SPIE. SCANNING MICROSCOPIES

SCANNING MICROSCOPIES TECHNICAL PROGRAM.

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CO-LOCATED WITH SPIE PHOTOMASK TECHNOLOGY 2014.

Conference: 16-18 September 2014
Exhibition: 16–17 September 2014
Monterey Conference Center
Monterey, California, USA

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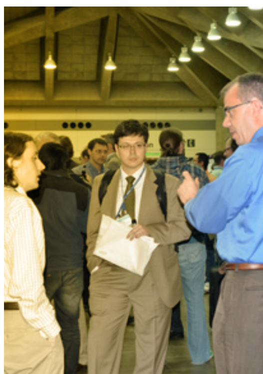
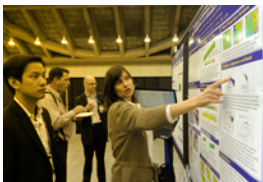
ABOUT SPIE

SPIE is the international society for optics and photonics, a not-for-profit organization founded in 1955 to advanced light-based technologies. The Society serves nearly 225,000 constituents from approximately 150 countries, offering conferences, continuing education, books, journals, and a digital library in support of interdisciplinary information exchange, professional growth, and patent precedent. SPIE provided $3.2 million in support of education and outreach programs in 2013.





SYMPOSIUM CHAIRS

Michael T. Postek
National Institute of Standards and Technology

Dale E. Newbury
National Institute of Standards and Technology

S. Frank Platek
U.S. Food and Drug Administration

Tim K. Maugel
Univ. of Maryland, College Park

Keynote Presentation

Tuesday 16 September 201
8:30 to 9:15 am

Many ways to shrink: The right moves to 10 nanometer and beyond

Martin van den Brink,
President and CTO, ASML

With mobile devices such as smartphones outpacing other market segments, the demand for low-power chips, enabled by continued device shrink, continues to be strong. The semiconductor industry's drive to innovate is relentless, R&D pipelines are filled, and IC manufacturers have multiple options to continue scaling. This presentation will examine the different technology options for the 10 nanometer node and beyond.

Martin van den Brink was appointed President and CTO on 1 July 2013. He joined ASML when the company was founded in early 1984. He held several positions in engineering and, since 1995, Mr. Van den Brink served as Vice President Technology. In 1999 Mr. Van den Brink was appointed as Executive Vice President Marketing & Technology and as a member of ASML's Board of Management.

SCANNING DAILY EVENT SCHEDULE

TUESDAY 16 September	WEDNESDAY 17 September	THURSDAY 18 September
MORNING SESSIONS		
BREADS AND COFFEE BREAK, 7:30 to 8:30 am		
SESSION 1A: Keynote Session, 8:30 to 9:15 am, (Session Chairs: Paul W. Ackmann, Naoya Hayashi, Michael T. Postek) **KEYNOTE PRESENTATION Many ways to shrink: The right moves to 10 nanometer and beyond, Martin van den Brink**	**SESSION 5: Metrology: Joint Session with Photomask and Scanning Microscopies,** 8:00 to 10:00 am, (Session Chairs: Postek, Scherübl)	**SESSION 8 Advanced Scanned Probe Microscopies,** 8:00 am to 10:00 am (Session Chairs: Dixson, Cordes)
SESSION 1: Invited Session: Joint Session with Photomask and Scanning Microscopies, 9:15 to 10:15 am, (Session Chairs: Ackmann, Hayashi, Postek)		
COFFEE BREAK, 10:15 to 10:45 am		
Scanning Microscopies Opening Remarks and Oatley Award Presentation, 10:45 to 10:55 am, (Session Chairs: Newbury, Platek)	**SESSION 6 Scanning Microscopies in Forensic Science,** 10:30 am to 12:10 pm (Session Chairs: Platek, McVicker)	**SESSION 9 Advanced Optical Microscopies I,** 10:30 am - 12:10 pm (Session Chairs: Vladár, Maugel)

= Co-located Sessions with SPIE Photomask Technology.

SCANNING DAILY EVENT SCHEDULE

TUESDAY 16 September	WEDNESDAY 17 September	THURSDAY 18 September
MORNING SESSIONS CONTINUED		
SESSION 2 Advanced Microscopies I, 10:55 am to 12:25 pm (Session Chairs: Maugel, Newbury)		
LUNCH · Buffet lunches are served Tuesday - 12:25 to 1:55 pm, Wednesday - 12:10 to 1:30 and Thursday - 12:20 to 2:00 pm. Not included with your paid Scanning Microscopies registration. Tickets may be purchased may be purchased at the SPIE registration desk onsite.		

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

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

DOWNLOAD THE SPIE CONFERENCE APP

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CONFERENCE 9236

Tuesday–Thursday 16–18 September 2014
Proceedings of SPIE Vol. 9236

Scanning Microscopies 2014

Conference Chairs: **Michael T. Postek,** National Institute of Standards and Technology (USA); **Dale E. Newbury,** National Institute of Standards and Technology (USA); **S. Frank Platek,** U.S. Food and Drug Administration (USA); **Tim K. Maugel,** Univ. of Maryland, College Park (USA)

Program Committee: **Eva M. Campo,** Bangor Univ. (United Kingdom); **Petr Cizmar,** Physikalisch-Technische Bundesanstalt (Germany); **Ronald G. Dixson,** National Institute of Standards and Technology (USA); **Lucille A. Giannuzzi,** L.A. Giannuzzi & Associates LLC (USA); **Robert J. Gordon,** Hitachi High Technologies America, Inc. (USA); **David C. Joy,** The Univ. of Tennessee Knoxville (USA); **Michael J. McVicar,** Ctr. of Forensic Sciences (Canada); **Bradley Thiel,** SUNY College of Nanoscale Science & Engineering (USA); **John S. Villarrubia,** National Institute of Standards and Technology (USA); **András E. Vladár,** National Institute of Standards and Technology (USA)

TUESDAY 16 SEPTEMBER

SESSION 1A

Location: Steinbeck Forum . . . . Tue 8:30 am to 9:15 am

Keynote Session

Session Chairs: **Paul W. Ackmann,** GLOBALFOUNDRIES Inc. (USA); **Naoya Hayashi,** Dai Nippon Printing Co., Ltd. (Japan); **Michael T. Postek,** National Institute of Standards and Technology (USA)

Keynote Presentation

MANY WAYS TO SHRINK: THE RIGHT MOVES TO 10 NANOMETER AND BEYOND

Martin van den Brink,
ASML Netherlands B.V. (Netherlands) . . . . [9235-1]

SESSION 1

Location: Steinbeck Forum . . . . Tue 9:15 am to 10:15 am

Invited Session

Joint Session with Photomask and Scanning Microscopies

Session Chairs: **Paul W. Ackmann,** GLOBALFOUNDRIES Inc. (USA); **Naoya Hayashi,** Dai Nippon Printing Co., Ltd. (Japan); **Michael T. Postek,** National Institute of Standards and Technology (USA)

9:15 am: **EUV mask infrastructure: Don't miss the train!** *(Invited Paper)*, Oliver Kienzle, Carl Zeiss SMS GmbH (Germany). . . . . [9235-2]

9:45 am: **3D Monte Carlo modeling of the SEM: Are there applications to photomask metrology?** *(Invited Paper)*, John S. Villarrubia, András E. Vladár, Michael T. Postek, National Institute of Standards and Technology (USA) . . . . [9236-1]

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

SCANNING MICROSCOPIES OPENING REMARKS AND OATLEY AWARD PRESENTATION

Location: Colton . . . . 10:45 am to 10:55 am

Session Chairs: **Dale E. Newbury,** National Institute of Standards and Technology (USA); **S. Frank Platek,** U.S. Food and Drug Administration (USA)

SESSION 2

Location: Colton . . . . Tue 10:55 am to 12:25 pm

Advanced Scanning Microscopies I

Session Chairs: **Tim K. Maugel,** Univ. of Maryland, College Park (USA); **Dale E. Newbury,** National Institute of Standards and Technology (USA)

10:55 am: **3D isotropic reconstruction of biological samples through cycles of physical and virtual sectioning in electron microscopy**, Ben Lich, Faysal Boughorbel, Pavel Potocek, Liesbeth Hekking, Ron van den Boogaard, Emine Korkmaz, Pavel Cernohorsky, FEI Electron Optics, B.V. (Netherlands); Milos Hovorka, FEI Co. (Czech Republic); Matthias Langhorst, FEI Co. (Germany). . . . . [9236-2]

CONFERENCE 9236

11:15 am: **A novel approach for scanning electron microscopic observation in atmospheric pressure**, Yusuke Ominami, Hitachi High-Technologies Corp. (Japan); Kenji Nakahira, Hitachi Ltd. Yokohama Research Laboratory (Japan); Shinsuke Kawanishi, Hitachi High-Technologies Corp. (Japan); Tatsuo Ushiki, Niigata Univ. (Japan); Sukehiro Ito, Hitachi High-Technologies Corp. (Japan) . . . . [9236-3]

11:35 am: **Does your SEM really tell the truth? How would you know? part 3: vibration and drift**, Michael T. Postek, Andras E. Vladár, National Institute of Standards and Technology (USA); Petr Cizmar, Physikalisch-Technische Bundesanstalt (Germany). . . . . [9236-4]

11:55 am: **Scanning electron microscopy menagerie** *(Invited Paper)*, Vladimir Vishnyakov, Manchester Metropolitan Univ. (United Kingdom) . . . . [9236-5]

Lunch/Exhibition Break . . . . Tue 12:25 pm to 1:55 pm

SESSION 3

Location: Colton . . . . Tue 1:55 pm to 2:55 pm

Advanced Scanning Microscopies II

Session Chairs: **Andras E. Vladár,**
National Institute of Standards and Technology (USA);
S. Frank Platek, U.S. Food and Drug Administration (USA)

1:55 pm: **Investigations on CMOS photodiodes using scanning electron microscopy with electron beam induced current measurements** , Andrea Kraxner, ams AG (Austria) and Technische Univ. Graz (Austria); Frederic Roger, Bernhard Loeffler, Rainer Minixhofer, ams AG (Austria); Martin Faccinelli, Stefan Kirnstoetter, Institute of Solid State Physics, Graz Universtiy of Technology (Austria); Peter Hadley, Technische Univ. Graz (Austria) . . . . [9236-7]

2:15 pm: **A novel transmission electron-imaging technique for observation of samples on plate using scanning electron microscope**, Yusuke Ominami, Hitachi High-Tech Science Corp. (Japan); Masato Nakajima, Tatsuo Ushiki, Niigata Univ. (Japan); Sukehiro Ito, Hitachi High-Tech Science Corp. (Japan) . . . . [9236-8]

2:35 pm: **Three-dimensional surface reconstruction using scanning electron microscopy and the design of a nanostructured electron trap**, Renke Scheuer, Eduard Reithmeier, Leibniz Univ. Hannover (Germany) . . . . [9236-53]

SESSION 4

Location: Colton . . . . Tue 2:55 pm to 4:45 pm

Advanced Scanning Microscopies III

Session Chairs: **Dale E. Newbury,** National Institute of Standards and Technology (USA); **Brad Thiel,** SEMATECH Inc. (USA)

2:55 pm: **Shear force microscopy using piezoresistive cantilevers in surface metrology**, Teodor P. Gotszalk, Daniel Kopiec, Wroclaw Univ. of Technology (Poland); Andrzej Sierakowski, Pawel Janus, Piotr B. Grabiec, Institute of Electron Technology (Poland); Ivo W. Rangelow, Technische Univ. Ilmenau (Germany) . . . . [9236-10]

3:15 pm: **High-throughput data acquisition with a multi-beam SEM**, Anna Lena Keller, Dirk Zeidler, Thomas Kemen, Carl Zeiss Microscopy GmbH (Germany). . . . . [9236-11]

Coffee Break . . . . Tue 3:35 pm to 4:05 pm

4:05 pm: **On the limits of miniature electron column technology**, Lawrence P. Muray, James P. Spallas, Agilent Technologies, Inc. (USA) . . . . [9236-12]

4:25 pm: **Hybrid metrology method for improving LWR/LER measurement in CD-SEM images**, Nivea G. Figueiro, CNRS-LTM (France) and Univ. Grenoble Alpes-LTM (France) and CEA-LETI (France); Marc Fouchier, Erwine Pargon, CNRS-LTM (France); Maxime Besacier, Univ. Grenoble Alpes-LTM (France); Jérome Hazart, Sandra Bos, CEA-LETI (France) . . . . [9236-13]

POSTERS-TUESDAY

Location: Serra Grand Ballroom . . . . . Tue 6:00 pm to 7:30 pm

Session Chairs: **Michael T. Postek,** National Institute of Standards and Technology (USA); **Tim K. Maugel,** Univ. of Maryland, College Park (USA)

A tale of three trials: from science to junk science, Bryan R. Burnett, Meixa Tech (USA) . . . . [9236-44]

Do electron flux and solar x-ray variation in juxtaposition prior a seismic event make signature?, Umesh P. Verma, Patna Science College (India); Amitabh Sharma, Maharani Janki Kuanr Girls Inter College (India). . . . . [9236-48]

Chromium-doped ZnSe nanoparticles induced by ns laser pulse, Jiayu Yi, Guoying Feng, Chao Yang, Shouhuan Zhou, Sichuan Univ. (China) . . . . [9236-49]

Confirmatory analysis of field-presumptive GSR test sample using SEM/EDS, Sarah J Toal, RedXDefense (USA); Wayne D Niemeyer, McCrone Associates (USA); Sean Conte, Daniel D Montgomery, Gregory S Erikson, RedXDefense (USA) . . . . [9236-51]

WEDNESDAY 17 SEPTEMBER

SESSION 5

Location: Steinbeck Forum . . . . Wed 8:00 am to 10:00 am

Metrology

Joint Session with Photomask and Scanning Microscopies

Session Chairs: **Michael T. Postek,** National Institute of Standards and Technology (USA); **Thomas Scherübl,** Carl Zeiss SMS GmbH (Germany)

8:00 am: **Assessing the viability of multi-column electron-beam wafer inspection for sub-20nm defects** *(Invited Paper)*, Brad Thiel, SEMATECH Inc. (USA) and SUNY College of Nanoscale Science and Engineering (USA); Michael J. Lercel, Brian C. Sapp, Benjamin D. Bunday, Abraham Arceo, SEMATECH Inc. (USA) . . . . [9236-14]

8:30 am: **PMJ Best Paper: Automated accurate on-device registration metrology for 14nm logic masks** *(Invited Paper)*, Shunsuke Sato, Shinji Kunitani, Tatsuhiko Kamibayashi, Akira Fuse, Toppan Printing Co., Ltd. (Japan); Frank Laske, Slawomir Czerkas, KLA-Tencor MIE GmbH (Germany); Mehdi Daneshpanah, KLA-Tencor Corp. (USA); Yoshinori Nagaoka, KLA-Tencor Japan (Japan); Klaus-Dieter Roeth, KLA-Tencor MIE GmbH (Germany). . . . . [9235-16]

9:00 am: **Photomask linewidth comparison by PTB and NIST**, Detlef Bergmann, Bernd Bodermann, Harald Bosse, Egbert Buhr, Gaoliang Dai, Physikalisch-Technische Bundesanstalt (Germany); Ronald G. Dixson, National Institute of Standards and Technology (USA); Wolfgang Hässler-Grohne, Hai Hahm, Physikalisch-Technische Bundesanstalt (Germany); John S. Villarrubia, Andras E. Vladár, National Institute of Standards and Technology (USA); Matthias Wurm, Physikalisch-Technische Bundesanstalt (Germany) . . . . [9236-15]

9:20 am: **The intra-field CDU map correlations between SEMs and aerial images**, GuoXiang Ning, GLOBALFOUNDRIES Inc. (USA); Jan P. Heumann, Stefan Meusemann, Advanced Mask Technology Ctr. GmbH Co. KG (Germany); Thomas Thaler, Carl Zeiss SMS GmbH (Germany); Lloyd C. Litt, GLOBALFOUNDRIES Inc. (USA); Martin Tschinkl, Advanced Mask Technology Ctr. GmbH Co. KG (Germany); Paul W. Ackmann, GLOBALFOUNDRIES Inc. (USA). . . . . [9235-17]

9:40 am: **Three-dimensional SEM metrology at 10nm**, Andras E. Vladár, John S. Villarrubia, Bin Ming, R. Joseph Kline, Michael T. Postek, National Institute of Standards and Technology (USA) . . . . [9236-16]

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

SESSION 6

Location: Colton . . . . Wed 10:30 am to 12:10 pm

Scanning Microscopies in Forensic Science

Session Chair: **S. Frank Platek,** U.S. Food and Drug Administration (USA)

10:30 am: **Rigorous quantitative elemental micro-analysis by scanning electron microscopy/energy dispersive x-ray spectrometry (SEM/EDS)**, Dale E. Newbury, Nicholas W. M. Ritchie, National Institute of Standards and Technology (USA). . . . . [9236-17]

10:50 am: **Measurement of hypodermic needle punctures in pharmaceutical vial stoppers by light and scanning electron microscopy: a preliminary study**, S. Frank Platek, Stefanie L. Kremer, U.S. Food and Drug Administration (USA) . . . . [9236-18]

11:10 am: **First experiences with 2D-mXRF analysis of gunshot residue on garment, tissue, and cartridge cases**, Alwin Knijnenberg, Amalia Stamouli, Martin Janssen, Netherlands Forensic Institute (Netherlands) . . . . [9236-19]

11:30 am: **Developing a quality assurance program for gunshot primer residue analysis**, Thomas R White, Texas Dept of Public Safety Crime Laboratory Service (USA) . . . . [9236-20]

11:50 am: **An electro-conductive organic coating for scanning electron microscopy (déjà vu)**, Bryan R. Burnett, Meixa Tech (USA) . . . . . [9236-21]

Lunch/Exhibition Break . . . . Wed 12:10 pm to 1:30 pm

STEM TEACHER'S SESSION

Location: Colton . . . . 1:30 pm to 1:40 pm

Introduction: Science Technology Engineering and Mathematics (STEM) Teacher's Session

Chairs: **Robert Gordon,** Hitachi-High Technologies America, Inc.; **Michael T. Postek**, National Institute of Standards and Technology

The future of our nation hinges on our ability to prepare our next generation to be innovators in science, technology, engineering and math (STEM). Excitement for STEM must begin in the earliest stages of our education process. Yet, today far too few of our students are prepared for the challenges ahead.

The special session "Microscopy for STEM Educators" is a general interest forum with several notable invited speakers discussing their successful programs implementing microscopy in STEM education to foster student interest and excitement. A hands-on session with a tabletop scanning electron microscope and atomic force microscope will be held at the end of the presentations. The attendees are encouraged to bring samples of interest and operate the instruments. STEM educators will receive a one-day reduced registration fee and will be able to also visit the exhibition.

All meeting attendees are invited to attend and participate. Educators attending this session only need to complete the Special Registration Form for STEM Educators. Although this session does provide formal MSDE CPD credit, a certificate of attendance for those wishing to apply for credit on their own can be provided.

SESSION 7

Location: Colton . . . . .Wed 1:40 pm to 3:20 pm

Scanning STEM Session

Session Chairs: **Robert Gordon,** Hitachi High Technologies America, Inc. (USA); **Michael T. Postek,** National Institute of Standards and Technology (USA)

1:40 pm: **Using the Hitachi SEM to engage learners and promote next-generation science standards inquiry**, Dave Menshew, James Enochs High School (USA). . . . . [9236-22]

2:00 pm: **Integrating electron microscopy into nanoscience and materials engineering programs**, Robert D. Cormia, Foothill College (USA); Michael M. Oye, NASA Ames Research Ctr. (USA) . . . . [9236-23]

2:20 pm: **Implementation of SEM in community college and high school contexts: Hitachi's TM3000 at Ohlone College and its partner schools**, Laurie Issel-Tarver, Ohlone College (USA) . . . . [9236-24]

2:40 pm: **Teaching the K-12 about nanoscale science by using SEM and other microscopies**, Nancy Healy, Georgia Institute of Technology (USA) . . . . [9236-52]

3:00 pm: **Project nano (nanoscience and nanotechnology outreach): a STEM training program that brings SEM's and stereoscopy into high school and middle school classrooms,** Sherry L. Cady, Pacific Northwest National Lab. (USA); Mikel Blok Beaverton High Schooll; Keith Gorsse, Lake Oswego High School (USA), Jennifer Wells, Portland State Univ. (USA) . . . . [9236-54]

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

STEM: Q&A WITH THE EXPERTS

Location: Colton . . . . 3:50 pm to 5:10 pm

STEM: Hands-on Instruments and Q&A with the Experts

Session Chairs: **Robert Gordon,** Hitachi High Technologies America, Inc. (USA); **Tim K. Maugel,** Univ. of Maryland, College Park (USA); **S. Frank Platek,** U.S. Food and Drug Administration (USA); **Dale E. Newbury,** National Institute of Standards and Technology (USA); **Michael T. Postek,** National Institute of Standards and Technology (USA)

Moderators: **Robert J. Gordon,** Hitachi High Technologies America, Inc.; **Tim K. Maugel,** Univ. of Maryland, College Park; **S. Frank Platek,** U.S. Food and Drug Administration; **Dale E. Newbury,** National Institute of Standards and Technology; **Michael T. Postek,** National Institute of Standards and Technology

Table-top scanning electron microscopes will be available during this hands-on session and experts will be available to answer questions. The attendees are invited to bring samples of interest and to operate the instruments. Attendees should also bring a memory stick to obtain scanning electron microscope images. Other scanning electron microscopes including laboratory instruments may be found on the exhibition floor. Attendees are encouraged to visit these instruments as well.

THURSDAY 18 SEPTEMBER

SESSION 8

Location: Colton . . . . Thu 8:00 am to 10:00 am

Advanced Scanned Probe Microscopies

Session Chairs: **Ronald G. Dixson,** National Institute of Standards and Technology (USA); **Aaron Cordes,** SEMATECH Inc. (USA)

8:00 am: **Design, technology, and application of integrated piezoresistive scanning thermal microscopy (SThM) microcantilever**, Pawel Janus, Piotr B. Grabiec, Andrzej Sierakowski, Institute of Electron Technology (Poland); Teodor P. Gotszalk, Wroclaw Univ. of Technology (Poland); Maciej Rudek, Daniel Kopiec, Wojciech Majstrzyk, Wroclaw Univ of Technology (Poland); Guillaume Boetsch, Imina Technologies (Switzerland); Bernd Koehler, Fraunhofer IKTS-MD (Germany) . . . [9236-25]

8:20 am: **Calibration transfer using a metrology atomic force microscope**, Ronald G. Dixson, Natalia Farkas, John A. Dagata, National Institute of Standards and Technology (USA) . . . . [9236-26]

8:40 am: **Classification of patterned wafer defects by AFM-based modulus measurement**, Aaron Cordes, Martin Samayoa, SEMATECH Inc. (USA); Sean Hand, Bruker Nano Inc. (USA) . . . . [9236-27]

9:00 am: **Deformation effects in accurate nanoparticle metrology with atomic force microscopy**, Malcolm A. Lawn, Jan Herrmann, Victoria A. Coleman, Bakir Babice, Åsa K. Jamting, National Measurement Institute of Australia (Australia) . . . . [9236-28]

9:20 am: **Use of a tip characterizer in atomic-force microscopy nanoparticle size analysis: correlated height and width measurements**, Natalia Farkas, Ndubuisi George Orji, Ronald G. Dixson, National Institute of Standards and Technology (USA); Hiroshi Itoh, National Institute of Advanced Industrial Science and Technology (Japan); John A. Dagata, National Institute of Standards and Technology (USA). . . . . [9236-29]

9:40 am: **Particle deformation induced by AFM tapping under different set-point voltages**, Chung-Lin Wu, Industrial Technology Research Institute (Taiwan); Natalia Farkas, John A. Dagata, National Institute of Standards and Technology (USA); Bo-Ching He, Wei-En Fu, Industrial Technology Research Institute (Taiwan) . . . . [9236-30]

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

SESSION 9

Location: Colton . . . . Thu 10:30 am to 12:10 pm

Advanced Optical Microscopies I

Session Chairs: **Andras E. Vladár,** National Institute of Standards and Technology (USA); **Tim K. Maugel,** Univ. of Maryland, College Park (USA)

10:30 am: **Wavelet transform-based method of compensating dispersion for high-resolution imaging in SDOCT**, Haiyi Bian, Wanrong Gao, Nanjing Univ. of Science and Technology (China) . . . . [9236-31]

10:50 am: **Optical coherence microscopy with extended depth of focus**, Xinyu Liu, Dongyao Cui, Xiaojun Yu, Jun Gu, Ding Sun, Linbo Liu, Nanyang Technological Univ. (Singapore) . . . . [9236-32]

11:10 am: **Nanoscale investigations by fluorescence and scattering scanning near-field optical microscopy**, Stefan G. Stanciu, Univ. Politehnica of Bucharest (Romania); Loredana Latterini, Univ. degli Studi di Perugia (Italy); Radu Hristu, Denis E. Tranca, Univ. Politehnica of Bucharest (Romania); Luigi Tarpani, Univ. degli Studi di Perugia (Italy); George A. Stanciu, Univ. Politehnica of Bucharest (Romania). . . . . [9236-33]

11:30 am: **Scan mirrors relay for high resolution laser scanning systems**, David Kessler, Kessler Optics & Photonics Solutions, Ltd. (USA) . . . . [9236-34]

11:50 am: **Using scanning near-field microscopy to study photo-induced mass motions in azobenzene containing thin films**, Anh-Duc Vu, Nicolas Desboeufs, Ecole Polytechnique (France); Filippo Fabbri, Univ. Paris-Sud 11 (France); Jean-Pierre Boilot, Thierry Gacoin, Khalid Lahlil, Yves Lassailly, Lucio Martinelli, Jacques Peretti, Ecole Polytechnique (France) . . . . [9236-35]

Lunch Break . . . . Thu 12:10 pm to 2:00 pm

SESSION 10

Location: Colton . . . . Thu 2:00 pm to 3:00 pm

Advanced Optical Microscopies II

Session Chairs: **Tim K. Maugel,** Univ. of Maryland, College Park (USA); **Dale E. Newbury,** National Institute of Standards and Technology (USA)

2:00 pm: **Evaluation of the phase discrepancies in the characterization of LCOS**, Spozmai Panezai, Dayong Wang, Jie Zhao, Yunxin Wang, Lu Rong, Beijing Univ. of Technology (China). . . . . [9236-36]

2:20 pm: **Nanoscale imaging by micro-cavity scanning microscopy**, Andrea Di Donato, Univ. Politecnica delle Marche (Italy); G. Ippoliti, Univ. Politecnica delle Marche (Italy) and Univ Politecnica delle Marche (Italy); Tullio Rozzi, Davide Mencarelli, G. Orlando, Marco Farina, Univ. Politecnica delle Marche (Italy) . . . . [9236-37]

2:40 pm: **Generating the longitudinal electric-field component on the optical axis with high-numerical-aperture binary axicons**, Sergei V. Alferov, Samara State Aerospace Univ. (Russian Federation); Svetlana N. Khonina, Sergei V. Karpeev, Image Processing Systems Institute (Russian Federation); Dmitrey Andreevich Savelyev, IPSI (Russian Federation) . . . . [9236-38]

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

SESSION 11

Location: Colton . . . . Thu 3:30 pm to 4:50 pm

Advancements in Modeling

Session Chairs: **John S. Villarrubia,**
National Institute of Standards and Technology (USA); **Andras E. Vladár,**
National Institute of Standards and Technology (USA)

3:30 pm: **Three-dimensional Monte Carlo modeling of critical dimension SEM metrology in a TCAD simulation environment**, Mauro Ciappa, Emre Ilgünsatiroglu, Alexey Y. Illarionov, ETH Zürich (Switzerland). . . . . [9236-39]

3:50 pm: **Monte Carlo modeling in a TCAD environment for the simulation of scanning electron microscopy images of three-dimensional samples with space charge**, Mauro Ciappa, Alexey Y. Illarionov, Emre Ilgünsatiroglu, ETH Zürich (Switzerland) . . . . [9236-40]

4:10 pm: **Monte Carlo simulation of phantom tissue under dynamic spatial frequency domain imaging (DSFDI)**, Jose E. Calderon, David Serrano, Jayanta Baneerjee, Univ. de Puerto Rico Mayagüez (USA) . . . . [9236-41]

4:30 pm: **A compact physical CD-SEM simulator for IC photolithography modeling applications**, Chao Fang, Mark D. Smith, John J. Biafore, Alessandro VaglioPret, Stewart A. Robertson, KLA-Tencor Texas (USA). . . . . [9236-42]

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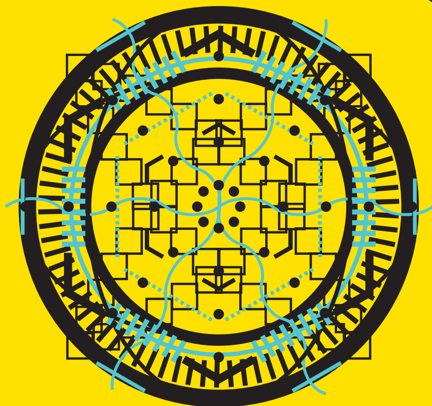

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