February Meeting Notice: Young Members’ Night

Day/Date: February 16th, 2017
Location: The University Club, University of Pittsburgh
Address: 123 University Place, Pittsburgh, PA 15260
Time: 05:30 PM – 09:00 PM
Invited Speaker: Richard J. Lee, PhD
Student Speaker: Farzin Fatollahi-Fard

Meal Choices: Chicken asiago, Atlantic salmon, Vegetable Napoleon
RSVP by 2/10/2017 to: Piyamanee Komolwit: pkomolwit@uss.com

Invited Speaker Bio
Dr. Richard J. Lee, founding member and CEO of RJ Lee Group, has over 30 years of experience specializing in forensic problem solving and technology development. He has managed laboratory operations, designed and developed novel electron microscopes, laboratory automation and information management systems, and commercialized laboratory products. Under Dr. Lee's direction, RJ Lee Group has grown from a small group to more than 200 staff across the country. Dr. Lee serves as a consultant to a wide range of industrial and governmental organizations. He has been an advisor to the Environmental Protection Agency (EPA) regarding laboratory methods for analysis of asbestos, as well as the evaluation of contamination in NYC following the events on 9/11.

Dr. Lee has also served on American Society for Testing and Materials (ASTM) committees to define analytical methods. He has been qualified as an expert witness in state and federal courts. He holds six patents and has published over 200 scientific articles and publications. Dr. Lee earned his Ph.D. in Theoretical Solid State Physics from Colorado State University and his B.S. in Physics from the University of North Dakota.

Student Bio
Farzin Fatollahi-Fard has a B.S. in Mechanical Engineering from the University of California, Berkeley. He has an M.S. in Materials Science and Engineering from Carnegie Mellon University. He is a 4th-year PhD candidate at CMU working on electrochemical titanium production in Professor Chris Pistorius’ lab. Mr. Fatollahi-Fard will give a talk titled, “The Electrochemical Production of Titanium by the MER Process.”

About Young Members’ Night
Young Members’ Night (YMN) exposes undergraduate and graduate students from the University of Pittsburgh, Carnegie Mellon University, and Robert Morris University to ASM International and fosters the development of relationships between students and professionals in local industries. A poster contest prior to dinner adds competition and camaraderie, and provides further opportunities for networking between students and industry leaders. We also take this opportunity to recognize the contributions made by undergraduate students majoring in materials science and engineering by awarding the Past Chairpersons Educational Assistance Scholarship (PCEAS). We also recognize students nominated by the faculty at their respective institutions with the Outstanding Senior Award. The program is being organized by a team of students from these institutions and is led by Dr. Elizabeth Clark, YMN Committee Chair.

YMN Sponsorship
Young Members’ Night is one of our most important meetings and also one of the most expensive. We welcome contributions in the form of a sponsorship. Table sponsorship, which costs $300, provides one paid meal for a representative of your company, helps cover meeting costs, and is an opportunity for recognition of your company. Sponsorships in the amount of $200 provide a food platter during the social hour and poster competition. Sponsorships assist our chapter in providing meals for all students in attendance at no cost to the students. Lastly, you can help by providing door prizes which are always popular with attendees!

For donations, please contact Elizabeth (Betsy) Clark at (412)268-3627 or betsyac Clark@gmail.com. Thank you!
**Letter from the Chair:**

It is hard to believe that we have already reached the new year! I hope that everyone had a healthy and relaxing holiday and wish you a prosperous new year. We closed last year with two exceptionally attended meetings, and a plant tour of AllClad where sadly you cannot buy the pots and pans that took shape during the tour. Additionally, we had a great talk from Kirk Rogers in front of a packed house at Lombardozzi's. Aside from Young Member’s Night, the November meeting was the most highly attended by students in recent history thanks in part to the great work done by David Sapiro and Betsy Clark. It has been wonderful seeing increased student turnout at these events. Finally, our Spouses’ Night at Narcisi Winery was a big hit again, with the first glass of wine generously provided by Tom Joseph, patent attorney, and metallurgists and non-metallurgists alike enjoyed Dr. Roy Matway’s talk on Pittsburgh’s role in the history of steel. Special thanks to Piyamanee "Nee" Komolwit for her hard work in arranging these past meetings and for this year’s great line up!

This new year, your chapter has several exciting meetings (always on the third Thursday of the month!) and meaningful volunteer opportunities. We are kicking off the year with National Officer Night featuring a talk from ASM Trustee, Larry Hanke, FASM. Also in the upcoming meetings listed in the newsletter, we are excited to have our annual Young Member Night in February with a presentation by Dr. R.J. Lee followed by a talk given by CMU’s president Subra Suresh in March. These interesting and informative meetings on the third Thursday of each month should not be missed!

Our goals this year beyond the monthly meetings include outreach opportunities geared towards younger students. Also coming up in February, our chapter will be participating in National Engineers Week at the Carnegie Science Center. This is an excellent opportunity to teach younger children the basics of materials science.

Additionally, our chapter will be hosting a Materials Minicamp next fall for high school students where we will need volunteers to help with this event that reaches 400+ students. Please watch your email for these announcements!

Finally, our chapter is nearing an important milestone. Very shortly we will be celebrating 100 years as a chapter! If anyone has articles, remembrances, or clippings that illustrate parts of our chapter's history, I would love to hear from you! We will be planning some special events for our 100th birthday in the near future, and we welcome your input.

Again, I speak for the entire executive committee that works hard to deliver the best program possible to you when I say I hope that we are providing value both as a way to stay in touch with each other and relevant topics as well as develop a connection to the materials professionals of tomorrow. We are always happy to have input and are looking for executive committee members to help celebrate the past and shape the future of our chapter. I can always be reached at neisinger@perrymanco.com with any comments or suggestions. Again best wishes for the new year!

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*Location is tentative. Please check the website for the most current information.*
January Meeting Preview

Day / Date: Thursday, Jan 19, 2017
Location: Foster's Restaurant
Address: 680 Anderson Dr, Bldg. 10, Pittsburgh, PA 15220
Time: 06:00 p.m. – 08:30 p.m.

Speaker: Larry Hanke, FASM

Topic: Forensic Materials Engineering for Product-Liability Litigation

Register: RSVP by 1/17/2017 to: Piyamanee Komolwit: pkomolwit@uss.com. Pay cash or check at the door, or pay ahead of time by online registration.

Abstract

Every manufactured product is made from a natural or engineered material. Unfortunately, some things are made from the wrong material, or are made from the right material, but in the wrong way. Those mistakes can lead to product failures that have serious consequences. When a product failure is analyzed to determine the cause, the material performance is a critical factor to consider, and a materials engineer will be an integral component of the investigation team.

Sometimes when bad things happen, the conflict can be taken to the legal system for resolution. The legal professionals rely on technical experts to show them the cause of failure and help assign responsibility for the failure and damages. Since material behavior, material selection, or material processing is often a critical issue in the failure, investigation of the incident will often require the expertise of a materials engineer.

This presentation will discuss potential materials-related problems in product design and manufacturing that can lead to product failures. Failure mechanisms, including fracture and corrosion, as well as the material properties and service conditions that cause these failures will be covered. In addition, special considerations for the process of investigating product failures involved in litigation from the materials-engineering perspective will be discussed.

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Speaker Bio

Larry D. Hanke, P.E. FASM, is the principal engineer and founder of Materials Evaluation and Engineering, Inc. in Minneapolis, MN. The company provides materials engineering and product testing services to manufacturers and end-users for a wide-variety of industries, including medical devices, microelectronics, power generation, and consumer products. Although managing a company and supervising a team of engineers takes up much of his time, Hanke is happiest when he is at a microscope looking at a fracture or a microstructure.

ASM has had an important role in Larry’s professional life since joining the society as a student member. He was a founding member and officer of the student chapter at Iowa State University, has chaired two different local chapters, and served on four different committees for the international society, including terms as chair for the Handbook Committee and the Failure Analysis committee. Along the way, he has also taught ASM education courses, chaired symposia, and mentored at materials camp.

Hanke is a registered professional engineer in multiple states and is also a member of SPE, NACE, AWS, ASTM, and the ASM Affiliate Societies: Shape Memory and Superelastic Technologies, Failure Analysis Society, and International Metallographic Society.
October Meeting Summary: Spouses’ Night

Since the 2015 Spouses’ Night at Narcisi Winery was so well-received, the Chapter thought, “Why not do it again for 2016?” And so it was that some 40 attendees navigated Rt. 910, accompanied by thunder, lightning, and rain (at times, a lot of rain) to the winery in Gibsonia, PA. Thomas Joseph, Patent Attorney and past Chair of the Pittsburgh Chapter, generously sponsored the first glass of wine.

Dr. Roy Matway presented “Steel Metaphysics: The Cosmic Partnership of Pittsburgh and Steel,” interweaving historical events with the periodic table and phase diagrams to illustrate the how and why of a partnership that is recognized around the world. Dr. Matway, the son of a Pittsburgh steelworker and a Ph.D. graduate of Metallurgical Engineering and Materials Science from Carnegie Mellon lives in a world of steel, including having worked at the Max Planck Institute for Iron and Steel Research in Düsseldorf and currently managing a process engineering group at ATI Flat-Rolled Product in Brackenridge.

He began by noting that he had successively given the same presentation at his church where he had asked if anyone remembered, in third grade, being asked to set little pieces of coal and limestone on a map at the location of Pittsburgh and wondered the reason. As it turned out, his third grade teacher didn’t know either. This was one of the mysteries that Dr. Matway would explain, displaying a lime-silica phase diagram and describing it such that anyone from a third-grader to an astrophysicist would simultaneously understand.
Central to the program was the element iron, fairly abundant on the earth and strategically located on the periodic table. Of course, no ASM presentation is complete without an iron-carbon phase diagram, and this was used to relate the difference between cast iron and steel. He showed the process trends with Bessemer, electric furnace, and open hearth steel production. Throughout the journey, Dr. Matway showed familiar images of Pittsburgh including the Bessemer converter at Station Square and Carrie Furnace.

The question, then, was, “Why Pittsburgh?” Largely, it was because the three materials necessary to make steel were readily available locally. Iron was available as bog iron, impure iron deposits that could be found laying around in bogs to the east of Pittsburgh. The second material was coal, outcrops of which can be seen around the area, including along Painter’s Run Road. Third was limestone, where outcroppings are visible in Frick Park and along Route 28 near Pittsburgh Mills.

Today, there is no bog iron and the sedimentary iron ores of the Great Lakes region are used in the blast furnace (Vice Chair Piyamanee “Nee” Komolwitt brought in some examples for display from US Steel to augment the presentation), and electric furnaces are used in an alternate process using scrap steel instead of ore as the main feedstock. Without recycling steel—today about 90%—there would still be over 135 years worth of known reserves, some 230 billion tons.

So, is steel still necessary? Sure it is. We can all list the qualities: strong, formable, weldable, affordable, and so on, but Dr. Matway took a different approach, exploring steel—as a material—from the standpoint of the familiar Product Lifecycle curve. From 1900-2000, the steel production curve nearly matches the Product Lifecycle curve, from early adoption, through maximum growth, to market saturation, including for Bessemer and open hearth processes viewed individually. He fitted aluminum and plastics to the Product Lifecycle curve as well to contrast some potential competing materials.

While the apparent steel demand looks to decline, the total steel demand (which encompasses steel included in products made of multiple materials) has a slightly increasing slope. But, if steel production in Pittsburgh has declined from its peak days, where is much of the rest of the steel of the United States?

While the apparent steel demand looks to decline, the total steel demand (which encompasses steel included in products made of multiple materials) has a slightly increasing slope. But, if steel production in Pittsburgh has declined from its peak days, where is much of the rest of the steel of the United States?

As a conclusion, and to tie in the “cosmic” relationship, Dr. Matway made an interesting comparison between a ladle of molten iron with slag on the top to the molten iron core of the earth with its plastic mantle—comprised of the same elements we use when making slag.

Thomas Joseph, Patent Attorney, generously sponsored the first glass of wine.
Wondering what those orange plastic blobs filled with a liquid shown in the photo on the left do? So did many of the kids who visited the ASM Pittsburgh chapter’s demonstrations of density, phase changes, and expansion characteristics of materials at Chemistry Week: Solving Mysteries through Chemistry at the Carnegie Science Center. On hand were Peter Kozlowski, Bob Wesolowski, Allan Hutt, Rachel Nicholson, Binky Sargent, and Parag Bedekar who engaged students of all ages and explained some of these “mysteries” of materials science.

This event, held October 16-22, 2016 had the second best attendance in the 18 year history of the event. A staggering 3,500+ people visited the Carnegie Science Center on Saturday alone, when ASM Pittsburgh exhibited. Parag Bedekar, who organized the ASM Pittsburgh demonstration table, said, “This was definitely the best attended day by far since I have been organizing our table. Thank you again to all the volunteers who donated their time on a Saturday and made it such a great success!”

If you missed this fun event in October, but are curious to know more about the orange plastic blobs (or any of the other great demos), check out this exhibit in February, at National Engineers Week!

As always, we are looking for volunteers who are excited to share their knowledge of materials science - see the next page for Parag’s contact information and details on volunteering.

Thank you again to those who volunteered at Chemistry Week, and a special thanks to Parag Bedekar for all his hard work in organizing this exhibit!
Call for Volunteers:
National Engineers Week at Carnegie Science Center

One of our greatest challenges is to spur interest in the next generation of engineers. We do this through outreach to high school, college, and even elementary school kids. National Engineers Week is a great opportunity to reach the younger kids. The ASM Pittsburgh Chapter is looking for volunteers to demonstrate materials properties to children during National Engineers Week: Engineer the Future 2017 at the Carnegie Science Center. Our chapter has a booth with neat experiments involving magnetism, thermal expansion, density, and phase changes. We will be demonstrating on Saturday, February 25 from 10:00 am until 4:00 pm.

This is a fun activity and a great chance to introduce kids to materials engineering. We are looking for volunteers to work at the booth in 2 hour shifts, 3 slots (10-12pm, 12-2pm, 2-4pm).

If you are available for this great outreach program, please contact Parag Bedekar, via email at parag_bedekar@comcast.net or by phone at 412-327-4091.
March Meeting Announcement:  
**Andrew Carnegie Lecture**

**Day / Date:** March 16th, 2017  
**Location:** Singleton Room, Roberts Engineering Hall, CMU Campus  
**Address:** 5000 Forbes Ave, Pittsburgh, PA 15260  
**Time:** 05:00 PM – 08:30 PM  
**Speaker:** Prof. Subra Suresh, President of CMU  
**RSVP to:** Piyamanee Komolwit: pkomolwit@uss.com

**Speaker Bio**

Professor Subra Suresh is President of Carnegie Mellon University, beginning his term in July 2013. He had served as director of the National Science Foundation, appointed by President Barack Obama in 2010. Prior to his service at NSF, he was dean of the School of Engineering (2007-2010), and Vannevar Bush Professor of Engineering at MIT; he had also served as chair of the department of materials science.

Dr. Suresh is the author or co-author of more than 240 research articles in international journals, co-editor of five books, and co-inventor on 22 US and international patent applications. He has authored or co-authored three widely used material science books: *Fatigue of Materials, Fundamentals of Functionally Graded Materials, and Thin Film Materials.* He is one of the most-cited scientists in materials science, according to Thomson Reuters Institute for Scientific Information. In 2011, Science Watch/Thomson Reuters selected Suresh as one of the top 100 scientists for the decade 2000-2010 in its worldwide ranking of the field of Materials Science. Dr. Suresh has received numerous awards and honors, including, most recently, the 2013 Benjamin Franklin Medal in Mechanical Engineering and Materials Science, one of the highest international honors for scientific and scholarly achievements, and the 2012 S.P. Timoshenko Medal from the American Society of Mechanical Engineers, the highest honor in Applied Mechanics. He is a member of the National Academy of Sciences and the National Academy of Engineering, the American Academy of Arts and Sciences, and seven other science or engineering academies. Dr. Suresh has been awarded 10 honorary doctorate degrees by universities in the U.S., Sweden, Switzerland, Spain, India and China.

**Materials Characterization Facility**

Prior to dinner and the lecture, there is an opportunity to tour the Materials Characterization Facility (MCF). The MCF is a centralized facility housed in the MSE department at CMU that is open to all research groups within CMU and collaborating research groups from industry. The facility offers state of the art instrumentation, techniques and expertise for advanced characterization of materials. The MCF provides capabilities to determine microstructural and microchemical characteristics and materials properties; for advanced electron microscopy techniques; for computer analysis and instrumentation; and to educate students and investigators in the theory and application of characterization techniques. A wide range of analytical instruments are housed in the MCF, including three TEMs, four SEMs, two dual beam (DB) FIB-SEMs, two XRDs, and three SPMs. The newest instrument, a xenon-ion plasma source DB-FIB-SEM, which was acquired with funding from NSF DMR 1428480, can remove material up to 50x faster than a conventional Ga+ source FIB. Coupled with EDS and EBSD capabilities, the Xe-ion FIB is a powerful piece of equipment that can be used to acquire large 3-D datasets in a very short period of time. Utilizing these larger datasets, which are more statistically significant, researchers can characterize, for example, lower symmetry materials. Graduate student Madeleine Kelly acquired a dataset from alpha-Ti containing nearly 14,000 grains and 92,100 grain faces (Kelly et al. Acta Mater. 111 (2016) 21).

For a sneak peak, check out the MCF video on YouTube: [https://www.youtube.com/watch?v=c4qrbhKN4X8](https://www.youtube.com/watch?v=c4qrbhKN4X8)

**Materials Science and Engineering Department at Carnegie Mellon University**

The Department of Materials Science and Engineering (MSE) has generously offered to sponsor appetizers at this event. The MSE Department is a distinguished department with a long history of leadership in education and focused research. The Department of Metallurgical Engineering was founded in 1906 and became the Department of Materials Science and Engineering in 1992. There are currently 28 active faculty, including some with joint appointments in Biomedical Engineering, Electrical and Computer Engineering, and Engineering and Public Policy. In addition, the department has more than 250 bachelors, masters, and doctoral students. MSE faculty conduct a wide range of experimental and theoretical research. The four areas of concentration are: Electronic Materials, Magnetic Materials, Microstructural Science, and Iron and Steelmaking Research. Department faculty and students are also active participants in the following centers: Center for Iron and Steelmaking Research (CISR), Data Storage Systems Center (DSSC) and Institute for Complex Engineered Systems (ICES).
November Meeting Summary

Sixty people, including twenty students, packed the reception room at Lombardozzi’s for the November meeting which included complementary presentations by Carnegie Mellon doctoral student Ming Tang and featured speaker Dr. Kirk Rogers.

Mr. Tang, who obtained his undergraduate degree in materials science from Beihang University in Beijing, China, has been at Carnegie Mellon since 2012 and is currently pursuing a Ph.D. His presentation titled, “Fatigue of Aluminum Alloy Parts Produced by Additive Manufacturing,” began with an explanation of why additive manufacturing is currently so pervasive. Much of the growth can be traced to the expiration of “old” patents from 1984 and 1989 for stereo-lithography and fused deposition modeling that, expiring after twenty years, have passed the technology into commercialization by multiple developers. The ability to make parts that are either custom, or difficult using other processes has also been a driving force for additive manufacturing. The Airbus A320neo, for example, claims nineteen 3-D printed fuel nozzles for each jet engine.

Mr. Tang then delved into his project on AlSi10Mg/EOS M280 alloy samples produced by additive manufacturing. These materials were fatigue tested at 100MPa and 80MPa and the porosity was evaluated by synchrotron X-ray microtomography to generate a 3-D image of the sample. A comparison of the fatigue tests for Mr. Tang’s 3-D printed samples of AlSi10Mg (10% silicon) to published results of fatigue tests for A356 castings (7% silicon), the “nearest neighbor,” showed the fatigue lives were similar.

Examination of the fracture surface by SEM revealed oxide-driven pores that appear to be the most common defects in the 3-D printed AlSi10Mg samples. Archimedes method finds the samples to be 99% dense. Thus, future work includes determining the extent of the porosity/fatigue life relationship.

Dr. Kirk Rogers then took the floor, saying that additive manufacturing accounts for about $2.5 billion whereas powdered metallurgy represents $6 billion, the largest market being automotive. For example, consider 15 million cars per year, each with a transmission that has nine gears made by PM methods.

Unlike additive manufacturing, powdered metallurgy has been traced back to 3000 BC when the Hittites sintered iron. Dr. Rogers reviewed some of the most common PM processes, from conventional press and sinter to metal injection molding before posing the question: why PM? Using a Venn diagram to illustrate the intersection of three characteristics—economic, captive, and unique—Dr. Rogers explained that, with its high material efficiency, PM was good for high quantity, low complexity products. PM is essential for making targets, which are used to produce x-rays for computed tomography (CT) scanners. Beneath the cover, the mechanism that encircles the patient accelerates to 30G while X-rays are generated by hitting targets with an electron beam. Though sounding “scary with a cover over it,” these machines are very safe.

Dr. Rogers explained what “extreme

(Continued on Page 10)
performance” meant in the title of his presentation in that the CT anode, or “target,” produced using PM, experiences four million cycles of mechanical stress, temperatures of 1100°C, and an energy density exceeding 3000 W/m²! Three alloys, all containing refractory metals, those with melting temperatures exceeding 2200°C, are used to meet these requirements. One is a W-Re alloy, another is a Mo-TZM alloy, and the third is a proprietary alloy.

These targets, Dr. Rogers explained could be “made in 35 easy steps.” Discs are manufactured via uniaxial pressing (about 25 tons/in²) with an initial density of 65%. For comparison, this is the equivalent of piling ten automobiles on top of a paper clip holder. Sintering is then accomplished via a batch process—belt furnaces are not that common. Then come all of the other steps, including stress relief, machining, cleaning, inspection, and degassing. Since it is a component of a medical device, the cleaning step appears multiple times.

Dr. Rogers worked for over 15 years at GE Healthcare, Refractory Process Innovations and, after a short time outside of GE, is currently Technology Leader, Additive Manufacturing at the Center for Additive Technology Advancement (CATA) in Pittsburgh. One of CATA’s objectives is to help the eight GE operating units (e.g. healthcare, transportation) industrialize additive manufacturing where it can be beneficial. Dr. Rogers earned a B.S. in Materials Engineering from Case Western Reserve University and holds a M.S. and Ph. D. in Materials Science and Engineering from Purdue University.

Prior to the night’s featured speaker, Mr. Bob Wesolowski gave a short presentation on the positive outcomes that have resulted from the ASM Teachers Camp that endeavored to promote materials science in schools. Financial constraints have impacted such programs, but there is interest in keeping such programs alive, which is discussed in more detail on Page 11.
Volunteer Opportunity: Looking for ASM Pittsburgh Member to Help Obtain Financing for MSE Teacher and Student Camps

Teachers’ Camps
ASM Materials Camps for Teachers are idea-generating workshops for high school teachers that show educators new ways to make teaching math and science principles more exciting and accessible to students. Materials Camp provides high school teachers with tools they can use in their classroom curriculum. Teacher participants learn the basics of materials science technology as taught at the high school level; they work hands-on with metals, ceramics, polymers, and composites, and develop a greater appreciation for the importance of these materials to modern life. As a result of their participation, teachers are using the information and concepts as a basis for teaching a materials science technology course or infusing the concepts into an existing course to increase relevancy. As Mr. Wesolowski pointed out at the November meeting, Teachers Camps are a great way of ultimately reaching many more students, as these teachers will interact with thousands of students over the course of their career.

The ASM Pittsburgh Chapter needs a volunteer interested in helping the Pittsburgh Chapter to find reliable source of financing for continuing to hold teachers camps in the Pittsburgh region.

Minicamp at MS&T
Pittsburgh’s ASM Chapter will be hosting a high school student minicamp at next year’s MS&T show in Pittsburgh on October 10th and 11th. This great event brings about 400 high school students to the convention center for a two hour camp where they are exposed to demonstrations ranging from steel making to ceramics and from polymers to locally manufactured materials. The feedback we receive from the teachers is amazing as they truly appreciate the experience that the students receive.

Our chapter has hosted this event numerous times and it is truly fulfilling, but we need your help both personally and financially! The chapter needs people to help with organizing volunteers/demonstrations for the event, fundraising, and organizing the school attendees. The event costs our chapter around $5,000, which helps to cover busing the students, providing the students with materials and a takeaway, supplies, and demonstrations. If you or your company are able to support this rewarding project either with time or financially, please contact Nate Eisinger neisinger@perrymanco.com.
ASM Pittsburgh Golden Triangle Chapter — Chapter Officers 2016-2017

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**Executive Committee Chairs (2016-2017)**

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**Owen M. Katz High School Scholarship Now Accepting Applications**

The ASM Pittsburgh Chapter established the Owen M. Katz High School Scholarship in 2009. The scholarship is awarded to an outstanding high school senior who wishes to pursue a career in the metals or materials field and enrolls in a related college program. The scholarship is **$1500**. The Katz family kindly donated the money to ASM to help make this scholarship possible.

**Owen M. Katz, PhD, FASM**, was an active member of ASM since the 1950's. He served as chairman and secretary of ASM. Dr. Katz was a recipient of the Edger C. Bain award in 2004. Dr. Katz began his career at Westinghouse Research and Development in 1956 after graduating from the University of Pittsburgh. He received his Ph.D. in 1963. Owen then transferred to Westinghouse, Bettis as a senior engineer where he instituted state-of-the-art metallographic technology and worked on failure analysis until retirement in 1998. Dr. Katz then began a second career as an adjunct professor at the University of Pittsburgh supporting students and faculty. Owen died on September 1, 2007 and will be remembered for his many contributions by his friends, family and community.

In 2011, a generous donation to the Chapter was also received from the Rich Foundation, to be invested along with original funds donated by the Katz family, to ensure the continuation of this award.

The application can be found on the ASM Pittsburgh website at: [http://www.asmiinternational.org/web/pittsburgh-chapter/scholarship-opportunities](http://www.asmiinternational.org/web/pittsburgh-chapter/scholarship-opportunities)

Completed applications should be sent to Parag Bedekar by **February 10, 2017**. For questions, Parag can be reached by email at parag_bedekar@comcast.net or by phone at 412-327-4091.
December Meeting Summary

All-Clad Metalcrafters, LLC has been making high-quality cookware in the Pittsburgh area since the mid-1960s. Currently the Canonsburg company is the only operating entity of the French company Groupe SEB that is manufacturing products in the United States. Groupe SEB employs 25,000 people worldwide and has seventeen product lines that are familiar to many who spend time in the kitchen. All-Clad has 220 hourly and 60 management and support personnel at the Canonsburg operation where their first building was constructed in 1971.

Producing in excess of 1.2 million pieces per year, the facility has been operating a 24-hour schedule, five days a week, meaning that cladding, forming, and finishing operations were in progress for the tour. Hosts for the evening were Ms. Cassandrea “Cassie” Jodon, Quality Manager, and Mr. Curt James, Environmental Health and Safety Manager.

During the presentation before the tour, Mr. James described their impressive and proactive safety program. Much of the effectiveness of their safety program can be attributed to their view that safety is not a priority but, instead, a value. To illustrate this difference, Mr. James asked who wore their seat belt on the drive to All-Clad. Of course, the law says that seat belt use is compulsory, meaning it is a priority to comply with the law. However, the attendees wore their seat belts because of the value they place on human life. So it is, too, with All-Clad where a shared value orientation towards safety drives performance well beyond compliance with regulations.

Ms. Jodon provided a brief summary of some of the possible defects that can occur in some of the 82-88 distinct process steps that also include 17 opportunities for inspection by the workforce. Most of the attendees recalled the January 2015 meeting with ASQ at which Ms. Jodon and Mr. Joshua
Greathouse presented some of the procedures used to assure quality. Touring the facility, one could see the almost famous “quality racks” with pictures and physical examples of every conceivable defect that could occur, and corrective actions to take. While the product must comply with fit, form, and function, aesthetics are often subjective, and the method for assessing quality of aesthetic characteristics was the topic of that joint meeting with ASQ.

After the presentation, the group began the tour, braving the windy, seven-degree night towards another building. Along the way, the group passed the pond, which is home to fish, frogs, turtles and a distinctive blue heron. However, in the chill of the night, the mostly ice-covered pond sported only a solitary duck curiously watching the group in their reflective safety vests walk past.

The tour progressed through the various operational departments of cladding, forming, rotary, and assembly. The employees working in the various departments exemplified the well-run facility, answering questions and showing examples at each process step, proud of the quality work they perform. From Canonsburg, Pennsylvania, the cookware they produce is shipped to New Jersey and, from there, to customers around the world.

Of course, the questions from the ASM contingent were revealing, if not amusing. At the cladding operation, where aluminum and stainless steel were being sandwiched together, those who work with aluminum asked solely about the aluminum and those who work with stainless steel asked solely about the stainless steel. Process people asked about both and the temperatures in the furnaces. Everyone asked “what size pot would that make?”

ASM Pittsburgh would like to thank Ms. Jodon and Mr. James and the employees of All-Clad Metalcrafters, LLC for their hospitality in hosting this event.
April Meeting Announcement:
Sustaining Member Night

Day / Date: April 20th, 2017
Location: Jaden Catering Restaurant/Purglitano*
*Location is tentative—please check the website for current information
Address: Monroeville, PA
Time: 06:00 PM – 08:30 PM
Speakers: Scott Story, PhD, Senior Research Consultant, U.S. Steel
         George Shannon, PhD, Principal Dev. Engineer, Carpenter Technology, Corp. Latrobe Operation
Topic: Automated SEM Inclusion Analysis as a Tool to Improve Steel Quality and Productivity

Student Speaker: Jia Tan, Carnegie Mellon University
Student Topic: Evolution of Steel Inclusions during Reoxidation

Abstract
The presence of non-metallic inclusions in steels affects their composition and method of manufacture. In early metalwork, they formed a surprisingly large portion of the steel's composition. However, process improvements in techniques and understanding, particularly in recent decades, have reduced inclusion content in steels by multiple orders of magnitude. With this improved cleanliness come requirements that are more stringent. With the advent of automated scanning electron microscopy (SEM) inclusion analysis techniques enabled by fast computer data collection and SEMs capable of accurate beam and stage control, steelmakers can collect a large amount of information about inclusions, though this inevitably requires generation of summary metrics to provide useful conclusions. An understanding of defect requirements, standardized according to tests such as fatigue testing, assists producers in relating automated inclusion information to customer requirements. This presentation will discuss historical aspects of the development of automated SEM inclusion analysis and provides examples of how this analysis is useful for understanding the impact of inclusions on steelmaking processes and product properties.

Speaker Bio—Dr. Scott Story
A native of Melbourne, Australia, Dr. Story graduated in 1989 with a B.Sc. in Materials Engineering from Monash University Victoria, Australia. He completed his M.S. and Ph.D. in Materials Science at Carnegie Mellon University (CMU) in 1997. Dr. Story began his career in the field of the continuous casting research group at the Broken Hill Proprietary (BHP) Company Research Laboratories, Mulgrave, Victoria in 1990. Upon completion of his graduate school studies, he joined the BHP Project “M” Strip Caster Development team. He later joined the steelmaking and casting group at US Steel's Research and Technology Center. He was awarded the AISI Medal in 2003 and 2006 and AIST R.J. Fruehan Award in 2014. Current research topics of interest include secondary metallurgy slag-metal chemistry control and the influence of inclusions on quality and productivity.

Speaker Bio—Dr. George Shannon
Dr. George Shannon received his B.Sc. from Lehigh University, and his Ph.D. from CMU. His thesis topic focused on the interaction of small particles with a liquid-liquid interface, used to describe inclusions at a steel-slag interface. He now works at Latrobe Specialty Metals, part of Carpenter Technology, as part of the aerospace group. His work there relates final properties of material with processing effects, such as melting method, remelting method, and chemistry. He has developed industrial test programs with both Aspex/FEI and IntellISEM/RJ Lee equipment for Latrobe's ingot casting processes and a broad range of specialty alloys.

Student Abstract
Research in steel cleanliness has been concerned with improving both the castability and steel performance. The presence of solid, non-metallic inclusions in aluminum-killed steels can negatively affect casting and finished product properties. This work examined the changes in inclusion chemistry, size, and shape distributions due to reoxidation. Lab heats were prepared with various additions and inclusions were analyzed with SEM. the mechanism of inclusion formation and growth was discussed and it was found that reoxidation event can be diagnosed by the change of inclusion size distribution.

Student Bio
Ms. Jia Tan is a fourth-year PhD student in Materials Science and Engineering at CMU. She is working with Professor Bryan Webler on inclusions and steel metallurgy. She received her M.S. in Materials Science at Carnegie Mellon University in 2012 and did her undergraduate study in Materials Physics at Nanjing University in China.
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