

# Minnesota Microscopy Society

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



Newsletter

September 2009

## “Gemstone Synthesis - Materials Known as Gemstones”

By Paul Hlava,  
Sandia National Labs (retired)



**Date** Thursday, September 24, 2009

**Schedule** 5:30 - 6:30 p.m. Registration  
6:30 - 7:30 p.m. Dinner  
7:30 - 8:30 p.m. Speaker

### Location

Rainforest Auditorium,  
Marjorie McNeely Conservatory, St. Paul  
(formerly Como Park Conservatory)

Driving directions:

[http://www.comozooconservatory.org/como\\_park/directions.shtml](http://www.comozooconservatory.org/como_park/directions.shtml)

<http://www.agmc.info/treasures.htm>

Grounds map:

<http://www.comozooconservatory.org/cons/map.shtml>

### Dinner Choices

- Chicken - Grand Marnier Chicken  
(Herb-Crusted Sauteed Breast of Chicken, Grand Marnier Beurre Blanc,  
Chive Mashed Potatoes, Green Beans and Carrots w/Thyme Butter)
- Fish - Pan Roasted Walleye  
(Lemon Butter Caper Sauce, Two Potato Hash, Spring Vegetables)
- Vegetarian - Spring Vegetable Cavatappi  
Spiral Pasta with Baby Spinach, Artichokes, Broccoli, Asparagus  
Plum Tomatoes, Sweet Red Onion and Summer Squash in a Light Mushroom Sauce

### Registration:

The cost of the meeting will be \$25 for MMS members, \$35 for nonmembers, and \$15 for students.

**Reservations must be made no later than Noon, Tuesday, September 15th.** Register by e-mail (preferred) to Bede Willenbring at [reservations@mnmicroscopy.org](mailto:reservations@mnmicroscopy.org), or by phone at 651-236-5470.

Include your name, company, phone number, email address, and **[DINNER CHOICE!](#)**

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## **Gemstone Synthesis – Materials Known as Gemstones**

Paul Hlava, Sandia National Labs (retired)

### **Biography**

Paul Hlava recently retired from Sandia National Laboratories in Albuquerque, New Mexico after 33 years. He ran the electron microprobe laboratory (as staff member in charge of the lab since 1980) the entire time. Because the EMP lab is part of the Materials Characterization Department, a centralized analytical facility for Sandia, Paul gets to work on a wide variety of (prosaic to exotic) materials and projects. He normally analyzes many alloys and joins (welds, brazes, solders, metal to ceramic, glass/metal seals, etc.) but also does work on high tech ceramics, low-temperature superconductors, electronic materials, phosphors, contamination, corrosion, failure analyses, nuclear waste simulants, thermal batteries, et hoc genus omne. As a result, he has written, co-authored, and/or presented over a hundred papers on a wide variety of materials.

Paul graduated from the University of New Mexico with a geology MS in 1974. At UNM he worked as a research graduate doing probe research under Klaus Keil in the Institute of Meteoritics. He worked on moon rocks, Hawaiian basalts, ultramafic rocks, meteorites, and inclusions in diamonds. Paul occasionally uses his geological and mineralogical expertise on Sandia projects but also does some personal research on minerals. He has been co-discoverer and co-author on the descriptions of several new mineral species.

Paul stays active in the area of geology, mineralogy, crystallography, and gemology. He has been president of the Albuquerque Gem and Mineral Club three times. He is the Chair for AGMC's annual show, geological/mineralogical expert for the New Mexico Faceters Guild, and often gives talks on geological/mineralogical/crystallographic/ gemological subjects. About twenty years ago, Paul started a side business, Access to Gems and Minerals, Inc., dealing in gemstones, jewelry, and related items. This has not only given him access to wholesale rooms full of gemstones but it has piqued his interest in the research side of this field. He has given several well-received talks on gem related subjects such as this one on the active and ever-changing field of gemstone synthesis.

### **Abstract**

From antiquity, gemstones have been so very highly prized for their beauty and rarity that they have always been difficult and/or expensive to acquire. Therefore it seems only natural that people would try to mimic them with less costly, artificial materials, often with noble intentions, sometimes with not so noble intentions. In olden times, let us say before 1800, these artificial materials were mere substitutes or simulants of variable quality. It wasn't until the end of the 18th century, when the science of analytical chemistry was well developed, that people knew what elements and contaminants were needed to form the desirable stones. From then on the race was afoot to produce synthetic materials identical to the best, perfect, natural stones. These quests benefited science and technology in that the researchers had to develop/perfect and control means of producing and stabilizing very high temperatures, medium to very high pressures, and extremely pure starting materials.

In this well illustrated and colorful talk I will discuss many (but not all, e.g., opal will not be covered) of the technologies used to produce true synthetic gemstones as well as simulants. After defining a few terms used throughout the talk, I will follow a more or less chronological path to briefly cover the various techniques and the materials they create.

People often have questions as to the ethics of synthesizing gems, their effect on natural stone sales, how to distinguish synthetic stones from natural stones, pricing issues, and more, so I will briefly address some these issues.

Come prepared! There is a short quiz at the beginning of the talk to test your pre-talk knowledge of synthetic gemstones.

**Upcoming Events****October**

Bethel College (joint with Sigma Zeta), Speaker and Date TBA

**February 18th**

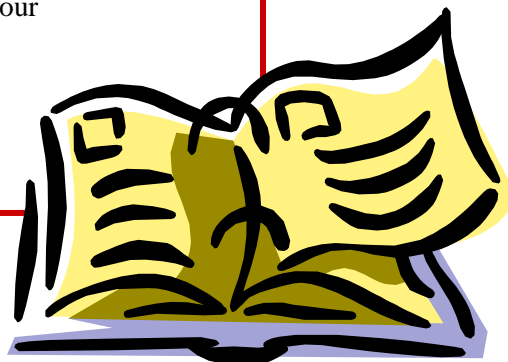
Boston Scientific (former Guidant in Arden Hills) Tour

**March 18**

MinnTS, Medtronic

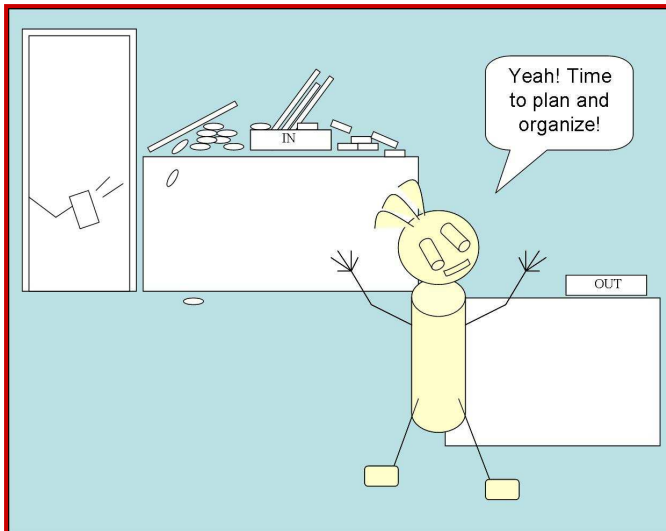
**May 7th**

MMS Spring Symposium, Science Museum

***New in this Newsletter:***

*Please see enclosed information on instruments  
and upcoming vendor events.*

*If you are a local vendor with information to share, please contact  
either Jason Heffelfinger ([jason.r.heffelfinger@medtronic.com](mailto:jason.r.heffelfinger@medtronic.com)) or  
Kathy Hough ([katiu@frontiernet.net](mailto:katiu@frontiernet.net)) for deadline and content  
guidelines.*

**Little Lab Laffs**



**Bruker AXS Microanalysis**



## Online Seminar

Wednesday, 16 September 2009

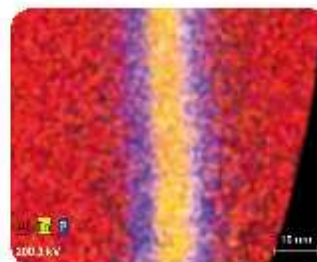
**Session 1: 10 am CEDT, 4 pm China, 5 pm JST**

**Session 2: 4 pm UK time, 5 pm CEDT, 11 am EDT**

### Using SDDs on TEMs

**Energy dispersive X-ray spectrometry on transmission electron microscopes (TEM) with Bruker's XFlash® silicon drift detector (SDD)**

Silicon drift detectors are a well established analytical technology on scanning electron microscopes. Bruker AXS Microanalysis, as the technological leader in this field, is the first company that has adapted SDDs for optimal operation on transmission electron microscopes. The XFlash® 5030 T is Bruker's detector for this application. Its design has been optimised to cause no interference with the electron optics of all types of transmission and scanning transmission electron microscopes, including aberration corrected instruments.



During this webinar we will explain the technology of SDDs and particularly focus on Bruker's adaptation to (S)TEM operation. We will also introduce the ESPRIT software features for transmission electron microscopy included with Bruker's QUANTAX EDS systems. Application examples from materials science will be presented to demonstrate the performance of the XFlash® on (S)TEMs.

#### This webinar will deal with

- EDS analysis using SDDs on transmission electron microscopes
- application examples from materials science
- the QUANTAX EDS system with 5<sup>th</sup> generation XFlash® 5030 T Detector for (S)TEM

#### Who should attend

- all managing or working in electron microscopy labs, especially users of transmission electron microscopes
- material sciences lecturers and students
- persons interested in electron microscopy, materials science and testing in general

#### Presenters

Dr. Anna Mogilatenko, TEM Scientist, Humboldt University, Berlin, Germany  
 Dr. Meiken Falke, Product Manager EDS on TEM, Bruker, Berlin  
 Dr. Ralf Terborg, Methodology Specialist, Bruker, Berlin

<http://www.microscopy-analysis.com/brukerwebinars>



think forward

EDS

Have additional questions? Please contact:

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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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Jason Heffelfinger (763-514-1021, [jason.r.heffelfinger@medtronic.com](mailto:jason.r.heffelfinger@medtronic.com))

or Kathy Hough (651-353-8458, [katiu@frontiernet.net](mailto:katiu@frontiernet.net)).

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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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**Reminder:** Membership in MMS runs from January through December. Have you paid your 2009 dues?

Please visit the MMS website, [www.MNmicroscopy.org](http://www.MNmicroscopy.org), for a fill-and-print pdf version of the membership form...

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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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Affiliation \_\_\_\_\_ Position \_\_\_\_\_

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