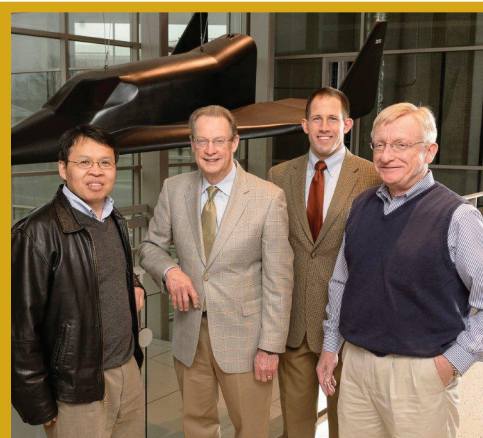


# Materials *Matter* @Purdue

2015 Annual Report



New Faculty Members





# A Message from the Head



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Dear Friends of Purdue Materials Engineering,

I'm happy to share some exciting highlights from the School of Materials Engineering from 2014-15, and a bit about the direction we're heading in for the 2015-16 School year.

The growth in the College of Engineering continues; there are over 7,800 total undergraduate engineering students and MSE has over 150 enrolled (sophomore-senior). In the spring of 2015 we graduated 54 BS MSE's. Combined with the 20 Ph.D.'s and 7 MS degrees over the year, this is the largest graduating class ever in MSE at Purdue. This year we will have over 100 graduate students enrolled (30 new graduate students in 2015), again, making this the largest group to date. And, we're more diverse than ever: for the third consecutive year, MSE had the highest fraction of undergraduates from minority groups traditionally under-represented in Purdue's College of Engineering, and our graduate students are 30% women. With our continued growth, we are now one of the top 10 largest MSE programs in the country.

If you ask around the School you'll hear buzz not only about class sizes, but about faculty hiring; 2015 is a banner year for new faces within MSE. We were able to hire four amazing faculty members this past year; there's more about Professors Shriram Ramanathan, Kenneth Sandhage, and Anter El-Azab in this newsletter, and we are very excited to have them here this fall. We have also hired Dr. Michael Titus, who is deferring his arrival until Dec. 2016 as he was awarded a Humboldt Fellowship to carry out post-doc work at the Max-Planck Institute for Iron Research in Düsseldorf, Germany. We are continuing to hire, and expect to add another 2 or 3 faculty over the next year. As always, check out the MSE website for news from the School ([www.purdue.edu/mse](http://www.purdue.edu/mse)).

This edition of the MSE annual report highlights MSE's senior design program; we had 14 unique projects in 2014-15, and 12 projects in 2015-16. Four new companies signed up to provide sponsorship and real-world problems for our seniors. These sponsors provide the financial resources and the time commitment of their engineering staff to work with our students on problems that make a difference.

We're working to reach more alumni; building our network between students and alumni is critical to student success and maintaining the friendly atmosphere in MSE. We hope you will be able to attend the School's events: current student, friends, and alumni mixer on campus Friday evening, September 25th, an alumni reception at MS&T, and a reception at TMS. If you regularly attend MS&T or TMS, our events will take place on Monday evenings. Please contact Robyn Jakes, Director of Development for the School, if you would like more information. We're still adding to our School LinkedIn group (Purdue Materials Engineering) for those of you so inclined to interact with us and each other electronically. And if you're on campus please let us know.

I look forward to hearing from you this year, and hope to share more exciting developments from the School over 2015-16.

Hail Purdue,

**Dr. David F. Bahr**

Professor and Head of Materials Engineering

**On the Cover (L to R)**

Laura Pelaez Vigna and Steve Ferdon at MSE Student Night

New MSE faculty: Drs. Michael Titus, Shriram Ramanathan, Anter El-Azab, Kenneth Sandhage

Leadership team for IACMI: Drs. Wenbin Yu, Byron Pipes, Jonathan Godsell and Ronald Steuterman

**PURDUE**  
UNIVERSITY



### 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 Engineering.



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

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To make a gift to the School of Materials Engineering, please contact:

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[rjakes@prf.org](mailto:rjakes@prf.org)  
Or click the "Giving" link on our homepage.

Purdue is an equal access/equal opportunity university.

# Welcome New Faculty Members



The School of Materials Engineering is pleased to announce that **Dr. Michael Titus** will be joining the faculty in the School of Materials Engineering. Dr. Titus obtained his Ph.D. in the spring of 2015 from the University of California Santa Barbara (UCSB), and also holds a B.S. in Engineering Physics (2010) from The Ohio State University. During graduate school at UCSB, he worked in the research group of Professor Tresa Pollock, and his research included processing, structure, and high temperature properties of Co-based superalloys. He utilizes single crystal casting methods (Bridgman) to create novel alloy systems that he tests and further characterizes using high performance electron microscopy. Dr. Titus is interested in linking solute interactions with crystalline defects to macroscopic deformation mechanisms, and he utilizes first-principles calculations and statistical mechanics to model these interactions.

Dr. Titus has recently accepted the prestigious Humboldt Fellowship, and will spend the next year as a postdoctoral researcher in Germany. As such, he will defer his arrival to Purdue until 2016. He looks forward to developing a unique suite of tools here at Purdue for creating the next-generation of high performance, high temperature metallic alloy systems.



Purdue Materials Engineering is pleased to announce the addition of **Dr. Shriram Ramanathan** to the MSE faculty. Dr. Ramanathan hails from Harvard University where he held the position of Associate Professor in the Materials Science Department since 2010. He received his Bachelor's Degree in Metallurgical Engineering from the Indian Institute of Technology in India in 1996, his Master's Degree in Materials Engineering from the University of Houston in 1997, and his Ph.D. in Materials Science and Engineering from Stanford University in 2002. In addition to serving as an Assistant Professor at Harvard University from 2006-2010, he also served as Researcher/Senior Process Engineer in Components Research at Intel Corporation from 2002-2005.

Dr. Ramanathan's research focuses on thin film materials synthesis, electronic devices, and new materials for solid oxide fuel cells, and he has received numerous awards including National Academies Keck Futures Grant in 2014, after being named a Kavli Fellow Lecturer by the United States National Academy of Sciences in 2012. In 2011, he received the Robert Lansing Hardy Award from The Minerals, Metals and Materials Society (TMS), as well as the CAREER Award from National Science Foundation in 2010.



The School of Materials Engineering is pleased to welcome **Dr. Anter El-Azab** to the faculty. Formerly a Professor in Nuclear Engineering at Purdue University, Dr. El-Azab's current research and teaching interests are closely aligned with MSE. Dr. El-Azab obtained a Ph.D. in Nuclear Engineering from the University of California, Los Angeles, in 1994, and an M.S. and B.S. in Nuclear Engineering, both from the University of Alexandria, Egypt in 1989 and 1986, respectively. His research interests include: structure, thermodynamics and kinetics of materials, mesoscale mechanics, radiation effects in nuclear materials, surfaces and interfaces in materials, and computational methods in materials science.



The School of Materials Engineering is excited to welcome back one of its own, **Dr. Ken H. Sandhage**. Dr. Sandhage, who received a B.S. in Metallurgical Engineering with Highest Distinction from Purdue University and a Ph.D. in Ceramics from the Massachusetts Institute of Technology, returned to MSE as the Reilly Professor of Materials Engineering in August 2015. After working as a Senior Scientist on the processing of optical fibers at Corning, and the processing of oxide superconductors at American Superconductor Corporation, he joined the Department of Materials Science and Engineering at The Ohio State University (1991). In 1999-2000, Sandhage was a Humboldt Fellow in the Advanced Ceramics Group at the Technical University of Hamburg-Harburg. In 2003, he joined the School of Materials Science and Engineering at the Georgia Institute of Technology, where he has since been the B. Mifflin Hood Professor. Sandhage's current research is focused on the gas/solid and liquid/solid reaction processing, and conformal coating (via wet (bio) chemical strategies), of biogenic and synthetic structures to yield functional 3-D materials for energy, chemical, environmental, optical, medical, defense, and aerospace applications. This research has yielded several patented methods for fabricating complex-shaped, chemically-tailored materials, including the Displacive Compensation of Porosity (DCP) process for generating 3-D macroscale/microstructured ceramic/metal composites and the Biological Assembly and Shape-preserving Inorganic Conversion (BASIC) process for fabricating 3-D microscale/nanostructured materials. Sandhage is a Fellow of the American Ceramic Society.

# Outstanding Materials Engineer Award Recipients



**Dr. Frank R. Cichocki, Jr.**  
Associate Director  
Research and Development  
**Ethicon Inc.**

Dr. Frank R. Cichocki, Jr. received his Associate's Degree in Aviation Technology from Purdue in 1992, followed by a Bachelor's, Master's and Ph.D. in Materials Engineering in 1995, 1997, and 2000, respectively.

In his present position as Associate Director of R&D at Ethicon, Inc. (a Johnson and Johnson company), Dr. Cichocki leads a team of engineers and technical specialists with responsibility for the needles and the metallurgy technical platform involving the development of new surgical needles and the ongoing support of Ethicon's suture portfolio on a global basis. He manages various facets of new product development, including exploratory research, materials processing and characterization, medical device development, and product implementation. Prior to this position, which he has held since 2013, Dr. Cichocki held multiple positions with Ethicon including: Manager of Research and Development, Staff R&D Engineer, Senior R&D Engineer, and R&D Engineer. Before joining Ethicon Inc. in 2002, he worked as an R & D Engineer at the Owens Corning Science and Technology Center(2000-2002) on composite materials development. He was a guest researcher in the Metals Research and Technology division of Daimler-Benz Corporation in Ottobrunn, Germany in 1999, and he spent the summer of 1996 as a visiting student at the Technical University of Darmstadt, in Germany working in composites processing and fracture analysis.

Dr. Cichocki holds 16 U.S. patents, along with multiple international patents, and has published journal and conference articles in the fields of materials science, composites, biomaterials, and medical devices. In addition, he is a recipient of Johnson and Johnson's Philip B. Hoffman Research Scientist award(2008) for his outstanding contributions leading to the advancement of the standards of care in surgery. While at Purdue as a graduate student in the School of Materials Engineering, he received the Magoon Award for Excellence in Teaching and the Outstanding Graduate Student Teacher Award in 1998 and 1999, respectively.



**Mr. Robert A. Hull**  
Vice President (Retired)  
**Hiler Industries**

Robert A. Hull received his Bachelor's degree in Metallurgical Engineering from Purdue University in 1965 and an MBA from the University of Michigan. In 1975, after working as an Engineering Supervisor at John Deere for 7.5 years, Mr. Hull went to work for Kingsbury Castings (which along with Accurate Castings, falls under the umbrella of Hiler Industries), a foundry that his father co-founded with Robert Hiler Sr. in 1969. He quickly became Plant Superintendent after spending many hours working on set-ups, molding, and pouring to learn every aspect of the foundry business.

Mr. Hull played an integral role in implementing the technology improvements that came with the addition of ductile iron, which was developed in the late 1940's as a stronger, more versatile alternative to gray iron. In the early 1970's, Kingsbury Casting was producing both gray and ductile iron, but by 1978 they began to focus exclusively on Ductile Iron. Mr. Hull played a major role in insuring that Hiler Industries remained at the forefront of technology as the industry advanced over the next 30 years. Today the U.S. produces more tons of Ductile Iron castings than Gray Iron castings.

In 1982, Mr. Hull was promoted to Vice President. Under his leadership, Kingsbury Castings was one of the first foundries in the U.S. to use the Shell Mold Process invented by J. Croning of Germany during WWII. Mr. Hull used his knowledge of foundry tooling to head up the company's efforts in the area of tooling production, and today, Kingsbury Castings is the largest and only foundry in the country producing Ductile Iron using the Shell Mold Process exclusively.

Later in his career Mr. Hull was given management responsibility for both of Hiler Industries foundries: Kingsbury Castings which produces Ductile Iron Shell Mold castings and Accurate Castings which produces Gray Iron Shell Mold castings as well as other specialty irons.

Mr. Hull retired in 2005, and still serves on the Board of Directors of Hiler Industries.

As a leader in adopting new casting technologies and implementing them successfully in industry, Bob has had a significant impact in bringing innovation to the field, serving both commercial and military customers with a wide range of products. He has been active in, and ensured Hiler was active in, supporting professional societies and commercial consortiums, such as AFS and the Indiana Cast Metals Association.





**Dr. Nicholas W. Medendorp, Jr.**  
Vice President, Medical Devices  
**Novan Therapeutics**

Dr. Nicholas Medendorp, Jr. graduated with a Bachelor of Science degree in Material Science Engineering from Purdue University in 1993 where he was also a member of the International Fraternity Phi Gamma Delta. Dr. Medendorp pursued his thirst for knowledge by extending his senior project into a master's program under the guidance of Professors Kevin Trumble and Keith Bowman. His work with ceramic - metal composites led to a deeper understanding of the interaction with Ag effect on the process of Bi-based superconductors. He graduated with a Master of Science in Metallurgical Engineering in 1995. His master's work uncovered a unique phase change that occurred with the high-T<sub>c</sub> superconductors that caught the eye of Professor David Gaskell. This collaboration with Professor Gaskell led to a Ph.D. project in which the phase stability of Bi-based superconductors was intensely investigated. Dr. Medendorp graduated in 1998 with his Doctor of Philosophy degree in Material Science Engineering.

Dr. Medendorp began his commercial product career at Motorola, Inc. by joining their Phoenix Corporate Research Lab in Tempe, AZ. As a Technical Staff Engineer he worked on state-of-the-art advances in development of gate oxide materials for GaAs MOSFET devices. Dr. Medendorp realized that there was more to commercialization of products than just basic materials research. He transitioned to Agility Communications, Inc. in Santa Barbara, CA where he grew from a Product Manager into the Operations Manager that commercialized an industry leading tunable laser transponder. This novel product line was one of the lead assets that led to the acquisition by JDS Uniphase in 2004.

After the JDSU acquisition, Dr. Medendorp traveled to Durham, NC to join Cree, Inc. where he was part of the creation of the LED Components division. In this start-up division, Dr. Medendorp held many crucial leadership positions as Director of Operation, Director of Marketing, and Director of Research & Development. Dr. Medendorp played a vital role in development of this technology and commercialization of the first Lighting Class LED component. Dr. Medendorp left Cree Components in October 2007 to join other like-minded entrepreneurial leaders at LED Lighting Fixtures, Inc. There they developed the first high efficiency 6" LED down light with CRI greater than 90. This novel technology and leadership was in high demand and Cree, Inc. acquired LED Lighting Fixtures, Inc. in February 2008. This was the foundation for the Cree Lighting Division. Dr. Medendorp served in a variety of senior leadership positions in the Cree Lighting division as he was responsible for manufacturing, supply chain, engineering, and compliance as Vice President of Operations. Dr. Medendorp then transitioned into a technology leadership position that enabled Cree to rise as an industry technology leader. As Vice President of Research & Development for Cree Lighting, he was responsible for product development, engineering, compliance, and advanced technology development.

Dr. Medendorp has more than 50 issued U.S. patents and continues to focus on creative technology solutions for hard-to-solve problems.



**Dr. Lisa Veitch**  
Research Staff Member  
**Institute for Defense Analyses,  
Science and Technology Division**

Dr. Lisa Veitch graduated in 1983 with a Bachelor of Science in Ceramic Science and Engineering degree from Penn State University. She gave the commencement speech that year at the Penn State New Kensington Campus (PSUNK) where she started her academic career as well as in 2013.

In 1983, Dr. Veitch went to work at Delco Electronics, as a production line engineer on the semiconductor line. She returned to school part-time at Purdue University where she obtained her Master's Degree in Materials Science and Engineering in 1986. Upon receiving her degree, she returned to school full-time to obtain her Ph.D. in the same discipline (degree granted 1989).

After graduating from Purdue with her doctorate, Dr. Veitch became a researcher at NASA Glenn Research Center in 1989. She also spent a year at NASA Langley Research Center as the Deputy Technical Integration Program Manager for the High Speed Research Program.

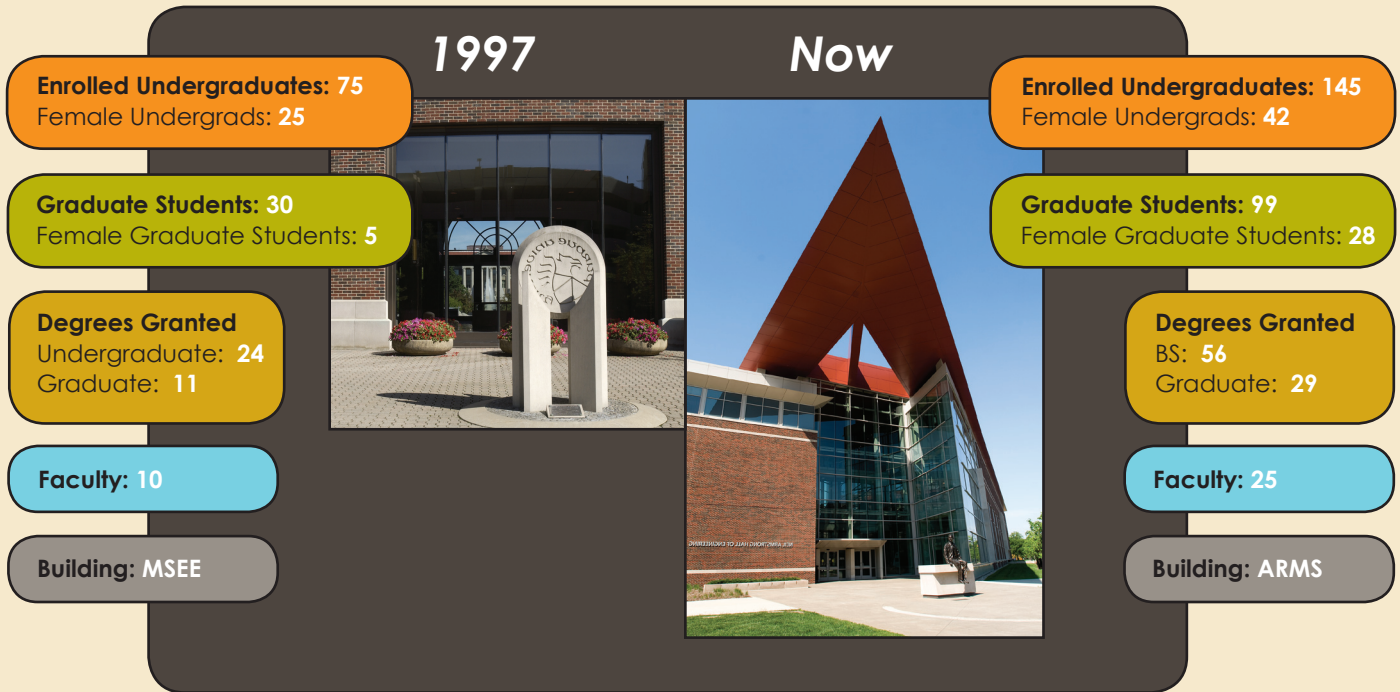
In 1996, she joined the Institute for Defense Analyses (IDA) in Alexandria, VA. Dr. Veitch has been involved in a number of new weapon systems over the last 19 years including the Joint Strike Fighter, Comanche Helicopter, and the Presidential Helicopter, and her assessments have led to either the Defense Department restructuring the program or have supported their decision to terminate the programs. She has also been involved in a number of modernization programs (CH-47 Chinook helicopters and UH-60 Blackhawk helicopters) as well as new technologies that the Defense Department is developing to increase effectiveness on the battlefield. Throughout Dr. Veitch's career, she has authored or co-authored over 40 publications and filed a patent for a coating she developed for ceramic materials at NASA.

Over the years, Dr. Veitch has been involved in a variety of professional societies including the American Ceramic Society, the American Institute for Aeronautics and Astronautics, SAMPE, and the Air Force Association. She also served on Penn State University's Women in Engineering Board from 1999-2001. She has received several awards and honors including Plum Senior High School Distinguished Alumni Award in 2011, Exceptional Performance Award from NASA Vehicle Systems Program in 2004, the 2004 NASA TGIR Award for the Supersonic Flight Demonstration, Honorary Exemplar for the Ohio Academy of Science, the National Defense Industrial Association (NDIA) U.S. Office of the Secretary of Defense (OSD) Contractor Tester of the Year Award, Special Services Award from NASA Glenn Research Center, Tau Beta Pi, Alpha Sigma Mu, and Keramos.

Dr. Veitch has also given back to the community. She has given seminars in classes at Plum Senior High, Penn State New Kensington Campus, and a variety of schools in the Cleveland area and other parts of the U.S. on her experiences and the importance of math and science. She also tutored inner city 7th graders in Cleveland as well as at a local high school in Alexandria, VA. She has mentored a number of men and women over the years pursuing degrees in engineering, all of whom have had exceptional careers.

# 18-Year Comparison

In 1997, a gallon of gas cost \$1.22, a movie ticket was \$4.59, Madeleine Albright became the first female Secretary of State in the United States, and many of this year's freshmen were born. As those freshmen bombard campus and roam through the Neil Armstrong Hall of Engineering this fall, they have yet to learn about the MSE family that they will soon become a member of. They don't yet know that when they were born the department footprint looked much different and they likely never consider that the building they currently wander through did not exist in 1997. Each school year lists of "what was it like when" come out. Here's our version of how MSE has changed over the lives of our new first year students.



## Staff Updates



The School of Materials Engineering is pleased to announce that **Stacey Coar** joined MSE in December 2014 as a department secretary. In this role, she provides administrative support to MSE faculty, as well assists with development activities and event planning. Prior to joining MSE, Stacey was employed with Purdue University from 1999-2012 where she worked in multiple areas including Continuing Education, Information Technology and Biomedical Engineering.



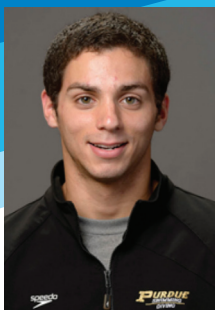
MSE Graduate Secretary, **Patti Finney**, has transitioned to a new role within Purdue University as of August 2015. She will now be working for the Division of Environmental and Ecological Engineering (EEE). In her new role as Administrative Assistant, she will be helping EEE start-up its graduate program. MSE would like to thank Patti for her nine years of dedication to the School and exceptional service to our graduate students. We wish her the best of luck with this wonderful opportunity.



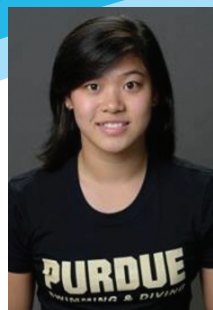
**Timothy C. VanMeter** joined Materials Engineering in November 2014, replacing David Meyer as the School's Lab Technician. Tim, an internal Purdue transfer, previously worked as an Air Quality Technician in the Animal Science Department. Prior to joining Purdue University, Tim also worked as a Scientist with Witham Toxicology Lab and an Electronics Technician with Landis + Gyr both located in Indiana.



## Undergraduate Student Profiles



**Theodore (Ted) Curtiss**



**Meagan Lim**

Purdue Engineering is known for its demanding class schedules and intensive labs, and that's part of what makes it so special. Because of that, it takes a special student to balance the academic requirements and also manage the grueling practice and travel schedule that comes along with being a student athlete. Since its inception more than 50 years ago, the School of Materials Engineering has been home to only five NCAA athletes and two of those five are current MSE juniors. Theodore (Ted) Curtiss and Meagan Lim come from very different backgrounds, but both share a love of Materials Engineering and a passion for swimming. Ted grew up in Brentwood, Tennessee while Meagan joined Purdue by way of Singapore. We caught up with Ted and Meagan to learn a little more about each of them.

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

T: I was attracted to Purdue because of its great reputation as an excellent engineering school, and I was also drawn by the great coaches that I have here. I was interested in studying materials engineering for a while before I was a high school senior, so I knew a strong materials program along with a strong swimming program was the right fit for me. The beautiful campus was a plus too.

M: Initially when looking at schools, I was focusing on the athletic side of it. After I narrowed down my school choices, Purdue stood out as I knew I wanted to major in engineering, and I really clicked with the swim coaches. Coming to Purdue, I was undecided as to which engineering discipline I wanted to do but after the engineering schools' presentations in First Year Engineering, MSE really stood out to me and it was something I really geared towards and felt like something I would really enjoy pursuing.

### **2. How long have you been swimming and what is it about the sport that draws you to it?**

T: I have been swimming since I was 6 years old, and I've stuck with the sport for so long because of the relationships I've built with friends and teammates over the years.

M: 12 years. (I started swimming competitively at the age of 7). From a very young age, I always enjoyed being in the water. I am a very competitive person by nature and racing really appealed to me. I love the adrenaline I feel before and during a race. Even though swimming is conceived to be an individual sport, in reality, I would be nowhere without my team, and I love the feeling of swimming not only for myself but also for my teammates.

### **3. What has been your greatest achievement in swimming?**

T: My greatest achievement in swimming is being able to swim for Purdue in one of the most competitive conferences in the country. I am also a Tennessee state champion in the 4x50 medley relay.

M: My greatest achievement in swimming is being a part of the Singapore National Swimming Team since 2010 and representing the nation in multiple sporting competitions. A few of these competitions include the South East Asian Games (2011, 2013, 2015), Asian Youth Games (2013), Short Course World Championships (2010) and South East Asian Swimming Championships (2012, 2014). My best performances at these international competitions was attaining 3 bronze medals at the South East Asian Games in 2013 held in Naypyitaw, Myanmar and 2 silver medals at the Asian Youth Games held in Nanjing, China.

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

T: MSE 250 taught by Professor Trice has been my favorite class because I really enjoy mechanical applications of materials, and I think Professor Trice is an excellent teacher. There was rarely a boring moment due to the way he taught the class and due to my interest in the subject matter.

M: My favorite MSE course so far has been MSE 235, the first lab course required. I felt that it was a good introduction to the lab work I will be doing in the future, and I really enjoyed the class.

### **5. How do you balance the hectic swimming practice, game and travel schedule with the difficult engineering course load?**

T: Because I've been swimming almost all my life, I am used to balancing swimming with school through discipline in my studies and time management skills.

M: It definitely is a challenge, and at times it can get a little overwhelming but to me, the key is definitely time management and discipline. Understanding professors that are willing to accommodate these schedules certainly help.

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

T: I think that the subject matter is extremely interesting, and I like that the classes are relatively small. Also the professors in MSE do an excellent job of interacting with students and helping them understand the material as best as possible.

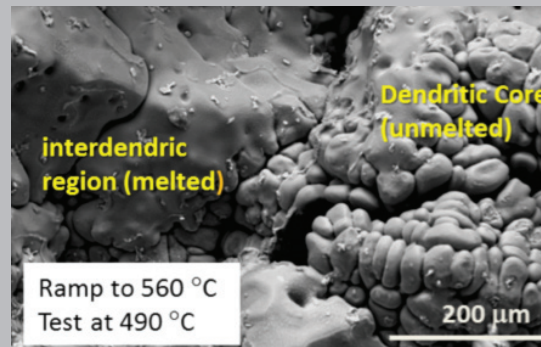
M: As MSE is not as popular an engineering discipline as compared to other disciplines like chemical or electrical, for example, not as many students choose to go into it. This in turn allows the students in the MSE department to have smaller class sizes and a really good student to professor ratio. Personally, it was one of the reasons I picked MSE as I felt that it would enable me to have more interaction with professors, which could really benefit me in college and the future.

## Faculty Profile: Dr. David R. Johnson



Professor Johnson has been on the faculty in Purdue's School of Materials Engineering since 1998, after four years on research staff at Kyoto University in Japan. He holds two graduate degrees in metallurgical engineering (M.S.E, 1990; Ph.D., 1994) and a B.S. in engineering science and mechanics (1987), all from the University of Tennessee. He works on development and processing of high temperature structural materials, including the development of specialized solidification processing techniques to grow single crystals of high temperature alloys with exceptional purity. Professor Johnson is a founding member of the Purdue Center for Metal Casting Research and co-advises four graduate students working on the development metal alloys, and understanding and defect formation during solidification through modeling and experiment. His current research includes the ultra-purification of gallium used in the MBE growth of

semiconductor nanostructures (with Professors Kevin Trumble and Mike Manfra), investigating the role of boron in defect formation during the production of high strength, heat treatable steels (with Professors Matthew Krane and Volkan Ortalan) and, the solidification and deformation processing of high strength aluminum alloys (with Professors Krane and Trumble).



*Fracture surface from an as-cast aluminum AA750 tensile bar tested at high temperature. Casting segregation resulted in local melting of the interdendritic areas during testing.*

## Faculty Promotions



**Professor Matthew J.M. Krane**  
promoted from Associate Professor to Full Professor



**Professor Jeffery P. Youngblood**  
promoted from Associate Professor to Full Professor

## Faculty Awards

### **Professor Kendra Erk**

#### **2015: NSF CAREER Award**

This award supports junior faculty who exemplify the role of teacher-scholars through outstanding research, excellent education, and the integration of education and research.

#### **2014 TA Instruments' Distinguished Young Rheologist**

This award is designed to help accelerate the research of new academics through grants for rheometer systems.

### **Professor John Howarter**

#### **2015 TMS Young Leader Award from the Extraction and Processing Division of TMS.**

The award was created to enhance the professional development of dynamic young people from TMS' five technical divisions by helping them participate in Society activities, become better acquainted, make important contacts with TMS leaders, and network with prominent Society members.

#### **2014-2015 Teaching for Tomorrow Fellowship Award**

This award recognized 12 faculty from across campus and provided a mentoring and networking platform to further develop teaching skills and strategies.

#### **2014-2015 SSEE Instructional Excellence Award**

This award is to recognize an Environmental and Ecological Engineering (EEE) faculty member for outstanding achievement in the area of teaching. Students in the EEE undergraduate degree program vote for an outstanding instructor based on the faculty member's commitment to student success, ability to effectively communicate material to students, and desire to motivate students to learn.

### **Professor Ernesto Marinero**

#### **2014 American Physical Society (APS) Fellow**

This award honors APS members who are deemed by the Society to have made exceptional contributions to the physics enterprise.

### **Professor Christopher Owen**

#### **Purdue Engineering Professional Education Distance Teaching Award**

This award recognizes the outstanding contributions of distance education faculty and is based on nominations from distance students.

### **Professor Elliott Slamovich**

#### **Reinhardt Schuhmann, Jr. Best Undergraduate Teacher Award**

This award recognizes the best undergraduate teacher in MSE as voted on by MSE undergraduate students.



## Graduate Student Profiles

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

L: Purdue University is a great institution, and I was able to live here before applying to graduate school. I came for an internship in the Materials department, working for Professor Alejandro Strachan, my current advisor. That time here helped me to see the work that people in Materials Science were doing, get involved with the activities on campus and interact with some of the graduate students. All the possibilities at the University, the program, the professors and the good relations between Colombia and Purdue attracted me to apply.

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

A: Being in MSE has shown me that some of those things you learn from your classmates, working in the lab on a daily basis or a simple chat with your professor in the hallway are much more powerful than you thought at the beginning. Additionally, as a Colombian it makes me pretty happy to see that more people from my country are coming to Purdue, not only for grad school, which is great, but also for internships, summer camps and even commercial and entrepreneurship purposes.

### 3. What is your area of research?

A: I'm developing a new method for processing ceramic materials, more specifically, boron carbide. Its low density and high hardness make it attractive, but so far it is commercially produced in simple shapes with poor mechanical properties in some cases. The goal of my Ph.D. is to find a way to obtain components with complex shapes and good mechanical properties. We do that using water based suspension and, with the addition of some other ceramics, we look to improve the mechanical response. Hopefully, what we are learning now could be used for application such as armor, wear protection and additive manufacturing in the future.

L: In my group, we work on atomistic and molecular simulations to describe the materials. I am part of the polymers area using Molecular Dynamics to understand the behavior under certain conditions.

E: I'm in the soft materials mechanics group. I specifically work with the nanofabrication of polymeric filtration membranes under the guidance of Professor Kendra Erk. In general, we focus on flow properties and rheology of soft materials.

### 4. Have you been involved in any student organizations or community activities while at Purdue? If so, which ones?

A: Yes, I'm currently the vice-president of the Colombian Student Association at Purdue, CSAP. Although we are a small community compared to other countries here at Purdue, the association is pretty active. We hold monthly academic presentations where Colombian students can share their research with other people, which helps them to improve their presentation skills, prepare for a prelim exam or a conference. We also participate in some cultural and recreational activities such as the food bazaar, summer supper series and organize some events such as July picnic, celebrating Colombian Independence Day. My role in that ranges from posting the events on our Google calendar and booking the classrooms to meeting with representatives from Colombian Universities, institutes and companies.



### Leidy (Lorena) Alzate Vargas

Hometown: Medellín, Colombia  
Advisor: Dr. Alejandro Strachan  
B.S. Degree: Universidad EAFIT



### Eduard Andres Caicedo-Casso

Hometown: Santiago de Cali, Colombia  
Advisor: Professor Kendra Erk  
B.S. Degree: La Universidad del Valle



### Andrés Díaz Cano

Hometown: Medellín, Colombia  
Advisor: Professors Trice and Youngblood  
B.S. Degree: Universidad Nacional de Colombia

E: Yes, I've been involved. I'm part of the CSAP (Colombian student association at Purdue). It is a welcoming association that cares for the well-being and development of any student that wants to be part of the association.

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

L: I would recommend it first because the department has excellent professors. They are always there to help you with your learning and your progress; the equipment in the department is also very good, so you will have everything you need to do research. Also it is a very international department, with students from everywhere in the world and that is something amazing. If you really want to learn and work with materials, I think MSE at Purdue is one of the best options.

A: Materials are everywhere, from your shoes or food up to the devices we are going to put on Mars' surface in a couple of years. What that means is that the knowledge you acquire here is going to be useful in many fields. The department slogan explains it perfectly: "You can't make it without materials."

### 6. Why did you choose grad school as opposed to going straight into the workforce?

E: I have always been passionate about science, and I was not interested in working in a company. I think grad school is a really good step, to be more mature not only in your knowledge, which is very important for me, but also in your personal life. There are a lot of things you need in grad school: discipline and passion that could be hard to learn working in industry.

### 7. If you could bring one thing from Colombia to West Lafayette, what would it be?

A: During my bachelor's I used to eat in front of my university. There was this woman with a tiny ambulant food cart selling empanadas (some sort of deep fried potato tacos). My friends and I used to have them with beer on Fridays after class. If I could, I'd have an empanada cart in a beer garden.

E: Personally, I would bring a street food store and a bakery. Also, I would like to bring several holidays and carnivals to this little location. I want the local people to know a second face of Colombians that international media doesn't advertise. I also want to advertise how good our country is.

L: Definitely mountains, I really miss the geography in Colombia, very different than West Lafayette. From my city in Colombia, I will bring the nice weather.

# Indiana Manufacturing Institute

In February 2015, Purdue Research Foundation's Board of Directors approved construction of the \$50 million, 62,000-square-foot Indiana Manufacturing Institute, in support of a \$259 million, five-year initiative by the Department of Energy to develop the next generation of energy-efficient automobiles, wind energy and compressed gas storage technologies. The Institute is funded through a \$70 million grant from the Department of Energy and \$189 million pledged by industry, states (Indiana, Illinois, Kentucky, Michigan, Ohio, Tennessee and Colorado), universities and national research labs. Anchored by the Institute for Advanced Composites

Manufacturing Innovation (IACMI), the Indiana Manufacturing Institute will also house a new MSE lab for the Metal Casting Research Center. In this state-of-the-art facility, Purdue University researchers will advance

the study of composite materials manufacturing to develop more energy-efficient technologies. The IACMI groundbreaking ceremony was held on June 23rd, and the facility is scheduled to open in mid-2016.

Purdue MSE faculty member, R. Byron Pipes, the John Leighton Bray Distinguished Professor of Engineering, will



lead the Indiana-based Design, Modeling and Simulation Enabling Technology Center for IACMI.

"The research conducted by faculty, staff and students in the

**"The new Boeing 787 Dreamliner is a wonderful example of what this technology can achieve in energy savings."**

Institute will be structured to serve advanced composite

materials manufacturing R&D, and provide these technologies in a seamless transition to American manufacturing industries," Pipes said. "Advanced composite materials have broad applications due to their lightweight, proven strength and durability. The new Boeing 787 Dreamliner is a wonderful example of what this technology can achieve in energy savings."

## 2015 Student Award Recipients

**Kevin Chaput**

### **MSE Outstanding Graduate Student**

This award recognizes one student for service and activities within MSE, Purdue and the community as well as research endeavors.

### **Mathew Cherukara Outstanding Graduate Student Researcher**

This award recognizes one student who demonstrates excellence and leadership in research through publications, participation in professional organizations and willingness to mentor others.

**John Epling**

### **National Physical Science Consortium Graduate Fellowship**

The National Physical Science Consortium is a partnership between government agencies and laboratories, industry, and higher education. NPSC's goal is to increase the number of American citizens with graduate degrees in the physical sciences and related engineering fields, emphasizing recruitment of a diverse applicant pool.

**Rose Galley**

**Isabella Ramirez  
Ruocun Wang**

### **John L. Bray Memorial Award**

This award recognizes the senior student(s) with the highest grade point average.

**Benjamin Helfrecht**

### **2015 Goldwater Fellow Award**

Goldwater Scholars were selected on the basis of academic merit from a field of 1,206 students who were nominated by the faculties of colleges and universities nationwide.

**Logan Kearney**

### **College of Engineering Outstanding Graduate Student Service Scholarship**

This award recognizes one student who provides outstanding service to the graduate student community, the School, the College, and the University.

**Michael Maughan  
Samuel Reeve**

### **Estus H. and Vashli L. Magoon Graduate Teaching Award**

This award recognizes outstanding teaching assistants and instructors throughout the College of Engineering.

**Lisa Murray**

### **Selected to present at Excellence in Graduate Polymer Research Symposium**

Presentation Title: Polymer-Particle Rheological Analysis of Adsorbed Cement Additives for Improved Processing.

**Jerome Nash**

### **MSE Outstanding Senior**

This award is given for service and activities within MSE, Purdue and the community as well as for technical and academic achievements.

**Travis Thornell**

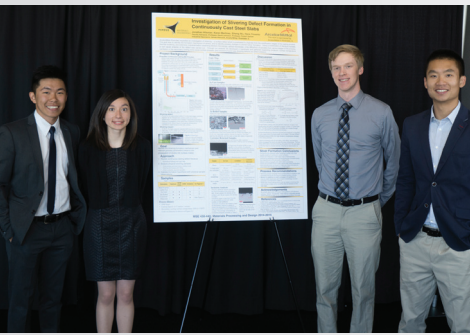
### **2015 National Science Foundation (NSF) Graduate Fellowship**

This award is bestowed upon individuals selected early in their graduate careers based on their demonstrated potential for significant achievements in science and engineering.

### **First Runner-Up in the Student Poster Competition at the 2015 Meeting of The Adhesion Society.**

Poster Title: Fracture-Healing Kinetics of Physically Associating Thermoreversible Gels





## Senior Design and Sponsors

One of the most exciting parts of being an MSE student is the opportunity to participate in hands-on lab and research opportunities. The MSE senior design program combines both of these into a year-long (fall and spring) capstone experience. MSE seniors team up in groups of four to six students to work on a real-world industry problem that allows them to gain practical experience while simultaneously allowing the company to solve an ongoing issue. An MSE faculty member will work with an engineer from the corporate partner to define a project of the right scope to fit within the constraints of a year-long project and to develop the abstract used to describe the project to the students.

If you are interested in sponsoring a project, please contact Robyn Jakes at [rjakes@prf.org](mailto:rjakes@prf.org) or by phone at 765-494-4094 for additional details.

Please visit our website: <http://eng.purdue.edu/jump/b8a2ff> to see posters from the 2014-2015 projects.



### Airforce Research Laboratory

A Colloidal Approach to Liquid Crystal Transflective Displays Making Your E-Reader Color



### Alcoa Howmet

Effects of Increased Tramp Element Content in Cast Inconel 718



### Alcoa Lafayette

Optimization of Commercial Aluminum Alloy Melting in Reverberatory Furnaces



ArcelorMittal

### ArcelorMittal

Investigation of Slivering Defect Formation in Continuously Cast Steel Slabs

### Cisco Systems, Inc.

First Insertion Failure of Dual In-Line Memory Modules



### Contour Hardening, Inc.

Thermally Initiated Material Transformation in Ballistic Projectiles



### Cummins

Fuel Systems Autofrettage Measuring Residual Stress



### General Electric

Preferential Hydrogen Diffusion from Zircaloy-2 Cladding to an Inner ZrBarrier



Global Nuclear Fuel  
A Joint Venture of GE, Toshiba, & Hitachi

### General Electric

Physical Metallurgy of Selected Zr-Alloys

### IBC Coatings Technologies, Inc.

Optimization of Diamond-Like Carbon Coatings



### IBC Coatings Technologies, Inc.

Life Expectancy of Plasma Electrolytic Oxidation Electrolyte for Aerospace Applications

### Medtronic

Reliability of Pb-Free Solder Assemblies for Non-Implantable, Medical Device Applications



### Rolls-Royce

Investigation of BSAS Environmental Barrier Coatings for Silicon Carbide Turbine Blades



Rolls-Royce

### United States Steel

Thermomechanical Model for Rolling and Cooling of Hot Rolled Steel Band



# Materials **Matter** @Purdue

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Neil Armstrong Hall of Engineering  
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## UPCOMING EVENTS **Mark Your Calendar!**

**September 25, 2015**

**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 5, 2014**

**MSE Alumni Reception at MS&T Conference**  
**6:30 – 8:00 pm**

**Ray's Living Room**  
**17 Brickel Street**  
**Columbus, OH 43215**

**Cost: Free**

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



**The TMS annual meeting** hosted in Orlando, Florida this spring featured the first ever student-run symposium led by four Purdue Materials Engineering graduate students; Andrew Kustas, Kathlene Reeve, Lisa Rueschhoff, and Kevin Chaput. The symposium, titled "Messaging Research to a Broader Audience," consisted of a morning and afternoon session with featured talks on materials science in comic books, preparing grants and proposals, and removing scientific jargon to make information accessible to the public. Presentations were given from post-doctoral researchers, national lab scientists, university professors, and program managers.

As a unique non-technical symposium at TMS, the talks attracted many students and professionals alike, with average attendance reaching 40 attendees each talk. Due to the success of the symposium, it will continue next year led by a group of students from the University of California- Santa Barbara and will focus on diversity.

