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Conferences + Courses: 23-28 January 2010
BiOS Exhibition: 23-24 January 2010
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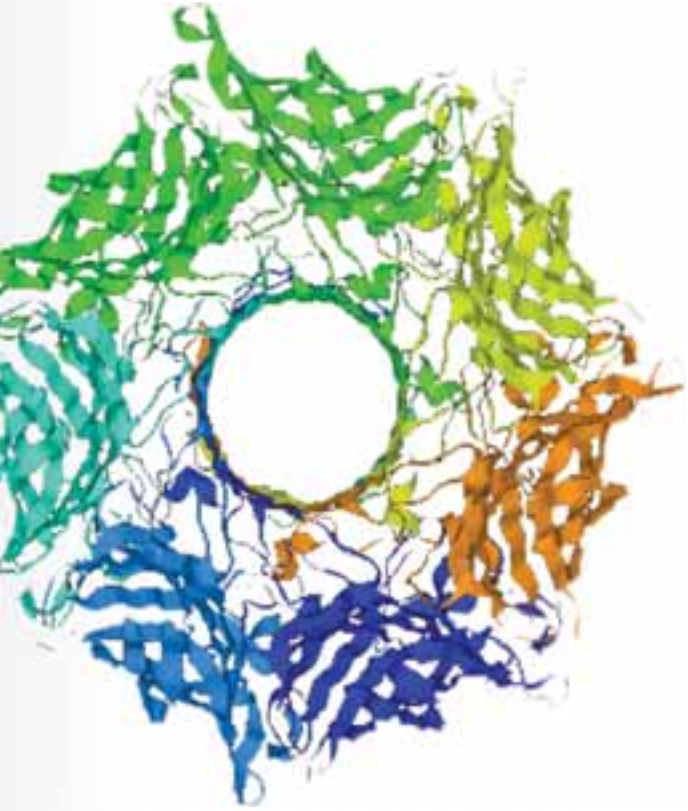

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Conferences

Photonic Therapeutics and Diagnostics

Program Chair: **Reza S. Malek, M.D.,** Mayo Clinic (USA)

Clinical Technologies and Systems

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

Tissue Optics, Laser-Tissue Interaction, and Tissue Engineering

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

Biomedical Spectroscopy, Microscopy, and Imaging

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

Nano/Biophotonics

Program Chairs: **Paras Prasad,** SUNY/Buffalo (USA); **Dan V. Nicolau,** The Univ. of Liverpool (UK)

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continued next page

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BiOS is the world's largest international biomedical optics conference, encompassing clinical, translational, and fundamental research and development in the field of biomedical optics. It provides a premier technical forum for reporting and learning about the latest research and development, as well as for launching new applications and technologies. BiOS is part of SPIE Photonics West, the largest laser, electro-optics, and imaging event in North America, with over 5,000 technical attendees from over 50 countries. Special events include hot topics presentations, the international biomedical optics exhibit, and industry leading working groups and panels.

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James Fujimoto,
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Dr. Gregory Altshuler,
Senior Vice President of Research,
Palomar Medical Technologies, Inc.

Photonic Therapeutics and Diagnostics

Program Chair: **Reza S. Malek, M.D.,** Mayo Clinic (USA)

Photonics in Dermatology and Plastic Surgery (BO100)

Conference Chairs: **Nikiforos Kollias**, Johnson & Johnson CPPW (USA); **Bernard Choi**, Univ. of California, Irvine (USA); **Haishan Zeng**, The BC Cancer Research Ctr. (Canada)

Program Committee: **Anthony J. Durkin**, Univ. of California, Irvine (USA); **Iltefat Hamzavi**, Henry Ford Hospital (USA); **Jessica C. Ramella-Roman**, The Catholic Univ. of America (USA)

The research and development of highly selective lasers has forever transformed the clinical practice of dermatology and plastic surgery by allowing vascular lesions, pigmented lesions, tattoos, and hair to be removed without scarring. These important examples of selective photothermal injury continue to be refined and extended. The potential for laser or non-laser applications in skin diagnosis, imaging, and treatment for burns and other conditions such as psoriasis, acne, and vitiligo far exceeds their present use.

A detailed understanding of skin optics, photothermal, photoacoustic, and photobiological processes is emerging. Innovative schemes for delivery and control of laser irradiation, including robotics, can potentially improve therapy. Optical spectroscopy, microscopy, and imaging techniques hold significant diagnostic promise in dermatology, and submissions in these areas are especially welcome.

New laser therapeutics, including burn treatment, wound healing, drug delivery and photodynamic therapy of inflammatory skin conditions and cancer, will also be topics of interest for this session. Laser/tissue interaction, therapeutics, and diagnostics relating to light and skin, as well as competing technologies in the same scope, are also invited.

Contributions from all medical, dental, and veterinary specialties, military-related applications, and basic sciences contributions are encouraged. Presentations that focus on unmet clinical needs in dermatology and plastic surgery are also welcomed.

Critical Dates

Abstract Due Date: 13 July 2009
On-Site Manuscript Due Date: 16 November 2009
Post-Meeting Manuscript Due Date: 18 December 2009

Please Note: Submissions imply the intent of at least one author to register, attend the conference, present the paper as scheduled, and submit a full-length manuscript for publication in the conference proceedings.

Urology: Diagnostics, Therapeutics, Robotics, Minimally Invasive, and Photodynamic Therapy (BO101)

Conference Chair: **Reza S. Malek**, Mayo Clinic (USA)

Program Committee: **Nathaniel M. Fried**, The Univ. of North Carolina at Charlotte (USA); **Matthew T. Gettman**, Mayo Clinic (USA); **Patrice Jichlinski**, Ctr. Hospitalier Univ. Vaudois (Switzerland); **Hyun Wook Kang**, Innovation Ctr., American Medical Systems, Inc. at San Jose (USA); **Bodo E. Knudsen**, The Ohio State Univ. (USA); **Ed Koullick**, American Medical Systems (USA); **Unyime O. Nseyo**, North Florida Foundation for Research and Education, Inc. (USA); **Rudolf M. Verdaasdonk**, Univ. Medical Ctr. Utrecht (Netherlands)

This era of high technology in urology includes many new and routine uses of lasers. In addition, the use of light for both photodiagnostic purposes and photodynamic therapy continues to move from the research lab to clinical use. Additional energy forms, including radio frequency and microwaves, are also being applied for tissue destruction.
Papers are solicited on the following and related topics:

All Urologic Diagnostic and Therapeutic Modalities including Minimally Invasive Surgical Techniques (MIST)

Lasers for Benign and Neoplastic Tissue Coagulation and Vaporization
- laser prostatectomy (contact, interstitial, and free-beam delivery)
- Nd:YAG, Ho:YAG, KTP, diode or other laser sources
- laser therapy of transitional cell carcinoma of bladder, ureter, and renal pelvis
- laser therapy of renal and adrenal lesions
- laser therapy of male genital and urethral tumors.

Laser Treatment of Ureteropelvic Junction, Ureter, and Urethral Strictures

Laser Applications for Tissue Welding and Approximation

Laser Lithotripsy
- optimum parameters for fragmentation systems
- feedback applications during lithotripsy
- instrumentation
- clinical results.

Light Penetration in Urologic Tissues
- photodynamic therapy (PDT)
- photodynamic diagnosis (PDD)
- light as a diagnostic tool
- optical biopsy
- chromophores.

Other Energy Forms for Tissue Coagulation and Ablation
- microwaves (including TUMT)
- radio frequency (including dry and wet interstitial RF procedures)
- ultrasound.

Robotics and Their Application to Urologic Surgery

Unmet Clinical Needs in Urology

Critical Dates

Abstract Due Date: 13 July 2009
Post-Meeting Manuscript Due Date: 16 December 2009

Please Note: Submissions imply the intent of at least one author to register, attend the conference, present the paper as scheduled, and submit a full-length manuscript for publication in the conference proceedings.

Advanced Technology and Instrumentation in Otolaryngology: Lasers, Optics, Radio Frequency, and Related Technology (BO102)

Conference Chairs: **Brian J. Wong**, Univ. of California, Irvine (USA); **Justus F. R. Ilgner**, Univ. Hospital Aachen (Germany)

Program Committee: **James A. Burns**, Massachusetts General Hospital (USA); **Holger Lubatschowski**, Rowiak GmbH (Germany); **Udayan K. Shah**, Nemours/Alfred I. duPont Hospital for Children (USA)

Otolaryngology and head and neck surgery continues to be a rich field for the application of new technologies. Precise focused beams and advanced energy delivery systems provide the foundation for the development of innovative microsurgical techniques. Fluorescence and infrared spectroscopy can enhance tissue differentiation and identification. Interferometric and stroboscopic optical techniques are used to monitor motion of the vocal folds and the tympanic membrane. Progress in these and other areas is facilitated with interactions among clinicians, scientists, engineers, and researchers.

This conference covers the use of lasers and optical technology in otolaryngology and head and neck surgery from the early phases of development to clinical practice. This conference provides an informative and crucial face-to-face interaction between the basic scientist and the clinician.

2nd Scientific Meeting of the Head and Neck Optical Diagnostics Society will be held in conjunction with this conference at BiOS, part of Photonics West.

Papers from physicians, scientists, engineers, and manufacturers are solicited in the following medical subspecialty areas:

- imaging of the vocal cords and airway
- cochlear imaging
- femtosecond laser surgery applications
- CO_2 laser ablation
- middle ear surgery/Stapes surgery
- endoscopic cancer resection
- RF surgical applications
- plasma-mediated ablation
- optical diagnostic techniques
- laryngology and speech science
- head and neck surgery
- facial plastics and reconstructive surgery
- endoscopic nasal and sinus surgery
- image-guided surgery
- novel surgical approaches
- imaging techniques
- unmet clinical needs
- surgery for sleep apnea
- airway simulation
- telemedicine applications
- lasers in robotics.

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Diagnostic and Therapeutic Applications of Light in Cardiology (BO103)

Conference Chairs: **Kenton W. Gregory**, Oregon Medical Laser Ctr. (USA); **Guillermo J. Tearney**, Massachusetts General Hospital (USA); **Laura Marcu**, Univ. of California, Davis (USA)

During the last decade there have been significant scientific developments in the diagnosis and treatment of cardiovascular diseases using lasers and optical technology. Recent progress in vulnerable plaque detection has motivated the development of a variety of new optical techniques for intracoronary diagnosis. The scientific and medical communities have additionally continued to search for new technologies and to improve on existing technologies that can be applied to areas such as cardiovascular recanalization or angioplasty, welding of vascular anastomoses, ablation of arrhythmogenic foci, transmyocardial revascularization, etc. The interdisciplinary research and collaboration among physicians, scientists, engineers, and manufacturers is paramount to maintaining and strengthening the field of biomedical cardiovascular laser applications.

This conference intends to bring together researchers and industry partners to present and discuss the important advances in laser and diagnostic applications in cardiovascular medicine. The intent is to stimulate interactions, which will contribute to future progress in developing effective clinical cardiovascular diagnostic and therapeutic systems.

Topics will include, but are not limited to, the following:

- new laser sources for transmyocardial laser revascularization
- mechanisms of laser revascularization
- ablation of arrhythmogenic foci and bypass pathways
- excimer laser applications
- ablative and nonablative applications
- catheter design for laser therapy of arrhythmias
- evaluation of available laser angioplasty devices
- new fibers and catheter designs for laser angioplasty
- new lead extraction laser catheters
- optical methods of assessing cardiovascular structure, biomechanics and function
- vascular welding
- vascular reactivity to laser energy
- approaches to control and assess the extent of laser injury
- new applications for laser thrombolysis
- spectroscopy
- fluorescence spectroscopy
- photodynamic therapy
- photodynamic therapy for intimal hyperplasia
- MEMS for cardiovascular diagnostics
- optical coherence tomography
- Raman, fluorescence, and absorption spectroscopy
- angioscopy
- thermography
- optical studies of the cardiovascular system in animal models
- unmet clinical needs.

Grow your biomedical optics business at BiOS 2010

Exhibition Dates

BiOS Exhibition:
23-24 January 2010

Photonics West Exhibition:
26-28 January 2010

"BiOS 2009 brought together world-leading researchers in medicine, biotechnology, and life science with exhibitors showcasing their photonic-based technologies and capabilities. We look forward to exhibiting again at BiOS 2010 in San Francisco!"

- **George L. Minott**, Business Development Commercial Applications, Barr Associates, Inc.

Exhibit at the world's largest and most prestigious international biomedical optics and imaging event. This is your cost-effective opportunity to gain visibility with this targeted audience.

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Optical techniques in Neurosurgery, Brain Imaging, and Neurobiology (BO104)

Conference Chairs: **Henry Hirschberg**, Univ. of California, Irvine (USA); **Steen J. Madsen**, Univ. of Nevada, Las Vegas (USA)

Recent technological advances have opened exciting opportunities for lasers and optical techniques in neurosurgery and brain imaging. Therapeutic applications include: tumor debulking/removal via thermal or photochemical interactions, and spinal decompression and discectomy. Optical techniques have also shown promise in a number of diagnostic applications, including fluorescence-guided tumor resection imaging of cortical function and intravascular examinations. Of special interest is the use of optical or other imaging modalities in the detection and therapy of neuro-degenerative diseases such as Alzheimer's or Parkinson's.

The purpose of this conference is to provide a forum for clinicians, scientists, engineers and manufacturers to report on current developments and to discuss future opportunities for optical techniques in neurosurgery and brain imaging.

Contributed papers are solicited concerning, but not limited to, the following areas:

- laser surgery in the brain and spine
- fluorescence-guided resection
- optical spectroscopy of normal brain and neoplastic tissue
- functional imaging of the brain using optical techniques
- photodynamic therapy in neurosurgery
- optical instrumentation and devices, including microscopes and endoscopes
- optical localization and registration techniques for neuronavigation
- fMRI/PET
- techniques for in vivo microscopy
- microscopic imaging and advanced microscopic techniques
- virtual reality
- real-time functional imaging in the OR
- co-registration (optical and other imaging modalities)
- unmet clinical needs.

Lasers in Dentistry XVI (BO105)

Conference Chairs: **Peter Rechmann**, Univ. of California, San Francisco (USA); **Daniel Fried**, Univ. of California, San Francisco (USA)

Program Committee: **Gregory B. Altshuler**, Palomar Medical Technologies, Inc. (USA); **Tatjána Dostálová**, Charles Univ. in Prague (Czech Republic); **John D. Featherstone**, Univ. of California, San Francisco (USA); **David M. Harris**, Bio-Medical Consultants, Inc. (USA); **Harvey A. Wigdor**, Advocate Illinois Masonic Medical Ctr. (USA)

Laser applications for dental hard tissue are a clinical reality. Several exciting future applications are being developed and will be featured at this conference. An entire session will be devoted to lesion detection by optical methods. This is one of the areas of rapidly expanding interest in dental research and applications to clinical practice, especially in relation to dental caries. Soft tissue clinical applications continue to be expanded. This conference will provide a forum for presentation of both basic and applied research in laser dentistry. Presentations of clinical studies are especially welcome. Manuscripts will be reviewed prior to publication.

Papers are solicited in all dental laser and biomedical optics dental application areas including, but not limited to, the following:

- optical methods for lesion detection, especially dental caries
- early caries detection
- optical coherence tomography in dentistry
- dental holography, 3D imaging
- decay removal with lasers
- decay prevention with lasers
- laser endodontics
- laser applications in periodontology
- lasers and dental implants
- laser photopolymerization
- laser hard-tissue and soft tissue surgery
- CO_2 laser use in dentistry
- Nd:YAG laser use in dentistry
- Er:YAG/ErCr:YSGG use in dentistry
- Ho:YAG laser use on dental tissues
- excimer laser treatment of dental tissues
- other wavelengths for hard or soft tissue use
- clinical trials of lasers for dental applications
- hard-tissue ablation and plasma production
- laser-tissue interactions relevant to dentistry
- wavelength and energy dependence of dental laser applications
- unmet clinical needs.

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Post-Meeting Manuscript Due Date: 16 December 2009

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Ophthalmic Technologies XX (BO106)

Conference Chairs: **Fabrice Manns**, Univ. of Miami (USA); **Per G. Söderberg**; **Arthur Ho**, Institute for Eye Research Ltd. (Australia)

Program Committee: **Rafat R. Ansari**, NASA Glenn Research Ctr. (USA); **Michael Belkin**, Tel Aviv Univ. (Israel); **Ralf Brinkmann**, Univ. zu Lübeck (Germany); **Wolfgang Drexler**, Cardiff Univ. (United Kingdom); **Daniel X. Hammer**, Physical Sciences Inc. (USA); **Karen M. Joos**, Vanderbilt Univ. (USA); **Katsuhiko Kobayashi**, Topcon Corp. (Japan); **Kirill V. Larin**, Univ. of Houston (USA); **Ezra I. Maguen**, American Eye Institute (USA); **Donald T. Miller**, Indiana Univ. (USA); **Peter J. Milne**, National Science Foundation (USA); **Daniel V. Palanker**, Stanford Univ. Medical Ctr. (USA); **Jean-Marie A. Parel**, Univ. of Miami Medical School (USA); **Roberto Pini**, Istituto di Fisica Applicata Nello Carrara (Italy); **Luigi L. Rovati**, Univ. degli Studi di Modena (Italy); **Georg Schuele**, OptiMedica Corp. (USA); **Jerry Sebag**, Univ. of Southern California (USA); **Peter Soliz**, VisionQuest Inc. (USA); **William B. Telfair**, IRIDEX Corp. (USA); **Valery V. Tuchin**, Saratov State Univ. (Russian Federation)

You are invited to submit papers to Ophthalmic Technologies XX - the premier international meeting on therapeutic and diagnostic technology in the field of ophthalmology, which brings together engineers and scientists developing the next innovations, and clinicians and practitioners extending the technology.

Some recent topics covered include:

- ophthalmic diagnostics
- ophthalmic applications of OCT
- retinal prosthesis and bionic vision
- wavefront sensing and wavefront-guided surgery
- laser surgical systems
- artificial cornea and keratoprostheses
- optoacoustic monitoring
- selective retinal photocoagulation
- adaptive optics
- dynamic light scattering
- Raman spectroscopy
- optics of the eye and vision correction
- ocular biometrics
- ocular diagnostics of neural diseases
- new devices and techniques
- virtual reality in ophthalmology
- optics and laser applications in ophthalmic drug delivery.

Papers on any other relevant topics are welcomed.

NOTE ON DUPLICATE ABSTRACTS

Authors that submit an abstract on a similar topic for presentation at another BiOS conference may be invited to present a short communication that should focus on ophthalmic issues.

EXTENDED ABSTRACT REQUIRED

In addition to the short 250-word abstract that will be published in the Abstract Digest, authors must submit a structured two-page extended abstract by the Abstract Due Date. The two-page extended abstract should include figures and tables and sufficient data to permit review. All extended abstracts will be peer-reviewed by the Program Committee to determine acceptance. The best extended abstracts will be nominated for the Pascal RoI Award. The extended abstracts will be used only for the purpose of peer review and will not be published.

PASCAL ROL AWARD 2010

Outstanding extended abstracts submitted to the Ophthalmic Technologies XX conference will be nominated for the Pascal RoI Award for Best Paper in Ophthalmic Technologies. The award and prize will be presented after the last scientific session of the conference to recognize the best paper and presentation. The 2009 recipient of the Pascal RoI Award was Katzuhiro Kurokawa, University of Tsukuba (see www.pascalrolfoundation.org).

SPECIAL PRESENTATION

Unmet Ophthalmic Technology Needs

This presentation series was established to promote the exchange of ideas between clinicians with a technological need and engineers interested in solving problems in ophthalmology. The invited lecture is sponsored by the Pascal RoI Foundation (www.pascalrolfoundation.org). The keynote speaker will be Professor Okihiro Nishi, from the Nishi Eye Hospital, Osaka, Japan, on the topic of technology needs for tomorrow's treatment and diagnosis of cataract.

Optical Methods for Tumor Treatment and Detection: Mechanisms and Techniques in Photodynamic Therapy XIX (BO107)

Conference Chair: **David H. Kessel**, Wayne State Univ. (USA)

Cochair: **Tayyaba Hasan**, Wellman Ctr. for Photomedicine (USA) and Harvard Medical School (USA)

Program Committee: **Thomas H. Foster**, Univ. of Rochester Medical Ctr. (USA); **Charles J. Gomer**, Childrens Hospital Los Angeles (USA); **Nancy L. Oleinick**, Case Western Reserve Univ. (USA); **Brian W. Pogue**, Dartmouth College (USA); **Kenneth K. Wang**, Mayo Clinic (USA)

Photodynamic therapy (PDT) has been approved by health agencies in several countries for treatment of neoplasia in a variety of sites, and is being examined with regard to other pathologic conditions including actinic keratosis, atherosclerosis, and age related macular degeneration (AMD). PDT can be used to target different subcellular sites for photodamage, e.g., the endoplasmic reticulum, lysosomes, mitochondria, and the plasma membrane. Photodamage can elicit cell death by activation of apoptosis, circumventing many common modes of drug resistance. This conference will emphasize drug development, mechanisms, clinical applications, instrumentation for light delivery and dosimetry determinations along with new information on photodynamic mechanisms.

Abstracts are encouraged dealing with these topics:

- drug development and characterization
- clinical protocols and outcomes
- mechanisms of phototoxicity
- techniques for light delivery and dosimetry
- tissue optics.

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Post-Meeting Manuscript Due Date: 16 December 2009

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Mechanisms for Low-Light Therapy V (BO108)

Conference Chairs: **Michael R. Hamblin**, Massachusetts General Hospital (USA); **Ronald W. Waynant**, U.S. Food and Drug Administration (USA); **Juanita Anders**, Uniformed Services Univ. of the Health Sciences (USA)

Program Committee: **James D. Carroll**, THOR Photomedicine Ltd. (United Kingdom); **Luis H. De Taboada**, PhotoThera, Inc. (USA); **Mary Dyson**, King's College London (United Kingdom); **Tomas L. M. Hode**, Irradia USA (USA)

Low levels of visible light (frequently red or near-infrared) can have significant therapeutic effects on multiple classes of diseases, injuries and medical disorders. In particular it is effective for wound healing and pain control as well as reduction of inflammation and swelling.

It is believed that the primary cellular chromophore that absorbs low levels of red and near-infrared light is cytochrome c oxidase, which is located in mitochondria. This absorption of energy may lead to increase in ATP synthesis and release of reactive oxygen species from the electron transport chain that can subsequently activate transcription factors and lead to cell proliferation and migration.

Despite many reports of positive findings from experiments conducted in vitro, in animal models and in randomized controlled clinical trials, LLLT remains controversial. This likely is due to two main reasons; firstly the biochemical mechanisms underlying the positive effects are incompletely understood, and secondly the complexity of rationally choosing amongst a large number of illumination parameters such as wavelength, fluence, power density, pulse structure and treatment timing has led to the publication of a number of negative studies as well as many positive ones.

This conference covers a field that is rapidly achieving a general level of acceptance in the medical and biomedical communities and will cover all of the important areas of LLLT research.

Contributed papers are solicited in the following areas (among others):

- mechanistic studies and cellular chromophores
- development of light sources for LLLT (LED photomodulation; pulsed IR light therapy)
- study of LLLT dosimetry
- in vitro research in mammalian cells
- in vitro research in micro-organisms in culture
- stimulation of wound healing and scar reduction in animal models
- nerve regeneration and neural stimulation
- prevention of ischemia-induced tissue death and regeneration.

Well-controlled clinical trials in the following areas:

- stimulation of wound healing such as non-healing ulcers
- treatments for stroke and degenerative brain disease
- pain reduction in post-surgical and neuralgia patients
- dental applications
- dermatology applications
- reduction of pain and inflammation in arthritis and other orthopedic conditions
- macular degeneration prevention
- reduction of edema.

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Optics in Bone Biology and Diagnostics (BO109)

Conference Chair: **Andreas Mandelis**, Univ. of Toronto (Canada)

Program Committee: **Robert R. Alfano**, The City College of New York (USA); **Angela Cheung**; **Peter Fratzl**, Max-Planck-Institut für Kolloid- und Grenzflächenforschung (Germany); **Huabei Jiang**, Univ. of Florida (USA); **Stephen J. Matcher**, The Univ. of Sheffield (United Kingdom); **Michael D. Morris**, Univ. of Michigan (USA); **Eleftherios P. Paschalis**, Ludwig Boltzmann Institut (Austria); **George Sandor**

With the new millennium and the rapid penetration of lasers, optics, and imaging techniques in the field of tissue diagnostics, a rapid growth in bone-related biophotonics and applications has emerged. While x-ray bone diagnostics and imaging are well established photonic techniques due to their deep sub-dermal penetration, bone research has been associated more with endoscopic technologies for which light waves face serious penetration barriers. However, we are witnessing an explosion in optical probes and diagnostics of bones and bone disease in the last 4-7 years.

This conference emphasizes optical applications to bone biology and diagnostics. It targets interdisciplinary research reports which bring out the interactions of bone with photons and can be used as a forum for the cross-fertilization and advancement of the science and technologies associated with bone optics and photonics. Technical and scientific papers related to the interactions and studies of bones with photons with energies spanning the entire spectral range from γ-rays to microwave and millimeter waves are solicited.

These include:

- mineral density, mechanical strength, strain, optical and other bone property measurements using optical absorption, reflection, transmission and scattering techniques.
- optics in bone biology and biomedicine
- γ- and x-ray imaging and bone densitometry
- general bone radiography
- bone applications of ultrafast laser techniques
- advanced optical techniques for the study of bones and osteopathologic processes: optical coherence tomography, terahertz, photoacoustic and photothermal detection and spectroscopy, diffuse photon techniques
- bone tissue ablation with lasers
- bone spectroscopies, microscopies and diagnostic instrumentation
- in-vitro and in-vivo imaging and tomographies
- fluorescence imaging and emission tomography
- transdermal optics
- optics in bone endoscopy and surgery
- bone optical engineering and clinical systems
- non-linear effects in bone-photon interactions.

Critical Dates

Abstract Due Date: 13 July 2009
Post-Meeting Manuscript Due Date: 16 December 2009

Please Note: Submissions imply the intent of at least one author to register, attend the conference, present the paper as scheduled, and submit a full-length manuscript for publication in the conference proceedings.

Frontiers in Pathogen Detection: From Nanosensors to Systems (BO110)

Conference Chairs: **Philippe M. Fauchet**, Univ. of Rochester (USA); **Benjamin L. Miller**, Univ. of Rochester (USA)

Program Committee: **Carl A. Batt**, Cornell Univ. (USA); **Jeffrey L. Coffer**, Texas Christian Univ. (USA); **Harold Craighead**, Cornell Univ. (USA); **Jiri Homola**, Institute of Photonics and Electronics of the ASCR, v.v.i. (Czech Republic); **Hongrui Jiang**, Univ. of Wisconsin-Madison (USA); **Laura M. Lechuga**, Ctr. d'Investigacions en Nanociència i Nanotecnologia (Spain); **Deborah Leckband**, Univ. of Illinois at Urbana-Champaign (USA); **Sonia E. Letant**, Lawrence Livermore National Lab. (USA); **Frances S. Ligler**, Naval Research Lab. (USA); **Daniel V. Lim**, Univ. of South Florida (USA); **Christopher Myatt**, Precision Photonics Corp. (USA); **Michael J. Sailor**, Univ. of California, San Diego (USA); **Jerry Schultz**; **Christopher C. Striemer**; **Christopher M. Strohsahl**, Lighthouse Biosciences, LLC (USA); **Sharon M. Weiss**, Vanderbilt Univ. (USA)

Pathogen detection is increasingly becoming a concern throughout society, not only in diagnostic laboratories in hospitals but also for on-site uses by health care providers or soldiers. From monitoring incidence of drug-resistant bacteria in hospitals and detecting harmful pathogens for homeland security to ensuring that our food is safe and our water clean, new, simple, inexpensive, sensitive, and fast methods of identifying pathogens are a pressing need. Optical solutions promise to provide many of these advantages and as a result many platforms for optical detection of pathogens are being demonstrated in the laboratory. The deployment of pathogen detection systems however requires that stringent specifications be met, for example in terms of sensitivity, false-positive and false-negative assessments, automated sample processing and analysis, system design and integration, and low cost.

This conference seeks to gather scientists, engineers and users active in pathogen and toxin detection. Contributions are sought in all areas, from novel optical detection platforms to nanosensors to system integration and commercialization. Topics of interest include but are not limited to:

- new sensing platforms
- ultrasensitive (single pathogen) detection methods
- utilization of nanomaterials and new optically responsive materials for pathogen detection
- miniaturized optic components such as microring resonators, photonic crystals, integrated optical waveguides, and nanoparticles
- label-free vs. tagged detection systems
- organic and inorganic platforms
- probe design
- strategies to eliminate non-specific binding
- integration of optics and microfluidics
- systems demonstrations
- new applications for environmental, medical, and food testing.

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Laser and Noncoherent Light Ocular Effects (BO111)

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

Program Committee: **Jeremiah Brown, Jr.**; **Henry D. Hacker**, U.S. Army Medical Research Detachment (USA); **Richard C. Hollins**, Defence Science and Technology Lab. (United Kingdom); **Tamar Kadar**, Israel Institute for Biological Research (Israel); **Brian J. Lund**, Northrop Grumman Mission Systems (USA); **David J. Lund**; **Russell L. McCally**, The Johns Hopkins Univ. (USA); **Leon McLin**, Air Force Research Lab. (USA); **Karl Schulmeister**, Austrian Research Ctrs. GmbH (Austria); **David H. Sliney**; **Robert J. Thomas**, Air Force Research Lab. (USA); **Deborah Whitmer**, U.S. Army Medical Research Detachment (USA); **Joseph A. Zuclich**, Northrop Grumman Mission Systems (USA); **Harry Zwick**, U.S. Army Medical Research Detachment (USA)

The use of lasers continues to grow in research, medicine, communications, industry, education, and the military. Laser or photonic-induced ocular injuries occur with a severity that depends mainly on the wavelength, exposure dose, and location of exposure. Depending on these variables, laser-induced retinal injuries have a range of effects, from dazzle to permanent blindness. They pose difficult challenges in their diagnosis, characterization and treatment. Laser pointers have caused concern and possible injury in certain instances. Laser and non-coherent diodes are emerging with higher intensities and varying bandwidths for use in signage, illumination and other applications. There are reports of the development of laser weapons aimed at causing visual disruption or incapacitation. Protection standards and the biological data which supports the establishment of permissible exposure limits assist in minimizing overexposure and the understanding of injury from optical radiation.

There is no accepted treatment for laser or light-induced eye injuries. Current research uses animal and cellular models to characterize laser and non-coherent light-induced eye injuries, to develop pharmacological and surgical modalities of treatment, and to evaluate advanced diagnostic techniques. Neuroprotection and the use of stem cells are promising methods in treating retinal injuries. Proteomics and genomics are emerging approaches to identify cellular and molecular interaction mechanisms and to target treatment approaches that minimize cell loss after injury and conserve vision.

Eye protection must not only provide the required level of protection but also permit the wearer to perform visual tasks. These requirements are often incompatible and not easily met with commercial laser protective eyewear.

Papers are solicited in the following topic areas:

- laser or noncoherent light (including solar) ocular effects and injury case histories and surveys
- ocular and skin effects of optical and terahertz radiation and their implication to exposure guidelines
- diagnostics for laser and light-induced retinal injuries
- ocular imaging in the assessment of laser-induced injury
- pharmacological and surgical treatment of laser and light damage to the eye
- ophthalmic surveillance and situational assessment of laser-induced eye injuries
- cellular models to assess laser interaction mechanisms and treatment strategies.
- animal models for laser or light-induced ocular injury
- optical radiation protection standards, permissible exposure limits and biological effects
- laser and environmental protective eyewear (e.g. sunglasses) devices and concepts
- vision and performance penalties from using eye protection and photic eye injury.

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Clinical Technologies and Systems

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

Coherence Domain Optical Methods and Optical Coherence Tomography in Biomedicine XIV (BO112)

Conference Chairs: **Joseph A. Izatt**, Duke Univ. (USA); **James G. Fujimoto**, Massachusetts Institute of Technology (USA); **Valery V. Tuchin**, Saratov State Univ. (Russian Federation)

Program Committee: **Peter E. Andersen**, Technical Univ. of Denmark (Denmark); **Stephen A. Boppart**, Univ. of Illinois at Urbana-Champaign (USA); **Zhongping Chen**, Univ. of California, Irvine (USA); **Johannes F. de Boer**, Vrije Univ. Amsterdam (Netherlands); **Wolfgang Drexler**, Cardiff Univ. (United Kingdom); **Christoph K. Hitzenberger,** Medizinische Univ. Wien (Austria); **Rainer A. Leitgeb**, Univ. Wien (Austria); **Xingde Li**, The Johns Hopkins Univ. (USA); **Adrian G. Podoleanu**, Univ. of Kent (United Kingdom); **Andrew M. Rollins**, Case Western Reserve Univ. (USA); **Natalia M. Shakhova**, Institute of Applied Physics (Russian Federation); **Guillermo J. Tearney**, Massachusetts General Hospital (USA); **Ruikang Wang**, Oregon Health & Science Univ. (USA); **Maciej Wojtkowski**, Nicolaus Copernicus Univ. (Poland); **Yoshiaki Yasuno**, Univ. of Tsukuba (Japan)

IMPORTANT NOTE: PEER REVIEW

All submissions will be peer reviewed by the full program committee. In order to facilitate the evaluation of your submission, please submit both an abstract and summary by the Abstract and Summary Due Dates. The summary can be up to three pages in length and should have sufficient technical and scientific information to permit review of the paper. To accommodate the peer review process, abstracts/summaries will not be accepted after 14 July 2009.

Depending upon the number of submissions, the length of talks may be reduced from 20 to 15 minutes in order to accommodate more speakers.

Optical coherence tomography and other optical methods and instruments based on coherent light interactions with inhomogeneous tissues are very promising for noninvasive medical diagnostics and for monitoring a wide spectrum of human pathologies. The focus of this conference will be on discussion of the physical and mathematical basis of coherence domain methods, and their applications in biomedical science and clinical practice. Directions of research and development in areas such as optical coherence tomography (OCT), low-coherence interferometry, speckle and speckle interferometry measurement and imaging technologies, polarized light diagnostic methods, coherent light microscopy, and coherence technologies for flow and functional imaging will be considered. Applications of coherence domain optical methods for studies of living tissue and clinical applications will also be discussed.

Papers are solicited on the following and related topics:

- optical coherence tomography (OCT) systems, theory, image processing
- Fourier/spectral domain and swept source OCT
- optical coherence microscopy (OCM)
- molecular, spectroscopic and functional OCT
- Doppler and polarization OCT
- clinical applications of OCT
- novel light sources for OCT
- imaging devices and probes for OCT
- low-coherence interferometry and topography
- speckle technologies in biomedical diagnostics and imaging
- optical homodyne and heterodyne detection methods for tissue spectroscopy and imaging
- polarization light scattering spectroscopy
- coherent light-acoustic wave interactions
- micro-elastography of tissues and cells
- estimation and monitoring of dynamic motion of organs, tissues, and cells
- laser diode, LED, SLD, and fiber optical portable coherence-domain instruments.

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Advanced Biomedical and Clinical Diagnostic Systems VIII (BO113)

Conference Chairs: **Anita Mahadevan-Jansen**, Vanderbilt Univ. (USA); **Tuan Vo-Dinh**, Duke Univ. (USA); **Warren S. Grundfest**, Univ. of California, Los Angeles (USA)

Program Committee: **Maurice C. Aalders, Jr.**, Univ. van Amsterdam (Netherlands); **Jennifer K. Barton**, The Univ. of Arizona (USA); **Stephen A. Boppart**, Univ. of Illinois at Urbana-Champaign (USA); **Laura Marcu**, Univ. of California, Davis (USA); **Mary-Ann Mycek**, Univ. of Michigan (USA); **Jianan Y. Qu**, Hong Kong Univ. of Science and Technology (Hong Kong, China); **Urs Utzinger**, The Univ. of Arizona (USA); **Georges A. Wagnieres**, Ecole Polytechnique Fédérale de Lausanne (Switzerland)

As surgical systems and clinical diagnostics adapt to new methods, instrumentation and assay technology, the pace of system innovations continues to accelerate. Many technologies originally developed for other applications, e.g., defense, energy, and aerospace, have found applications in the medical industry/environment. This conference provides a forum for scientists, engineers, manufacturers, and clinical providers to present the most recent advances in instrumentation and methods of diagnostic and therapeutic guidance systems for clinical applications. The conference goal is to provide an interdisciplinary forum for state-of-the-art methods in instrumentation research and development of biomedical technologies, approaching the translation from research and development prototypes to user application. The emphasis will be on clinical translation and implementation. The conference will address the interests of researchers, applied scientists, engineers, and clinicians whose goal is to implement clinical systems with extended, improved performance capabilities.

Papers are sought that describe the methodologies, instrumentation systems and analysis of biomedical optics technologies for clinical implementation. Topics will span the areas of instrumentation, system engineering, assay automation, delivery technology, and data management for biomedical diagnostics and surgical assistance in the clinical setting. Examples include stereotactic systems developed for brain surgery, flexible micronavigation devices engineered for medical laser ablation treatments, real-time monitoring system of critical function, online sensing of biological assays.

Oral and poster sessions are planned in the following subject areas:

Clinical diagnostic systems
- minimally invasive diagnostics systems based on Fluorescence, Raman scattering, diffuse reflectance
- early screening applications
- clinical monitoring of early pathological or physiological states
- multi-modality diagnostic systems (optics combined with acoustic, ultrasound, MRI, PET, X-ray)
- component/system design, engineering, and performance of biomedical instruments
- microinstrumentation and miniaturized clinical systems
- integrated instrument systems
- high throughput systems.

Advanced sensors for medicine
- clinical applications of optical biosensors (enzyme, antibody, gene probe-based systems)
- physical sensors and chemical in vivo sensors
- biochip technologies
- bio-electrics and nanosecond pulsing technology
- sensors for burn diagnostics
- advances in assay automation and delivery technology.

Medical imaging techniques and devices
- IR, OCT and other optical imaging systems
- advanced endoscopy techniques and devices
- smart catheters
- laser radar sensing and imaging
- RF radar imaging
- terahertz techniques and systems (imaging, spectroscopy, and modeling)
- optical methods of assessing structure and function
- trauma and critical care
- telemedicine, telesurgery
- virtual reality technologies.

Medical guidance systems
- tracking technology (optical, acoustic, etc.)
- stereotactic technology
- catheter navigation
- anatomical identification
- tumor demarcation, margin identification
- therapeutic assessment
- dexterity-enhanced surgery
- robotics-assisted surgery
- surgical simulators
- real-time feedback systems
- virtual reality techniques.

Design and Quality for Biomedical Technologies III (BO114)

Conference Chairs: **Ramesh Raghavachari**, U.S. Food and Drug Administration (USA); **Rongguang Liang**, Carestream Health, Inc. (USA)

Cochair: **T. Joshua Pfefer**, U.S. Food and Drug Administration (USA)

Program Committee: **Anthony J. Durkin**, Beckman Laser Institute and Medical Clinic, Univ. of California, Irvine (USA); **Kazuhiro Gono**, Olympus Medical Systems Corp. (Japan); **Jeeseong Hwang**, National Institute of Standards and Technology (USA); **Stephen P. Morgan**, The Univ. of Nottingham (United Kingdom); **Jannick P. Rolland**, Univ. of Rochester (USA); **Tomasz S. Tkaczyk**, Rice Univ. (USA); **Rudolf M. Verdaasdonk**, Univ. Medical Ctr. Utrecht (Netherlands)

Rapid advances in optical technologies and computational power have brought about a revolution in biomedical diagnostics and therapeutics. However, these advances necessitate parallel progresses in techniques used for development and evaluation. This conference will focus on four key areas that are critical to the design and production of safe, effective, and commercially-viable biomedical devices and technologies

- the devices used in biomedical researches and clinical applications
- the design and analysis of systems and components which require unique solutions for biomedical applications
- the evaluation of quality and safety of the biomedical imaging technologies and device
- the establishment of device reliability, including failure and degradation of performance.

This conference provides a unique forum for scientists and engineers from academia, industry and government to discuss issues that are relevant to all biomedical imaging modalities. Interactions between these parties should facilitate the development of biomedical devices and evaluation methods that will benefit the field of medicine. Submissions pertaining to optical diagnostics and therapeutics for all fields of medicine as well as optical evaluation of pharmaceuticals and biotechnology products are solicited for this conference.

I. Devices

- optical and biophotonic devices & instruments for researches and clinical applications
- biosensor, noninvasive photonics medical sensors
- biomedical instrumentation
- fiber based biomedical devices
- image guided surgical and therapeutic device and technologies.

II. Design

- optical and system design for biomedical imaging systems, including fluorescence, polarization, confocal, multispectral, multiphoton, and multimodal imaging systems
- optics for biomedical imaging technologies and devices
- illumination and detection geometry for imaging and spectroscopic systems
- fiber optic imaging systems
- novel optical sensing and detection
- micro-optics and MEMS based optical systems
- sources, detectors and other components
- development, validation and application of computer-aided design tools.

III. Quality

- Quality by Design (QbD)
- device calibration and intercomparison
- phantoms and test methods
- metrology and standardization
- development/evaluation of novel measurement tools
- computer-aided diagnosis algorithms
- critical metrics for assessing quality
- patient and user safety; photothermal, biochemical, etc.

IV. Reliability

- physics, analysis, failure mechanisms and testing for failure
- aging, dormancy and component degradation
- computational and analytical modeling
- determination of factors of safety.

V. Biomedical imaging technologies

- novel biomedical imaging technologies
- image enhancing techniques
- CMOS technologies for biomedical applications
- multi-modal techniques, including hybrid devices with non-optical (e.g., MRI, ultrasound) components
- small animal imaging
- digital Imaging and telemedicine
- high resolution optical imaging.

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Multimodal Biomedical Imaging V (BO115)

Conference Chairs: **Fred S. Azar**, Siemens Corporate Research (USA); **Xavier Intes**, Rensselaer Polytechnic Institute (USA)

Program Committee: **Nicholas Ayache**, INRIA Sophia Antipolis (France); **David A. Boas**, Massachusetts General Hospital (USA); **Britton Chance**, Univ. of Pennsylvania (USA); **Sergio Fantini**, Tufts Univ. (USA); **Keyvan Farahani**; **Gultekin Gulsen**, Univ. of California, Irvine (USA); **Mario Khayat**, ART Advanced Research Technologies Inc. (Canada); **Dimitris N. Metaxas**, Rutgers Univ. (USA); **Nassir Navab**, Technische Univ. München (Germany); **Tim Nielsen**, Philips Research (Germany); **Vasilis Ntziachristos**, Helmholtz Zentrum München, GmbH (Germany); **Brian W. Pogue**, Dartmouth College (USA); **Birsen Yazici**, Rensselaer Polytechnic Institute (USA); **Arjun G. Yodh**, Univ. of Pennsylvania (USA)

Data generated by novel imaging technologies such as optical tomography are complex to analyze, due to the inherent scattering of light through anatomical systems. Cross validation and direct comparison with established methods in other imaging modalities are especially challenging. There is critical need for new computational techniques to provide rapid, accurate and cost-effective means for quantification and characterization of such data, either independently or integrated with other modalities. These computational methods will enable faster acceptance of novel imaging modalities into viable clinical and/or pre-clinical systems. The applications are diverse and range from imaging at the cellular level to the whole body while incorporating molecular, functional and anatomical information. The conference objectives are to provide a forum: (1) To review and share recent developments in novel multimodal imaging techniques, (2) to report development of novel computational methods, and (3) to bring together the optical imaging and image analysis communities.

Topics include, but are not limited to:

- multimodal imaging integrating structural, molecular and functional information
- 2D, 3D, 4D, tomographic and / or multi-spectral imaging
- imaging analysis and/or image processing techniques applied to optical imaging (e.g. visualization, segmentation, registration)
- detection and diagnostic analysis techniques which may provide better quantitative and/ or diagnostic insight into clinical & pre-clinical imaging (e.g. methods for quantitative measurements, computer-assisted diagnosis)
- imaging analysis and/or image processing techniques used to combine optical imaging with other imaging modalities (e.g. MR, X-Ray, PET)
- image analysis, computational methods and reconstruction approaches which may help bring optical imaging into the clinic (visual rendering of complex data set, novel algorithms for assisted optical reconstruction)
- clinical evaluation of these new technologies (Physiological and functional interpretation of image data, visual perception and observer performances, validation of quantitative assessment of optical signatures in-vivo).

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Endoscopic Microscopy V (BO116)

Conference Chairs: **Guillermo J. Tearney**, Massachusetts General Hospital (USA); **Thomas D. Wang**, Univ. of Michigan (USA)

Program Committee: **David L. Dickensheets**, Montana State Univ. (USA); **Arthur F. Gmitro**, The Univ. of Arizona (USA); **Martin R. Harris**; **Ralf Kiesslich**, Johannes Gutenberg Univ. Mainz (Germany); **Francois Lacombe**, Mauna Kea Technologies (France); **Stephen Lam**, The BC Cancer Research Ctr. (Canada); **Hiroshi Mashimo**, VA Boston Healthcare System (USA); **Kenzi Murakami**, Olympus Corp. (Japan); **Norman S. Nishioka**, Massachusetts General Hospital (USA); **Wibool Piyawattanametha**, Stanford Univ. (USA); **Mark J. Schnitzer**, Stanford Univ. School of Medicine (USA); **Peter T. C. So**, Massachusetts Institute of Technology (USA)

Papers for this session focus on the development of high resolution imaging systems that are endoscope compatible and include novel techniques for early detection, screening, diagnosis, intervention, and treatment of disease in either pre-clinical models or human subjects. In general, remote detection is based on the use of an optical fiber to transmit light between the instrument and the tissue, and involves the collection of information about molecular and cellular processes without physical excision of tissue. These methods of in vivo optical imaging extends across a wide range of resolution, from molecular, sub-cellular and cellular to tissue and organ levels. The creation of an image may require a variety of different scanning mechanisms.

Endoscopic techniques provide unique advantages over other (e.g. whole body) imaging modalities for evaluating disease present over the epithelial surface of hollow organs. The direct proximity of collection optics to regions of disease can result in unparalleled achievement of resolution, unraveling of molecular mechanisms, and use of fluorescence contrast agents. Examples of applications of endoscopic microscopy to medicine include the detection of pre-malignant lesions, identification of disease below the tissue surface, assessment of depth of tumor invasion, localization of cancer margins, evaluation of effectiveness of pharmacological therapy, and reduction in number of physical biopsies and frequency of surveillance.

This conference provides an inter-disciplinary forum for physicians, molecular biologists, chemists, biochemists, optical engineers, and instrument designers to report and discuss recent results, improvements, and new approaches in the emerging field of endoscopic microscopy.

Contributed papers are solicited concerning, but not limited to, the following areas:

- confocal microendoscopy
- multi-photon microendoscopy
- endoscopic OCT
- endoscopic OCM
- fluorescence endoscopic imaging
- video capsule endoscopy
- endocytoscopy
- high magnification endoscopy
- light scattering spectroscopy
- Raman spectroscopy
- infrared spectroscopy
- MEMS scanning mechanisms
- micro-actuators
- luminal optical contrast agents
- endoscopic image processing and analysis.

Miniature Instruments for Endoscopic Microscopy

Special joint session with the Conference on MOEMS and Miniaturized Systems

(part of the MEMS/MOEMS Symposium)

Papers are solicited that address the unique challenges to deliver high-fidelity microscopic imaging of tissue with a miniaturized instrument platform. Example topics include mechanisms for distal beam scanning, focus control and aberration correction using MOEMS devices, MEMS actuators or electrowetting optics; proximal scanning based on DMD or other SLM technologies; novel optical assembly and alignment techniques; highly corrected miniature optical systems.

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Optical Fibers and Sensors for Medical Diagnostics and Treatment Applications X (BO117)

Conference Chair: **Israel Gannot**, Tel Aviv Univ. (Israel)

Program Committee: **Ilko K. Ilev**, U.S. Food and Drug Administration (USA); **Karl-Friedrich Klein**, Fachhochschule Giessen-Friedberg (Germany); **Pierre Lucas**, The Univ. of Arizona (USA); **Yuji Matsuura**, Tohoku Univ. (Japan); **Urs Utzinger**, The Univ. of Arizona (USA)

Delivery devices, fibers, waveguides, bundles and sensors are essential components needed to perform minimally invasive surgical procedures. This conference will cover various topics in these fields. In the medical field there are still pressing demands for the following:

- new fibers and waveguides, other delivery devices and transendoscopic tools for the x-ray, UV, visible, and IR regions of the spectrum
- invasive and noninvasive optical, biological and chemical sensors for UV/VIS/NIR/ IR fluorescence, Raman, absorption and evanescent-wave spectroscopy
- biosensors for the medical and biological environment
- fiber sensors for physical, chemical and immunoassays
- waveguide sensors, including molecular diagnostic arrays
- covering an increasing number of laser output wavelengths (i.e., ultrafast lasers, x-ray lasers, and fiber lasers)
- terathertz lasers
- low loss waveguides and fiber bundles for terahertz imaging
- theory of waves and signals delivery in fibers
- fiber damage thresholds for high energy pulse delivery, nonlinear effects
- making the therapeutic and diagnostic systems more intelligent and safer, i.e., by increasing the number and the role of fiber- based diagnostic and control devices in the surgical apparatus (this will lead to safer operative procedures for both patients and physicians)
- optical fiber and waveguides materials (i.e. 1-d and 2-d photonic bandgap crystals) and devices required specifically for medical applications
- new surgical and diagnostic procedures based on optical fibers and waveguides
- fiber based methods and systems
- imaging bundles for the visible and IR
- embedded optical sensors
- imaging capsules
- remote sensing
- bio-compatibility of fiber materials for endoscopic tools
- mechanical properties of fibers (bending, tensile strength) for endoscopic tools
- new fibers and catheter designs for laser surgical applications
- sensor arrays
- sensors for the smart medical home.

The aim of the conference is to bring together groups of researchers, applied scientists, engineers, clinicians and students belonging to different disciplines who have as a common link the development and use of fiber delivery techniques and methodologies.

The conference subject is particularly suitable to obtain the right balance among the various disciplines. To this aim, the papers should report on both technical and biomedical advances. Contributions focusing on the development of fibers, endoscopic delivery and diagnostic systems sensing methods for applications in all biomedical areas are solicited.

Critical Dates

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Biomedical Vibrational Spectroscopy VI: Advances in Research and Industry (BO118)

Conference Chairs: **Anita Mahadevan-Jansen**, Vanderbilt Univ. (USA); **Wolfgang Petrich**, Roche Diagnostics GmbH (Germany)

Program Committee: **Andrew J. Berger**, Univ. of Rochester (USA); **Max Diem**, Northeastern Univ. (USA); **Airton A. Martin**, Univ. do Vale do Paraíba (Brazil); **Michael D. Morris**, Univ. of Michigan (USA); **Dieter Naumann**, Robert Koch-Institut (Germany); **Nicholas Stone**, Gloucestershire Royal Hospital (United Kingdom)

Vibrational spectroscopy provides molecular specific information that has long been used in the field of biochemistry. Technical advances in the last decade have led to the application of vibrational spectroscopy to address many biological and biomedical problems. In particular, NIR and mid-IR absorption as well as Raman spectroscopy have received tremendous interest in biomedicine. The fingerprint nature of these techniques allows precise analysis of biological materials that can be used for applications ranging from the macroscopic to the micro and submicroscopic levels. The development of diode lasers and novel designs of fiber optic probes have led to the potential of applying these techniques in vivo.

This year's conference will be organized based on medical or biological systems rather than techniques to facilitate cross-fertilization of solutions to problems in implementation. Where feasible, the specific sessions will be co-localized with the specific clinical conference to ensure increased awareness of vibrational spectroscopy by clinicians. This year's conference will focus on bringing together a variety of different fields wherein vibrational spectroscopy has played a powerful role in their development for a specific application. We would like to particular encourage the participation of the single molecule and molecular processes community to foster interactions with the tissue and cell based researchers. An added agenda will be interaction between research and industry and the synergy therein.

This call solicits abstracts in biomedical applications of vibrational spectroscopy as well as new discoveries in its implementation. This conference will encompass methodologies that probe vibrational energies at tissue, cell, sub-cellular and molecular levels. Such modalities include but are not confined to:

- conventional Raman spectroscopy
- spatially offset Raman spectroscopy (SORS)
- Raman microscopy and microspectroscopy
- surface enhanced Raman spectroscopy (SERS)
- coherent anti-Stokes Raman spectroscopy (CARS)
- NIR and IR spectroscopy
- NIR and IR microscopy and microspectroscopy
- Mid-IR and THz laser spectroscopy.

The techniques may be applied in biology as well as medicine.

Potential areas of applications include but are not confined to:

- histopathology
- cytology
- tissue and cellular probes and processes
- sub-cellular and molecular probes and processes
- protein and DNA analysis
- pharmacology
- analysis of biological fluids such as blood
- infectious agents
- disease identification
- guidance of therapy
- microbiology.

Proposed areas for joint sessions include neurosurgery, dermatology and urology. The rest of the sessions will continue this format to other specialties.

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Optical Biopsy VIII (BO119)

Conference Chair: **Robert R. Alfano**, City College/CUNY (USA)

Cochair: **Stavros G. Demos**, Lawrence Livermore National Lab. (USA)

Program Committee: **Stefan K. Andersson**, Lund Univ. (Sweden); **Britton Chance**, Univ. of Pennsylvania (USA); **Christopher H. Contag**, Stanford Univ. School of Medicine (USA); **Amir H. Gandjbakhche**, National Institutes of Health (USA); **Israel Gannot**, George Washington Univ. (USA) and Tel Aviv Univ. (Israel); **Richard B. Rosen**, The New York Eye and Ear Infirmary (USA); **Masood Siddique**, City College/CUNY (USA); **Urs Utzinger**, The Univ. of Arizona (USA); **Wubao B. Wang**, City College/CUNY (USA); **Webb W. Watt**, Cornell Univ. (USA)

The goal of the conference is to present novel state-of-the-art work in non-invasive spectroscopic methods to detect pre-malignancy, malignancy, wound healing and other diseases. The conference will focus on the work investigating the differences in optical signatures of normal and diseased tissues, and on understanding the underlying biochemical and structural changes of tissues and cells responsible for the observed spectroscopic signatures. This conference will focus on both in vivo and ex vivo fluorescence, fluorescence imaging, Raman spectroscopy, laser tissue welding and new optical techniques to diagnose tissues changes. Compact smart spectral explorers, multispectral imagers and hyperspectral imaging will be highlighted by invited speakers.

Topics:

- fluorescence spectroscopy
- fluorescence imaging
- in-vivo diagnostics
- excitation spectroscopy
- instrumentation for optical biopsy
- absorption spectroscopy
- THz spectroscopy
- near-infrared fluorescence wing spectroscopy
- Raman spectroscopy
- Stokes shift spectroscopy
- inelastic light scattering
- nonlinear optical biopsy mapping
- polarization spectral imaging
- diffusive reflectance spectroscopy
- video spectral imaging and mapping of tissue
- cell smears spectroscopy
- physiological state of tissue
- chemo-targeting agents
- spectroscopy with micro-endoscopes
- nano particle tagging
- STED nanoscale imaging
- supercontinuum for medical and biological
- stimulated Raman Gain spectroscopy
- diabetes noninvasive detection
- speckle spectroscopy for diagnoses
- time reversal techniques.

Critical Dates

Abstract Due Date: 13 July 2009
Post-Meeting Manuscript Due Date: 16 December 2009

Please Note: Submissions imply the intent of at least one author to register, attend the conference, present the paper as scheduled, and submit a full-length manuscript for publication in the conference proceedings.

Smart Medical Home (BO137)

Conference Chair: **Israel Gannot**, Tel Aviv Univ. (Israel)

As people grow older they find it more difficult to remain in their houses and they move to retirement homes, nursery homes, assisted living projects or other special housing for the elderly. This identification surely affects their state of mind. A move from their natural surrounding or habitat may also have an impact on their health condition for the worse.

With the advance of medicine, technologies of sensing, monitoring and health informatics, there is a big potential in creating a smart medical home where elderly people can continue to live their normal lives in their natural and recognized surrounding. Modern medicine which moved from long period of hospitalization into outpatient clinics and minimal invasive procedure, is moving further into home care processes.

This meeting will deal with different aspects of the smart medical home environment.

Papers reporting methods and ideas for assessment of health condition, monitoring, sensing, informatics, tele-medicine, home treatments, and rehabilitation are solicited.

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Tissue Optics, Laser-Tissue Interaction, and Tissue Engineering

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

Optical Interactions with Tissues and Cells XXI (BO120)

Conference Chairs: **E. Duco Jansen**, Vanderbilt Univ. (USA); **Robert J. Thomas**, Air Force Research Lab. (USA)

Program Committee: **Randolph D. Glickman**, The Univ. of Texas Health Science Ctr. at San Antonio (USA); **Jessica C. Ramella-Roman**, The Catholic Univ. of America (USA); **Alfred Vogel**, Univ. zu Lübeck (Germany); **Lihong V. Wang**, Washington Univ. in St. Louis (USA)

The basic mechanisms of laser tissue and cell interactions fall into three categories: photochemical, photomechanical, and photothermal. These mechanisms form a fundamental basis for the field but are now expanded to include the cellular and bio-molecular response to irradiation from lasers and laser systems both in-vitro and in-vivo. Understanding the fundamental mechanisms of interactions between light, tissue and cells is the basis for the development of future biomedical optic technologies that include both therapeutic and diagnostic applications.

This conference will focus on papers that demonstrate and elucidate the previously mentioned mechanisms of light-tissue interaction, at both the tissue and cellular levels, and their role in the design of lasers and laser systems for biomedical applications. An aim of this conference is to identify optical technologies that will be useful in addressing problems of biomaterials, tissue engineering and tissue mechanics. In addition, the conference is interested in methods of assessing the optical properties associated with laser tissue and cell interactions and the modeling and simulation required to enhance experimental findings leading to new biomedical optic technology development.

A preliminary list of session topics is listed:

- photochemical and photo-oxidative interactions
- photothermal interactions
- pulsed laser ablation
- ultra-short pulsed laser interactions
- optical monitoring of tissue mechanics
- tissue optics
- local laser treatment and immune responses
- low intensity light stimulation
- cellular micro-and nanosurgery
- laser-induced lysis, microdissection and catapulting of cells
- in-vitro cellular and biomolecular response
- in-vivo cellular and biomolecular response
- novel applications of lasers and light in biomedicine.
- optical assessment of tissue
- mechanical properties
- heterogeneity
- function
- optical and acoustic imaging of engineered tissues
- special topic: polarized light interaction with tissues
- biological effects of terahertz radiation
- laser welding and soldering of tissue
- applied mathematics for laser induced tissue and cell response mechanisms
- modeling and simulation of laser interaction with tissue & cells.

Critical Dates

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Post-Meeting Manuscript Due Date: 16 December 2009

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Dynamics and Fluctuations in Biomedical Photonics VII (BO121)

Conference Chairs: **Valery V. Tuchin**, Saratov State Univ. (Russian Federation); **Donald D. Duncan**, Oregon Health & Science Univ. (USA); **Kirill V. Larin**, Univ. of Houston (USA)

Program Committee: **Vadim S. Anischenko**, Saratov State Univ. (Russian Federation); **Wei R. Chen**, Univ. of Central Oklahoma (USA); **Joseph P. Culver**, Washington Univ. School of Medicine in St. Louis (USA); **Jingying Jiang**, Tianjin Univ. (China); **Sean J. Kirkpatrick**, Oregon Health & Science Univ. (USA); **Jürgen M. Lademann**, Charité Universitätsmedizin Berlin (Germany); **Hong Liu**, Univ. of Oklahoma (USA); **Qingming Luo**, Huazhong Univ. of Science and Technology (China); **Igor V. Meglinski**, Cranfield Univ. (United Kingdom); **Vladislav Y. Toronov**, Ryerson Univ. (Canada); **Lihong V. Wang**, Washington Univ. in St. Louis (USA); **Ruikang Wang**, Oregon Health & Science Univ. (USA); **Vladimir P. Zharov**, Univ. of Arkansas for Medical Sciences (USA); **Dmitry A. Zimnyakov**, Saratov State Univ. (Russian Federation)

The conference will be devoted to applications of recent developments in dynamics, coherence and synchronicity in networks, and statistical physics to biomedical photonics. The goal of the conference is to gather essentially five groups of leading researchers:

- biophysicists
- physicians
- systems biologists and neuroscientists
- mathematicians
- optical and laser engineers

along with graduate and undergraduate students to facilitate future progress in the development of optical and laser technologies based on a dynamics approach to biomedical science and clinical applications. This approach will be useful for diagnosis and therapy of diseases such as those of the heart and vasculature, cancer, psoriasis, mental illness, and many others that manifest as a breakdown of the living organism's auto-regulation systems at the level of molecule, cell, organ, or organism as a whole. This methodology is also intended to promote a deeper understanding of the role of complex dynamics in biological development across all length scales from embryos, to tissues, to organs and systemic functions. We hope that this new conference will contribute to the development of such interdisciplinary fields of science and applications as dynamics and structures of living systems, biomedical optics and laser medicine, and that it will be helpful for scientists, physicians, engineers, and students.

Papers are solicited on photonics technologies, including diffusion, fluorescence and polarization spectroscopies, OCT, speckles, photoacoustics, and nanophotonics, applied for estimation, monitoring, and/or controlling of:

- nonlinear dynamics of stochastic systems in biology and medicine
- fractal point processes and cell structure analysis
- brain functioning
- nonlinear dynamics of heartbeat, breath, fibrillary tremor, eyeball tremor, etc.
- bio-vibrations, tremor and breath measuring technologies and instruments
- contractile activity of blood and lymph vessels, flow measurement and imaging
- red blood cell and other bio-particle sedimentation and aggregation processes
- cell proliferation
- cell drug and dye uptake
- intracellular flows and contractile activity of cells
- molecular agents, intelligent particles and collective behavior
- molecular motor driving
- stochastic cluster dynamics of macromolecules
- nonlinear diffusion of metabolic and exogenous agents and nanoparticles in tissues
- glucose sensing
- fluctuations and chaos in living systems and organisms
- stochastic resonance and synchronization in neural science and cardiology
- adaptive coherent optical systems for medicine.

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Photons Plus Ultrasound: Imaging and Sensing 2010 (BO122)

Conference Chairs: **Alexander A. Oraevsky**, Fairway Medical Technologies, Inc. (USA); **Lihong V. Wang**, Washington Univ. in St. Louis (USA)

Program Committee: **Mark A. Anastasio**, Illinois Institute of Technology (USA); **Paul C. Beard**, Univ. College London (United Kingdom); **Claude Boccara**, Ecole Supérieure de Physique et de Chimie Industrielles (France); **Gerald J. Diebold**, Brown Univ. (USA); **Charles A. DiMarzio**, Northeastern Univ. (USA); **Stanislav Y. Emelianov**, The Univ. of Texas at Austin (USA); **Rinat O. Esenaliev**, The Univ. of Texas Medical Branch at Galveston (USA); **Martin Frenz**, Univ. Bern (Switzerland); **Steven L. Jacques**, Oregon Health & Science Univ. (USA); **Robert A. Kruger**, OptoSonics, Inc. (USA); **Pai-Chi Li**, National Taiwan Univ. (Taiwan); **Andreas Mandelis**, Univ. of Toronto (Canada); **Matthew O'Donnell**, Univ. of Washington (USA); **Günther Paltauf**, Karl-Franzens-Univ. Graz (Austria); **Wiendelt Steenbergen**, Univ. Twente (Netherlands); **William M. Whelan**, Univ. of Prince Edward Island (Canada); **Vladimir P. Zharov**, Univ. of Arkansas for Medical Sciences (USA); **Quing Zhu**, Univ. of Connecticut (USA)

This conference will be dedicated to imaging, spectroscopy, and monitoring by synergistically combining the high contrast in the optical and microwave regime and the high ultrasonic resolution. The hybrid technology can provide anatomical and functional imaging for cancer detection, localization, and characterization. It is also capable of providing high-resolution molecular imaging. The areas of interest include methods involving optically induced acoustic waves and acoustically modulated optical waves and a variety of photothermal and photoacoustic phenomena, covering basic research, instrumentation and applications. A preliminary list of topics includes the following:

Large-scale optoacoustic tomography
- optoacoustic tomography of human organs: breast, prostate, colon, brain, and skin
- optoacoustic imaging of angiogenesis network, blood vessels, and blood perfusion
- optoacoustic measurement of tissue optical properties in vivo
- optoacoustic functional imaging of hemoglobin concentration and oxygen saturation
- optoacoustic detection of lymph nodes and image guided biopsy
- optoacoustic monitoring of therapeutic intervention.

Small animal optoacoustic imaging
- optoacoustic tomography of the brain and other organs
- optoacoustic tomography with contrast agents
- optoacoustic molecular imaging and monitoring
- optoacoustic imaging for cancer research in animals.

Microscopic optoacoustic imaging
- optoacoustic detection of superficial and microscopic lesions
- optoacoustic microscopy of cells and organelles
- imaging and monitoring of cells with optoacoustic and thermoacoustic systems
- optoacoustic biosensors of single cells and micro-organisms.

Optoacoustic tomography with optical and interferometric detection
- novel interferometric and fiber optic optoacoustic devices
- optoacoustic characterization of phantoms and tissue structures
- optoacoustic localization and measurement of thickness and distances.

Optoacoustic monitoring of therapy
- optoacoustic feedback and monitoring of thermal therapy by lasers, RF, PDT and ultrasound
- optoacoustic imaging of physiological changes in tissue
- optoacoustic imaging and monitoring with optical and ultrasonic contrast agents
- optoacoustic monitoring of laser-induced cavitation
- optoacoustic monitoring of drug delivery and photomechanical drug delivery.

Optoacoustic spectroscopy and analytic monitoring
- optoacoustic measurements of tissue optical properties
- optoacoustic infrared sensors and thermal sensors
- optoacoustic monitoring of health related gases and environment
- optoacoustic detection of physiologically important molecules in human tissue and body liquids
- optoacoustic contrast agents.

Thermal wave and thermoacoustic imaging
- systems and methods of thermoacoustic imaging and monitoring
- diagnostic and therapeutic applications of thermoacoustic imaging
- thermal waves in biological systems
- optical monitoring of thermal processes in cells
- combination of electromagnetic energy and ultrasound in medical applications.

Clinical applications of optoacoustic imaging
- optoacoustics in oncology and photodynamic therapy
- optoacoustics in monitoring digestive system
- optoacoustics in dentistry
- optoacoustics in ophthalmology
- optoacoustics in monitoring trauma and other acute conditions.

Signal processing and image reconstruction
- algorithms of 2D and 3D image reconstruction
- filters and denoising procedures
- wavelets and multiresolution imaging
- image post-processing methods.

continues ➡

Biophotonics and Immune Responses V (BO123)

Conference Chair: **Wei R. Chen**, Univ. of Central Oklahoma (USA)

Program Committee: **Samuel Achilefu**, Washington Univ. School of Medicine in St. Louis (USA); **Gianfranco L. Canti**, Univ. degli Studi di Milano (Italy); **Xing Da**, South China Normal Univ. (China); **Yuncheng Ge**, Beijing Glass Research Institute (China); **Sandra O. Gollnick**, Roswell Park Cancer Institute (USA); **Michael R. Hamblin**, Massachusetts General Hospital (USA); **Tomas L. M. Hode**, ImmunoPhotonics, Inc. (USA); **Zheng Huang**, Univ. of Colorado at Denver and Health Sciences Ctr. (USA); **Mladen Korbelik**, British Columbia Cancer Agency (Canada); **Mark F. Naylor**, Univ. of Oklahoma (USA); **Karl-Goran Tranberg**, Lund Univ. (Sweden); **Xunbin Wei**, Fudan Univ. (China); **Vladimir P. Zharov**, Univ. of Arkansas for Medical Sciences (USA)

Immunological responses are crucial in the treatment of diseases. Phototherapy (photothermal, photochemical, and photomechanical), often used in conjunction with immunotherapy, has shown promise in stimulating and enhancing host immune systems. Recently, many researchers have started human clinical studies using photo-immunotherapy. This conference will provide a forum for discussion and interaction among people from academia, industry, and health professions who are working in this area. It will serve as a bridge between technology development and clinical applications, in the field of phototherapy-related immune activities.

This conference will focus on induction, enhancement, mechanisms, and detection of immune responses induced by phototherapy and combination modalities. It will specifically address the issue of searching for an effective immunological modality for different diseases, ranging from autoimmune diseases to cancer, using optical methods. It will also address the issue of detecting immune activities, using modern technologies such as molecular and cellular imaging, as well as other imaging modalities. It will include research using different combination modalities, novel approaches for stimulations of systemic responses, and innovative methods in monitoring and guiding photo-immunotherapy.

Preliminary session topics include:

- opto-immune therapies
- novel technologies in monitoring immune activities
- novel combination therapy in cancer treatment
- new approaches in inducing immune responses
- local and systemic effects of low intensity laser irradiation
- local and systemic effects of high intensity laser irradiation
- sensing and sensors for immune activities
- molecular imaging for immune responses
- in vitro cellular and biomolecular responses
- in vivo cellular and biomolecular responses
- photodynamic therapy and immune responses
- localized thermal effect on immune systems
- immunological mechanism of laser therapies
- combination of laser therapy and immunoadjuvants
- laser induced cell proliferation and apoptosis
- detections of molecular interaction in immune responses
- clinical trials of photo-immunotherapy
- gene expression and signaling in the immune system.

Photons Plus Ultrasound: Imaging and Sensing 2010 (BO122) *continued*

Novel technologies and applications

- ultrasound-modulated optical (acousto-optical) tomography
- hybrid technologies employing combination of light and ultrasound, including laser ultrasound emission systems
- combined systems employing ultrasound and optoacoustic imaging
- comparative studies of optoacoustic imaging versus other imaging modalities
- gold, silver, and other strongly absorbing nanoparticles as optoacoustic contrast agents
- thermoacoustic nanothermolysis of cells
- novel ultrawide-band acoustic transducers and arrays
- new biomedical applications of photons plus ultrasound.

Best Paper Award and Best Poster Award

Fairway Medical Technologies of Houston, Texas, will sponsor two Awards for this Conference: Best Paper and Best Poster presented.

Optics in Tissue Engineering and Regenerative Medicine IV (BO124)

Conference Chairs: **Sean J. Kirkpatrick**, Oregon Health & Science Univ. (USA); **Ruikang Wang**, Oregon Health & Science Univ. (USA)

Program Committee: **Stephen A. Boppart**, Univ. of Illinois at Urbana-Champaign (USA); **Irene Georgakoudi**, Tufts Univ. (USA); **Miya Ishihara**, National Defense Medical College (Japan); **Stephen P. Morgan**, The Univ. of Nottingham (United Kingdom); **Ying Yang**, Keele Univ. (United Kingdom)

Real time monitoring of structures, biomechanics, and biochemical contents of engineered tissues during the growth cycle has been identified as an urgent need in tissue engineering. Equally in demand is the development and application of non/minimally invasive monitoring techniques to monitor the engineered tissue after implantation, since a clinical failure can complicate the treatment procedure that in turn makes the regulation and clinical assessment of engineered tissues slow and expensive. The purpose of this conference is to identify techniques related to optics/electro-magnetic waves for the monitoring of tissue engineering processes, such as in vivo repair or in vitro bioreactors. This conference is designed to offer a unique forum for interchanging ideas between tissue engineers and physicists, thus addressing current clinical problems, and forging collaborations between the disciplines as well as stimulating novel optical applications.

Abstracts are solicited on the following and related topics:

- tissue optics related to tissue engineering and regenerative medicine
- functional imaging and optical manipulation of living cells and tissues
- fluorescence and luminescence lifetime imaging in cells and tissues
- high spatial resolution methods for cellular imaging (AFM, near-field, etc)
- metrology techniques
- assessment of tissue mechanical properties (optical, ultrasonic, hybrid, etc)
- optics in tissue engineering and regenerative medicine
- novel instrumentation, applications and analysis.

Critical Dates

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Post-Meeting Manuscript Due Date: 16 December 2009

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Photons and Neurons (BO125)

Conference Chairs: **Anita Mahadevan-Jansen**, Vanderbilt Univ. (USA); **E. Duco Jansen**, Vanderbilt Univ. (USA)

Program Committee: **Edward S. Boyden**, Massachusetts Institute of Technology (USA); **Timothy J. Ebner**, Univ. of Minnesota (USA); **Maarten Frens**, Erasmus MC (Netherlands); **Elizabeth M. C. Hillman**, Columbia Univ. (USA); **Henry Hirschberg**, Univ. of California, Irvine (USA); **Steen J. Madsen**, Univ. of Nevada, Las Vegas (USA); **Agnella I. Matic**, Northwestern Univ. (USA); **Jonathon D. Wells**, Lockheed Martin Aculight (USA)

Neurons are the basic building blocks of the nervous system and study of neuronal structure, function and behavior forms the basis of understanding and manipulating neural activity. Conventional methods in the research laboratory as well as in the clinic rely on electrical methods for stimulating, modulating and recording neural activity. The past decade has seen the rise of optical methods in this domain. This conference aims to bring together biomedical engineers, neuroscientists, optical physicists as well as clinicians involved in stimulating, modulating, manipulating and detecting neural activity at a molecular, cellular and tissue level using optical means.

Direct stimulation of neural cells and tissues using (laser) light has seen tremendous interest in the past few years. The use of infrared light to stimulate neural activity in the peripheral and central nervous system is only the beginning of this field. The conference will bring together researchers focused on the application of light-based technologies for stimulating neural tissue and cells using different wavelengths from the UV through the infrared so that discussion on the mechanism of the light induced neural activation can be initiated. Researchers who have developed novel optically inducible ion channels such as the -opsins for neural targeting, present an additional dimension to this area of research and opportunities for cross-fertilization of research ideas.

Different methods of optical imaging have been developed in recent years for the detection of neural activity. This field began with the development of near infrared spectroscopy (NIRS) and progressed to the use of a variety of different techniques and technologies towards the goal of better temporal and spatial resolution and enhanced sensitivity in a variety of organ systems. By creating a common forum for neural stimulation researchers and optical detection scientists we can move forward towards an all-optical approach that takes maximum advantage of the spatial selectivity, high sensitivity and resolution of this methodology.

This call solicits abstracts in biomedical applications of optical methods for the induction and detection of neural activity. We encourage submissions of existing as well as new discoveries in the implementation of such techniques. This conference will encompass methodologies that probe neural signals at tissue, cell, sub-cellular and molecular levels as well as technologies that initiate neural activity in cells, cranial and peripheral nerves, brain as well as other excitable tissues. Abstracts may be focused on the development of such optical modalities as well as their applications in neuroscience and medicine. Some methods of interest (amongst others) include:

- infrared neural stimulation (INS)
- optical activation of neurons (genetically targeted light activated ion channels)
- other methods for neural activation
- near infrared spectroscopy (NIRS) and imaging (OIS) fluorescence imaging
- other methods include DP-OCT, birefringence imaging, etc.
- novel applications of optical methods for neurons.

Studies may be conducted in cells, animal models, human tissues in vitro, ex vivo as well as in vivo. Applications include research in:

- fundamental understanding of brain function
- optical neural prosthetics
- nerve conduction
- therapeutic interventions
- feedback control
- diagnosis of nerve dysfunction
- pain control and modulation
- traumatic brain injury
- neural regeneration
- artificial neurons.

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Design and Performance Validation of Phantoms used in Conjunction with Optical Measurement of Tissue (BO126)

Conference Chair: **Robert J. Nordstrom**, National Institutes of Health (USA)

Program Committee: **Anant Agrawal**, U.S. Food and Drug Administration (USA); **Gerald T. Fraser**, National Institute of Standards and Technology (USA); **William W. Mantulin**, Univ. of California, Irvine (USA); **Brian W. Pogue**, Dartmouth College (USA); **Scott Prahl**, Providence St. Vincent Medical Ctr. (USA); **Lihong V. Wang**, Washington Univ. in St. Louis (USA)

As optical technologies in medical detection and diagnosis progress toward clinical utility, the use of phantoms is becoming increasingly important. While information regarding the fabrication and validation of specific phantom devices can be found in the literature, there is as yet no effort to bring a level of standardization and NIST traceability to this problem. As optical imaging technologies mature, the FDA may require standardized phantom measurements for areas such as the use of imaging as a biomarker to monitor drug response.

This conference provides a forum for scientists and engineers from academia, industry and government to discuss the issues affecting the direction and relevance of phantoms for optical devices and methods in medicine.

The conference will focus on these important areas of phantom development:

- Phantoms in optical coherence tomography
- Phantoms for fluorescence spectroscopy
- Phantoms for tissue reflectance and scattering measurements
- Novel phantom design such as dynamic phantoms.

As a part of each of these areas, papers are invited that describe design and validation procedures, quality control and testing, shape and boundary issues, and disease conditions being simulated. Submissions dealing with simulation of benign or disease-free tissue conditions as well as the simulation of a variety of disease conditions including cancer precursors such as breast calcifications and epithelial lesions are encouraged.

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Biomedical Spectroscopy, Microscopy, and Imaging

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

Imaging, Manipulation, and Analysis of Biomolecules, Cells, and Tissues VIII (BO127)

Conference Chairs: **Daniel L. Farkas**, Cedars-Sinai Medical Ctr. (USA); **Dan V. Nicolau**, The Univ. of Liverpool (United Kingdom); **Robert C. Leif**, Newport Instruments (USA)

Cochairs: **James F. Leary**, Purdue Univ. (USA); **Ramesh Raghavachari**, U.S. Food and Drug Administration (USA); **J. Paul Robinson**, Purdue Univ. (USA); **Attila Tarnok**, Univ. Leipzig (Germany)

Program Committee: **Vincenza Andrisano**, Univ. degli Studi di Bologna (Italy); **Christopher H. Contag**, Stanford Univ. School of Medicine (USA); **Ewa M. Goldys**, Macquarie Univ. (Australia); **Charles P. Lin**, Massachusetts General Hospital (USA); **Andreas G. Nowatzyk**, Cedars-Sinai Medical Ctr. (USA); **Markus Sauer**, Univ. Bielefeld (Germany); **Takahisa Taguchi**, National Institute of Advanced Industrial Science and Technology (Japan)

This interdisciplinary conference addresses the knowledge continuum from molecular structure and fundamental mechanisms to biological, energy production, and medical applications, focusing on new approaches to imaging, manipulation, and analysis of biomolecules, cells and tissues, both in vitro and in vivo. The conference will report on the latest developments in functional and multispectral imaging, optical manipulation, analysis, algorithms, quantification, separation, sorting, and standards for cells (cytomics) and tissues (histomics). The principal aim is to further improve the interdisciplinary dialog between those who design and implement critical technologies and the primary users who study important problems that drive developments, in order to advance translational research.

Reports of original research contributions are solicited on the following topics:

Functional imaging of biomolecules, live cells and tissues:
- light microscopy of living cells and tissues (2D, 3D, 4D)
- spectral imaging of multiple cellular and tissue components
- new and automated methods for monitoring biological structure and physiology
- microscopic imaging of electric potentials and events
- mesoscopic (microscopic resolution in vivo) tissue imaging
- multimodality tissue imaging in vivo.

Biophotonic techniques for regenerative medicine:
- stem cell characterization in vitro
- stem cell imaging and tracking in vivo
- in vivo studies of immunologic events
- imaging methods in organ transplantation
- functional monitoring of tissue engineering constructs
- imaging of tissue oxygenation and vascularization.

Optical manipulation of cells and tissues:
- cell micromanipulation using optical trapping
- cellular effects of localized energy deposition into micro- and nano-absorbers
- cells and biomolecules in micro- and nanoconfined spaces
- scanning probe microscopy of cells and surface-immobilized biomolecules.

Spectral imaging (microscopic and macroscopic):
- spectral pathology
- small animal imaging
- clinical applications
- bioenergy applications.

Fluorescence and phosphorescence lifetime imaging:
- probes, including new dyes
- high throughput cytometry
- in situ diagnostic applications.

Multimode optical imaging:
- tools and approaches for combining several optical imaging methods
- advanced registration and visualization.

Microarrays for biomolecules, cells and tissues:
- printing technologies
- readout methods, including image analysis and quantification
- applications of microarrays in diagnostics and drug discovery.

Advanced quantitation in cells (cytomics) and tissues (histomics):
- new technologies for multispectral and multiparameter imaging, including acquisition, segmentation and analysis methods
- new components for cytometry instrumentation, including ultraminiature and nano- systems
- clinical & research applications of cytometry, with emphasis on new and unusual approaches.

Rare event detection:
- new methods for cell separation including high-speed, optical and magnetic-paramagnetic sorting
- circulating stem, fetal, cancer, and other rare cells
- digital imaging for quantitative pathology
- mutant selection.

Image and data processing, quantification, standards, and display methods:
- cell-based high throughput and high content screening
- clustering algorithms
- analytical quantification, including new methods for multiparameter cell and tissue analysis and data manipulation
- automated 3D image processing, including tracking of tissue section surfaces, image segmentation, and fluorometry/densitometry
- software standards and regulatory requirements for spectroscopy, flow cytometry, and imaging
- image formats, databasing and retrieval
- advanced image registration and display methods, including co-display of multimodality image sets.

Monitoring of pilot and industrial cell and tissue growth and production, for:
- biomedical products applications
- tissue engineering
- energy applications.

Biomedical Spectroscopy, Microscopy, and Imaging

Multiphoton Microscopy in the Biomedical Sciences X (BO128)

Conference Chairs: **Ammasi Periasamy**, Univ. of Virginia (USA); **Peter T. C. So**, Massachusetts Institute of Technology (USA)

Program Committee: **Wolfgang Becker**, Becker & Hickl GmbH (Germany); **Keith M. Berland**, Emory Univ. (USA); **Guy C. Cox**, The Univ. of Sydney (Australia); **Alberto Diaspro**, Univ. degli Studi di Genova (Italy); **Chen-Yuan Dong**, National Taiwan Univ. (Taiwan); **Dennis Donley**, Olympus America (USA); **Kevin W. Eliceiri**, Univ. of Wisconsin-Madison (USA); **Scott E. Fraser**, California Institute of Technology (USA); **Paul M. French**, Imperial College London (United Kingdom); **Hans C. Gerritsen**, Utrecht Univ. (Netherlands); **Min Gu**, Swinburne Univ. of Technology (Australia); **Stefan W. Hell**, Max-Planck-Institut für biophysikalische Chemie (Germany); **Brian A. Herman**, The Univ. of Texas Health Science Ctr. at San Antonio (USA); **Satoshi Kawata**, Osaka Univ. (Japan); **Karsten König**, Saarland Univ. (Germany); **Arnd K. Krueger**, Newport Spectra-Physics (USA); **Joseph R. Lakowicz**, Univ. of Maryland School of Medicine (USA); **Stephen M. McDonald**, Coherent, Inc. (USA); **Simon C. Watkins**, Univ. of Pittsburgh (USA); **Paul W. Wiseman**, McGill Univ. (Canada); **Sunney X. Xie**, Harvard Univ. (USA); **Bernhard Zimmermann**, Carl Zeiss Jena GmbH (Germany); **Warren R. Zipfel**, Cornell Univ. (USA)

Modern biology research on molecular, cellular, and organism levels requires the precise measurement of cellular or sub-cellular activity in two or three dimensions. Many available fluorescence microscope techniques are yielding limited in vivo information about the organizations and dynamics of complex cellular and tissue structures. The multiphoton (one- or two- or three- or- more photons) excitation fluorescence imaging microscopy process will provide a unique, state-of-the-art, minimally invasive imaging system for thick tissue (deeper) and cellular imaging, and can effectively utilize UV absorption fluorophores. This multidisciplinary conference will be a forum for scientists from various fields of research, including both commercial and academic sectors, to discuss the system development and advantages of multiphoton microscopy in the various fields of biomedical sciences.

Topics include:

- multiphoton (one- or two- or three- or more photons) microscopy theory and system development
- multiphoton (MP) in wide-field and laser scanning confocal microscopy
- infrared lasers for MP system (femtosecond vs. picosecond vs. CW)
- tissue engineering and spectral imaging
- fluorescence resonance energy transfer imaging (FRET)
- fluorescence lifetime imaging (frequency and time domain) (FLIM)
- fluorescence correlation spectroscopy and image cross correlation spectroscopy (FCS, ICCS)
- harmonic generation microscopy (SHG, THG)
- Raman spectroscopy and Coherent Ati-Stokes Raman Spectroscopy (CARS)
- fluorescence recovery after photobleaching (FRAP) and Photoactivation
- deep tissue and cellular imaging
- calcium and pH imaging
- developmental, neurobiology, plant biology and other biological applications
- photodynamic therapy (PDT) and clinical imaging
- inducing localized chemical reactions such as probe uncaging
- photo-thermal, -chemical and -mechanical effects of IR radiation
- laser safety and other related applications.

Students Poster Session Competition

Students and postdocs are welcome to participate in the poster session competition of the conference on Multiphoton Microscopy in the Biomedical Sciences. There is a cash award for the winner(s). The participants should follow the rules and regulations of the SPIE organization for submission of their abstract and manuscript. They should also mention that their submission is for the "Students Poster Session Competition (SPSC-MP).

Critical Dates

Abstract Due Date: 13 July 2009
Post-Meeting Manuscript Due Date: 16 December 2009

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Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XVII (BO129)

Conference Chairs: **Jose-Angel Conchello**, Harvard Univ. Ctr. for Brain Science (USA); **Carol J. Cogswell**, Univ. of Colorado at Boulder (USA); **Tony Wilson**, Univ. of Oxford (United Kingdom); **Thomas G. Brown**, Univ. of Rochester Medical Ctr. (USA)

Program Committee: **G. J. Brakenhoff**, Univ. van Amsterdam (Netherlands); **Charles A. DiMarzio**, Northeastern Univ. (USA); **Mats G. L. Gustafsson**, Howard Hughes Medical Institute, Jenelia Farm Research Ctr. (USA); **Raimund J. Ober**, The Univ. of Texas at Dallas (USA); **Chrysanthe Preza**, The Univ. of Memphis (USA)

This conference will explore the rapidly developing field of multidimensional microscopy, including light microscopy as well as probe microscopy. Consideration will be given to the characteristics of the overall system design, as well as to the topics of image formation, image recording, deconvolution and image restoration in two, three or more dimensions, image classification, and digital methods of producing and displaying the resulting reconstruction. Recent innovations in multidimensional microscopy are having a large impact in the biological and medical fields, as well as in materials science and the semiconductor industry. Many microscopes are now fully integrated systems, including computer hardware and software. It is hoped that the broad range of relevant topics being presented at this conference will serve to encourage interaction among instrumentation engineers, computer image analysts, and researchers in the various fields of application.

We especially encourage submission of articles on novel optical and digital techniques for imaging or detecting object features approaching the nanometer-scale range.

In addition, we encourage submission of articles on the growing research area of full-field quantitative phase imaging, including hardware, models, multi-view tomography, algorithms and applications.

Papers are invited in the following and related areas:

- instrumentation and methods for microscopy in 2, 3, or more dimensions
- innovations in optical modes for microscopy (such as interference, fluorescence, or polarizing) in reflection or transmission
- full-field quantitative phase imaging
- innovations aimed toward nano-structure detection and imaging confocal microscopy
- new modes of multiphoton fluorescence excitation microscopy
- probe microscopy (atomic force microscopy, near-field scanning optical microscopy)
- time-resolved image acquisition systems
- image processing and analysis
- image reconstruction in 2, 3, or more dimensions
- deconvolution in 2, 3, or more dimensions
- computational models
- super-resolution
- wavefront manipulation techniques for correcting aberrations, extending depth of field, etc.
- spectral imaging
- specimens and procedures for testing and evaluating new instruments and algorithms
- spatio-temporal reconstruction of living cells and tissues
- applications in materials science
- 3D image visualization techniques, including volume rendering, animation, stereoscopic and holographic displays.

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Biomedical Spectroscopy, Microscopy, and Imaging

Single Molecule Spectroscopy and Imaging III (BO130)

Conference Chairs: **Jörg Enderlein**, Eberhard Karls Univ. Tübingen (Germany); **Zygmunt K. Gryczynski**, The Univ. of North Texas Health Science Ctr. (USA); **Rainer Erdmann**, PicoQuant GmbH (Germany)

Program Committee: **Michael Börsch**, Univ. Stuttgart (Germany); **Christian Eggeling**, Max-Planck-Institut für biophysikalische Chemie (Germany); **Paul M. French**, Imperial College London (United Kingdom); **Ewa M. Goldys**, Macquarie Univ. (Australia); **Johan Hofkens**, Katholieke Univ. Leuven (Belgium); **Thomas R. Huser**, Univ. of California, Davis (USA); **Gabor Laczko**, Univ. of Szeged (Hungary); **Joseph A. Miragliotta**, The Johns Hopkins Univ. (USA); **Maria Teresa Neves-Petersen**, Aalborg Univ. (Denmark); **Markus Sauer**, Univ. Bielefeld (Germany); **Shimon Weiss**, Univ. of California, Los Angeles (USA); **Andong Xia**, Institute of Chemistry, Chinese Academy of Science Peking (China)

The focus of this meeting are all fields of optical single molecule spectroscopy and imaging, ranging from fundamental physics, technical and methodological questions, towards applications in chemical, biological and biomedical research as well as medical diagnostics. It provides a state-of-the-art interdisciplinary forum for information exchange on new technological developments, advanced applications, and fundamental questions of single molecule detection and imaging and imaging.

Ultrasensitive spectroscopic techniques have become an important tool in fundamental biological and biomedical research, allowing study of the function and interaction of individual biomolecules. Improving and extending the existing arsenal of techniques for studying specific biophysical and biochemical questions on a single molecule level is of paramount interest for the biology community.

A topic of particular interest has become the application of single-molecule imaging to achieve sub-diffraction superresolution in fluorescence microscopy. It has opened previously unknown opportunities to image live cells in the optical far field with unprecedented optical resolution. Fascinating alternative optical methods are stimulated-depletion optical (STED) microscopy, single molecule localization microscopy (PALM, STORM) or non-linear structured illumination microscopy. The conference shall also provide an interdisciplinary platform for these new and exciting developments in fluorescence imaging.

The need for ultrasensitive and specific biomedical diagnostics requires development of optical and photonic detection/sensing technologies capable of reaching the single biomolecule level. The technical challenges to rapidly and specifically detecting chemical and biological agents at minimal concentration levels are enormous and largely yet to be realized.

All spectroscopic techniques (optical spectroscopy, fluorescence spectroscopy, elastic scattering, Raman scattering, IR spectroscopy, terahertz spectroscopy) as well as the chemical and biological sciences themselves, are potentially critical components for a multidisciplinary approach to ultrasensitive sensing and diagnostics.

Contributed papers are solicited concerning, but not limited to, the following areas:

- techniques and methods of SM detection
- techniques and methods of SM spectroscopy (such as FCS, FLCS, FLIM, FRET)
- techniques of single molecule manipulation
- superresolution fluorescence imaging (STED, PALM, STORM and related techniques)
- multi-modal SM detection such as combining AFM with confocal microscopy
- fundamental aspects of SM spectroscopy
- biophysical applications of SM spectroscopy
- SM imaging and tracking in cells and tissues
- ultrasensitive biomedical diagnostics
- high-througput screening applications
- chemical and biochemical sensing
- photonic materials for ultrasensitive optical detection
- plasmonics and metal enhanced fluorescence for ultrasensitive optical detection
- microfluidic and capillary devices
- lab-on-a-chip sensing platforms
- biochip systems.

PicoQuant Young Investigator Award

Young scientists (age 35 or below) are encouraged to participate in this best paper competition which offers a cash award. Participants must be both the primary author and presenter of an accepted abstract to be eligible. Please note in your abstract submission to this conference "Young Investigator best paper competition BO130" to be considered. This award is sponsored by PicoQuant GmbH Berlin.

Critical Dates

Abstract Due Date: 13 July 2009
Post-Meeting Manuscript Due Date: 16 December 2009

Please Note: Submissions imply the intent of at least one author to register, attend the conference, present the paper as scheduled, and submit a full-length manuscript for publication in the conference proceedings.

Optical Diagnostics and Sensing X: Toward Point-of-Care Diagnostics (BO131)

Conference Chair: **Gerard L. Coté**, Texas A&M Univ. (USA)

Program Committee: **Rafat R. Ansari**, NASA Glenn Research Ctr. (USA); **Werner Gellermann**, The Univ. of Utah (USA); **Yuri I. Gurfinkel**, Central Clinical Hospital (Russian Federation); **Jürgen M. Lademann**, Charité Universitätsmedizin Berlin (Germany); **Michael J. McShane**, Texas A&M Univ. (USA); **Kenith E. Meissner**, Texas A&M Univ. (USA); **Risto A. Myllylä**, Univ. of Oulu (Finland); **Gert E. Nilsson**, Univ. Hospital Linköping (Sweden); **Jeffery S. Reynolds**, Bayer Healthcare (USA); **Wiendelt Steenbergen**, Univ. Twente (Netherlands); **Kexin Xu**, Tianjin Univ. (China); **Shaoqun Zeng**, Britton Chance Ctr. for Biomedical Photontics (China); **Dmitry A. Zimnyakov**, Saratov State Univ. (Russian Federation)

The focus of this conference will be on optical methods for the diagnostics and sensing of all types of biological fluids: blood, lymph, saliva, mucus, gastric juice, urine, aqueous humor, semen, etc. both in vitro and in vivo.

This year an emphasis will be placed on point-of-care diagnostics. The optical properties of these fluids will be discussed. Elastic, quasi-elastic and inelastic (Raman) light scattering, Doppler flowmetry, spectrophotometry, polarimetry, diffraction, holography, speckle, fluorescence, imaging, and related spectroscopic and microscopic techniques will be considered. Studies of biological fluid components on cellular and macromolecular levels, as well as nondestructive measurements of gas and analyte content, will be presented. Theoretical and model studies, as well as clinical applications of the developed optical methods and instrumentation, will be outlined.

The suggested topics include, but are not limited to, the following areas:

- Point-of-care diagnostic and sensing systems
- analyte monitoring in vivo and in vitro
- biological fluid spectroscopy and imaging
- local flow velocity measurement
- blood microcirculation and tissue perfusion monitoring
- blood cell and macromolecular interaction and aggregation sensing
- blood cell deformation, orientation, diffusion, and sedimentation imaging
- fluid viscosity measurement
- effects of physical and chemical factors on fluid composition, rheological, and other properties
- disease diagnostic potential of optical techniques.

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Biomedical Applications of Light Scattering IV (BO132)

Conference Chairs: **Adam P. Wax**, Duke Univ. (USA); **Vadim Backman**, Northwestern Univ. (USA)
Program Committee: **Irving J. Bigio**, Boston Univ. (USA); **Stephen A. Boppart**, Univ. of Illinois at Urbana-Champaign (USA); **Bernard Choi**, Beckman Laser Institute, Univ. of California, Irvine (USA); **Steven L. Jacques**, Oregon Health & Science Univ. (USA); **Lev T. Perelman**, Harvard Medical School (USA); **Brian W. Pogue**, Dartmouth College (USA); **Bruce J. Tromberg**, Beckman Laser Institute and Medical Clinic, Univ. of California, Irvine (USA)

Light scattering techniques are under development as biomedical diagnostics for their ability to accurately and precisely determine structures within biological samples. Clinical applications have included detecting pre-cancerous and cancerous tissue states both in vivo and with ex vivo biopsy samples, characterizing the mechanical properties of cells and tissues for identifying disease and for assessing the presence and concentration of biochemicals for diagnostic purposes. The development of these clinical modalities has relied upon implementing light scattering instruments, creating models of light scattering by normal and diseased tissues and devising new analysis methods. In addition, light scattering has also been employed in pre-clinical cell biology studies which seek to detect structural changes of sub-cellular components such as mitochondria and cell nuclei. Improved understanding of the relationship between light scattering signals and underlying morphological changes has relied upon these pre-clinical studies in developing new clinical modalities.

The increasing use of light scattering techniques for biomedical applications has led to a significant presence at Photonics West in recent years, with invited and contributed talks appearing across several conferences. This conference seeks to consolidate this presence with a focused conference on biomedical applications of light scattering.

Papers are solicited on (but not restricted to) the following areas:

Clinical applications of light scattering methods including:
- dynamic light scattering
- speckle contrast imaging
- elastic scattering spectroscopy
- polarized light scattering spectroscopy
- low coherence light scattering
- diffuse reflectance spectroscopy
- enhanced backscattering spectroscopy.

applications of light scattering for identifying biochemicals

light scattering methods for assessing structural properties of cells and tissues for clinical diagnostics, such as cancer detection

pre-clinical cell biology investigations using light scattering including:
- light scattering microscopy
- goniometry.

light scattering instrumentation for biomedical diagnostics including:
- confocal microscopy
- spectroscopic optical coherence tomography.

novel light scattering techniques for clinical applications

theoretical modeling of light scattering for clinical applications including:
- numerical modeling
- analytical treatments.

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Nanoscale Imaging, Sensing, and Actuation for Biomedical Applications VII (BO133)

Conference Chairs: **Alexander N. Cartwright**, Univ. at Buffalo (USA); **Dan V. Nicolau**, The Univ. of Liverpool (United Kingdom)

Program Committee: **Igal Brener**, Sandia National Labs. (USA); **Philippe M. Fauchet**, Univ. of Rochester (USA); **Paul L. Gourley**, Sandia National Labs. (USA); **Piotr Grodzinski**, National Cancer Institute (USA); **Brian McGraith**, Dublin City Univ. (Ireland); **Igor L. Medintz**, Naval Research Lab. (USA); **Ammasi Periasamy**, Univ. of Virginia (USA); **Paras N. Prasad**, Univ. at Buffalo (USA); **Weihong Tan**, Univ. of Florida (USA)

Novel applications and/or solutions to technological problems involving the use of nanostructures and nanostructured materials for biological applications, photonic studies of nanoscale interactions in biology and medicine, and the use of biological materials for the development of nanophotonic devices and applications are the focus of both industrial and academic research. The interdisciplinary nature of this emerging field requires a seamless transfer of knowledge between physics, chemistry, biology, medicine and engineering.

Integrative research efforts have included, for example, (a) nanotechnology (fabrication and application) as a tool in developing new, and improving existing, optical imaging techniques for real-time imaging of cells and cellular processes, (b) developing the next generation of biosensors and improving sensing applications, (c) using nanotechnology and optical engineering for targeting and treatment of disease, (d) applying computer and information technologies in the development of new models and data analysis for understanding cellular mechanisms, (e) developing new photonic devices and systems that are hybrids of traditional polymeric and semiconductor materials with biological materials; and (f) very large scale and/or very sensitive detection down to single molecule level for drug discovery and diagnostics applications, such as nanoarrays.

The objective of this conference is to bring together scientists and researchers interested in the latest advances in the advancement of materials and methods that combine nanophotonics with biology. More specifically, this conference is to discuss the development of processing, characterization, and simulation of bioinspired and bioderived nanophotonic structures, nanoscale interactions in biological systems, functionalized nanoparticles for biological applications and use of nanostructures for high throughput analysis (nanoarrays).

The Conference will focus on three streams of contributions:
- nanoscale imaging
- nanospectroscopy
- nanoscale sensing and actuation for biomedical applications.

Papers from industry, government, academia, and other research organizations are solicited on the following and related topics:

Fundamentals (materials and tools)
- studies of cellular and membrane biophysics using nanophotonics (nanoparticles & nano-optics)
- characterization of nanoscale interactions in biological systems, e.g, near-field microscopy, scanning force microscopy
- nanocomposites of inorganic/organic hybrids for biophotonics
- biological templates for fabrication of nanophotonic devices
- bio-inspired and bio-derived nanstructured materials
- localized fluorescence spectroscopy using nanotechnology
- modeling and simulations of bio/nanophotonics
- manipulation of biomolecules and cells at the nano-level.

Technology (devices)
- nanoscale device design and processing for biological applications
- biological sensors based on nanophotonic structures (e.g. photonic bandgap materials for smart dust)
- multifunctional nanoparticles (targeting, imaging, and treatment)
- hybrid bionanodevices, e.g. molecular motors and nanofluidics.

Applications
- optical imaging using nanophotonics principles
- in vitro and in vivo applications of nanophotonics
- biomedical instrumentation development.

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Colloidal Quantum Dots for Biomedical Applications IV (BO134)

Conference Chairs: **Marek Osiński**, The Univ. of New Mexico (USA); **Wolfgang J. Parak**, Philipps-Univ. Marburg (Germany); **Thomas M. Jovin**, Max-Planck-Institut für biophysikalische Chemie (Germany); **Kenji Yamamoto**, International Medical Ctr. of Japan (Japan)

Program Committee: **Antigoni Alexandrou**, Ecole Polytechnique (France); **Moungi G. Bawendi**, Massachusetts Institute of Technology (USA); **Maxime Dahan**, Lab. Kastler Brossel (France); **Alexander Eychmüller**, Technische Univ. Dresden (Germany); **Jennifer A. Hollingsworth**, Los Alamos National Lab. (USA); **Hedi Mattoussi**, Naval Research Lab. (USA); **Paul Mulvaney**, The Univ. of Melbourne (Australia); **Jay L. Nadeau**, McGill Univ. (Canada); **Shuming Nie**, Emory Univ. (USA); **Sandra J. Rosenthal**, Vanderbilt Univ. (USA); **Tania Q. Vu**, Oregon Health & Science Univ. (USA); **Michael S. Wong**, Rice Univ. (USA)

Ongoing rapid progress in the synthesis of a variety of biofunctionalized colloidal nanocrystals with fascinating electronic, magnetic, and optical properties not associated with bulk materials symbolizes a fundamental breakthrough in physics and chemistry of condensed matter, which significantly extends our knowledge about the nature of materials and our abilities to manipulate their properties. Inorganic nanostructures that interface with biological systems are attracting an increasingly widespread interest in biology and medicine. Quantum dot intravascular probes can be used in a remarkable number of biomedical applications, such as highly specific markers for cellular microscopy, flow cytometry, DNA and protein chips, immunoassays for diagnostics, histology, cancer detection, in situ hybridization, PCR DNA detection, biochemical and cell-based drug screening, single molecule studies, and correlation spectroscopy. There are abundant opportunities for improved or completely novel probes and seemingly endless new applications.

This conference will consider biomedical applications of colloidal nanocrystals, as well as recent advances in new materials and methods of synthesis, coating, and bioconjugation. Its objective is to provide a widely interdisciplinary forum for practicing clinicians, biomedical scientists, development engineers, physicists, and chemists specializing in different fields to benefit from each other's expert knowledge and to create trend-setting interdisciplinary links that will accelerate progress in this field.

Previously unpublished experimental and theoretical papers are solicited on the following and related topics:

- synthesis of colloidal nanocrystals: II-VI, I-VII, III-V, and group-IV semiconductor quantum dots; ternary compounds; core-shell nanocrystals; nano-onions; nanoshells; metal nanocrystals; shape and size control
- bioconjugation and biolabeling; bioconjugate chemistry; dendron ligands; thiol and oligonucleotide coatings; phospholipid micelles; biotin/avidin; sticky polymers; targeting peptides; target specificity
- measurement techniques; microscopy (AFM, SFM, STM, TEM, HRTEM, SNOM); XRD; spectroscopy (FTIR, EELS, ICP, DFS); spectroscopy of single quantum dots; multiphoton spectroscopy; frequency upconversion; magnetic sensing and imaging
- physics and characterization of colloidal nanocrystals; electronic structure, band alignment; dielectric screening; optical, electronic, and magnetic properties; excitons and biexcitons; quantum efficiency; intraband transitions; spin dynamics; blinking mechanisms, surface-enhanced Raman spectroscopy
- theoretical and experimental studies of interactions with surrounding ambient, including dynamics and electronic structures
- numerical modeling; multiscale modeling; density functional modeling; molecular dynamics; Brownian dynamics; quantum Monte Carlo simulations
- biomolecular sensing; FRET; molecular interactions
- biocompatibility; development of non-toxic quantum dots; intracellular behavior; long-term effects
- biological applications of colloidal nanocrystals; in vitro and in vivo imaging; biology at molecular level; receptor-ligand interactions; protein folding/unfolding; DNA conjugation, sequencing, and assembly; cell motility; gene expression mutation, etc.
- medical applications of colloidal nanocrystals; immuno-fluorescent assays; applications in neuroscience; drug delivery and screening; cancer diagnostics and therapy; screening; cancer diagnostics and therapy; biomechanics; etc.

Ocean Optics Young Investigator Award

This 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 the Young Investigator and $1,000 Ocean Optics equipment credit to the laboratory where the work was performed. To be eligible, manuscripts of self-nominating authors must be received by the due date.

Reporters, Markers, Dyes, Nanoparticles, and Molecular Probes for Biomedical Applications (BO135)

Conference Chairs: **Samuel Achilefu**, Washington Univ. School of Medicine in St. Louis (USA); **Ramesh Raghavachari**, U.S. Food and Drug Administration (USA)

Program Committee: **Mikhail Berezin**, Washington Univ. School of Medicine in St. Louis (USA); **Richard B. Dorshow**, Covidien (USA); **Paul M. French**, Imperial College London (United Kingdom); **Israel Gannot**, Tel Aviv Univ. (Israel); **Hisataka Kobayashi**, National Institutes of Health (USA); **Lyle R. Middendorf**, LI-COR Biosciences (USA); **Gabor Patonay**, Georgia State Univ. (USA); **Yasuteru Urano**, The Univ. of Tokyo (Japan)

Chemical and genetic sensors, reporters, and molecular probes are the cardinal elements in molecular imaging and analyses of normal and pathophysiological processes at the cellular and molecular levels. Diverse molecular designs with unique optical signatures have been developed and are currently used to sense the presence and activity of molecular targets that characterize specific biological processes. These have been used to probe human diseases, explore the mechanisms of pathogenesis, monitor drug efficacy, discriminate healthy from diseased tissues, and assess therapeutic outcomes. These applications deploy molecular probes over a range of scales from microscopy and subcelluar resolution to optical tomography of entire organisms. Development and use of these probes typically involve multidisciplinary teams that have assembled to address specific biological questions.

The objective of this Conference is to provide a forum to present and collate significant and exciting studies involving chemically or biologically developed optical molecular probes that have been used in biomedical research. Papers appropriate for this solicitation include, but not limited to studies performed with dyes, bioluminescent enzymes, photoproteins such as GFP, activatable probes, receptor-, tissue-, or function-specific probes, nonspecific contrast effectors, nanoparticles, quantum dots, and multimodal molecular probes, monitoring molecular and physiological processes in cell and living organisms, clinical use of imaging agents, and applications of biomarkers and sensors in medicine and biology.

This Conference will target state-of-the-art studies where these probes have been used, in vitro or in vivo, and encompasses a wide variety of applications. To accommodate the multidisciplinary nature of the Conference, papers are requested from a variety of subject areas, including the following topics:

Design, synthesis, development, or analyses of near infrared and other fluorescent dyes
- novel dyes (fluorescent, absorption, and environment-sensitive dyes)
- novel luminescent probes
- absorption-, fluorescent-, and light scattering-based agents.

Design, synthesis, development, and analyses of Nanoparticles
- caged complexes or chelated optical markers
- quantum dots, micro- and nano-particles.

Development of bioluminescence and fluorescent proteins, intrinsic probes, and molecular reporters
- function-specific chemical and biological sensors
- molecular beacons.

Markers for membrane potential, electrolytes, and pH regulations
- structure-dependent spectroscopy
- intracellular and extracellular pH measurements
- functional analysis of biological processes in cells and animals.

In vitro and in vivo applications of contrast agents and molecular probes
- genomics and proteomics, including gene expression
- biological assays, including immunoassays, cell internalization, receptor binding, LRET, FRET and FISH studies
- physiologic function monitoring, including molecular and cellular events, pH, electrolytes, metabolites, minerals, and membrane potential
- in vivo organ function monitoring
- molecular, cellular, and tissue imaging
- site-specific delivery mechanisms and endoscopy methods
- multi-color and multi-modality imaging systems and upconversion markers
- real time monitoring of disease progression or regression
- tandem diagnostic and therapeutic interventions
- molecular ruler design and application
- monitoring treatment response
- contrast agents for imaging applications.

Time-resolved tissue spectroscopy for medical diagnosis and imaging
- fluorescence lifetime spectroscopy and imaging
- fluorescence lifetime of endogenous and exogenous fluorescent materials and molecules
- time-resolved fluorescence methods based on endogenous and exogenous molecules.

Biomarkers
- new disease biomarkers
- imaging disease biomarkers
- methods for identify and amplify signals for imaging biomarkers.

Pathway to clinical translation of imaging probes and nanomaterials
- human studies using imaging agents
- challenges of human translational studies with contrast agents and optical probes
- regulatory issue related to human studies by optical methods.

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Plasmonics in Biology and Medicine VII (BO136)

Conference Chairs: **Tuan Vo-Dinh**, Duke Univ. (USA); **Joseph R. Lakowicz**, Univ. of Maryland School of Medicine (USA)

The goal of this conference is to provide an interdisciplinary forum for state-of-the-art methods and instrumentation related the new research area of ìplasmonicsî and related nanosystems and their applications in biology and medicine. Plasmonics refers to the investigation, development and applications of enhanced electromagnetic properties of metallic nanostructures. The term plasmonics is derived from ìplasmonsî, which are the quanta associated with longitudinal waves propagating in matter through the collective motion of large numbers of electrons. Incident light irradiating these surfaces excites conduction electrons in the metal, and induces excitation of surface plasmons leading to enormous electromagnetic enhancement.

A forum that integrates interdisciplinary research and development is critically needed for scientists, engineers, and clinical providers to present the most recent advances in instrumentation and methods as well as biomedical applications in the new field of plasmonics in biology and medicine.

The focus is on the following topics:

- properties of metallic nanostructures
- nanophotonics systems
- plasmonics-based sensors
- surface plasmon resonance (SPR) sensing systems
- bioprobes and nanoprobes
- nanosensors
- nanoarchitectures and naooptics
- fabrications of nanostructured substrates
- spectroscopies related to plasmonics
- surface-enhanced Raman scattering (SERS) and biomedical applications
- surface enhanced luminescence (SEL) and biomedical applications
- single-molecule spectroscopy
- single-molecule manipulation
- single-cell analysis
- cellomicss using nanoparticle technology
- nanosystems for drug delivery
- metal nanoparticle contrast agents for medical diagnostics
- photonic atoms.

Critical Dates

Abstract Due Date: 13 July 2009
Post-Meeting Manuscript Due Date: 16 December 2009

Please Note: Submissions imply the intent of at least one author to register, attend the conference, present the paper as scheduled, and submit a full-length manuscript for publication in the conference proceedings.

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Technical Program

Available October 2009

The comprehensive Advance Technical Program for this symposium will list conferences, paper titles, and authors in order of presentation; an outline of all planned special events; and hotel and registration information. All those who submit an abstract will receive a copy.

Registration

SPIE Photonics West registration will be available September 2009

All participants, including invited speakers, contributed speakers, session chairs, co-chairs, and committee members, must pay a registration fee.

Fee information for conferences, courses, a registration form, and technical and general information will be available on the SPIE website in September.

Hotel Information

Opening of the hotel reservation process for Photonics West 2010 is scheduled for approximately the beginning of June 2009. SPIE will arrange special discounted hotel rates for SPIE attendees that will be available when housing opens.

Student Travel Contingency Grants

A limited number of SPIE contingency student travel grants will be awarded based on need. Applications must be received no later than 10 weeks prior to the meeting. Eligible applicants must present an accepted paper at this meeting. Offer applies to undergraduate/graduate students who are enrolled full-time and have not yet received their PhD.

Clearance Information

If government and/or company clearance is required to present and publish your presentation, start the process now to ensure that you receive clearance if your paper is accepted.

Important News for All Visitors from Outside the United States

Find important new requirements for visiting the United States on the SPIE Photonics West website. There are new steps that ALL visitors to the United States need to follow.

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Submission of Abstract

1. By submitting an abstract, I agree to the following conditions:

- An author or coauthor (including keynote, invited, and solicited speakers) will register at the reduced author registration rate, attend the meeting, and make the presentation as scheduled. (Current SPIE Members receive an additional discount on the registration fee.)
- Authors and coauthors attending the meeting must obtain funding for their registration fees, travel, and accommodations, independent of SPIE, through their sponsoring organizations before submitting abstracts.
- All clearances, including government and company clearance, have been obtained to present and publish. If you are a DoD contractor, allow at least 60 days for clearance.
- SPIE is authorized to circulate your abstract to conference committee members for review and selection purposes.
- Accepted abstracts may be published with the printed Final Programs or on a CD-ROM for distribution at the meeting. Please submit only 250-word abstracts that are suitable for publication.
- Please also submit a 100-word abstract suitable for early release. If accepted, this abstract text will be published prior to the meeting in online or printed programs promoting the conference.
- A full-length manuscript (8-12 pages) for any accepted oral or poster presentation (including keynote, invited, and solicited presentations) will be submitted for publication in the SPIE Digital Library, printed conference Proceedings, and CD-ROM.

2. Prepare to submit:

- Have all contact information (full names, affiliations, addresses, phone numbers, and emails) for your coauthors ready.
- Only original material should be submitted.
- Abstracts should contain enough detail to clearly convey the approach and the results of the research.
- Commercial papers, papers with no new research/development content, and papers where supporting data or a technical description cannot be given for proprietary reasons should not be submitted, and will not be accepted for presentation in this conference.

3. Submit your abstract online:

Browse to locate the conference to which you are submitting at:

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Review, Notification, and Program Placement

- To ensure a high-quality conference, all abstracts will be reviewed by the Conference Chair/Editors for technical merit and suitability of content. Conference Chair/Editors reserve the right to reject for presentation or publication any paper that does not meet content or presentation expectations.
- Conference Chair/Editors are expected to assess manuscripts for technical merit, suitability of content, and clarity. The process for assessing manuscripts for publication in SPIE proceedings is managed differently by chairs/editors of different conferences. Conference Chair/Editors may require one or more manuscript revisions before approving publication, and reserve the right to reject for publication any paper that does not meet content or quality expectations or manuscript requirements. SPIE’s decision on whether to publish a manuscript is final.
- Applicants will be notified of abstract acceptance and sent manuscript instructions by email no later than 21 September 2009.
- Final placement in an oral or poster session is subject to the Chairs’ discretion. Instructions for oral and poster presentations will be sent to the person marked as Contact Author by email.

Proceedings of SPIE and SPIE Digital Library

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- Manuscript instructions will be emailed to the person marked as Contact Author for the paper and are also available from the “Information for Authors” link on the conference website.
- Authors must be authorized to transfer copyright of the manuscript to SPIE, or provide a suitable publication license. Authors reserve the right to expand and revise the manuscript for future publication.
- Only papers presented at the conference will be published in the conference Proceedings and SPIE Digital Library.
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BiOS Exhibition: 23 – 24 January 2010
Photonics West Exhibition: 26 – 28 January 2010

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