Abstract submission extension to February 15, 2007

SCANNING 2007 – PRELIMINARY PROGRAM

The Eighteenth Annual International Scientific Meeting on Scanning Microscopies

Monterey, California • April 10–12, 2007

TUESDAY, APRIL 10

Scanning Microscopy in Forensic Science (Portola Room) (8:30 a.m. - 4:30 p.m.) – Short Course 2007A
Chairs: S. Frank Platek, Forensic Chemistry Center, U.S. Food and Drug Administration, Cincinnati, OH; Michael T. Postek, US DOC-NIST, Gaithersburg, MD, M.A. Trimpe, Hamilton County Coroner's Office, Cincinnati, OH, USA, and Michael J. McVicar, Chemistry Section Scientist, Center of Forensic Sciences, Ontario, Canada

This short course is devoted to scanning microscopy analysis of many types of forensic samples. Specific topics to be covered include particulate trace evidence analysis, gunshot residue (GSR) analysis and instrument calibration concerns and procedures. A trace evidence section in forensic sample processing will be presented. Topics covered include collection , handling, embedding, polishing, sectioning, mounting, storage and micro-manipulation of fine particles. With the increased efforts of most forensic laboratories to be certified, a portion of this short course will be devoted to SEM/EDX calibration issues and discussion among course attendees. A final segment will consist of a variety of actual sample-related applications of scanning microscopy over a number of interesting forensic cases. The short course will be instructed by forensic scientists and microscopists, each a specialist in his respective area of expertise. Course format will include a group question-and-answer session.

Introduction to AFM – Sponsored by Pacific Nanotechnology, Inc. (Two-Day Course)
(Ironwood) (8:30 a.m. – 4:30 p.m.) – Short Course 2007B
Chair: Paul West, Pacific Nanotechnology, Inc., Tustin, CA, USA

This course covers the following subjects: theory of AFM operation, AFM instrumentation, acquiring AFM images, recognizing artifacts, and processing AFM images. Students will have the opportunity to operate an AFM in this course.

Cryo Microscopy (9:00 a.m. – 10:15 a.m.) (Bonzai II)
Chair: Jacob Bastacky, University of California, Berkeley, CA, USA

Low-temperature microscopy means imaging of samples held at temperatures down to that of liquid helium. Cryo light microscopes often operate in the range of the freezing temperature of water, 0°C, cryo electron microscopes below the recrystalization temperature of solid water, –130°C, the temperature of boiling nitrogen –196°C or that of liquid helium –273°C. Physical fixation without the need for chemical modification of the sample, protection against beam damage, and rapid immobilization of real time processes are possible with cryo. Recent applications to new imaging instruments such as the x-ray microtomograph and soft x-ray microscope, and ongoing applications such as CryoSEM, CryoTEM, and differential solidification light microscopy are examples of areas of interest for this session. Methodological similarities in imaging, interpretation, and all-important specimen preparation will provide a common ground for discussion.

(see over)

Among the contributors –

"A complete cryo-chain from specimen preparation to the combined SIMS and SEM and EDX analysis of frozen hydrated biomedical samples", W.H. Schroeder[a,] U. Breuer[b], S. Kayser[c], W. Lorenz[c], U. Schurr[a], and R. Metzner[b], [a]Phytosphere Institute, Research Center Jülich GmbH, Jülich, Germany, [b]Central Division of Analytical Chemistry, Research Center, Jülich, Germany, [c]ION-TOF GmbH, Münster, Germany

"Focused ion beam technology: Prototyping and fabrication of nanoscale devices", Brandon Van Leer, FEI Company, Hillsboro, OR, USA

Microwaves in Microscopy (sponsored by Ted Pella, Inc.) (9:00 a.m. – 12:30 p.m.) (Bonzai III)
Chairs: Elaine Humphrey, University of British Columbia, Vancouver, BC and Beverly Giammara, University of Louisville School of Medicine, Louisville, Kentucky, USA

Microwave processing is currently used for fluorescence labeling, immunogold labeling, TEM processing, SEM processing, decalcification and antigen retrieval. This session will include a complete demonstration of immunolabelling tissue with two fluorescent antibodies and the results shown on a fluorescent microscope. The practical necessities of controlling the temperature and the latest technology of using a magnetic stirrer within the microwave chamber will be covered.

Among the contributors –

"Benefits and drawbacks of microwave-assisted methods in both electron and light microscopy", Rick Giberson, Research and Development Manager, Ted Pella, Inc., Redding, CA, USA; Mark Sanders, Imaging Center, University of Minnesota, Twin Cities, MN, USA; and Elaine Humphrey, University of British Columbia, Vancouver, BC

Scanning Cultural Heritage: Research, Documentation and Preservation for Works of Art, Museum Collections, Architecture and Archaeological Materials (9:00 a.m. - 5:00 p.m.) (Bonzai I)
Chair: Eric Doehne, The Getty Conservation Institute, Los Angeles, CA, USA

Over the past decade, scanning technologies have become important tools in helping scientists perform research, documentation, conservation and preservation on an array of our material cultural heritage, ranging from Egyptian mummies to modern art. These technologies, including scanning electron microscopy (SEM), computed tomography (CT), and surface scanning, give researchers important insights into the history and state of preservation of these materials. Most techniques are non-destructive and non-invasive, and some can even be brought into the field. This kind of research borrows heavily from forensic science and this session will focus on the innovative application of various scanning techniques used to study our to cultural heritage as well as the detective work needed to investigate these materials.

Invited speakers –

"Feasibility of conducting X-ray tomographic inspection of Michelangelo's David", James Trebes[1], John Boone[2], Cliff Bueno[3], Franco Casali[4], James Clayton[5], Sung Han[6], James Johnson[5], Harry E. Martz, Jr.[4], Alessandro Pasini[4], Roger Perry[1], Dan Schneberk[1], Gary Stone[1], [1]Lawrence Livermore National Laboratory; [2]University of California, Davis; [3]General Electric; [4]University of Bologna; [5]Varian Instrument; [6]Samsung

"Cryo-SEM of building materials – behavior of salts in the pore space", Herbert Juling, Bremen Institute of Materials Science, Bremen, Germany

"3D-µCT in the analysis of sculpture", Aurelia Badde, Staatliche Museen zu Berlin (SMB), Berlin, Germany, and Bernhard Illerhaus, Bundesanstalt für Materialforschung und-prüfung (BAM), Berlin, Germany

Among the contributors –

"Optimization of CT scanning system for museum objects", David Carson, Getty Conservation Institute, Los Angeles, CA, USA

"ESEM" and wet STEM applications to cultural heritage", Eric Doehne, Getty Conservation Institute, Los Angeles, CA, USA

"FIB analysis of Coral Red and black gloss on Greek vases", Alex Buxbaum, FEI Company, Hillsboro, OR, USA

"Analysis of gloss layers on Greek vases using ESEM/EDS and EPMA", Marc Walton, Getty Conservation Institute, Los Angeles, CA, USA

Focused Ion Beam Microscopy – Sponsored by the FEI Company (1:30 – 5:00 p.m.) (Bonzai II)
Chair: Warren J. MoberlyChan, Materials Science and Technology Division, Lawrence Livermore National Laboratory, Livermore, CA, USA

Focused ion beam (FIB) microscopy and dual-column ion/electron beam systems are advancing into all fields of science, research and industrial applications. FIB is critical to the semiconductor industry for defect analysis, transmission electron microscopy (TEM) sample preparation, metrology and even device design and repair. Similar such applications are now being expanded into biology, geology, micromechanics, and nanoscience. Advances in computer control, in situ micromanipulators and add-on site-specific deposition systems enable the FIB/SEM to be ideal for prototyping a wide range of new nanostructures via simple cut-and-paste operations. This symposium will cover FIB uses in a wide range of fields, with an emphasis on sharing technical information among attendees in both formal and non-formal settings.

Invited speakers –

"Focused ion beam sculpting curvilinear features", David P. Adams, Sandia National Laboratories, Albuquerque, NM, USA

"Wafers to needles: Utilizing the FIB for atomic scale co-examination with STEM and atom probe", Brian Gorman, University of North Texas, Denton, TX, USA

Among the contributors –

"Membrane folding by He^+ ion implantation using a focused ion beam", W.J. Arora, S. Sijbrandij*, L. Stern*, H.I. Smith, G. Barbastathis, Massachusetts Institute of Technology, Cambridge, MA, USA and *ALIS Corporation, Peabody, MA, USA

"EM investigations of impurities in a fuel cell H_2 electrode", A. Hauch, S.H. Jensen, L. Theil Kuhn, M. Mogensen, Fuel Cells and Solid State Chemistry Department, Riso National Laboratory, Technical University Denmark, Roskilde, Denmark

"1-mm organic crystals (Rhodamine 590) for lasers and non-linear optics: A FIB/SEM preliminary investigation", M. Milani*†, L. Ferraro*†, M. Moret*, S. Magni*†, and F. Tatti‡, *Department Materials Science, University of Milano-Bicocca, Milan, Italy, †Laboratory FIB/SEM Bombay, University of Milano-Bicocca, Milan, Italy, ‡FEI Italia S.r.l., Milan, Italy

"Focused ion beam post-fabrication processing of superluminescent diodes – a detailed analysis", F. Causa, M. Milani*†, J. Sarma, F. Tatti‡, and L. Ferraro*, Department of Electronic and Electrical Engineering, University of Bath, Bath, UK, *Department of Materials Science, University of Milano-Biococca, Milan, Italy, †Laboratory FIB/SEM Bombay, University of Milano-Bicocca, Milan, Italy, ‡FEI Italia S.r.l., Milan, Italy

"Dual FIB/SEM systems for plasma facing materials in magnetic thermonuclear fusion", M. Milani, S. Magni, F. Ghezzi*, F. Tatti†, Laboratory FIB/SEM Bombay and Department of Materials Science, University of Milano-Bicocca, Milan, Italy, *Istituto di Fisica del Plasma 'Piero Caldirola', CNR/ENEA/EURATOM, Milan, Italy, †FEI Italy S.r.l., Milan, Italy

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"FIB sectioning for metal detection in digestive gland cells of *P. scaber* (Isopoda, Crustacea)", H. Zorz*, M. Milani*†, F. Tatti‡, C. Savoia[#], M. Acciarri*, D. Drobne[o], *Department of Materials Science, University of Milano-Bicocca, Milan, Italy, †Laboratory FIB/SEM Bombay, University of Milano-Bicocca, Milan, Italy, ‡FEI Italy S.r.l., Milan, Italy, [#]STMicroelectronics Agrate Brianza, Milan, Italy, [o]Department of Biology, University of Ljubljana, Ljubljana, Slovenia

"Focused ion beam technology: Prototyping and fabrication of nanoscale devices", Brandon Van Leer, FEI Company, Hillsboro, OR, USA

Advances in Scanning Microscopy and Analysis (10:45 a.m. – 5:00 p.m.) (Bonzai III)
Chair: Timothy Maugel, Laboratory for Biological Ultrastructure, Biology Department, University of Maryland, College Park, MD, USA

"Combining SEM, X-ray and Raman spectroscopies for the study of geological materials", A.D. Brooker, Renishaw plc., Spectroscopy Division, Old Town, Wotton-under-edge, Glos, UK and R. Bormett, Renishaw Inc., Hoffmann Estates, IL, USA

"Characterization of lead zirconate titanate – Ianthanum ruthenate thin films structures prepared by chemical solution deposition", Andreja Benčan, Barbara Malič, Goran Drăzič, Marija Kosec, Jožef Stefan Institute, Ljubljana, Slovenia

"Selection of drying methods for coated calcium alginate beads", L. Deladino[1], P. Anbinder[1], A. Navarro[1,2], and M. Martino[1,2], [1]Centro de Investigación y Desarrollo en Criotecnologia de Alimentos (CIDCA), Conicet, Fac. Ciencias Exactas; [2] Fac. Ingeniera (UNLP), La Plata, Buenos Aires, Argentina

"Physicochemical characterization of different chemically modified corn starches", O.V. López[1], M.A. Garcia[1], *N. Zaritzky[1,2], [1]Centro de Investigación y Desarrollo en Criotechnologia de Alimentos, Fac. Cs. Exactas, CONICET, Argentina, and [2]Depto. Ing. Qca, Facultad de Ingenieria, Universidad Nacional La Plata, Argentina

"Particle impact damage study on optical lens materials", David P. Ziegler, Suzanne E. Bosselman, Christopher P. Drew, U.S. Army Natick Soldier RDEC, Natick MA

"Development of automatic target recognition techniques for detecting and measuring the geometrical properties of carbon nanotubes and other nano-objects", M. Kaplan, N. Parkansky, R. Boxman, and L.P. Yaroslavsky, Electrical Discharge and Plasma Lab, Tel Aviv University, Tel Aviv, Israel

"Controlled parallel DNA filament deposition in stretched conformation", Giovanni Valdrè, University of Bologna, Department of Earth Sciences, Bologna, Italy

"Electrostatic force and resolution of EFM cantilevers modeled by finite element analysis", Giovanni Valdre and Daniele Moro, Department of Earth and Geo-Environmental Sciences, University of Bologna, Bologna, Italy

"New *in situ* investigation methods of polymers in the environmental SEM (ESEM)", Armin Zankel, Elisabeth Ingolic and Peter Poelt, Institute for Electron Microscopy, Graz University of Technology, Graz, Austria

"Image analysis characterization of geological porous systems using Wood's metal intrusion", Serge Galaup, René Burlot, and Adrian Cerepi, EGID-Bordeaux 3, Université Michel de Montaigne, Pessac Cedex, France

"Characterization of the peel behavior of polyethylene/polybutene-1 peel-systems using the *in situ* environmental scanning electron microscopy", Michael Nase, Armin Zankel*, Beate Langer†, Hans-Joachim Baumann‡, and Wolfgang Grellmann, Martin-Luther-University of Halle-Wittenberg, Center of Engineering Science, Merseburg, Sachsen-Anhalt, Germany, * Intitute for Electron Microscopy, Graz University of Technology, Graz, Austria, †Polymer Service Ltd, Merseburg, Germany, ‡ORBITA-FILM Ltd, Germany

"Electron microscopy and microanalysis of fiber-matrix interface in SiC based ceramic composite material for fusion reactor application", Goran Drazic, Tea Toplisek, Sasa Novak, Natasa Drnovsek, Department for Nanostructured Materials, Jozef Stefan Institute, Ljubljana, Slovenia

"Seed coat structure and colour in B*rassica*", Waheeb K. Heneen and Kerstin Brismar, Plant Protection Biology, Faculty of Landscape Planning, Horticulture and Agricultural Science, Swedish University of Agricultural Sciences, Alnarp, Sweden

"Study on ultrastructure change and cross-linking behaviors of *microtusfortis* neurocytes in physiological solution with contact mode atomic force microscopy", Jie Zhu[1], Li Lan and Guodong Wang, [2], [1]Department of Applied Physics, College of Science, Northwest A & F University, Yangling, China, [2]Morphologic Labs of Animal Cell, the Fourth Military and Medical University of China, Xi'an, China

"Partially gelatinized starches by high hydrostatic pressure as oligoelement carriers", A.D. Molina-García, P.P. Fernández, P.D. Sanz, and M.N. Martino*, Department of Engineering, Instituto del Frío, CSIC, C/José Antonio Novais 10, Madrid, Spain, *Centro de Investigación y Desarrollo en Criotecnología de Alimentos (CIDCA), Facultad de Ciencias Exactas, Universidad Nacional de La Plata, CONICET, La Plata, Argentina

"Field emission scanning electron microscopy and correlative microscopy of axospinodendritic synapses of rodent and primate cerebellar cortex", O.J. Castejón, Biological Research Institute, *Drs. Orlando Castejón and Haydée Viloriade Castejón*, Faculty of Medicine, Zulia University, Maracaibo, Venezuela

"Quantifying the impacts of biobased urban wood waste on mycorrhizal formation", Kamran K. Abdollahi, Urban Forestry Program, Southern University Agricultural Research and Extension Center, Baton Rouge, LA, USA

"Characterization of PbSe quantum dots embedded in poly vinyl alcohol film", George A. Stanciu[1], Josef Friedmann, Stefan G. Stanciu[1], Mahmoud A. Mahmoud[2], Bouchta Sahroui[3], [1]Center for Microscopy-Microanalysis and Information Processing, University Politechnica of Bucharest, Bucharest, Romania; [2]Chemistry Department, Faculty of Science, Zagazig University, Zagazig, Egypt; [3]Laboratory POMA UMR CNRS 6136, University of Angers, UFR sciences, Angers, France

WEDNESDAY, APRIL 11

Advanced Topics in SEM (Bonzai I) (8:30 a.m. - 4:30 p.m.) – Short Course 2007C
Chairs: D.C. Joy, Department of Biochemistry, Cellular and Molecular Biology, University of Tennessee, Knoxville, TN, USA; O. C. Wells, Yorktown Heights, NY, USA

This is a course dealing with the fundamentals of scanning electron microscopy. Lectures will cover the basic techniques of scanning microscopy and applications to materials science. Specific topics include low voltage and low pressure microscopy, the appropriate use of detectors for the different types of imaging, Image J, SMART, Monte Carlo methods.

Introduction to AFM (continued) Sponsored by Pacific Nanotechnology, Inc. (Two-Day Course) (Ironwood) (8:30 a.m. - 4:30 p.m.) Short Course 2007D
Chair: Paul West, Pacific Nanotechnology, Inc., Tustin, CA, USA

This course covers the following subjects: theory of AFM operation, AFM instrumentation, acquiring AFM images, recognizing artifacts, and processing AFM images. Students will have the opportunity to operate an AFM in this course.

Quality Assurance for Measurements in the SEM (9 a.m. - 12:30 p.m.) (Bonzai II)
Chairs: Dale E. Newbury and Michael T. Postek, NIST, Gaithersburg, MD, USA

The scanning electron microscope has evolved into a sophisticated measurement system incorporating morphological, compositional, and crystallographic characterization methods. The measurement science that forms the foundation of these characterization techniques is often overlooked, but careful attention to the individual measurement process is critical for achieving robust results with a meaningful error budget. This session seeks contributions describing efforts to bring SEM measurements in their wide diversity into satisfactory control, including specific applications such as linewidth measurement, particle analysis, etc.

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Among the topics and contributors

“Reference materials for quality assurance of automatic qualitative and quantitative analysis by energy dispersive x-ray spectrometry in the scanning electron microscope”, Dale E. Newbury, NIST, Microanalysis and Analytical Chemistry, Gaithersburg, MD, USA

Morphological: Michael T. Postek and Andras E. Vladar, NIST, Precision Engineering Division, Gaithersburg, MD QA issues in high resolution and morphological measurement

Compositional: "Quality Assurance in automated electron beam analysis", Frederick Schamber, Aspex Corporation, Product Development, Delmont, PA

"Quantifying large particle data sets to facilitate robust classification", Nicholas W.M. Ritchie, Surface and Microanalysis Science Division, NIST, Gaithersburg, MD, USA

Crystallographic: Joseph R. Michael, Sandia National Laboratories, Albuquerque, NM, USA
QA issues with EBSP for grain size measurements

"3D image correction of tilted sample through coordinate transformation", Wei Chu, Joseph Fu, Ronald Dixson and Theodore Vorburger, Surface & Microform Metrology Group, Precision Engineering Division, NIST, Gaithersburg, MD, USA

“Computational models of the nano probe tip for static behaviors”, Shaw C. Feng, Theodore V. Vorburger, Che Bong Joung, Joseph Fu, Ronald G. Dixson and Li Ma, NIST, Gaithersburg, MD, USA

“Improving linewidth and sidewall metrology capability with fast AFM scanning actuator”, Tianming Bao and Lars Mininni, Veeco Instruments, Inc., Santa Barbara, CA, USA

The Role of Scanning Microscopies in the Study of Disease (9:00 a.m. – 5:00 p.m.) (Bonzai I)
Chair: Kenneth C. Moore, Central Microscopy Research Facility, The University of Iowa, Iowa City, IA, USA

This session will include research presentations using light, confocal, electron and atomic force microscopy featuring speakers in the respective technical areas. The morning session will begin with a one-hour tutorial on the theory, methodology and general applications of light, confocal and two-photon microscopy in medical research. A second one-hour tutorial will begin the afternoon session and introduce the theory, methodology and general applications of scanning and transmission electron microscopy in medical research. Established speakers in the areas of inflammation, cancer, lung disease, stem cells and other areas will present talks.

Invited speakers –

“Dynamics of neurons and glia in developing mammalian brain tissues”, Michael E. Dailey, Biological Sciences, The University of Iowa, Iowa City, IA, USA

“Development of new optical techniques for imaging live cells, tissues and intact organisms”, Steven J. Smith, Molecular and Cellular Biology, Stanford University, Stanford, CA, USA

Tutorials:

Atomic Force Microscopy, Kenneth C. Moore, Central Microscopy Research Facility, The University of Iowa, Iowa City, IA, USA

SEM for Biomedical Research, Randy A. Nessler, Central Microscopy Research Facility, The University of Iowa, Iowa City, IA, USA

Multiphoton microscopy in biomedical research: A tutorial, Thomas M. Moninger, Central Microscopy Research Facility, The University of Iowa, Iowa City, IA, USA

The important role of atomic force microscopy in the study of diseases: A tutorial, Sophia Hohlbauch, Asylum Research, Santa Barbara, CA, USA

Raman chemical imaging characterization of the adhesive-collagen interface, Newton T. Samuel, Ethicon, Inc., Corporate Product Characterization, Somerville, NJ, USA

Applications of Scanning Microscopy in Forensic Science – Day 1 of 2 (9:00 a.m.) (Portola Room)
Chairs: S. Frank Platek, Forensic Chemistry Center, U.S. Food and Drug Administration; M.A. Trimpe, Hamilton County Coroner's Office, Cincinnati, OH, USA

9:00-9:30 a.m. -"Forensic examination of surface-modified fibers", Kurt Gaenzle, Materials Engineering Laboratory, Naval Air Depot, North Island, San Diego, CA, USA, and Bob Blackledge, El Cajon, CA, USA

9:30-10:00 a.m. - "A comparison of chemically prepared toners (CPT's) against conventional toners", Joseph C. Stephens, United States Secret Service, Forensic Services Division, Washington, D.C., USA

10:45-11:15 a.m. - "Quantitative analysis of toolmarks using stereoimaging", L.S. Chumbley, J. Kidd, J. Craft, M. Morris, L. Genalo, Ames Laboratory, Iowa State University, Ames, IA, USA, and J. Kreiser, State of Illinois Forensic Laboratory (ret.), Springfield, IL, USA

11:15-11:45 a.m. - J. Mershon, CamScan USA, Cranberry Twp., PA, USA – "TBA"

11:45-12:15 a.m. - "9mm Luger ammunition and its relationship with environmental and occupational sources", A. Hanson and F. Springer, Sacramento County Forensics Office, Sacramento, CA, USA

1:30-2:00 p.m. - "Evidence for victim identification from dental materials", R.G. Miller, DDS, AAFO, AAFS, Laboratory for Forensics Odontology Research, Department of Oral Diagnostic Sciences, School of Dental Medicine, SUNY, Buffalo, NY, USA

2:00-2:30 p.m. - "Dental materials database generation using SLICE", Mary A. Bush, DDS, ASFO, AAFS, Laboratory for Forensics Odontology Research, School of Dental Medicine, SUNY, Buffalo, NY, USA

2:30-3:00 p.m. - "Validation experiment using cadavers and portable X-ray fluorescence", Peter Bush, BS, ASFO, South Campus Instrumentation Center, School of Dental Medicine, SUNY, Buffalo, NY, USA

Microscopy in Firearms Identification and Consecutive Line Matching (3:30 – 5:00 p.m.)
Chair: David G. Howitt, Graduate Program in Forensic Science, University of California at Davis, Davis, CA, USA

The technique of consecutive lines matching for tool mark identification has long been practiced in California and provides an objective criterion for the determination of whether bullets were likely fired from the same gun. This session will be devoted to the objective and statistical evaluation of matching and non-matching striae along the lines originally developed by A.A. Biasotti. The presentations will include the uniqueness of particular tool marks and the differences between class, sub class and individual characteristics.

"A simple method for examining ballistic and tool marks using low-angle BSE imaging", E. Randich[1], F. A. Tulleners[2], and M.F. Giusto[3], [1]Lawrence Livermore National Laboratory, Livermore, CA, USA, [2]Forensic Science Graduate Program, University of California at Davis, Davis, CA, USA, [3]California Department of Justice

"The technique of consecutive matching lines for bullet identification", David Howitt, Fred Tulleners, Karen Cebra and Shiahn Chen, Graduate Program in Forensic Science, University of California, Davis, CA, USA

"The durability of the micromachining marks proposed for the identification of firearms", Michael Beddow, Frederick Tulleners and David Howitt, Department of Chemical Engineering and Material Science , Graduate Program in Forensic Science, University of California, Davis, CA, USA

(see over)

Microscopies for the Structural and Dynamic Organization of the Nucleus and Chromosomes (1:30 - 5:00 p.m.) (Bonzai II)
Chair: Terry D. Allen, Paterson Institute for Cancer Research, University of Manchester, Manchester, U.K.

The cell nucleus has undergone a renaissance over the last few years, largely brought about by the application of microscopic technologies enabling not just visualization of dynamic events, but also their characterization using a variety of antibody labeling and fluorescent probes such as green fluorescent protein (GFP). This has been applied with great effect not only to the events occurring at cell division, but also many aspects of nuclear activity throughout interphase, which has now been demonstrated to be infinitely more dynamic than previously imagined.

Three-dimensional time lapse imaging of living cells has produced existing new observations on many aspects of cell division, a subject studied for the last hundred years. Further ways of modifying nuclear biology by genetic mutants and techniques such as RNA interference have provided unique material for novel separate structural investigations. This session will incorporate a variety of approaches through light and electron microscopy concentrated on the biology of the nucleus.

THURSDAY, APRIL 12

Quantitative Measurements Using Atomic Force Microscopy – Sponsored by Pacific Nanotechnology, Inc. (Half Day Course) (Ironwood) (8:30 a.m. - 12:30 p.m.) – Short Course 2007D
Chair: Paul West and Natasha Starostina, Pacific Nanotechnology, Inc., Tustin, CA, USA

This course focuses on the use of an AFM for making advanced measurements. Topics covered include modes such as EFM and MFM. Additionally, quantitative measurements such as metrology and friction will be discussed.

Materials Sciences Applications of Atomic Force Microscopy – Sponsored by Pacific Nanotechnology, Inc. (Half Day Course) (Ironwood) (1:30 p.m. - 4:30 p.m.) – Short Course 2007E
Chair: Paul West and Natasha Starostina, Pacific Nanotechnology, Inc., Tustin, CA, USA

There are many applications for atomic force microscopes in the field of materials sciences. This course covers the types of applications that are possible with an AFM as well as a practical discussion on sample preparation.

Mastering the Digital Image (Bonzai I) (8:30 a.m. - 4:30 p.m.) – Short Course 2007F
Chair: P. C. Cheng, University of New York, Buffalo, NY, USA

I. **Observation–**Examining the images and samples to determine how humans identify the components of the image, and then looking at the analogs for what a computer can and cannot easily isolate.

II. **Acquisition–**Capturing the digital image with attention to resolution requirements, noise (both pattern and random), contrast, and color.

III. **Isolation–**Making the computer isolate the components of the image(s) on the basis of color, texture, size, orientation, etc. This includes a discussion of which methods are more reproducible and less susceptible to variation.

IV. **Measurement–**Now that the components have been isolated, it is time to examine the statistical measures that can be made, along with their expected error.

V. Automation–While it is generally easy to measure any ONE image, the whole procedure is much more difficult when measuring a batch of images. This includes both methods of automating Photoshop and also better choices for how to perform Steps II, III, and IV.

And finally we revisit Step I to compare the computer's identified components with what the trained human experts were seeing in the first place.

Electron Beam/Specimen Interaction Workshop (9:00 a.m. – 12:30 p.m.) (Bonzai III)
Chair: Michael T. Postek, Division Chief, Precision Engineering Division, National Institute of Standards and Technology, Gaithersburg, MD, USA

The Electron Beam/Specimen Interaction Workshop has brought experimentalists and modeling experts together for nearly a decade to share information on this exciting topic.

This workshop has contributed to an enhanced understanding of the signal generation and imaging process in electron beam instrumentation. Signal formation in the scanning electron microscope represents a complex interaction between the instrument and the three-dimensional (3-D) sample. The primary beam also consists of electrons distributed within a 3-D volume.

The scope of this workshop includes developments in the measurements and modeling of this interaction from electron generation to formation of the electron beam and focusing of it upon the sample to scattering of electrons and generation of signals within the sample and finally to collection and detection of those signals that produce the image (secondary electrons, transmitted electrons, x-rays, etc.) It also includes the use of such models for reduction of artifacts and uncertainty in SEM measurement results. The workshop encourages presentations on methods of inputting 3-D structural information as well as 3-D graphic representations of the data obtained. Other issues of interest include the effects of finite scatting volume of electrons within the sample, sample charging, modeling of the environmental SEM, charge-compensation methods, interactions with materials (e.g., photoresist) of particular scientific or technological interest, and behavior of electron scattering at energies much lower (<500eV) or much higher (>20keV) than those typically used in laboratory instruments.

Anyone interested in electron beam modeling, electron beam interactions and their effect on the signals collected in a scanned beam instrument is welcome to submit abstracts to this workshop.

Among the contributors–

"Improved X-ray simulation in NISTMonte" Nicholas W.M. Ritchie, Surface and Microanalysis Science Division, NIST, Gaithersburg, MD

"Monte Carlo simulation of SEM work with semiconducting devices", Eliahu Napchan, DLM Enterprises, London, UK

“Modeling for SEM imaging and micro-analysis in water", D.C. Joy, University of Tennessee Knoxville, TN, and Center for NanoPhase Materials Science, Oak Ridge National Laboratory, TN, USA

"Charge transport and secondary electron contrast in dielectric multi-layers", Visiliki Tileli†, Milos Toth‡†, W. Ralph Knowles‡, and Bradley L. Thiel†, †College of Nanoscale Science and Engineering, University at Albany, Albany, NY, USA ‡FEI Company, Newburyport, MA, USA

“Cathodoluminescence of SiO_2: Influence of electron beam parameters”, J. Bigaré, CEA-LE Ripault, DMAT/SCMF/LOD, Monts, France

"Monte Carlo simulation of SEM and AEM image of 3D objects", Z.J. Ding[1], Z. Zhong[1], S.M. Xiao[1], S.F. Mao[1], Y.G. Li[1], H.Y. Wang[1], H.M. Li2, Z.M. Zhang[3], [1]Hefei National Laboratory for Physical Sciences at Microscale and Department of Physics, University of Science and Technology of China, Hefei, Anhui, China, , [2]Department of Astronomy and Applied Physics, University of Science and Technology of China, Hefei Anhui, China, and [3]USTC-HP Laboratory of High Performance Computing, University of Science and Technology of China, Hefei, Anhui, China

"Monte Carlo simulation of X-ray photoemission electron microscopy image", Z.M. Zhang[1], Y.J. Kuang[2], T. Chen[2], and Z.J. Ding[2], Hefei National Laboratory for Physical Sciences at Microscale and Department of Astronomy and Applied Physics, University of Science and Technology of China, Hefei, Anhui, China, [2]Hefei National Laboratory for Physical Sciences at Microscale and Department of Physics, University of Science and Technology of China, Hefei, Anhui, China

"Prediction of SEM image details using Lagrange time-delay estimation interpolation (LATDEI model", K. S. Sim, C. P. Tso, W.K. Lim, Faculty of Engineering & Technology, Multimedia University, Melaka, Malaysia

(see over)

”Charge contrast imaging of non-conductive samples in the high vacuum FE-SEM", Y. Ji, X.L. Quan, J.Y. Fu, Y.Q. Zhang, L. Wang, X.D. Xu, C.X. Liu, Beijing University of Technology, Beijing, China

"Resolution and signal-to-noise measurement in the SEM – A user's perspective", J. Alexander Liddle, Andras E. Vladar, and Michael T. Postek, NIST, Gaithersburg, MD, USA

“Monte Carlo modeling of SEM using CHARIOT software and opportunity for calibration of linewidth metrology”, S. Babin, S. Borisov, A. Ivanchikov, Abeam Technologies, Inc., Castro Valley, CA, USA

“Automatic measurement of electron beam size using BEAMETR technique”, Sergey Babin,*D.C. Joy, Mikhail Machin, Alexey Martynov, Abeam Technologies, Inc., Castro Valley, CA, USA; *Department of Biochemistry, Cellular and Molecular Biology, University of Tennessee, Knoxville, TN, USA

“The electron beam hole-drilling of silicon nitride thin films”, S.J. Chen, D.G. Howitt, Dept. of Chemical Engineering and Materials Science, University of California, Davis, USA, B. Gierhart, Dept. of Electrical and Computer Engineering, University of California, Davis, USA, R. Smith and S. Collins, The Micro Instruments and Systems Laboratory, Laboratory for Surface Science and Technology, University of Maine, Orono, ME, USA

Applications of Scanning Microscopy in Forensic Science – Day 2 of 2 (9:00 a.m. – 5:00 p.m.) (Portola Room)
Chairs: S. Frank Platek, Forensic Chemistry Center, U.S. Food and Drug Administration; M.A. Trimpe, Hamilton County Coroner’s Office, Cincinnati, OH, USA

9:00-9:30 a.m. - "The Colonel Sabow homicide: The gunshot residue evidence", B. Burnett, MEIXA TECH, Forensic Science Consultants Group, Cardiff-by-the-Sea, CA, USA

9:30-10:00 a.m. - "A survey of primer residues produced by contemporary powertool rounds and their relation to gunshot residue", Elspeth Lindsay, Michael J. McVicar, Robert V. Gerard, Naomi Janson*, Chemistry Section, Center of Forensic Sciences, Toronto, Ontario, Canada, *University of Toronto at Mississauga, Mississauga, Canada

10:45-11:15 a.m. - TBA - J. Lebiedzik, Advanced Instruments Corp., Golden, CO, USA

11:15-11:45 a.m. - “Non-traditional GSR evidence: The continuing saga”, James B. Crippin, Colorado State University, Western Forensic Law Enforcement Center, Pueblo, CO, USA

11:45-12:15 -

Applications of Scanning Microscopy in Forensic Science – Gunshot Residue and GSR Forum – 1:30-3:00 p.m.
Chair: Michael A. Trimpe, Hamilton County Coroner's Office, Cincinnati, OH, USA

3:30-5:00 p.m. – Special "SLICE" Tutorial, xk, Inc., Clackamas, OR, USA (moderated and presented by John Colby, owner)

Part I – Basic Electron Backscattered Diffraction (EBSD): Tutorial and Applications; Part II – Advanced Electron Backscattered Diffraction (EBSD): Tutorial and Applications, Co-sponsored by TSL-EDAX, Draper, UT and HKL-Oxford, Pasadena, CA (9:00 a.m. – 5:00 p.m.) (Bonzai II)
Co-chairs: Roy H. Geiss, NIST, Boulder, CO, USA, and Joseph R. Michael, Sandia National Laboratories, Albuquerque, NM, USA

Invited speakers –

"EBSD 101 – an interactive tutorial", Matt Nowell, TSL-EDAX, Draper, UT, USA and Scott Sitzman, HKL-Oxford, Pasadena, CA, USA

“Sample preparation for EBSD utilizing focused ion beams – is it worth the effort?”, J.R. Michael, Materials Characterization Dept., Sandia National Laboratories, Albuquerque, NM, USA

"Carbonate EBSD – a new tool for understanding shell growth and ancient visual systems", M. Cusack, P. Dalbeck, M.R. Lee, A.W. Owen and A. Perez-Huerta, Department of Geographical and Earth Sciences, University of Glasgow, Glasgow, UK

"EBSD in the study of phase transformations", Gareth Seward, Department of Earth Science, University of California Santa Barbara, Santa Barbara, CA, USA

"Focused ion beam routes to sample preparation for EBSD", Joseph Michael, Sandia National Laboratories, Albuquerque, NM, USA

"Techniques for measuring elastic train using EBSD", Roy H. Geiss, NIST, Boulder, CO, USA

Contributed paper –

"Statistical variances between texture analyses conducted using electron backscatter diffraction and X-ray diffraction", Stuart I. Wright, TSL-EDAX, Draper, UT, USA

Student Forum – 1:30 p.m. – A $200.00 scholarship will be awarded. **(Bonzai III)**

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