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# Minnesota Microscopy Society

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



## Newsletter

September 2002

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### Particle Analysis in the EPMA / SEM: New Ways to Solve Old Problems & Tour of Seagate

Thursday, September 19, 2002

#### Speaker

John Small  
National Institute of Science & Technology (NIST)

#### Location

Seagate, Inc.  
7801 Computer Avenue South  
Bloomington, MN 55435

#### Schedule

Tour of Seagate's microscopy facilities	5:30 PM - 6:30 PM
Dinner	6:30 PM - 7:30 PM
Business meeting	7:30 PM - 7:45 PM
Talk	7:45 PM - 8:45 PM

Please try to arrive by 5:15 PM so that we can get the tour started on time.

#### Dinner Menu

Oriental buffet with beef & broccoli, and vegetable cashew stir-fry served with white and fried rice and fortune cookie.

#### Cost of the Meeting

The cost for the meeting and dinner is \$15 for members and \$5 for students.

#### Reservations

Reservations for the meeting **MUST** be made no later than **Friday, September 13**. Contact Mike Coscio at [mike.coscio@medtronic.com](mailto:mike.coscio@medtronic.com) or by phone at (763) 505-4561 to make your reservations.

#### Abstract

Methods for the quantitative x-ray analysis of individual particles in the EPMA / SEM were developed about 30 years ago, corresponding roughly to the introduction of EDS analytical capabilities on the scanning electron beam instruments. Since that time, various correction procedures have been developed to minimize the effects of particle shape and size on quantitative x-ray analysis. Although many of these correction procedures significantly reduce the effects of particle shape and size, uncertainties in the elemental concentrations from particles is on the order of 10-20% relative which compares to roughly 5% for bulk sample analyses by EDS. In recent years, however, there have been a series of advances in electron beam instruments and x-ray detectors that may make it possible, through "low-voltage" analysis to improve significantly the quality of results from the quantitative electron probe analysis of individual nano- and microparticles.

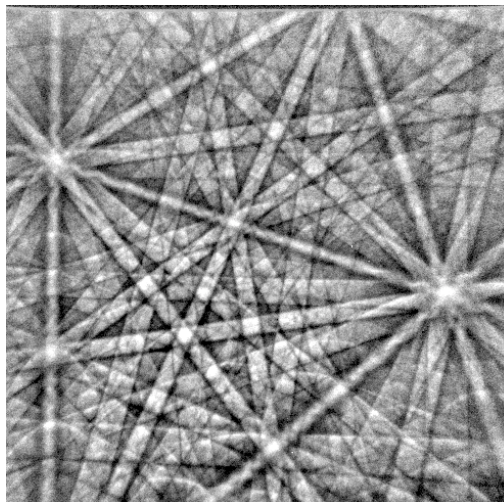
In addition to the quantitative x-ray analysis of particles, another method that is gaining in popularity for quantitative identification of crystalline particles is phase identification by electron backscatter diffraction EBSD. In this method the crystallographic information from EBSD is combined with qualitative elemental information to search a diffraction database identifying possible matching phases. Once a given phase is identified, an

(Abstract continued on page 2)

### Abstract (continued from page 1)

EBSD pattern is synthesized with the correct orientation and overlaid on the experimental EBSD pattern of the unknown for comparison.

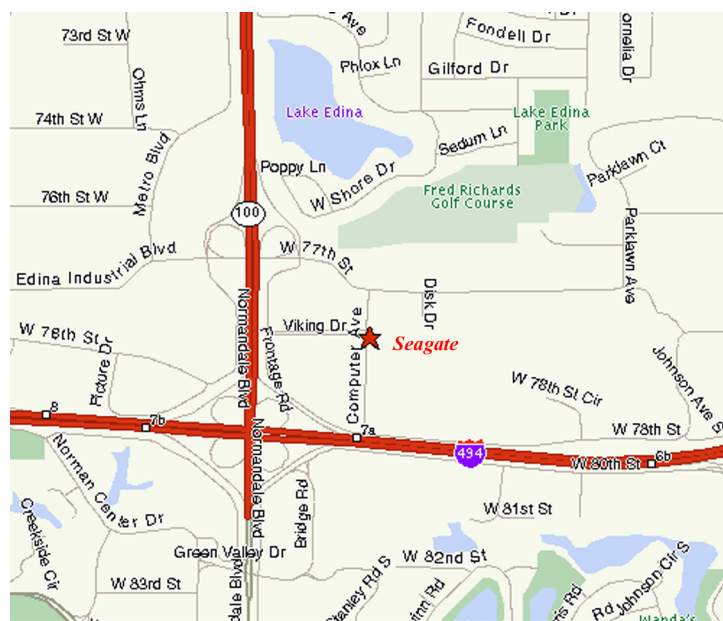
This talk will describe the basics of the two methods and will highlight the current and future potential of these techniques for the quantitative identification of nano- and microparticles. In addition, the talk will emphasize the advantages and disadvantages of each method based on experimental results obtained at NIST.



### Biography

John A. Small is a senior research chemist in the Microanalysis Research Group under the Surface and Microanalysis Science Division at the National Institute for Standards and Technology (NIST). He received a Ph.D. in Chemistry from the University of Maryland in 1976 and has worked at NIST, formerly the National Bureau of Standards (NBS) since that time. During his 25-year career with NBS/NIST, his research has been in the general area of accuracy in quantitative analysis of materials, focusing on the quantitative chemical analysis of individual particles. Over the years, research activities have included the development of a peak-to-background method for the quantitative analysis of particles and rough surfaces; the establishment of an accuracy base for the measurement of environmental asbestos; the modeling of bremsstrahlung radiation; and the development of an experimental electron-optical bench for measuring electron probe parameters. Recent research interests include microcalorimeter and silicon drift x-ray detectors as well as low voltage and EBSD analysis of single particles. Dr. Small has been an active member of MAS since 1975 and has served the society in various capacities, including as secretary and president of the MAS council and program chair for the national meeting. He is currently serving as chairman of the long range planning committee.

### Seagate Location map



Seagate is just off Highways 100 and I-494 at  
7801 Computer Avenue South.

## Upcoming Meetings

**October 22 - Tuesday**

◆ **35 Year Retrospective on MMS**

by Richard Zeyen, University of Minnesota

◆ **Textile Curating**

by Ann Frisina, Minnesota Historic Society

***Location: Minnesota Historic Society***

Richard Zeyen has been a member of MMS since the late 1960's, and served twice as president. He got his start in electron optics using a TEM as a tool in his investigation of a small RNA plant virus for his doctoral research. Later Richard was asked to develop an electron optical facility for the Minnesota Agricultural Experiment Station at the University of Minnesota. Thirty years later he is still doing electron microscopy, and will be talking about some of the changes that have taken place in our field over these years.

Ann Frisina is a textile curator at the Minnesota Historic Society.

**November 14 (or 16th) - Project Micro**

**February 20 - To be announced**

**March - Joint meeting with ASM**

**May 2 - Spring Symposium**  
*The Science of National Security*

### Microscopist Wanted

SurModics is a leading biomedical technology company specializing in surface modification of medical devices and the development of new high-value biomedical products. We are currently seeking an experienced microscopist for our surface characterization department. The successful candidate will apply atomic force microscopy (scanning probe microscopy), electron microscopy, and optical microscopy methods to a wide variety of coatings, develop new surface characterization methods, and be able to work in a flexible, creative R&D environment.

Qualifications include:

- B.S. in Physics, Chemistry, Material Science or equivalent education and experience
- Minimum of 2 years of experience in a research and development environment
- Extensive experience with atomic force microscopy and/or electron microscopy
- Advanced computer skills
- Advanced image processing skills
- Knowledge of hardware, software and computer interfaces
- Must be able to work in a team environment
- Excellent written, verbal and interpersonal communication skills

Please send or fax cover letter and resume to:

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Human Resources  
9924 West 74th Street  
Eden Prairie, MN 55344  
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[www.surmodics.com](http://www.surmodics.com)

## Sustaining Corporate 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](mailto:jason.r.heffelfinger@medtronic.com)) or Peter McSwiggen (612- 624-7370, [mcswi001@umn.edu](mailto:mcswi001@umn.edu)).

## MMS Patron Members

The Minnesota Microscopy Society would like to express a sincere thanks to our Patron Members. These members provide financial support to the organization above the standard membership fee. This type of added 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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**Corporate Liaison:** Jason Heffelfinger, Medtronic Inc.,  
 6700 Shingle Creek Parkway, Brooklyn Center, MN 55350;  
 (763) 514-1021; jason.r.heffelfinger@medtronic.com

**Webmaster:** Stuart McKernan, IT Characterization Facility,  
 University of Minnesota, Minneapolis, MN, 55455;  
 (612) 624-6009, FAX (612) 626-7530, stuartm@umn.edu

**Newsletter Editor:** Peter McSwiggen, University of Minnesota,  
 Dept. of Geology & Geophysics, Minneapolis, MN 55455;  
 (612) 624-7370, mcswi001@umn.edu

Copy Editing: Barbara Meier

**MAS Representative:** Michael Coscio, Medtronic Inc.,  
 710 Medtronic Parkway, Minneapolis, MN 55432-5604;  
 (763) 505-4561; mike.coscio@medtronic.com

### Other Board Members:

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 (651) 736-0104, efosten@mmm.com

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 (651) 733-2352, jjpayne@mmm.com

Sue Okerstrom, Medtronic Inc., Minneapolis, MN;  
 (763) 514-4678, sue.okerstrom@medtronic.com

Paul Baker, Medtronic Inc., Minneapolis, MN;  
 (763) 514-4519, paul.baker@medtronic.com

Diana Kittleson, Pillsbury Technology East, St. Paul, MN;  
 651-917-5859, dkittleson@pillsbury.com

**Your MMS Annual Membership dues are payable in September/October!**

All microscopists are urged to support their Society at one of the membership levels offered below. The more dues-paying members we have, the more likely we are to attract sustaining corporate memberships which form the financial backbone of our Society. 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 (\_\_\_\_) \_\_\_\_\_

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

Area of interest: Bioscience \_\_\_\_\_ Materials Science \_\_\_\_\_ SEM \_\_\_\_\_ TEM \_\_\_\_\_ X-ray \_\_\_\_\_

Membership level: Basic \$10 \_\_\_\_\_ Patron ≥ \$25 \_\_\_\_\_ Corporate Sustaining \$100 \_\_\_\_\_ Student \$5 \_\_\_\_\_

**Make checks payable to MMS and mail to our treasurer:****Dwight Erickson, MMS Treasurer, 3M Center, Bldg. 251-1A-03, Saint Paul, MN 55144-1000.**

**Minnesota Microscopy Society**  
Peter McSwiggen, MMS Editor  
University of Minnesota  
310 Pillsbury Drive, SE,  
Minneapolis, MN 55455

**September 19, 2002****Particle Analysis in the EPMA /SEM  
&  
Tour of Seagate**

Forwarding and Address  
Correction Requested