Sustaining Members & Exhibitors Showcase Meeting

presented by

Midwest Microscopy and Microanalysis Society (M^3S)

A local affiliate of the Microscopy Society of America and the Microanalysis Society

November 22nd, 2013

Baxter Healthcare Corporate Headquarters, Deerfield, IL

(Directions and map below)

Please RSVP by Tuesday, November 19th

Email your contact information to: Alan Nicholls (nicholls@uic.edu)

Onsite Registration Fee:

Meeting Free for M^3S members, $20.00 for non-members, $5.00 for students (Fee includes M^3S membership for 2014)

We welcome vendor participation. Tables are available for $100. Please contact Alan Nicholls (Nicholls@uic.edu) for details.

8:00 – 9:00AM **Registration**

9:00 – 9:15AM **Welcome and Opening Remarks**

9:15 – 10:00AM **Use of Advanced Characterization Techniques to Accelerate Materials Development in Energy and Transportation**

Ernie Hall, GE Global Research, MSA President – MSA Tour Speaker

The development of new high-performance materials for energy, aviation, transportation, and other fields requires a detailed understanding of the correlation between structure, composition, processing, and properties. Increasingly, it is necessary to measure the structure and composition of materials at higher spatial resolution, with greater efficiency, and on real materials operating under real conditions. Recent advances in techniques such as focused ion beam and electron backscatter diffraction in the SEM, synchrotron x-ray and neutron diffraction, and surface analysis using electrons, x-rays, and ions have allowed much more information to become available to the materials scientist. In this talk, I will describe some applications of these techniques, as well as conventional SEM and TEM, to characterize phase transformations, residual stress/retained strain, and mechanical behavior in materials, nanomaterials, and coatings of vital importance to the energy and transportation industries.

10:00 – 10:30AM **New Detectors to Meet the Challenge of EDS Analysis in the Nano-world**

Neil Rowlands, Oxford Instruments

10:30 – 11:00 **Break – Visit with Vendors**

11:00 – 11:30AM **The "Low Down" on Today's SEM Technology, Low kV Applications with FESEM**

Vern Robertson, JEOL USA Inc.

As geometries of interest in the biological and material science world continue to shrink so does the need to analyze and image these structures. Improvements in basic microscope gun & lens technology, imaging detector technology, spectrometer technology and software have made the examination of many materials at low kV the modality of choice

even for ultra-high resolution. Discussion of these techniques and why they are used will be presented along with applicable examples from a wide variety of samples. As it turns out the “low down” can be very low indeed!

11:30– 12:00PM **Advancements in Direct Detection Technology for Transmission Electron Microscopy**
Steven Mick, Gatan Inc
TEM imaging options continue to evolve rapidly. Pixel count and frame rates are increasing and higher data collection efficiency is being realized. As imaging performance improves, it becomes increasingly important to understand the inherent advantages and limitations of each available technology. This talk will give an overview of the fundamental TEM camera technologies that are available today and recent advancements in direct detection.

12:00– 12:30PM **Flexible and Efficient Electron Microscopy Sample Preparation with the mPrep System**
Kristy Wendt & Steven Goodman, Microscopy Innovations

12:30 – 1:45PM **Lunch – Visit with Vendors**

1:45– 2:15PM **How to Improve the Quantity and Quality of Data per Electron in Modern Analytical Electron Microscopy, Without Requiring More Trained Operators**
Jan Rignaldi, FEI Company

2:15 – 2:45PM **Cryo-SEM Simplified using Quorum/EMS PP3010T Preparation System.**
Al Cortiz, Electron Microscopy Sciences

2:45 – 3:15PM **Tomography: What you see depends on how deep you go. MicroCT Applications in the SEM**
Mark Kelsey, Bruker AXS Microanalysis
When electrons from a scanning electron microscope (SEM) strike and penetrate a sample different types of information can be revealed. Closest to the surface, the secondary electrons (SE1 and SE2) produce structural 2D signals from a depth of 1-10 nm. While from a depths of 0.25 - 1 micrometer 2D backscatter data can be collected. Most of the chemical information comes from deeper in the sample as the electrons continue their interactions and produce X-rays characteristic of the elements present. The information though is limited by the depth that the electrons can penetrate. To go deeper into the sample the electrons must be replaced with (or converted to) X-rays. X-rays not only penetrate deeper but in some cases can be transmitted through the sample. For these cases a 2D image can be captured digitally. If the sample is rotated then a series of the 2D images can be collected and combined with special algorithms in a computer to produce a full 3D image of the sample. This volume technique is called computed tomography (CT). This talk will show how the SEM can be used to produce the X-rays and images and present some examples.

3:15 – 3:30PM **Break**

3:30 – 4:00PM **EDAX - Design Enhancements in Microanalysis:**
TBD, EDAX
Nearly ten years ago, the Silicon Drift Detector was introduced to the market, quickly changing the landscape of microanalysis. The immediate impact of the detector was the ability to accept large rates of counts into the EDS system (and of course, no liquid nitrogen!). Today's talk will focus on the next wave of design enhancements which are pushing forward not just EDS, but the entire suite of EM-based techniques. Specific highlights will be new detector designs, advancements in electronics, and synergistic software.

4:00 – 4:30PM **High Resolution Tomography and the Focused Ion Beam Workstation**
Ed Principe, *Tescan*

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Directions to Baxter Corporate Headquarters: 1 Baxter Parkway, Deerfield Illinois, 60015

From South (O'Hare Airport): I-294 (Tri State Tollway) north to the merge with I-94 (west) towards Milwaukee. North on I-94 to Lake Cook Road exit. Turn left (west) to first light, Saunders Road. Turn right on Saunders to Baxter Parkway. Turn right on Baxter Parkway. Keep to the right. Follow the special event parking signs in the garage. See Deerfield Campus Map and proceed to "Cafeteria, Auditorium, Reception" building on ground level.
From South (Edens): North to the merge with I-94 (west) towards Milwaukee on Edens Spur. Exit on Deerfield Road. Turn left (west), then take left on Saunders Road. Turn left on Baxter Parkway. Keep to the right. Follow the special event parking signs in the garage. See Deerfield Campus Map and proceed to "Cafeteria, Auditorium, Reception" building on ground level.
From North (Milwaukee): From I-94 east, going south towards Chicago exit at Lake Cook Road exit. Turn right (west) to first light, Saunders Road. Turn right on Saunders to Baxter Parkway. Turn right on Baxter Parkway. Keep to the right. Follow the special event parking signs in the garage. See Deerfield Campus Map and proceed to "Cafeteria, Auditorium, Reception" building on ground level