

# Materials **Matter** @Purdue

2014 Annual Report



OMSE Award Recipients





# A Message from the Head



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Dear Friends of Purdue Materials Engineering,

It is my pleasure to share this update about the School of Materials Engineering with you in this year's newsletter. The College of Engineering continues its expansion as part of President Daniel's "Purdue Moves" initiatives. This includes adding faculty in all the Schools, growing enrollment at both the undergraduate and graduate levels, and ensuring we are providing an excellent educational experience for all our students. Materials Engineering will have almost 150 undergraduates this year (sophomores to seniors), and we're approaching 100 graduate students. We have students from over 15 states and 7 countries in the MSE undergraduate program, and our new graduate students are coming from as close as Indiana and Illinois and as far as Colombia, Turkey and China. We are taking some new approaches to ensuring that even with our increasing enrollment, we are continuing to provide a high quality experience for the ever expanding base of students. We have added summer MSE courses (select labs and lectures), we are expanding our co-op options with a new 3 rotation program that allows students to still graduate in 4 years, and we are adding brand new equipment to provide increased hands-on lab experiences while making sure students also get access to high quality simulations on on-line and distance learning modules. Our study abroad options are increasing; we are adding schools in England and Germany and ensuring students that want that experience have the option, access, and financial support to make that happen.

In addition to the booming student numbers, we have some new faces in the department. In this edition of the newsletter, you will read about Dr. Aisling Coughlan, visiting assistant professor, and Dr. Sebastian Osswald, our newest faculty member who also joins us as an assistant professor. We'll be looking for a new staff member to replace Dave Meyer, who moved on to the diesel engine test facility in Herrick Labs on the Purdue campus.

While we use the newsletter to share highlights from the last year, it represents only a fraction of what we are actually doing. Please visit our website at [www.purdue.edu/mse](http://www.purdue.edu/mse) for updates on research, alumni, and student activities.

Specifically, we are highlighting a very special group of 4 students: who won highly competitive national graduate fellowships this year (3 from NSF and one from DoD); these students effectively just won the equivalent of over \$600K in funding to support their innovative graduate research at Purdue. And don't think there's not equivalent excitement at the undergrad level: a senior design team won the Purdue Burton Morgan Entrepreneurship Business Plan competition and took home \$20K to help start up a business (MSE's are hoping to shake up an industry).

Finally, we hope to see you at some of the School's upcoming events: The current student and alumni mixer, receptions at the MS&T conference, informal dinner meetings at the TMS conference (Monday evenings), off-campus alumni lunches. Please contact Robyn Jakes, Director of Development for the School, to share your success stories and to let us know if you're in town. So, enjoy the newsletter, and please keep in touch.

Hail Purdue,

**Dr. David F. Bahr**

Professor and Head of Materials Engineering

**PURDUE**  
UNIVERSITY



### On the Cover (L to R)

Barry Effron and Lisa Murray at Graduate Student Poster Session

OMSE Award Recipients: Mr. Timothy McCrea, Dr. Janet Sater, Dr. Richard Sisson

NSF Graduate Research Fellowship Recipients: Lisa Rueschhoff, Michael Heiden and Alexandra Bruce

NDSEG Fellowship Recipient: Kate Reeve

### SCHOOL OF MATERIALS ENGINEERING

John A. Edwardson Dean of Engineering • **Leah H. Jamieson**

Head • **Dr. David F. Bahr**

Director of Development • **Robyn Jakes**

[www.engineering.purdue.edu/MSE](http://www.engineering.purdue.edu/MSE)

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*Materials Matter@Purdue* is published by the School of Materials Engineering at Purdue University for alumni, faculty, students, corporate partners, and friends.

We welcome your comments, opinions, and questions. Please send them to the following address:

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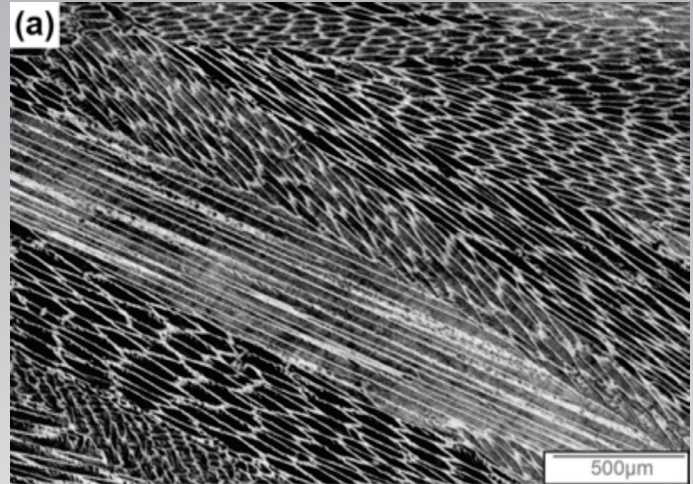
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Purdue is an equal access/equal opportunity university.

# Shakeout: Metal Casting Research Update

The Center for Metal Casting Research (PCMC) continues to gain momentum, with several new industrially sponsored projects in the past year. Twelve students and five faculty members are currently engaged in fundamental and applied research on a broad range of casting processes, phenomena and alloys. Continuing support from Nanshan Aluminum is enabling unique capabilities for modeling direct chill casting of large ingots, as well as interactions of microstructure development in downstream thermal and deformation processing. Early in 2014 Chrysler funded several projects on die casting aluminum alloys as part of a large initiative in manufacturing at Purdue. Professors Han (MET), Johnson, Krane and Trumble are all involved in the new Chrysler effort. ArcelorMittal has supported a new study on microsegregation in continuously cast steels. This project features Prof. Johnson's levitation zone melter and the advanced analytical TEM capabilities of Prof.

Ortalan. Another new project, funded by Rolls-Royce and led by Profs. Krane and Trumble, is characterizing metal-mold wetting behavior in single crystal nickel-based superalloy casting. Several other projects on investment casting are pending with industry sponsors. Prof. Krane has also extended funding of his program on ingot remelting processing for wrought high temperature alloys. Finally, a new lead-free casting bronze has been developed, which exhibits completely cellular (i.e., non-dendritic) solidification as shown in the micrograph. The cellular growth morphology, rarely achieved under conventional casting conditions, results in high fluidity and low microporosity



Cellular Structure of Congruent Cu-Mn Cast Alloy (Chaput and Trumble, 2014)

formation; the June 2014 issue of *Metallurgical and Materials Transactions B* contains a full research article. Readers interested in current or potential casting research should directly contact the center director, Prof. Kevin Trumble, or other faculty involved.

## Senior Design: From Materials Engineering Solutions to Startup Creation

The academic year 2013–14 established a landmark achievement in our successful Senior Design program. One of the projects, co-sponsored by Contour Hardening (CEO John Storm, BS, Metallurgical Engineering, 1977) and Servaas Laboratories, was earmarked for an educational experiment that exceeded expectations. The student team had to both deliver a problem solution and develop a plan for creating a potential startup company based on their technology development. MaryBeth Pavlick, Daw Gen Lim, Nolan Lantieri and Wanying Li chose to work on the "Aluminum Extrusion Die Cleaning" project that aimed at developing a safe, efficient, low-cost process for removing aluminum from steel extrusion dies. The solution currently utilized by industry uses caustic chemicals to dissolve the aluminum that remains stuck in the dies at the end of an extrusion cycle, leaving dies out of service for more than 24 hours. In addition, prolonged die immersion in caustic solutions can reduce the die lifetime. Furthermore, caustic chemical systems require large capital investments and monthly costs for acquiring and disposing of the hazardous chemicals that present significant safety risks to the operators. The student team researched several potential solutions and found a novel approach based on their materials understanding of the process

responsible for the aluminum adhesion to the steel die using localized heating and subsequent mechanical removal to clean the extrusion die in a faster and safer fashion. Microstructural analysis was conducted to verify that the die microstructure was not altered as a consequence of die heating. Tensile tests were run at various strain rates, at elevated temperature (~500°C) to determine the conditions needed for mechanically removing the stuck aluminum. The results indicated that both high rate impact and the steady state application of pressure could be utilized to remove the aluminum. Based on their novel solution, the student team put together a business plan and entered the prestigious Purdue University *Burton D. Morgan Business Competition*. **ExDie Cleaning Technologies**, the potential startup created by the students, was selected as the overall winner among the 48 competing teams that participated in 2014 in the undergraduate division. A panel of judges comprising different industry areas and venture capital firms awarded the team the winning prize of \$20,000. It should be noted that the second place team in the division, **Atlas Energy Systems**, also had one member from the MSE program, junior Ian Hamilton.



# Faculty and Staff News

**Dr. Aisling Coughlan** joined the School of Materials Engineering at Purdue University in January, 2014, as a visiting assistant



professor. She obtained her BSc in Biomedical and Advanced Materials at the University of Limerick, Limerick, Ireland (2006) and her Ph.D. in Biomedical Materials at the Materials and Surface Science Institute also at the University of Limerick (2009). Prior to joining Purdue University she undertook a postdoctoral position at the Inamori School of Engineering at Alfred University in Upstate New York. Her research at Alfred University focused on glass science, both industrial and biological. In January, 2012, she also became an adjunct professor at Alfred University, primarily teaching both undergraduates and post graduates on subjects relating to biomedical materials. She has 32 peer reviewed journal articles and has one patent pending. At Purdue, her research will focus on developing and characterizing glass-based biomaterials with current research projects including developing chemotherapeutic and antibacterial biomaterials for hard tissue applications and creating hemostatic agents for both clinical and non-clinical environments specifically in the area of trauma.



**Dr. Sebastian Osswald** is an Assistant Professor in the School of Materials Engineering at Purdue University. He holds a dual Ph.D. degree (2008) in Materials Science and Engi-

neering (Drexel University, Philadelphia, PA) and in Physics (Ilmenau University of Technology, Ilmenau, Germany). Prior to joining Purdue, Dr. Osswald was appointed as Assistant Professor of Physics at the Naval Postgraduate School (2010-2014) in Monterey, CA, and as Postdoctoral Associate (2008-2010) in the Department of Materials Science at the Massachusetts Institute of Technology (MIT) in Cambridge, MA.

Dr. Osswald's research interests revolve around carbon nanostructures and other advanced materials, with a primary focus on their suitability for energy storage. His research is highly interdisciplinary in nature and comprises both fundamental and applied studies. Using Raman spectroscopy, one of the most powerful tools for the characterization of carbon nanostructures, Dr. Osswald has investigated phonon confinement effects, studied contributions from surface and edge atoms to the properties of nanocrystals, controlled and adjusted the surface chemistry of various carbon nanomaterials, and developed new routes for size-control and purification. His research contributions on the physics and chemistry of carbon nanomaterials were recognized in 2010 by Elsevier's CARBON prize, an international award given every three years to the best Ph.D. thesis in carbon science. Publications featuring the results of his work include Journal of the American Chemical Society, Chemistry

of Materials, and Small as well as other leading journals, counting more than 1100 citations to date. In addition, he has written 3 book chapters on carbon nanomaterials and holds 4 international patents.

At Purdue, Dr. Osswald's research group is exploring new energy storage solutions including sodium-ion, metal-air, and flow batteries. Of particular interest are semi-solid flow cells (SSFC), where anode and cathode materials are utilized in the form of small particles dispersed in a transport electrolyte. Dr. Osswald is studying the thermodynamics and kinetics of these battery systems, with a focus on the governing charge transfer and mass transport mechanisms. While previous research investigated primarily lead acid- and nickel metal hydride-based chemistries, future work will explore other material systems, including metal air and Na-/Mg-ion. Dr. Osswald is also investigating the Li-ion storage mechanism in a variety of carbon nanostructures (e.g. carbon nanotubes, graphene). These unique materials offer many advantages over conventional anode materials for Li-ion batteries, including a high surface area for faster interfacial kinetics and increased energy storage capacity. Dr. Osswald's research aims to better understand the nature of the electrochemical interactions between nanostructured carbons and the metal ions in order to identify the primary storage mechanism. The insights gained from these studies will also further the development of other promising technologies, including Na- and Mg-ion batteries. Additional areas of interest include the study of corrosion and other degradation processes in energy storage systems as well as the development of more energy-efficient material synthesis and manufacturing technologies.



**MSE Lab Technician, Dave Meyer**, has transitioned to a new role within Purdue University as of June, 2014. He is now working for Herrick Labs as Diesel Engine Test Cell Technician. Over the last seven years, Dave has been a valuable asset to MSE, and his service to both students and faculty in designing, maintaining, and training users on our processing and materials testing equipment has been most appreciated. This is a wonderful opportunity for Dave to continue his career with Purdue, and we wish him the best of luck.



## Faculty Profile: John Howarter



John Howarter, Assistant Professor in both the School of Materials Engineering (MSE) and the School of Environmental and Ecological Engineering (EEE), describes himself as having a unique niche within the field of engineering. His research looks at not only structure-property relationships of newly developed materials,

but also how the synthesis, processing and disposal will impact the environment.

Howarter, whose background includes an undergraduate degree in Materials Science and Engineering from The Ohio State University in 2003 as well as a Ph.D. in Materials Engineering from Purdue University in 2008, joined the Purdue MSE faculty in 2012. Prior to his return to campus, he served as an NRC Postdoctoral Fellow in the Polymers Division at the National Institute of Standards and Technology (NIST).

Currently, Howarter advises a team of four graduate students whose research focuses on reducing the operational energy footprint and increasing the separation performance of polymer membranes through material design. This includes a focus on material improvements of polyamide membranes used in desalination and functional composite membranes for targeted separation and treatment of industrial wastewater.

Professor Howarter's research interests in collaboration with Prof. Chad Jafvert in Civil Engineering led him to Colombia in 2012 where they partnered with the manufacturer Kimberly Clark to improve drinking water in rural Colombian schools. Materials-based innovations of a slow sand filtration system were developed through a senior design project and some follow-up research studies. The resulting design has provided these schools with low cost potable water. This project has since expanded to pilot testing in Kenya, Tanzania, and China.

In addition to his innovative research, Dr. Howarter is also extremely passionate about sharing the exciting world of materials with a younger generation. He actively participates in outreach programs with the Purdue Women in Engineering Program (WIEP), Minority Introduction to Engineering and Science (MITES), and the Indiana 4-H program, and teaches MSE 190, Introduction to Materials Engineering. Through these venues, prospective students study materials composition by conducting mini labs – they even make ice cream. The difference between good and bad ice cream comes down to microstructure. Howarter says his job is to give someone the “full flavor of MSE in one afternoon or one semester.”

For more information on what Professor Howarter is up to, please visit him on the MSE website at: [www.purdue.edu/mse](http://www.purdue.edu/mse).

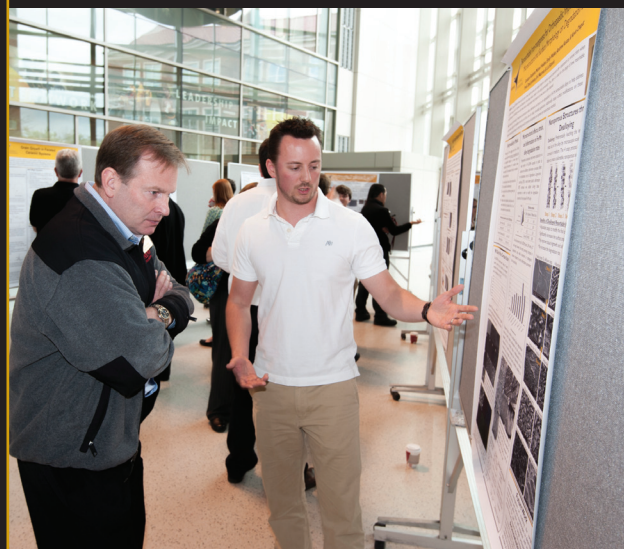


### Graduate Poster Session

On May 2, 2014, industry partners were invited to the Neil Armstrong Hall of Engineering to interact with MSE graduate students. This presented a unique opportunity for graduate students to present their research to industry leaders. This event will be held annually on the Friday after MSE Student Night each spring. Undergraduate senior design posters will be presented at Student Night and graduate students will have their chance to present their research at a graduate-focused poster session the following morning. If you or a representative from your company would like to attend, please see the back cover for additional information on how to RSVP.

***Presenting at the graduate symposium allows graduate students to interact directly with the advisory board, gain exposure for our research, and receive useful insight into our projects from a different perspective.***

***— Kevin Chaput, MSE PhD Student***



# Undergraduate Student Profile

## Jerome J. Nash

Hometown: Indianapolis, Indiana

### **What attracted you to Purdue University and specifically, Materials Engineering?**

Around my sophomore year in high school, I realized I had an aptitude for engineering and there were two very good options available for me here in the Midwest, close to my hometown. My decision was between Purdue University and Rose-Hulman. While Rose-Hulman was quite attractive for their rigorous engineering curriculum, I knew that I would get a much more well-rounded experience at Purdue. After visiting both campuses several times, it became clear that the Purdue campus was unique in that I could make academic achievements in engineering, while at the same time developing other necessary life skills. I would be able to interact with people from all walks of life, with different motivations, and varying goals. This characteristic was unique to Purdue University and was paramount in my university decision. I chose the School of Materials Engineering for similar reasons. I initially wanted to study chemical engineering at Purdue, but I quickly found that this path did not coincide with my desires or skill set. When I discovered materials engineering and witnessed firsthand what materials engineers do, I was enthralled.

### **What has been your greatest achievement during your time in the School of Materials Engineering?**

My greatest achievement during my time in the School of Materials Engineering has been how far I have advanced as an undergraduate researcher. For the past two years, I have had the opportunity to work with Prof. Kendra Erk in her Soft Materials Mechanics Group and every moment has been very rewarding. Prof. Erk has been a phenomenal mentor and has developed several different opportunities for me that will surely pave the way for my future.



### **What has been your favorite MSE course; why?**

My favorite MSE course has been MSE 330: Processing and Properties of Materials. This has proven to be my favorite class for a number of reasons. This was my first MSE class where I truly began to understand the relationship between processing, properties, and structure in different materials. Studying how each of these aspects relies on the others helped nurture my respect and understanding for the importance of materials engineering. I was also fortunate enough to be taught by Prof. Elliott Slamovich, a great lecturer that truly wants to see his students succeed as materials engineers. This course also helped solidify my desire to continue my education in materials engineering after graduation.

### **Have you been involved in any student organizations while at Purdue? If so, which ones?**

For the last two years, I have been a Resident Assistant in Earhart Hall for Purdue University Residences. I have grown significantly as a leader after being a mentor and role model to about 100 first-year Purdue students over the course of two years. My interpersonal skills have reached a career high because of the multitude of daily interactions and weekly meetings that this role demands. I have also been fortunate enough to meet some of the most amazing people I could imagine, who I now call my closest friends.

### **Why would you recommend this department to others who are still deciding on an area of study?**

I would recommend this department to other students because of the opportunities available to grow in a myriad

of ways. For those students interested in undergraduate research, there are many professors within our department with very interesting projects that demand talented students. For those interested in study abroad opportunities, our department has developed many close connections with schools around the world, including locations in Europe, China, Australia, and South America. No matter which part of the world you are most interested in visiting, the Purdue Materials Engineering Study Abroad program will most likely have a fit for you. Another great reason to consider the school of materials engineering is the abundance of industrial partners that our department has collected. There are many Purdue MSE alumni in the world, all of which want to see future Purdue MSE alumni achieve great things. To encourage this, many companies offer exclusive internship and co-op opportunities to current MSE students. Also, senior design projects partner up with an industrial sponsor to take on a real world challenge. There are many other reasons to consider our department, but the best way to learn about them all is to experience them firsthand.

### **How do you plan to use your knowledge and experience gained at Purdue University in the future?**

I plan to use the knowledge and experiences that I have gained at Purdue University by continuing my education. After I graduate with my B.S.MSE at Purdue, I plan to pursue my Ph.D. in Materials Engineering. Among the number of things I have picked up during my time at Purdue University, one thing in particular has been a love of knowledge and learning. There is still so much that I have yet to learn and the desire to push forward my education still burns deep inside me. My time as a student in materials engineering has been extremely rewarding and I look forward to applying the knowledge I have obtained to my future.



# David R. Gaskell Memorial Lecture



Claire Gaskell Hankenson



Drs. John Speer and Nick Medendorp



Audience members enjoy a funny moment in the program



In April, 2013, longtime Professor, Dr. David Gaskell passed away unexpectedly. A Professor in Materials Engineering (MSE) since 1982, Dr. Gaskell made countless contributions to the

field of Materials Engineering as well as to the undergraduate and graduate students whom he taught and mentored. He is fondly remembered amongst his colleagues as being a leader and pioneer in the area of thermodynamics.

To honor their father's memory and lifetime achievements, Dr. Gaskell's family endowed a scholarship in his name that will benefit undergraduate students in MSE. In addition, they also sponsored a memorial lecture in their father's name, which was held on May 9, 2014, at the Purdue University Memorial Union.

Nearly 100 people attended the lecture, which featured invited speakers, Dr. John Speer, John Henry Moore Professor of Metallurgical and Materials Engineering and Director of the Advanced Steel Processing and Products Research Center at the Colorado School of Mines, and Dr. Nick Medendorp, Vice President for Research and Development at Cree, Inc. Attendees recounted their fond memories of Dr. Gaskell and shared stories of how he impacted their lives and careers for the better.



## David R. Gaskell Scholarship Endowment



The family of Professor Gaskell has endowed a scholarship in his honor. This scholarship benefits undergraduate students in the School of Materials Engineering. For information on how to contribute, please contact Robyn Jakes at [rnjakes@prf.org](mailto:rnjakes@prf.org) or at 765-494-4094.



# Graduate Student Profile

## Kevin Chaput

Hometown: Merritt Island, Florida

Previous Institution: University of Florida – BS, Materials Science and Engineering

### **What attracted you to Purdue University's graduate programs?**

Purdue University was first recommended to me by a professor at the University of Florida, a Purdue alum, due to their great facilities and outstanding academic reputation. Upon attending the prospective student visit at Purdue, I found that not only was his description spot on, but I also discovered a community that I meshed with very quickly. At Purdue I found a department with diverse areas of interest, motivated students and faculty, and an environment that fostered collaboration. Most importantly for me, the numerous resources available for metal processing research, due to the close industrial ties and support, was unmatched by any of the other institutions that I visited.

### **What has been most rewarding about your time in Materials Engineering?**

The most rewarding experiences that I have had during my tenure here at Purdue have involved both mentoring and collaboration. As a senior graduate student, I was afforded the opportunity to work with some really invested graduate students. Whether it was giving input on a current research problem, instructing on different processing practices, or simply giving practice prelim exams, I enjoyed interacting with these students, and offering guidance when needed. Watching these graduate students not only develop, but excel was incredibly rewarding. These relationships were also often very fruitful, since a lot of times these interactions formed into collaborative projects and papers. Due to the different backgrounds of graduate students and the collaborative environment fostered by the faculty, many projects could be approached that may have not been possible without the varying perspectives brought to the table.



### **What is your area of research?**

In short, my research primarily consists of metal processing and alloy design and development. My thesis work is on the development of a near-congruent, lead-free copper-manganese casting alloy. As a secondary project, I have also worked on large strain extrusion machining, a severe plastic deformation process, and the effect of the as-cast microstructure on the resultant strip produced during the deformation processing.

### **Have you been involved in any student organizations while at Purdue? If so, which ones?**

During my time here I have been heavily involved in the Materials Science and Engineering Graduate Student Association (MSEGSA) as the president (2012-2013) and as a member of the recruitment committee (2011-present) and safety committee (2012-present), which received the inaugural Presidential Safety Award. I was also on the head search committee as a graduate student representative.

Outside the materials department, I have participated in recruitment activities for the College of Engineering. This includes the Big Ten Expo and the Return to Recruit program, which sends graduate students to their respective undergraduate institutions to try and gain prospective students.

### **Why would you recommend this department to others who are still deciding on an area of study?**

Materials are an important factor in all engineering problems. For this reason, students and faculty with backgrounds ranging from mechanical engineering to polymer chemistry come to this graduate department to work on important materials problems. The materials engineering department

at Purdue exemplifies this diversity allowing for students/faculty with different educational backgrounds to approach problems from varying viewpoints. Alumni from this department have gone to work in a wide array of fields from steel mills to the space program and everywhere in between. It's the support from these Purdue alumni that aid in the continued success and growth of this unique department.

### **How do you plan to use your knowledge and experience gained at Purdue University in the future?**

The community in the School of Materials Engineering at Purdue has given me tools in communication, leadership, and taught me to be a better researcher. While I believe that my career path is leading towards a job in industry, these are abilities that will translate into any career path. In the future, I plan to utilize this skill set, in a research environment, to lead interdisciplinary teams to address problems that not only affect the materials community but a range of disciplines.



2014

# Outstanding Materials Engineer Award Recipients



**Mr. Timothy S. McCrea**  
Technical Service Manager  
*ArcelorMittal*

Mr. Timothy S. McCrea is a Technical Service Manager at ArcelorMittal (formerly Inland Steel Co.) servicing the General Motors North American facilities since 2011. He has over 35 years' experience in the steel industry starting as a co-op student at Inland Steel Company in 1979. After completing his MSE BS degree in 1983, he began working in the Quality Department, advancing to Senior Supervising Engineer, then Steel Finishing Operations Manager in 1993. He has held various management positions in maintenance, operations and quality assurance while assisting with the development and improvement of cold rolled based advanced high strength steels (AHSS) for the automotive market.

Mr. McCrea was an active member of the AISI Metallic Coated Sheet Practice Committee from 2003-08 acting as secretary ('06) and committee chairman ('06-08) for the bi-annual meetings. In 2004, the Galvanizers Association presented Mr. McCrea with the Outstanding Author Award for his technical paper, "Ispat Inland Experience with Ceramic SERs in Horizontal Galvanize Line." He has been a member of the Materials Engineering Advisory Committee at Purdue University since 2009, and as the lead recruiter for ArcelorMittal, he has been instrumental in hiring numerous MSE graduates over the last seven years.

In addition to his BS degree from the West Lafayette campus, Mr. McCrea received a BSE in mechanical engineering from Purdue Calumet in 1993.



**Dr. Janet M. Sater**  
Research Staff Member  
*Institute for Defense Analyses,  
Science and Technology Division*

Dr. Sater received her M.S. and Ph.D. degrees in Materials Science and Engineering from Purdue University and her B.S. degree in metallurgical engineering from Grove City College. She is currently a Research Staff Member and Task Leader in the Science and Technology Division of the Institute for Defense Analyses, providing the Department of Defense input on science and technology policy;; advanced composite materials, metal matrix composites for high temperature applications; smart/multi-functional/adaptive materials and structures; and exoskeletons and robotics. Dr. Sater actively participates in many professional societies at the local and national level. She is an active leader and organizer of several conferences, including the ASME Smart Materials, Adaptive Structures and Intelligent Structures or SMASIS conference, the CANSMAST International Workshop on Smart Materials and Structures, and the SPIE Smart Structures and Materials Industrial and Commercial Applications Conference. She has authored/co-authored a number of open access and limited distribution publications and presentations, including a book chapter for AIAA on future aerospace structures technologies. She received the SPIE Smart Structures and Materials Lifetime Achievement Award in 2006, and was named a Fellow of ASM International in 2012.



**Dr. Richard D. Sisson**  
Dean of Graduate Studies  
*George F. Fuller Professor  
Mechanical Engineering*

Richard D. Sisson, Jr. is Dean of Graduate Studies, George F. Fuller Professor, and Director of Manufacturing and Materials Engineering at Worcester Polytechnic Institute. Professor Sisson has been with WPI for 30 years. In addition, he has taught at Virginia Polytechnic Institute and has been a research metallurgist with DuPont Savannah Laboratory and a staff engineer with Exxon Chemical Company.

Professor Sisson received his BS in Metallurgical Engineering from Virginia Tech in 1969 and an MS in 1971. In 1975 he earned a Ph.D. in Metallurgical Engineering from Purdue University. Professor Sisson's main research interest is the application of the fundamentals of diffusion kinetics, modeling, and thermodynamics to the solution of materials problems.

His research has resulted in over 200 publications and another 200 technical presentations. In addition, Professor Sisson has been recognized by WPI for his excellent teaching and research with the inaugural Chairman's Exemplary Faculty Prize in 2007. He has also been recognized with Virginia Tech College of Engineering Academy of Engineering Excellence 2006 and at WPI as the ME Outstanding Advisor, awarded Morgan Worcester Distinguished Instructorship for 2006. He was the WPI Trustees Award winner as Teacher of the Year in 1987. He has advised 12 Ph.D. students.



## Alumni Profile: Bob Simcoe

MSE alumnus, Charles "Bob" Simcoe received a degree in metallurgical engineering from Purdue University in 1950. His interest in metallurgy was realized in 1943 after he completed a sixth-month course in metallurgy and welding in the United States Navy. After his discharge from the Navy, he enrolled at The Ohio State University (OSU) on the G.I. Bill and attended classes for the next two years. At that time, OSU offered only a five-year degree option, and the G.I. Bill covered only four years. That, coupled with the fact that he already had a family of two and had to commute to campus, encouraged him to seek a transfer to Purdue.

Simcoe says he enjoyed Purdue and the lifestyle it provided, from living on campus in married student housing, to biking to class, to the courses he took both in metallurgical engineering as well as events and activities outside the School. One of Simcoe's fondest memories is studying production metallurgy under Professor John L. Bray, who Simcoe says was an amazing teacher. After graduation, Simcoe's first job was with Westinghouse Atomic Power Division in Pittsburgh, where he studied the mechanical properties of zirconium, the structural metal for the atomic reactor in the submarine, Nautilus. After two years with Westinghouse, he returned to his hometown of Columbus, Ohio, and began working at Battelle Memorial Institute, the largest metallurgical research laboratory in the country. In this role, he worked on alloy steels and hydrogen in steel and titanium.

In 1958, Simcoe accepted an offer to manage alloy development at Armour Research Foundation, a laboratory located on the campus

of Illinois Institute of Technology (IIT) in Chicago, where he oversaw a team that worked on titanium, aluminum, alloy steels, columbium and other alloy systems.

Later, from 1964 until he retired in 1985, Simcoe held various positions with Simonds Steel, a manufacturer of tool steels, high-nickel alloy steels, nickel-based alloys and jet engine alloys. Here he held positions of increasing responsibility beginning with assistant laboratory director, materials manager, and finally advancing to vice president of sales and marketing.

Even after retirement, Simcoe's interest and involvement in the field of metallurgy has remained high. He taught metallurgy at the University of Buffalo for six years, and during that time, as a hobby, began writing about the history of metallurgy. Currently, Simcoe is writing for the American Society for Metals International's (ASM) Advanced Materials & Processes Magazine, an organization to which Simcoe has belonged for 65 years.

## Outreach in Action

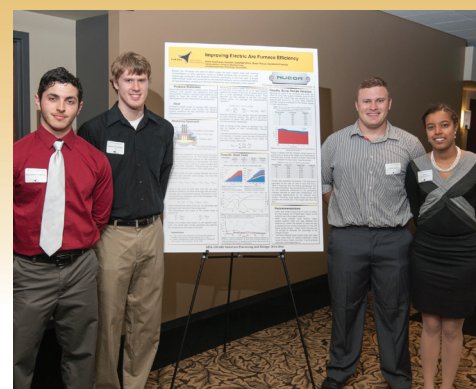
Every summer the 4-H organization brings high school students from across the state of Indiana on a 2-day visit to Purdue for the Engineering Science and Technology Workshop. The 40-45 youth in attendance are divided into three groups (12 to 15 youth each) and participate in three concurrent morning sessions that run for 50 minutes featuring programs on the engineering side of campus. Another set of three sessions is run in the afternoon hosted by programs on the agriculture side of campus. Materials Engineering has sponsored a session over the past two years titled "You Can't Make it Without Materials" where we introduce concepts of material processing, microstructure, and material characterization and testing through a series of hands-on activities.

Prof. Howarter has led these workshops, usually with some assistance from graduate students. This year, Travis Thornell and Matt Krafcik helped run activities which included experiments and demonstrations derived from MSE 235 and 367 labs and an undergraduate research project from MSE rising senior Sophie Ydstie (advised by Prof. Erk). Quoting Prof. Howarter, "We pack a lot of activities into 45 minutes, which is good because I think the students walk away with a very comprehensive introduction into the field of Materials Engineering. We do so much hands-on instruction with our undergraduates so it's very straight-forward to translate those instructional moments to pre-college outreach like the 4-H event."





# MSE Student Night 2014



Each spring, the School of Materials Engineering invites students, industry partners, faculty and staff to celebrate the accomplishments of MSE undergraduate and graduate students during MSE Student Night. This year's event, made possible by our generous sponsors, welcomed nearly 200 attendees to the press boxes of Ross-Ade Stadium.

This annual event recognizes the achievements of MSE students through the presentation of various awards, while simultaneously promoting networking between the various stakeholders in attendance. MSE seniors explain their capstone projects to leading industry professionals while being given the chance to thank their project sponsors in person. Underclassmen gain a better picture of their future as MSE students and have the chance to discuss other opportunities such as internships and Co-Ops in a comfortable setting.

Thanks to our 2014 MSE Student Night sponsors.



## Student Award Recipients

### MSE Outstanding Graduating Graduate Student

Winnie Tan

### MSE Outstanding Graduating Senior

MaryBeth Pavlick

### John L. Bray Memorial Award

Logan Williams

### Estus H. and Vashti L. Magoon Graduate Teaching Award

David Guzman

### Teaching Academy Teaching Award

Alexander Plotkowski

### Outstanding Graduate Student Teacher (CETA)

Kara E. Luitjohan

### Reinhardt Schuhmann, Jr.

### Best Undergraduate Teacher Award

Eric Kvam

### College of Engineering Outstanding Graduate Student Researcher

Bivas Saha

### College of Engineering Outstanding Graduate Student Service Scholarship

Jairo Diaz Amaya

### National Science Foundation Graduate Research Fellowships

Alexandra Bruce

Michael Heiden

Lisa Rueschhoff

### National Defense Science and Engineering Graduate Fellowship

Kate Reeve

# Materials**Matter** @Purdue

School of Materials Engineering  
Neil Armstrong Hall of Engineering  
701 West Stadium Avenue  
West Lafayette, IN 47907-2045

## UPCOMING EVENTS

### **Mark Your Calendar!**

**September 19, 2014**

**MSE Alumni and  
Current Student Mixer**

**5:30 – 7:00 pm**

*(grassy area outside at west end)*

**Neil Armstrong Hall of Engineering**

**Cost: Free**



**October 13, 2014**

**MSE Alumni Reception at MS&T Conference**

**6:30 – 8:00 pm**

**Tonic Bar & Grill, 971 Liberty Avenue, Pittsburgh, PA 15222**

**Cost: Free**

**March 16, 2015**

**MSE Alumni Dinner at 2015 TMS Annual Meeting**

**7:30 pm**

**Orlando, FL (location TBD)**

**Friday, May 1, 2015**

**MSE Graduate Student Poster Session**

**10:00am – 12:00pm**

**Atrium (located on the West end of the building)**

**Neil Armstrong Hall of Engineering**

**Cost: Free**

For additional information about these events or to RSVP, please contact Lisa Stacey at 765-494-4100 or at [staceyl@purdue.edu](mailto:staceyl@purdue.edu).



***It has been an MSE tradition over the last 50+ years to capture photos of the incoming students each year.***

Early on, these pictures were taken in groups by class. While we have worked diligently to maintain this collection of photos, several years have come up missing. We are hoping that alumni from those classes might be able to help us recover these lost years. If you have class pictures taken during the years of 1953-58 and 1960-64, and would be willing to share those with the School, please email Donna Bystrom at [bystrom@purdue.edu](mailto:bystrom@purdue.edu).