Minnesota Microscopy Society

Local affiliate of the ***Microscopy Society of America***
and the ***Microanalysis Society***

Newsletter

April 2014

Minnesota Microscopy Society Spring Symposium

Date: Friday, May 2, 2014

Location: Science Museum of Minnesota
120 W. Kellogg Blvd., St. Paul
Discovery Hall

Parking: Science Museum or River Centre parking ramps

Schedule

7:30 – 8:15 AM	Registration, Continental Breakfast, Vendor Displays
8:15 – 8:30 AM	Welcome
8:30 – 9:30 AM	**George F. Vander Voort** *Overview of Grain Size Measurement Methods*
9:30 – 10:30 AM	**Scott Walck** *Tripod Polishing*
10:30 – 11:00 AM	Break and Vendor Displays
11:00 – 12:00 PM	**Dieter Scholz** *Broad Beam Argon Ion Milling - A Unique Sample Preparation Tool*
12:00 – 1:30 PM	Lunch and Vendor Displays
1:30 – 1:45 PM	Business Meeting
1:45 – 2:45 PM	**Dick Bisbing** *The Forensics of the Night: The CSI Effect and the Microscopy and Analysis of Trace Evidence*
2:45 – 3:45 PM	**Keith Thompson** *Does My EDS Specification Really Describe My EDS Detector?*

Spring Symposium
continued

Registration

The cost of the meeting will be $75 for MMS members, $85 for nonmembers, and $20 for students/K-12 teachers via PayPal at the link below. The fee includes the meeting, buffet lunch, breakfast, coffee breaks and a free pass to the Museum exhibits.

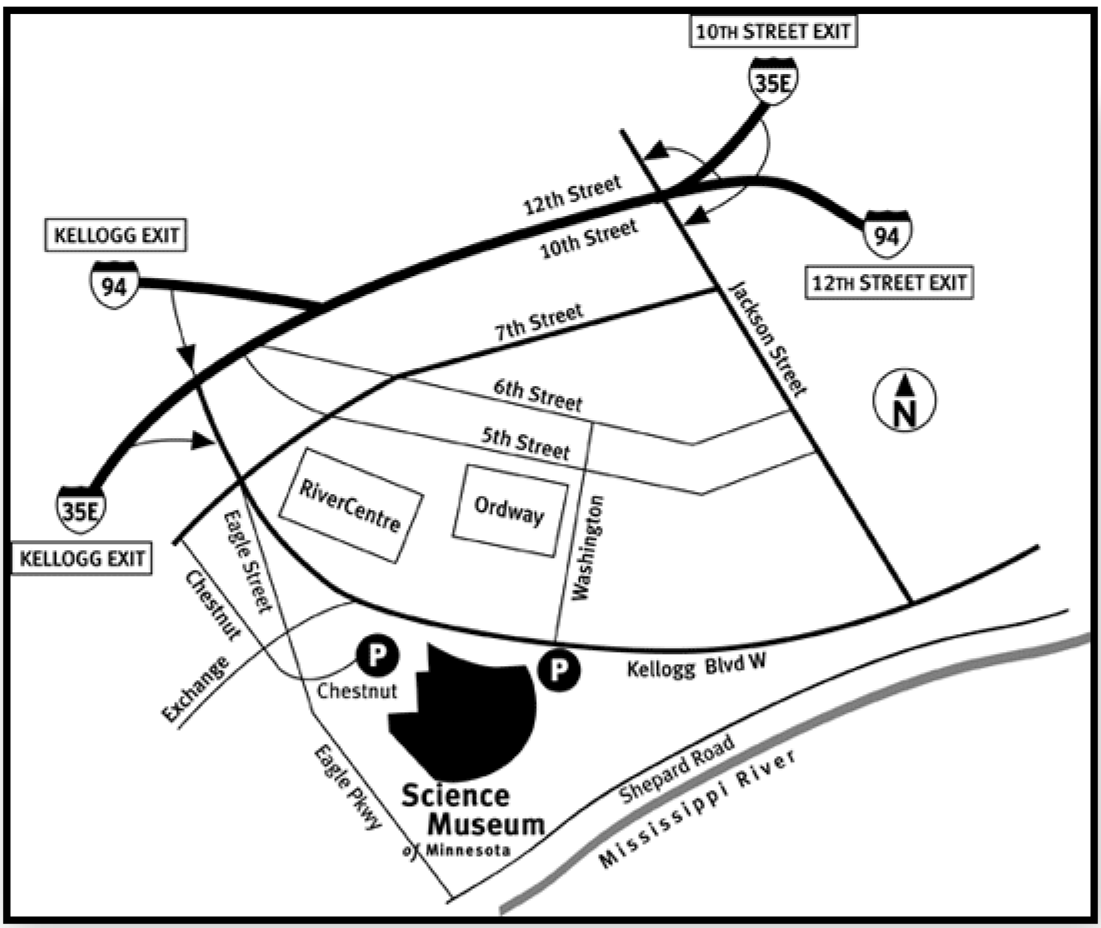
Reservations must be made no later than April 25th.

Register online at **http://www.mnmicroscopy.org/calendar.html.** Or call Bede Willenbring at 651-236-5470.

Directions

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

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. The Discovery Hall is one floor down.



Spring Symposium 2014 - Speakers

Overview of Grain Size Measurement Methods

George Vander Voort, Principal, Vander Voort Consulting and Consultant, Struers, Inc.

Biography

George Vander Voort, president of Vander Voort Consulting L.L.C. and consultant to Struers Inc., is a graduate of Drexel University and Lehigh University with a background in metallurgy and materials science and 29 years experience in the specialty steel industry. A past president of the International Metallographic Society and past chairman of ASTM Committee E-4 on Metallography, George holds six patents and more than 368 publications including *Metallography: Principles and Practice* (McGraw-Hill, 1984; ASMI, 1999) and the ASM video course, Principles of Metallography. He served as a trustee for ASM International, and is a member of several ASMI committees. He is vice president of Alpha Sigma Mu honorary scholastic society. He is a member of the editorial board of *Praktische Metallographie* and the *International Journal of Microstructure and Materials Properties* and is on the scientific committee of *La Metallurgica Italiana*. He was associate editor of Materials Characterization (1991-2004) and was on its editorial advisory board (1986-2007). He is a member of ASM International, IMS, ASTM, TMS, RMS, ISS, MSA, MAS, DGM, and PSS. George is a fellow of ASMI, ASTM and IFHTSE and has 34 awards for his microscopy work including the Jacquet-Lucas Grand Prize and the Dubose-Crouse Award of the International Metallographic Contest. He has given more than 399 lectures in 39 countries. He is the author of nine ASTM metallography standards and two ISO metallography standards.

Abstract

Measurement of grain size is one of the oldest and most important quantitative microstructural characterizations as grain size must be controlled to have good mechanical properties and service performance. Measurements are made on single-phase non-twinned or twinned metals and alloys, as well as two-phase alloys. The distribution of the grain areas may be “normal” (Gaussian) or it may be bi-modal. For heat-treated steels, the prior-austenite grain size is most important but developing the boundaries by etching can be challenging or impossible. The lecture will illustrate grain size measurements using the E112 Jeffries planimetric method, the Saltykov planimetric method, the Heyn-Hilliard-Abrams intercept method, and the triple-point count method (not in E112) as a function of count density per measurement. Examples of two-phase grain size measurements will be included. Finally, examples of normal and bi-modal grain size distributions will be shown and illustrated by calculation of the skew and kurtosis of the distributions.

Spring Symposium 2014 - Speakers

Tripod Polishing

Scott Walck, Senior Scientist, Bowhead Science and Technology

Biography

Scott is currently a Bowhead Science and Technology contractor at the United States Army's Weapons and Materials Research Directorate. He is a senior scientist and subject matter expert in electron microscopy and related topics. Scott is responsible for instrumentation, training of personnel, and collaborating with civilian and contract scientists for a broad range of materials.

Broad Beam Argon Ion Milling – A Unique Sample Preparation Tool

Dieter Scholz, Senior Scientist / Quality Manager, Materials Evaluation and Engineering, Inc.

Biography

Dieter Scholz is a senior scientist with Materials Evaluation and Engineering, Inc. He graduated from the St. Paul College chemical technology program in 1991. Dieter worked 6 years with the analytical chemistry department of Medtronic performing wet chemical analyses, scanning electron microscopy, energy dispersive x-ray spectroscopy, and fractography. Since 1997, he has worked for Materials Evaluation and Engineering, where he has expanded his skill set to include metallography, materials characterization, failure analysis and corrosion testing. Since the summer of 2012, Dieter has been experimenting with and developing applications for the argon ion mill.

Abstract

Microscopic analysis relies on optimum sample preparation to produce accurate and useful data. Good sample preparation has become more challenging in recent years due to high-technology materials, complex assemblies of mixed materials, and smaller components. Broad beam ion milling is a unique method of sample prep that complements and significantly extends the capabilities of the traditional microscopy and metallographic laboratories. Although mechanical cross-sectioning, polishing, and chemical etching are sufficient for many applications, ion milling provides an additional level of quality and clarity for critical and difficult-to-prepare samples. The broad beam ion milling method uses high-energy ion bombardment to remove material or modify the surface of a sample.

cont'd…

Spring Symposium 2014 - Speakers

DIETER SCHOLZ *cont'd…*

This presentation will provide a background of the method, how the instrument works, the capabilities and the limitations. Examples will be shown demonstrating the advantages of broad beam ion milling in several areas including: revealing microstructures of samples difficult to chemically etch; removing layers to expose the material beneath, and preparing cross-sections of materials difficult to prepare by traditional metallographic methods.

The Forensics of the Night: The CSI Effect and the Microscopy and Analysis of Trace Evidence

Richard Bisbing, Forensic Scientist, Executive VP, McCrone Associates

Biography

For 40 years, Dick Bisbing practiced forensic science and analytical light microscopy at the Michigan State Police and McCrone Associates laboratories. His experience includes: crime scene investigations, and cases of consumer safety, medical malpractice, patent infringement, industrial security, art fraud, pollution, accident and crime. He has testified in 21 states and Canada; lectured at Michigan State University, The University of Michigan, and Northwestern University; made presentations to the National Academy of Sciences, Washington. D.C. and The Geological Society of London, Burlington House; been a pundit for CNN News regarding the O.J. Simpson and JonBenet Ramsey cases, 850 KOA Radio in Denver regarding the Chandra Levy and the Kobe Bryant cases; and consulted on CBS's show "C.S.I." He specializes in ultramicroanalysis and microscopy applied to manufacturing problems, contamination control, pollution, industrial hygiene, indoor air quality, art, archaeology, and forensic science, which includes consumer safety, medical malpractice, patent infringement, industrial security, fraud, environmental law and criminal investigations.

Initially trained by Dr. Walter C. McCrone, for 40 years Dick solved problems using analytical light microscopy and microanalysis. He believes materials analysis often requires the particle approach: microscopical observation of the problem, morphological analysis, isolation of homogeneous samples, and ultra-microanalysis of the samples. He also is a member of State Microscopical Society of Illinois and Midwest Microscopy and Microanalysis Society.

A native of Flint, Michigan, he studied Chemistry at Albion College and Forensic Science at Michigan State University where he earned a Bachelors of Science degree in 1968.

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Spring Symposium 2014 - Speakers

RICHARD BISBING *cont'd…*

Abstract
The CSI Effect has had a remarkable influence on the practice of forensic science, public policy, the educational interests of our young people and, therefore, on my own career. It all started unexpectedly with the murder of Ron Goldman late one night and the subsequent trial of O.J. Simpson where The CSI Effect germinated and, for the first time, where DNA evidence was publicly revealed. Now, everybody wants to be a forensic scientist.

In all television dramas, whenever science is portrayed, a microscope comes into view. Unfortunately, all types of strange things are seen down the tube of the C.S.I. microscope and most are half-truths about trace evidence.

Traces can be any mark or material left by something that has passed by. Trace evidence usually is found as small bits of material and used as associative evidence in a forensic investigation; it associates people with places, objects with people, objects with places and objects with objects and provides evidence to help understand the behavior of parties to accidents and crimes.

One way to recognize trace evidence is to consider all the possibilities in generic groups rather than trying to remember each and every possibility individually. Trace evidence will originate from any of the following groups: impressions like from shoes or tools; fractured fragments like torn paper; genetic markers found in blood and semen; somatic samples from the body like hairs; manufactured materials like fibers, paint, and glass; or soil and other natural samples from the ecological environment. I'll illustrate some types and how they are used. Trace evidence will often be microscopic in size and initially invisible to the unaided eye. The crime scene investigator (CSI) must think small in order to make the big discoveries and must be capable of recognizing a wide variety of materials as evidence, and the trace evidence examiner is necessarily skilled in microscopy in order to handle and analyze the small motes and usually has the knowledge, skills and means to analyze all kinds of materials.

Recently, there has been a paradigm change in trace evidence caused by The Innocence Project. While remarkable advances in biotechnology have enabled DNA typing to become the gold standard for forensic science, other forensic evidence such as fingerprints, toolmarks, bitemarks, handwriting, hairs, and blood spatters struggle to defend themselves against their critics. We should all expect forensic science to solve crimes and put the right people in jail--but it doesn't always work that way and that's a problem. Those that practice forensic science need to better understand the principles, practices, and contexts of the scientific methodology they use, as well as the distinctive features of their microanalysis. So, what's the solution?

Spring Symposium 2014 - Speakers

Does My EDS Specification Really Describe My EDS Detector?

Keith Thompson, Product Manager, Thermo Fisher Scientific

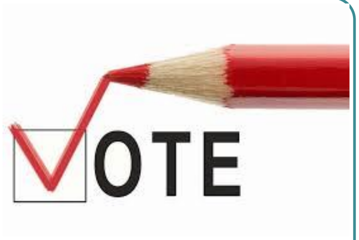
Biography

Keith Thompson holds a PhD in electrical engineering with a minor in materials science from the UW-Madison. He is a registered Project Management Professional (PMP) who is strongly grounded in statistical controls with experience in both semiconductor and automotive manufacturing. He has significant involvement in developing tools for materials characterization on the sub-micron and atomic scale. Currently, Keith is the product manager for microanalysis (EDS, WDS, EBSD) at Thermo Fisher Scientific.

Abstract

The spectral performance of an EDS detector is almost universally described as the energy resolution measured at the Mn k-alpha line at an x-ray collection rate of only a few thousand counts per second. At times, this metric is supplemented with the phrase: “detection to X” where “X” is a specified light element such as B or Be. The rationale for this description is mainly historic and is based on the ready availability of Fe55 as an inexpensive and relatively weak (thereby safe) source of radiation emitted at the Mn-k line. The light element supplement referred only to the window type – Be, BN, light-element or windowless – and not to actual light element performance. This specification presented a convenient and pragmatic description for the spectral performance of LN-cooled Si(Li)-based EDS detectors whose window occluded most of the low energy portion of the spectrum and whose x-ray collection rate was generally low. In an era of modern, SDD-based EDS detectors with high count rates and sophisticated, light-element windows, the value of this simplified specification warrants examination.

This presentation examines the spectral performance of modern EDS detectors across the full range of the x-ray spectrum. Both low and the high count rates are discussed as well as the trade-offs between window type, active area, (effective) solid angle. Detailed and statistically meaningful data will be presented in order to demonstrate how one class of EDS detectors can meet the traditional specifications yet seriously underperform against user expectations while a second class of EDS detectors can meet the same traditional specifications and seriously over perform against that same set of expectations. Proposals for how to more properly describe (i.e. specify) an EDS detector will be presented. A discussion of “how to choose the right detector” will hopefully follow.



Election of MMS officers for 2014/2015 to be conducted during the business meeting following lunch.

Candidates proposed by the board:

President Elect – Jeff Haggerty

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MMS Corporate Sponsors

Corporate Sponsors 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. MMS gratefully acknowledges the Corporate sponsorships provided by the following companies in 2013-2014. To become a Corporate Sponsor, 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.

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