M&M 2012

MICROSCOPY & MICROANALYSIS

July 29 – August 2 • Phoenix, AZ

CALL FOR PAPERS

Abstract Submission Deadline:

February 15, 2012

Up-to-date information www.microscopy.org/MandM/2012/

MSA Microscopy Society of America

MAS MICROANALYSIS Society

International Metallographic Society, Inc.
An Affiliate Society of ASM International

QUESTIONS?

› Questions regarding the technical content of the meeting or regarding specific sessions may be directed to:
Program Chair – **Luke N. Brewer**
MM2012ProgramChair@microscopy.org

› Questions regarding registration may be directed to:
Registration@microscopy.org

› Questions regarding exhibits, exhibitors or sponsors may be directed to:
Doreen@corcexpo.com

› Please direct all other meeting-related questions to:
MeetingManager@microscopy.org.

Not a Member?
Join Today And Save On M&M 2012 Registration Fees!

Registration Opens February 1, 2012

MSA Microscopy Society of America

Visit www.microscopy.org to join the Microscopy Society of America online, or call 1-800-538-3672 for more information about the benefits of MSA Membership.

MAS Microanalysis Society

Visit www.microanalysissociety.org to join the Microanalysis Society and find out information about MAS membership benefits.

International Metallographic Society, Inc. An Affiliate Society of ASM International

Go to www.internationalmetallographicsociety.org for membership information on the International Metallographic Society.

M&M 2012 MICROSCOPY & MICROANALYSIS

July 29 – August 2 • Phoenix, AZ

Dear Fellow Microscopists, Microanalysts, Students, and Friends,

We invite you to join us for Microscopy & Microanalysis 2012, July 29 – August 2 in beautiful Phoenix, Arizona. The annual M&M meeting continues to be the premier meeting for scientists, technologists, and students who use microscopy or microanalysis in their research. The Program Committee has put together an outstanding scientific program that brings the latest advances in the biological and physical sciences, techniques and instrumentation. Complementing the program is one of the largest exhibitions of microscopy and microanalysis instrumentation and resources in the world. Educational opportunities include a variety of Sunday short courses, tutorials, evening vendor tutorials, and in-week intensive workshops. After a successful inauguration at M&M 2011, the daily poster awards will continue to highlight the best student posters in instrumentation & techniques, biological applications of microscopy & microanalysis, and physical applications of microscopy & microanalysis. The winners of our major society awards for distinguished scientists, professional technical achievement as well as student and post-graduate scholars will be honored during the opening plenary session. Each year, the joining societies offer a variety of awards and scholarships for students, post-docs, and technologists. Details regarding each specific award, criteria and prize(s) can be found in this Call for Papers and on the meeting website.

Microscopy & Microanalysis 2012 offers a variety of opportunities for all attendees to interact with peers and meet new colleagues. We look forward to seeing you in Phoenix!

Janet H. Woodward
President, MSA

John F. Mansfield
President, MAS

Natalio T. Saenz
President, IMS

MSA Microscopy Society of America

MAS Microanalysis Society

International Metallographic Society, Inc. An Affiliate Society of ASM International

BIOLOGICAL SCIENCES SYMPOSIA

B01 Microbial Biofilms — The Good, The Bad, and The Ugly

Janet H. Woodward, Alice Dohnalkova

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

This symposium will cover studies on the structure and function of proteins involved in membrane morphology and will focus on:

- Organelle shape and function
- Membrane fission and fusion
- Membrane coats
- Membrane bending
- Proteins involved in membrane lipid modification

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

Elizabeth R. Wright, Teresa Ruiz, Kelly Lee

This symposium will cover structural and ultrastructural aspects of biological systems resolved using advanced EM techniques and hybrid methodologies, and will focus on:

- Eukaryotic and prokaryotic architecture
- Cellular metabolism, cell division and protein translation
- Cellular secretion, adhesion and motility
- Cell-cell interactions and cell signaling
- Virus-host interactions and virus structure
- Structure and function of biological macromolecules and assemblies

B05 Visualization, Localization and Dynamics of Cellular Components

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

This symposium on the localization, interaction and dynamics of macromolecular and subcellular structures within cells or isolated cellular components will focus on quantitative fluorescence microscopy approaches, including:

- Fluorescence Resonance Energy Transfer (FRET)
- Fluorescence Lifetime Imaging (FLIM)
- Confocal and Multiphoton Microscopy
- Total Internal Reflection Microscopy (TIRF)
- Single Molecule Imaging
- Image Correlation Microscopy
- Superresolution Microscopy

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

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

This symposium will cover:

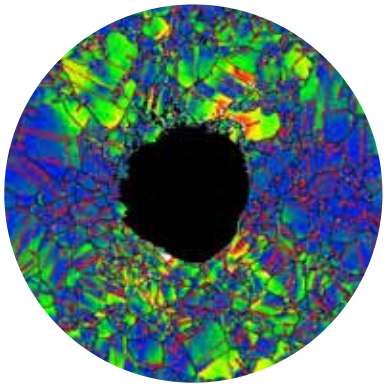
- Research and the use of microscopy for improving the quality and durability of crops and livestock
- Clinical techniques which may improve rapid and accurate detection and treatment of diseases
- Examination of cells, tissues, entire organisms, and their associated pathogens
- Investigation of organisms and their related pathogens in clinical, diagnostic and research laboratories

B07 Microscopy, Microanalysis and Image Analysis in the Pharmaceutical Sciences

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

This symposium will cover:

- Specialized imaging and analysis technologies and themes for drug discovery and delivery as well as practical problems in the pharmaceutical industry
- Forum provided for sharing thoughts and strategies on issues in the pharmaceutical laboratory



EBSD misorientation map of cylindrical hole in strained brass tensile bar.
IMAGE BY — LUKE BREWER, NAVAL POSTGRADUATE SCHOOL

PHYSICAL SCIENCES SYMPOSIA

P01 Electron Microscopy/Spectroscopy of Energy-Related Materials

Paulo J. Ferreira, Yimei Zhu, Mary Grace Burke

The symposium will cover:

- TEM/STEM/EELS of materials for batteries, aberration-corrected imaging and spectroscopy of energy materials, including Li and H elements, characterization of interfaces and defects in functional nanomaterials/devices, in-situ techniques of energy materials during operation
- TEM/STEM/EELS studies of catalysts for fuel cell and hydrogen storage, photocatalysts and materials for thermoelectrics and photovoltaics
- Microstructural characterization of alloys used in nuclear power systems, with particular emphasis on environment-sensitive behavior (SCC, corrosion fatigue) and radiation effects

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

Raul Arenal, Jannik C. Meyer, Sebastian Osswald

This symposium will cover studies of the structure, composition and properties of carbon-based nanomaterials (e.g. graphene, nanotubes, nanodiamond, fullerenes) as well as BxCyNz materials via:

- TEM and STEM studies (imaging, electron diffraction), including corrected and/or monochromated microscopy of carbon nanostructures
- TEM combined with Raman, infrared, optical spectroscopy, XPS or SPM (STM/STS, AFM) investigations
- Radiation damage and electron-beam induced modifications
- In-situ experiments with carbon nanomaterials
- Confocal Raman/IR microscopy

P03 Hybrid (Soft-Hard) Materials and Interfaces

Vinayak Dravid, Richard Leapman, Derk Joester

The symposium will address the specific challenges in specimen preparation, microscopy and analysis presented by hard-soft hybrid structures and interfaces:

- 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
- Addressing structural hierarchy in hybrid materials: multi-scale and correlative imaging approaches
- Hybrid materials and interfaces across the disciplines: bio-inspired materials, biominerals, polymer-composites, tissue scaffolds, surface coatings, functionalized nanomaterials, and others.

[PHYSICAL SCIENCES SYMPOSIA Continued]

P04 Microscopy and Microanalysis of Joining and Coating Materials
Steven R. Claves, Chad M. Parish, Donald F. Susan

Microscopy and microanalysis to investigate:

- Advanced welding processes, including explosive and friction-stir welding
- Welding, brazing, and soldering of complex geometries or applications
- Effects of process conditions on chemistry and microstructure of welding and coating technologies
- Analytical techniques: imaging (LOM, SEM), compositional (EDS, WDS), and diffraction (XRD, EBSD)

P05 High Resolution Microscopy and Microanalysis of Meteorites, Minerals, and Aerosols
John Armstrong, David Smith, Lindsey Keller, David Bell

Appropriate topics for the session include:

- Characterization of minerals at the atomic level by high resolution electron microscopy, electron diffraction and related methods
- High resolution microscopy and microanalysis of meteoritic and other extraterrestrial materials
- Development and application of high accuracy x-ray microanalysis methods for geological specimens
- Microscopy and microanalysis of aerosols at the single particle level

P06 Failure Analysis of Structural Materials
J. Martinez, D. Dennies

- Real-world applications and research case studies
- Application of multiple analytical techniques to failure analyses
- Failure analysis of modes and causes in structural materials
- Application of failure analysis techniques to electronics, devices, and biomaterials

P07 Microscopy and Analysis of Quantum Structures and Devices
Brendan Foran

- Structure-property relationships in quantum structures and devices
- Spatial variation of strain and composition in quantum devices
- Unveiling new physics and quantum structures and devices
- Process optimization and functionality of new devices

INSTRUMENTATION & TECHNIQUES SYMPOSIA

A01 Applications of Aberration-Corrected STEM and SEM
K. Andre Mkhoyan, Paul M. Voyles, Joseph R. Michael

This symposium will cover:

- Applications of aberration-corrected STEM and SEM to the characterization of materials and nanostructures.
- Quantitative imaging and simulation in aberration-corrected STEM and SEM
- Electron energy loss spectroscopy and X-ray analysis in aberration-corrected STEM and SEM

A02 Robert Gray Memorial Symposium on Metallography of Reactive Materials
Jaret J. Frafjord, Rod McCabe, Steve Dekanich

This symposium will honor the work of Robert Gray, who helped establish the Metallography Group at the Oak Ridge National Laboratory in East Tennessee.

- Metallographic and analytical techniques for materials that react readily with air, water or other media
- Techniques for working with radioactive materials or materials that have been exposed to radiation
- Preparation techniques for other reactive materials such as hydrides, battery materials, and explosives

A03 TEM Phase Contrast Imaging in Biological and Materials Science
Mike Marko, Radostin Danev

This symposium will cover:

- Theoretical background of phase-contrast TEM
- New designs of phase-shifting devices, and optimization of the TEM platform
- Guidelines for use of phase-plate imaging in biological cryo-EM
- Prospects for atomic-resolution phase-plate imaging with Cs-tunable TEM

A04 3D Structure Determination in Physical and Biological Sciences
Daniela Nicastro, Peter Nellist

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

Featured topical areas will include:

- Ultrafast/Dynamic Transmission Electron Microscopy
- Ultrafast Electron Diffraction
- Photoemission sources for TEM
- Design and Implementation of Phase Plate Technologies
- Laser Interactions with TEM Specimens and In-Situ Stage Design

A06 Focused Ion Beam Instrumentation & Applications for Physical and Biological Sciences
Keana Scott, Lucille Giannuzzi, Nabil Bassim

This symposium will cover:

- FIB applications for physical and biological sciences
- Nano and micro fabrication and prototyping using FIB based techniques
- Theoretical and experimental research on ion-solid interactions
- Advances in FIB-based 2D and 3D analytical techniques
- Advances in FIB instrumentation

A07 Super-resolution Microscopy — Principles and Practice
Hari Schroff, Jim Galbraith, David Giovannucci

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

This symposium will cover:

- The principles, modeling and simulation of channeling effects in electron- and ion-based instrumentation and techniques
- Advances in instrumentation and detectors for channeling-based measurements
- Channeling effects observed in the (S)TEM, SEM, HIM, and FIB
- Analysis of strain, defects and grain structure using channeling-based contrast
- Implications of channeling for quantitative atomic-resolution imaging and spectroscopy
- Opportunities and challenges for channeling in EFTEM, tomography, and in-situ TEM
- Recent developments in EBSD, ECCI, CBED, electron microdiffraction, and ALCHEMI

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

Peter Hosemann, Andrew Minor

This symposium will cover:

- Spatially-resolved diffraction techniques for the measurement of stress, strain and deformation
- In-situ deformation under SEM/TEM, and HRTEM measurements of strain
- Connecting small scale mechanics with real-world engineering
- 3D characterization of deformation structures

A10 Helium Ion Microscopy

David Bell, David C Joy, Vincent S. Smentkowski

This symposium will cover:

- Helium Ion Microscopy
- Contrast mechanisms, imaging, analysis
- Instrument development/modification
- Application development
- Lithography
- Biological Imaging

A11 Correlative Microscopy and Chemical Imaging

Alice Dohnalkova, Xiaokun Shu, Carol Hirschmugl

Topics can include:

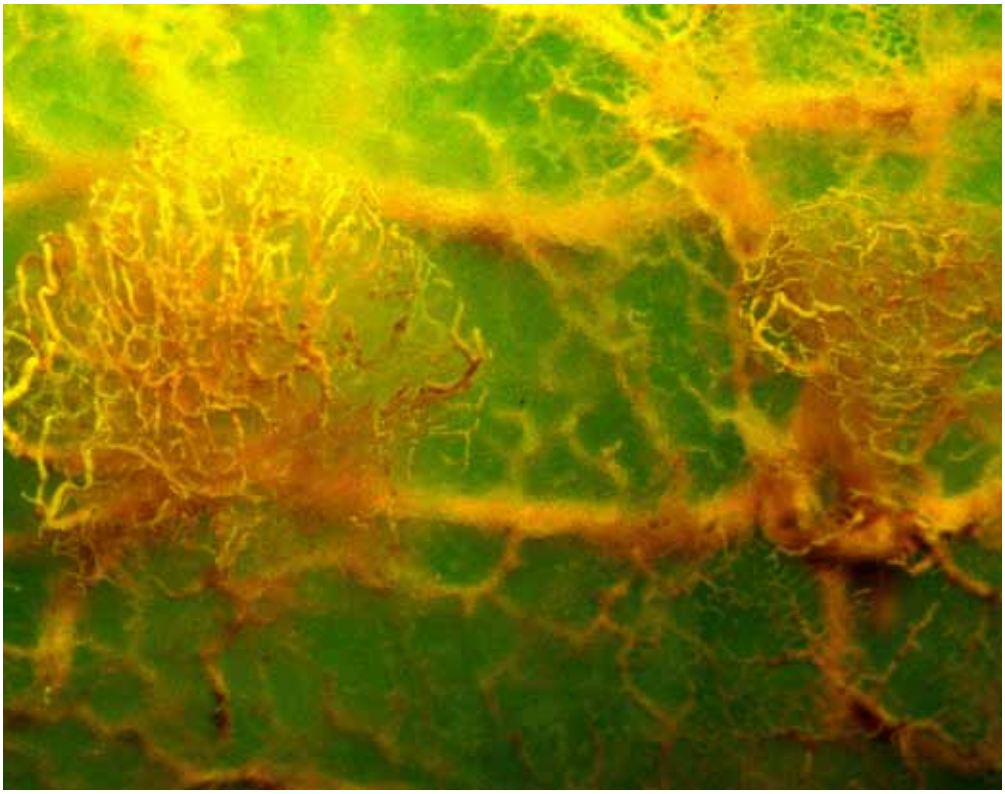
- Correlated light and electron microscopy
- Chemical imaging and analysis of organic macromolecules, mineral species and polymers
- 3D chemical imaging and mapping using soft X-ray microscopy methods
- Applications of advanced X-ray source methodologies (STXM, XANES, EXAFS, IR-based)

A12 Surface and Subsurface Analysis

Vincent Smentkowski, John Chaney, Supanan Seraphin, Igo Sokolov

This symposium will cover:

- State of the art surface analysis instrumentation including but not limited to AES, XPS, ISS, SIMS, SPM, and 3D APT
- Low voltage SEM
- Advanced data reduction and analysis tools including hyper-spectral and 3D spectral imaging
- Surface analysis challenges



Blood vessels in intestinal tumors of mice.

IMAGE BY—MARJ PENA AND BOB PRICE – UNIVERSITY OF SOUTH CAROLINA; AND TROY BAUDINO, TEXAS A&M HEALTH CENTER

A13 Micro X-Ray Fluorescence

Eric Telfeyan, Jeffrey M. Davis

This symposium will cover:

- State of the art instrumentation in both synchrotron and bench applications for µXRF
- Advances in optics and detectors for use in µXRF
- Advanced data reduction including statistical methods for spectral image analysis in µXRF
- Applications of µXRF to a variety of sample types and fields
- Environmental, energy, and materials conservation research using µXRF

A14 Quantification From the Micro- to Sub-nano-scales: Pushing the Limits.

Paul G. Kotula, Gianluigi Botton, Emmanuelle Marquis

This symposium will cover:

- Data reduction and quantitative analysis tools for hyperspectral images
- Artifacts and challenges to trace analysis over a range of length scales
- Specimen preparations challenges: ideal and non-ideal analytical geometries
- New technologies that push both detection limits and spatial resolution in a variety of analytical techniques, including CL, EELS, EFTEM, and X-ray signals
- Modeling approaches and Monte Carlo simulations in particular

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

Blythe Clark, Konrad Rykaczewski, Eric A. Stach

- In-situ electron microscopy studies: SEM, TEM and STEM
- Instrument development/modification
- Using aberration corrected instrumentation in real world environments
- Quantifying electron beam effects in the presence of gases and liquids (heating, radiolysis, charging, etc.)
- Monitoring processes such as catalysis, electrochemistry, corrosion, and ice formation at micro- and nanoscales

MICROSCOPY OUTREACH EDUCATION

X90 Microscopy in the Classroom: Strategies for Education and Outreach
Alyssa Calabro, Craig Queenan, David Becker

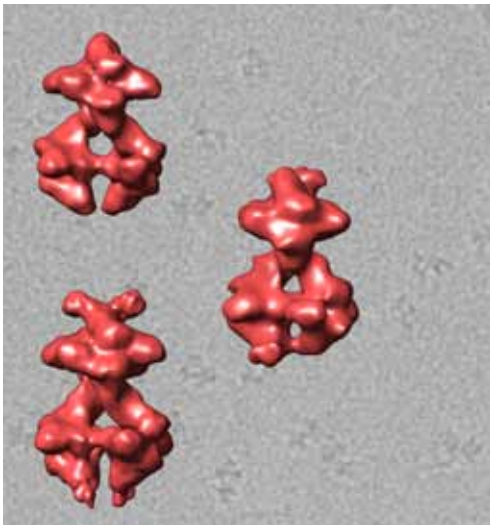
Local educators and registered conference attendees are invited to participate in any of the round table discussions on strategies for microscopy outreach and education from K-12 and beyond. This session will help determine the MSA Education Committee's path forward as it takes a leading role in keeping 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 Science, Technology, Engineering and Math (STEM) & microscopy education outreach in corporate, government and academic environments

X91 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



CryoEM and 3D reconstruction of yeast phosphofructokinase.
IMAGE BY — TERESA RUIZ, UNIVERSITY OF VERMONT

PHYSICAL SCIENCES TUTORIALS

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

» Tracking Enveloped Virus Entry by Live Cell Fluorescence Microscopy
Gregory Melikian

This tutorial will cover:

- Biological relevance of virus entry studies
- Virus labeling strategies
- Measurements of virus endocytosis
- Measurements of endosomal pH during the virus trafficking
- Pinpointing the sites of virus entry — ways to circumvent the need for super-resolution microscopy
- Monitoring post-fusion events leading to infection

» Artifacts in Immunolabeling
Hong Yi

This tutorial will cover:

- Broad overview of immunolabeling methods and sample preparation techniques
- Correlative interpretation of immunolabeling from light to electron microscopy
- Examples of immunolabeling artifacts and possible causes
- How to minimize artifacts in immunolabeling

» Correlative Light and Electron Cryo-Microscopy
Ariane Briegel

This tutorial will cover:

- Broad overview of the development of correlative light microscopy and electron cryo-microscopy
- Introduction to the currently available equipment options
- Correlation of electron cryo-microscopy with either room temperature- or cryo-light microscopy
- Optimization of experimental design using specific examples

TECHNOLOGISTS' FORUM SESSIONS

» Technologists' Forum Platform: Microscopy Techniques in Hydrology
John Chandler

This session will cover:

- Microscopy techniques at each phase: water supply, retention, quality, purification, delivery and disposal
- Characterization of geologic structures
- Interaction of materials and biologic organisms
- Discussion of other industries that utilize similar processes

» Technologists' Forum Special Topics: Confocal Microscopy Across the Sciences
John Chandler

This session will cover:

- A variety of confocal techniques, and the basics of how confocal microscopy works
- How to form a 3 dimensional reconstruction of the sample
- Illumination techniques
- Recent advances, including Raman spectrometry and use of transmission electron microscopes
- Biological and materials research applications

» Technologists' Forum Roundtable: EM Biological Specimen Prep — Protocols for Success
Frank Macaluso

This session format is a short presentation from a panel of experts followed by open discussion among participants. Discussion topics include:

- Specimen preparation techniques to produce useful image data and spectacular micrographs
- Advantages and disadvantages of available protocols
- Criteria that guide the selection of fixatives, embedding media

SEM image of individual moth scale.
IMAGE BY — BILL MONROE, MISSISSIPPI STATE UNIVERSITY

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 (fee $10/members; $50/non-members)
- Morning and afternoon coffee breaks are included
- Lunch is on your own

Course Fees:

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

BIOLOGICAL SCIENCES

X10 Cryo-preparation for Biological EM
Kent McDonald

- Observation and use of some of the newest equipment and techniques for low temperature sample preparation
- The best strategies for cryo-immobilization and cryo-substitution
- Demonstrations of high pressure freezing, plunge freezing, and cryosectioning
- Low-cost alternatives for some biological specimen preparation methods

X11 Immunolabeling Technology for Light and Electron Microscopy
Caroline Miller

- Specimen preparation considerations for optimizing morphological preservation and labeling efficiency for either light microscopy, electron microscopy, or both
- Consideration of the location of the antibody target within the cell or on its surface
- Matching the localization technique to the antigen of interest
- Correlative techniques bridging light and electron microscopy

X12 3D Electron Microscopy of Macromolecular Assemblies
Teresa Ruiz, Michael Radermacher and Edward Morris

- Sample preparation: deep stain, vitreous ice
- Imaging conditions, low-dose imaging, tilt pair data collection
- Alignment techniques and multivariate statistical analysis
- 3D reconstruction methods
- X-ray structure docking
- Techniques described have applications in both biological and material science

MULTI-DISCIPLINARY

X13 Electron Tomography in Life and Material Sciences
Ilke Arslan and Montserrat Barcena

- Basic principles of data collection and reconstruction
- Matching the imaging mode to the application
- Analyzing and visualizing the results

X14 Imaging and Analysis with Variable Pressure or Environmental SEM
Brendan J. Griffin and Matthew Phillips

- Imaging with SE, BSE, CL, and EDX detectors
- Monitoring and optimizing instrument performance
- Use of charge-related contrast mechanisms
- Use of hot, cool, and cold stages
- Imaging uncoated specimens with ultra low kV and other beams (He, Ga)

X15 Scientific Digital Imaging: Ethics and Execution
John Mackenzie

- Ethics of imaging
- Scientific image enhancement
- Handbook for Scientific Digital Imaging: starting point for standardization
- Scientific workflow including printing, archiving, and publication

PHYSICAL SCIENCES

X16 Metallography for Failure Analysis
Frauke Hogue

- Learn preparation techniques to solve challenges in failure analysis
- Discover the importance of selecting the appropriate etching solution
- Correlate microstructure features to failure modes through case studies
- Receive an extensive notebook of annotated images

X17 Transmission Electron Microscopy of Materials
Alwyn Eades, Michael Kaufman and Bob Field

- Images and diffraction patterns (especially convergent-beam diffraction)
- Two-beam conditions (bright-field and dark-field imaging; weak-beam imaging)
- Diffraction contrast — thickness fringes and bend contours
- Imaging and characterizing: dislocations; stacking faults; twins; precipitates
- Phase identification

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 Continuing Microscopy Education Units are available (fee $10/members; $50/non-members)

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

**The registration fee includes full registration for M&M 2012.*

X18 Introduction to SEM Imaging and X-ray Compositional Analysis
David Joy and Brad Thiel

- Instrument features
- Operation basics
- Spectral optimization
- Sample preparation

X19 Basic Confocal Light Microscopy
Jay Jerome and Bob Price

- Introduction and overview: Resolution, basics of digital images, image formats
- Specimen fixation, processing and labeling
- Basics of microscopic fluorescence and dye characteristics
- Types and component parts of confocal microscopes; proper set up of operating parameters

X20 Nanomaterial Microscopy & Microanalysis: Tools and Preparation
Phillip Russell and Louis Germinario

- Choosing the proper preparation technique
- Minimizing the introduction of artifacts
- Ensuring that representative samples are identified for subsequent analysis
- SEM, ESEM, and EBSD; FESEM: X-ray Microanalysis
- AFM: Imaging and Nanofabrication
- TEM and HRTEM; STEM/EELS: Nanoanalysis
- FIB: Sample Prep and Nanofabrication

TOPIC LIST FOR CONTRIBUTED PAPERS

Organizers: Executive Program Committee

Potential contributed session topics in the three categories (Biological Sciences, Physical Sciences, and Instrumentation and 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

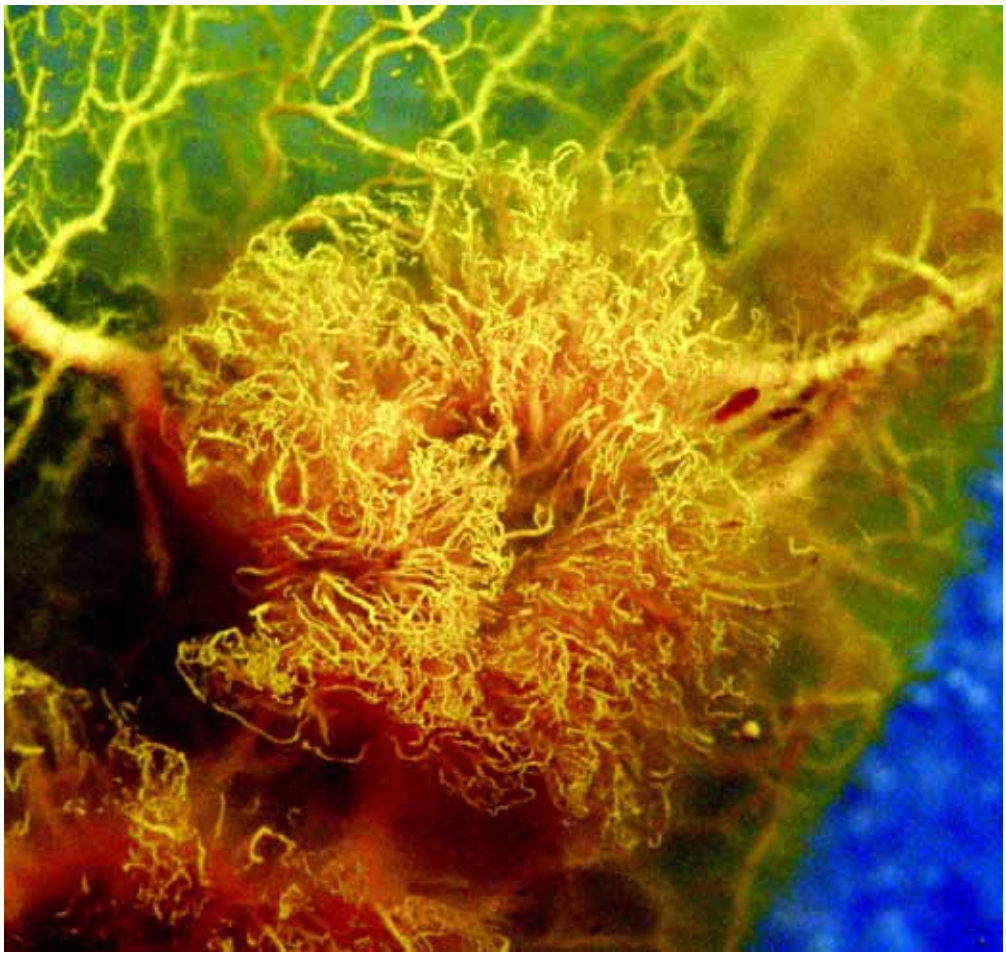
C01 - Biological Sciences – General
C02 - Biological Sciences – Specimen Preparation
C03 - Biomaterials
C04 - Biomedical Applications
C05 - Botany
C07 - Cytochemistry (Histochemistry, Immunochemistry, In-Situ Hybridization)
C08 - Cytoskeleton
C09 - Developmental/Reproductive Biology
C10 - Entomology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

Physical Sciences

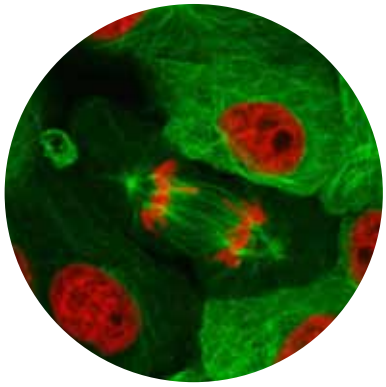
C19 - Physical Sciences – General
C20 - Physical Sciences – Specimen Preparation
C22 - Ceramics
C23 - Films & Coatings
C25 - Magnetic & Superconducting Materials
C26 - Metals, Alloys, Composites
C27 - Nanostructured Materials
C29 - Polymers
C30 - Semiconductors

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
C37 - Electron Spectroscopy/Imaging in the TEM/STEM
C39 - Scanning Electron Microscopy
C40 - Variable Pressure/Environmental SEM
C41 - Electron Backscatter Diffraction (EBSD)
C43 - Cathodoluminescence
C44 - Spectral Imaging
C47 - Atom Probe Field 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
C57 - Digital Image Acquisition, Processing, and Analysis
C59 - Metallography and Metallographic Specimen Preparation
C61 - Forensic Science
C62 - Industrial "Real World" Microscopy
C63 - Core/User Facility Management
C64 - Corporate Session



Blood vessels in intestinal tumors of mice.
IMAGE BY—MARJ PENA AND BOB PRICE – UNIVERSITY OF SOUTH CAROLINA; AND TROY BAUDINO, TEXAS A&M HEALTH CENTER



Cell division with Red chromosomes (labeled with mApple-histone H2B)
IMAGE BY—MICHAEL DAVIDSON, FLORIDA STATE UNIVERSITY

PAPER SUBMISSION REQUIREMENTS & INFORMATION

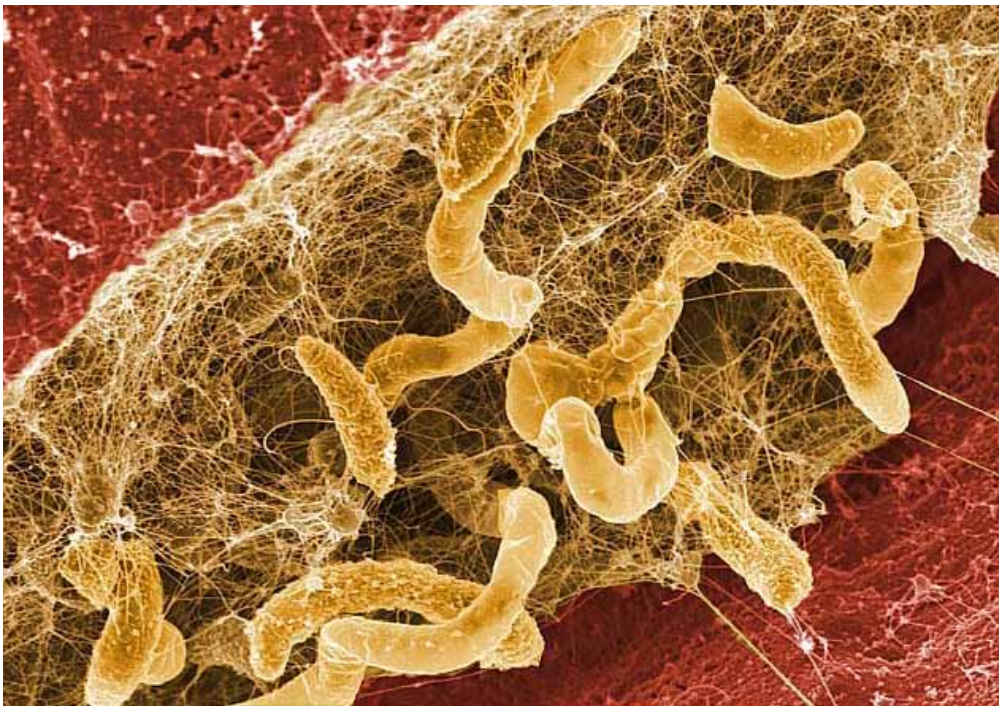
Submission Deadline:
February 15, 2012

All papers must be submitted in electronic format only at the online submission portal located through:
www.microscopy.org/MandM/2012/ ***PLEASE READ ALL INSTRUCTIONS CAREFULLY!***

Detailed instructions for authors regarding Electronic Setup, Text, Margins, Pagination, Figures, Tables, Line Drawings, Micrographs, Photos, References, and Copyrights can be found online at: www.microscopy.org/MandM/2012/

Please complete all the steps to ensure a valid submission.

1. Register as a User at the Paper Submission Website (reached through the meeting home page above). Be sure to read all instructions about format and treatment of artwork and special characters.
2. Prepare your paper according to the Instructions for Authors in the next section. Your source file must be either Microsoft Word 2000 or later, or Adobe Acrobat PDF format, saved with NO document security, with all fonts and images embedded electronically.
3. Carefully review instructions for inserting graphics into your paper, for your particular software.
4. Complete an Author Data Form (online) for **EACH PAPER** at the time that the electronic file of your paper is submitted.
5. Ensure that all addresses are complete and that all co-authors are listed in the same order as in the paper submission.
6. Upload your paper when requested after completing the Author Data Form electronically.
7. Review and approve the final PDF version generated from the source file of your uploaded paper. ***[PLEASE NOTE: This requires that you revisit the paper submission website after you have uploaded your paper. You must verify that the PDF file is a faithful representation of your original.]*** Be sure to pay special attention to artwork and special characters.
8. Print the Author Data Acknowledgment Email with the electronically-assigned Paper Number and keep it for your records.
9. *If you need an invitation letter for a visa application, be sure to check the appropriate box.*



SEM image of biofilm formed by sulfate reducing soil bacteria Desulfovibrio desulfuricans G20.
IMAGE BY— ALICE DOHNALKOVA, PACIFIC NORTHWEST NATIONAL LABORATORY

Awards
Please see additional instructions for award application on Pages 10-11.

Receipt of submitted files will be acknowledged promptly by email. All papers will be reviewed by the Program Committee. (Please go to Paper Submissions on the meeting website for a list of reasons for rejection.)

Notifications
All notifications will be sent via email ONLY. Notifications of session assignment, presentation room, day and time will be sent around April 15, 2012 and will be sent ONLY to the "Corresponding Email" address identified in the paper submission. ***PLEASE ENSURE YOUR CORRESPONDING EMAIL ADDRESS IS VALID.***

Audio-Visual Equipment
All rooms will be equipped with a screen and LCD projector (projector will have multiple connections for laptops). ***Presenters MUST supply their own computer.*** Special A-V equipment requests must be indicated on the Author Data Form. All special requests (e.g. 35mm slide projector; overhead projector, VHS player) will be accommodated as much as possible but cannot be guaranteed.

Presentation of Paper
Authors are responsible for presenting their paper(s). Presenters who are not able to attend the meeting must: 1) notify the Program Chair and Meeting Manager; and 2) arrange for a colleague or co-author to present the paper. Failure to do so may result in rejection of future submitted papers.

Posters
Papers will be assigned by the Program Committee to either a Platform or Poster presentation, unless "Prefer Poster" is selected on the Author Data Form. Authors will be notified of their assignment on or around April 15, 2012. Poster assignments will specify a presentation day; however, all posters are required to be displayed for the duration of the meeting. See meeting website for poster presentation times by day.

Each poster will be allocated a 92" wide x 46" high display area. Authors must bring their own pins or Velcro hooks for mounting.

PLEASE NOTE: NO A-V equipment shall be provided for ANY poster presentations.

TRAVEL AWARDS

Please see below and online (www.microscopy.org/MandM/2012/awards) 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

UNDERGRADUATE STUDENT, GRADUATE STUDENT & POST DOCTORAL AWARDS

Eric Samuel Scholarship

Sponsored by OXFORD INSTRUMENTS *The Business of Science®*

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 and 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 associate 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 research associates (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 and 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)

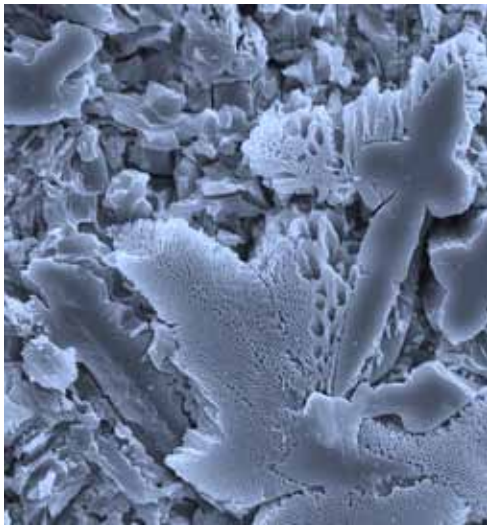
Criteria:

- 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



Second Place Winner – 2011 MSA Micrograph Competition, "At the Bottom of the Sea."
IMAGE BY—SERGIO BALLESTEROS, MAXIMINA ROMERO, CENTER FOR ADVANCED TECHNOLOGY, COAHUILA, MEXICO

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 and 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, ***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:

James Wittig
Vanderbilt University
5617 Stevenson Center
Nashville, TN 37232 USA

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

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 (2) 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***

- Non-winning entries must be removed Thursday afternoon by 3:00 PM. Micrographs remaining after that time will be discarded
- Winners will be announced at the meeting. Submitted micrographs remain the property of the entrants subject to the conditions above

M&M 2012 MICROSCOPY & MICROANALYSIS

July 29 – August 2 • Phoenix, AZ

Registration Opens
February 1, 2012

www.microscopy.org/MandM/2012/register.cfm

Hotel reservations available
Feburary 2, 2012 Book your room early!

Thank You To Our
SUSTAINING MEMBER COMPANIES & INDIVIDUALS:

As of 10/1/2011

Advanced Analysis Technologies, LLC
Advanced MicroBeam, Inc.
Advanced Microscopy Techniques
Anatech USA
Angstrom Scientific Inc.
Applied Physics Technologies, Inc.
Boeckeler Instruments Inc.
Bruker Nano
CAMCOR, University of Oregon
Cameca Instruments, Inc.
CANMET-MTL Natural Resources Canada
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MST Foundation
MTI Instruments
Nikon Instruments, Inc.
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Tescan USA Inc.
ThermoFisher Scientific Inc.
Tousimis Research Corporation
XEI Scientific, Inc.

J. Zuo *(individual)*

MSA Microscopy Society of America
MAS Microanalysis Society
IMS International Metallographic Society, Inc. An Affiliate Society of ASM International