

# Call For Abstracts

Abstract Deadline:  
MAY 4, 2011

Complete details  
available online at  
[www.avs.org](http://www.avs.org)



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# AVS 58th International Symposium & Exhibition

Oct 30-Nov 4, 2011 • Nashville Convention Center • Nashville, Tennessee

## DIVISION/GROUP PROGRAMS:

- Advanced Surface Engineering
- Applied Surface Science
- Biomaterial Interfaces
- Electronic Materials & Processing
- Magnetic Interfaces & Nanostructures
- Manufacturing Science & Technology
- MEMS & NEMS
- Nanometer-Scale Science & Technology
- Plasma Science & Technology
- Surface Science
- Thin Film
- Vacuum Technology

## FOCUS TOPICS:

- Actinides & Rare Earths
- Biofabrication & Novel Devices
- Electron Transport in Low-Dimensional Materials
- Energy Frontiers
- Graphene & Related Materials Focus Topic
- Helium Ion Microscopy Focused Topic
- *In situ* Spectroscopy & Microscopy
- Marine Biofouling
- Nanomanufacturing Science & Technology
- Neutron Scattering
- Spectroscopic Ellipsometry Focus Topic
- Transparent Conductors & Printable Electronics
- Tribology

## The 58<sup>th</sup> AVS International Symposium

On behalf of the AVS community, we invite you to participate in, and submit an abstract to, the 58th International Symposium & Exhibition, to be held in Nashville, Tennessee, during October 30-November 4, 2011.

The AVS Symposium is a full-week conference with an average of 15 parallel sessions sponsored by 10 divisions and 2 technical groups, an extensive equipment exhibition and a wide range of networking and career advancement events. We encourage you to contribute to these exciting sessions and events and submit your abstract before the deadline on May 5, 2011.

This year's symposium promises to be more exciting than ever and will feature programming in thirteen timely topical areas in addition to the core AVS technical program. Running concurrent with the symposium, we have organized eleven focused sets of sessions (Focus Topics) that will feature state-of-the-art research on **Energy Frontiers, Graphene, Helium Ion Microscopy, Biofabrication & Novel Devices, Neutron Scattering, Electron Transport in Low Dimensional Materials, Transparent Conductors & Printable Electronics, Rare Earths and Actinides, Marine Biofouling, Nanomanufacturing Science & Technology, Spectroscopic Ellipsometry, Tribology, and *In Situ* Electron Spectroscopy/Microscopy.**

The AVS fosters a **multidisciplinary environment** that cuts across traditional boundaries between disciplines and is the place for exchanging ideas on the latest developments in the science and technology of materials, interfaces and processing. The technical program covers not only state-of-the-art advancements in the science and technology of measurement, manipulation and processing of material surfaces and interfaces, but also a wide range of fundamental findings to better understand the properties of these surfaces and interfaces for the purpose of manufacturing novel devices for high-impact applications. The program covers topics that span the range from biological materials to solid-state electronics, biological cells to solar cells, and friction and wear to plasma deposition of thin films. If your work involves fundamental science or applications and processing of materials and interfaces, we hope to see you in Nashville.

**A key feature of this year's program is Energy Technology.** The week-long Energy Frontiers Focus Topic provides a forum for presenting multidisciplinary research advances that impact a wide range of energy conversion and storage issues. A highlight of the Focus Topic is the **AIP Industrial Physics Forum** that will kick-off the week and address such issues as Global Energy Prospects, The Supply/Demand Challenge of the Electric Economy and Materials for a Sustainable Future. If your work focuses on materials, surfaces and interfaces for energy harvesting, conversion and/or storage – the Energy Frontiers Focus Topic is the place to showcase your advances!

**Nanoscale science and technology is a prevailing theme** throughout the symposium, as the properties and processing of nanoscale materials and are strongly affected by surfaces and interfaces. The use of nanostructured materials is ubiquitous and ranges from energy harvesting to electronic, optical or biomedical devices. Three quarters of the program encompass various aspects of Nano Science and Technology. If you work in Nano, consider submitting an abstract to one of many sessions on nanoscale science and technology.

The foundation of the AVS is vacuum science and technology, which over the years has evolved into the use of controlled and sophisticated environments for quantitative measurements and processing of material surfaces and interfaces. While there are many direct links to vacuum science and technology in many of the program topics, controlled environments and measurements are now being applied to a spectrum of *in vacuo*, *in situ*, *in operando*, and *in vivo* systems. If your work involves the development of controlled environments, the processing of interfacial systems, or quantitative interfacial analysis - from vacuum, to plasmas, to biological systems, then the AVS is the venue where you need to present your work!

As you examine the Call for Abstracts, we are certain that you will see many sessions that will interest you and still many others that will be a perfect fit for your latest research. We think that you will benefit greatly by participating in this Symposium and networking with the rest of the AVS community.

We look forward to receiving your abstract and seeing you in Nashville!

Susan B. Sinnott  
2011 Program Chair

Charles R. "Chip" Eddy, Jr.  
2011 Vice-Program Chair

## **PROGRAM COMMITTEE**

### **Program Chair**

Susan Sinnott  
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Charles R. "Chip" Eddy, Jr.  
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#### **Biomaterials Plenary Session**

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Perez-Luna, Victor, Illinois Institute of Technology  
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Kummel, Andrew, University of California at San Diego  
Lloyd, Kathryn G., DuPont Corporate Center for Analytical Sciences  
Mayer, Theresa, The Pennsylvania State University  
McGuire, Gary, International Technology Institute  
Schultz, Brian, University of California at Santa Barbara  
Tutuc, Emanuel, University of Texas at Austin  
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Rubloff, Gary W., University of Maryland  
Seebauer, Edmund G., University of Illinois at Urbana-Champaign  
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Ventrice, Carl, The University at Albany-SUNY

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Gousev, Evgeni, Qualcomm Technologies  
Kotru, Sushma, University of Alabama  
Krylov, Slava, Tel Aviv University, Israel  
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Joseph, Eric A., IBM T.J. Watson Research Center  
Labelle, Catherine, GLOBALFOUNDRIES  
Rauf, Shahid, Applied Materials Inc.  
Sankaran, R. Mohan, Case Western Reserve University  
Shannon, Steven, North Carolina State University  
Shiratani, Masaharu, Kyushu University, Japan  
Tay, Sing-Pin, Mattson Technology Inc.  
van de Sanden, M.C.M., Eindhoven University of Technology, the Netherlands

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Utz, Art, Tufts University  
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### **Thin Film Division**

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Gupta, Subhadra, University of Alabama  
Jur, Jesse S., North Carolina State University  
Karabacak, Tansel, University of Arkansas at Little Rock  
Kessels, Erwin, Eindhoven Univ. of Tech., the Netherlands  
Kim, Hyungjun, Yonsei University, Korea  
Lewis, Jay, RTI International  
Linford, Matthew R., Brigham Young University  
Melechko, Anatoli, North Carolina State University  
Muscat, Anthony J., University of Arizona  
Parsons, Gregory N., North Carolina State University  
Rack, Philip D., University of Tennessee at Knoxville; Oak Ridge National Laboratory  
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Vallee, Christophe, Université Joseph Fourier, France  
Wolden, Colin, Colorado School of Mines

### **Vacuum Technology Division**

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Li, Yulin, Cornell University  
Peacock, Neil, MKS Instruments  
Smart, Loralie, Brookhaven National Laboratory  
Stutzman, Marcy, Jefferson Lab  
Thornberg, Steve, Sandia National Laboratories  
Versluis, Richard, TNO Science and Industry, the Netherlands  
Wüest, Martin, INFICON, Liechtenstein

### **Nanomanufacturing Science and Technology Focus Topic**

Chair: Rogers, Bridget, Vanderbilt University  
Co-Chair: Madsen, Lynnette, National Science Foundation  
Ku, Victor, Satcon Technology Corporation

### **Actinides and Rare Earths Focus Topic**

Chair: Tobin, James G., Lawrence Livermore National Laboratory  
Aydil, Eray S., University of Minnesota  
Caruso, Anthony N., University of Missouri-Kansas City  
Dowben, Peter A., University of Nebraska - Lincoln  
Gouder, Thomas, Institute for TransUranics (ITU), Karlsruhe, Germany  
Guisinger, Nathan P., Argonne National Laboratory  
Gupta, Subhadra, University of Alabama  
Joyce, John, Los Alamos National Laboratory  
Petit, Leon, Daresbury Laboratory, UK  
Reutt-Robey, Janice E., University of Maryland

### **Biofabrication and Novel Devices Focus Topic**

Co-Chair: Boland, Thomas, University of Texas at El Paso  
Co-Chair: Forgacs, Gabor, University of Missouri  
Co-Chair: Gamble, Lara J., University of Washington  
Co-Chair: Payne, Greg, University of Maryland  
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Co-Chair: Sun, Wei, Drexel University

### **Electron Transport in Low Dimensional Materials Focus Topic**

Chair: Li, An-Ping, Oak Ridge National Laboratory  
Kavanagh, Karen, Simon Fraser University, Canada  
Mayer, Theresa, The Pennsylvania State University  
Swan, Anna, Boston University  
Varga, Kalman, Vanderbilt University  
Wendelken, John, Oak Ridge National Laboratory

### **Energy Frontiers Focus Topic**

Chair: Aydil, Eray S., University of Minnesota  
Agarwal, Sumit, Colorado School of Mines  
Altman, Eric I., Yale University  
Baxter, Jason B., Drexel University  
Gessert, Timothy, National Renewable Energy Laboratory  
Goeckner, Matthew J., University of Texas at Dallas  
Goldman, Rachel S., University of Michigan, Ann Arbor  
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Leschkies, Kurtis, Applied Materials Inc.  
Lewis, Jay, RTI International  
Ludeke, Rudy, IBM  
Murday, James, University of Southern California  
Muscat, Anthony J., University of Arizona  
Nagpal, Prashant, Los Alamos National Laboratory  
Phillips, Jamie, University of Michigan  
Porter, Lisa M., Carnegie Mellon University  
Rieth, Loren, University of Utah  
Rubloff, Gary W., University of Maryland  
Siebentritt, Susanne, University of Luxembourg  
Tobin, James G., Lawrence Livermore National Laboratory  
Wang, Qi, National Renewable Energy Laboratory  
Wolden, Colin, Colorado School of Mines

### **Graphene and Related Materials Focus Topic**

Chair: Oleynik, Ivan, University of South Florida  
Batzill, Matthias, University of South Florida  
Chabal, Yves J., University of Texas at Dallas  
Diebold, Alain, College of Nanoscale Sci. and Eng., U. Albany  
Gözlhüser, Armin, University of Bielefeld, Germany  
Jernigan, Glenn, U.S. Naval Research Laboratory  
Opila, Robert, University of Delaware  
Sheehan, Paul E., U.S. Naval Research Laboratory  
Spenser, Michael, Cornell University

### **Helium Ion Microscopy Focus Topic**

Chair: Gözlhüser, Armin, University of Bielefeld, Germany  
Co-Chair: Smentkowski, Vincent, GE Global Research Center

### **In Situ Microscopy and Spectroscopy Focus Topic**

Chair: Cumings, John, University of Maryland  
Artyushkova, Kateryna, University of New Mexico  
McGaughey, Alan J.H., Carnegie Mellon University  
Yang, Judith C., University of Pittsburgh  
Zhou, Guangwen, State University of New York at Binghamton

### **Marine Biofouling Focus Topic**

Chair: Barlow, Daniel E., U.S. Naval Research Laboratory  
Co-Chair: Rosenhahn, Axel, Karlsruhe Institute of Technology, Germany

### **Neutron Scattering Focus Topic**

Chair: Lauter, Valeria, Oak Ridge National Laboratory  
Ekkebus, Allen, Oak Ridge National Laboratory  
Majewski, Jaroslaw, Los Alamos National Laboratory  
Mankey, Gary J., University of Alabama  
te Velthuis, Suzanne, Argonne National Laboratory

### **Spectroscopic Ellipsometry Focus Topic**

Chair: Creatore, Mariadriana, Eindhoven University of Technology, the Netherlands  
Diebold, Alain, College of Nanoscale Science and Engineering, U. Albany  
Durbin, Steve, University at Buffalo  
Goeckner, Matthew J., University of Texas at Dallas  
Lloyd, Kathryn G., DuPont Corporate Center for Analytical Sciences

Schubert, Mathias, University of Nebraska - Lincoln  
Wagner, Matthew, Procter and Gamble  
Woollam, John, J.A. Woollam Co., Inc.  
Wormeester, Herbert, University of Twente, the Netherlands

### **Transparent Conductors and Printable Electronics Focus Topic**

Chair: Porter, Lisa M., Carnegie Mellon University  
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Gilmore, Ian, National Physical Laboratory, UK  
Haasch, Richard, University of Illinois at Urbana-Champaign  
Herman, Greg, Oregon State University

### **Tribology Focus Topic**

Chair: Perry, Scott S., University of Florida

### **Exhibitor Technology Spotlight**

Co-Chair: DeGennaro, Jeannette, AVS  
Co-Chair: Surman, David, Kratos

## **FOCUS TOPICS**

**Actinides and Rare Earths Focus Topic (AC)** Actinides and Rare Earths exhibit many unique and diverse physical, chemical and magnetic properties, due in large part to the complexity of their 5f and 4f electronic structure. These Special Topic Sessions will focus upon the chemistry, physics and material science in the Lanthanide and Actinide materials, driven by the 4f and 5f electronic structure. Particular emphasis will be placed upon the 4f/5f magnetic structure, surface science and thin film properties and their applications to energy related issues. For the actinides, fundamental actinide science and its role in resolving technical challenges posed by actinide materials will be stressed, particularly with regard to energy applications, including energy generation, novel nuclear fuels and structural materials, waste remediation and waste disposal. Both basic and applied experimental approaches, including synchrotron- radiation-based and neutron-based investigations, as well as theoretical modeling computational simulations, are to be part of the Special Sessions. Of particular importance are the issues connected to potential renaissance in nuclear energy, including fuel synthesis, oxidation, corrosion, intermixing, stability in extreme environments, prediction of properties via bench-marked simulations, separation science, environmental impact and disposal of waste products. The shared sessions will be with Magnetic Interfaces and Nanostructures, Surface Science, Thin Films and Energy Frontiers.

### **AC1+MI Magnetic and Electron Correlation Effects in Actinides and Rare Earths**

*G. Malcolm Stocks*, Oak Ridge National Laboratory, "Recent Work on Magnetism, Actinides and Defects at ORNL"

### **AC2+SS The Surface Science of Actinides and Rare Earths**

*David Pugmire*, Los Alamos National Laboratory, "Oxidation of Pu and Actinide Materials"

### **AC3+TF The Structure, Properties and Chemistry of Thin Films of Actinides and Rare Earths**

*Moritz Schmidt*, Argonne National Laboratory, "Plutonium Sorption and Reactivity at the Solid/Water Interface"

### **AC4 Actinides and Rare Earths Poster Session**

### **EN16+AC Materials Challenges for Nuclear Energy**

*Peter Burns*, University of Notre Dame, "New Results from the DOE EFRC on the Material Science of Actinides"

**Biofabrication and Novel Devices Focus Topic (BN)** Opportunities in regenerative medicine, point-of-care diagnosis, and toxicological analysis of drugs emphasize the need for fabrication methods that accommodate labile biological materials, allow spatially-controlled assembly in two and three dimensions, and yield adaptive/responsive structures that can promote cell proliferation and tissue differentiation. Biofabrication refers to the design, construction and performance of such biologically-relevant structures, and advances in biofabrication often reside at the interface between the physical, chemical and biological sciences, and engineering. Papers are solicited on various topics that include: the use of biological materials and mechanisms for bottom-up hierarchical assembly;

methods to fabricate materials with controlled architectures (e.g., through rapid prototyping or microfluidic contacting); approaches for cell and tissue printing; the interfacing of biology to electronics (e.g., for lab-on-a-chip or biosensing applications); and the evolution of structure and function (e.g., in response to cell-matrix interactions or due to biological activities).

### **BN1+BI+MN Biofabrication Methods and Devices**

*David Kaplan*, Tufts University

*Jeffrey Morgan*, Brown University / Rhode Island Hospital

### **BN2+BI+MN Biofabrication Applications**

*William Bentley*, University of Maryland

*Michael Shuler*, Cornell University

### **BN3 Biofabrication and Novel Devices Poster Session**

The **Electron Transport in Low Dimensional Materials Focus Topic (ET)** provides a forum for the discussion of transport properties of electrons in low-dimensional materials. Materials of interest here include **metal, semiconductor, complex oxide** and **carbon based nanostructures**. The transport in low-dimensional materials topic encompasses both **theory and experiments**. Areas of interest include transport through **nanowires, nanojunctions, interfaces, and grain/domain boundaries**, and **electronic inhomogeneities** and **phase transitions**. An area of growing activity is the subject of **energy transfer and conversion** in low dimensional materials including the study of **photovoltaics, solid-state lighting, and sensing**. The transport properties observed are correlated with the local structural or electronic properties and may be influenced by **external magnetic fields, dielectric screening, defects, dopants**, etc. A wide range of scanning probe, electron microscopy, and optical techniques including STM, SEM, TEM, conductive AFM studies, photoemission, Raman spectroscopy, photoluminescence, photoconductance, and ballistic electron emission microscopy are making these studies possible. Reports on **novel methodologies** for dynamic processes at or near atomic resolution and measurements in individual intrinsic nanostructures are strongly encouraged.

#### **ET1+EM+SS Quantum Transport: Fundamentals**

*Shuji Hasegawa*, University of Tokyo, Japan, "Multi-Probe STM Study of 2-D Transport on Surface State"

#### **ET2+NS+EM Nanoelectronics, Interconnect, and Energy Applications**

*Hanno H. Weitering*, University of Tennessee, "1-D Transport in Atomic Structures"

#### **ET3+NS+GR Transport Spectroscopy in Carbon-based Nanostructures**

*Stephen Cronin*, University of Southern California, "Transport and Raman of Nanotubes"

*Philip Kim*, Columbia University, "Electron Transport in Graphene Nanoribbon"

#### **ET4+EM+NS New Developments in Transport Theory and Techniques**

*Art Baddorf*, Oak Ridge National Laboratory, "Domain Wall Transport in Ferroelectric Materials"

*Harold Baranger*, Duke University, "Quantum Phase Transition and Emergent Symmetry in a Quadruple Quantum Dot System"

#### **ET5 Electron Transport in Low Dimensional Materials Focus Topic Poster Session**

**Energy Frontiers Focus Topic (EN)** In response to the growing interests in the fundamental science and technology of energy conversion and storage, AVS is organizing a week-long conference on energy related research topics. The Energy Frontiers focus topic conference will dovetail into this year's AIP Industrial Physics Forum (IPF) where the theme will also be energy. AIP-IPF Monday sessions featuring all invited talks with emphasis on sustainability and a variety of energy related topics will lead-in to the AVS symposium sessions on energy. Abstracts are solicited in topics ranging from all types of photovoltaics and photocatalysis to materials and thin films for energy conversion and storage including nanostructured materials such as nanoparticles and nanowires. Of particular interest are abstracts on (1) fundamental interfacial and surface science of materials for energy conversion and storage, (2) electron transfer processes at interfaces, (3) excitonic solar cells including dye-sensitized and quantum-dot solar cells, (4) organic solar cells, (5) plasmonics in energy conversion, (6) thermophotovoltaics and thermoelectrics, (7) thin films for energy storage (8) transparent conducting oxides, (9) thin films for solar fuels, (10) lithium-ion batteries and fuel cells, (11) crystalline, polycrystalline and thin film silicon solar cells (12) chalcogenide solar cells (CIGS, CZTS, CdTe and related materials), (13) materials for nuclear energy, and (14) sustainable and green PV manufacturing.

**EN1 Energy: Global Prospects**

*Ellen Williams, BP*

**EN2 The Electric Economy: The Supply/Demand Challenge**

*Harold McFarlane, Idaho National Laboratory, "The Role of Nuclear Energy in a Sustainable Energy Scenario"*

**EN3 Materials for a Sustainable Future**

*Todd Allen, University of Wisconsin, Madison, "Materials for Low Risk Nuclear Reactors"*

*Sally Swanson, IBM, "Battery 500 - the Li-Air Battery Opportunity"*

**EN4+PS Plasmas for Photovoltaics & Energy Applications**

*Erwin Kessels, Eindhoven University of Technology, the Netherlands, "Novel Plasma-enhanced CVD and ALD Processes for c-Si Photovoltaics"*

*Seokjae Yoo, National Fusion Research Institute, Korea*

**EN5 Silicon-Based Solar Cells**

*Liwei Li, ENN*

*Baojie Yan, Uni-solar Ovonic, "Amorphous and Nanocrystalline Silicon Thin Film Photovoltaic Technology on Flexible Substrates"*

**EN6+TF Thin Films for Solar Cells**

*Craig Taylor, Colorado School of Mines*

**EN7+TF Thin Film Chalcogenide Solar Cells (CIGS, CZTS, CdTe and Related Materials)**

*David Mitzi, IBM T.J. Watson Research Center, "Progress Towards a High-Efficiency Cu-Zn-Sn-S-Se Thin-Film PV Technology"*

**EN8+TF Thin Films for Solar Fuels**

*Kevin Sivula, Ecole Polytechnique Fédérale de Lausanne, Switzerland, "Nanostructured Thin Films for Solar Water Splitting"*

**EN9+EM+NS Nanostructured Materials for Third Generation Solar Cells**

*Sheila Bailey, NASA Glenn*

**EN10 Quantum Dot Solar Cells**

*Ethan Klem, RTI International*

*Uwe Kortshagen, University of Minnesota*

**EN11+EM+NS Nanowire Solar Cells**

*Michael Filler, Georgia Institute of Technology*

*Ali Javey, University of California Berkeley*

**EN12+NS Organic Photovoltaics**

*Marc Baldo, MIT, "Excitonic Antennas for Solar Cells"*

**EN13+NS Nanostructures for Energy Storage and Fuel Cells**

*Khalil Amine, Argonne National Laboratory, "Nanostructured Anodes and Cathodes for Improved Power and Energy Density for Automotive Applications"*

*Jianyu Huang, Sandia National Laboratories, "In Situ Observation of Battery Operation at Atomic Resolution"*

*Fritz Prinz, Stanford University*

*Andreas Stein, University of Minnesota, "Templating of Porous Materials for Energy Storage and Generation"*

**EN14+NS Nanostructured Materials for Thermophotovoltaics, Thermoelectrics & Plasmonics**

*Rana Biswas, Iowa State University & Ames Laboratory U.S. D.O.E., "Photonic and Plasmonic Crystals for Thermophotonics and Energy Conversion"*

*David Norris, ETH Zurich, Switzerland*

*Rachel Segalman, University of California Berkeley*

*Dmitri Talapin, University of Chicago, "Design of Nanostructured Thermoelectric Materials by Self-Assembly of Colloidal Nanocrystals and Molecular Metal Chalcogenide Linkers"*

**EN15+NS Ultrafast Charge and Energy Transfer in Nanomaterials**

*Victor Klimov, Los Alamos National Laboratory*

*William Tisdale, MIT*

*Emily Weiss, Northwestern University, "Mechanisms of Heterogeneous Charge Transfer at the Quantum Dot-Organic Interface"*

**EN16+AC Materials Challenges for Nuclear Energy**

*Peter Burns*, University of Notre Dame, "New Results from the DOE EFRC on the Material Science of Actinides"

**EN17+VT Vacuum Technology for Green Solutions: Solar and Energy Storage**

*Lindsey VanMannes*, South Park Platinum, Inc., "The Use of Vacuum Technology to Improve Smelting and Refining of REE Ores and REE Resource Issues"

**EN18+MS Photovoltaics Manufacturing**

*Salah Bedair*, North Carolina State University

*Bob Conner*, Semprius

*Pradeep Haldar*, University at Albany SUNY

*Eric Seymour*, Advanced Energy Industries, Inc.

**EN19 Energy Frontiers Topical Conference Poster Session**

**TF2+EN ALD for Energy**

*Gary W. Rubloff*, University of Maryland, "ALD: Enabling Designer Nanostructures for Energy Applications"

The **Graphene and Related Materials Focus Topic (GR)** will provide an interdisciplinary forum on the science and technology of graphene and related carbon-based materials. The conference will review the world wide effort in exploring the fundamental properties of graphene, its synthesis, characterization, processing and applications. The papers are solicited from focus topics that will highlight recent major breakthroughs, progress, and challenges in such areas as graphene growth and processing; electronic, optical, magnetic, mechanical, and thermal properties; charge and spin transport; characterization by microscopy and spectroscopy; surface chemistry; graphene nanostructures; and applications in nanoelectronic devices, sensors, spintronics, optoelectronics, and photonics.

**GR1 Graphene Growth**

*Luigi Colombo*, Texas Instruments, Inc., "Growth Mechanisms of Graphene on Cu by Chemical Vapor Deposition"

**GR2+EM Graphene: Optical Properties, Optoelectronics, Photonics and Transparent Electronics**

*Andrea Ferrari*, University of Cambridge, UK

**GR3+TF Graphene: Electronic Properties and Charge Transport**

*Michael Fuhrer*, University of Maryland

*Daniel Gunlycke*, U.S. Naval Research Laboratory, "Electronic and Magnetic Properties of a Graphene Line Defect"

**GR4+MI Graphene: Magnetic Properties and Spintronics**

*Klaus Kern*, Max-Planck-Institut für Festkörperforschung, Germany

**GR5+MN Graphene: Mechanical and Thermal Properties, Graphene MEMS and NEMS**

*Paul McEuen*, Cornell University

**GR6 Graphene Characterization including Microscopy and Spectroscopy**

*Nathan P. Guisinger*, Argonne National Laboratory

*Jürgen Rabe*, Humboldt University Berlin, Germany

**GR7+NS+PS+SS Graphene: Surface Chemistry, Functionalization, Plasma Processing and Sensor Applications**

*Jeremy Robinson*, U.S. Naval Research Laboratory

**GR8+TF+NS Graphene Nanoribbons and Related Structures**

*Michael Arnold*, University of Wisconsin-Madison

*Klaus Mullen*, Max Planck Institute for Polymer Research, Germany

**GR9+MS+EM Graphene Device Manufacturing**

*Ji Ung Lee*, University at Albany

*Chun-yung Sung*, IBM Research

**GR10+EM Dielectrics on Graphene, Graphene Transfer to Novel Substrates**

**GR11 Graphene and Related Materials Focus Topic Poster Session**

**ET3+NS+GR Transport Spectroscopy in Carbon-based Nanostructures**

*Stephen Cronin*, University of Southern California, "Transport and Raman of Nanotubes"

*Philip Kim*, Columbia University, "Electron Transport in Graphene Nanoribbon"

## **SS11+GR Surface Science of Low-Dimensional Carbon**

*Yves Chabal*, University of Texas, Dallas, "Infrared Tracking of Oxidation at Graphene Surfaces"

The **Helium Ion Microscopy Focus Topic (HI)** provides a forum for scientists working with Helium Ion Microscopes (HIM) and those interested in its prospects and capabilities. HIM is capable to image conductive as well as insulating samples without special treatment, in particular it allows imaging of unstained biomaterials and cell surfaces. HIM has the potential to become a routine microscopy tool for material science and nanotechnology, as well as in life science and biotechnology. The focused topic covers all aspects of HIM related science, ranging from Helium ion optics and contrast mechanisms to materials imaging, bioimaging and lithography. Contributions covering fundamentals of HIM imaging and lithography as well as from HIM applications are very welcome.

### **HI1+AS Basics of Helium Ion Microscopy**

*David C. Bell*, Harvard University, "Applications of Helium Ion Microscopy"

*Colin A. Sanford*, Carl Zeiss, Inc., "Principles of Helium Ion Microscopy"

### **HI2+AS+BI+NS Nano- and Bio- Imaging with Helium Ion Microscopy**

*Daniel S. Pickard*, National University of Singapore, "Aspects of BioImaging"

*Hongzhou Zhang*, Trinity College, Ireland, "Imaging of Nanostructures"

### **HI3 Aspects of Helium Ion Microscopy Poster Session**

***In Situ* Microscopy and Spectroscopy Focus Topic (IS)** Understanding and tailoring material synthesis processes, controlling the behavior during growth or assembly, as well as during subsequent processing procedures, are key targets for materials research. *In situ* methodologies and corresponding improvements in temporal, spatial and spectral resolution as well as significant advances in theoretical simulations are playing an increasingly critical role in achieving these goals. With the recent development of new experimental techniques and instrumentation, it is now possible to synthesize, characterize, and measure properties of active materials, *in situ*, during advanced imaging and beam scattering. Examples include *in situ* electron microscopy, *in situ* scanning probe microscopy, and real time x-ray scattering. Corresponding advances in theoretical simulations and computing capabilities permit correlations between experiment and theory for fundamental materials science. This symposium will bring together scientists and engineers to share the successes and the potential for *in situ* studies correlated with theoretical simulations across materials science disciplines.

### **IS1+AS+SS *In Situ* Surface Science Studies**

*Miquel Salmeron*, Lawrence Berkeley National Laboratory, "The Changing Structure of Surfaces When in Gaseous and Liquid Environments"

### **IS2+AS+SS *In Situ* Film Growth Studies**

*Guus Rijnders*, University of Twente, the Netherlands, "Real-time Growth Characterization using Atomic Force Microscopy"

### **IS3+AS *In Situ* Studies in Novel Environments**

*Niels De Jonge*, Vanderbilt University, "Imaging Whole Cells in Liquid with Scanning Transmission Electron Microscopy"

### **IS4+AS+SS *In Situ* Beam-Scattering Studies**

*Anatoly Frenkel*, Yeshiva University, "*In Situ* X-Ray Studies"

### **IS5+AS *In Situ* Studies of Structure & Mechanical Properties**

*Ian Robertson*, University of Illinois at Urbana-Champaign and National Science Foundation, "*In Situ* TEM Studies of Structural Evolution"

### **IS6 *In Situ* Spectroscopy and Microscopy Poster Session**

**Marine Biofouling Focus Topic (MB)** Environmentally friendly methods to defeat biofouling of man-made structures in marine environments are in great need, but present highly difficult and complex problems to achieve. Key research in the field is aimed at better fundamental understanding of marine biofouling and advancing coatings technologies. This focus topic will provide an interdisciplinary forum to present fundamental research of the biology, chemistry, and mechanics involving the formation and adhesion of marine biofouling communities at surfaces. In addition, abstracts are sought on advances in antifouling coating materials and surface functionalities, as well as the environmentally friendly strategies employed to prevent fouling.

### **MB1 Interfacial Aspects of Marine Biofouling**

*Bo Liedberg*, Linköping University, Sweden

*A. James McQuillan*, University of Otago, New Zealand, "Probing Molecular Details of Marine Bioadhesion Processes with *In Situ* Infrared Spectroscopy"

### **MB2+BI+PS Marine Antifouling Coatings**

*John Schetz*, University of North Texas Health Science Center, "Advances in Sustainable Technologies for the Prevention of Marine Biofouling"

### **MB3 Marine Biofouling Poster Session**

The AVS-58 **Nanomanufacturing Science and Technology Focus Topic (NM)** highlights the AVS's strength in bringing together basic science and applied technology to support cutting edge industry. To move forward from bench-top demonstration to full-scale production, scalable, high-throughput, controllable processes are needed. In addition, development of characterization and metrology techniques able to support manufacturing of nanoscale materials and devices is needed. Presentations of work in the areas of scalable devices, top-down or bottom-up high-throughput processes, or metrology methods for sustainable nanomanufacturing are encouraged.

### **NM1+MS Challenges Facing Nanomanufacturing (All Invited Session)**

*John Busbee*, Wright-Patterson Air Force Base

*Mihail Roco*, National Science Foundation

*Mark Tuominen*, University of Massachusetts Amherst

### **NM2+TF+MS Materials Processes for Nanomanufacturing**

*Rod Ruoff*, The University of Texas at Austin, "Large-scale Graphene: Challenges and Progress"

*Brian E. Goodlin*, Texas Instruments

### **NM3+MS+NS Manufacturable Nanoscale Devices**

*Teri Odom*, Northwestern University, "A SANE Approach to Programmable Soft Lithography"

### **NM4+NS+MS+TF Directed Assembly for Nanomanufacturing**

*Paul F. Nealey*, University of Wisconsin, "Advancing the Lithographic Process for Nanomanufacturing using Self-Assembling Block Copolymers"

### **NM5+MS Environmental Concerns in Nanomanufacturing**

*Vicki Colvin*, Rice University

### **NM6+AS+MS Metrology for Nanomanufacturing**

*Dawn Bonnell*, University of Pennsylvania, "Local Probes Enabling Science and Manufacturing"

### **NM7 Nanomanufacturing Science and Technology Poster Session**

### **MS1+NM What is Needed to use ALD for Manufacturing?**

*Steven George*, University of Colorado at Boulder, "Atomic Layer Deposition for Continuous Roll-to-Roll Processing"

The **Spectroscopic Ellipsometry Focus Topic (EL)** will provide a fertile terrain of discussion for all scientists and engineers willing to present their most recent progress in the field of spectroscopic ellipsometry. Given the extensive, yet complementary interest of the AVS community in material science and characterization, in the physics and chemistry principles at the basis of surface modification and (thin) film growth, and in novel applications, the Focus Topic will host several oral sessions and a poster session dedicated, though not restricted, to the following research areas: Spectroscopic Ellipsometry for Photovoltaics and Inorganic Thin Films; Spectroscopic Ellipsometry of Organic and Biological Materials; Spectroscopic Ellipsometry: Fundamentals, New Techniques and Future Directions. Contributions are solicited in these areas reporting on the most recent results in the field of fundamentals of optical functions, data analysis/ modeling, *in situ* (real time) process monitoring, complementarities between spectroscopic ellipsometry and other surface/bulk diagnostic tools and novel instrumentation capabilities. Furthermore, on the basis of an abstract selection based on the criteria of originality and advancement in the field of ellipsometry, the Focus Topic Program Committee will make awards to the three best contributed papers given by graduate students and young postdoc researchers. The Committee gratefully acknowledges J.A. Woollam Co., Inc. for sponsoring the awards.

### **EL1+AS+TF+MS+EM+PS Spectroscopic Ellipsometry for Photovoltaics and Inorganic Thin Films**

*Dean Levi*, National Renewable Energy Laboratory, "Applications of Ellipsometry in Photovoltaics"

## **EL2+AS+TF+MS+EM+PS Spectroscopic Ellipsometry of Organic and Biological Materials**

*Klaus-Jochen Eichhorn*, Leibniz-Institut für Polymerforschung Dresden e.V., Germany, "Application of Various Spectroscopic Ellipsometry Techniques for *In Situ* Studies of Thin Polymer Films on Solid Substrates"

## **EL3+AS+TF+MS+EM+PS Spectroscopic Ellipsometry – Fundamentals, New Techniques, & Future Directions**

*James Hilfiker*, J.A. Woollam Co., Inc., "Current Trends and Future Outlook for Spectroscopic Ellipsometry"

## **EL4 Spectroscopic Ellipsometry Poster Session**

**Neutron Scattering Focus Topic (NT)** During the past decade, neutron reflectometry has increasingly become a key technique for the investigation of magnetic, polymer and biological thin films. An advantage in using neutron reflectometry for the study of magnetic structures is that neutrons are sensitive to the absolute atomic magnetic moment and other aspects such as growth morphologies, interfacial and surface roughness, interdiffusion. A benefit for polymer and biological systems is that neutrons are sensitive to the light elements (carbon, hydrogen, nitrogen and oxygen), - the important part in these materials, as well as to isotopic differences in these elements. Considerable advancements in the instruments' performance, sample environment and the data analysis make it possible to obtain with nanometer accuracy information about the depth-dependent composition and in-plane correlations in thin films, multilayers and nanostructures. The 2011 Neutron Scattering Focus Topic (NT) program seeks contributions in the following areas: (1) Magnetic thin films and multilayers; (2) Neutron scattering for energy conversion; (3) Biological interfaces, membranes, thin films and co-sponsored by Magnetic Interfaces and Nanostructures (MI), Biomaterial Interfaces (BI) and Energy Frontiers Focus Topic (EN). The program will include invited and contributed talks.

## **NT1+AS+MI Magnetic Thin Films and Multilayers**

*Thomas Brueckel*, Forschungszentrum Jülich, Germany

*Chris Leighton*, University of Minnesota, "Nanoscale Magnetic Phase Separation at the SrTiO<sub>3</sub>/La<sub>1-x</sub>Sr<sub>x</sub>CoO<sub>3</sub> Interface"

## **NT2+AS Neutron Scattering for Energy Conversion**

*Jerzy Chlistunoff*, Los Alamos National Laboratory, "Nafion-Carbon-Platinum Interfaces Studies using Neutron Scattering and Electrochemical Methods"

*Michael Kent*, Sandia National Laboratories

## **NT3+AS+BI Biological Interfaces, Membranes, Thin Films**

*Eva Y. Chi*, University of New Mexico

*Mike Reinschtedter*, McMaster University, Canada

## **NT4 Neutron Scattering Poster Session**

**Transparent Conductors and Printable Electronics Focus Topic (TC)** The future of electronics is moving toward greater versatility, e.g., via printability over large areas while maintaining or enhancing the properties of functional elements such as transparent conductors. This focus topic addresses research on transparent conductors and printable electronics, both as distinct areas and as areas having commonality. While transparent conductive oxides have been researched intensively and have been commercially available for many years, recently there have been a number of promising novel approaches to alternative transparent conductor materials and processes. Some of these approaches involve materials, such as conductive polymers and carbon nanotubes that are also being pursued for printable electronics. Abstracts addressing synthesis, growth, fabrication, theory, characterization, or processing of novel or established materials for transparent conductors and printable electronics are solicited. Topics are expected to include growth, processing and characterization of TCOs, alternative and p-type TCOs, alternative approaches to transparent conductors, printable inks and conductors, and processing and characterization of printable transistors.

## **TC1+AS Growth, Processing, and Characterization of Transparent Conductors**

*Su-Huai Wei*, National Renewable Energy Laboratory, "Multi-component Transparent Conducting Oxides: Progress in Materials Modeling"

## **TC2+NS Printable Electronics**

*John Wager*, Oregon State University, "Amorphous Oxide Semiconductor Thin-Film Transistors"

## **TC3 Transparent Electronics / Transistors**

*Holger von Wenckstern*, Universität Leipzig, Germany, "Schottky Contacts and their Utilization in Transparent Electronics"

## **TC4 Transparent Conductors and Printable Electronics Poster Session**

**The Tribology Focus Topic (TR)** program will feature topics including novel tribological materials advanced tribological measurements, characterization of tribological interfaces, atomistic and multi-scale modeling of friction and wear events, and evaluation of environmental influences. Papers are solicited with a materials focus in areas such as biomaterials, thin film deposition, solid lubricants, nanocomposites designed for tribological function, self-healing interfaces, and wear-resistant polymers. Contributions are also sought considering advances in *in situ*, molecularly specific, spatially resolved approaches to the quantitative characterization of tribological interfaces. Accounts of numerical computation and molecular modeling of tribological materials of all types are also solicited.

### **TR1 Bio- and Biomimetic Tribological Interfaces**

*David Burris*, University of Delaware, "Microtribology of Articular Cartilage"

### **TR2+AS+SS Atomic-scale Characterization of Tribological Interfaces**

*Michael Falk*, Johns Hopkins University, "Accelerated Molecular Dynamics Simulations of Tribological Interfaces"

### **TR3 Advanced Tribological Materials**

*Thomas Scharf*, University of North Texas, "Tribology of Nanocrystalline Oxides and Adaptive Nanocomposite Coatings: Achieving Low Friction and Wear by Shear Accommodation"

### **TR4 Fundamentals of Interfacial Wear**

*W. G. Sawyer*, University of Florida, "Going No Wear!"

### **TR5 Tribology Focus Topic Poster Session**

## **DIVISIONAL PROGRAMS**

The program of the **Advanced Surface Engineering Division (SE)** addresses both scientists as well as technologists who are interested in new thin film materials and emerging technologies to prepare them, who need to know about their characterization and who aim at their practical use. The five oral ASSED sessions, partly co-organized with other divisions, and the poster session provide a balanced mix of fundamentals and applications of surface engineering. These sessions (see below for a complete list) will particularly emphasize the basics and use of atmospheric pressure plasmas; new developments in nanostructured thin films coatings, the possibilities of glancing angle deposition, novelties in pulsed plasma processes and innovations in surface engineering for thermal management. In conjunction with the Thin Films Division (TF) a wide range of aspects in tribology are covered in joint sessions. Under these topics, presentations on novel coating materials, processes to prepare them, design and modeling, diagnostics and growth control, mechanical property characterizations, resistance to severe conditions, thermal stability and other aspects related to surface engineering and coatings are solicited.

### **SE1+PS Atmospheric Pressure Plasmas**

*Michael Kong*, Longborough University, UK, "Cold Atmospheric Plasma Sources for Surface Treatment"

### **SE2 Nanostructured Thin Films and Coatings**

*Sam Zhang*, Nanyang Technological University, Singapore, "Hard Yet Tough Nanocomposite Coatings"

### **SE3 Glancing Angle Deposition (GLAD II)**

*Gwo-Ching Wang*, Rensselaer Polytechnic Institute, "Evolution of Crystal Orientation during Oblique Angle Deposition"

### **SE4+PS Pulsed Plasmas in Surface Engineering**

*Jaroslav Vlcek*, University of Western Bohemia, Czech Republic, "Pulsed Magnetron Sputtering Systems for Reactive Deposition of Oxide and Nitride Films"

### **SE5+SS Surface Engineering for Thermal Management**

*Gang Chen*, Massachusetts Institute of Technology, "Near-field Radiation Heat Transfer"

### **SE6 Advanced Surface Engineering Poster Session**

### **PS9+SE Atmospheric Plasma Processing and Micro Plasmas**

*Jan Benedikt*, Ruhr-Universität Bochum, Germany, "Deposition of SiO<sub>x</sub> Material by Means of Atmospheric Pressure Microplasma Jet: The Study of Deposition Mechanism"

### **PS14+SE Fundamentals of Pulsed Plasmas and Gas Breakdown**

*John Caughman*, Oak Ridge National Laboratory

## **TF11+SE Glancing Angle Deposition (GLAD) I**

*Motofumi Suzuki*, Kyoto University, Japan, "Progress in Glancing Angle Deposition Technology for Practical Applications"

**Applied Surface Science Division (AS)** Applied Surface Science is of major importance to innovation and manufacturing across a broad range of industrial sectors as well as fundamental research. The Applied Surface Science Division (AS) focuses on topics including quantitative surface analysis and data interpretation, practical surface analysis (e.g. insulators and challenging samples), recent developments and applications of techniques. We welcome original work in electron and optical spectroscopies, all aspects of surface mass spectrometry, multi-technique analysis and, this year, have a special emphasis on scanning probe microscopy in a joint session with Biomaterial Interfaces (BI) and Nanometer-scale Science & Technology (NS) Divisions. We welcome abstracts on techniques such as atom probe tomography and combined surface analysis with FIB to our 3D chemical analysis session. This year we are delighted to co-sponsor the BI plenary session with a theme of "Challenges in Biomaterials Analysis" as well as joint sessions on the characterization and functionalization of nanoparticles. We are excited to support the AVS Focus Topics on Spectroscopic Ellipsometry (EL), Helium Ion Microscopy (HI), *In Situ* Spectroscopy and Microscopy (IS), Tribology (TR) and Transparent Conductors and Printable Electronics (TC). Our popular annual poster session will cover all aspects of applied surface science. Students are encouraged to participate in the student presentation competition; both posters and oral presentations will be considered.

### **AS1 Quantitative Surface Chemical Analysis and Technique Development**

*Sven Tougaard*, University of Southern Denmark, "Characterization of Nano-structures from Analysis of the XPS Background: Automation and 3D-imaging"

### **AS2 Imaging and 3D Chemical Analysis**

*Takuya Miyayama*, ULVAC-PHI, Japan, "Recent Applications of GCIB Depth Profiling with XPS and TOF-SIMS"

*Wilfried Vandervorst*, IMEC, Belgium, "Advances in Probing 3D Semiconductor Structures"

### **AS3 Correlative Analysis - A Multi-technique Approach for Identification and Structure-Property Relationships**

*Kathryn G. Lloyd*, DuPont Corporate Center for Analytical Sciences, "Challenges with Multi-technique Correlation of Surface Analytical Methods"

### **AS4 Analysis of Insulators and Challenging Samples**

*Donald R. Baer*, Pacific Northwest National Laboratory, "Working with Difficult Samples - Preparation, Damage, Charging and Data Analysis"

### **AS5+BI Quantitative Chemical Analysis of Soft Materials and Biomaterials**

*Ralf Richter*, CIC biomaGUNE, Spain, "Surface-based Model Systems of Biomolecular Hydrogels - From Supramolecular Organization and Dynamics to Biological Function"

### **AS6+BI Nano-Object (including Nanoparticles) Chemical Characterization**

*Emile Schweikert*, Texas A&M University, "Characterization of Nano-objects by Cluster-SIMS"

### **AS7+BI+NS Advances in Scanning Probe Microscopy**

*Toshio Ando*, Kanazawa University, Japan, "High-Speed Atomic Force Microscopy for Filming Biomolecular Processes"

*Christopher Yip*, University of Toronto, Canada, "Advances in Characterizing Membranes and Cells using Atomic Force Microscopy"

### **AS8 Applied Surface Science Poster Session**

### **BI4+AS+NS+SS Surface Functionalization of Nanostructures**

*Holger Schönherr*, University of Siegen, Germany, "Surface Functionalization and Analysis of Functional "Soft" Nanostructures: From 2 to 3 Dimensions"

### **BI5+AS Characterization of Biomedical Materials**

### **BI7+AS Quantitative Analysis of Biomaterials**

*Erika Johnston*, Genzyme, "Industrial Biosurface Analysis: A Surfeit of New Frontiers"

### **BP1+AS Challenges in Biomaterials Analysis**

*David Castner*, University of Washington, "Wants, Needs, and Challenges in Biomedical Surface Analysis"

*Yves Dufrene*, Université catholique de Louvain, Belgium, "Nanoscale Surface Analysis of Living Cells using Atomic Force Microscopy"

*Alex Shard*, National Physical Laboratory, UK, "Depth Profiling and 3D Analysis of Organic Surfaces"

### **EL1+AS+TF+MS+EM+PS Spectroscopic Ellipsometry for Photovoltaics and Inorganic Thin Films**

*Dean Levi*, National Renewable Energy Laboratory, "Applications of Ellipsometry in Photovoltaics"

### **EL2+AS+TF+MS+EM+PS Spectroscopic Ellipsometry of Organic and Biological Materials**

*Klaus-Jochen Eichhorn*, Leibniz-Institut für Polymerforschung Dresden e.V., Germany, "Application of Various Spectroscopic Ellipsometry Techniques for *In Situ* Studies of Thin Polymer Films on Solid Substrates"

### **EL3+AS+TF+MS+EM+PS Spectroscopic Ellipsometry – Fundamentals, New Techniques, & Future Directions**

*James Hilfiker*, J.A. Woollam Co., Inc., "Current Trends and Future Outlook for Spectroscopic Ellipsometry"

### **HI1+AS Basics of Helium Ion Microscopy**

*David C. Bell*, Harvard University, "Applications of Helium Ion Microscopy"

*Colin A. Sanford*, Carl Zeiss, Inc., "Principles of Helium Ion Microscopy"

### **HI2+AS+BI+NS Nano- and Bio- Imaging with Helium Ion Microscopy**

*Daniel S. Pickard*, National University of Singapore, "Aspects of BioImaging"

*Hongzhou Zhang*, Trinity College, Ireland, "Imaging of Nanostructures"

### **IS1+AS+SS In Situ Surface Science Studies**

*Miquel Salmeron*, Lawrence Berkeley National Laboratory, "The Changing Structure of Surfaces When in Gaseous and Liquid Environments"

### **IS2+AS+SS In Situ Film Growth Studies**

*Guus Rijnders*, University of Twente, the Netherlands, "Real-time Growth Characterization using Atomic Force Microscopy"

### **IS3+AS In Situ Studies in Novel Environments**

*Niels De Jonge*, Vanderbilt University, "Imaging Whole Cells in Liquid with Scanning Transmission Electron Microscopy"

### **IS4+AS+SS In Situ Beam-Scattering Studies**

*Anatoly Frenkel*, Yeshiva University, "In Situ X-Ray Studies"

### **IS5+AS In Situ Studies of Structure & Mechanical Properties**

*Ian Robertson*, University of Illinois at Urbana-Champaign and National Science Foundation, "In Situ TEM Studies of Structural Evolution"

### **NM6+AS+MS Metrology for Nanomanufacturing**

*Dawn Bonnell*, University of Pennsylvania, "Local Probes Enabling Science and Manufacturing"

### **NT1+AS+MI Magnetic Thin Films and Multilayers**

*Thomas Brueckel*, Forschungszentrum Jülich, Germany

*Chris Leighton*, University of Minnesota, "Nanoscale Magnetic Phase Separation at the SrTiO<sub>3</sub>/La<sub>1-x</sub>Sr<sub>x</sub>CoO<sub>3</sub> Interface"

### **NT2+AS Neutron Scattering for Energy Conversion**

*Jerzy Chlistunoff*, Los Alamos National Laboratory, "Nafion-Carbon-Platinum Interfaces Studies using Neutron Scattering and Electrochemical Methods"

*Michael Kent*, Sandia National Laboratories

### **NT3+AS+BI Biological Interfaces, Membranes, Thin Films**

*Eva Y. Chi*, University of New Mexico

*Mike Reinschtedter*, McMaster University, Canada

### **TC1+AS Growth, Processing, and Characterization of Transparent Conductors**

*Su-Huai Wei*, National Renewable Energy Laboratory, "Multi-component Transparent Conducting Oxides: Progress in Materials Modeling"

### **TR2+AS+SS Atomic-scale Characterization of Tribological Interfaces**

*Michael Falk*, Johns Hopkins University, "Accelerated Molecular Dynamics Simulations of Tribological Interfaces"

In the tradition of the **Biomaterial Interfaces Division (BI)**, a broad technical program has been established that is focused on progress in biointerface science and engineering bringing together an interdisciplinary group of experts that work at the intersection of biosurface and interface science, the nanosciences, and biomedical engineering. The BID technical program for the week incorporates classical topics such as Cells at Interfaces (including stem cells, bacteria, etc.), Biomolecules at Interfaces (Protein, peptide, DNA and sugar interactions), Characterization of Biomedical Materials and Protein-Membrane Interactions. These sessions are designed to appeal to the core of the Biomaterials Interface Division by focusing on new developments in the key strengths that have appealed to our members, while also including some new ways of looking at these classic BI topics.

#### **BI1 Cells at Interfaces**

*Pieter Dorrestein*, University of California at San Diego, "Analysis of Cells at Interfaces"

*Todd McDevitt*, Georgia Institute of Technology, "Engineering Stem Cell Differentiation via Material Properties"

#### **BI2 Biomolecules at Interfaces**

*Rein Uljin*, University of Strathclyde, UK, "Enzyme-Responsive Surfaces"

#### **BI3 Protein-Membrane Interactions**

*Matthias Loesche*, Carnegie Mellon University, "Membrane Binding, Structure and Regulation of the PTEN Phosphatase"

#### **BI4+AS+NS+SS Surface Functionalization of Nanostructures**

*Holger Schönherr*, University of Siegen, Germany, "Surface Functionalization and Analysis of Functional "Soft" Nanostructures: From 2 to 3 Dimensions"

#### **BI5+AS Characterization of Biomedical Materials**

*Larry Salvati*, DePuy Orthopaedics, "Characterization of Biomedical Materials"

#### **BI6 Sensors and Fluidics for Biomedical Applications**

*Jennifer Shumaker-Perry*, University of Utah, "Combining Microfluidics and Plasmon Sensing to Assess Immunogenicity"

#### **BI7+AS Quantitative Analysis of Biomaterials**

*Erika Johnston*, Genzyme, "Industrial Biosurface Analysis: A Surfeit of New Frontiers"

#### **BI8 Biomaterial Interfaces Poster Session**

#### **AS5+BI Quantitative Chemical Analysis of Soft Materials and Biomaterials**

*Ralf Richter*, CIC biomaGUNE, Spain, "Surface-based Model Systems of Biomolecular Hydrogels - From Supramolecular Organization and Dynamics to Biological Function"

#### **AS6+BI Nano-Object (including Nanoparticles) Chemical Characterization**

*Emile Schweikert*, Texas A&M University, "Characterization of Nano-objects by Cluster-SIMS"

#### **AS7+BI+NS Advances in Scanning Probe Microscopy**

*Toshio Ando*, Kanazawa University, Japan, "High-Speed Atomic Force Microscopy for Filming Biomolecular Processes"

*Christopher Yip*, University of Toronto, Canada, "Advances in Characterizing Membranes and Cells using Atomic Force Microscopy"

#### **BN1+BI+MN Biofabrication Methods and Devices**

*David Kaplan*, Tufts University

*Jeffrey Morgan*, Brown University / Rhode Island Hospital

#### **BN2+BI+MN Biofabrication Applications**

*William Bentley*, University of Maryland

*Michael Shuler*, Cornell University

#### **HI2+AS+BI+NS Nano- and Bio- Imaging with Helium Ion Microscopy**

*Daniel S. Pickard*, National University of Singapore, "Aspects of BioImaging"

*Hongzhou Zhang*, Trinity College, Ireland, "Imaging of Nanostructures"

#### **MB2+BI+PS Marine Antifouling Coatings**

*John Schetz*, University of North Texas Health Science Center, "Advances in Sustainable Technologies for the Prevention of Marine Biofouling"

### **NT3+AS+BI Biological Interfaces, Membranes, Thin Films**

*Eva Y. Chi*, University of New Mexico

*Mike Reinschtedter*, McMaster University, Canada

### **PS12+BI Plasmas for Medicine and Biological Applications**

The **Electronic Materials and Processing Division (EM)** sponsors sessions on electronic materials synthesis, processing, characterization, and structure-property relationships. Abstracts are solicited pertaining to a wide range of inorganic and organic electronic materials, ranging from conductors to semiconductors to dielectrics and insulators. Sessions on electronic material surfaces and self-assembled monolayers, defects in electronic materials, hybrid and organic films, nanowire devices, and semiconductor growth are planned. Sessions on high-k, low-k, and memory dielectrics will be a special feature this year, and new sessions on emerging electronic materials, such as topological insulators and next-generation electronics will highlight cutting-edge research. In addition, EM is sponsoring a separate focus topic on transparent conductors and printable electronics, and is co-sponsoring sessions on photonics and plasmonic materials and in the Energy Frontiers and Graphene focus topics.

#### **EM1+TF Activation and Deactivation of Surfaces with Self-assembled Monolayers**

*W. Grant McGimpsey*, Worcester Polytechnic Institute, "Chemical Modification of Surfaces for Biological Applications"

#### **EM2 Defects in Electronic Materials**

*Leonard J. Brillson*, The Ohio State University, "Controlling Schottky Barriers and Doping with Native Point Defects"

#### **EM3 Hybrid and Organic Electronic Materials**

*Seong-Il Im*, Yonsei University, Korea, "Organic/Oxide Hybrid Thin-Film Applications for Photo-detector Cells and Complementary Inverters"

*Manuel Quevedo*, University of Texas at Dallas, "Hybrid Organic/Inorganic Materials and Devices for Flexible Electronics Applications"

#### **EM4+TF High-k Dielectrics**

*Marc Heynes*, IMEC, Belgium, "High Mobility Channel Materials and Novel Devices for Scaling of Nanoelectronics beyond the Si Roadmap"

*Minghwei Hong*, National Tsing Hua University, Taiwan, "Research Advances on III-V and Ge MOSFETs Beyond Si CMOS"

*Paul McIntyre*, Stanford University, "Bilayer Gate Stacks for High-k Gates on Ge and InGaAs"

*Eric Vogel*, University of Texas at Dallas, "A Comprehensive Electro-physical Model for the Mobility of In<sub>0.53</sub>Ga<sub>0.47</sub>As Surface Channel MOSFETs"

#### **EM5 Memory Dielectrics**

*Cheol-Seong Hwang*, Seoul National University, Korea, "Johnson-Mehl-Avrami Type Kinetic Model for Resistance Switching in TiO<sub>2</sub>"

*Derchang Kau*, Intel Corp., "A Survey of Cross Point Phase Change Memory Technologies"

*Gabriel Molas*, CEA LETI, France, "Charge Trap Memories and 3D Approaches"

*Kang Wang*, UCLA, "Oxides for Spintronics"

#### **EM6 Low-k Dielectrics**

*George Antonelli*, Novellus Systems, Inc., "Advanced Pre-Treatments and Low-k Dielectric Barrier Technology for Beyond 2x nm Node"

*Reinhold Dauskardt*, Stanford University, "Molecular Strengthening Mechanisms for Low-k Dielectrics"

*Al Grill*, IBM T.J. Watson Research Center, "Ultralow-k PECVD pSiCOH Dielectrics and their Implementation in VLSI Interconnects"

*Tony Heinz*, Columbia University, "Electric and Optical Characterization of Leakage and Breakdown in Low-k Dielectric Materials"

## **EM7 Dielectrics for Novel Devices and Process Integration**

*Mihaela Balseanu*, Applied Materials Inc., "Boron Nitride Development and New Applications for sub-20nm Device Fabrications"

*Tetsuo Endoh*, Tohoku University, Japan, "Impact of Vertical Structured Devices for Future Nano LSI"

*Alan Seabaugh*, University of Notre Dame, "Interface Traps and Low Subthreshold Swing in III-V Tunnel FETs"

*Do Yeung Yoon*, Seoul National University, Korea, "Novel Polysilsesquioxane Systems for Ultralow-Dielectric Films with High Modulus, Low CTE, and Closed-Pore Morphology"

## **EM8 Interfaces and Transport in Semiconductor Materials**

### **EM9+NS Nanowire Electronic Devices**

*Lars-Erik Wernersson*, Lund University, Sweden

### **EM10 Topological Insulators**

*M. Zahid Hasan*, Princeton University, "Bulk Topological Insulators and Superconductors: Discovery and the Frontier"

### **EM11 Next Generation Electronics**

*Tomas Palacios*, Massachusetts Institute of Technology, "High Frequency Electronics based on GaN and Graphene"

### **EM12 Semiconductor Growth**

### **EM13+SS Structure and Morphology of Electronic Material Surfaces**

### **EM14 Electronic Materials and Processing Poster Session**

### **EL1+AS+TF+MS+EM+PS Spectroscopic Ellipsometry for Photovoltaics and Inorganic Thin Films**

*Dean Levi*, National Renewable Energy Laboratory, "Applications of Ellipsometry in Photovoltaics"

### **EL2+AS+TF+MS+EM+PS Spectroscopic Ellipsometry of Organic and Biological Materials**

*Klaus-Jochen Eichhorn*, Leibniz-Institut für Polymerforschung Dresden e.V., Germany, "Application of Various Spectroscopic Ellipsometry Techniques for *In Situ* Studies of Thin Polymer Films on Solid Substrates"

### **EL3+AS+TF+MS+EM+PS Spectroscopic Ellipsometry – Fundamentals, New Techniques, & Future Directions**

*James Hilfiker*, J.A. Woollam Co., Inc., "Current Trends and Future Outlook for Spectroscopic Ellipsometry"

### **EN9+EM+NS Nanostructured Materials for Third Generation Solar Cells**

*Sheila Bailey*, NASA Glenn

### **EN11+EM+NS Nanowire Solar Cells**

*Michael Filler*, Georgia Institute of Technology

*Ali Javey*, University of California Berkeley

### **ET1+EM+SS Quantum Transport: Fundamentals**

*Shuji Hasegawa*, University of Tokyo, Japan, "Multi-Probe STM Study of 2-D Transport on Surface State"

### **ET2+NS+EM Nanoelectronics, Interconnect, and Energy Applications**

*Hanno H. Weitering*, University of Tennessee, "1-D Transport in Atomic Structures"

### **ET4+EM+NS New Developments in Transport Theory and Techniques**

*Art Baddorf*, Oak Ridge National Laboratory, "Domain Wall Transport in Ferroelectric Materials"

*Harold Baranger*, Duke University, "Quantum Phase Transition and Emergent Symmetry in a Quadruple Quantum Dot System"

### **GR2+EM Graphene: Optical Properties, Optoelectronics, Photonics and Transparent Electronics**

*Andrea Ferrari*, University of Cambridge, UK

### **GR9+MS+EM Graphene Device Manufacturing**

*Ji Ung Lee*, University at Albany

*Chun-yung Sung*, IBM Research

### **GR10+EM Dielectrics on Graphene, Graphene Transfer to Novel Substrates**

### **SS8+EM Semiconductor Surfaces**

*Andrew Kummel*, University of California, San Diego, "An Atomic View of ALD of Dielectrics on Semiconductors Using STM"

#### **TF4+EM ALD/MLD: Hybrid Organic Films**

*Mato Knez*, Max Planck Institute of Microstructure Physics, Germany, "Hybrid Materials by Vapor Phase Infiltration"

*Myung Mo Sung*, Hanyang University, Korea, "Vapor-Phase Fabrication of Organic-Inorganic Hybrid Thin Films Using Molecular Layer Deposition with Atomic Layer Deposition"

#### **TF8+EM Nanostructuring Thin Films**

*Carl Thompson*, Massachusetts Institute of Technology, "Templated Solid-State Dewetting for Patterning of Films"

#### **TF12+EM+SS Applications of Self Assembled Monolayers**

*Nitin Chopra*, University of Alabama, "Development of Nanoscale Heterostructures: from Single Component Nanostructures to Multicomponent Nanosystems"

*Han Zuilhof*, University of Wageningen, the Netherlands, "Organic Monolayers on Silicon-rich Substrates: Methods and Mechanisms"

The **Magnetic Interfaces and Nanostructures Division (MI)** program features pioneering, controversial, introductory and emerging results in topical areas related to magnetic interfaces and nanostructures. The 2011 MI program topics include: (1) fundamental problems in magnetism (e.g., are half-metals half-metallic, reduced dimensionality, accounting for and understanding d and f correlation); (2) the forefront of topological insulators; (3) future spintronics, magnetoelectrics, Rashba interactions and all things multiferroic; (4) new pumps and probes in magnetic imaging and characterization. The 2011 program highlights electron spin related phenomena at the crossroad of basic and applied. We are also co-sponsoring the Actinides and Rare Earths Focus Topic (AC), the Neutron Scattering Focus Topic (NS) and the Spins in Graphene and Related Materials Focus Topic (GR). Noted invited speakers anchor each of these topics and topical conferences. The Magnetic Interfaces and Nanostructures Division will be selecting the best graduate student presentation from three finalists for the Leo Falicov Award. The winner of this award will be announced during the break of the Thursday morning session. The division will also offer an award for postdoctoral fellows who will be presenting MIND papers at this year's International Symposium.

#### **MI1 Fundamental Problems in Magnetism**

*Mairbek Chshiev*, CEA LETI, France

*Claudia Felser*, University of Mainz, Germany

#### **MI2 Topological Insulators and Rashba Interactions**

*Elio Vescovo*, Brookhaven National Laboratory

*Qi-Kun Xue*, Tsinghua University, China, "Low Temperature Scanning Tunneling Microscopy of Magnetically Doped Topological Insulators"

#### **MI3 Spintronics, Magnetoelectronics, Multiferroics, and Dilute Magnetic Semiconductor Applications**

*Kirill Belashchenko*, University of Nebraska-Lincoln

*William Butler*, The University of Alabama

#### **MI4 Emerging Pumps and Probes in Magnetic Imaging and Characterization**

*Chi-Chang Kao*, Stanford University

*Thomas Z. Ward*, Oak Ridge National Laboratory, "Controlling Electronic Phase Separation in Strongly Correlated Systems with Ferromagnetic Nanodots"

#### **MI5 Magnetic Interfaces and Nanostructures Poster Session**

#### **AC1+MI Magnetic and Electron Correlation Effects in Actinides and Rare Earths**

*G. Malcolm Stocks*, Oak Ridge National Laboratory, "Recent Work on Magnetism, Actinides and Defects at ORNL"

#### **GR4+MI Graphene: Magnetic Properties and Spintronics**

*Klaus Kern*, Max-Planck-Institut für Festkörperforschung, Germany

#### **NT1+AS+MI Magnetic Thin Films and Multilayers**

*Thomas Brueckel*, Forschungszentrum Jülich, Germany

*Chris Leighton*, University of Minnesota, "Nanoscale Magnetic Phase Separation at the SrTiO<sub>3</sub>/La<sub>1-x</sub>Sr<sub>x</sub>CoO<sub>3</sub> Interface"

The **MEMS and NEMS Technology Group (MN)** program will highlight recent advances in emerging areas of micromechanical systems at the micro and nanoscale ranging from fundamental studies of functional, integrated

devices to novel applications of micro and nanoelectromechanical systems (MEMS/NEMS). The ability to collectively manipulate, control and detect vibrational dynamics of MEMS/NEMS raises intriguing possibilities of integrating these devices with existing fluidic, electronic and optical on-chip networks. This year's session will cover these areas which are thematically related to multi-scale interaction of materials with focus directed towards lithography, pattern transfer and fabrication at the micro- and nano-scale, along with integration and packaging of MEMS and NEMS and characterization for MEMS and NEMS. Additionally, applications of MEMS and NEMS devices in the sensing arena by employing local biochemically functionalized nanoscale sites on surface of NEMS oscillator arrays for selective biomolecular adsorption, integration with active CMOS architectures for RF-MEMS applications, high Q-resonant dynamics in air, nanoscale vibrational mass sensing using fluidic resonators, ultrananocrystalline diamond nanowires and thin film nanostructuring, deep silicon etching for device fabrication and packaging, parametric excitation and nonlinear dynamics, integrated gas chromatography system, and advanced nanofabrication techniques are the core topics of discussions.

**MN1 Multi-scale Interactions of Materials and Fabrication at the Micro- and Nano-scale**

*Daniel Lopez, Argonne National Laboratory*

**MN2 Integration and Packaging of MEMS and NEMS**

*Chris Gudeman, Innovative Micro Technology (IMT)*

**MN3 Characterization for MEMS and NEMS**

*Horacio Espinosa, Northwestern University*

**MN4 Innovations in Lithography and Patterning for Nanosystems**

*Michael Guillorn, IBM TJ Watson Research Center*

**MN5 MEMS and NEMS Poster Session**

**BN1+BI+MN Biofabrication Methods and Devices**

*David Kaplan, Tufts University*

*Jeffrey Morgan, Brown University / Rhode Island Hospital*

**BN2+BI+MN Biofabrication Applications**

*William Bentley, University of Maryland*

*Michael Shuler, Cornell University*

**GR5+MN Graphene: Mechanical and Thermal Properties, Graphene MEMS and NEMS**

*Paul McEuen, Cornell University*

**PS10+MN Plasma Processing for 3D Integration, TSV, and MEMS**

*Yasuhiro Morikawa, ULVAC, Inc., Japan, "Scallop Free TSV Etching Method For 3-D LSI Integration"*

**VT6+MN+NS+MS Vacuum Technology for the Next Generation Nanofabrication and Graphene Physics**

*Joseph A. Stroscio, National Institute of Standards and Technology, "New UHV Low Temperature Scanning Probe Microscopy (SPM) Facility for the Study of Future Electronic Materials"*

This year, **Manufacturing Science and Technology Group (MS)** will primarily focus on manufacturing aspects of a variety of technology areas. These include areas that MSTG has worked in previously such as carbon based nanoelectronic devices, especially on graphene and in in-line measurements. This year, MSTG adds two new topical areas: photovoltaic materials and applications of ALD technology. We will discuss different solar cell substrate selection and current development status including CIGS, CdTe, II-V, flexible Si, and organic materials. The manufacturing issues will also be addressed in the PV manufacturing session of the Energy Frontier focus topic. ALD technology session will have different industry experts and academia to present the recent ALD process development, manufacturing process control, and tool design concepts. We are co-sponsoring a session on „Graphene Nanoelectronics“ with the Graphene Focus Topic.

**MS1+NM What is Needed to use ALD for Manufacturing?**

*Steven George, University of Colorado at Boulder, "Atomic Layer Deposition for Continuous Roll-to-Roll Processing"*

**MS2 ALD Tool for Manufacturing**

*Brian Lu, AIXTRON*

**MS3 ALD Manufacturing Control Issues**

*Gert Leusink, Tokyo Electron America Inc.,*

**MS4 Manufacturing Science and Technology Poster Session**

**EL1+AS+TF+MS+EM+PS Spectroscopic Ellipsometry for Photovoltaics and Inorganic Thin Films**

*Dean Levi, National Renewable Energy Laboratory, "Applications of Ellipsometry in Photovoltaics"*

**EL2+AS+TF+MS+EM+PS Spectroscopic Ellipsometry of Organic and Biological Materials**

*Klaus-Jochen Eichhorn, Leibniz-Institut für Polymerforschung Dresden e.V., Germany, "Application of Various Spectroscopic Ellipsometry Techniques for *In Situ* Studies of Thin Polymer Films on Solid Substrates"*

**EL3+AS+TF+MS+EM+PS Spectroscopic Ellipsometry – Fundamentals, New Techniques, & Future**

**Directions**

*James Hilfiker, J.A. Woollam Co., Inc., "Current Trends and Future Outlook for Spectroscopic Ellipsometry"*

**EN18+MS Photovoltaics Manufacturing**

*Salah Bedair, North Carolina State University*

*Bob Conner, Semprius*

*Pradeep Haldar, University at Albany SUNY*

*Eric Seymour, Advanced Energy Industries, Inc.*

**GR9+MS+EM Graphene Device Manufacturing**

*Ji Ung Lee, University at Albany*

*Chun-yung Sung, IBM Research*

**NM1+MS Challenges Facing Nanomanufacturing (All Invited Session)**

*John Busbee, Wright-Patterson Air Force Base*

*Mihail Roco, National Science Foundation*

*Mark Tuominen, University of Massachusetts Amherst*

**NM2+TF+MS Materials Processes for Nanomanufacturing**

*Rod Ruoff, The University of Texas at Austin, "Large-scale Graphene: Challenges and Progress"*

*Brian E. Goodlin, Texas Instruments*

**NM3+MS+NS Manufacturable Nanoscale Devices**

*Teri Odom, Northwestern University, "A SANE Approach to Programmable Soft Lithography"*

**NM4+NS+MS+TF Directed Assembly for Nanomanufacturing**

*Paul F. Nealey, University of Wisconsin, "Advancing the Lithographic Process for Nanomanufacturing using Self-Assembling Block Copolymers"*

**NM5+MS Environmental Concerns in Nanomanufacturing**

*Vicki Colvin, Rice University*

**NM6+AS+MS Metrology for Nanomanufacturing**

*Dawn Bonnell, University of Pennsylvania, "Local Probes Enabling Science and Manufacturing"*

**VT6+MN+NS+MS Vacuum Technology for the Next Generation Nanofabrication and Graphene Physics**

*Joseph A. Stroscio, National Institute of Standards and Technology, "New UHV Low Temperature Scanning Probe Microscopy (SPM) Facility for the Study of Future Electronic Materials"*

The **Nanometer-scale Science and Technology Division (NS)** explores the exciting and rapidly evolving science and technology enabled by nanoscale structures. Researchers from around the globe will present their work on topics ranging from fabricating atomically precise devices to exploiting nano-scale control of materials for biological applications and to control light. Multiple themes are explored such as assembly of nanoparticles and nanowires, biomimetic and hierarchical patterning over multiple length scales, and the challenges of characterizing such structures. We have invited nine speakers who will provide perspective from the forefront of their respective fields and will highlight the sessions on frontiers of imaging and characterization at the nanoscale, nanowires and nanoparticles: synthesis and characterization, nanowires and nanoparticles: assembly, applications, and devices, carbon-based nanomaterials, nanomaterials and interfaces in biological systems, nanoscale device fabrication, testing, and manufacturing, nanophotonics and plasmonics, and biomimetic and hierarchical patterning. Additional co-sponsored sessions cover the areas of nanostructures for energy conversion, nanostructures for energy storage, nanomechanics and nanotribology, graphene chemistry, graphene nanoribbons, organic photovoltaics, and in-situ scanning probe microscopy and spectroscopy.

**NS1 Nanoscale Device Fabrication, Testing and Manufacture**

*Stanley Williams, Hewlett-Packard Research Labs, "Memresistance and Negative Differential Resistance in Nanoscale Electronic Devices"*

**NS2 Nanowires and Nanoparticles I: Characterization and Synthesis**

*Lars Samuelson*, Lund University, Sweden, "Semiconductor Nanowires: From Materials Physics to Devices"

**NS3 Nanowires and Nanoparticles II: Assembly and Applications**

*Theresa Mayer*, Pennsylvania State University, "Adding New Capabilities to Silicon CMOS via Deterministic Nanowire Assembly"

**NS4 Carbon-Based Nanomaterials**

*Phaedon Avouris*, IBM T.J. Watson Research Center, "Carbon-Based Electronics and Optoelectronics"

**NS5 Frontiers in Nanoscale Imaging and Characterization**

*Donald Eigler*, IBM Almaden Research Center, "Spin Excitation Spectroscopy"

**NS6 Biomimetic and Hierarchical Patterning**

*Stanislav Gorb*, University of Kiel, Germany, "Biological and Biomimetic Attachment Devices: What Can We Learn from Evolution"

**NS7 Frontiers in Nanophotonics and Plasmonics**

*Evelyn Hu*, Harvard University, "Gap-Mode Plasmonic Cavities"

**NS8 Molecular Assembly and Devices**

*Latha Venkataraman*, Columbia University, "Electronics and Mechanics of Single Molecule Circuits"

**NS9 Nanomaterials and Interfaces in Biological Systems**

*Weiwei Gao*, Harvard-MIT Health Science & Technology, "Combined Chemical and Biological Approaches to Enhance Nanoparticle Drug Delivery"

**NS10 Nanometer Scale Science and Technology Poster Session**

**AS7+BI+NS Advances in Scanning Probe Microscopy**

*Toshio Ando*, Kanazawa University, Japan, "High-Speed Atomic Force Microscopy for Filming Biomolecular Processes"

*Christopher Yip*, University of Toronto, Canada, "Advances in Characterizing Membranes and Cells using Atomic Force Microscopy"

**BI4+AS+NS+SS Surface Functionalization of Nanostructures**

*Holger Schönherr*, University of Siegen, Germany, "Surface Functionalization and Analysis of Functional "Soft" Nanostructures: From 2 to 3 Dimensions"

**EM9+NS Nanowire Electronic Devices**

*Lars-Erik Wernersson*, Lund University, Sweden

**EN9+EM+NS Nanostructured Materials for Third Generation Solar Cells**

*Sheila Bailey*, NASA Glenn

**EN11+EM+NS Nanowire Solar Cells**

*Michael Filler*, Georgia Institute of Technology

*Ali Javey*, University of California Berkeley

**EN12+NS Organic Photovoltaics**

*Marc Baldo*, MIT, "Excitonic Antennas for Solar Cells"

**EN13+NS Nanostructures for Energy Storage and Fuel Cells**

*Khalil Amine*, Argonne National Laboratory, "Nanostructured Anodes and Cathodes for Improved Power and Energy Density for Automotive Applications"

*Jianyu Huang*, Sandia National Laboratories, "In Situ Observation of Battery Operation at Atomic Resolution"

*Fritz Prinz*, Stanford University

*Andreas Stein*, University of Minnesota, "Templating of Porous Materials for Energy Storage and Generation"

**EN14+NS Nanostructured Materials for Thermophotovoltaics, Thermoelectrics & Plasmonics**

*Rana Biswas*, Iowa State University & Ames Laboratory U.S. D.O.E., "Photonic and Plasmonic Crystals for Thermophotonics and Energy Conversion"

*David Norris*, ETH Zurich, Switzerland

*Rachel Segalman*, University of California Berkeley

*Dmitri Talapin*, University of Chicago, "Design of Nanostructured Thermoelectric Materials by Self-Assembly of Colloidal Nanocrystals and Molecular Metal Chalcogenide Linkers"

### **EN15+NS Ultrafast Charge and Energy Transfer in Nanomaterials**

*Victor Klimov*, Los Alamos National Laboratory

*William Tisdale*, MIT

*Emily Weiss*, Northwestern University, "Mechanisms of Heterogeneous Charge Transfer at the Quantum Dot-Organic Interface"

### **ET2+NS+EM Nanoelectronics, Interconnect, and Energy Applications**

*Hanno H. Weitering*, University of Tennessee, "1-D Transport in Atomic Structures"

### **ET3+NS+GR Transport Spectroscopy in Carbon-based Nanostructures**

*Stephen Cronin*, University of Southern California, "Transport and Raman of Nanotubes"

*Philip Kim*, Columbia University, "Electron Transport in Graphene Nanoribbon"

### **ET4+EM+NS New Developments in Transport Theory and Techniques**

*Art Baddorf*, Oak Ridge National Laboratory, "Domain Wall Transport in Ferroelectric Materials"

*Harold Baranger*, Duke University, "Quantum Phase Transition and Emergent Symmetry in a Quadruple Quantum Dot System"

### **GR7+NS+PS+SS Graphene: Surface Chemistry, Functionalization, Plasma Processing and Sensor Applications**

*Jeremy Robinson*, U.S. Naval Research Laboratory

### **GR8+TF+NS Graphene Nanoribbons and Related Structures**

*Michael Arnold*, University of Wisconsin-Madison

*Klaus Mullen*, Max Planck Institute for Polymer Research, Germany

### **HI2+AS+BI+NS Nano- and Bio- Imaging with Helium Ion Microscopy**

*Daniel S. Pickard*, National University of Singapore, "Aspects of BioImaging"

*Hongzhou Zhang*, Trinity College, Ireland, "Imaging of Nanostructures"

### **NM3+MS+NS Manufacturable Nanoscale Devices**

*Teri Odom*, Northwestern University, "A SANE Approach to Programmable Soft Lithography"

### **NM4+NS+MS+TF Directed Assembly for Nanomanufacturing**

*Paul F. Nealey*, University of Wisconsin, "Advancing the Lithographic Process for Nanomanufacturing using Self-Assembling Block Copolymers"

### **TC2+NS Printable Electronics**

*John Wager*, Oregon State University, "Amorphous Oxide Semiconductor Thin-Film Transistors"

### **VT6+MN+NS+MS Vacuum Technology for the Next Generation Nanofabrication and Graphene Physics**

*Joseph A. Stroscio*, National Institute of Standards and Technology, "New UHV Low Temperature Scanning Probe Microscopy (SPM) Facility for the Study of Future Electronic Materials"

The **Plasma Science and Technology Division (PS)** program highlights state-of-the-art advances in plasma research, ranging from fundamental studies of plasma physics and chemistry to new applications in plasma processing. Abstracts describing novel research are being solicited in the areas of plasma etching and deposition, plasma modeling, plasma-surface interactions, plasma sources, 3-D integration (including TSV and MEMS), and plasma diagnostics, sensors and control. One may also choose to present emerging work that focuses on atomic layer or neutral beam processing, atmospheric pressure plasmas, microplasmas, liquids and multiphase discharges, medical and biological applications of plasma science. After a successful second year, we are excited to continue offering a session on "Plasma Processing for Photovoltaics" in conjunction with the Energy Frontiers Focus Topic. We are participating in three new Focus Topics: "Spectroscopic Ellipsometry", "Marine Biofouling" and "Graphene and Related Materials". In addition to the oral sessions, abstracts may be submitted to the poster session, which provides an excellent opportunity for one-on-one discussion of new results with colleagues.

### **PS1 Advanced BEOL / Interconnect Etching**

*Masanaga Fukasawa*, Sony Corporation, Japan, "Surface Reaction Control in Hydrogen-Containing Plasma"

*Eric A. Hudson*, Lam Research Corp.

### **PS2 Advanced FEOL / Gate Etching**

*Maxime Darnon*, CNRS-LTM, France

*Deirdre Olynick*, Lawrence Berkeley National Laboratory

**PS3+SS Plasma Surface Interactions (Fundamentals & Applications)**

*Eray S. Aydil*, University of Minnesota

*Takeshi Kitajima*, National Defense Academy, Japan

**PS4 Plasma Diagnostics, Sensors and Control**

*Ed Barnat*, Sandia National Laboratories

**PS5 Plasma Modeling**

*Natalia Yu Babaeva*, University of Michigan, Ann Arbor, "Challenges of Plasma Modeling in Biology and Medicine: What Insights Can You Expect?"

**PS6 Plasma Sources**

*Lee Chen*, Tokyo Electron America Inc.

**PS7 Neutral Beam and Low Damage Processing**

*Seiji Samukawa*, Tohoku University, Japan

**PS8+TF Plasma Deposition and Plasma Enhanced ALD**

*Colin Wolden*, Colorado School of Mines, "Plasma Deposition of Carbide-based Membranes for High Temperature H<sub>2</sub> Separations"

**PS9+SE Atmospheric Plasma Processing and Micro Plasmas**

*Jan Benedikt*, Ruhr-Universität Bochum, Germany, "Deposition of SiO<sub>x</sub> Material by Means of Atmospheric Pressure Microplasma Jet: The Study of Deposition Mechanism"

**PS10+MN Plasma Processing for 3D Integration, TSV, and MEMS**

*Yasuhiro Morikawa*, ULVAC, Inc., Japan, "Scallop Free TSV Etching Method For 3-D LSI Integration"

**PS11+TF Plasma Processing for Non-Volatile Memory Materials**

*Mark Kiehlbauch*, Micron Technology

**PS12+BI Plasmas for Medicine and Biological Applications**

**PS13 Multiphase (Liquid, Solid, Gas) Plasmas**

*Peter Bruggeman*, Eindhoven University of Technology, the Netherlands, "Water Containing Non-Equilibrium Atmospheric Pressure Plasmas"

**PS14+SE Fundamentals of Pulsed Plasmas and Gas Breakdown**

*John Caughman*, Oak Ridge National Laboratory

**PS15 Plasma Science and Technology Poster Session**

**EL1+AS+TF+MS+EM+PS Spectroscopic Ellipsometry for Photovoltaics and Inorganic Thin Films**

*Dean Levi*, National Renewable Energy Laboratory, "Applications of Ellipsometry in Photovoltaics"

**EL2+AS+TF+MS+EM+PS Spectroscopic Ellipsometry of Organic and Biological Materials**

*Klaus-Jochen Eichhorn*, Leibniz-Institut für Polymerforschung Dresden e.V., Germany, "Application of Various Spectroscopic Ellipsometry Techniques for *In Situ* Studies of Thin Polymer Films on Solid Substrates"

**EL3+AS+TF+MS+EM+PS Spectroscopic Ellipsometry – Fundamentals, New Techniques, & Future Directions**

*James Hilfiker*, J.A. Woollam Co., Inc., "Current Trends and Future Outlook for Spectroscopic Ellipsometry"

**EN4+PS Plasmas for Photovoltaics & Energy Applications**

*Erwin Kessels*, Eindhoven University of Technology, the Netherlands, "Novel Plasma-enhanced CVD and ALD Processes for c-Si Photovoltaics"

*Seokjae Yoo*, National Fusion Research Institute, Korea

**GR7+NS+PS+SS Graphene: Surface Chemistry, Functionalization, Plasma Processing and Sensor Applications**

*Jeremy Robinson*, U.S. Naval Research Laboratory

**MB2+BI+PS Marine Antifouling Coatings**

*John Schetz*, University of North Texas Health Science Center, "Advances in Sustainable Technologies for the Prevention of Marine Biofouling"

**SE1+PS Atmospheric Pressure Plasmas**

*Michael Kong*, Longborough University, UK, "Cold Atmospheric Plasma Sources for Surface Treatment"

**SE4+PS Pulsed Plasmas in Surface Engineering**

*Jaroslav Vlcek*, University of Western Bohemia, Czech Republic, "Pulsed Magnetron Sputtering Systems for Reactive Deposition of Oxide and Nitride Films"

The **Surface Science Division (SS)** provides a forum for cutting-edge research that involves solid surfaces and interfaces. Phenomena that take place at the gas-solid and liquid-solid interfaces are prominent within the Division programs. Technical sessions address atomistic, electronic and chemical phenomena at surfaces and interfaces, their impact on materials properties, and their implication for technology and environmental processes. Surface Chemistry is an important divisional theme, encompassing the kinetics and dynamics of surface chemical events from adsorption and reaction to catalysis. Film growth is another key theme, explored from a fundamental perspective, through the development of new growth and processing methods for materials preparation. Surface chemical modification is an important focus, as is the interaction of surfaces with radiation, energetic species and charged particles. Lively sessions are devoted to the surface science of newly discovered materials and their emergent properties, as well as the metallic, semiconductor, oxide and organic surfaces that support unique chemical activity and electronic properties. Surface science applications in high-impact areas - particularly energy science, nanotechnology, and environmental science - are highlighted in the program. This Division's overarching goal is to provide the atomistic insights on solid surfaces and interfaces needed to advance our understanding of materials systems and benefit society. We are co-sponsoring a session on „Surface Science of Low-Dimensional Carbon“ with the Graphene Focus Topic.

#### **SS1 Chemisorption & Surface Reaction**

*Bjoerk Hammer*, University of Aarhus, Denmark, "Dynamics in Chemisorption & Self Assembly"

*Martin Sterrer*, Fritz-Haber-Institut der Max-Planck-Gesellschaft, Germany, "Charge-Mediated Chemisorption on Supported Clusters"

#### **SS2 Reactivity & Selectivity on Catalyst Surfaces**

*D. Wayne Goodman*, Texas A & M University, "Catalytically Active Au Nanoparticles"

*Manos Mavrikakas*, University of Wisconsin-Madison, "The Role of Hydrogen in Heterogeneously Catalyzed Reactions"

#### **SS3 Surface Chemical Dynamics**

*Karina Morgenstern*, University of Hannover, Germany, "STM Insights on Single-Molecule Dynamics"

#### **SS4 Atomistic Processes in Nucleation & Growth**

*Norman Bartelt*, Sandia National Laboratories, "Carbon Diffusion in the Growth of Epitaxial Graphene"

#### **SS5 Oxide Surface Structure & Reactivity**

*Susannah Scott*, University of California, Santa Barbara, "Electronic Structure of Oxide-Supported Catalysts under Reaction"

#### **SS6 Organic Electronic Interfaces, "The Effect of Structure on Interfacial Energy"**

#### **SS7 Self Assembly & Surface Functionalization**

*Trolle Linderoth*, University of Aarhus, Denmark, "Conformational chirality, chiral switching and chiral induction in self-assembled molecular structures"

*Steven L. Tait*, Indiana University, "Structural Analysis and Electronic Properties of Negatively Charged TCNQ: 2D Networks"

#### **SS8+EM Semiconductor Surfaces**

*Andrew Kummel*, University of California, San Diego, "An Atomic View of ALD of Dielectrics on Semiconductors Using STM"

#### **SS9 Water Films & Environmental Interfaces**

*John Hemminger*, University of California, Irvine, "Composition and Chemistry at the Liquid/Vapor Interface of Aqueous Solutions: Liquid-Jet XPS Experiments Coupled with MD Simulations"

*Bruce Kay*, Pacific Northwest National Laboratory, "Diffusivity in Supercooled Water Films"

#### **SS10 Electrochemical and Liquid-Solid Interfaces**

*Klaus Wandelt*, University of Bonn, Germany, "Redox Activity & Structural Transitions at Electrochemical Interfaces"

#### **SS11+GR Surface Science of Low-Dimensional Carbon**

*Yves Chabal*, University of Texas, Dallas, "Infrared Tracking of Oxidation at Graphene Surfaces"

#### **SS12 Ferroelectric Surfaces**

*Eric Altman*, Yale University, "Polarization Dependence of the Surface and Interfacial Chemistry of Ferroelectric Oxides"

#### **SS13 Surface Science Poster Session**

## **AC2+SS The Surface Science of Actinides and Rare Earths**

*David Pugmire*, Los Alamos National Laboratory, "Oxidation of Pu and Actinide Materials"

## **BI4+AS+NS+SS Surface Functionalization of Nanostructures**

*Holger Schönherr*, University of Siegen, Germany, "Surface Functionalization and Analysis of Functional "Soft" Nanostructures: From 2 to 3 Dimensions"

## **EM13+SS Structure and Morphology of Electronic Material Surfaces**

### **ET1+EM+SS Quantum Transport: Fundamentals**

*Shuji Hasegawa*, University of Tokyo, Japan, "Multi-Probe STM Study of 2-D Transport on Surface State"

## **GR7+NS+PS+SS Graphene: Surface Chemistry, Functionalization, Plasma Processing and Sensor**

### **Applications**

*Jeremy Robinson*, U.S. Naval Research Laboratory

## **IS1+AS+SS In Situ Surface Science Studies**

*Miquel Salmeron*, Lawrence Berkeley National Laboratory, "The Changing Structure of Surfaces When in Gaseous and Liquid Environments"

## **IS2+AS+SS In Situ Film Growth Studies**

*Guus Rijnders*, University of Twente, the Netherlands, "Real-time Growth Characterization using Atomic Force Microscopy"

## **IS4+AS+SS In Situ Beam-Scattering Studies**

*Anatoly Frenkel*, Yeshiva University, "In Situ X-Ray Studies"

## **PS3+SS Plasma Surface Interactions (Fundamentals & Applications)**

*Eray S. Aydil*, University of Minnesota

*Takeshi Kitajima*, National Defense Academy, Japan

## **SE5+SS Surface Engineering for Thermal Management**

*Gang Chen*, Massachusetts Institute of Technology, "Near-field Radiation Heat Transfer"

## **TF12+EM+SS Applications of Self Assembled Monolayers**

*Nitin Chopra*, University of Alabama, "Development of Nanoscale Heterostructures: from Single Component Nanostructures to Multicomponent Nanosystems"

*Han Zuilhof*, University of Wageningen, the Netherlands, "Organic Monolayers on Silicon-rich Substrates: Methods and Mechanisms"

## **TR2+AS+SS Atomic-scale Characterization of Tribological Interfaces**

*Michael Falk*, Johns Hopkins University, "Accelerated Molecular Dynamics Simulations of Tribological Interfaces"

## **VT5+SS Surface Science for Accelerators**

The **Thin Film Division (TF)** is requesting abstracts for the 58th AVS International Symposium. Thin Films highlights the core Atomic Layer Deposition (ALD) program, with 5 sessions focusing on Energy Applications, Fundamental Reactions and Film Properties, Emerging Applications, Hybrid Organic Films, and Semiconductors and Nanostructures. Abstracts are also solicited for sessions on Growth and Characterization, Nanostructuring Thin Films, Modeling and Analysis, Glancing Angle Deposition (GLAD), and Nonvolatile Memories. Exciting new additions to the program include Post Deposition Processing and Applications of Self Assembled Monolayers. Thin Films is also co-sponsoring TF for Photovoltaics and TF for Solar Fuels to be highlighted in the Energy Frontiers Focus Topic, in addition to organizing a Focus Topic on Spectroscopic Ellipsometry. As the home division for Graphene at the AVS, Thin Films will again contribute co-sponsored sessions on Electronic Properties along with GNRs to its Focus Topic. The Thin Films Division is also contributing to a Focus Topic on Rare Earth and Actinide Thin Films and co-sponsoring sessions on Magnetic Thin Films.

## **TF1 Emerging ALD Applications**

*Eric Dickey*, Lotus Applied Technologies, "High Rate Continuous Roll-to-Roll Atomic Layer Deposition"

*Vladimir Kuznetsov*, Levitech, the Netherlands, "Atmospheric ALD of Al<sub>2</sub>O<sub>3</sub> for a High Throughput c-Si Solar Cell Passivation"

## **TF2+EN ALD for Energy**

*Gary W. Rubloff*, University of Maryland, "ALD: Enabling Designer Nanostructures for Energy Applications"

**TF3 ALD: Fundamental Reactions and Film Properties**

*Sumit Agarwal*, Colorado School of Mines, "Gas-Surface Interactions during Atomic Layer Deposition"

*Helmut Baumgart*, Old Dominion University, "Mechanical Properties of ALD Films"

**TF4+EM ALD/MLD: Hybrid Organic Films**

*Mato Knez*, Max Planck Institute of Microstructure Physics, Germany, "Hybrid Materials by Vapor Phase Infiltration"

*Myung Mo Sung*, Hanyang University, Korea, "Vapor-Phase Fabrication of Organic-Inorganic Hybrid Thin Films Using Molecular Layer Deposition with Atomic Layer Deposition"

**TF5 ALD for Semiconductors and Nanostructures**

*Brian Willis*, University of Connecticut, "In Situ Studies of Oxide ALD for Crystalline Oxide Growth on Silicon"

**TF6 Thin Films: Growth and Characterization**

*Jon-Paul Maria*, North Carolina State University, "Flux and Surfactant-Assisted Physical Vapor Deposition: New Approaches for Improving Complex Oxide Thin Film Growth"

**TF7 Modeling and Analysis of Thin Films**

*Oleg Mryasov*, University of Alabama, "Composition and Finite Size Effects in Thin Ferromagnetic Films for Data Storage Applications: Magnetism and Transport Properties"

**TF8+EM Nanostructuring Thin Films**

*Carl Thompson*, Massachusetts Institute of Technology, "Templated Solid-State Dewetting for Patterning of Films"

**TF9 Nonvolatile Memory**

*Eric Joseph*, IBM T.J. Watson Research Center, "Characterizing the Chemical and Structural Effects of Processing on Chalcogenide and Ferromagnetic Materials for Phase Change and Spin Torque Based Non-volatile Memory Technologies"

*Christian Wenger*, IHP - Materials Research, "Embedded HfO<sub>2</sub> based 1T1R Cells for Future RRAM Applications"

**TF10 Post-Deposition Processing of Thin Films**

*Yue Kuo*, Texas A&M University, "Post Deposition Annealing Effects on Thin Film Material, Process, and Device Properties"

**TF11+SE Glancing Angle Deposition (GLAD) I**

*Motofumi Suzuki*, Kyoto University, Japan, "Progress in Glancing Angle Deposition Technology for Practical Applications"

**TF12+EM+SS Applications of Self Assembled Monolayers**

*Nitin Chopra*, University of Alabama, "Development of Nanoscale Heterostructures: from Single Component Nanostructures to Multicomponent Nanosystems"

*Han Zuilhof*, University of Wageningen, the Netherlands, "Organic Monolayers on Silicon-rich Substrates: Methods and Mechanisms"

**TF13 Thin Films Poster Session**

**AC3+TF The Structure, Properties and Chemistry of Thin Films of Actinides and Rare Earths**

*Moritz Schmidt*, Argonne National Laboratory, "Plutonium Sorption and Reactivity at the Solid/Water Interface"

**EL1+AS+TF+MS+EM+PS Spectroscopic Ellipsometry for Photovoltaics and Inorganic Thin Films**

*Dean Levi*, National Renewable Energy Laboratory, "Applications of Ellipsometry in Photovoltaics"

**EL2+AS+TF+MS+EM+PS Spectroscopic Ellipsometry of Organic and Biological Materials**

*Klaus-Jochen Eichhorn*, Leibniz-Institut für Polymerforschung Dresden e.V., Germany, "Application of Various Spectroscopic Ellipsometry Techniques for In Situ Studies of Thin Polymer Films on Solid Substrates"

**EL3+AS+TF+MS+EM+PS Spectroscopic Ellipsometry – Fundamentals, New Techniques, & Future Directions**

*James Hilfiker*, J.A. Woollam Co., Inc., "Current Trends and Future Outlook for Spectroscopic Ellipsometry"

**EM1+TF Activation and Deactivation of Surfaces with Self-assembled Monolayers**

*W. Grant McGimpsey*, Worcester Polytechnic Institute, "Chemical Modification of Surfaces for Biological Applications"

#### **EM4+TF High-k Dielectrics**

*Marc Heynes*, IMEC, Belgium, "High Mobility Channel Materials and Novel Devices for Scaling of Nanoelectronics beyond the Si Roadmap"

*Minghui Hong*, National Tsing Hua University, Taiwan, "Research Advances on III-V and Ge MOSFETs Beyond Si CMOS"

*Paul McIntyre*, Stanford University, "Bilayer Gate Stacks for High-k Gates on Ge and InGaAs"

*Eric Vogel*, University of Texas at Dallas, "A Comprehensive Electro-physical Model for the Mobility of In<sub>0.53</sub>Ga<sub>0.47</sub>As Surface Channel MOSFETs"

#### **EN6+TF Thin Films for Solar Cells**

*Craig Taylor*, Colorado School of Mines

#### **EN7+TF Thin Film Chalcogenide Solar Cells (CIGS, CZTS, CdTe and Related Materials)**

*David Mitzi*, IBM T.J. Watson Research Center, "Progress Towards a High-Efficiency Cu-Zn-Sn-S-Se Thin-Film PV Technology"

#### **EN8+TF Thin Films for Solar Fuels**

*Kevin Sivula*, Ecole Polytechnique Fédérale de Lausanne, Switzerland, "Nanostructured Thin Films for Solar Water Splitting"

#### **GR3+TF Graphene: Electronic Properties and Charge Transport**

*Michael Fuhrer*, University of Maryland

*Daniel Gunlycke*, U.S. Naval Research Laboratory, "Electronic and Magnetic Properties of a Graphene Line Defect"

#### **GR8+TF+NS Graphene Nanoribbons and Related Structures**

*Michael Arnold*, University of Wisconsin-Madison

*Klaus Mullen*, Max Planck Institute for Polymer Research, Germany

#### **NM2+TF+MS Materials Processes for Nanomanufacturing**

*Rod Ruoff*, The University of Texas at Austin, "Large-scale Graphene: Challenges and Progress"

*Brian E. Goodlin*, Texas Instruments

#### **NM4+NS+MS+TF Directed Assembly for Nanomanufacturing**

*Paul F. Nealey*, University of Wisconsin, "Advancing the Lithographic Process for Nanomanufacturing using Self-Assembling Block Copolymers"

#### **PS8+TF Plasma Deposition and Plasma Enhanced ALD**

*Colin Wolden*, Colorado School of Mines, "Plasma Deposition of Carbide-based Membranes for High Temperature H<sub>2</sub> Separations"

#### **PS11+TF Plasma Processing for Non-Volatile Memory Materials**

*Mark Kiehlbauch*, Micron Technology

The **Vacuum Technology Division (VT)** is soliciting abstract submissions addressing both long standing and emerging issues important to a wide variety of advanced technology applications. Topics will include: special sessions on accelerator surface science, energy frontiers, and nanotechnology along with traditional sessions on pumping, outgassing, gas analysis, vacuum gauging, gas-flow modeling, calibration methods and accelerators and large vacuum systems. Emerging topics are solicited with sessions on vacuum technology for next generation nanofabrication and graphene physics, renewable solutions for energy storage/production, and unique surface science materials/treatments for accelerators. Process measurements for trace-gas-analysis, gas-delivery and contamination control will include mass spectroscopy and optical spectroscopy methods. VTD is promoting student involvement with a \$500 cash prize for the best "Student-Built Vacuum System" poster and presentation with judging taking place during the VT poster session – contact [tim\\_gessert@nrel.gov](mailto:tim_gessert@nrel.gov) for details. VTD will host an "Ask The Experts" booth where experienced vacuum experts will help answer all simple and perplexing vacuum technology issues. Finally, papers on use of vacuum technology in the astronomy, accelerator, neutron generator, and fusion communities are encouraged, along with new or emerging vacuum technologies not specifically solicited above.

#### **VT1 Vacuum Measurement, Calibration and Primary Standards**

*Michael Duncan*, Oak Ridge National Laboratory, "Vacuum Calibration and Measurement"

#### **VT2 Gas Dynamics, Transport, Flow, Leaks and Permeation**

*Roberto Kersevan*, ITER, "Numerical Methods for the Design of Vacuum Systems with Examples"

**VT3 Optical and Mass Spectroscopy for Gas Analysis and Contamination Control**

*Joseph Hodges, NIST, "Cavity Ring Down Spectroscopy for Trace Humidity Measurements"*

**VT4 Accelerators and Large Vacuum Systems**

*H.-C. (Dick) Hseuh, Brookhaven National Laboratory, "Status of the National Synchrotron Light Source II Vacuum System Construction"*

**VT5+SS Surface Science for Accelerators**

**VT6+MN+NS+MS Vacuum Technology for the Next Generation Nanofabrication and Graphene Physics**

*Joseph A. Stroscio, National Institute of Standards and Technology, "New UHV Low Temperature Scanning Probe Microscopy (SPM) Facility for the Study of Future Electronic Materials"*

**VT7 Vacuum Production, Pumping and Modeling**

*Christian Day, Karlsruhe Institute of Technology, Germany, "Modeling and Simulation of the ITER Cryopumping Systems"*

**VT8 Outgassing and Desorption Phenomena including Water and Hydrogen in Vacuum Systems**

**VT9 Vacuum Technology Poster Session Including Student Poster Competition**

**EN17+VT Vacuum Technology for Green Solutions: Solar and Energy Storage**

*Lindsey VanMannes, South Park Platinum, Inc., "The Use of Vacuum Technology to Improve Smelting and Refining of REE Ores and REE Resource Issues"*

## **SPECIAL EVENTS**

The **Biomaterials Plenary (BP)** session will kick off the annual BID sessions on Sunday afternoon. This year our Plenary Session is co-hosted by the Applied Surface Science (AS) division with the theme "Challenges in Biomaterials Analysis". Talks will address current needs and issues in biomedical surface analysis and translation of traditional strengths of the BID division into challenging areas. The event will close with the opportunity for further discussions at our traditional industry sponsored Plenary Reception.

### **BP1+AS Challenges in Biomaterials Analysis**

*David Castner*, University of Washington, "Wants, Needs, and Challenges in Biomedical Surface Analysis"

*Yves Dufrene*, Université catholique de Louvain, Belgium, "Nanoscale Surface Analysis of Living Cells using Atomic Force Microscopy"

*Alex Shard*, National Physical Laboratory, UK, "Depth Profiling and 3D Analysis of Organic Surfaces"

**Exhibitors Technology Spotlight (EW):** Abstracts are solicited from Exhibitors only for presentations to all symposium attendees during technical session breaks. Papers submitted and material presented during the presentation must provide technical information and/or analysis using a specific exhibitor product, technique or service. The **Exhibitor Technology Spotlight** will emphasize: New instrumentation, products, services, techniques and/or new applications in research, industrial, manufacturing or processing; Technology transfer from R&D to manufacturing; Scale-up aspects and innovations in manufacturing practices; Technology/economic aspects and market impact of new and innovative scientific and/or engineering technologies. The 20 minute presentations will be held in a designated area in the convention center and will take place during symposium session breaks to ensure maximum attendance. Cost is \$300 (\$250 for Corporate Members). For space availability, contact Jeannette DeGennaro: [Jeannette@avs.org](mailto:Jeannette@avs.org)

### **EW1 Exhibitor Technology Spotlight**

**AVS Post-Deadline Session:** There will be opportunities for presentation of post-deadline discoveries in all fields relevant to the AVS membership. Submissions that address topics in surfaces, interfaces, films, nanometer-scale phenomena, emerging technologies, or new innovations. Abstracts of approximately 2,500 characters are solicited for either (1) an individual 15 minute oral presentation, or (2) a poster presentation. Abstracts must be received electronically by Friday, September 16, 2011. Notification of acceptance/rejection will be made soon thereafter. Submit abstracts to: [ssinn@mse.ufl.edu](mailto:ssinn@mse.ufl.edu) (Susan Sinnott, phone: 352-846-3778).

**AVS Vendor Exhibit:** The Exhibit comprises an extensive display of tools, equipment, services and consulting for film deposition, surface and interface measurements and analysis, materials, chemicals, supplies, vacuum production and measurement, and related instrumentation for surface, interface and film measurements, as well as professional literature and publications. Each year, the technical symposium expands into new and exciting technical disciplines. Our Nanotechnology division has grown to record levels and our focus in emerging technologies, such as fuel cell and energy research, consistently keeps our Symposium fresh and exciting for exhibitors and attendees alike. The exhibits will be open from Tuesday morning until Thursday afternoon (**November 1<sup>st</sup> through 3<sup>rd</sup>**). Please contact [exhibits@avs.org](mailto:exhibits@avs.org) for additional information. You may also review our website [www.avs.org](http://www.avs.org), or contact us at 212-248-0200, ext. 229.

**AVS Sponsorship Program:** AVS is a not-for-profit society that offers a myriad of services, programs and events related to science and technology in the fields of vacuum, materials, interfaces and processing to scientists and engineers from around the world. An extensive recognition and exposure program, which is active before and during the Symposium, is available to our Symposium Sponsors. As a Symposium Sponsor, your logo will appear on the AVS website, in the Technical Program and Show Guide, and on signage and slide shows at the Symposium. The earlier you commit to AVS Symposium Sponsorship, the greater exposure you will receive. To learn more about Sponsorship opportunities, please contact Yvonne Towse at 212-248-0200 ext. 222 or [yvonne@avs.org](mailto:yvonne@avs.org).

## **AVS AWARDS & TRAVEL GRANTS**

All award applications for AVS National and Division/Group awards may be found at the following link:

(<http://www.avs.org/inside.awards.aspx>)

You may also contact Angela Klink, Awards Coordinator ([angela@avs.org](mailto:angela@avs.org), 212-248-0200 ext. 221) for any additional information.

### **AVS Professional Awards**

AVS Professional Research Awards: Each year, the AVS solicits nominations for major national awards. These include the Medard W. Welch Award, the Gaede-Langmuir Award, the Albert Nerken Award, the John A. Thornton Memorial Award and Lecture, the Peter Mark Award, Fellow of the Society and the George T. Hanyo Award. Nominations are due March 31, 2011 and should be submitted electronically to the Awards Coordinator, Angela Klink ([angela@avs.org](mailto:angela@avs.org)). Nomination information is available on [www.avs.org](http://www.avs.org) or through Angela Klink (212-248-0200, ext. 221 or [angela@avs.org](mailto:angela@avs.org))

### **National Student Awards**

**Beginning in 2010, students may apply for one National Student Award and one Division/Group Award in a given year.**

Each year, the AVS solicits nominations for five graduate student awards. These are the Dorothy M. and Earl S. Hoffman Award, the Nellie Yeoh Whetten Award, the Russell and Sigurd Varian Award, and two Dorothy M. and Earl S. Hoffman Scholarships (N.B. the Hoffman Award and Scholarships are distinct from the Hoffman Travel Grants described below). The Application Form and the Report on Candidate Form, along with the nomination procedure, is available on [www.avs.org](http://www.avs.org) or through Angela Klink (212-248-0200, ext. 221 or [angela@avs.org](mailto:angela@avs.org)). The deadline is May 4, 2011.

### **Dorothy M. and Earl S. Hoffman Travel Grants**

The Hoffman Travel Grants have been created in an effort to promote student involvement in AVS and encourage their participation in the annual AVS International Symposium. These travel grants will be given to any applying graduate students who meet the following criteria: 1) you must be an author or co-author of an abstract accepted for presentation at the Symposium, 2) you must be a full-time graduate student, 3) the grant is not transferable 4) you must attend the Symposium to receive the grant and 5) only one student per abstract will be given a Hoffman grant. It is not required that the student be the presenter and local students will be eligible for a smaller stipend. An invitation e-mail will be sent to eligible students (late June 2011) and the student should apply for the grant by return e-mail to the AVS National Office. The application deadline is Friday, August 23, 2011. Should your application be approved, you will receive an e-mail notification by September 20. Grants will be given on a random basis until the 2011 funds are depleted. Checks for the grant recipients will be available at the Symposium Registration Manager's desk, and you will also be asked to present a student I.D. Please note that all checks must be collected at the meeting. Please be advised that receiving a Hoffman Travel Grant does not affect your eligibility for any national, divisional, or technical group merit-based awards.

### **Division/Group Student Awards**

**Beginning in 2010, students may apply for one National Student Award and one Division/Group Award in a given year.**

The **Applied Surface Science Division** is offering awards for the best student presentations. Students who would like to compete for the awards will need to present a poster or talk during any ASSD sessions, plus an additional "capsule" (3-slide, 5-minute) presentation to the judges, who will choose the winners based on the scientific merit and originality of their work. The awards consist of three cash prizes totaling \$1,000 and certificates. Students wishing to

participate in the competition should complete the [application](#) and submit an abstract by May 4, 2011 to Angela Klink ([angela@avs.org](mailto:angela@avs.org))

The **Biomaterial Interfaces Division** traditionally awards three cash prizes of \$500 each for the best student research poster presentations. To be eligible, the student must present a poster at one of the BI poster sessions on their thesis research. The students will be judged on the scientific merit and originality of their research. Individuals more than one year past the date when their final degree was awarded are not eligible to compete for the student prize. Students may in addition compete simultaneously for one societal level and one Division or Group level award that is presented at the International Symposium. In addition to following the standard AVS abstract submission procedures, the students must submit a copy of their abstract along with a statement of intent to compete for the student prize by May 4, 2011. Email: Angela Klink ([angela@avs.org](mailto:angela@avs.org)). In addition, please submit this [application](#).

**Magnetic Interfaces & Nanostructures Division - The Leo M. Falicov Student Award** has been established in memory of Professor Leo M. Falicov to recognize outstanding research performed by a graduate student in areas of interest to the MIND. Finalists will be selected on the basis of abstract submission, and will each receive a cash award of \$500 upon attending the AVS International Symposium and presenting their paper in an oral session. The Best Student Paper Award winner will be selected on the basis of the oral presentation, considering quality of research and clarity of presentation. The award consists of a \$500 cash prize and a certificate. Interested applicants should submit an abstract and the [application](#) to Angela Klink ([angela@avs.org](mailto:angela@avs.org)). In addition, a copy of the AVS abstract, reprints/preprints of the work, and a letter of recommendation from the advisor should be sent before May 4, 2011.

**Manufacturing Science and Technology Group** is pleased to announce and solicit applications to be competitively awarded to up to 2 graduate students who present papers in MSTG sessions. The purpose of the MSTG Fellowships is to both encourage participation of students in the MSTG program and to acknowledge the valuable contributions they make in advancing state-of-the-art in manufacturing science and technology. Full-time university graduate students with primary appointments at universities are eligible to apply. Preference will be given to those who give oral presentations of their papers. Students awarded MSTG Fellowships will receive a grant. Submission materials consist of: 1) Letter of application describing the student's research (1 pg. max.); 2) Letter of endorsement by the student's research advisor (1 pg. max.); 3) Copy of submitted abstract. Send application materials to arrive by the deadline of May 4, 2011 to Angela Klink ([angela@avs.org](mailto:angela@avs.org)); 4) Completed [application](#).

**MEMS and NEMS Technical Group Best Paper Award** is pleased to announce a "Best Paper Award" competition at the AVS Symposium and Exhibition. The award includes a cash prize (\$500) and a certificate to the well deserving student presenting his/her paper in an oral or poster session of the MN group. Both graduate and undergraduate students are eligible. The candidates will be judged on the quality, originality of his/her research and their skill in presentation (oral/poster). In addition, MN group is also introducing Registration Waiver Award to the well deserving graduate/undergraduate student submitting abstract to the MN session. This award will be solely based on the quality of work mentioned in the abstract. In order to qualify for the competition, interested candidates should submit a cover letter describing their intent to compete for any one of the above mentioned awards along with a copy of their AVS abstract, current CV and [application](#) to Angela Klink ([angela@avs.org](mailto:angela@avs.org)). All application material must be received on or before May 4, 2011.

The **Morton M. Traum Surface Science Student Award** will be given to the best student poster presented in the poster session sponsored by the Surface Science (SS) Division at the AVS International Symposium. This is the oldest student award in AVS, presented since 1981. A candidate for the award must be either a current graduate student or have received the Ph.D. degree in the year of the Symposium. Up to a maximum of five finalists will be selected to compete. Although they will be judged based only on their poster presentations, they may also present the same material orally during the meeting, since such presentations are independent of the competition. The main selection criteria include both scientific content and presentation skill. The winner will receive a cash prize of \$1200 and a certificate. The winner's name will appear in the list of previous winners published yearly in the Symposium technical program and on the plaque that is on display at the Symposium. The other finalists will receive a cash award. [Application](#) should include the following: 1) a copy of the abstract submitted to AVS that includes the abstract submission number; 2) an

extended abstract that does not exceed two pages (including tables, figures, and references); 3) a CV with publication list; 4) name, address, and e-mail of advisor; and 5) expected graduation date. Electronic submission of all information in a single PDF file, labeled by the applicant's name, ("FirstName\_LastName.pdf") is preferred and should be sent to Angela Klink ([angela@avs.org](mailto:angela@avs.org)). Deadline: May 4, 2011.

The **Nanometer-Scale Science and Technology Division Graduate Award** was established in 1998 to bring recognition to outstanding dissertation work by students giving oral presentations in NSTD sessions at AVS international symposia. [Applications](#) should be sent to Angela Klink ([angela@avs.org](mailto:angela@avs.org)) and must include a copy of the abstract, an extended abstract written by the student of no more than three pages, and a recommendation letter from the student's research advisor, who must be a member of AVS. Finalists are selected by the Awards Committee and must present a short talk at the Best Student Paper Lunch on Tuesday of the symposium. The winner is selected based on the quality of the talk, the responses to questions, and the level of the research. All finalists receive a cash award of \$500; the winner receives a certificate and an additional \$1,000. Deadline: May 4, 2011. These award levels are made possible by NSTD's sponsors, who in 2010 were Park Systems (Gold sponsor), Omicron Nanotechnology, RHK Technology, and SPECS.

**John Coburn and Harold Winters Student Award in Plasma Science and Technology** - Required Application Materials: 1) A curriculum vitae of the nominee, 2) A one-page letter of endorsement from the student's research advisor/mentor, 3) A copy of the nominee's submitted abstract for the AVS International Symposium. A maximum of six finalists will be selected on the basis of technical and scientific merit and originality of research. Each finalist will receive a cash award of \$500 and must present their paper in a PSTD oral session at the AVS Symposium. The Coburn and Winters Award winner will be selected from the finalists on the basis of the oral presentation, the quality of research, the clarity of the presentation, and the potential for the research to advance the field of plasma science. The award consists of an additional cash prize. The selection of finalists and the award winner is made by the PSTD Executive Committee. These awards are contingent upon acceptance of the abstract for presentation in a PSTD session at the AVS International Symposium. Submissions are limited to one application from a particular research group unless previously discussed with the Awards Coordinator. All [application](#) materials should be sent to Angela Klink ([angela@avs.org](mailto:angela@avs.org)) and must be received on or before May 4, 2011.

The **Thin Film Division** will grant up to 3 Graduate Student Award in the amount of \$500 to encourage and recognize excellence in thin film research. Interested applicants should send 1) their CV; 2) a copy of their submitted AVS abstract; and 3) a letter of recommendation from their research advisor. To be eligible for the Graduate Student Award, the student must be the presenter of either an oral or poster presentation in the Thin Film Division sessions at the AVS meeting and must be a currently registered graduate student on the date of the abstract submission deadline. [Application](#) materials should be sent by email to Angela Klink ([angela@avs.org](mailto:angela@avs.org)). Deadline: May 4, 2011.

**Vacuum Technology Division Student Poster Competition** - "Student-Built Vacuum Systems" will sponsor a competition for student posters that describe design, development, and/or use of "student-built vacuum systems." Although these types of vacuum systems may not represent state-of-the-art technology, they often reflect creative designs that are guided by unique functionality, and/or are constrained by limited resources. Competitive submissions are expected to reveal inspired and/or cost-effective solutions to real-world issues encountered in typical vacuum system designs. The posters will be judged during the poster session, and a cash prize of \$500 will be awarded to the first-place winner of the competition. The [application](#) deadline for entering the competition is May 4, 2011. Students desiring to enter the competition should send the application directly to Angela Klink ([angela@avs.org](mailto:angela@avs.org)).

### **Focus Topic Awards**

**The Spectroscopic Ellipsometry Focus Topic (EL)** Committee welcomes applications for the EL cash award for graduate students and young postdoctoral fellows who will be presenting EL papers at this year's International Symposium. Be prepared to send (i) a copy of the accepted abstract, (ii) a recommendation letter from the advisor, (iii) the curriculum vitae, plus (iv) a cover letter of request. The Committee gratefully acknowledges J.A. Woollam

Co., Inc. for sponsoring the award. Deadline: May 4, 2011. The applicant should send application documents by email to the Chair of the EL Focus Topic: Dr. M. Creatore, [m.creatore@tue.nl](mailto:m.creatore@tue.nl)

### **Society/Division/Group Professional Awards (Not for Students)**

**Electronic Materials & Processing Division** welcomes applications for the EMPD Postdoctoral cash award for postdoctoral fellows who will be presenting EMPD papers at this year's International Symposium. Be prepared to send (i) a copy of the accepted abstract, (ii) a recommendation letter from his/her advisor, and (iii) his/her vitae, plus (iv) a cover letter of request. Deadline: September 9<sup>th</sup>, 2011. Interested postdocs should send application materials by email to: Dr. Leonard J. Brillson, [Brillson.1@osu.edu](mailto:Brillson.1@osu.edu).

**Magnetic Interfaces and Nanostructures Division** welcomes applications for the MIND Postdoctoral cash award for postdoctoral fellows who will be presenting MIND papers at this year's International Symposium. Be prepared to send (i) a copy of the accepted abstract, (ii) a recommendation letter from his/her advisor, and (iii) his/her vitae, plus (iv) a cover letter of request. Deadline: September 1 of the Symposium year. Interested postdocs should send an email to: Anthony Anthony Caruso at [carusoan@umkc.edu](mailto:carusoan@umkc.edu).

**Nanotechnology Recognition Award** recognizes members of NSTD for outstanding scientific and technical contributions in the science of nanometer-scale structures, technology transfer involving nanometer-scale structures, and/or the promotion and dissemination of knowledge and development in these areas. It is a cash award plus a certificate. The nomination deadline is May 4 of the Symposium year. The nomination consists of a nominating letter, biographical material, and supporting letters. Specific guidelines are available by email: Udo Schwarz at [udo.schwarz@yale.edu](mailto:udo.schwarz@yale.edu). The Award will be presented at the AVS International Symposium and travel support is available to attend the presentation. The travel support is made possible by NSTD's sponsors, who in 2010 were Park Systems (Gold sponsor), Omicron Nanotechnology, RHK Technology, and SPECS.

The **Plasma Science & Technology Division** is pleased to solicit nominations for the Plasma Prize, which is awarded annually for outstanding contributions to the field of plasma science and technology. Please submit ONLY the following required application materials: (1) A one-page description citing the reason for the nomination and (2) a biography and Curriculum Vitae of the nominee. Nominations must be submitted as a pdf file by email to: Cathy Labelle (Past Chair) at [cathy.labelle@globalfoundries.com](mailto:cathy.labelle@globalfoundries.com). Nomination deadline: 07/31/2011.

The **Thin Film Division** is pleased to solicit nominations for a prestigious new award, the **Paul H. Holloway Young Investigator Award**. This award is named after Professor Paul H. Holloway, who has a distinguished history of scholarship and services to AVS. The nominee must be a young scientist or engineer who has contributed outstanding theoretical and experimental work in an area important to the Thin Film Division of AVS. The nominee's Ph.D. or equivalent degree must have been earned less than 7 years prior to January 1 of the award year. Required application materials: 1) a description citing the reason for nomination, 2) a nominating letter and two supporting letters, 3) a biography and CV of the nominee. Application materials will be reviewed and the award winner chosen by the TFD Executive Committee. The award consists of a cash prize, a certificate citing the accomplishments of the recipient, and an honorary lecture at one of the TFD oral sessions at the International Symposium. Application materials should be sent by email to: Dr. Steve Rossnagel, [rossnag@us.ibm.com](mailto:rossnag@us.ibm.com). Deadline: May 4, 2011.

AVS is pleased to solicit nominations for a prestigious new award, the **Theodore E. Madey Award for Surface Science and Scientific Exchange**. This award is named after Professor Theodore E. Madey, who had a distinguished history of scholarship and service to AVS. The applicant must have accomplished outstanding theoretical and/or experimental research of interest to the AVS, with special emphasis on surface processes at a fundamental atomic and molecular level, as well as outstanding leadership at the international level. Required application materials are: 1) a description citing the reason for application, 2) two supporting recommendation letters, 3) a biography and CV of the applicant. Application materials will be reviewed and the award winner selected by a special committee appointed by the AVS President. The Award is for coach-class travel to and from Poland in addition to a \$1,000 stipend for one or more lectures at the leading research universities in Poland. Local travel expenses within Poland are to be provided by

the Polish universities. Application materials should be sent by email to: Angela Klink, AVS Awards Coordinator, [angela@avs.org](mailto:angela@avs.org) by May 1, 2011.

**ABSTRACT SUBMISSION IS VIA THE WEB ONLY**

Deadline: 11:00 p.m. EDT, Wednesday, May 4, 2011

([www.avsymposium.org](http://www.avsymposium.org))

**Supplemental data (1-2 pages, 1MB) will also be accepted via the web submission process.**

**Instructions may be found at the web site above.**

**RECORDING EQUIPMENT POLICY**

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