**SPONSOR:** Prof. Linda S. Schadler
Rensselaer Polytechnic Institute

**TOPIC:** The Power of the Small: Why Nanomaterials are Unique

Nanostructuring of materials leads to dramatic changes in properties and unique combinations of properties not observed for materials with larger scale structures. While this phenomenon has been observed for centuries, it is only recently that we have had the understanding and control to significantly broaden the application space. As a result, nanomaterials are being developed for use in sustainable energy, healthcare, clean water, and other problems critical to society. This talk will introduce nanomaterials and highlight: how and why properties change with size, current applications of nanomaterials, and the potential use of nanomaterials to solve some of the world’s global challenges including the more efficient use of energy. Examples will focus on polymer nanocomposites, but will draw from across the field of nanotechnology.

Dr. Linda S. Schadler joined Rensselaer in 1996 and is currently the Russell Sage Professor of Materials Science and Engineering and the Associate Dean for Academic Affairs in the School of Engineering. She graduated from Cornell University in 1985 with a B.S. in materials science and engineering and received a PhD in materials science and engineering in 1990 from the University of Pennsylvania. After two years of post-doctoral work at IBM Yorktown Heights, Schadler served as a faculty member at Drexel University in Philadelphia, PA before coming to Rensselaer.

Active in materials research for 25 years, Schadler is an experimentalist and her research interests include the mechanical, optical, and electrical behavior of nanofilled polymer composites.

Linda has co-authored more than 140 journal publications, several book chapters, and one book. Linda received a National Science Foundation National Young Investigator award, the ASM International Bradley Stoughton Award for Teaching, and is an ASM International Fellow.

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**Meeting Cancellation Notification**
In the event of cancellation of a meeting due to inclement weather, we will broadcast the news as part of KYW News radio’s (1060AM) Storm Center Service. ASM cancellations will be specifically announced when KYW airs community cancellations at :20 and :50 past each hour during the afternoon of the day of the meeting. ASM’s name will be specifically mentioned, so listen for the name rather than an organization number as is used for schools.

**Technical Chairperson:** Ron Smith, S-Bond Technologies, Inc.

**Meeting Sponsors:** Laboratory Testing Inc., and Robert Wooler Inc.
Chairperson's Message

January 2015

Happy 2015! I hope everyone had an enjoyable and safe holiday season. With all the festivities behind us, it's time for Sauveur Award Night this month.

January's speaker is Professor Linda S. Schadler from Rensselaer Polytechnic Institute. Professor Schadler's talk will center around why nanomaterials are unique.

Last month was Young Members Night at Drexel University. I would like to thank Dr. Steven May, Assistant Professor, Material Science & Engineering, for presenting his talk on high quality complex oxide films can serve as model systems for materials critical for applications in energy and electronics. Plus, we were treated to two brief discussions by students about their work. A special thanks to Technical Chair, Brian Gorney, and, as always, our chapter thanks the Drexel University organization, including professors and students, for all the accommodations they provide for a really wonderful evening!

The MEI course, Metallurgy for the Non-Metallurgist, will begin Tuesday evenings starting February 10. So, if you are interested, please complete the registration form on page 4.

Finally, I am really looking forward to 2015 to be a great year for bringing in new volunteers and expanding our reach in education.

Best regards,
Jerri Jefferies
2014-2015 Chapter Chairperson

Welcome New Members...

Alan S. Fabiszewski  Corrosion Testing Labs., Inc.
Ron Dise  Penn Engineering
Aliaga Karina  Benedicine Academy
Henry Rowan  Inductotherm Group
Patrick Mason, Jr.  Element Materials Technology
Max Mindel

To ensure you receive your E-newsletter and yearbook: Please update your membership listing or your company affiliation listing. You can do this by calling Membership Service, ASM International at 1-800-336-5152 or using the ASMI website at www.asminternational.org. This will permanently update your information. We depend on ASM International to receive our updated Chapter roster.

SPEAKER: PROF. LINDA S. SCHADLER
(continued from page 1)

Linda is a former member of the National Materials Advisory Board and a current member of ASM International's Board of Trustees. She was the education and outreach coordinator for the National Science Foundation's Center "Directed Assembly of Nanostructures" headquartered at Rensselaer. As part of that position she was one of the executive producers for the "Molecularium" - a new style of planetarium show that takes the audience (primarily students in K-5) on a magical musical adventure into the world of atoms and molecules with the help of oxy, hydro and hydra (www.molecularium.com). Children learn that "everything is made of atoms and molecules" and about the three states of matter "solids slow, liquids flow, gas is fast!"
3-D Printing Presented at Joint ASM-ASME Meeting

A joint ASM-ASME meeting was held at Villanova University on Tuesday November 11th, 2014 - Veterans Day. Professor Brian George from the ASME Department at Philadelphia University was in charge of running the meeting that was attended by approximately 50 people; 40 from ASME and 10 from ASM. Because of the subject matter, ASME was kind enough to ask us to join them in this meeting. The two speakers were from the Solid Concepts Company, which is headquartered in Texas, but has about a half a dozen locations throughout the US. They spoke about 3D printing of metal parts. This is accomplished by putting down a layer of metal powder on a substrate and then directing a laser to fuse the metal at the desired locations that form the piece. The layer is roughly one third of the thickness of a human hair.

Once the desired layer that forms the piece is fused another layer is put down and the process is repeated. The end product can be several inches or even several feet in size and thickness. The "production" can take a half an hour or as many as 10 hours. The finished product is similar to a powder metal product in strength and size with about 90% of the strength of the base metal.

However, the complexity of the piece can be much greater and parts can double back on themselves in a way that is not possible with a compressed part. The setup for a complex part can be extremely expensive, sometimes exceeding half a million dollars. This means that it is not possible for this process to compete on price with conventional processes. However, the software can be modified in a short time. To produce a part for a research project that may require only a few pieces may require a month for design and preparation of dies in a conventional (machined) process, while a 3D printed part may be done in a week. Changes to a design, say a dimension, can be accomplished in minutes while it may require starting over from scratch on a machined die for a powder metal part. Also, the dimensions from 3D printing can be extremely precise.

ASME does things differently from the way we run our meetings. Dinner was pizza and soda that was brought in. The price for dinner was $10, and there was a jar to put your money in as you went through the line. Even though ASM was asked to participate six months before the meeting, the date, time, and venue were not finalized until about 4 weeks before the meeting. We were not able to get a notice into our October newsletter, and the meeting took place on the day our November newsletter was sent out. We did make announcements at two earlier meetings and we sent out a broadcast email about three weeks before the November 11th date. The speaker's had about a one hour formal presentation with many parts and dies that were passed through the audience and many visuals of new layers being put down and lasers racing around the new layer to fuse the appropriate powder to the parts. However, about a quarter of the way into the presentation one of the speakers said we should feel free to ask questions during the presentation. As a result, there was a steady stream of questions and answers that used up all of the remaining time in the meeting.

If you google 3-D printing you can probably find some examples of how the process works. GE has a very good display of this technology on their website. ASM would like to say thank you to Professor George from ASME for allowing us to participate in this meeting.

- Contributed by Jim Watters, DVUA

This Month’s E-Newsletter Sponsored by:

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MEI Course: Metallurgy for the Non-Metallurgist


When: Tuesday evenings, February 10, 2015 through May 19, 2015 -- 6:30 to 9:00 PM
Where: Laboratory Testing, Inc., 2331 Topaz Drive, Hatfield, PA 19440
Cost: $450.00 includes the 15 written lessons, the course carrying 2.8 CEU’s and instructed by qualified personnel. Each student, after the first one from the same company, will cost $400.00.

**New this year:** You can order the material text in the traditional binder or on a CD. Please choose when you register.

Who should attend:
- Anyone who needs a working understanding of metals and their applications.
- Those with no previous training in metallurgy
- Technical, laboratory, and sales personnel
- Engineers from other disciplines
- Management and administrative staff
- Non-technical support staff
- Anyone studying, or intending to study, for ASNT Level III or AWS CWI

Course overview:
- Presents a history of metals-providing background on the origins of various metals.
- Provides an explanation of physical characteristics of metals, including the reason that metals behave differently than such nonmetals as plastics, wood, glass, etc.
- Metals represent a wide range of densities, conductivity and other physical properties.
- Explains how and why different metals are selected for specific environmental purposes including resistance to wear, to corrosion, to heat, to cold, to repeated stress, to impact, etc.
- Describes how much stronger metals can become for various applications by heat treatment.
- Describes how mechanical properties are measured including descriptions of testing procedures for tensile, impact, fatigue, etc.
- Describes how metals are alloyed and formed to achieve desired mechanical properties-including comparisons between various forming processes . including casting, forging, extrusion, rolling, etc.
- Provides basic knowledge on the heat treatment of carbon and alloy steels and some nonferrous alloys to achieve specific property levels. This includes discussion about how alloy additions affect the heat treatability of steels and other alloy bases.
- Describes other methods of increasing strength by cold working.
- Provides information about welding and other joining processes in use today.
- Discusses why metals corrode and how metals can become more resistant to corrosion with coatings, alloying, electrical methods, and combinations of these along with a discussion about different stainless steel grades.

For more information contact Bob Rich at 215 -771-3647 or email robert789@comcast.net

Return the lower portion of this form, with a check payable to “Philadelphia ASMI” to Bob Rich at 2233 Oakfield Road, Warrington, PA 18976 by February 1, 2015.

Name: ________________________________________________________________________
E-mail address: ________________________________________________________________________
Check one: Binder      CD
Work phone: ___________________________  Company Address____________________________________________________________________________________________________
E-mail address: ________________________________________________________________________
Your Position: ___________________________  ASM Member # (If Ap.) ____________________
Home phone and address: ______________________________________________________________________________________________
ASM Liberty Bell Chapter Scholarships

In the academic year of 2015-2016, the Philadelphia Liberty Bell Chapter will provide three scholarships ($1500.00 each) to college engineering students who intend to pursue a career in Materials Science. All eligible students are encouraged to apply. One full-page essay (single spaced, Arial font, with font size between 11 and 12), stating his/her commitment to the Materials Science profession, will be required. Please contact Mr. Kenneth Moyer at Magna-Tech P/M Labs for the application form and details (e-mail: moyer@snip.net). The deadline for application is March 1, 2015.

Eligibility of Applicants:

a) All students pursuing a diploma program, an Associates Degree or Baccalaureate Degree at a Philadelphia area educational institution in Metallurgy and/or Materials Science are eligible for scholarship consideration. Philadelphia area educational institutions are defined as those physically located in Philadelphia, Montgomery, Bucks, Delaware, and Chester Counties in Pennsylvania; and Burlington, Camden, and Gloucester Counties in New Jersey.

b) The children of Philadelphia Chapter ASM Members who are pursuing a diploma program, an Associates Degree, or a Baccalaureate Degree in Metallurgy and/or Materials Science at any accredited institution, including those outside of the defined geographical area, also are eligible for consideration.

c) Students whose residence is established in the counties noted in Section 3(a), who are pursuing a diploma program, an Associates Degree, or a Baccalaureate Degree in Metallurgy and/or Materials Science at any accredited institution, including those outside of the defined geographical area, also are eligible for consideration.

ASM INTERNATIONAL PHILADELPHIA CHAPTER UNDERGRADUATE SCHOLARSHIP APPLICATION (Academic Year of 2014-2015)

Type or print neatly in black or blue ink -

1. (circle one) Miss Mrs. Ms. Mr. Name: ________________________________________________________________

Home Address: _______________________________________________________________________________________

City/State/Zip Code: __________________________________________________ Home Phone Number: (          )________________________

Parent an ASM - Philadelphia Chapter - Member? Yes_____ No______ If “Yes”, Name: ___________________________________

2. College or University: ___________________________________________________________

Campus Address: _______________________________________________________________________________________

City/State/Zip Code: __________________________________________ Campus Phone Number: (         )_________________________

Expected Graduation Date and Degree: _____________________________ Major (including option if applicable): _______________________

3. Cumulative grade point average and basis (e.g. 3.5/4.0): ______________________________

4. Employment experience (attach resume if applicable): _________________________________________________________________________

5. **NOTE - A personal essay (on separate sheet) describing special achievements, honors, and recognitions, background of interest in metallurgy/materials, interdisciplinary skills/interest and financial need. Essay should be no longer than two typewritten pages. A copy of resume should be included in the application.

6. Name: __________________________________ Date: _____________________

7. DEADLINE: Applications must be received by March 1, 2015. Send application and attachments as a Word or Pdf file to:
Mr. Kenneth Moyer, ASM Scholarship Chairman, Magna-Tech P/M Labs, 4 Greenbriar Lane, Cinnaminson, NJ 08077, Phone: 856-786-9061
Email: moyer@snip.net
Solar Atmospheres Vacuum Heat Treats Ti Manifold for Orion Spacecraft

NASA’s new spacecraft Orion launched successfully from Cape Canaveral on Friday, Dec. 5, 2014 and completed its first test flight. One of the tricky parts of launching humans into space is deciding what to do if something goes wrong while riding on top of a controlled explosion for nine minutes. New to all future “human present” rockets will be the Launch Abort System (LAS). This critical part of the safety system was vacuum heat treated by Solar Atmospheres of Western PA. The large manifold housing made from 6Al 4V titanium is designed to rapidly propel astronauts away from the main rocket in case of a catastrophic explosion or any other unexpected event. Once fired, the LAS will accelerate the astronauts away from the main rocket at accelerations up to 10 to 15 g’s.

Michael Johnson, Sales Manager stated "The welded component needed to be homogenously treated to insure peak performance in the event the LAS would be needed. Precise temperature monitoring of the part and uniformity of the furnace was the easy part, while minimizing distortion, and avoiding eutectics with the fixturing materials used, were ultimately the real challenge. At the end of the day, both Solar and its customer had a process that proved to be successful on the prototype and the three additional manifolds that followed."

Solar Atmospheres of Western PA is very proud knowing that they contributed to the success of the Orion Mission.

- Contributed by Lori Atkinson, Solar Atmospheres, Inc.

Upcoming Events... 

2-10 thru 5-19 MEI Course: Metallurgy for the Non-Metallurgist. Classes presented at LTI.
2-19-15 Thursday Continuing Education Night- Topic: Conservation & Restoration of Historic Metal Sculptures, Williamson Banquet, Willow Grove, PA
4-16-15 Thursday Sustaining Members Night - Sustaining Members Mini Expo/Annual Charles F. Burns Poster Contest, Williamson Banquet, Willow Grove, PA

For more info about the ASM Liberty Bell Chapter...
Contact Chapter Chairperson Jerri Jefferies at 440-570-4381 or email jerri.jefferies@struers.com