet**, Juan Carlos I. Ibarra, Sr., Univ. de Guadalajara (Mexico)[6912-51]

**Holograms in real time recorded in material composed by Norland 65 and violet of crystal**, Juan Carlos I. Ibarra, Sr., Univ. de Guadalajara (Mexico). . . . . [6912-52]

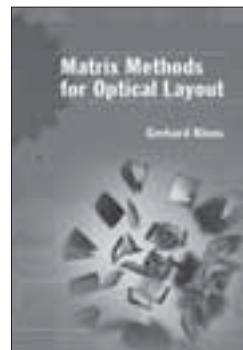
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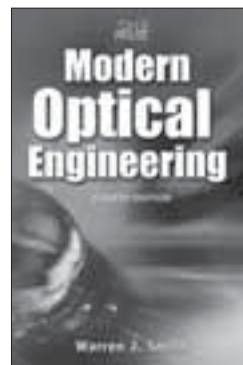
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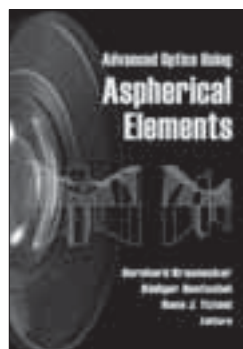
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# General Information

## Registration \_\_\_\_\_

### Onsite Registration Hours

*Street Level, San Jose Convention Center*

|                                |                    |
|--------------------------------|--------------------|
| Saturday 19 January . . . . .  | 7:15 am to 5:00 pm |
| Sunday 20 January . . . . .    | 7:15 am to 5:00 pm |
| Monday 21 January . . . . .    | 7:00 am to 5:00 pm |
| Tuesday 22 January . . . . .   | 7:30 am to 5:00 pm |
| Wednesday 23 January . . . . . | 7:30 am to 5:00 pm |
| Thursday 24 January . . . . .  | 7:30 am to 4:00 pm |

Multiple facilities in downtown San Jose are used for conferences and courses, so please allow yourself enough time to register, pick up your materials and possibly walk to a nearby facility before your meeting or course begins.

### Course Materials Desk

*Convention Center lower arcade*

*Open during Registration hours*

If you have registered to attend a course, stop by the Course Materials Desk after you pick up your badge to obtain your course notes and course location. Pick up a copy of the latest Education Services catalog to see SPIE Courses at symposia, on video and CD-ROM, and to discover the opportunities of customized In-Company courses.

### BiOS Exhibition Hours

*San Jose Convention Center, Exhibition Hall 1*

|                               |                     |
|-------------------------------|---------------------|
| Saturday 19 January . . . . . | 1:00 to 5:00 pm     |
| Sunday 20 January . . . . .   | 10:00 am to 4:00 pm |

### Photonics West Exhibition Hours

*San Jose Convention Center, Exhibition Halls 1-3, Exhibit Foyer, and South Halls 1 and 2*

|                                |                     |
|--------------------------------|---------------------|
| Tuesday 22 January . . . . .   | 10:00 am to 5:00 pm |
| Wednesday 23 January . . . . . | 10:00 am to 5:00 pm |
| Thursday 24 January . . . . .  | 10:00 am to 4:00 pm |

### SPIE Receipts, Badge Corrections, Cashier

**Receipts** - Preregistered attendees who did not receive a receipt prior to the meeting may obtain a new copy of their registration receipt onsite at the Badge Corrections and Receipts counter in the registration area.

**Badge Corrections** - Attendees who need a correction to their badge information onsite may do so at the Badge Corrections and Receipts counter in the registration area.

**Cashier Station** - If you are paying by cash or check as part of your onsite registration, wish to add a short course, workshop, or special event requiring payment, or have questions regarding your registration please see the onsite cashier at the Cashier station in the registration area.

## Author/Presenter Information \_\_\_\_\_

### Speaker Check-In Desk/ Preview Station

*San Jose Convention Center, Concourse 1*

Saturday through Thursday . . . . . 7:30 am to 5:00 pm

All conference rooms will have a computer workstation, LCD projector, screen, lapel microphone, and laser pointer. All presenters are requested to come to the speaker check-in desk to confirm display settings of their presentations from their memory devices or laptops with the audiovisual equipment being used at this symposium.

### Poster Setup Instructions

*Civic Auditorium*

Poster presenters may set up on Monday between 10 am and 5:00 pm and Tuesday and Wednesday between 10 am and 5:30 pm on the day of their assigned presentation. **Poster presenters who have not set up by the appropriate time on the day of their presentation will be considered a "no show" and their manuscript will not be published.** Presenters must remove their posters immediately after the poster session. Posters not removed will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session.

**Monday 21 January**  
**BiOS conferences**

**Tuesday 22 January**  
**LASE and MOEMS/MEMS conferences**

**Wednesday 23 January**  
**OPTO conferences**

Poster numbers will be pre-posted on the poster boards thus authors need to find their applicable poster number and post their paper on the appropriate board space. Presenters who have not placed their papers on their assigned board by 5:00 pm on Monday or by 5:30 pm on Tuesday or Wednesday on the day of their presentation will be considered a "no show" and their manuscript will not be published.



## SPIE Onsite Services \_\_\_\_\_

### SPIE Marketplace & Membership Services

*Convention Center lower arcade*

*Open during Registration hours*

The SPIE Marketplace is your source for the latest SPIE Press books, Proceedings, and Educational and Professional Development materials. Become a Member of SPIE, explore the Digital Library, and take home a souvenir.

### Industry Resources Booth #6143

The SPIE Industry Resources Booth provides the tools you need to move ideas and technology to the market. Visit the booth for information on events, marketing opportunities, education, and training that SPIE can provide you to make your venture a success. Books from SPIE Publications will be available for purchase.

### SPIEWorks Career Fair

In addition to the onsite recruitment activities, SPIEWorks offers you online services to help you with your search for employment before, during and after the conference. Visit the online Career Fair being held in conjunction with Photonics West; post your resume, view jobs, or sign-up for "Job Alerts" and receive opportunities by email long after this event is over. For more information see p. 21.

### Press & Media Center

The Press & Media Center provides press conference facilities, refreshments, and press releases from exhibitors. Credentialed media are invited to communicate news via the provided telephone and high-speed internet connections. Registration and exhibition fees are waived for working journalists and editors. Preregister by e-mailing name, organization, title, address, e-mail, and phone number to [media@spie.org](mailto:media@spie.org).

### Internet Pavilion

SPIE will have a complimentary Internet Pavilion at the Convention Center on Saturday through Thursday and one in South Hall on Tuesday through Thursday where attendees can use provided workstations or hook up their laptop to an Ethernet connection to access the Internet.

### Complimentary Internet Wireless Access

SPIE is pleased to provide complimentary wireless access to the Internet for all conference attendees bringing 802.11b wireless-enabled laptops or PDAs. Coverage locations and connection settings will be posted in the final program and onsite.

## Business Services \_\_\_\_\_

### SPIE Copy Center

Saturday through Thursday during registration hours San Diego Copy will provide a copy service during the week for symposium attendees. The rates are 5 cents per copy and \$1 per transparency (\$2.50 for color). The Copy Center will be located near registration.

### SPIE Message Center

The SPIE Message Center telephone number is 408-271-6000 Messages will be taken during registration hours Saturday through Thursday. Please check the message board at the message center near SPIE registration daily to receive your messages.

### Luggage/Package Storage and Coat Check

*Convention Center – Street Level Arcade*

*Saturday through Thursday*

Complimentary luggage/package and coat storage will be available to attendees.

Please note hours of operation posted onsite. If you intend to stay later than closing time, you will need to claim your checked items before it closes.

### Child Care Services

A few child sitting services available in San Jose are as follows.

1. **Bay Area 2nd MOM Inc.**, Hotel Nanny Service, Toll Free Phone: 1-888-926-3666, or (650) 858-2469, ext. 109. Fax: (650) 493-6598, Email: [ncall@2ndmom.com](mailto:ncall@2ndmom.com) or [parentcounselor@2ndmom.com](mailto:parentcounselor@2ndmom.com), Website: [www.2ndmom.com](http://www.2ndmom.com)
2. **Sitters Unlimited**: Toll Free Phone: (408) 452-0225, E-mail: [info@bayareasittersunlimited.com](mailto:info@bayareasittersunlimited.com) or [www.bayareasittersunlimited.com](http://www.bayareasittersunlimited.com)  
Note: SPIE does not imply an endorsement or recommendation of these services. They are provided on an "information-only" basis for your further analysis and decision. Other services may be available.

### Restaurant Reservations and Information Desk

The San Jose Convention and Visitors Bureau operates a Restaurant Reservations and Information Desk on the street level of the Convention Center near the main entrance. The desk will be open Saturday through Thursday during core hours of the convention. For more information visit <http://www.sanjose.org>

# General Information

## Food and Beverage Services \_\_\_\_\_

### Coffee Breaks

Complimentary coffee will be served twice each day of the conference at approximately 10:00 am and 3:00 pm. Please check the individual technical conference listings for exact times and locations.

### Refreshment Purchases

For attendee purchase of light refreshments, including continental breakfast, specialty carts will be set up in the foyer of the Convention Center Saturday through Thursday.

Cash Lunches and Exhibition Concessions at Exhibition Halls 1-3, South Hall 2. A cash sandwich bar will be available in the foyer of the Convention Center Saturday through Thursday.

Visit the Exhibition Concessions located in the back of the exhibition halls on Tuesday-Thursday featuring Domestic and International Cuisine. They will serve hot and cold snacks, beverages, deli-type sandwiches, salads, hot entrees, and pastries and will be open during exhibition hours.

### Free lunch at South Hall 2

*Tuesday – Thursday*

*Starting at 12 noon, while supply lasts*

Each day, Tuesday through Thursday, a limited supply of a free lunch item will be available to attendees on a first-come, first-served basis.

### Free Popcorn

Popcorn carts will be located in the back of Exhibition Hall 3 and South Hall 1 and will be open from 11:00 am to 3:00 pm, Tuesday through Thursday.

### Desserts

#### Saturday and Sunday

Served in the BiOS exhibition

#### Tuesday through Thursday

*Served in the Photonics West Exhibition Halls and South Hall 1 & 2*

Dessert snacks will be served from 3:00 to 3:30 pm. Complimentary tickets for the dessert snacks will be included in attendee registration packets.

## Policies \_\_\_\_\_

### Audio, Video, Digital Recording Policy

*In the Meeting Rooms and Poster Sessions:* for copyright reasons, recordings of any kind are prohibited without prior written consent of the presenter in any conference session, short course or poster session. Each presenter being taped must file a signed written consent form. Individuals not complying with this policy will be asked to leave a given session and to surrender their film or recording media. Consent forms are available at the Speakers Check-In Desk.

*In the Exhibition Hall:* photographing or videotaping individual booths and displays in the exhibit hall is allowed ONLY with explicit permission from on-site company representatives. Individuals not complying with this policy will be asked to surrender their film and to leave the exhibition hall.

### Laser Pointer Safety Information

SPIE supplies tested and safety approved laser pointers for all conference meeting rooms, and for short course rooms if instructors request one. For safety reasons, SPIE requests that presenters use our provided laser pointers available in each meeting room.

If using your own laser pointer, have it tested at your facility to make sure it has <5 mW power output. Laser pointers in Class II and IIIa (<5 mW) are eye safe if power output is correct - but don't automatically trust the labeling. Commercially available laser pointers, red or green (or any color), could be incorrectly labeled as to their wavelength and power output.

Presenters intending to use their own laser pointer for presentations are required to come to the Speakers Check-In Desk onsite and test their pointer on our power meter. If the pointer fails the safe power level you may not use the pointer at the conference. You will be required to sign a waiver releasing SPIE of any liability for use of potentially non-safe laser pointers.

Use of a personal laser pointer at an SPIE event represents user's acceptance of liability for use of a non-SPIE supplied laser pointer device. Misuse of any laser pointer could lead to eye damage. In California, it is a criminal misdemeanor to shine a laser pointer at individuals "who perceive they are at risk."

### Underage Persons on Exhibition Floor

For safety and insurance reasons, no persons under the age of 16 will be allowed in the exhibition area during move-in and move-out. During open exhibition hours, only children over the age of 12 accompanied by an adult will be allowed in the exhibition area.

### No Suitcasing Policy

"Suitcasing" is the act of soliciting business in the aisles during the exhibition or in other public spaces, including another company's booth or a hotel lobby.

Please note that while all meeting attendees are invited to the exhibition, any attendee who is observed to be soliciting business in the aisles or other public spaces, in another company's booth, or in violation of any portion of SPIE Exhibition Policy will be asked to leave immediately. Additional penalties may be applied. Please report any violations you may observe to show management.

### Unsecured Items

Personal belongings such as briefcases, backpacks, coats, book bags, etc. should not be left unattended in meeting rooms or public areas. These items will be subject to removal by security upon discovery.

**Headquarters Hotel**

*Fairmont Hotel*  
 170 South Market St.  
 Hotel Phone: 408 998 1900  
 Hotel Fax: 408 287 1648

**Other Accommodations**

*San Jose Marriott*  
 301 South Market St.  
 Hotel Phone: 408 280 1300  
 Hotel Fax: 408 278 4444

*Hilton San Jose and Towers*  
 300 Almaden Blvd.  
 Hotel Phone: 408 287 2100  
 Hotel Fax: 408 947 4489

*Crowne Plaza San Jose Hotel*  
 282 Almaden Blvd.  
 Hotel Phone: 408 998 0400  
 Hotel Fax: 408 289 9081

*The Sainte Claire, a Larkspur Hotel*  
 302 South Market St.  
 Hotel Phone: 408 885 1234  
 Hotel Fax: 408 977 0403

*Ramada Ltd.*  
 455 South Second St.  
 Hotel Phone: 408 298 3500  
 Hotel Fax: 408 298 2477

*Hotel Montgomery*  
 211 South First St.  
 Hotel Phone: 408 282 8800  
 Hotel Fax: 408 282 8850

*Wyndham Hotel San Jose*  
 1350 North First St.  
 Hotel Phone: 408 453 6200  
 Hotel Fax: 408 437 9693

*Holiday Inn San Jose*  
 1740 North First St.  
 Hotel Phone: 408 993 1234  
 Hotel Fax: 408 453 0259

*Clarion San Jose Hotel*  
 1355 North Fourth St.  
 Hotel Phone: 408 453 5340  
 Hotel Fax: 408 453 5208

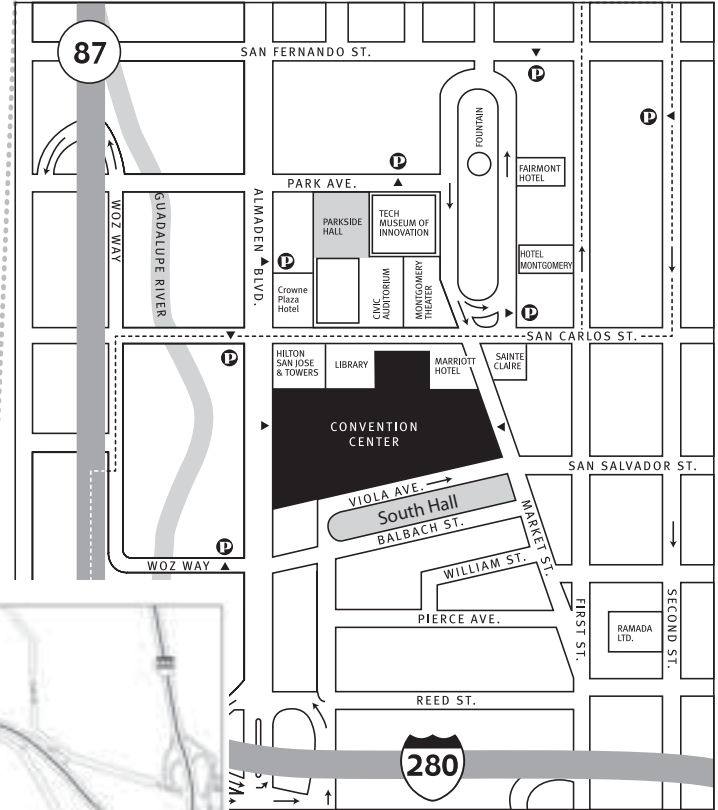
*Radisson Plaza Hotel*  
 1471 North Fourth St.  
 Hotel Phone: 408 452 0200  
 Hotel Fax: 408 437 8819

*Best Western-Gateway Inn*  
 2585 Seaboard Ave.  
 Hotel Phone: 408 435 8800  
 Hotel Fax: 408 435 8879



Hertz Car Rental is the official car rental agency for this Symposium. To reserve a car, identify yourself as a Photonics West Conference attendee using the Hertz Meeting Code CV# 029B0011

- In the United States call 1-800-654-2240.



Paid Public Parking  
 Parking Lot Entrances  
 Light Rail Line

# General Information

## Parking During Photonics West

| LOCATION  | RATES (SUBJECT TO CHANGE)   |
|---|---|
| <b>AT THE SAN JOSE CONVENTION CENTER</b>  |   |
| 150 W. San Carlos St.   | Max \$16 per day. (\$1 for each 20 min to max \$16.)<br><br>There are approximately 650 spaces for the public to use. |
| <b>ALTERNATE PARKING DOWNTOWN SAN JOSE</b><br>River Park Tower Garage, located on the corner of San Carlos and Woz Way, 333 W. San Carlos St.   |   |
| \$1.25 per each 20 minutes, \$18 daily maximum. Rates and hours subject to change without notice.<br>Approx. 1,000 spaces available each day of the event.<br>Hrs of operation: Mon-Fri - 6:30 am to 12:00 midnight,<br>Sat - 8:00 am to 12 midnight<br>Sun - 8:00 am - may close at 10pm if event over |   |

Alternate parking lots: [www.sjdowntownparking.com](http://www.sjdowntownparking.com)

## Parking at the Downtown Hotels

(On space available basis. Rates subject to change without notice.)

### Fairmont San Jose

Valet Only:

Overnight guests - \$26 with in/out privileges.

Visitors - \$5 for 1st 30 min, \$1.50 for each additional 20 min, max per day is \$26. Parking garage is beneath the hotel

### San Jose Marriott

Guests - \$25 per day with in/out privileges

Non-guests - \$4.00 per hour with a maximum of \$25/day.

### Hilton San Jose & Towers

Guests: Self - \$18 max. with in/out privileges. Valet \$23 max. with in/out privileges and \$10 with validation at the City Bar & Grille.

Non Guests: Self - \$21 max., Valet \$26 max. and complimentary for up to 5 hours with validation from the City Bar & Grille.

### Crowne Plaza

Guests self parking \$14 with in/out privileges (no valet). Covered parking garage parallel to hotel.

Non-guest parking is \$20 daily max. (\$6. for 1st hour, then \$1 every 1/2 hour to \$20 max)

### Sainte Claire

For Guests only Valet Parking Only, \$21 for overnight.

In/out privileges for those guests who charge the parking to their rooms. Parking garage is not owned by hotel. Fees are subject to change.

### Hotel Montgomery

For guests - Self parking \$20 per day, Valet parking \$23 per day (24-hour period), both with in/out privileges.

### Ramada Ltd.

Guest parking complimentary

### Wyndham Hotel

Guest parking complimentary

### Holiday Inn San Jose

Guest parking complimentary

## Park & Ride

### Parking Lots

Since parking at the Convention Center can be quite congested at times, try the Park and Ride alternative transportation method, utilizing VTA's complimentary Park & Ride parking lots to commute to the Convention Center. To see a full listing of Park and Ride lots, visit [www.vta.org](http://www.vta.org) and click on "Schedules, Maps & Fares" and then "Park and Ride." Free regular Park & Ride parking is limited to 72 hours.

*Directions to the Convention Center using*

*Park & Ride:*

- Link to Light Rail Map [http://www.vta.org/schedules/pdf/SC\\_LRT\\_MAP\\_color.pdf](http://www.vta.org/schedules/pdf/SC_LRT_MAP_color.pdf)
- From the north, park in the Evelyn Park-and-Ride Lot in Mountain View. Take the light rail with the headsign "Winchester" to the Convention Center Station in downtown San Jose.
- From the south, park in the Santa Teresa Park-and-Ride lot located at the Santa Teresa Light Rail Station. Board the light rail with the headsign "Alum Rock" and get off at the Convention Center Station.
- From the west, park at the Vallco Fashion Park Park-and-Ride lot. Board the eastbound Route 23 bus on Stevens Creek Blvd. with the headsign "Downtown San Jose", and get off at the Convention Center Station. (no light rail line from the west)
- From the east, park in the Capitol and Alum Rock Avenue Park-and-Ride lot. Board the light rail with the headsign "Santa Teresa" and get off at the Convention Center Station.

## Airport Flyer and Light Rail Transportation

*From San Jose International Airport to San Jose Convention Center*

Free Airport Flyer #10 Bus to/from San Jose International Airport travels between the San Jose International Airport, the Metro/Airport Light Rail Station and the Santa Clara Caltrain Transit Center, daily from 5:00 am until midnight - every 15 minutes. For Airport Flyer #10 pickup locations see San Jose International Airport website [www.sanjose.org](http://www.sanjose.org)

*From the San Jose International Airport*

take the free Airport Flyer toward Metro Light Rail and transfer at the Metro/Airport Light Rail Station (see light rail fares below). Via the Light Rail, go southbound and take either the Santa Teresa bound line or the Winchester bound line and get off at the Convention Center Station. The San Jose Convention Center is adjacent to the San Jose Convention Center Light Rail Station on San Carlos Street.

For guests staying at the Hotel Montgomery, from the San Jose International Airport take the free Airport Flyer and transfer to the Metro/Airport Light Rail Station (see light rail fares below). Via the Light Rail, go southbound and get off at the Paseo de San Antonio Station on 2nd Street, which is about 1 block east of the hotel. Northbound trains are serviced by the Paseo de San Antonio Station on 1st Street hotel directly in front of the Hotel Montgomery.

Light rail transit stations connect with a number of bus routes. See the Downtown San Jose map for location ([www.sjdowntownparking.com](http://www.sjdowntownparking.com)) in relationship to the convention center and the hotels. For more information on light rail stops, connections, and transit times, please call Santa Clara Valley Transportation Authority (VTA) Customer Service at (408) 321-2300. Information Service Representatives are available Monday through Friday, 6:00 a.m. to 7:00 p.m., and Saturday, 7:30 a.m. to 4:00 p.m. Automated schedule information is available 24 hours a day by calling the same number. You may also find this information on the web at [www.vta.org](http://www.vta.org).

## Bus and Light Rail Fares

The adult single-ride fare for regular service buses and light rail is \$1.75. A single-ride ticket purchased at a ticket vending machine (TVM) is valid only on light rail for two hours. An adult Day Pass will be \$5.00. Day passes are valid for unlimited rides on both light rail and regular service buses for the one-day period of purchase and can be purchased on the light rail platforms at the ticket vending machines. Rates are subject to change without notice.

## Shuttles & Taxis

(Rates are subject to change without notice)

| To   | Carrier                                | Rate   | Payment  | Phone   | Web  |
|--|--|--|--|---|--|
| <b>From San Jose International Airport (3 miles)</b>                             |  |  |  |   |  |
| Downtown San Jose  | The South and East Bay Airport Shuttle | \$21 1st person, \$6 for each additional person same group   | Credit cards, cash & local checks accepted   | Call 408- 559-9477 or 1-800-548-4664  | <a href="http://www.southandeastbayairportshuttle.com">www.southandeastbayairportshuttle.com</a>   |
|  | Taxi                                   | \$14 - \$20  | Credit cards, cash only, no checks.  |   | <a href="http://www.sjc.org">www.sjc.org</a><br>Rate is an estimate and fares can vary with traffic conditions. Rates are per taxi, not per person, therefore rates remain the same up to the maximum passenger capacity of the cab.       |
| <b>From San Francisco International Airport (1 hour's drive)</b>                 |  |  |  |   |  |
| Downtown San Jose  | Airport Commuter Limo Service          | Lincoln exec town-car flat rate \$135 + \$15% tax + grats 15-20% (rates subject to change without notice)<br>Arrivals btwn 10pm-6am, add \$10 - \$30 based on arrival time | Reservations are required 24 hours in advance. Cash or credit cards accepted (no checks) | 1-888-876-1777 or 650-876-1777 24 hrs/day, 7 days/wk  | <a href="http://www.airportcommuter.com">www.airportcommuter.com</a> . One to three passengers can ride for the price of one, maximum 3 per car.   |
|  | The South and East Bay Airport Shuttle | \$32.00 for the first person and \$6.00 for each additional person in the same group, one way  | Credit cards, cash & local checks accepted   | Call 408- 559-9477 or 1-800-548-4664  | <a href="http://www.southandeastbayairportshuttle.com">www.southandeastbayairportshuttle.com</a>   |
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