ASM Pittsburgh Golden Triangle Chapter Hosts Its 27th Annual Student Poster Competition at the 2013 Young Members’ Night

February 21, 2013
Young Member’s Night
Guest Speaker: Prof. Gary Shiflet, UVA
Topic: “Physical Metallurgy and the Ages of Civilization”

One hundred attendees packed the University Club in Oakland for the ASM Pittsburgh Golden Triangle Chapter’s annual Young Members’ Night on February 21, 2013. The evening featured a poster competition for the undergraduate and graduate students of the University of Pittsburgh (UPitt), Carnegie Melon University (CMU) and Robert Morris University (RMU); an awards presentation ceremony; a student speaker; an invited speaker; and an opportunity for students to network with members of the materials community and professionals from local industries.

The poster competition was judged by five volunteers from local companies including Gary Bray and Jennifer Giocondi from Alcoa Technical Center, Paul Ohodnicki from DOE’s National Energy Technology Laboratory, Bryan Webler from the Bettis Atomic Power Laboratory, and Sumin Zhu from Vesuvius. About 52 students from UPitt, CMU and RMU participated in the event. A wide range of different technical topics and themes in materials science and engineering were addressed by the various student posters that were presented. There were six posters presented in the undergraduate category and twelve posters presented in the graduate category. The awards of the poster competition winners were presented by the guest speaker for the evening, Prof. Gary Shiflet of the University of Virginia.

The winners of the poster competition were:
**Undergraduate Student Category:**
1st Place: Elise Hall (CMU) - $150
2nd Place: Marvin Alim (CMU) - $125
3rd Place: Brandon Davies-Sekle (UPitt) - $100

**Graduate Student Category:**
1st Place: Sutatch Rataphan (CMU) - $300
2nd Place: Reetu Pokharel (CMU) - $200
3rd Place: Evan Lieberman (CMU) and Sudarshan Narayana (CMU) - $125

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Young Members’ Night 2013

In addition to the poster competition awards, several other awards that were instituted by the ASM Pittsburgh Chapter were presented on this evening to recognize the contributions made by students at UPitt, CMU and RMU. Allen Hutt, Student Development Chair for the Pittsburgh Chapter, presented the two Past Chairpersons Educational Assistance Scholarship (PCEAS) awards of $500 each to Madeline Cramer from CMU for PCEAS Junior award and Catherine Groschner from CMU for the PCEAS Sophomore award.

Outstanding College Seniors Awards of $500 each were presented by their faculty representatives from their respective universities to: Timothy Hoye from UPitt, Brooke Gladstone from CMU, and Charles Mura from RMU.

The Chapter’s Outstanding Young Member Award was awarded to Sumin Zhu of Vesuvius, the 2012-13 treasurer of the chapter.

Michael Helminiak, student speaker from the University of Pittsburgh, delivered the dinner presentation on “Failure Mechanisms of Thermal Barrier Coatings.” Helminiak explained the continued need for better thermal resistance as power generation and propulsion applications continue to operate at higher temperatures. He reviewed his research into plasma-spray top coatings and the different failure mechanisms associated with coatings ranging in thickness from 100 – 1425 μm.

Professor Gary J. Shiflet, guest speaker from the University of Virginia’s Department of Materials Science and Engineering, then took the audience on an expedition through time presenting the metallurgical milestones associated with the development of various cultures from ancient times to present day.

Dr. Shiflet began with the Stone Age and showed increasing progress on the stress-strain curve as some of the “seven metals of antiquity” progressed through the Bronze Age and the Iron Age. He highlighted processes such as solid state diffusion which allowed the intricate artwork that incorporated granulation—a technique that was lost for centuries until 1934—and alloying, the fundamental underpinning of the Bronze Age, which ended around 1200 BCE for reasons that remain speculative.

Continued on page 4
May Chapter Meeting Combines Past Chairs Night and the Andrew Carnegie Lecture

Thursday, May 16, 2013

Location: Double Tree by Hilton
105 Double Tree Drive, Pittsburgh

Guest Speaker: Dr. Anthony Rollett, Carnegie Mellon University


Please make your plans now to join us for Past Chairs Night, Thursday, May 16. Our Andrew Carnegie Lecturer for this evening is Anthony Rollett, a former past chair who has contributed much to the ASM Pittsburgh Chapter for several years.

Tony is a distinguished teacher, scholar and researcher who is internationally recognized as one of the pioneers of computer applications for research in materials science.

Continued on page 8

Register Today for the May Chapter Meeting

For online registration, visit the Pittsburgh chapter website at: asminternational.org/portal/site/Pittsburgh.

Contact: Mary Pam Kilgore
Phone: 412-854-4827
E-mail: mpkilgore@comcast.net
In talking of the Iron Age, Dr. Shiflet described the six-ton Delhi Iron Pillar, a 1600-year-old wrought iron column that does not rust due to its high phosphorus content, and emphasized the related developments in pyrotechnology that would lead to our modern age of steelmaking and alloys. He included personal anecdotes from his adventures spending three days with a Japanese Samurai Sword master, and the swords that have been called the “greatest single piece of metallurgy” in history.

Dr. Shiflet’s engaging presentation combined with the large number of interested and talented students in attendance at Young Members’ Night evokes the question as to the significant developments in materials that we may look forward to seeing in the coming years. Dr. Shiflet’s presentation certainly reinforced how societies benefit from advances in materials science and engineering, even if the magnitude of those contributions is not immediately recognized by the individuals making the discoveries.

As always, Young Members Night wouldn’t be possible without the dedicated help of a number of young student volunteers from the local universities. The organizing committee prepared for several months prior to the event and did a great job of collecting the sponsorships from the local industries and in the planning logistics for the event.

The student committee members included: Carolyn Norwood (student chair), Lily Nguyen, and Marvin Alim from CMU; Ria Patel and Roger Walker II from UPitt; and Nicholas Depczymski and Benjamin Smith from RMU. These students were guided and supported by Dharma Maddala (Chair for the YMN), Phil Smith (Chapter Chair), and Mary Pam Kilgore.
Lastly, this important chapter event would not be possible without the generous sponsorship from the local industries. The YMN committee would like to thank American Stress Technologies, Carpenter Latrobe Specialty Metals, Product Evaluation Systems, Elliott Group, U.S. Steel, ATI Powder Metals, Matco, and Vesuvius for being Table Sponsors; Perryman and Ellwood Group Incorporated for being Food Tray Sponsors; Westmoreland Mechanical Testing and Research Inc. and Kalumetals for their sponsorship; and Alcoa Technical Center, Air Products, TMS, U.S. Steel, American Stress Technologies, Carpenter Latrobe Specialty Metals, Arcva, and Robert Dax for their contributions toward door prizes.

Young Members’ Night 2013 — Students are introduced to materials professionals and industry leaders at this annual event.

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### ASM Pittsburgh Golden Triangle Chapter

**Proposed Monthly Meeting Schedule 2012-2013**

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<th>Theme</th>
<th>Topic</th>
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<td>11/12</td>
<td>Joint meeting with SME</td>
<td>Smart Materials and Devices</td>
<td>Dr. Pradeep Fulay, Associate Dean for Research, Statler College of Engineering and Mineral Resources, WVU</td>
<td>Sewell Center RMU Moon Township</td>
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<tr>
<td>12/13</td>
<td>Pittsburgh Night Lecture</td>
<td>Bottom-Up Engineering for Building Complex Tissues Using Protein Nanofibers</td>
<td>Adam W. Feinberg, PhD Dept. of Biomedical Engg., Dept of Materials Science &amp; Engrg., Carnegie Mellon Univ.</td>
<td>Sheraton Station Square, Pittsburgh</td>
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<td>1/17</td>
<td>Joint Meeting with American Society for Quality (ASQ)</td>
<td>Materials for Oil and Gas Drilling Industry</td>
<td>William Copeland, Drilling Engineer III, Equitable Gas</td>
<td>Alcoa Corporate Center, Pittsburgh</td>
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<td>2/21</td>
<td>Young Members Night</td>
<td>Physical Metallurgy and the Ages of Civilization</td>
<td>Prof. Gary J. Shiflet, Dept. of MSE, University of VA</td>
<td>University Club 123 University Place Pittsburgh</td>
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<td>3/21</td>
<td>Sustaining Members Night – Joint Meeting with SME</td>
<td>Materials Technology in Sensor and Process Control Equipment in Fossil Fuel-Based Power Generation</td>
<td>Dr. Paul Ohodnicki, National Energy Technology Laboratory</td>
<td>Sewell Center RMU Moon Township</td>
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<td>4/18</td>
<td>National Officers Night</td>
<td>Polymer Nanocomposites: To Improve Properties Globally, Think Locally</td>
<td>Dr. Linda Schadler, Prof. MSE, Rensselaer Polytechnic Institute</td>
<td>Hilton Garden Inn, Forbes Avenue Oakland</td>
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<tr>
<td>5/16</td>
<td>Andrew Carnegie Lecture, E.C. Bain Award, and Past Chairs Night</td>
<td>Why Every Materials Professional Should Know How Computation Can Help</td>
<td>Dr. Anthony Rollett, Prof. of Materials Science &amp; Engineering, Carnegie Mellon University</td>
<td>Double Tree by Hilton 105 Double Tree Drive, Pittsburgh</td>
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<tr>
<td>6/7</td>
<td>Social Event – Riverboat Dinner Cruise</td>
<td>An Evening to Remember — With family and friends</td>
<td>Two-hour dinner cruise 7:00—9:00 p.m.</td>
<td>Gateway Clipper Cruises</td>
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### Chapter Volunteers Participate in National Engineering Week — February 23, 2013

On Saturday, February 23, ASM Pittsburgh Golden Triangle Chapter volunteers demonstrated phase change, magnetism, thermal expansion, and density to young children at Carnegie Science Center during National Engineer’s Week. In an event that drew more than 1,000 children, ASM’s volunteers were busy all day.

A new demonstration introduced this year was color changing pens by Steve Fyfitch. Kids were certainly entertained with the hand warmers that are reversible and the brass ball and ring experiment that uses a propane torch to demonstrate the effect of temperature on size. Even the small kids enjoyed guessing which of the density blocks would float in water.

Situated on the second floor, the ASM table was well positioned to attract the attention of many future engineers. Special thanks to Bob Dax, Steve Fyfitch, Sarup Chopra, Gary Bray, and Nate Eisinger for volunteering at this wonderful event.

![Hot Snapz hand warmers which demonstrate a reversible phase change and brass thermal expansion ball and loop.](image)
2013-14 Chapter Officer Nominations

The Nominating Committee has submitted the following names for Chapter Officers and the Chapter Executive Committee for the 2013-2014 chapter year:

Officers:

Chairman: Priyadarshan Manohar, Robert Morris University
Vice-Chairman: Sumin Zhu, Vesuvius
Treasurer: Dharma Maddala, Alcoa
Secretary: F. Robert Dax, Retired

“Any member of the Chapter may submit other nominations by presenting to the Secretary, no later than fifteen (15) days after the May meeting, a written petition signed by at least twenty (20) members in good standing. Any candidate so nominated must give consent to serve in case of election before the fifteen-day limit has expired.

Upon receipt of such request, the Secretary shall have proper ballots mailed to every Chapter member. Those ballots must be mailed to the Secretary postmarked no later than midnight, June 25 in order to be counted. The Secretary shall report the results of the election in July. However, if there are no other nominations than those made by the Nominating Committee within the prescribed fifteen-day period, no ballot shall be taken and the Secretary shall certify the election of the nominations at the September Chapter Meeting.”

An Evening to Remember — Gateway Clipper Dinner Cruise — June 7

The ASM Pittsburgh Chapter has organized a two-hour dinner cruise with Gateway Clipper on Friday evening, June 7, 2013 from 7:00 - 9:00 p.m. ASM members, spouses, family and friends are welcome to join this event! Those interested in joining this fun, exciting social event need to act quickly as the deadline is Thursday, May 9. Please send checks payable to ASM Pittsburgh Chapter to the treasurer, Sumin Zhu, 103 Elizabeth Lane, Pittsburgh, PA 15237. Questions? Please contact Sumin Zhu at Sumin.Zhu@US.vesuvius.com.

Prices: Member $25 and one guest $25. Additional guests are $35 per person.

Retirees, Children, Students are $15 each. Reserve your spot TODAY!
Past Chairs Night, May 16—Anthony Rollett Andrew Carnegie Lecturer

Dr. Rollett has been a Professor of Materials Science & Engineering at Carnegie Mellon University since 1995 and was the Department Head 1995 - 2000. Previously, he worked for the University of California at the Los Alamos National Laboratory (1979 - 2005). He spent ten years in management with five years as a Group Leader (and then Deputy Division Director) at Los Alamos, followed by five years as Department Head at CMU (1995-2000).

He has a research group of about ten students. The main focus of his research is on the measurement and computational prediction of microstructural evolution especially in three dimensions.

**Abstract:**

Computation is an off-putting term for most people, even materials professionals. Really all it means, however, is using a computer to help with calculations. So the aim of this presentation is to convince you, as a materials professional, that computation is a useful aid to your work. For most practical purposes, the calculations that you need are performed inside a software package that you buy or rent. There are too many packages and application areas to provide a comprehensive overview. Instead, we will discuss some key examples and proceed from more general cases to more specific examples of current research.

Thermodynamics is extremely useful for predicting what phases one expects to have under given conditions of temperature, pressure and composition; the basic principles behind the computation will be reviewed, along with practical examples of why it is so useful in all kinds of materials processing. Many manufacturing processes involve deformation such as extrusion and forging. Again, simulation of the process is readily performed with a variety of commercial software packages and examples will be given. Part of the input to such simulations is information about the stress-strain behavior of the material(s) and a brief illustration will be given of the research required to provide such input. Finally, one often would like to predict how microstructure will evolve during annealing and examples will be given of how one can compute this. Finally, it is important to understand the spectrum of materials properties and to be aware that some materials properties remain very challenging to predict, e.g. stress corrosion cracking, and are not suitable candidates for computation.
March Chapter Meeting Report Summary

March 21, 2013

Guest Speaker: Dr. Paul Ohodnicki, Materials Scientist, Chemistry and Surface Science Division, National Energy Technology Laboratory


Coal gasification, and other fossil fuel technology, has enormous potential both for power generation and the separation of constituent gases for chemicals. To derive maximum benefit, however, requires more efficient downstream use of the complex gases which, in turn, requires process control relying on sensors that are sensitive, selective, and stable in the high-temperature gas streams. Dr. Paul Ohodnicki and researchers at the National Energy Technology Laboratory (NETL) have been making progress towards prototype development of such sensors as well as gaining fundamental understanding of phenomena associated with materials from which the thin films are constructed. Dr. Ohodnicki presented the state of the technology to a joint meeting with the Society of Manufacturing Engineers at Robert Morris University for the March Chapter Meeting.

Dr. Paul Ohodnicki joined the NETL in 2010 supporting the Department of Energy’s Office of Fossil Energy, working in federal project management and research and development and currently leads a project identifying and developing sensing materials for fossil-energy-based power generation. Previously, he worked for PPG in new product development involving large area thin films for energy efficiency applications. He holds a Ph.D. from Carnegie Mellon University and a dual degree in Engineering Physics and Economics from the University of Pittsburgh.

In the implementation scenario, thin film materials are responsible for generating the signal which affects the control processes that manage the gas streams and these materials must be capable of withstanding the demands of high temperatures and pressures in corrosive environments that may contain reducing or oxidizing atmospheres. While the fundamentals of the chemi-resistive approach to sensor construction is well understood, the lesser-known optical properties of thin film sensors are a novel area of interest—for example, the changes in refractive index or optical absorption of a thin film sensor as a response to pressure or temperature. The optical approach also holds promise insomuch as the conventional chemi-resistive sensors are not suitable for use at the higher temperatures experienced by the gas streams of solid oxide fuel cells, advanced boiler systems, and gas turbines.

Dr. Ohodnicki found that above 500°C, the tin dioxide particles common in chemi-resistive sensors irreversibly populate the thin films with a coarser formation of tin-enriched nanoparticles. For the higher temperature ranges desired, a different material would be required. Titanium dioxide was investigated, as it would not be reduced up to temperatures of 700°C. However, when exposed to a cycle of air, 4% hydrogen, and air again at high temperature, reversibility was not achieved. When gold nanoparticles were introduced, they arranged themselves in a specific crystallographic orientation at defects in the titanium oxide. Now, the optical transmission response was reversible to about 850°C.

This led Dr. Ohodnicki to explore the addition of gold to SiO₂, resulting in a real-time stable, reversible response when subjected to the air-hydrogen-air cycle at 800°C, a temperature associated with fuel cells. Moving into the second year of research, Au/SiO₂ coated optical fiber sensors (in contrast to planar films) will be examined, with a focus on stability of the silica-based optical fibers at high temperatures.
April 18, 2013
Dr. Linda S. Schadler
National Officers Night
Topic: “Polymer Nanocomposites: The Reality Beyond the Hype”

Nanotubes still haven’t delivered the “space elevator” nor have they “saved the world,” as some had promised, but they have become an indelible part of the materials landscape by providing new avenues to improve existing technologies. This was the message delivered by Dr. Linda S. Schadler at National Officers Night, April 18, 2013, at the Hilton Garden Inn, Pittsburgh University Place.

The presentation commenced with an overview of activities at Materials Park, where ASM is celebrating its centennial anniversary. Dr. Schadler then explored two areas where the nanotechnology has short term impact. The first was in the area of light emitting diodes (LEDs) which addressed an aspect of their construction which differed from that provided by Dr. Davis at the September 20, 2012 meeting. The goal was to improve the refractive index of the polymer housing above the LED and thereby the emitted light.

Initial experiments were performed with TiO₂ and it was possible to achieve the goal of particles that looked like polymers with few long chains and many short chains grafted onto the silicone. While it was recognized that this substance was photoactive, it allowed the development of “phase diagrams” which could be extended to a ZrO₂/silicone nano-composite. Testing of the aging properties of this nano-composite is in progress.

Dr. Schadler challenged the attendees with questions as she introduced a second application for the electrical insulation between stator bars in motors. While particles at the micron level are incapable of penetrating the tapes used on the windings, nanoparticles can, and these are being explored to increase the mechanical durability of the assemblies while simultaneously improving the electrical breakdown characteristics. The upshot of the discussion was that the interface in the nano-composite is critical to controlling properties and to add functionality.

Dr. Schadler has had an active career with ASM and is an ASM International Fellow. She is the Russell Sage Professor of Materials Science and Engineering and the Associate Dean for Academic Affairs in the Rensselaer Polytechnic Institute College of Engineering. She holds a B. S. in Materials Science and Engineering from Cornell University and an MSE and Ph.D. from the University of Pennsylvania.

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Letter from the Chair

As we near the end of our 2012-2013 year, I think back on our accomplishments. We started the year off with a lovely Spouses Night meeting at the Borelli-Edwards Galleries, held joint meetings with SME and ASQ, and sponsored and organized a two-day Mini Materials Camp at the MS&T Conference for over 400 students. We did such a fine job organizing the mini camp, AISTech asked us to help organize a Mini Materials Camp at the AISTech 2013 Conference to be held at the David L. Lawrence Convention Center May 5-8, 2013. The one-day mini camp will take place on May 7.

We sponsored an outstanding Young Members Night event involving three universities where outstanding students were awarded monetary prizes, and the students participated in a poster competition. Our April meeting featured our National Officer, Dr. Linda Schadler. My personal thanks to all of you for an outstanding job.

But...we’re not done yet! We still have an action-packed meeting scheduled for May. This year we are holding the “Past Chairs Night” celebration at our May meeting to allow our past chairs to partake in the Andrew Carnegie Lecture and observe the awarding of the E. C. Bain Award. The Andrew Carnegie Lecture speaker is Anthony Rollett, a past chair himself.

In addition, the Meetings Committee has planned a Gateway Clipper River Board Cruise for our social event on June 7. There is a tight deadline, so if you are interested in attending, please act quickly and register by the deadline. See more information on page 7.

My thanks and congratulations to the officers, executive committee members and all that helped make this a successful year.

Philip E. Smith
2012-13 Chair

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New Chapter Benefit: PDH Certificates For Attending Regular Meetings

If you are a professional engineer or hold certifications that require your expanding your knowledge, don’t forget you can now request documentation for attending any of the monthly chapter meetings. Each meeting will earn you one (1) Professional Development Hour (PDH).

In addition to the PDH and the knowledge gained from the excellent speakers and presentations, you’ll benefit from the opportunity to network with colleagues from across the materials industries.

Our thanks to Mark Sindelar at West Virginia University for organizing the program for ASM Pittsburgh Golden Triangle members. For more information, please contact Mark.Sindelar@mail.wvu.edu.
Thank you to all our Sustaining Member Companies

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