Minnesota Microscopy Society Newsletter

Local affiliate of Microscopy Society of America
Local affiliate of Microbeam Analysis Society

MMS FEBRUARY *LEAP YEAR* NEWSLETTER

MMS FEBRUARY MEETING
THURSDAY, FEBRUARY 29, 1996
5:30 - 8:30 PM

330 Cafe , The Pillsbury Company
330 University Avenue SE, Minneapolis

SPEAKER: Dr. Paul Barbara, Dept. of Chemistry, UM
TOPIC: Near Field Scanning Optical Microscopy

Program:

Cost: $10 per person, includes everything, payable at the door, but must reserve in advance (see below).

- **5:30 - 6:30** Social Hour with Appetizers
  Crackers, cheese, soft drinks, ice water, and wine
- **6:30 - 7:15** Dinner

  Wild mushroom chicken breast, mashed potatoes, vegetable, dinner rolls
  or:
  Beef Tenderloin with baby red potatoes, vegetable, dinner rolls.

  Desert: Pillsbury angel food cake with raspberry or strawberry sauce

- **7:15 - 7:30** Break
- **7:30 - 8:30** Presentation, Dr. Paul Barbara

Dr. Barbara uses two state-of-the-art NSOM instruments that are capable of a number of different types of NSOM measurements, including reflection NSOM, fluorescence detected NSOM, transmission NSOM, phase contrast NSOM, picosecond time-resolved fluorescence NSOM and femtosecond pump-probe NSOM. He has used them to study conductive polymers, localized fluorescence, and other materials related phenomena. Registration Deadline: February 22 We need to give a head count to Cafe 330 at Pillsbury for the dinner. Please reserve your spot with Mark Cavaleri at phone (612)733-3247, FAX(612)733-0648, or e-mail: mecavaleri@mmm.com

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5TH ANNUAL METALLOGRAPHIC EVENT
Wednesday, March 27, 1996
St. Louis Park VFW Hall
5605 West 36th St.

Overview: The metallographic event is intended to be a fun and educational way for you to share your metallographic work and learn from other's experiences. As an added attraction, this year's metallographic event will include the ASM/IMS Traveling Metallographic Exhibit. The Speaker for the evening will be Samuel M. Purdy, Curent Chairman of ASTM E4 on Metallography. As in past years, participants will receive a free dinner courtesy of Mager Scientific.

6:00 - 6:45 Social Hour.
6:45 - 7:30 Dinner.
7:30 Speaker.

To make your dinner reservation, call 1-800-446-1472 by March 20.

Directions: Take 394 west to Hiway 100, go south to West 36th and take westbound exit. Its nearby there.

MMS Remaining Winter and Spring 1996 PROGRAMS

February 29, 1996 February "Leap Year" Dinner Meeting, Near Field Scanning

Optical Microscopy, Paul Barbara, Dept. of Chemistry, UM, 5:30pm to 8:30pm, 330

Cafe , The Pillsbury Company, 330 University Avenue SE, Mpls., details above.

March 27, 1996 5th Annual Metallographic Event. Free dinner, posters, speaker.
See details above.

May 23, 1996, MMS Spring Symposium: Image Aquisition and Processing

Emphasis will be on helping people with litte or no experience in this area. There will be an overview of the various components needed to take the image from a microscope (light or electron) and process it in a computer. There will be presentations on:

1. Types of video cameras and printers and how to evalutatethem.
2. Types of computer image capture boards and data storage devices.
3. Freeware image processing programs that are available.
4. Microscopy resources available on the internet.

Location: Midway Sheraton Inn at I-94 and Hamline Avenue, Midway area of St. Paul.
More information in April Newsletter, or contact Rodney Rappe (see MMS Board members).

MMS TO HOST MSA/MAS NATIONAL CONVENTION IN 1996

August 11-15

The 1996 meeting, to be held in Minneapolis, August 11-15, at the Convention Center, will be a joint meeting with The Microbeam Analysis Society and The Microscopical Society of Canada/Societe de Microscopie du Canada. The Minnesota Microscopy Society will be hosting that meeting. If you are interested in participating or helping out contact Ev Osten, 736-0104, or email "efosten@mmm.com" with your address and daytime phone number.

MICROSCOPY SOCIETY OF AMERICA (MSA) PRESENTS:

MICROSCOPY & MICROANALYSIS '96

54th ANNUAL MEETING

Minneapolis, Minnesota

Deadline for Papers/Posters: March 15,'96
For information and registration materials, contact MSA Business Office (note new address and phone #'s),
4 Barlows Landing Road, Suite 8, Pocasset, MA 02559.

telephone (508)563-1155, toll free: 1-800-538-3672
FAX(508)563-1211,
e-mail: BusinessOffice@MSA.Microscopy.com.

These materials contain all the information and forms needed to register in advance for the Meeting, submit papers and posters for presentation, order reprints, apply for scholarships, reserve hotel rooms, and enter the micrograph competition, and much more.

MMS MICROSCOPY OUTREACH

The Minnesota Microscopy Society has an opportunity to become involved in an Educational Outreach Program being developed by the Microscopy Society of America (MSA). The program is developed for children in grades five through eight. A volunteer from the Local Society would be paired with a Middle School Science Teacher and would act as a resource for the teacher. The volunteer would be involved in helping the teacher set up a School Fesitval for the children involved. This would involve several microscopy stations with the goal of interesting the child in science. Next the volunteer would work with the teacher to integrate the MSA designed experiments (these experiments are designed and tested for children at this level) into the science curriculum.

Caroline Schooley, coordinator of the project for MSA, will be in the Twin Cities May 20 or 21, 1996 for a meeting of volunteers and teachers. Then a workshop will be presented in August for the teachers and volunteers. If this is a program you would like to be involved in contact: Tina Schwach 624-1295, Devora Molitor 737-4485, or Rod Rappe 733-0564.

MMS now has World Wide Web site

The Minnesota Microscopy Society now has its own World Wide Web site. For those of you with access to the Web the URL of the MMS Home page is:

http://www.charfac.umn.edu/MnMicSoc.html

The IP address of this site is liable to change, but the URL will remain the same (unless we get a shorter and more relevant alias). Currently the Web page contains information about the society officers and patrons, schedule of upcoming events, the current and past newsletter(s), and membership application forms for MMS, MAS and MSA.
Links to our affiliate national societies are also available.

Provided your Web browser is setup with your correct e-mail name and address,one advantage of having the newsletter online is that at the end of each article or MMS event description is the name and e-mail address of the organizer.
Clicking on this name will (if it is possible to do so) launch a mailer for you to respond directly. Therefore there should be less reason for not signing up for MMS events.

The home page is located on the CIE Characterization facility home page which is to be found at the URL http://www.cie.umn.edu/what/facility/. This page contains descriptions of the characterization facility as well as links to many local chapters of national professional societies.

If you have any comments or suggestions for improvements and additions to these pages you can contact MMS web page custodian Stuart McKernan at stuartm@maroon.tc.umn.edu or click on the link at the bottom of each Web page.

What sign is your microscope?

A constellation named for microscopy? Strange, but true. The constellation Microscopium resides in the Southern Hemisphere just below Capricorn and Sagitarius. If you've ever suspected your SEM's performance was influenced by the stars, now you know why.

Monte Carlo Modeling for Better X-ray Microanalysis

Don Chernoff, Small World

X-ray microanalysis on a SEM or TEM is the simplest and sometimes the only way to get chemical information from a small volume of material. Often, nothing more is required than putting the beam spot onto the area of interest and collecting a spectra. After 30 seconds you have your answer.

Or do you?

Analysts very often forget the extent to which the beam penetrates and spreads laterally in their sample. It is not unusual for a 20 kV beam to penetrate and spread several microns into a sample. This becomes a big problem when analyzing thin films, small particles and other difficult samples. Remember that the x-ray signal is generated from the interaction volume of electrons in the sample. If the electron beam spreads beyond the area

of interest you will be generatingx-raysfrom material other than what you really want to analyze. If you don□t know how the beam is spreading in your particular sample how can you produce accurate x-ray analyses? A simple method of modeling the beam interaction with the sample can help prevent these problems.

The best way to determine this interaction volume without tedious experimentation is to use software to produce a visual model of the interaction.

A useful program will allow you to define the chemistry and structure of your sample (i.e. layers, particles, inclusions, tilted, etc.) and vary the accelerating voltage and watch to see how the interaction volume changes. By doing this kind of modeling with software you can quickly determine the accelerating voltage needed to get the best results without a lot of trial and error. A program which can do all this and a lot more is called Electron Flight Simulator. This program runs on any PC with Windows 3.1 or Windows 95.

For more information call or fax (415) 345-8013 or send e-mail to dchernoff@aol.com..

VARIABLE PRESSURE SCANNING ELECTRON MICROSCOPY FOR NONCONDUCTIVE & VOLATILE SAMPLES

Larry D. Hanke
Materials Evaluation and Engineering, Inc. Plymouth, MN

Many applications where scanning electron microscopy (SEM) evaluation could be useful involve samples that are not electrically conductiveor contain volatile materials. These samples have traditionally required pretreatment, such as drying and/or coating with a conductive film, before SEM examination.
In many cases, however, sample pretreatment is only partially effective in preparing the samples for SEM examination. For example, wet samples change character when dried, thus appearing different in the SEM examination than in their native state. Coating confuses chemical microanalysis by EDS and WDS techniques. For porous samples, it is difficult to get the conductive coating into the subsurface spaces. Charge buildup at the pores continues to interfere with the SEM examination.
As the SEM is increasingly used for routine evaluations, there is increasing demand for examination without pretreatment. Coating is not an alternative for in-process inspection of components and may also be unacceptable for preparation of samples that should not have their character altered, such as historic materials or evidence in legal actions.
An answer to the problems of charging and volatile samples is the development of scanning electron microscopes that operate without exposing the sample to high vacuum. This technique is referred to alternately as environmental, low-vacuum, high-pressure, or variable-pressure SEM. Higher pressures in the SEM sample chamber offer two primary benefits compared to traditional high vacuum chambers. First, a higher pressure minimizes the outgassing from volatile samples. Secondly, by allowing a controlled amount of gas into the chamber, charging is diminished on nonconductive samples.
The advantages of a higher pressure in the sample chamber are obvious for wet and volatile samples. The higher pressure decreases the rate of volatilization or outgassing. This decreases the drying and deformation of wet samples. Since the sample chamber can tolerate higher pressures, any outgassing does not inhibit operation of the microscope.
For nonconductive samples, the advantage of higher pressure is less obvious. When gas molecules in the sample chamber are struck by the electron beam, the gas is ionized. These positive ions are attracted to and neutralize the negative charge building up on the nonconductive specimens. By controlling the pressure in the sample chamber, the number of gas molecules intercepting the electron beam is maintained at a level that is sufficient to prevent charging, but does not deflect the beam sufficiently to prevent imaging and microanalysis.
At the higher pressures, accelerating voltages up to the maximum capacity of the SEM (typically 30 KV for

high-performance SEMs) can be used for imaging and microanalysis of nonconductive and wet samples. No pretreatment, which could interfere with imaging and analysis, is required.
Within the past 2 years, variable-pressure operating capabilities have been made available on moderately-priced, easy-to-operate, high-performance SEMs. The best of these microscopes are excellent conventional high-vacuum SEMs, with high-resolution imaging, as well as, the capability to operate at variable pressure. These instruments have all of the features that provide the versatility, usability, and cost-effectiveness on which so many SEM users have come to depend. In addition, there is no adaptation necessary to equip these instruments for microanalysis.
The new generation of variable-pressure scanning electron microscopes have brought the higher- pressure capability out of the research laboratories and into the quality assurance and failure analysis laboratories in manufacturing companies and service organizations. This development will continue the increase in demand for scanning electron microscopy in an ever widening range of applications.
The variety of applications that have been studied in our laboratory using variable-pressure SEM include: biological samples, cloth, polymer films, plastic components, printed circuit boards, ceramics, painted and coated metals, explanted medical devices with attached tissue, metal components encapsulated in polymer, lubricated metals and polymers, and corroded, contaminated parts. In many of these cases, evaporative or sputter coating was either undesirable or not possible. These examples have shown the value of eliminating sample pretreatment and the utility for performing scanning electron microscopy at variable pressures.

CIE COURSE ANNOUNCEMENTS

1. A graduate level course will be offered Spring Quarter at the U, jointly through the Chemical Engineering and Materials Science Department and the Cell Biology and Neuroanatomy Department.

"**Practical Scanning Electron Microscopy**" features lectures and laboratories and is designed for students with some prior SEM experience.

The labs will be held on the CIE instruments, the Geology Microprobe, and the Medical School Hitachi S-900. For more information, interested people may contact Beth Trend, 624-1365, trend@cems.umn.edu.

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2. The CIE Characterization Facility is sponsoring a Master Class in **Scanning Probe Microscopy** May 13 and 14.
There will be lectures and hands-on opportunities on Digital Instruments' SPMs, a Nanonics Near-field Scanning Optical Microscope, the Hysitron Microindenter, and more.

Enrollment is limited, and there will be a fee for the class; please call 626-7594,

charfac@gold.tc.umn.edu to register or to obtain more information.

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3. The CIE Spring Meetings will include a Workshop on **Scanning Probe Microscopy**, May 14 and 15,

Consisting of lectures and question sessions on all aspects of SPM.
Call 626-2230 to register or to obtain more information.

TED PELLA, Inc.'96 MICROWAVE WORKSHOPS

3-HOUR TISSUE PROCESSING FOR TEM

March 5-7 Washington University, St. Louis, MO
July 1-3 NIH/Rocky Mountain Labs, Hamilton, MT
Aug 7-9 Madison Area Technical College, Madison, WI

The 2-1/2 day course fee is $700 which includes lodging, lunches and a group dinner.
Contact Kathy Stangenberg at Ted Pella, Inc. 1-800 237-3526.

COMPUTER-ASSISTED IMAGE ANALYSIS & MEASUREMENT

3-Day Short Course And Workshop
Organized By John Russ

MAY 16-18 & MAY 20-22, 1996
North Carolina State University
Raleigh, North Carolina

The subjects discussed include acquisitiomn and processing of images, measurement & interpretation of data. Attendees typically include biologists, medical and, materials scientists, geologists, etc.

For informative brochure, contact North Carolina State University, Office of Continuing Education and Professional Development, Box 7401, Raleigh, NC
27695-7401, (919)515-8171, internet at http://vims.ncsu.edu/matsci/IPCourse.html

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FOUNDATION for ADVANCES in MEDICINE & SCIENCE(FAMS) and SCANNING, THE JOURNAL of SCANNING MICROSCOPIES Presents:

SCANNING 96

April 9-12, 1996

The sponsors of SCANNING 96 are pleased to announce the Monterey Marriott Hotel & Monterey Conference Center, Monterey, CA, as the site of its 8th international scientific meeting.

The four-day forum will include scientific sessions with invited and contributed papers. The Call for Papers is currently being distributed; topics will include the biological, materials, and imaging sciences.

In addition to scientific presentations, the meeting will include an extensive commercial Exhibit Hall featuring the latest in equipment, as well as poster sessions, tutorials, and workshops.

For information, contact: Mary K. Sullivan, SCANNING 96, PO Box 832, Mahwah, NJ
07430-0832. Or: (201) 818-1010; FAX 201-818-0086.

Experienced Microscopy Technician. Available for part-time or short-term projects.
Some equipment will be provided.
For further details, please contact Rae Vigeant at (612)525-3327.

Seeks Position. Microscopist with 21 years experience in Scanning Electron Microscopy in materials science seeks lab supervisor or lab support position.

Contact Ms. Kathy Vulu at (612)521-2049.
