

# **EASTERN NEW YORK ASM/ HUDSON-MOHAWK TMS NEWSLETTER**

**September 2005**

## **September ASM Meeting**

**Tuesday September 13, 2005**

**Glen Sanders Mansion, 1 Glen Avenue, Scotia, NY**

### **Metallurgy in Space**

**Prof. Martin E. Glicksman, FASM**

Materials Science and Engineering Department,  
Rensselaer Polytechnic Institute

Dendrites form archetypal microstructures and pattern-forming events in many processes. As such, dendritic solidification assumes considerable technological importance from the perspective of process modeling for alloy improvements in directional freezing of near net-shape castings, continuous casting, ingot formation for non-ferrous alloys, welding, etc. Since the early 1980's it has been clearly recognized that gravity induces thermal and solutal convection in a freezing alloy that modifies terrestrial solidified metals and alloys. Low-earth orbit (LEO), first made accessible on a reasonably predictable schedule via the Space Shuttle, provided the long-duration microgravity environment required for freezing dendrites under pure diffusion control. Three successfully executed flights of the Isothermal Dendritic Growth Experiment (IDGE) will be described briefly: the first, launched in 1994 on the United States Microgravity Payload mission (USMP-2); the second, launched in March, 1996; and the most recent launched in November, 1997, aboard USMP-4. Each of these metallurgy-in-space experiments returned to Earth after about two weeks in LEO. They collectively yielded hundreds of solidification cycles providing a rich archive of dendrite images from which growth speeds and morphological details observed at various supercoolings, free of convection, were used to test theories of dendritic growth. These theories now form the basis of important solidification scaling laws for processing engineers, and provide benchmarks for computer simulations such as phase-field and sharp interface methods. The first-ever use of tele-operational control to command NASA experiments remotely from a university campus will also be described, although, sadly, future materials/metallurgy experimentations for the International Space Station remain very much in doubt.

**5:30 pm** Social Hour

**6:00 pm** Dinner

**Reservations:** Contact to Dana Levene at 395-7070 or [asmeasternny@yahoo.com](mailto:asmeasternny@yahoo.com) by Friday, Sept 9th  
with your dinner choice of:

Grilled Tuna, Chicken Dijon, or Vegetable Napoleon  
Dessert is a Chocolate layer cake.

Students - \$7.00; Retirees - \$10.00; Members - \$15.00

## **Upcoming October ASM Meeting**

### **Tour of Mechanicville-Halfmoon Hydroelectric Facility**

**Tuesday, October 11, 5 pm**

The Mechanicville-Halfmoon Hydroelectric Station, designed by General Electric engineer Charles Steinmetz, began operation in 1898. It is a 4.5-megawatt hydroelectric power plant that straddles a portion of the Hudson River about 18 miles north of Albany, N.Y., in Halfmoon.

## Note from ASM Chairman

Welcome to the 2005/2006 program for the Eastern New York Chapter of ASM International. First, I would like to extend my thanks to Ed Richey and the other officers who made last year such a great success. The highlight of last year's program was the ASM/TMS spring symposium, "Materials for Extreme Environments", details of which are included elsewhere in this newsletter. In addition, the chapter co-sponsored the first ever Capital District Materials Camp. These events serve to educate our current (and future) members about the latest in materials science and technology. I hope that we will again have your support in making these events a success.

Later this month, we will be moving and updating the chapter's website. The address will remain the same: <http://www.asm-easternny.org> but the content will be updated and now includes the presentations given at last year's symposium. As in previous years, we will be holding regular meetings to provide you with technical information, networking opportunities, and social interaction with your peers. We will also be hosting several plant tours, awarding scholarships, and presenting the Geisler Award. This year's committee will continue to work hard to maintain the chapter's history of excellent technical programming and I look forward to seeing you all there.

If you have any questions, comments, or ideas, please do not hesitate to contact me or any of the Chapter officers.

Jud Marte  
August 2005

## Calendar of Events

- September 13:** Metallurgy in Space,  
Prof. Martin E. Glicksman
- October 11:** Hydroelectric Facility Tour,  
Mechanicville
- November:** TMS Micrograph and Poster  
Contest at RPI
- December:** Partners Night
- January:** TMS Distinguished Career  
Award
- February 7:** Joint ASM-AWS Meeting
- March:** Geisler Award Night
- April:** ASM Meeting/Tour
- May:** ASM-TMS Spring Symposium

This newsletter and other chapter information can also be found on the

**ASM Chapter website:** [www.asm-easternny.org](http://www.asm-easternny.org)

Please send any newsletter announcements or suggestions to Luana Iorio at [iorio@asm-easternny.org](mailto:iorio@asm-easternny.org).

## ASM OFFICERS

Chairman: Jud Marte (GE GRC) 387-6417  
Vice Chairman: Rich DiDomizio (GE GRC) 387-4470  
Secretary: Luana Iorio (GE GRC) 387-6320  
Treasurer: George Swinler (KAPL) 395-5268

## ASM COMMITTEE

Programming: Dana Levene (KAPL)  
Education: PR Subramanian (GEGR)  
Public Relations: David Ferrill (KAPL)  
Membership: Jim Ruud (GEGR)  
Awards: Heather Mohr (KAPL)  
Student Affairs: Linda Schadler (RPI)  
Young Members: Sarah Lewis (RPI)  
Chapter Counsel Representative:  
Bernard Bewlay (GEGR)

Chairmen at-large:

Jack Westbrook (Brookline Technologies)  
Martin Glicksman (RPI)

## TMS OFFICERS

Chairman: Dan Lewis (GE GRC) 387-4539  
Vice Chairman: Will Heward (GE GRC) 387-6106  
Secretary: Tim Hanlon (GE GRC) 387-7149  
Treasurer: Seth Taylor (GE GRC) 387-4004  
Education: Kathleen Dunn (SUNY) 437-8686

## 2005 Spring Symposium Report

The 2005 ASM/TMS Spring Symposium continued our chapter's long tradition of technical interaction and education with "Materials for Extreme Environments." The symposium, co-sponsored by the Eastern New York chapter of ASM International and the Hudson-Mohawk chapter of TMS, is held every spring to provide opportunities for technical information exchange between professionals, to provide continuing education and to educate science and engineering students in Eastern New York.

This year, over 120 students and professionals attended the symposium held on May 23rd and 24th at GE's Global Research Center. Session topics included Materials characterization in 3D, Structural materials for high temperatures, Materials for space applications, and Materials by design. Invited speakers came from as far as Wisconsin, Florida, and Tennessee to talk about electron tomography, solid oxide fuel cells, materials in space reactors, carbon nanotubes, and nanocomposites.

After tours of GE's research facilities, a symposium dinner was held at the Glen Sanders Mansion. The dinner speaker was Matt Nordan of Lux Research, a company that advises corporations, startups, financial institutions, and governments on the impact of nanotechnology and related emerging technologies.

Planning for next year's symposium will begin later this year. If you are interested in getting involved, please contact Laurent Cretegy or Jud Marte.

## First Annual Capital District Materials Camp

By Daniel Lewis



Rising high school juniors and seniors got some hands-on experience in engineering during a four-day Capital District Materials Camp held earlier this summer at Global Research and RPI. The brand new curriculum was developed by local members of ASM and TMS.

The camp was divided into morning demonstrations and afternoon group projects. Demonstrations centered on sports, entertainment, and energy themes. During the group projects, students studied the mechanical response of a steel bike frame, the construction materials of a ski, how to make a steel drum, and dental materials used to fill teeth.

Demonstrations at RPI and GE Global Research focused on the crystalline and amorphous structure of metals, energy absorbing properties of polymeric foams, thermomechanical processing of metals, fatigue and tensile testing of materials, and energy conversion using solar cells, fuel cells, and wind turbines.

For the afternoon projects, students were divided into groups of four or five, and each had one or two mentors. Each project was designed so students could explore materials engineering using hands-on techniques.

Under the direction of Bill Carter (GE) and Ben Winkler (GE), the bike team used strain gauges to study the mechanical response of a steel frame under different riding conditions. They also performed mechanical testing to understand differences between composite bicycle frames and steel frames.

The steel drum team, led by Mike Henry (GE), Mike Gigliotti (GE) and assisted by Peter Hale (RPI-MRC) and Rebecca Casey (GE), first learned how steel drums are fabricated, and then used its newfound

knowledge to put notes into a 55-gallon steel drum. By studying the mechanical deformation of the drum and other metallic materials, the team deduced that the annealing step is critical to drum fabrication. Students also studied frequency shifts caused by geometry and deformation levels in metals.

Bill Hamm (KAPL), Nicole Lay (RPI), and Vance Shofner (Aquatic Development Group) led the ski team in its exploration of the mechanical properties of composite skis. Students measured the flexing modulus of different skis and prepared cross sections. They identified the different materials making up the ski, and the role each performed in improving the ski's performance. Students were then given similar construction materials and fabricated their own skis using the engineering principles learned.

Tim Hanlon (GE) and Anthony Ku (GE) led the dental materials team in studying materials used to create dental repairs. They also looked at the mechanical properties of teeth that had been donated by Dr. Hal Sossner. Students mechanically tested both unfilled teeth, and teeth with composite fillings, to observe the changes in strength under compressive loads. The group concluded, tongue-in-cheek, that natural teeth should be replaced with composite teeth because of their increased strength under compression.

The four-day camp concluded with a poster session and graduation ceremony at RPI. "Based on the parent and student comments, it was very clear that everyone appreciated the hard work by the TMS and ASM team in organizing the camp," noted Dan Lewis, one of the camp organizers.

Although there have been previous collaborations between the Hudson-Mohawk and Eastern NY chapters of TMS and ASM, nationally, this is the first time both organizations co-sponsored and collaborated on a Materials Camp event. Other events co-sponsored by the organizations include a spring symposium and dinner meetings.

Financial and personnel support was provided by the ASM Educational Foundation, TMS Foundation, Hudson-Mohawk TMS Chapter, Eastern NY ASM Chapter, GE Global Research, RPI, and Lockheed-Martin/KAPL.

The Capital District Materials Camp is planned to be an annual event for the local materials science community. If you would like to volunteer to assist with the organization and operation of the camp, or you would like to get additional information, please contact Dan Lewis, Sarah Lewis, Jud Marte, Laurent Cretegnny, or Cathy Jordan.

**RENSSELAER POLYTECHNIC INSTITUTE  
MATERIAL SCIENCE & ENGINEERING SEMINAR SERIES – Fall 2005**

| <b>Date / Place</b>                           | <b>Speaker / Affiliation</b>                                       | <b>Title</b>   |
|---|--|--|
| Sept. 15<br>Center for Biotech.<br>Auditorium | Samuel J. Palmisano<br>IBM Corporation                             | Conferral of Honorary Degree and Presidential Lecture<br>“Innovation and Leadership in the 21 <sup>st</sup> Century” |
| Sept. 22<br>CII-3051                          | Himanshu Jain<br>Lehigh University                                 | New Functionality in Glass from Novel Photoinduced Effects   |
| Sept. 29<br>CII-3051                          | Glenn Eisman<br>Center for Fuel Cell and<br>Hydrogen Research, RPI | Fuel Cells: Challenges and Research Opportunities  |
| Oct. 6<br>CII-3051                            | Setsuro Ito<br>Asahi Glass Co., Ltd, Japan                         | Application, Mechanical Property and Nano-structure of<br>Glass  |
| Oct. 11<br>DCC-324                            | Matthew Tirrell<br>UC Santa Barbara                                | ABB Distinguished Lecture<br>Peptide Materials Science   |
| Oct. 20<br>CII-3051                           | Carelyn Campbell<br>NIST/Metallurgy Division                       | Multicomponent Diffusion Data as a Key Input for<br>Computational Materials Design                                   |
| Oct. 27<br>CII-3051                           | Eric Cotts<br>SUNY Binghamton                                      | TBA  |
| Nov. 3<br>CII-3051                            | Jochen Schneider<br>RWTH Aachen, Germany                           | Protective Coatings: Materials Selection and Low<br>Temperature Synthesis  |
| Nov. 10<br>CII-3051                           | Kevin Robbie<br>Queens University                                  | Nanostructured Thin Films with Glancing Angle Deposition   |
| Nov. 17<br>CII-3051                           | Gregory McKenna<br>Texas Tech University                           | Material Behavior at the Nanoscale: Perspectives on<br>Thermodynamic and Dynamic Transitions                         |
| Dec. 1<br>CII-3051                            | John Turner<br>NREL  | Materials Perspectives in the Photo-electrolysis of Water for<br>Hydrogen Generation                                 |
| Dec. 8<br>CII-3051                            | Hanadi Sleiman<br>McGill University                                | Self-assembly of DNA and Biologically Enabled Polymers   |

All seminars are scheduled for 4:00pm with the exception of the Presidential Lecture, Sept. 15 at 3:30pm

## First Annual Capital District Materials Camp Student Activities

In addition to exercising their minds, some students got the chance to exercise their muscles as they shaped a steel drum.

The materials camp students use a hair-dryer to spin their newly constructed wind turbine while they learn about magnetic materials.



Nicole Lay (RPI) and Tim Hanlon (GE) read the output from a Charpy impact test while a student looks on during one of the materials camp afternoon projects.