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Microscopy & Microanalysis 2012 Meeting

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M&M 2012 will be held July 29 – August 2, 2012 at the [Phoenix Convention Center](#) in downtown Phoenix, AZ. Please check this site often for updated and new information.

REGISTRATION for the meeting is now open. Click on "Register Now" to the left to register online or with a paper form.

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Full Symposia Descriptions

B01: Microbial Biofilms - The Good, The Bad, and The Ugly

Janet H. Woodward, Alice Dohnalkova

Invited Speakers:

- Pamela Lloyd, UES, Inc., Dayton
- Jeffrey McLean, J. Craig Venter Institute, San Diego
- Ryan Hunter, California Institute of Technology
- Brenda Little, Naval Research Laboratories

This symposium will cover current research on biofilms in human health and diseases, industrial applications, and in the environment. Topics can include:

- Biofilm structure and function
- Cell signaling and quorum sensing in biofilm environments
- Biofilm motility and mechanics
- Biofilm dynamics

B02: Microscopy and Analysis in Forensic Science

The symposium will focus on:

- Microscopy of impression evidence with a specific emphasis on the techniques that can be used for firearms identification
- Scanning and confocal microscopy applications, which provide specific advantages over conventional optical microscopy.
- Precision and reproducibility of microscopic and microanalytic techniques for evidence collection and comparison
- Sample collection and preparation techniques for proper handling and analysis of evidentiary material

B03-Structure of Membrane-shaping Proteins

Jenny E. Hinshaw, William A. Prinz, Jason A. Mears

Invited Speakers:

- Vinzenz Unger, Northwestern University
- Leonid Chernomordik, NICHD, National Institutes of Health
- Scott Stagg, Florida State University
- Carlson Lars-Anders, NIDDK, National Institutes of Health
- Marjin Ford, University of California — Davis
- Michael Stowell, University of Colorado — Boulder

Each cellular organelle has a unique shape that contributes to its function. The Golgi consists of membrane stacks, the endoplasmic reticulum is a network of membrane tubules and sheets, while mitochondria are complex double-membrane organelles with various spherical and elongated shapes. Membrane trafficking between the organelles and the plasma membrane is actively occurring by membrane fission and fusion events, and yet the organelles maintain their shape. In recent years, numerous proteins have been identified that play a crucial role in maintaining organelle structure, and the communication between organelles and the plasma membrane. This symposium will discuss the proteins that are involved in these dynamic membrane events. Various methods are used for these studies including, electron microscopy, X-ray crystallography, freeze-fracture and fluorescence microscopy.

B04: 3D Structure and Ultrastructure of Cells, Organelles and Macromolecules

Elizabeth R. Wright, Teresa Ruiz, Kelly Lee

Invited Speakers:

- Esther Bullitt, Boston University School of Medicine
- Grant Jensen, California Institute of Technology
- Arne Moeller, The Scripps Research Institute
- Kenneth Taylor, Florida State University
- Xing Zhang, University of California — Los Angeles
- Michael Radermacher, University of Vermont

Our understanding of the 3D structure and functional subtleties of cells, microorganisms and macromolecular assemblies has experienced great advances through recent developments of EM techniques and hybrid methodologies. This symposium highlights structural and ultrastructural studies of cells, microorganisms and macromolecules using electron microscopy techniques (e.g. tomography; crystallography; single-particle analysis; helical reconstruction) singly or combined with other structural methods (e.g. X-ray crystallography; X-ray tomography; atomic force microscopy). Topics will include: eukaryotic and prokaryotic architecture; cellular metabolism; cell division and protein translation; cellular secretion, adhesion and motility; cell-cell communication and signaling; virus structure and virus-host interactions; structure and function of macromolecular assemblies.

B05: Visualization, Localization and Dynamics of Cellular Components

Christopher L. Berger, Diane S. Lidke, Josh E. Baker

Invited Speakers:

- Paul Wiseman, McGill University
- Raimund Ober, University of Texas Southwestern Medical Center
- Louis Hodgson, Albert Einstein College of Medicine
- Ammasi Periasamy, University of Virginia
- Ajit Joglekar, University of Michigan



Our understanding of the localization, intramolecular interactions, and dynamics of macromolecular complexes within the cell or cellular components has grown in tandem with the development of quantitative fluorescence microscopy techniques. Recent advances in fluorescence microscopy have dramatically increased both spatial and temporal resolution, allowing for direct visualization of biological processes. This symposium will highlight advances in these techniques that have provided new insight into the structure and dynamics of cell signaling pathways, the cytoskeleton and cell motility, and intracellular membrane systems.

B06: Utilizing Microscopy for Research and Diagnosis of Diseases in Humans, Plants and Animals

Patricia E. Kysar, Irene Piscopo, Jay Jerome, Cindy Smith

Invited Speakers:

- Sara Miller, Duke University Medical Center, Dept of Pathology
- George Perry, University of Texas College of Science
- Rich Goodwin, University of South Carolina School of Medicine
- Wilma Lingle, The Mayo Clinic
- E. Ann Ellis, Texas A&M University
- Rich Giberson, Ted Pella, Inc.
- Carolyn Larabell, University of California — San Francisco
- Johnny Carson, UNC-Chapel Hill, Center for Environmental Medicine

Microscopy is not only useful, but critically important in the ongoing research, detection, diagnosis and treatment of disease. Advances that improve rapid and accurate detection and treatment often involve the use of various microscopic applications. Various microscopy and imaging approaches in diagnostics and research of human, plant and animal specimens, provide us with an improved ability to research disease origin, development and response. This is an opportunity to share information on the investigation of pathogens of cells, tissues and entire organisms in clinical, diagnostic and research laboratories. Emphasis will be placed on both rapid detection and improvements in methodologies.

B07: Microscopy, Microanalysis and Image Analysis in the Pharmaceutical Sciences

Alejandra Camacho, Beverly E. Maleeff, Phoebe L. Stewart

Invited Speakers:

- Michel Deschuyteneer, GlaxoSmithKline Biologicals, Belgium
- Greg Haugstad, University of Minnesota
- Florian Formanek, L'Oreal, France
- Jennifer Barton, University of Arizona

Pharmaceutical research and development laboratories are at the forefront of science and have developed specialized technologies and themes that are of particular value to microscopists in industry. This symposium will present applications of microscopy associated techniques to biological and materials science problems that arrive during drug discovery, formulation and production. In addition to presentations by invited speakers, an informal forum will be provided for sharing of thoughts and strategies related to regulatory and other issues faced in our laboratories. Contributed papers from industry, government or academia for platform or poster presentation on related topics are also welcome.

P01: Electron Microscopy/Spectroscopy of Energy-Related Materials

Paulo J. Ferreira, Yimei Zhu, Grace Burke

Invited Speakers:

- Jin Zou, University of Queensland, Australia
- Tsukasa Hiramaya, Japan Fine Ceramics Center
- Jianyu Huang, Sandia National Laboratories
- David Muller, Cornell University
- Chung Sung Yoon, Inha University, Korea
- Javier Bareno, Argonne National Laboratory
- Stephen Pennycook, Oak Ridge National Laboratory
- Andrew Minor, University of California — Berkeley
- Steve Claves, Bettis Laboratory

With an ever-increasing demand in clean and efficient energy research and the development of new energy materials, there is currently a significant effort in developing novel electron microscopy imaging, diffraction and spectroscopy methods for determining the atomic/nano structure and chemical composition of various materials for energy conversion and storage. On the basis of these developments, it seems appropriate to review the field in a manner that would be useful for the areas of alternative energy materials. The goal of this symposium is to bring together a wide variety of researchers with interests in electron microscopy imaging, electron diffraction, electron spectroscopy and computer simulations applied to batteries, fuel cells, photovoltaics, photocatalysts, supercapacitors, and nuclear materials.

P02: Structural, Chemical and Physical Properties of Carbon-based and Related Nanomaterials

Raul Arenal, Jannik C. Meyer, Sebastian Osswald

Invited Speakers:

- Kazu Suenaga, AIST, Japan
- David Muller, Cornell University
- Dmitri Golberg, NIMS, Japan
- Markus Morgerstern, RWTH Aachen, Germany
- Florian Banhart, IPCMS, University Strasbourg, France
- Andrei Khlobystov, University of Nottingham, UK
- Yuri Gogotsi, Drexel University
- Alejandro Lopez-Bezanilla, Oak Ridge National Laboratory

Carbon-based nanostructures such as fullerenes, nanotubes, nanodiamond, and graphene are attractive materials due to their unique properties and wide range of potential technological applications. While electron microscopies (TEM, STEM, SEM) are essential and powerful techniques for studying carbon nanomaterials at the (sub)nanometer scale, the coupling of electron microscopy with other characterization techniques, including Raman and infrared spectroscopy, XPS, and scanning probe microscopy is increasingly utilized to fully investigate these materials and provide deeper insights into their physical and chemical properties. This symposium focuses on microscopy-based studies that employ these techniques to study nanostructures, particularly carbon, boron, and nitrogen-containing nanomaterials.

P03: Hybrid (Soft-Hard) Materials and Interfaces

Vinayak P. Dravid, Richard D. Leapman, Derk Joester

Invited Speakers:

- Harald Ade, North Carolina State University
- Matt Libera, Stevens Institute of Technology
- Alexandra Porter, Imperial College, UK
- Alexandre Gloter, University of Paris, France
- Eli Sone, University of Toronto, Canada

- Stephen Vogt, Argonne National Laboratory
- Roger Wepf, ETH Zurich, Switzerland
- Roland Kroger, University of York, UK
- David Ginger, University of Washington
- Derk Joester, Northwestern University

The symposium will address the specific challenges in specimen preparation, microscopy and analysis presented by hard-soft hybrid structures and interfaces, including Improving specimen preparation for hybrid structures and interfaces, Imaging and analysis in the wet and pristine state (e.g., fluidic-cell development and applications), quantitative chemical imaging and tomography in hybrid systems. We will be addressing structural hierarchy in hybrid materials: multi-scale and correlative imaging approaches, as well as looking at hybrid materials and interfaces across the disciplines: bio-inspired materials, biominerals, polymer-composites, tissue scaffolds, surface coatings, functionalized nanomaterials, and others.

P04: Microscopy and Microanalysis of Joining and Coating Materials

Steven R. Claves, Chad M. Parish, Donald F. Susan

Invited Speakers:

- Kinga Unocic, Oak Ridge National Laboratory
- David Hoelzer, Oak Ridge National Laboratory
- Stepheni Liu, Colorado School of Mines
- Richard Fonda, Naval Research Lab
- Badri Narayanan, Lincoln Electric
- Howie Jin, ExxonMobil

Joining and coating technologies, such as welding, soldering, brazing, and cladding, are used to join multiple pieces into components and to protect the resulting component surfaces from wear and corrosion. These processes often involve complex, multi-component phase transformations, which can produce intricate micro- and nanostructures; characterization of these microstructures is required to understand how the joining and coating processes influence the properties of the materials in service. This symposium will cover non-destructive and destructive microscopy and microanalysis of advanced joining and coating processes, including a broad range of techniques from macroscale optical metallography to single-atom high resolution imaging.

P05: High-resolution Microscopy and Microanalysis of Meteorites, Minerals and Aerosols

John Armstrong, David Smith, Lindsey Keller, David Bell

High resolution electron microscopy and x-ray microanalysis have played major roles in the characterization of geological, extraterrestrial and environmental materials since their invention. High resolution electron microscopy has been responsible for moving the study of minerals from the macro to the atomic level. X-ray microanalysis has proven to be the most accurate analytical method for determining the elemental composition of geological and extraterrestrial specimens at the micro- and now nano-scale. For over forty years, Peter R. Buseck in the Chemistry Department and School of Earth and Space Exploration has been in the forefront of research in combining high resolution electron microscopy and x-ray microanalysis in the study of minerals, meteorites and environmental aerosols. This symposium will focus on the important contributions that have been and are continuing to be made by the synergistic use of these imaging and analysis procedures in studies of the solid materials of our solar system as demonstrated by Peter Buseck, his many students and colleagues, and those influenced by them.

P06: Failure Analysis of Structural Materials

J. Martinez, D. Dennies

Invited Speakers:

- Donald Susan, Sandia National Laboratories
- Johnny Golden, The Boeing Company
- Rudy Villa, United States Air Force
- Michelle Othon, GE Global Research Center

Failure analysis is an important function crossing all disciplines. This symposium will include real-world applications and research case studies to determine the root cause in the failure of structural materials. In particular, this symposium will highlight the application of all materials used as structural members and components. Any and all optical, scanning, transmission, and microanalytical techniques used throughout the investigation will be discussed. Topics covered include metal fatigue and fracture, environmental factors such as corrosion, embrittlement, overload, biomaterials/medical implants, semiconductor, multi-mode failures, etc. Contributions are encouraged from industry failure analysts and researchers active in any of these areas.

P07: Microscopy and Analysis of Quantum Structures and Devices

Brendan Foran

Invited Speakers:

- Michael Johnson, Arizona State University
- Michael Yakes, Naval Research Lab
- Andreas Rosenauer, University of Bremen, Germany
- Jason Kawasaki, University of California — Santa Barbara
- Rachel Goldman, University of Michigan

Quantum wells, wires and dots enable solid state device technologies requiring electronically and spatially well defined electronic states. The nano-scale size of these structures, and associated importance of interfacial states, strain and variation in local composition all make quantitative analysis and microscopy crucial for accurate interpretation of structure-property relationships necessary for understanding and improving materials performance. This symposium is focused on sharing recent results on microscopy and microanalysis of quantum structures and could include techniques ranging from TEM methods including HRTEM and geometric phase analysis, STEM-EELS or EDXS, SEM methods including EBIC and CL as well as scanning probe techniques such as cross-sectional STM, as these are used to improve understandings of the physics and chemistry involved in process optimization and functionality of devices.

A01: Applications of Aberration-Corrected STEM and SEM

K. Andre Mkhoyan, Paul M. Voyles, Joseph R. Michael

Invited Speakers:

- Philip Batson, Rutgers University
- Gianluigi Botton, McMaster University, Canada
- Yimei Zhu, Brookhaven National Laboratory
- Koji Kimoto, NIMS, Japan
- Sandra Van Aert, University of Antwerp, EMAT, Belgium

Access to aberration-corrected STEM and SEM instruments is increasingly common. This symposium will seek answers to the question "What new scientific or technological problems can we solve with these new tools?" Abstracts are therefore solicited on applications of aberration-corrected STEM and SEM to the characterization of the materials and nanostructures for

applications in nanotechnology. Techniques of interest include imaging, especially quantitative imaging and simulation, EELS and EDS, especially high-current, high-rate, and dense spectrum images, and CBED. Applications areas of interest include but are not limited to nanoelectronics, low-dimensional structures such as nanoparticles or single-atomic layer materials, and catalysis.

A02: Robert Gray Memorial Symposium on Metallography of Reactive Materials

Jaret J. Frajford, Rod McCabe, Steve Dekanich

Invited Speakers:

- Jane Howe, Oak Ridge National Laboratory
- Bob Crouse, Oak Ridge National Laboratory (Ret.)
- Ann Kelly, Los Alamos National Laboratory

This symposium will honor the work of Robert Gray, who helped establish the Metallography Group at the Oak Ridge National Laboratory in East Tennessee. Presentations will discuss work on the metallographic and sample preparation of reactive and radioactive materials. Many metals and alloys are extremely challenging to prepare because they react with the atmosphere or water during polishing or analysis. Some metals are radioactive and require special procedures to prevent contamination and radiation hazards. This symposium will not be limited to metals but will also discuss challenging reactive materials such as hydrides, battery materials, and explosives.

A03: TEM Phase Contrast Imaging in Biological and Materials Science

Mike Marko, Radostin Danev

Invited Speakers:

- Robert Glaeser, Lawrence Berkeley National Laboratory
- Fu-Rong Chen, National Tsing Hua University, Taiwan
- Wah Chiu, Baylor College of Medicine
- Kuniaki Nagayama, Okazaki Institute for Integrative Bioscience, Japan
- Andreas Walter, Max-Planck Institute for Biophysics, Germany
- Rasmus Schröder, University of Heidelberg, Germany
- Yoshiyuki Fukuda, Max-Planck Institute for Biochemistry, Germany
- Dagmar Gerthsen, Karlsruhe Institute of Technology, Germany
- Marek Malac, University of Alberta, Canada

Conventional TEM phase-contrast imaging limits maximum information transfer to a narrow band of spatial frequencies. This can be avoided by in-focus imaging with a physical phase plate. The theory, construction, and practical use of phase plates will be explored. In biological cryo-TEM, high-contrast, high-resolution imaging at low electron dose is facilitated. In materials science, the combination of a physical phase plate with tunable Cs offers an unparalleled opportunity for characterization of both atomic details and larger structures. Since the number of laboratories starting to employ phase-plates is growing, this will be a timely opportunity to learn and to share experiences.

A04: 3D Structure Determination in Physical and Biological Sciences

Daniela Nicastro, Peter Nellist

Invited Speakers:

- Sara Bals, University of Antwerp, Belgium
- Stefan Zaefferer, Max Planck Institute for Iron Research
- Ilke Arslan, University of California — Davis
- Thomas Marlovits, Institute of Molecular Biotechnology, Austria
- Michael Stowell, University of Colorado — Boulder
- James Anderson, University of Utah

This symposium will cover:

- Integrative cell biology: 3D-EM combined with other structural techniques (e.g. SAXS), fluorescence microscopy (CLEM), proteomics and genetics.
- Serial-section 3D-EM approaches, e.g. confocal STEM, FIB-SEM and axial tomography.
- Pushing the resolution in structure determination of macromolecules: from subtomogram averaging to femtosecond X-ray protein nanocrystallography.
- Advances in 3D reconstruction and element mapping, e.g. energy-filtered, HAADF, and holographic electron tomography.

A05: Laser Mediated Processes for High-Contrast, High-Resolution, Ultrafast and In-situ TEM

Nigel D. Browning, Geoffrey H. Campbell, Claus Ropers

Invited Speakers:

- Nobuo Tanaka, Nagoya University, Japan
- Yoshie Murooka, Osaka University, Japan
- Dwayne Miller, University of Hamburg, Germany
- Andreas Schroeder, University of Illinois & Chicago
- Tom Kelly, Ametek
- Bryan Reed, Lawrence Livermore National Laboratory
- Federico Rosei, University of Quebec, Canada

The aim of this symposium is to provide a forum to discuss new developments involving the integration of laser technologies into electron microscopy. Contributions are encouraged that concern all aspects of the use of optical excitation — including the generation of the electron beam through photoemission, phase plate technologies, optical in-situ experiments, and electron energy loss spectroscopy. Advanced applications of these approaches to biological systems, solid state materials and nanostructures are particularly welcomed. Finally, the development of new methods for processing, analysis and simulation of images, diffraction patterns and spectra will be a focus of this symposium.

A06: Focused Ion Beam Instrumentation & Applications for Physical and Biological Sciences

Keana Scott, Lucille Giannuzzi, Nabil Bassim

Invited Speakers:

- Michael Marsh, Visualization Science Group
- Michael Ramsey, University of North Carolina — Chapel Hill
- Brent Gila, University of Florida
- Jaroslav Liruse, Tescan, Czech Republic
- Eduardo Rosa-Molinar, University of Puerto Rico-Rio Piedras
- Carl Sondergeld, Oklahoma University

Focused ion beam instruments have become essential tool in many fields due to their versatility and three dimensional processing capabilities. With the recent advances in FIB instrumentation, detector technology and analysis techniques, FIB application space now spans from semiconductor industry to materials science to biology. In this symposium, we encourage

abstracts on all aspects of focused ion beam technology and its use to further the understanding of the physical and biological sciences. Topics such as theoretical or experimental work on ion-solid interactions, FIB-based specimen preparation, processing and fabrication methods and FIB-based 2D and 3D analyses of hard and soft materials are welcome. Advances in new FIB instrumentation or methods such as light ion sources, high current ion sources, mass filtered ion sources or low energy ion milling are also of interest.

A07 Super-resolution Microscopy — Principles and Practice

Hari Shroff, Jim Galbraith, David Giovannucci

Invited Speakers:

- Andrew York, NIBIB, National Institutes of Health
- Keith Lidke, University of New Mexico
- Luke Lavis, Janelia Farm
- Joerg Bewersdorf, Yale University
- Cathy Galbraith, National Institutes of Health

Particular areas of focus will include:

- Dynamic cellular processes
- Exploring biological structures using superresolution microscopy
- Multi-dimensional super resolution imaging (3D or multi color)
- Analysis approaches for extracting biologically relevant information from super-resolution data
- Probes for super-resolution imaging

A08: Channeling Effects in Microscopy and Microanalysis

Yoosuf N. Picard, Ian M. Anderson, Martin A. Crimp

Invited Speakers:

- David C. Bell, Harvard University
- Heiner Jaksch, Carl Zeiss NTS, Germany
- Leslie Allen, University of Melbourne, Australia
- Marc de Graef, Carnegie Mellon University
- Nestor J. Zaluzec, Argonne National Laboratory
- Patrick J. Phillips, Ohio State University
- Huolin L. Xin, Lawrence Berkeley National Lab

Channeling is inherent to the propagation of radiation in crystalline matter, a fundamental consequence of the anisotropy imposed by long-range atomic order. Channeling is the basis for diffraction-based structural characterization methods, such as CBED, electron microdiffraction, and EBSD, and is fundamental to atomic-resolution microanalysis. Channeling also provides contrast generation mechanisms for imaging grain structure, structural defects and strain in SEM-BSE/ECCI and HIM-/FIB-SE imaging and the basis for sublattice occupation measurements by ALCHEMI. This symposium seeks to bring researchers with expertise in diverse techniques and instrumentation together to discuss the role, effects, and exploitation/mitigation of channeling for microscopy and microanalysis.

A09: Measurement and Visualization of Mechanical Behavior at Micro and Nano-scales

Peter Hosemann, Andrew Minor

Invited Speakers:

- Manuel Pouchon, Paul Scherrer Institute, Switzerland
- Nathan Mara, Los Alamos National Laboratory
- Xiaoxu Huang, Risø National Laboratory, Denmark
- Ben Larson, Oak Ridge National Laboratory
- Mike Uchic, Wright-Patterson AFB
- Dan Gianola, University of Pennsylvania
- Cynthia Volkert, University of Göttingen, Germany
- Gerhard Dehm, Montan University of Leoben, Austria

This symposium will focus on new experimental tools and methods that allow us to access information on the microstructure and state of deformation in materials with spatial resolutions ranging from microns down to nanometers. It is important to consider the measurement of mechanical properties in conjunction with methods for visualizing a material's microstructure and its evolution during processing or deformation. Small-scale mechanical techniques such as ex-situ and in-situ compression, tension, bending or indentation generate fundamental insight into deformation processes that can be paired with structural techniques such as atom-probe tomography, electron tomography, synchrotron tomography and related digital image correlation methods.

A10: Helium Ion Microscopy

David Bell, David C. Joy, Vincent S. Smentkowski

Invited Speakers:

- Andre Beyer, University of Beilefeld, Germany
- John Notte, Carl Zeiss NTS
- Emile van Veldhoven, TNO, Netherlands
- Mike Postek, National Institute of Standards & Technology
- Adam Hall, University of North Carolina — Greensboro
- Daniele Pickard, National University of Singapore, Singapore
- Stuart A. Boden, University of Southampton, UK
- Rick Livengood, Intel

The Helium Ion Microscopy has now come of age with multiple instruments producing new and exciting results. HIM is capable to image conductive as well as insulating samples without special treatment, and allows imaging of unstained biomaterials and cell surfaces. Helium ion lithography is routinely producing ultra narrow line widths. HIM has the potential to become a routine microscopy tool for material science and nanotechnology, as well as in life science and biotechnology. This symposium 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.

A11: Correlative Microscopy and Chemical Imaging

Alice Dohnalkova, Xiaokun Shu, Carol Hirschmugl

Invited Speakers:

- Chris Jacobsen, Argonne National Laboratory
- Jack Griffith, University of North Carolina — Chapel Hill
- Tom Deerinck, University of California — San Diego

This symposium will cover multifaceted approaches of current research on obtaining high resolution structural information in conjunction with the compositional information, including spectroscopy-based imaging methodologies, chemical cellular responses and materials characterization.

A12: Surface and Subsurface Analysis

Vincent S. Smentkowski, John A. Chaney, Supanan Seraphin, Igor Sokolov

Invited Speakers:

- Chanmin Su, Bruker
- Craig Prater, Anasys Instruments
- Felix Kollmer, IonToF, Germany
- Tim Nunney, Thermo Scientific
- John Hammond, PHI
- Chris Moffitt, Kratos
- Tom Kelly, Cameca
- Bob Opila, University of Delaware
- Zoya Leonenko
- Sergey Magonov, NT MDT
- Robert Ross, ASU
- Franklin Tao, Notre Dame
- Anthony Muscat, University of Arizona
- Christopher Szakal, NIST
- Miriam Unger, University of Wisconsin @ Milwaukee
- Jean Paul Allain, Purdue
- Kai Wu, University of Beijing

Surface properties (composition, uniformity, thickness, etc) dictate the performance of many materials and biological systems. The surface analyst is asked to detect and image species present in ever-lower concentrations and within ever-smaller spatial and depth dimensions. This symposium will emphasize state of the art surface analytical instrumentation, advanced data analysis tools, the use of complementary surface analytical instrumentation to perform a complete analysis of complex materials and/or biological systems, and surface analytical challenges. Contributed papers on surface analysis are solicited for both platform and poster presentation we are especially interested in presentations on AES, XPS, ISS, SIMS, APT, SPM and low voltage SEM.

A13: Micro X-Ray Fluorescence

Eric Telfeyan, Jeffrey M. Davis, MSCE, EIT

Invited Speakers:

- Heike Soltau, PHSensor GMBH
- Paul Kotula, Sandia National Laboratories
- Michael Haschke, Bruker Nano GMBH, Germany
- Sergey Mamedov, Horiba Jobin Yvon, Inc.
- Andrew Lee, EDAX

From materials science to biology to art conservation, obtaining spatially resolved elemental information can be vital. Micro X-Ray fluorescence provides high sensitivity elemental distribution information using low vacuum or air operation and minimal sample preparation without destroying the sample. In part for these reasons, X-ray compositional imaging using synchrotron and laboratory μ XRF instruments has seen renewed interest in the microscopy field. This symposium will focus on μ XRF analysis with topics including novel applications, advanced instrumentation, and advanced data processing. Papers discussing synchrotron and laboratory scale instruments and their use in materials science, semiconductors, biology, art conservation, and chemistry are encouraged.

A14: Quantification from the Micro- to Sub-nano Scales: Pushing the Limits.

Paul G. Kotula, Gianluigi Botton, Emmanuelle Marquis

Invited Speakers:

- Ty Prosa, Cameca Instruments, Inc.
- Masashi Watanabe, Lehigh University
- Jean Audinot, Centre de Recherche Public-Gabriel Lippmann, Luxembourg
- Dominique Drouin, University of Sherbrooke, Canada
- Colin MacRae, CSIRO Materials, Australia
- Adam Hitchcock, McMaster University, Canada
- Gerald Kothleitner, TU Graz, Austria

Quantification from the micron to sub-nanometer length scale is a critical part of many studies of materials-both biological and physical in nature. This session will explore current limitations and advances in all aspects of quantitative microanalysis with an emphasis on pushing detection limits and correcting for artifacts over length scales, which include traditional near-surface micro-scale analyses down to atomic-resolution.

A15: In-situ Experiments in Liquids and Gases Using Electron-Optical Instruments

Blythe Clark, Konrad Rykaczewski, Eric A. Stach

Invited Speakers:

- Debbie Stokes, FEI Company
- Raymond Unocic, Oak Ridge National Laboratory
- Seiji Takeda, Osaka University, Japan
- James Evans, University of California — Davis
- Henny Zandbergen, Delft University of Technology, Netherlands
- Agnes Bogner, INSA Lyon, France
- Joseph Grogan, University of Pennsylvania
- Kate Klein, Zeiss/NIST

Recent advances in microscope and sample holder designs have opened new avenues for in-situ microscopy in liquid and gaseous environments. This symposium will focus on the latest advances in imaging of materials in the presence of liquids and gases in scanning, transmission and scanning transmission electron microscopes. Application areas are expected to include catalysis, oxidation, embrittlement, corrosion, electrochemistry, nanoparticle nucleation and growth, and biological processes and interactions. Invited speakers will be 'going beyond imaging', by emphasizing quantification of data and placing the results from in-situ experimentation into the broader framework of their respective scientific areas of emphasis.

A16: You Never Stop Paying for a Car — The Challenge of Instrument Maintenance in an Era of Shrinking Budgets

Thomas Williams

Invited Speakers:

- Debra Sherman, Purdue University

- Yagiao Wu, Boise State University
- Jeffery Bolin, Purdue University

Instrument maintenance is a constant and rising expense for Core Analytical Facilities. We all depend on outside vendors for service and maintenance. Choices include: demand service, service contracts, and the third-party facilitated maintenance agreements. The goal of the Symposium is to spur discussion of options, best practices, and how to pay the bill. Included in the Symposium: presentations from Vendors, Facility Directors, University Administrators, and Federal Agencies, followed by an open panel discussion. Contributions are invited for a follow-on Poster Session. Without maintenance, instruments go down and fail the users they are there to serve.

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Topic List for Contributed Papers

Organizers: Executive Program Committee

Potential contributed session topics in the three categories (Biological Sciences, Physical Sciences, and Instrumentation & Techniques) are listed below. Papers submitted to a topic that corresponds to an organized symposium will automatically be moved to that session. If a sufficient number of submissions on a topic are received, the Executive Program Committee will organize a contributed session on that topic; if not, the papers will be redirected to the closest regular symposium.

Biological Sciences

- C01 – Biological Sciences – General
- C02 – Biological Sciences – Specimen Preparation
- C03 – Biomaterials
- C04 – Biomedical Applications
- C05 – Botany
- C07 – Cytochemistry (Histochemistry, Immunochemistry, In-Situ Hybridization)
- C08 – Cytoskeleton
- C09 – Developmental / Reproductive Biology
- C10 – Entomology
- C11 – Histology
- C12 – Live Cell/In-vivo Imaging
- C13 – Macromolecules
- C14 – Microbiology
- C15 – Molecular Biology

Physical Sciences

- C19 – Physical Sciences – General
- C20 – Physical Sciences – Specimen Preparation
- C21 – Catalysts
- C22 – Ceramics
- C23 – Films & Coatings
- C24 – Geology / Mineralogy
- C25 – Magnetic & Superconducting Materials
- C26 – Metals, Alloys, Composites
- C27 – Nanostructured Materials
- C28 – Pharmaceuticals
- C29 – Polymers
- C30 – Semiconductors

Instrumentation & Techniques

- C31 – Advances in Instrumentation and Technique – General
- C32 – Electron Optics and Aberration Correction
- C33 – Transmission/Scanning Transmission Electron Microscopy
- C34 – Electron Diffraction (Transmission)
- C35 – Electron Holography
- C36 – Electron Tomography
- C37 – Electron Spectroscopy/Imaging in the TEM/STEM
- C38 – X-ray Spectroscopy/Imaging in the TEM/STEM
- C39 – Scanning Electron Microscopy
- C40 – Variable Pressure / Environmental SEM
- C41 – Electron Backscatter Diffraction (EBSD)
- C42 – X-ray Spectrometry / Quantitative X-ray Microanalysis (Bulk)
- C43 – Cathodoluminescence
- C44 – Spectral Imaging
- C45 – In-situ / Environmental Experiments
- C46 – Focused Ion Beam
- C47 – Atom Probe Field Ion Microscopy
- C48 – Scanning Ion Microscopy
- C49 – X-ray Microscopy (TXM/STXM)
- C50 – Scanning Probe Microscopy
- C51 – Optical (Light) Microscopy
- C52 – Confocal Microscopy
- C53 – Multi Photon Excitation Microscopy
- C54 – Optical Fluorescence Microscopy
- C55 – Infrared and Raman Microscopy and Microanalysis
- C56 – Correlative Microscopy
- C57 – Digital Image Acquisition, Processing, and Analysis
- C58 – Education in Microscopy and Microanalysis
- C59 – Metallography and Metallographic Specimen Preparation
- C60 – Failure Analysis
- C61 – Forensic Science
- C62 – Industrial "Real World" Microscopy
- C63 – Core/User Facility Management
- C64 – Corporate Session


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TUTORIALS, TECH FORUM, & SPECIAL EDUCATIONAL OPPORTUNITIES

PHYSICAL SCIENCES TUTORIALS

A Practical Guide to Bright/Dark Field - Scanning Transmission Electron Microscopy

Speaker: Michael J. Mills

Topics covered:

- Comparison between BF-STEM and conventional BF-TEM
- Simulating B/D field STEM imaging
- Optimizing image quality
- Characterizing crystalline defects

A Guide to EBSD for In-situ Studies

Speaker: Raj Mishra

Topics covered:

- Application of EBSD to study metal forming under complex strain paths
- EBSD study of microstructure evolution - challenges and opportunities
- 3D microstructure reconstruction using EBSD techniques
- EBSD and dislocation density measurement during forming

BIOLOGICAL TUTORIALS

X-50: Tracking Enveloped Virus Entry by Live Cell Fluorescence Microscopy

Gregory Melikian

A large number of enveloped viruses, including HIV, infect cells through endocytosis and fusion with intracellular compartments. We developed strategies to label viruses with fluorescent content and membrane markers and visualize single virus entry into cells with unprecedented details. We now resolve key steps of virus fusion, from uptake and delivery into acidic compartments to formation of small fusion pores and their dilation, which permits the nucleocapsid release into the cytosol. In addition, single virus imaging allows us to kinetically resolve the formation of a hemifusion intermediate that precedes the pore opening. These studies provide new insights into virus entry.

X-51: Artifacts in Immunolabeling

Hong Yi

Immuno electron microscopy (immuno-EM) is widely used for determining localization patterns of macromolecules at the ultrastructural level. However, for the inexperienced, distinguishing specific signal, recognizing artifacts, and interpreting the correlation between light and electron microscopy (LM and EM) data could be challenging. This tutorial will provide an overview of the common immuno localization methods for LM and EM, primary applications, and limitations. The tutorial will discuss the design of immuno-EM experiments based on immuno-LM data and the correlative interpretation of the data. For localization at the ultrastructural level, examples of immunolabeling artifacts and how to minimize artifacts will be discussed.

X-52: Correlative Light and Electron Cryo-Microscopy

Ariane Briegel

The combination of light and electron microscopy opens up new possibilities for the study of biological structures in a near-native state. We can now localize and identify a structure of interest in the light microscope prior to characterizing it at high resolution in the electron microscope. This tutorial will cover why this technique was originally developed; It will give an overview of the equipment that is currently available to perform such correlative experiments, and introduce the different approaches using either room temperature or cryogenic light microscopy. The optimization of the experimental design for addressing specific biological questions will be addressed.

TECHNOLOGISTS' FORUM SESSIONS

Technologists' Forum Platform: Microscopy Techniques in Hydrology

John Chandler

Provision of clean water is a worldwide issue that requires understanding not only of the source, but also devices that are used in purification and supply. Examination of the geologic structures involves traditional techniques such as light optical and scanning and transmission electron microscopy. Additionally, acoustic microscopy and micro computerized tomography are used to characterize microstructure.

Technologists' Forum Special Topics: Confocal Microscopy Across the Sciences

John Chandler

Confocal microscopy is expanding from the traditional fluorescence techniques. This symposium will explore novel uses of these established instruments and those that are being used for new areas of study. These will include both biological and materials sciences. This symposium will also present research using new instrumentation.

Technologists' Forum Roundtable: EM Biological Specimen Prep: Protocols for Success

Frank Macaluso

There is a tantalizing array of biological specimen prep protocols in the literature. Typically each lab has a set of tried-n-true protocols that everyone is encouraged to follow. Explore the criteria that guide the selection of protocols, fixatives, and



embedding media. Hear from a panel of experts and share your experience in this roundtable discussion. The format for this symposium is a short presentation from the experts followed by open discussion among the attendees.

OTHER EDUCATIONAL OPPORTUNITIES

X-90 Microscopy in the Classroom: Strategies for Education and Outreach

Alyssa Calabro, Craig Queenan, David Becker

Local educators and registered conference attendees are invited to participate in any of the round table discussions on strategies for microscopy outreach and education from K-20 and beyond. This session will help determine the MSA Education Committee's path forward as it takes a leading role in keeping microscopy in the classroom as a valuable experiential learning tool. Those involved in microscopy education or educational outreach are encouraged to submit an abstract for poster presentation. Topics to be covered include:

- Building microscopy curriculum and linking it to core content standards.
- Practical utilization of optical, electron and atomic force microscopes in the classroom.
- Promoting STEM & microscopy education outreach in corporate, government and academic environments.

X-91 It's a Family Affair

Elaine Humphrey, Jaret Frafjord

This exciting session is designed to pique the scientific interest of children of all ages - no previous microscopy experience needed!

- It is for the delegates' families and friends.
- Hands-on activities and demonstrations will prove that science is fun!
- Solve the mystery using clues left at the scene of the crime.
- Participants will have the opportunity to join in a guided tour of the exhibit floor and view samples left at the scene of the crime on electron microscopes to solve the mystery.

X-92 Microscopic Explorations — A FREE workshop for meeting attendees and Phoenix area teachers.

Elaine Humphrey

Do you want to introduce a class to microscopes and the micro-world? MSA's highly acclaimed middle school teacher's manual, *Microscopic Explorations*, contains everything that you need to know for classroom success. This half-day workshop will give you hands-on leadership experience.

- Spouses are welcome at the Microscopic Explorations workshop!
- Do you help a homeschool group? Introduce them to *Microscopic Explorations*.
- Do you work with Scouts or 4-H? Take them on a *Microscopic Exploration*.
- Does your grant require outreach? *Microscopic Explorations* will show you how.
- Do classes visit your lab? Use a *Microscopic Explorations* unit as an introduction.
- Do your children understand what you do? Begin with a *Microscopic Exploration*.

For further information, contact Caroline Schooley: schooley@mcn.org

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In-Week Intensive Workshops

Organizer: Mike Marko

- These in-depth courses will be held Monday-Thursday from 1:00 PM to 5:00 PM.
- A certificate of participation will be issued to each participant.
- Four (4) Continuing Microscopy Education Units are available (registration fee \$10).
- **The registration fee includes full registration for M&M 2012.**

Workshop fees:

\$600	Student (member or non-member; early or regular)
\$980	Member, early registration
\$1,100	Member, regular
\$1,100	Non-member, early registration
\$1,225	Non-member, regular

X-18 Introduction to SEM imaging and X-ray Compositional Analysis

David Joy and Brad Thiel

This introductory-level workshop will involve classroom lectures and live demonstrations. The SEM topics will be taught by David Joy and will cover basic instrument operation and imaging modes. The EDS topics will be taught by Brad Thiel and will cover basic compositional analysis using SEM with an energy dispersive x-ray spectrometer. The lessons in the lectures will be complemented with hands on demonstrations of SEM operation and x-ray microanalysis. Demonstrated topics will include the effects of working distance, accelerating voltage, probe size, imaging detector, detector bias, probe current, dead time, detector choice, sample geometry, etc.

X-19 Basic Confocal Light Microscopy

Jay Jerome and Bob Price

Confocal microscopy has become a primary method for visualizing structure in three dimensions. The technology is rapidly evolving with new instruments, lasers, detectors, and spectral imaging capabilities. Bob and Jay will instruct beginning and intermediate researchers on carrying out successful biological confocal microscopy experiments. Emphasis will be on practical aspects of specimen preparation, instrument setup and operation and enhancement and analysis of the digital images collected by confocal microscopy. A general knowledge of optical microscopy is helpful, but no prior knowledge of confocal microscopy is necessary to benefit from the workshop.

X-20 Nanomaterial Microscopy & Microanalysis: Tools and Preparation

Phillip Russell and Louis Germinario

With the wide variety of analytical instrumentation available, the selection of the correct "tool" for analysis of nanomaterials is critical. By introducing various microscopy and microanalysis methods, this workshop should provide a solid foundation for nanomaterial characterization for the beginning to intermediate investigator. The importance of choosing the proper preparation technique, to minimize introduction of artifacts and to ensure that representative samples are identified for subsequent analysis, will also be discussed.



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Sunday Short Courses

Organizer: Mike Marko

- These full-day courses run from 8:30 AM to 5:00 PM on Sunday, July 29.
- A certificate of participation will be issued to each participant.
- Two Continuing Microscopy Education Units are available (registration fee \$10).
- Morning and afternoon coffee breaks are included.
- Lunch is on your own; onsite vendors will be open.

Course fees:

\$175 — Member, early registration
 \$265 — Member, regular
 \$209 — Non-member, early registration
 \$289 — Non-member, regular

SHORT COURSES IN BIOLOGICAL SCIENCES

X-10 Cryo-preparation for Biological EM

Kent McDonald

In this course, we will briefly review why cryo-techniques for specimen preparation are superior to conventional methods. We will discuss some low-cost-alternative cryo-methods, as well as demonstrate some of the latest equipment and techniques for high pressure freezing, plunge freezing, cryosectioning, cryoSEM, and freeze fracturing. The Tokuyasu method for immunolabeling will also be covered briefly. Persons taking this course should leave with a better understanding of these cryotechniques and their role in different applications such as EM tomography, vitreous cryosectioning, and EM immunolabeling, as well as their routine use for the best available preservation of cellular fine structure

X-11 Immunolabeling Technology for Light and Electron Microscopy

Caroline Miller

The requirements for successful immunohistochemical and immunocytochemical labeling vary widely with different biological systems. The optimal techniques for light-microscope labeling often differ greatly from those needed for electron microscopy. The basics of immunolabeling at the light and electron microscope levels will be presented, illustrated with examples from several different biological systems. Some of the more complex methods and applications used in electron microscopy will be discussed in depth. The course will cover specimen preparation, immunogold labeling and enhancement methods, multiple labeling and correlative LM/EM techniques.

X12 3D Electron Microscopy of Macromolecular Assemblies

Teresa Ruiz, Michael Radermacher and Edward Morris

This short course will provide a comprehensive description of the methods used for 3D structure determination from electron micrographs of macromolecular complexes or weakly scattering specimens available in multiple copies. Specimen preparation techniques for single particles (deep stain, vitreous ice) will be presented, followed by selection of optimal imaging conditions, including low-dose imaging. Next, a detailed explanation of image processing techniques, with special emphasis on the random-conical reconstruction technique, will be presented. Finally, structure interpretation and docking of X-ray structures to 3D EM densities will be demonstrated. The techniques described could be applied to both biological and materials science specimens.

MULTI-DISCIPLINARY SHORT COURSES

X-13 Electron Tomography in Life and Material Sciences

Ilke Arslan and Montserrat Barcena

This short course will explain the basics of electron tomography, the experimental setups, and the instrumental prerequisites, illustrated by application examples. Bright-field, energy-filtered, and STEM tomographic methods will be discussed, emphasizing high resolution for materials applications, and low-dose cryo imaging for biological applications. A variety of reconstruction algorithms will be covered, as well as a survey of 3-D analysis and visualization methods. We intend the course to be of interest to both beginners and already-experienced users of electron tomography.

X-14 Imaging and Analysis with Variable Pressure or Environmental SEM

Brendan J. Griffin and Matthew Phillips

This short course aims to take the challenge out of imaging in variable pressure SEM mode. We will sequentially address VPSEM column components and operation, electron (SE and BSE), light (CL) imaging and x-ray analysis strategies and detectors for both biological and materials samples. Procedures for monitoring instrument performance and optimizing image quality will then be presented. Examples of the novel charge-related contrasts available in VPSEM will also be discussed. The appropriate use of hot, cool and cold stages is included. The course will conclude with invited manufacturer presentations on new developments and a final lecture comparing VPSEM with conventional SEM. Lecture pdfs will be available online.

X-15 Scientific Digital Imaging: Ethics and Execution

John Mackenzie

There is a need for standardization in scientific digital imaging in order to ensure proper ethical manipulation. The course will include a recently prepared Handbook for Scientific Digital Imaging. This handbook presents a standardized workflow with relevant theory to help kick-start the standardization discussion. Topics covered include: The proper optimization of digital images; preparation of images for Powerpoint, posters, and publication including newer enhanced on-line versions; selection of the top-rated and most affordable printers, scanners, and software; best practices for archiving scientific digital images. Step by step demonstrations of the best strategy for reproducible image optimization using Photoshop.

SUNDAY SHORT COURSES IN PHYSICAL SCIENCES

X16 Metallography for Failure Analysis

Frauke Hogue

This course is beneficial for anybody involved in metallurgical failure analysis – technician, metallurgist, or engineer. Special,



very practical techniques such as making very large mounts, grinding to a specific location, cleaning and replication will be discussed. The most important structures of various alloy groups, failure modes, and manufacturing methods are illustrated. More than two dozen case studies are presented to demonstrate the importance and use of optical metallography in failure analysis.

X-17 Transmission Electron Microscopy of Materials

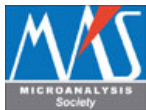
Alwyn Eades, Michael Kaufman and Bob Field

This course will provide an introduction to the characterization of materials and defects, with particular emphasis on crystalline materials. Transmission electron microscopy is very powerful and can provide highly valuable information about materials. However, much of the current literature focuses on the very newest techniques and overlooks the value of basic methods using standard instruments. It is those basic methods that will be the focus of this course.

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LATE-BREAKING POSTERS – SUBMISSION INFORMATION

- The deadline for submitting a Late-Breaking poster has passed. We look forward to reviewing your work next fall for M&M 2013.
- Late-Breaking posters are not included in the program proceedings and are not considered "published".
- Late-Breaking poster papers will be available for review and download (PDF) on the M&M 2012 site after July 17.
- Authors will be notified of their Late-Breaking poster number and presentation day by Tuesday, July 17.
- No travel support is available for Late-Breaking posters.
- All Late-Breaking poster presenters will need to register for the meeting – either a Full registration or a One-Day registration. This can be done onsite in Phoenix, or in advance by clicking on the "REGISTER NOW" button to the left.
- Questions? Contact the Meeting Manager at meetingmanager@microscopy.org.

LATE-BREAKING POSTER ABSTRACT

Poster#	Submitting Author	Affiliation	Paper Title
LB-1	H. Zhang	Harvard University	Cathodoluminescence of Color Centers in Nanodiamond
LB-2	D. Xie	Massachusetts Institute of Technology	In situ TEM Investigation of Electrical Current Effect on Aluminum Interconnect
LB-3	H. Elmlund	Stanford University School of Medicine	Software for <i>ab initio</i> Reconstruction of Flexible Single-particles
LB-4	R. Ramirez-Leal	Centro de Estudios Superiores del Estado de Sonora, Mexico	Identification and Characterization of Radioactive Particles in Samples of PM10 by SEM-EDS
LB-5	L. Gu	Beijing Laboratory for Electron Microscopy	Observation of Lithium Ions at Atomic Resolution Using an Aberration-corrected Annular-bright-field Electron Microscopy
LB-6	D. Baluch	Arizona State University School of Life Sciences	Pictures Worth a Thousand Words
LB-7	J. Liu	GE Power & Water	Failure Analysis Of Welded Connections Of Type 304 Austenitic Stainless Steel Piping In Water Service Industry
LB-8	D. Keene	Shriners Hospital for Children, Micro-Imaging Center	A Correlative Method for Imaging Identical Regions of Soft Tissue by Micro-CT, Light Microscopy, and Electron Microscopy: Evaluating Adipose Tissue in a Model System
LB-9	E. Sohr	University of California – Berkeley	Progress towards a Zernike Phase Plate for Electron Microscopy using a Focused Laser Beam
LB-10	H. Lowers	United States Geological Survey, Microbeam Lab	Photoluminescence and Microanalysis of Organic Macerals in the Kimmeridge Clay Formation, Offshore United Kingdom
LB-11	Y.L. Tang	Johnson Matthey Catalysts	High Resolution Electron Microscopy Study of Nano Structure in CO Emission Control Additives
LB-12	N. Zaluzec	MSA Standards Committee	MSA/MAS/AMMS Hyper-dimensional Data File Format - An Update
LB-13	I. Zapata	Instituto Mexicano del Petróleo (IMP)	AFM Study of Metal-reducing Bacteria Involved in Biocorrosion Process
LB-14	Y. Oshima	Osaka University, Japan	Reversible Contrast in Focus Series of Annular Bright Field Images for Thin Specimen
LB-15	P. Pinard	Central Facility for Electron Microscopy RWTH Aachen University, Germany	Better Identification of Dual Phase Steel Constituents by Combined EBSD and High Resolution EPMA Carbon Measurements
LB-16	J.H. Jang	Oak Ridge National Lab	Understanding the Mechanism of Resistive Switching via In Situ Observations of Bias-Induced Crystallization in Amorphous TiO ₂ Films
LB-17	M. Gajdardziska-Josifovska	Nicolet High School, Milwaukee, WI	Nanoparticles in Potable and Aquatic Freshwater: Stockholm Junior Water Prize Outreach
LB-18	C.C. Chen	UCLA	Atomic Scale Resolution Electron Tomography: Data Analysis, Projection Alignment and 3D Reconstruction

LB-19	C. Zhu	UCLA	Atomic Scale Resolution Electron Tomography: Experimental Procedure and Data Acquisition
LB-20	P. da Fonseca	The Institute of Cancer Research, London, UK	Structure of the Human 26S Proteasome
LB-21	B. Buse	University of Bristol, UK	Quantitative Nanoscale Low kV EPMA of Plagioclase Feldspar
LB-22	H. Pasolli	Rockefeller University, New York	Newly Identified Stem Cells in Sweat Glands: Roles in Homeostasis and Wound Repair
LB-23	C. Hombourger	Cameca Instruments	Quantitative And Repeatable Analysis At High Spatial Resolution With Field Emission Electron MicroProbe
LB-24	R. R. Cerchiara	E.A. Fischione Instruments, Inc.	Sample Preparation of Oil and Gas Shales for EBSD/EDX and FIB/SEM
LB-25	H. Xiong	University of New Mexico	A Simple Method to Prepare Hydrothermally Stable Nb2O5/Carbon Catalysts for Aqueous-phase Reaction
LB-26	A.P. Lindstrom	NIST	Preparation of a Wipe with a Known Particles Loading for Recovery Efficiency Studies
LB-27	A. Blackburn	Hitachi Cambridge Laboratory, UK	Magnetic Spiral Phase Plate
LB-28	A.C. Robins	E.A. Fischione Instruments, Inc.	Optimised Sample Preparation Using Large Area Ion Polishing On Leaded Brass For EBSD Characterisation
LB-29	G. DeRose	California Institute of Technology	Investigation of Inductively Coupled Plasma / Reactive Ion Etch Characteristics of Mask Materials for Semiconductor Micro and Nanofabrication
LB-30	P. Deshmukh	E.A. Fischione Instruments, Inc.	Bridging the Gap Between the Environmental Cell (e-cell) Holder Technology and in situ Applications in a (Canning) Transmission Electron Microscope
LB-31	M. Mecklenburg	The Aerospace Corporation	In situ Heating of Graphene Imaged Using Transmission Electron Microscopy
LB-32	X. Yu	University of Virginia	Filaments from <i>Ignicoccus hospitalis</i> Show Diversity of Packing in Proteins Containing N-terminal Type IV Pilin Helices
LB-33	B. Foran	The Aerospace Corporation	Characterization of Black Gloss Slips of 5th Century B.C. Athenian Pottery
LB-34	D. Bolser	University of Arizona	Analysis of a Calcium-Aluminum-Rich Inclusion from the Allende Meteorite Using Electron-Backscatter Diffraction
LB-35	M. Thompson	University of Arizona	Nanostructural Analysis of a Sulfide Assemblage in an R-Chondrite Meteorite via Large Solid-angle EDS
LB-36	B. Bammes	Direct Electron, LP	Improving Resolution and Field of View of Electron Cryo-Microscopy With a Larger Direct Detection Device
LB-37	S. Rajasekhara	Sandia Laboratories	Hydride Formation in Cladding Materials Studied Via In-situ Environmental Heating Transmission Electron Microscopy
LB-38	S. Burgess	Oxford Instruments NanoAnalysis, UK	Improving Low Energy Sensitivity of EDS Detectors – Towards Lithium Detection
LB-39	G. Subramanian	Arizona State University	ELNES Analysis of Cu in Bi2Se3 Topological Insulators
LB-40	T. Tomohito	Nippon Steel Corporation, Japan	FIB-SIMS Study on Grain Boundary Segregation of Boron in Steel

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Awards & Scholarships

All 2012 Awards Information — [Download PDF](#)

AWARDS

Students are encouraged to apply for scholarships to attend the meeting. MSA and MAS offer generous awards for outstanding papers to be presented by students. Papers must meet all deadline and submission requirements in order to be considered for scholarship award consideration. Papers must be submitted online at the M&M 2012 abstract submission site.

Scholarship awards are not meant to completely cover the cost of participating in the meeting, but rather to provide cost sharing for funds supplied by advisors' research monies or support from an institution. Please see below for information on specific awards.

Please see below for details regarding each specific award, criteria and prize(s). In order to be considered for the PSA, DSA or PPA, the appropriate box must be checked on the paper submission site. The email address of the person providing the supporting letter must be provided as well. (That person will be contacted via email and asked to submit their support letter via email.)

All support letters must be received no later than February 15, 2012. All applicants will be notified of their award status by March 24, 2012. Unsuccessful applicants are permitted to withdraw their papers by March 31, 2012.

UNDERGRADUATE & GRADUATE STUDENT AWARDS

MSA Presidential Student Awards (PSA)

Criteria:

- Applicants must be bona fide students at a recognized college or university at the time of the meeting (August 2012).
- Awards are based on the quality of the paper submitted for presentation at the meeting.
- Applicant must be the first author of the submitted paper.
- Paper must be submitted for platform presentation.
- Successful applicants must present their papers personally at the meeting in order to receive their award.
- Awardees are expected to attend and participate in the entire meeting.
- Please note: Former winners are ineligible for another award.

Successful applicants will receive:

- Complimentary full-meeting registration to M&M 2012 (includes proceedings and social event ticket)
- Invitation to the Presidential Reception
- Up to \$1,000 for travel (lowest roundtrip domestic USA airfare)
- Lodging stipend of up to \$100/day for up to 5 days.

MAS Distinguished Scholar Awards (DSA)

Criteria:

- Applicants must be bona fide students at a recognized college or university at the time of the meeting (August 2012).
- Awards are based on the quality of the paper submitted for presentation at the meeting.
- Applicant must be the first author of the submitted paper.
- Successful applicants must present their papers personally at the meeting in order to receive their award.

Successful applicants will receive:

- Complimentary full-meeting registration to M&M 2012 (includes proceedings and social event ticket);
- Invitation to the Presidential Reception;
- Monetary contribution towards travel and lodging expenses.

MSA Student Poster Awards

Presented for best posters in categories of:

- Instrumentation & Techniques;
- Applications of Microscopy & Microanalysis — Biological Sciences;
- Applications of Microscopy & Microanalysis — Physical Sciences.

Daily prizes will be awarded in each category: First Prize: \$400; Second Prize: \$200

Criteria:

- The first author of each awarded paper must be a student (contact information must be provided for someone who can verify student status).
- Awardees' posters must be displayed at the M&M meeting from Monday through Thursday.

UNDERGRADUATE STUDENT, GRADUATE STUDENT and POST DOCTORAL AWARDS

Eric Samuel Scholarship

Sponsored by Oxford Instruments

Criteria:

- Satisfy all criteria for Presidential Student Awards
- Open to all bona fide undergraduate and graduate students and post-doctoral research associates.

Successful applicants will receive:

- Complimentary full meeting registration to M&M 2012 (including proceedings & social event ticket)
- Invitation to Presidents' Reception
- Up to \$1,500 for lodging and travel (lowest available roundtrip airfare)
- Lodging stipend of up to \$100/day for up to 5 days.

Raleigh & Clara Miller Scholarship Award

Criteria:

- Applicant must be the first author of a paper submitted for platform presentation.
- Applicant must have been an undergraduate student, graduate student, or post-doctoral research associate when work to be presented was done.
- Preference is for biological topics, but materials and technical projects will be considered.
- Successful applicants will receive:
- \$1,000 to attend the meeting.

POST DOCTORAL AWARDS

Robert P. Apkarian Memorial Scholarship

- Will provide support for two (2) post-doctoral research associates to attend M&M 2012.
- One (1) award designated for biological sciences.
- One (1) award designated for materials science, education or instrumentation.

Criteria:

- Applicant must be a full-time, post-doctoral student (open to both domestic U.S. and international candidates).
- Submission procedures must be followed as indicated above for MSA Presidential Student Awards.
- A supporting letter must be received from a member of MSA, preferably the director or supervisor, attesting to the applicant's status.
- Applicant must be a current member of MSA (dues paid through 2012).

Successful applicants will receive:

- Complimentary full registration for M&M 2012 (including proceedings & social event ticket)
- Invitation to the Presidents' Reception
- Award plaque designating the Robert P. Apkarian Memorial Scholarship
- Limited travel and lodging support will be made available

MSA Presidential Post-Doctoral Awards (PPA)

Criteria:

- Applicants must be bona fide post-doctoral research associate at the time of the meeting (August 2012)
- Awards are based on the quality of the paper submitted for presentation at the meeting
- Applicant must be the first author of the submitted paper
- Paper must be submitted for platform presentation
- Successful applicants must present their papers personally at the meeting in order to receive their award
- Awardees are expected to attend and participate in the entire meeting
- Please note: Former winners are ineligible for another award

Successful applicants will receive:

- Complimentary full-meeting registration to M&M 2012 (includes proceedings and social event ticket)
- Invitation to the Presidential Reception
- Up to \$1,000 for travel (lowest roundtrip domestic USA airfare)
- Lodging stipend of up to \$100/day for up to 5 days

TECHNOLOGISTS AWARDS

MSA Professional Technical Staff Awards (PTSA)

(up to 4 awards given)

Criteria:

- Awards are designated for professional technical staff.
- Applicants must be regular, current members of MSA (dues fully paid for 2012).
- Awards are based on the quality of the paper submitted and are judged by the MSA Technologists' Forum.
- Applicant must be the first author of the submitted paper.
- Successful applicants must present their papers personally at the meeting in order to receive their award.
- Awardees are expected to attend and participate in the entire meeting.
- Please note: Former winners are ineligible for another award. This category also includes the Raleigh and Clara Miller Awards.

Successful applicants will receive:

- Complimentary full-meeting registration to M&M 2012 (includes proceedings and social event ticket)
- Up to \$600 for travel/lodging/meeting expenses

OTHER AWARDS

Diatome Awards

Sponsored by Diatome

Criteria:

- Presented for the posters illustrating the best use of diamond knife ultramicrotomy in either biological or physical sciences.
- First Prize: One week, all-expense-paid trip to Switzerland
- Second Prize & Third Prize: Swiss watches

IMS International Metallographic Contest*Criteria:*

- The contest embraces 11 classes representing various materials and methods revealing structure such as microphotography, optical and electron microscopy, and unique techniques.
- In general, an exhibit should tell a story about a problem and how it was solved.
- For complete requirements, detailed rules, and submission procedures, visit <http://www.internationalmetallographicsociety.org/contest.html>

Prizes will be awarded in each category.

First Prize: \$200;

Second Prize: \$100;

Third Prize: \$50;

Best in Show Prize: \$3,000

All entries must be received by July 15, 2012, and should be sent to:

Mitch Witkowski

General Dynamics - AIS

8201 E. McDowell Road

M/D: H1149F

Scottsdale, AZ 85257

MSA Micrograph Competition

Sponsored by Microscopy Society of America

Held at the M&M Meeting each year, this micrograph competition promotes the innovative blending of art and science. Open to all forms of microscopic imaging, winners of this competition are selected on the basis of artistic merit and general audience appeal. A maximum of three (3) awards will be presented; First Prize: \$200; Two Second Prizes: \$50 each.

Criteria:

- Entries must be scientifically significant
- Entries must contain novel information useful in resolving a scientific issue, and/or
- Present established information in a way that dramatically enhances its comprehension or interpretation.

Rules:

1. Any individual may submit a maximum of two (2) entries (one award per entrant).
2. Entries must have overall dimensions of 11" x 14" (horizontal or vertical), and be affixed to a stiff lightweight support (e.g. ¼" foam board). Micrographs may be mounted so that they have borders.
3. Each entry must have a separate text sheet with the title and a 200-word (max) description of the image, including the technique and its scientific significance. Text is recommended to be printed in 14-pt Times New Roman font on a separate 8½" x 11" sheet. Entrant's name, address and image title shall be posted on the back of the mounted entry(ies).
4. Entries must be brought to the meeting and mounted on the display boards by 12:00 noon on Monday, July 30, 2012.
5. Non-winning entries must be removed Thursday afternoon by 3:00 PM. Micrographs remaining after that time will be discarded.
6. Winners will be announced at the meeting. Submitted micrographs remain the property of the entrants subject to the conditions above.

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