Minnesota Microscopy Society

Local affiliate of the **Microscopy Society of America** *and the* **Microbeam Analysis Society**

Newsletter

April 2008

Date:
Friday, May 2, 2008

Location:
Science Museum of Minnesota
120 W. Kellogg Blvd., St. Paul
Discovery Hall
(www.sci.mus.mn.us)

Minnesota Microscopy Society
Spring Symposium

Schedule

7:30 - 8:30 AM	Registration, Continental Breakfast, and Vendor Displays
8:30 - 9:30 AM	Robert Simmons, Georgia State University *The Role of Microscopy in the Search for Fungi in the Human Environment*
9:30 - 10:30 AM	Greg Fischer, Physical Electronics, Inc. *TOF-SIMS C60 Sputtering for 3D Images*
10:30 - 11:00 AM	Break and Vendor Displays
11:00 – 12:00 AM	Mae Foster Nies, Medtronic, Inc. *Micro CT Imaging*
12:00 - 1:30 PM	Lunch and Vendor Displays
1:30 - 1:45 PM	Business Meeting
1:45 - 2:45 PM	Grace Burke, Bechtel Bettis, Inc. *Real World Microscopy: Applications of FIB to the Analysis of Real Materials*
2:45 – 3:45 PM	Robert Simmons, Georgia State University *Microbial Ecology of Extreme Environments: Automobile Air Conditioning Systems*
3:45-4:00 PM	Door Prizes, Closing Remarks

Registration

The cost of the meeting will be $80 for MMS members, $90 for nonmembers, and $40 for students and K-12 teachers. This fee includes the meeting, buffet lunch, breakfast, coffee breaks, and **a free pass to the Museum exhibits** (a $7 value).

Registrants can pay at the door, but reservations must be made no later than **Monday, April 28th**. Register by e-mailing at ***reservations@mnmicroscopy.org***, or by phone at 651-236-5470 (Bede Willenbring). Include your name, company, phone number, and e-mail address.

Luncheon Buffet

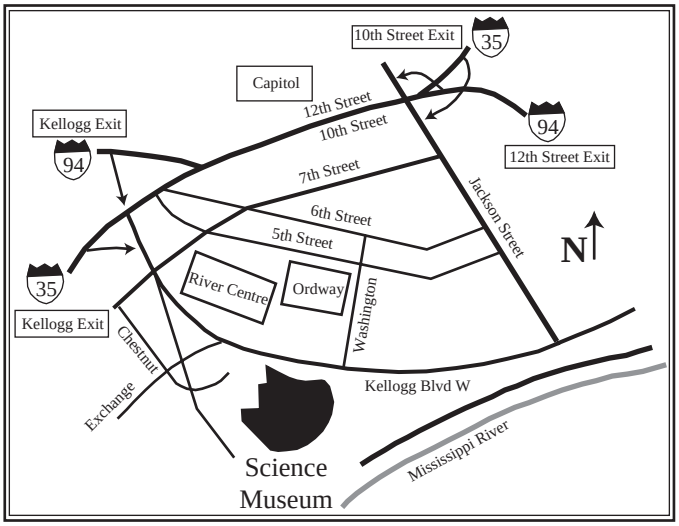
- Platters of cold roast beef, roast turkey, and smoked ham.
- Slices of swiss, cheddar, and pepper jack cheeses.
- Fresh lettuce, sliced tomatoes, onions, and pickles.
- Freshly baked bread, rolls and petite croissants.
- Country potato salad, penne pasta salad primavera, and kettle chips.
- Fresh sliced fruits of the season.
- Chocolate Torte.

Location of the Science Museum and Meeting Room

The Science Museum is located at 120 W. Kellogg Blvd., St. Paul. The meeting will be held in Discovery Hall. If entering the Museum from Kellogg Boulevard, go through the Lobby, angle left just after the Box Office, and continue to the stairs/elevators. Discovery Hall is one floor down.

Parking

The Science Museum's parking ramp can be accessed from either Kellogg Boulevard or Chestnut Street. Enter the museum by taking the parking ramp elevator to the Lobby level. The River Centre ramp is an alternative to the Science Museum's ramp.



Abstracts

Real World Microscopy: Applications of FIB to the Analysis of Real Materials

M. Grace Burke, Bechtel Bettis, Inc., Pittsburgh, PA. (m.g.burke@att.net)

The Focused Ion Beam technique has been successfully used for many years in the semiconductor industry for the evaluation of devices and failure analysis studies. However, the application of the FIB technique to more conventional materials has developed within the past 10 years. Microstructural characterization via analytical electron microscopy requires electron-transparent specimens that are usually prepared using conventional electropolishing techniques or using ion-milling/ion-polishing techniques. This presentation will describe the application of the FIB technique to the evaluation of an ODS molybdenum alloy, the characterization of a stress corrosion crack in a Ni-Cr-Fe alloy, the assessment of deformation, and the characterization of a complex stellite-steel clad interface structure.

Biography

Grace Burke is an Advisory Scientist in Materials Technology at the Bettis Laboratory, Bechel Bettis, Inc. in suburban Pittsburgh. She received her B.S. in Metallurgical Engineering from the University of Pittsburgh, and her Ph.D. in Metallurgy from Imperial College of Science and Technology (London). Her research interests include environment-sensitive behavior of materials, irradiation embrittlement of steels, phase transformations, and precipitation, with particular emphasis on the application of advanced microstructural characterization techniques to solve materials problems. Grace has authored or co-authored over 100 publications. She is a member of the Microscopy Society of America, TMS, IMS, the Institute of Materials, a Fellow of ASM International and the Royal Microscopical Society, and the International Group on Radiation Damage Mechanisms. She was the 2005 President of the Microscopy Society of America, and has been a member of several Department of Energy review panels on microcharacterization.

From 2D to 3D Biomolecular Imaging with TOF-SIMS

Gregory L. Fisher, Physical Electronics, 18725 Lake Drive East, Chanhassen, MN (gfisher@phi.com)

The unique analytical power of time-of-flight secondary ion mass spectrometry (TOF-SIMS) lies in the ability to obtain spatially-resolved molecular information from the surface region of the probed specimen. However, recent applications involving biological specimens and materials have shown that much of the valuable molecular information lies below the probed surface. Such examples, which will be discussed in relation to complementary analytical techniques, highlight the necessity for 3D molecular imaging by TOF-SIMS. This presentation demonstrates the efficacy of TOF-SIMS for 3D characterization of biomolecular and biomaterial systems.

The ability to probe molecular information at-depth is impeded by the static limit, the ion dose beyond which artifacts are introduced via ion-induced damage resulting in damage to analyzed molecules. The use of C_{60} primary ion beams in TOF-SIMS analysis has led to significant secondary ion yield enhancements over those produced by liquid metal ion gun (LMIG) cluster ion beams. More importantly, though, is the observation that the static limit is abolished for many applications. A recent study, discussed in this presentation, demonstrates the utility of C_{60} primary ion beams for 3D molecular imaging.

Biography

Dr. Gregory L. Fisher attended college at the University of Wisconsin - LaCrosse where he earned B.S. degrees in both Chemistry and Physics, then attended The Pennsylvania State University where he earned a Ph.D. in Chemistry using TOF-SIMS, XPS and FT-IR to study the dynamics of metal/organic surface reactions. Subsequently, Greg spent two years as a Post-Doctoral Fellow and five years as a Staff Scientist at the Los Alamos National Laboratory.

While at LANL, his research included actinide surface characterization, epitaxial growth and terahertz emission of magnetic thin films, and studying the effects of ionizing radiation on polymers. In February 2006, Greg joined Physical Electronics (Chanhassen, MN) as a Senior Scientist specializing in TOF-SIMS. Current research activities include ion source development and understanding ion/solid interactions as it relates to organic depth profiling and biomaterials characterization.

Micro CT Imaging

Mae Foster, Medtronic Inc., Medtronic Inc., 710 Medtronic Parkway, Minneapolis, MN

Micro-computed tomography (μCT) is a type of x-ray imaging utilizing advanced computing to construct three dimensional images, which are then viewed as two dimensional renderings or slices through the 3D volume. Micro-CT is capable of resolving features at the micrometer level, and is non-destructive. Several of the more common types of μCT will be examined with regard to theory, benefits/drawbacks and current application examples. Current applications include geology, biomedical research, defect visualization in electronics, composite material analysis and even evaluating gems such as diamonds for imperfections.

Biography

Mae Foster Nies is an Associate Scientist, and has worked at Medtronic for 3 years. She has a B.A. in biology from Hamline University. Her interests include tissue engineering, molecular biology, and all things that have to do with microscopes. Currently Mae is involved in vivo biocompatibility studies, in vitro gene regulation, and image analysis. Mae is part of the team that brought micro-computed tomography (μCT) technology to Medtronic in 2006. She helped establish a variety of methods, using multiple types of μCT technology, for analysis of Medtronic's wide range of materials and products. The success of the technology as a problem solving tool has led to high demand for μCT at Medtronic.

The Role of Microscopy in the Search for Fungi in the Human Environment

Robert Simmons, Georgia State University, Atlanta, GA (rsimmons@gsu.edu)

Fungi are fundamentally recyclers. Their main function in the environment is to break down complex materials, which allows the components to be reused by other organisms. These complex materials include dead plants, dead animals, building materials, valued artifacts of civilization and any number of other things. Problems arise when these organisms invade the built environment, either work or living spaces. Various methods, such as air sampling, have been commonly used to estimate the density of fungi in a structure. Volumetric sampling may indicate high levels of fungi or one particular fungus in a building compared to the outdoor environment or some predetermined standard. This method may indicate the presence of viable fungal conidia or hyphal fragments in the air column but it cannot identify sites of colonization. Surface cultures may indicate the presence of viable fungal propagules but do not prove colonization. Surface sampling for light microscopy using clear adhesive tape mounts may demonstrate the presence of colonizing fungi. The methodology, such as types of tape and optics employed may affect the results obtained. Examination of tape samples from environmental surfaces may show the level of colonization and, in many cases, allow for identification of colonizing species. Scanning electron microscopy studies of suspect materials may determine the nature of surface features and contamination not readily identifiable in the light microscope. Suspect materials may be shown to be biological in nature or non-biological surface. Microanalysis of materials may yield clues to the origin of non-biological contamination. Rapid and accurate analysis of suspect materials on indoor surfaces is vital to the identification of potential fungal colonization sites. These data may be used as an aid to determining an appropriate course of action.

Microbial Ecology of Extreme Environments: Automobile Air Conditioning Systems

Robert Simmons, Georgia State University, Atlanta, GA (rsimmons@gsu.edu)

Automobile air conditioning systems might be considered an extreme environment for many microorganisms. Organisms surviving and proliferating in these systems may be presented with temperature changes ranging from subzero to over 140°F, water activity from saturation to dryness and a nutrient complexity including varying levels of hydrocarbons. Microbial communities may develop in these systems and sometimes proliferate to the extent of massive colonization and production of objectionable odors. In a few instances microorganisms emanating from ACS have been associated with hypersensitivity pneumonitis and other allergic reactions. We have demonstrated that foam insulation and glues, in particular, on system insulations may be colonized by fungi such as Aspergillus, Aureobasidium, Cladosporium, and Penicillium. Such fungi often are implicated in colonization of similar substrates in buildings categorized with the sick building syndrome. Combined light microscopy, scanning and transmission electron microscopy and culture techniques have provided profiles of the microbial communities which inhabit some automobile air conditioning systems.

Biography

Dr. Robert Simmons is a native of Atlanta, Georgia. He earned his Bachelor of Science (Hons) degree in biological sciences at the University of Ulster, and continued with MS and Ph.D. degrees at Georgia State University. He joined the Biology Department at Georgia State University in 1983 and is the Program Director for Biological Imaging. His main research involves the interaction of microorganisms with the human environment, with an emphasis on fungi and air handling systems. Robert is the president-elect of the Southeastern Microscopy Society and councilor (biological sciences) for MSA.

2008 Nikon Small World Competition

Nikon is again holding its Small World Competition, its annual photo contest. Each year, exhibits containing the winning entries are displayed at museums and science centers throughout the U.S. and Canada. In the past, many of these images have graced the covers of scientific and industrial publications and journals. A full-color calendar featuring all twenty Nikon Small World winning images and honorable mentions will be produced and distributed to all of the contestants. The first place winner receives a selection of Nikon products and equipment worth $3,000. The deadline for entering the 2008 Nikon Small World competition is May 1st, 2008. Entries for the contest can be uploaded through a web browser to:
http://www.microscopyu.com/smallworld/scripts/entryPage1.asp

Still Needed:

New Editor for the MMS Newsletter

Work load: - Not bad
Contribution to MMS: - Very significant
Requirements: - Must be able to spel, and attend most monthly MMS Board meetings.

For more information contact Peter McSwiggen at PMcS@McSwiggen.com

Microscopy & Microanalysis 2008

August 3 - 7, 2008
Albuquerque Convention Center
Albuquerque, New Mexico

This is the joint annual meeting of the Microscopy Society of America and the Microbeam Analysis Society. For more information go to http://www.microscopy.org/MMMeetings/MM08/HomePage.html.

Up-Coming Events

The Changing World of Electron Microscopy and Microanalysis

Presented by JEOL USA, Thermo Fisher and Nikon

Hosted by Medtronic, Inc., WHQ, Fridley, MN

Thursday, May 22, 2008

8:30 - 9:00 AM
Welcome & Registration

9:00 - 9:45 AM
How Fast Can You Go? Advances in Silicon Drift EDS Detectors
John Konopka, Thermo Fisher

9:45 - 10:30 AM
The Future of TEM - How Low Can You Go?
Tom Isabell, JEOL USA

10:30 - 11:15 AM
SEM Simplified - New Microscopes that Bridge the Gap Between Optical and Electron Microscopy
Robb Mierzwa, JEOL USA
The new JEOL table top SEM, the Neoscope, will be available for demonstration.

11:15 - 11:45 AM
Discussion

11:45 - 12:45 PM
Lunch (Provided)

12:45 - 1:30 PM
Multivariate Statistical Analysis of an X-ray Microanalysis Data Cube
Paul Kotula, Sandia National Lab.

1:30 - 2:15 PM
3D Representation of Data - New Techniques
Vern Robertson, JEOL USA

2:15 PM
Closing Remarks

Deadline for registration is Friday, May 16, 2008.

To register contact Robb Mierzwa, JEOL USA, at 920-803-8945 or mierzwa@jeol.com

Sustaining Members

Sustaining members are the backbone of financial support for the Society. These members make it possible for the Society to support Project Micro and to cover many expenses of the regular meetings and the Spring Symposium. We greatly appreciate the continued support of these individuals and corporations. To become a Sustaining Member, complete and return the MMS membership form at the end of the newsletter.

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If any Sustaining Members are missing from this list, *please* contact either: Jason Heffelfinger (763-514-1021, jason.r.heffelfinger@medtronic.com) or Peter McSwiggen (612-781-2282, PMcS@McSwiggen.com).

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The Minnesota Microscopy Society would like to express sincere thanks to our Patron Members. These members provide financial support to the organization above the standard membership fee. This additional support makes it possible for MMS to maintain its financial well being. To become a Patron Member, complete and return the MMS membership form at the end of the newsletter.

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Minnesota Microscopy Society – Membership Form

All microscopists are urged to support their Society at one of the membership levels offered below. Often, supervisors will support MMS memberships out of their project budget because they recognize that it is a very inexpensive way to maintain and increase the skills of their microscopists. If you have been a member over the years and recognize the value of MMS to the community of microscopists it serves, consider upgrading your membership this year to the patron or sustaining level. Thank you.

Name _____ Dr _____ Mr _____ Ms _____ Phone (_____)_____

Affiliation _____ Position _____

Address _____ ZIP _____

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Indicate the method by which you would like to receive the Newsletter: e-mail/web _____ mail _____

Check here _____ if you do NOT want your name and address to appear in the Society directory.

Are you an MSA member? ____ MAS Member? ____ Other Professional groups? _____

Student ($5) _____ Basic ($10-$24) _____ Patron ($25-$99) _____ Corporate Sustaining ($100-) _____

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May 2, 2008

Spring Symposium