

## Advances in Instrumentation and Techniques Symposia

### **A-01 MICROSCOPY AND ANALYSIS OF SOFT MATTER: FROM THE MOLECULES UP**

ORGANIZERS: DEBBIE J. STOKES AND RICHARD D. LEAPMAN

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#### **In Picuris Room**

**Monday, August 4, See Pages 83 & 88**

**See Page 92 (Poster Session)**

**Tuesday, August 5, See Page 97**

This symposium emphasizes the derivation of quantitative information from carbon-based systems (e.g. nanotubes, polymers, biomaterials, cells, tissues) using a range of complementary approaches. Techniques could include TEM, SEM, VPSEM, FIB, AFM, cryoEM, X-ray imaging, STEM-EELS and other analytical methods. Topics will encompass methodologies for overcoming beam damage, obtaining contrast, good practices in specimen preparation, minimizing the effects of charging, avoiding contamination, etc, to provide 2D and 3D data on the structure, properties and function of these important systems, from the molecular level to the bulk. Contributions on any of these aspects of soft matter imaging and analysis are strongly encouraged.

### **A-02 IMAGING CELLS AND TISSUES IN 3D—CONFOCAL MICROSCOPY**

ORGANIZER: BARTEK RAJWA

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#### **In Picuris Room**

**Wednesday, August 6, See Pages 111 & 116**

**See Page 119 (Poster Session)**

This symposium will focus on methods to accurately visualize, in 3D, cells and tissues imaged using confocal microscopy. Topics will include preparing samples for viewing in depth, image data correction techniques (such as deconvolution), and software packages useful in visualizing morphology, counting sample features, and quantifying volumes and surface areas. Presentations will introduce new tools or discuss current strategies in 3D reconstruction, as well as demonstrate the use of current tools to successfully reconstruct cells and tissues for visualization or 3D quantifica-

tion. Contributed platform and poster presentations are welcome.

### **A-03 VISUALIZING UNSTAINED SPECIMENS: PHASE, POLARIZED LIGHT AND OTHER INTRINSIC CONTRAST METHODS**

ORGANIZER: RUDOLF OLDENBOURG

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#### **In Dona Ana Room**

**Tuesday, August 5, See Page 97**

This symposium will focus on light microscopy methods that image physical properties, such as absorption, scattering power, and vibrational excitations that are intrinsic to the materials studied. In biology, the functions of macromolecular assemblies, such as membranes and filament arrays, are related to their physical properties, including their symmetry and anisotropy. Hence, intrinsic contrast methods provide important information that is complementary to fluorescence and other microscopy modes that rely on staining and labeling of specimens. Contrast methods covered in this session include: phase contrast, differential interference contrast, polarized light, second harmonic generation, UV and X-ray microscopy.

### **A-04 IMAGING, FLUORESCENCE AND FLOW CYTOMETRY**

ORGANIZERS: J. PAUL ROBINSON AND RANDALL W. SMITH

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#### **In Taos Room**

**Monday, August 4, See Page 89**

**See Page 93 (Poster Session)**

This symposium covers comparative and correlative aspects of several fluorescence microscopies and flow cytometry including confocal or fluorescence microscopy, evanescent field microscopy, flow cytometry and cytomics. Studies that evaluate fluorescence chemicals and dyes, filters, and quality assurance are appropriate for this symposium, as are advances in instrumentation including multichannel detection, PMT

and avalanche photodiode detectors, single molecule fluorescence, imaging flow cytometry, and laser scanning microscopies. Applications of these instruments in immunology, developmental biology and cell biology will also be discussed. Those interested in this symposium are encouraged to attend the PreMeeting Congress which includes related topics on cellular analysis and instrumentation.

### **A-05 ADVANCED CARS MICROSCOPY IN BIOLOGY: METHODS AND APPLICATIONS FOR CELLULAR AND TISSUE IMAGING**

*ORGANIZERS: MARTIN VOGEL AND RICHARD SCHALEK*

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#### **In Taos Room**

**Wednesday, August 6, See Page 116**

Coherent Anti-Stokes Raman Scattering microscopy has matured as a tool for an increasing number of studies in biology and biomedicine, due to its chemical selectivity, contrast generation without exogenous labels and its seamless integration with other laser scanning imaging modalities. This symposium will focus on recent applications of CARS microscopy in biology and biomedicine. Platform and poster presentations are sought on technical improvements, applications, and work that illustrates how CARS microscopy is integrated with other imaging modalities for an integrative insight into structure and function of tissue and cells.

### **A-06 HYPERSPECTRAL IMAGING, CATHODOLUMINESCENCE, AND SOFT X-RAY ANALYSIS**

*ORGANIZERS: COLIN MACRAE, PAUL KOTULA, AND PAUL MAINWARING*

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#### **In Pecos Room**

**Wednesday, August 6, See Page 119 (Poster Session)**

**Thursday, August 7, See Pages 126 & 131**

This symposium will highlight the advances in interpretation and analysis of spectral imaging in the fields of cathodoluminescence, EELS, TOF-SIMS, and X-ray data sets collected by TEM, SEM, proton or ion probe and XRF. In particular, contributions on the collection and analysis of hyperspectral data containing density-of-state or bonding information, and elemental and elemental speciation are encouraged, as are spectral weighting or analysis procedures for correlating different types of data. New spectral collection techniques and detectors, new file format standards, compression algorithms, and methods for the archiving and inter-instrument exchange of hyperspectral data are all encouraged for presentation.

### **A-07 TEM ACCESSORY INSTRUMENTATION AND AUTOMATION**

*ORGANIZERS: ALEXANDER ZIEGLER AND MIKE MARKO*

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#### **In Picuris Room**

**Wednesday, August 6, See Page 120 (Poster Session)**

**Thursday, August 7, See Pages 126 & 132**

Significant research effort is being devoted to advances in accessory instrumentation and software for TEM to enable specific applications. Invited and contributed papers will cover topics such as: advances in cameras and detectors for imaging and diffraction; automation software for data collection; special-purpose specimen holders for tomographic and *in-situ* investigations; integrated specimen preparation and handling of the specimens in the TEM; and electron optical accessories that can be utilized in existing instruments.

### **A-08 TEACHING MICROSCOPY AND MICROANALYSIS**

*ORGANIZERS: ELAINE SCHUMACHER AND CHARLES LYMAN*

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#### **In Galisteo Room**

**Wednesday, August 6, See Pages 111 & 116**

**See Page 120 (Poster Session)**

**Thursday, August 7, See Page 127**

Microscopy encompasses many interrelated techniques and requires extensive training. Scientists enter the field of microscopy by many routes, and training levels vary widely. Even the experienced microscopist periodically must seek out additional educational resources. This symposium will explore current educational opportunities for microscopists and how training efforts can be better integrated. Educators will describe programs and materials for classroom teaching, remote learning, vendor training, short courses, and technician training. Speakers and attendees will share their teaching and learning experiences in an open discussion session. Contributed papers are welcome.

**A-09 SIMULATION OF MICROSCOPY,  
MICROANALYSIS, AND MICROSCOPIC PHENOMENA**  
ORGANIZERS: NICHOLAS RITCHIE AND LUKE BREWER

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**In Aztec Room**

**Monday, August 4, See Page 89**

**Tuesday, August 5, See Pages 98 & 102**

**See Page 105 (Poster Session)**

This symposium will emphasize simulation of microscope signals—imaging, diffraction, and spectral and in particular the advances in the physics that underlie these models. Examples include modeling electron energy-loss spectra (EELS), Monte Carlo and analytical models of electron and X-ray transport, and HREM image simulation. Also featured will be the combination of microscopy with the simulation of structures and phenomena in materials. Examples include: STEM-Z-contrast imaging of grain boundary structure compared with molecular dynamics simulations, 3D-atom probe analysis compared with kinetic Monte Carlo simulations, and EBSD compared with finite element modeling.

**A-10 SCANNING PROBE MICROSCOPY IN THE  
PHYSICAL AND BIOLOGICAL SCIENCES**

ORGANIZERS: INGA HOLL MUSSELMAN AND  
VASILIKI POENITZSCH

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**In San Miguel Room**

**Monday, August 4, See Page 83**

**See Page 93 (Poster Session)**

Scanning probe microscopy (SPM) is playing an important role in the nanoscale characterization of materials properties and in the testing of electronic devices with nanoscale features. Various high-resolution SPM techniques are capable of probing the local electrical, magnetic, chemical, mechanical, optical, and thermal properties of matter at the nanoscale level, and of changing these properties in a controlled manner. This symposium will focus on the latest developments in the field of SPM as applied to both the physical and biological sciences, in subdisciplines ranging from condensed matter physics, chemistry, and materials science, to medicine and biology.

**A-11 FIB-BASED APPLICATIONS AND  
INSTRUMENTATION ADVANCES FOR THE PHYSICAL  
AND BIOLOGICAL SCIENCES**

ORGANIZERS: LUCILLE GIANNUZZI, BRIAN GORMAN,  
AND MICHAEL UCHIC

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**In Galisteo Room**

**Monday, August 4, See Pages 84 & 89**

**See Page 93 (Poster Session)**

**Tuesday, August 5, See Page 98**

The Focused Ion Beam (FIB) has become an invaluable tool for researchers for a wide range of specimens in the physical and biological sciences. FIB-based techniques have been used for materials characterization, specimen preparation, and prototyping. We seek contributions that discuss advances in and applications of specimen preparation for SEM, TEM, atom probe, or other analytical instrumentation. Advances in ion column, gas chemistry, gas delivery, nanomanipulation, and combined FIB plus EDS, EBSD, cryo stages, or other instrumentation techniques are also welcome, as are papers on 3-D characterization, large area patterning, and *in-situ* electronic and mechanical testing.

**A-12 PROBLEM SOLVING WITH LIGHT  
MICROSCOPY**

ORGANIZERS: DEBBIE ROTHE AND BILL HEESCHEN

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**In Cimarron Room**

**Thursday, August 7, See Page 132**

Light microscopy (LM) is a powerful technique for problem solving. Visual contrast is the fundamental requirement in LM, and is developed with proper illumination to gain insight into many complicated issues including failure analysis, and the morphology of polymers, ceramics, emulsions, and pharmaceuticals. LM can also yield quantitative studies on macroscopic systems. Often the use of low magnification lenses is required to perform *in-situ* or high-speed imaging to solve a problem. This symposium will showcase practical applications of light microscopy and the solutions they provide.

### **A-13 ADVANCES IN ELECTRON TOMOGRAPHY FOR THE PHYSICAL AND BIOLOGICAL SCIENCES**

ORGANIZERS: ILKE ARSLAN, ANDREAS HOENGER, AND MIKE MARKO

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#### **In San Miguel Room**

**Wednesday, August 6, See Page 120 (Poster Session)**

**Thursday, August 7, See Pages 127 & 132**

This symposium is devoted to providing an overview of the progress made in electron microscopy-based tomography. For inorganic materials, resolution on the order of one nanometer can be obtained, and aberration-corrected STEM makes it possible to acquire serial focal planes where the  $x$ - $y$  resolution is on the sub-nanometer scale. In biology, use of frozen-hydrated specimens, and correlative techniques, is leading to important new insights in cell function at the macromolecular level. Invited and contributed talks will cover applications in both fields, as well as development of data-collection techniques and reconstruction algorithms.

### **A-14 PROBLEM SOLVING USING MICROANALYTICAL TECHNIQUES**

ORGANIZERS: PAUL CARPENTER AND DAN KREMSEK

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#### **In Cimarron Room**

**Monday, August 4, See Pages 84 & 90**

**Tuesday, August 5, See Page 99**

**See Page 105 (Poster Session)**

This session will emphasize microanalytical techniques applied to a wide range of material types and problem solving strategies. We welcome contributions on problem-driven issues related to sample preparation, hardware and detector selection and development, calibration techniques and microanalysis methods, spectral analysis, quantitative analysis, and the visualization of problem and solution. We encourage presentations on the analysis of organic and inorganic materials by electron, ion, and X-ray sources, and the identification of critical roadblocks in microanalysis that may be removed with respect to advances in these areas. We especially encourage student and young scientist participation.

### **A-15 40 YEARS OF ENERGY DISPERSIVE X-RAY SPECTROMETRY**

ORGANIZERS: DALE NEWBURY AND RAYNALD GAUVIN

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#### **In Aztec Room**

**Wednesday, August 6, See Pages 112 & 116**

**See Page 121 (Poster Session)**

2008 marks the 40th anniversary of the Si(Li) EDS method as a practical analytical tool for elemental analysis for the electron microscope community. This symposium will review the remarkable progress in Si(Li) EDS technology and the recent emergence of the silicon drift detector (SDD) capable of 100 times faster output count rate at the same (or better) resolution as Si(Li). All aspects of EDS-SDD spectrometry and microanalysis are welcome, including spectral imaging, and the emergence of closely related micro- and milli-analysis probes, such as beams of X-rays. The EDS field at 40 years is poised for another period of rapid advance!

### **A-16 21ST CENTURY SCANNING MICROSCOPY—ELECTRONS AND HE IONS**

ORGANIZERS: DAVID JOY AND RAYNALD GAUVIN

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#### **In Dona Ana Room**

**Wednesday, August 6, See Page 121 (Poster Session)**

**Thursday, August 7, See Pages 128 & 132**

New types of particle beams, major advances in electron-optical capabilities, and the desire to work in realistic environments and not just in high vacuum, are redefining the limits of the SEM and the areas of science and technology to which it can contribute. This symposium will focus on three recent areas of development: (1) the ALIS scanning helium ion beam microscope and other high performance ion optical systems; (2) aberration corrected SEMs; and (3) environmental scanning microscopy including imaging in liquids in the SEM and/or STEM. Platform and poster presentations covering any aspects of these or related areas are welcome.

### **A-17 ATOM-PROBE ANALYSIS OF NON-TRADITIONAL MATERIALS**

ORGANIZERS: J.A. PANITZ, P.R. SCHWOEBEL, AND D.G. BEAR

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#### **In Dona Ana Room**

**Monday, August 4, See Pages 85 & 90**

**See Page 94 (Poster Session)**

Recent advances in Atom-Probe analysis have led to a renewed optimism for characterizing non-traditional materials. These include the introduction of novel detectors,

methods for obtaining high mass resolution, femtosecond laser pulsing, and rapid data throughput. This symposium will introduce recent advances in Atom-Probe analysis within the context of a proven framework for specimen preparation, and the extension of the preparation techniques to include non-traditional methods such as cryofixation and cryotransfer. The question "What non-traditional materials are now subject to Atom-Probe analysis?" will be addressed with implications for the characterization of geologic, organic, polymeric, and biological materials.

### **A-18 NEW ANALYTICAL TECHNIQUES IN MICROBEAM ANALYSIS**

*ORGANIZERS:* HEATHER LOWERS AND JOHN DONOVAN

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#### **In Cimarron Room**

**Wednesday, August 6, See Page 122 (Poster Session)**

**Thursday, August 7, See Page 128**

The 40th and 50th anniversaries of the EDS detector and first commercial electron microprobe, respectively, are celebrated this year. Although many aspects of these techniques are mature and proven, new and exciting microbeam analytical techniques for geologic, biologic, extraterrestrial, and insulating materials are constantly being developed to improve precision and accuracy. We welcome contributions on achieving lower detection limits, analyzing rough surfaces, particles and insulating materials, improving quantitative element interference corrections, easier manipulation of spectrum imaging data, and new software algorithms. Submissions describing new methods in the related fields of Raman spectroscopy, ion microprobe, FIB, TEM, and VPSEM are also encouraged.

### **A-19 ADVANCES IN STRUCTURE/FUNCTION DETERMINATION BY CRYO-ELECTRON MICROSCOPY**

*ORGANIZERS:* TERESA RUIZ AND ESTHER BULLITT

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#### **In San Miguel Room**

**Wednesday, August 6, See Pages 112 & 119**

**See Page 122 (Poster Session)**

Continuing advances in software and hardware are shaping cryoEM as a tool for revealing structural and functional information of biological systems. New insights have been obtained from EM data alone, or in interdisciplinary approaches in combination with other imaging techniques and x-ray studies. This symposium will present advances of technical or biological nature that evidence the role of cryoEM in identifying correlations between macromolecular structure and function. Topics covered are: improvements in preparative techniques, computational approaches and instrumentation for achieving higher resolution; 3D

correlation averaging of tomographic data; multi-resolution studies; optimized docking of crystal structures; and new biological structure/function relationships.

### **A-20 ANALYTICAL ELECTRON MICROSCOPY: ADVANCED TECHNIQUES AND APPLICATIONS FOR NANOSCIENCE**

*ORGANIZERS:* PETER CROZIER AND

MASASHI WATANABE

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#### **In Brazos Room**

**Monday, August 4, See Pages 85 & 90**

**Tuesday, August 5, See Page 99**

**See Page 106 (Poster Session)**

Recent developments in the field of analytical electron microscopy are providing powerful tools for exploring the chemistry of materials, with unprecedented spatial and energy resolution. The vast demands of nanoscience continue to push the envelope in both the development and application of AEM. In this symposium, we focus on (1) high spatial resolution EDS and EELS in aberration-corrected AEM, (2) monochromated EELS and EFTEM, (3) novel developments in the field of AEM, and (4) applications AEM to explore elemental and electronic structure for nanoscience.

### **A-21 MICROSCOPY TECHNIQUES FOR CERAMICS AND COMPOSITES**

*ORGANIZERS:* ERICA CORRAL, LUTHER GAMMON, AND

BRYAN GAUNT

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#### **In La Cienega Room**

**Wednesday, August 6, See Page 122 (Poster Session)**

**Thursday, August 7, See Pages 129 & 133**

The understanding and development of advanced ceramics and composites has largely been due to the use of novel processing and analytical techniques. Microstructural analysis based ceramic processing has shown how low levels of impurities in ceramic powders can lower mechanical properties in the sintered microstructure. Metals, ceramics and polymers reinforced with nano- to micron size fibers or particles lead to controlled mechanical and thermal properties of the composites. This technical session will draw together researchers who use microstructural analysis to gain processing-based understanding of advanced ceramics and composites. Processing and analytical techniques are not limited, and should include any type of preparation, microscopy, and analysis of ceramics and composites.



## Biological Sciences Symposia

### **B-01 IMAGING IN STEM CELL BIOLOGY**

ORGANIZER: HEIDE SCHATTEN

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**In Taos Room**

**Monday, August 4, See Page 86**

Research in stem cell biology has generated a wealth of data which has been directed toward the creation of specific cell and tissue types to regenerate nerve cells and heart muscle cells, benefitting patients with Parkinson's, Alzheimer's and heart disease. New imaging methods have played a major role in identifying specific cell types using markers to characterize the process of differentiation into the desired cell types. This symposium will feature current leaders in stem cell biology, as well as investigators with novel molecular imaging applications.

### **B-02 CILIOPATHIES**

ORGANIZER: JOHNNY L. CARSON

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**In Taos Room**

**Wednesday, August 5, See Page 113**

Although the observation of cell locomotion by eukaryotic Protists was observed by Leeuwenhoek in the 17th century, the structures conferring this function, cilia and flagella, were not described until the 19th century. Accompanying modern advances in imaging and molecular genetics, a number of human congenital disease syndromes have been identified as being rooted in dysmorphic and thereby dysfunctional cilia and flagella. Moreover, ciliary defects deriving from infection and irritant exposure also have been described. This symposium addresses basic research findings in lower organisms as well as clinical research that has led to a more unifying understanding of human ciliopathic diseases.

### **B-03 IMPROVING "GREEN" PRODUCTS THROUGH IMAGING: BIOMASS, BIOFUELS AND BIOPRODUCTS**

ORGANIZERS: DELILAH F. WOOD AND

TINA G. WILLIAMS

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**In Mesilla Room**

**Monday, August 4, See Pages 86 & 91**

**See Page 94 (Poster Session)**

Environmentally friendly or green technologies are being engineered to incorporate novel feedstocks into products. Biological alternatives include biofuels, biodegradable packaging, biosorbents, building materials, adhesives and plastics. Knowledge of the microstructure of these new feedstocks and bioproducts is necessary to understand their functionality. For failure analysis, imaging can show where and how a product breaks under strain. Microscopic imaging can be used as a quality control measure for novel products derived from nanotechnology consisting of nano-foams, nanoporous materials and nano-composites. This symposium will integrate conventional microscopies and other novel imaging techniques such as infra-red and Raman imaging.

### **B-04 STRUCTURAL BASIS OF DISEASE**

ORGANIZER: DAVID GIOVANNUCCI

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**In Taos Room**

**Wednesday, August 6, See Page 122 (Poster Session)**

**Thursday, August 7, See Page 129**

The use of microscopy and other imaging modalities provides a multiscale approach to address the causes and consequences of disease. In addition to the continuing advancement in ultrastructural methods, the imaging of spatial and temporal dynamics of biological processes in living cells or tissues using fluorescent chemical indicators or recombinant fluorescent proteins has enabled a deeper understanding of the disease process. Recent examples of studies using some of these novel approaches will be highlighted. Individuals or groups engaged in translational research exploring the underpinnings or diagnosis of disease from the level of single molecules to whole organism are encouraged to contribute to this session.

**B-05 MICROSCOPY AND INFECTIOUS DISEASES**

ORGANIZERS: CYNTHIA GOLDSMITH AND  
DANIEL BENIAC

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**In Taos Room**

**Tuesday, August 5, See Page 100**

**See Page 108 (Poster Session)**

Viruses, bacteria, protozoa, and parasites that infect humans, animals, and plants are better understood by having information about their ultrastructure, morphogenesis, and pathogenesis. Microscopy techniques are also valuable diagnostic tools that do not require specific reagents for a particular pathogen, but offer an unbiased view in the search for a novel etiologic agent of an infection. This symposium will cover a range of scientific studies of pathogens, from the morphologic studies of a single protein, to the pathogenesis of an agent within host tissues.

**B-06 IMPACT OF BIOFILMS IN THE REAL WORLD**

ORGANIZER: ROBERT SIMMONS

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**In Mesilla Room**

**Tuesday, August 5, See Page 100**

**See Page 108 (Poster Session)**

A biofilm is a microbial community that may consist of bacteria, fungi, protozoa or algae or, more commonly in the natural world, combinations of multiple organism types. Microbial communities may form on almost any surface exposed to water or at the interface between still water and air. Complex metabolic processes carried out in these communities are often of critical importance and may have a wide-ranging impact in a number of areas. This symposium will explore the use of microscopy in the study of biofilms and their impact in a range of applications including medicine and medical devices, bioreactors, waste management and industrial processes.

**B-07 VISUALIZING BIOLOGICAL NANOMACHINES**

ORGANIZERS: ALASDAIR STEVEN AND  
MARC C. MORAIS

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**In San Miguel Room**

**Monday, August 4, See Page 91**

**See Page 94 (Poster Session)**

**Tuesday, August 5, See Pages 101 & 103**

The majority of fundamental biological processes are performed by multi-component macromolecular assemblies which are—in effect—nanoscale machines. Cryo-electron microscopy is uniquely positioned to determine their structures. This symposium will capture the state of the art in cryo-electron microscopy, three-dimensional image reconstruction, and cryo-electron tomography to elucidate the structures, assembly properties, and dynamics of nanomachines. The following areas of research will be considered: progress towards higher resolution; multiple particle analysis to capture distinct conformations; image classification techniques; systematic analysis of image variance to illuminate dynamic properties; optimized docking of crystal structures of subunits; interaction of machines with substrates; three-dimensional correlation averaging of tomographic data; and innovative computational approaches. Structure-function relationships will be discussed for a variety of biological nanomachines.

**B-09 MICROSCOPY, MICROANALYSIS AND IMAGE ANALYSIS IN THE PHARMACEUTICAL SCIENCES**

ORGANIZERS: LYNN M. DIMEMMO AND  
GIANPIERO TORRACA

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**In Mesilla Room**

**Wednesday, August 6, See Page 123 (Poster Session)**

**Thursday, August 7, See Pages 129 & 133**

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 a variety of biological and materials science applications of significance to the pharmaceutical community. In response to feedback from previous meetings, an informal forum will be provided for sharing of thoughts and strategies related to regulatory and other issues faced in our laboratories in addition to talks by invited speakers. Contributed papers for platform or poster presentation on related topics are also welcome.

## Physical Sciences Symposia

### **P-01 UNDERSTANDING THE SYNTHESIS AND PROPERTIES OF NANOSTRUCTURES AND NANOMATERIALS**

ORGANIZERS: PAUL VOYLES AND RENU SHARMA

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#### **In Ruidoso Room**

**Monday, August 4, See Pages 87 & 91**

See Page 95 (Poster Session)

**Tuesday, August 5, See Pages 101 & 103**

See Page 109 (Poster Session)

**Wednesday, August 6, See Pages 113 & 117**

See Page 123 (Poster Session)

**Thursday, August 7, See Pages 131 & 133**

Microscopy and microanalysis play an essential role in understanding the synthesis, structure, and properties of nanomaterials. This symposium will cover synthesis-structure-property relationships of nanomaterials including thin films with a domain or grain size at the nanoscale and discrete nanostructures such as tubes, wires, rods, or particles, and microscopy and microanalysis techniques based on electron or ion microscopies. Contributions on measurement of synthesis or properties are solicited. Contributions on applications or assembly of nanostructures, including nanodevices, should be submitted to Symposium P02.

### **P-02 HIGH RESOLUTION AND ANALYTICAL CHARACTERIZATION OF ENGINEERED NANOSTRUCTURES**

ORGANIZERS: MOON J. KIM, BRENDAN J. FORAN, AND R. W. CARPENTER

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#### **In San Miguel Room**

**Wednesday, August 6, See Pages 113 & 117**

See Page 124 (Poster Session)

**Thursday, August 7, See Pages 130 & 134**

Microelectronics and functional research have clearly evolved to nanoscience. With reductions in device scaling, the use of new materials and device structures is bringing enormous new challenges to characterization required to bring systems to production. From enhanced mobility strained-channel substrates, to high dielectric constant gates, to quantum well structures, to single nanotube devices, increased emphasis is placed on characterization at the nano-scale to enable progress in technical development. This symposium solicits papers on high resolution and

analytical characterization of functional materials and devices engineered for future and current cutting edge electronic and opto-electronic devices.

### **P-03 SURFACE MICROSCOPY AND MICROANALYSIS IN MATERIALS AND BIOLOGICAL SYSTEMS**

ORGANIZERS: VINCENT SMENTKOWSKI, TONY OHLHAUSEN, AND JULIA FULGHUM

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#### **In Aztec Room**

**Monday, August 4, See Page 87**

See Page 95 (Poster Session)

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 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 poster and platform presentation.

### **P-04 ULTRAFAST ELECTRON MICROSCOPY AND ULTRAFAST SCIENCE**

ORGANIZERS: MITRA TAHERI, NIGEL BROWNING, AND JOHN LEWELLEN

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#### **In Dona Ana Room**

**Wednesday, August 6, See Pages 114 & 118**

See Page 125 (Poster Session)

*In situ* TEM techniques provide insight into many aspects of mechanisms that are otherwise unclear in static experiments. Conventional *in situ* TEM is limited by video frame rate (30 Hz) time resolution. Ultrafast *in situ* TEM can potentially fill in gaps in the current understanding of various structural, chemical, electronic and magnetic properties in a myriad of materials. Ultrafast TEM and related ultrafast *in situ* methods are able to study a variety of materials problems, from metals to molecules. This symposium focuses on ultrafast techniques in microscopy, along



with general dynamic microscopy experiments that can benefit from greater time resolution.

**P-05 MICROBEAM ANALYSIS OF TERRESTRIAL AND PLANETARY MATERIALS—A SYMPOSIUM IN MEMORY OF GENE JAROSEWICH**

ORGANIZERS: GREG MEEKER AND MICHAEL SPILDE

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**In Cimarron Room**

**Tuesday, August 5, See Page 104**

**See Page 114 (Poster Session)**

**Wednesday, August 6, See Pages 114 & 118**

The development and stunning success of X-ray microanalysis as an analytical technique is due, in large part, to the critical and exacting requirements of geological and planetary science researchers. Other microanalytical techniques including secondary ion mass spectrometry, laser ablation techniques for chemical analysis, and other X-ray and electron-beam based techniques for elemental and chemical analysis have followed EPMA because of their ability to provide high quality data for the geologic community. This symposium will explore some of the most recent advances in these analytical methods as applied to problems of the earth and beyond, and in doing so we will honor one of the great contributors in our field, Eugene Jarosewich.

**P-06 METALLOGRAPHIC TECHNIQUES AND MATERIAL CHARACTERIZATION**

ORGANIZERS: RICK NOECKER AND NAT SAENZ

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**In Pecos Room**

**Monday, August 4, See Pages 88 & 92**

**See Page 96 (Poster Session)**

This technical session will draw together metallographers, engineers and researchers working on a wide range of materials produced by many different methods. The session will focus on efforts at both revealing and characterizing the true microstructure for each material discussed. This includes advances in equipment and consumable technology that enhance the ability to prepare materials so that the true microstructure is revealed. Additionally, this session will address new analytical equipment and enhanced characterization techniques that improve material characterization.

**P-07 IMAGE ANALYSIS AND QUANTITATIVE MICROSCOPY**

ORGANIZERS: ROB PANARO AND DON SUSAN

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**In Pecos Room**

**Wednesday, August 6, See Page 125 (Poster Session)**

**Thursday, August 7, See Page 131**

Image analysis and its significance in the analytical methods of material and biological laboratories has grown in direct proportion to the continued advancement in computing power. Tests that had once been completed by hand, can be calculated more accurately and in a fraction of the time due to enhanced digital imaging and the use of software to interpret or manipulate the data. This session will outline capabilities offered in image analysis, from high-powered microscopes and computers, to commercial software packages, and discuss techniques or methods applied in academia and industry.

**P-08 FAILURE ANALYSIS: REAL WORLD APPLICATIONS AND CASE STUDIES**

ORGANIZERS: DANIEL DENNIES AND FRED SCHMIDT

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**In Pecos Room**

**Tuesday, August 5, See Pages 102 & 104**

**See Page 110 (Poster Session)**

Failure analysis is an important function crossing all disciplines. In businesses today, engineers and scientists examine diverse biological, composite and exotic materials in severe service environments. This symposium will include research, real-world applications and case histories that determine the root cause of the failure. In particular, this symposium will highlight the various correlative microscopies and special techniques that can be used. All topics are encouraged including metal fatigue and fracture, biomaterials/medical implants, and semiconductor failures. Any and all optical, scanning, and microanalytical techniques will be discussed. Contributions are encouraged from both research and practical application in any of these areas.

**P-09 NUCLEAR AND REACTIVE MATERIALS**

ORGANIZERS: IAN DAVIDSON AND ALLAN LOCKLEY

**In San Miguel Room****Wednesday, August 6, See Pages 115 & 119**  
**See Page 125 (Poster Session)**

Materials used in nuclear facilities include both the radioactive materials and the materials that are exposed to this radioactivity. Issues may include material reactivity to air,

personal radioactive exposure, material aging due to neutron exposure, and stress corrosion cracking of exposed components. Preparation and examination of nuclear and other materials that easily oxidize, or are pyrophoric, are very challenging. This session will cover methods for evaluating these nuclear and reactive materials, both for characterization and failure analysis. Techniques for reducing waste streams and reducing exposure time will also be evaluated.

## Technologists' Forum Symposia

**Technologists' Forum Symposia**

The Technologists' Forum is a committee dedicated to the growth and development of technologists within the Microscopy Society of America. The Forum organizes a symposium, special topics/lecture workshop, and roundtable discussion and an exhibit booth at the annual M&M meeting. A semiannual newsletter, website, and bulk e-mailer are used to increase contact among its members and expand their participation to MSA. Forum services that are available to members include the Microscopy Facilities Directory. The Forum also sponsors the Professional Technical Staff Awards; it is a competitive program to encourage participation of the technologists at the annual meeting

Technologists' Forum

Valerie Woodward, Tech Forum Chair

Frank Macaluso, Tech Forum Vice-Chair

**X31 PLATFORM: GEOLOGY OF THE SOUTHWEST US—REVEALED THROUGH M&M**

ORGANIZER: VALERIE WOODWARD

**In Mesilla Room****Wednesday, August 6, 2008, Page 115**

Beautiful rock formations, native artifacts, caverns, ecological changes—what can we learn about these using microscopy and microanalysis? The geographical areas surrounding Albuquerque are rich with diversity and information, much of which can be revealed using multiple analytical techniques. From optical microscopy using petrographic preparations to EPMA, the Tech Forum wants to present a virtual exploration of the area in both invited and contributed papers—a combination of the wonders of nature and the wonders of our science.

**X32 SPECIAL TOPIC SESSION: EM PREPARATION REVISITED—DEALING WITH THE NANOWORLD**

ORGANIZER: VALERIE WOODWARD

**In Mesilla Room****Wednesday, August 6, 2008, Page 119**

Smaller, thinner, better and faster—how many times are technologists faced with these criteria on a weekly basis? The use of smaller and smaller materials and the need for better section preparation are pushing us to find innovative preparation methods that will maintain the integrity of the samples and yet allow us to obtain better resolution and information that is more detailed. Step up to the challenge to teach your colleagues how to excel in the nanoworld. Contributed papers welcome.

**X33 ROUNDTABLE: IMMUNOGOLD LABELING**

ORGANIZER: FRANK MACALUSO

**In Mesilla Room****Tuesday, August 5, 2008, Page 104**

Immuno labeling with colloidal gold is the most widely used technique for localization of cellular macromolecules by electron microscopy. Successful application of this powerful technique is dependent on specimen preparation and labeling protocol. There are many choices regarding fixation, embedding media, ambient or low temperature embedding, blocking reagents for background reduction, pre or post embedding labeling, or labeling hydrated cryosections. The expert panelists will briefly review these critical areas. An open discussion period will follow. Bring your questions and share your expertise at this roundtable session.

## Late Breaking Posters

ORGANIZER: JOHN HENRY SCOTT, PROGRAM CHAIR

The late breaking poster session provides an avenue for presenting results not submitted before the February 15<sup>th</sup> paper submission deadline. **Contributions for this session will be accepted until Friday July 18<sup>th</sup>, 2008.** Late breaking poster submissions address state-of-the-art advances that

have been made in the field of microscopy. Title and a brief abstract should be submitted as a word or PDF document to [MM2008Programchair@microscopy.org](mailto:MM2008Programchair@microscopy.org). Late breaking poster submissions will not appear in the proceedings, but will be announced through the Daily Newsletter.