

Materials *Matter* @Purdue

2013 Annual Report



OMSE Award Recipients

A Message from the Head



Dear Friends of Purdue Materials Engineering,

I am very glad to have this opportunity to provide you with a short update about the activities and people in the School of Materials Engineering at Purdue. A year ago I arrived on campus as a new head, and tried my best to hit the ground running. And let me tell you, Purdue knows how to run...

You may have heard about the expansion of Purdue Engineering. The university has provided the College the opportunity to add approximately an additional 100 faculty positions in the next five years. This will not occur in a vacuum; a similar number of staff will be added, and of course those faculty will be adding new graduate students. This will occur while the College adds about 700 more undergrads to the yearly enrollment. We're doing this while tuition has been and will remain flat for two years, one of President Daniels' first actions in ensuring affordability for students. Materials Engineering is going to grow along with the College. We're already seeing that growth: during 2012-13 we graduated 40 BS, 8 MS and 12 PhD students, and we have about 60 students enrolled in the junior level labs, with 90 graduate students in Fall 2013.

You'll see some highlights in the newsletter from the previous year, such as exciting undergraduate research, senior design projects, and one of our faculty being named as one of the four Chairs for the Spring Materials Research Society meeting. It was also a time of transition, with the addition of a new Professor of Engineering Practice, a new instructional lab support engineer for materials characterization, and a new classroom instructor for materials processing. This spring also saw the retirement of Patti Metcalf (who was probably thanked in more students' theses than any other person in the school), and the very sad and unexpected passing of Prof. David Gaskell. There will be a memorial lecture in May 2014 honoring Prof. Gaskell's achievements and career, and we hope you can join us.

We're also getting in touch personally with our alumni and friends. We're hosting a current student and alumni mixer Friday evening before the Notre Dame game, an alumni reception at MS&T, and a dinner at TMS. If you regularly attend MS&T or TMS, MSE events will take place on Monday evenings, and please contact us if you are going to be there. Robyn Oldfather, Director of Development for the School, and I have visited alumni from CA to MA and PA to AZ over the year, and will continue to reach out to hear about your success stories, share our progress, and let you know how you can interact with and support our students. We're also starting a School LinkedIn group (Purdue Materials Engineering) for those of you so inclined to interact with us and each other electronically. With the University investing in the College, and the College investing in the School, we need your support to make sure we keep the hands on, personal touch a hallmark of our School.

I look forward to hearing from you this year, and hope to share more exciting developments from the School over 2013-14.

Hail Purdue,

Dr. David F. Bahr

Professor and Head of Materials Engineering

On the Cover

(Left) MITE students casting new alloys

(Right) 2013 OMSE Award Recipients

(L to R) Dr. Kenneth E. Blazek, Dr. Mary Lee Gambone, Mr. John E. Barnes

PURDUE
UNIVERSITY



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SCHOOL OF MATERIALS ENGINEERING

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

Head • **Dr. David F. Bahr**

Director of Development • **Robyn Oldfather**

www.engineering.purdue.edu/MSE

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

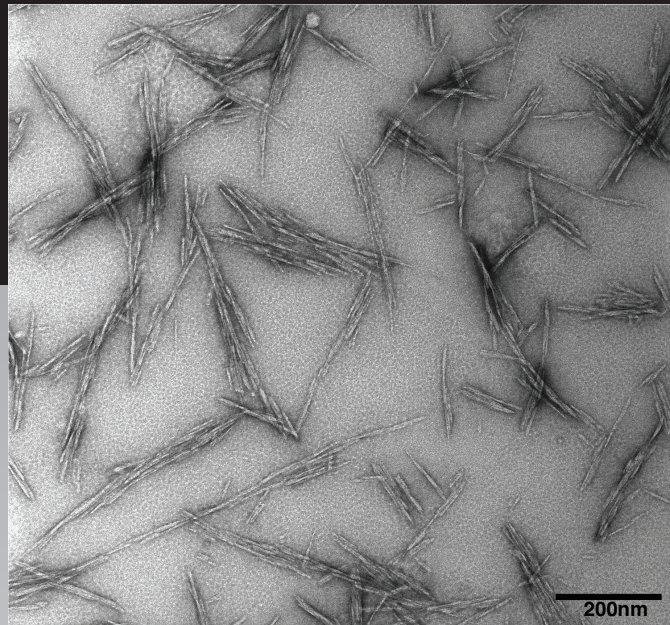
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Can You See the Forest with the Nanotrees?



You might be wondering how a metallurgist ends up working for the U.S. Forestry Service. The answer is simple, according to **Dr. Robert Moon**, Materials Research Engineer with the U.S. Forestry Service. "You can apply materials science, but it doesn't have to be with metals and ceramics. You can apply it to any materials system."

Moon, who received his B.S. in Metallurgy from the University of Wisconsin, and his M.S. and PhD in Materials Engineering from Purdue in 1996 and 2000, respectively, was hired by the USDA-Forest Service- Forest Products Laboratory (FPL) in 2005. In 2007, Moon was asked to establish and lead a joint research program between Purdue University and FPL. This program is still in existence, and focuses on providing funding to help support new research endeavors in lignocellulosic nanotechnology and biofuels research at Purdue University. This program, which is multidisciplinary, includes multiple departments at Purdue including: Materials Engineering, Food Science, Agricultural and Biological Engineering,



Dr. Robert Moon

TEM image of cellulose nanocrystals -CNCs

Mechanical Engineering, Aeronautical Engineering, Biological Engineering, Physics and Wood Science.

Considering that the program was built from the ground up just six years ago, its production is quite remarkable. Currently there are over \$1M in awards, eight faculty participants (from Aeronautical, Civil, Mechanical, and Materials Engineering), ten graduate students, publications in top journals, and a published cellulose nanomaterials review paper. These numbers continue to grow.

Due to the diligent work of Dr. Moon, and the successful collaboration

between Purdue University and FPL, industry partners have requested a similar partnership with Georgia Tech. FPL has answered this request by agreeing to send Dr. Moon to the Georgia Tech campus beginning in August. He will continue to oversee the program at Purdue, both during and after his transition.

To learn more about nanocellulose, please visit: <https://engineering.purdue.edu/nanotrees/>. If you would like additional information or are interested in becoming an industry partner, please contact Dr. Moon at robertmoon@fs.fed.us.

Stanciu Makes Global Impact

In the true spirit of Purdue global outreach, MSE has formed a partnership with the University of Sao Paulo, Sao Carlos in Brazil. In June of 2012, **Lia Stanciu**, Purdue Associate Professor of Materials Engineering, traveled to Brazil to conduct a two week intensive class on Biosensors for Environmental Monitoring. This class involved four Purdue undergraduate students (three MSE and one IE) and ten Brazilian students (from the University of Sao Paulo, Sao Carlos). During this class, the students were exposed to information on how sensing technologies are leveraging efforts towards minimizing pollution due to industrial and agricultural activities around the world. Moreover, during her stay at USP Sao Carlos, Dr. Stanciu led communications between Purdue and USP, towards establishing of an undergraduate exchange program.

As part of this program, in January 2013, twelve Brazilian students traveled to the Purdue campus. They spent the spring semester auditing classes, and conducting research in Materials, Mechanical Engineering, Civil Engineering, and Industrial Engineering. Bruna Callegari, Paulo Salgado, and Ana Carolina Honda were part of the MSE led research during their time on campus.



In similar fashion, Dr. Stanciu has also developed a strong partnership with the University of Antioquia in Columbia. In conjunction with MSE Professors Alejandro Strachan and Carol Handwerker, Dr. Stanciu participated in a Columbia/Purdue workshop for nanotechnology. This workshop was part of a larger Purdue-Colombia effort that has been ongoing for the past several years, and which involved a similar workshop held at Purdue two years ago. The workshop brought together ten Purdue researchers from various Departments and established the grounds for starting collaborations between Colombian universities, government officials, and Purdue University. Research

exchanges in the form of student recruitment, collaborative proposals, and subsequent joint participation or organization of scientific symposia at National and International conferences stemmed from this effort. Dr. Stanciu was recently named a Chair for the Materials Research Society Spring 2015 Meeting, where she'll be overseeing organizing thousands of presentations by materials researchers from around the world (probably including some from Columbia).

Faculty and Staff News

Promotions



Professor Rodney Trice promoted from Associate Professor to Full Professor



Professor Alejandro Strachan promoted from Associate Professor to Full Professor



Professor Carlos Martinez promoted from Assistant Professor to Associate Professor

We are pleased to welcome **Jameson Root** as the new Instructional and Research Support Engineer in MSE. Jameson received BS and MS degrees from Washington State University in 2008 and 2010, respectively, and was most recently employed by Idaho National Lab (INL). Prior to joining INL, Jameson served as the SEM Lab Manager at Washington State University. Jameson has published two peer-reviewed research papers and was the recipient of the MME Outstanding Researcher Award from Washington State University for the 2010-2011 academic year.

In his new role, Jameson will maintain, develop, and utilize advanced characterization tools in the School to ensure the faculty, staff, and students have access to cutting edge research tools. In addition, he will be responsible for the training of new users and will manage the electron microscopy, x-ray diffraction, and other characterization tools operated by the School.



Ernesto E. Marinero joined Purdue University in February 2013 as a Professor of Engineering Practice with joint appointments in the School of Materials Engineering and Chemical Engineering. He comes to Purdue

from the IBM Almaden Research Center and the Hitachi San Jose Research Center in California. His recent research focused on the synthesis and fabrication of nano-scale magnetic materials and devices for future magnetic storage technology. The physical understanding of the correlation of structure-property relationships to engineer materials properties and device functionality has been the underpinning of his research career in industry. At Purdue, Professor Marinero's research program will focus on nanomaterials and devices for applications in bio-sensing, energy generation and storage and for environmental needs. In addition, Professor Marinero is the Inaugural Purdue Research Foundation Deliberate Innovation Faculty Fellow. This appointment aims to catalyze transformational changes in the entrepreneurship system and includes the development of projects that can be transformational technology generators and can rapidly lead to company startups, industrial impact and economic development.

His research experience in both fundamental and applied science has been gained through appointments in Europe and the USA. This includes the Max Planck Institute in Göttingen, Germany; Stanford University, California; the IBM Almaden Research Center and the Hitachi San Jose Research Center both in San Jose, California. He is an experimentalist whose multi-disciplinary research projects have spanned diverse fields such as Chemical Physics, Materials Science, Semiconductor Physics, Synthesis of Nanostructured Materials and Thin Films, Laser Physics and Picosecond Phenomena, Laser-Materials Processing, Magnetism, Surface Science and Nanoscale Sensor Device Physics and Fabrication. His scientific work has resulted in 126 refereed journal publications as well as numerous patents in the USA (50 granted and 15 pending), Asia (32) and Europe (15). His inventions have been utilized in IBM's and Hitachi's products. Professor Marinero has effectively leveraged his research in industry through joint study agreements between his laboratory and Universities as well as the National Laboratories. He has been the Principal Investigator of 26 research projects with academic and research institutions in the USA, Europe and Latin America. Professor Marinero has participated on NSF, DARPA and DOE committees and managed a DARPA sponsored Academia-Industry Consortium. He is a member of MRS and APS where he has served in multiple capacities.

MSE is sad to announce that **Patti Metcalf** retired on April 26th, 2013. Since 2007, Patti has managed the MSE laboratories and worked closely with the faculty and students to assist them in their research efforts. Patti plans to travel and spend time with her family. She will be missed, and we wish her well.



David R. Gaskell, Ph.D. (1940 – 2013)

Dr. David Robert Gaskell passed away on April 7th, 2013 at the age of 73 in West Lafayette, Indiana. At the time of his death, he was a Professor of Metallurgical Engineering at Purdue University, where he had served as a faculty member since 1982. Dr. Gaskell was born in Glasgow, Scotland and attended The Royal College of Science and Technology, receiving First Class Honors in Metallurgy and Technical Chemistry for his B.Sc. in 1962. He was married to Sheena Morrow on July 11, 1964 and shortly thereafter they immigrated to Hamilton, Canada for his pursuit of graduate studies at McMaster University. He received the International Nickel Company of Canada Fellowship to support his graduate work from 1965-1967. His Ph.D. degree was awarded in 1967 with the completion of his thesis project, "The Densities of Liquid Silicates Containing Iron Oxide at 1410°C." He was named as a Distinguished Alumnus of McMaster University in 1977.

Dr. Gaskell's first faculty position was at the University of Pennsylvania, Philadelphia, PA, where he taught from 1967-1982 in Metallurgy and Materials Science. He was recruited in 1982 to Purdue University at the rank of Professor. During Dr. Gaskell's career he served as a Visiting Professor, National Research Council of Canada, Atlantic Regional Laboratory, in Halifax, Nova Scotia (1975-1976) and as a Visiting Professor, G.C. Williams Co-operative Research Centre for Extraction Metallurgy, in the Department of Chemical Engineering, University of Melbourne (1995). He also held a position during his sabbatical in Australia as a Visiting Scientist, Commonwealth Scientific and Industrial Research Organisation (CSIRO), in Clayton, Victoria.

Professor Gaskell served as the thesis advisor for numerous Master's and Ph.D. degree students, many of whom were international students, as well as the faculty mentor for dozens of undergraduate student projects. Independently and in collaboration with colleagues at Purdue University, he developed a variety of topical courses in his specialty. He was dedicated to the presentation of his subject matter and was the recipient of the Schuhmann Best Teaching Award in Materials Engineering several times over. He particularly enjoyed his discussions with students from a variety of disciplines and served as a Faculty Fellow in Earhart Residence Hall from 2000-2006. He held membership on the Freshman Engineering Curriculum Committee from 1997-2013 and on Purdue University's Senate, Senate Steering and Grievance Committees. He was prominent in his professional activities, including the Metallurgical Society of AIME (1970-2013), Alpha Sigma Mu (President, 1985-1986),



the Extraction and Processing Division Congress (Chairman, 1990 & 1991), the Iron and Steel Society Transactions International Advisory Board (Member, 1995-2013), and the Executive Steering Council, Indiana Industries of the Future Project, Indiana Business Modernization and Technology Corporation (Member, 2002-2013). In 2000, Dr. Gaskell was named as the Iron and Steel Society Elliott Memorial Lecturer. Since 2010, Professor Gaskell has been listed in the Who's Who in Science and Engineering.

Dr. Gaskell's funded independent and collaborative research resulted in prolific journal publications, conference proceedings, textbook contributions, reviews, editorial roles, and specialized short courses around the world. He was the author of the textbooks "Introduction to Metallurgical

Thermodynamics," "An Introduction to the Thermodynamics of Materials," which was in its 5th Edition, and "An Introduction to Transport Phenomena in Materials Engineering," the 2nd Edition of which was published in August 2012.

Professor Gaskell was gifted with an exceptional combination of intellect and curiosity that made his academic work of the highest priority to him. He was never without his trusty fountain pen and note pad in his front pocket, ready to capture his thoughts and ideas. He frequently recounted to his family that he could never imagine retiring because he enjoyed his work too much to stop voluntarily. Over his lifetime, Dr. Gaskell had many hobbies, including playing the guitar, piano and bagpipes, photography, building and flying model airplanes, coin and stamp collecting, and sampling cuisines from around the world. In recent years, he became a Spanish language enthusiast, travelling to Mexico and South America to practice his language skills, and continued with his lifelong love of reading literature, mysteries and newsmagazines. Professor Gaskell is survived by Sheena Gaskell (West Lafayette, IN), and their three children and families: Sarah Gaskell, Andy, Mac and Ivy Larson (Verona, WI), Claire (Gaskell), Kurt and Hugh Hankenson (Philadelphia, PA), and Andrew and Jill Gaskell (Chicago, IL). He is also survived by his sister and brother-in-law, Jilly and Derek Hazeldine (Austwick, England).

The family of Professor Gaskell has endowed an undergraduate scholarship in his name. For more information on how to contribute, please contact Robyn Oldfather at roldfather@purdue.edu.

A memorial lecture will be given May 9th, 2014 at Purdue in his honor, with more details to be released this fall.



Undergraduate Student Profile

MaryBeth Pavlick

Hometown: Aurora, OH

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

I knew that I wanted to go to a big school that had a great reputation for academics and athletics. Growing up in the Midwest, I knew the Big Ten conference was the place to find a school that has high standards for both. Purdue's reputation for engineering spoke for itself. There are more students studying engineering at Purdue than any other major. That is the kind of academic environment I wanted to be a part of. From the minute I stepped onto campus I knew that I wanted to be a Boilermaker. The First Year Engineering program and the Women in Engineering learning community were also important factors in my decision to attend Purdue. The MSE department specifically appealed to me because of the faculty and the size. Smaller class sizes meant getting to know faculty and peers personally. The MSE department really is a family, and everyone is there to help each other succeed.

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

Twice earning Academic All-Big Ten honors has been my greatest achievement.

Please discuss any participation in co-op or internship programs and how the experience was beneficial.

I have had internships with ArcelorMittal and Owens Corning. These jobs have given me an inside perspective of how two different industries operate and firsthand experience working as an engineer. I have learned a lot about my strengths and weaknesses and my likes and dislikes in a work environment. One of the greatest advantages has been being surrounded by experienced professional engineers who I can continually bother with questions about anything and everything for 12 weeks at a time. The advice and experiences they have shared are invaluable.

Have you been involved in any student organizations or participated in any campus sports while at Purdue? If so, which ones? How has this experience been beneficial?

I am going to be a senior catcher for Purdue Softball this coming year. I walked-on to the team at the beginning of my freshman year and it has been an incredible experience. Being a part of this team has provided me with some of the best teammates and friends anyone could ask for, along with amazing coaches and mentors. Being surrounded by talented athletes pushes me to work harder and compete. The same mentality applies to

the classroom. Our coaches have always stressed the importance of hard work, commitment, and character. I am a better athlete, student, and person thanks to my coaches, teammates and all the athletic support staff. I owe a lot of my success to Coach Maher for giving me the opportunity to be part of her program and all she has taught me over the last three years.

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

With a degree in Materials Engineering you can work in any industry. You can't build it without materials, so no matter where you want to go MSE can help get you there. The MSE department at Purdue is the perfect combination. It offers all of the opportunities of a Big Ten university, and the smaller department allows you to have personal relationships with your peers and your professors. All of the professors know the students by name and genuinely care about their success. They are always willing to go above and beyond to help. Knowing all of your classmates and professors also makes the hard work fun. Being a part of the MSE family here at Purdue has been a great experience for me and I highly recommend it.

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

I plan to use the knowledge I've gained through classes and experiences at Purdue throughout my career. The technical and professional skills will help me to be successful in any role I have the opportunity to fill.

Purdue Students Attend TMS Sponsored Congressional Visits Day



In April of each of the past 6 years, TMS has taken the lead in bringing a group of between 30 and 50 students from around the country to visit with their legislators and their staff in DC. Congressional Visits Day (CVD) helps students gain an appreciation for the political process, and provides them a venue to let their elected officials know how supporting Science, Technology, Engineering, and Math (STEM) activities impacts their lives personally. Purdue MSE undergraduates: Alison Gatons, Chloe Heinen, Anna Popp, and PhD student, Samantha Lawrence, attended this year. These leaders from the student organization of Purdue University, Materials Advantage (PUMA), visited with staff and congressmen from their home districts. They also had an opportunity to meet congressional fellows and staff that work on science policy programs in DC, a career path many engineers don't consider when they're deep in thermodynamics in school. After the visits, they were able to socialize with the DC chapter of ASM International, who hosted all the visiting students to a dinner and debriefing.

Senior Design



One of the many benefits of being an undergraduate in the School of Materials Engineering at Purdue is the ability to learn from a multi-faceted curriculum. This is evident in the Senior Design course required for all students in the School.

During this hands-on course students spend two full semesters, working in teams of four to six, tackling a real-world problem provided by a corporate sponsor. This problem is typically a high importance, low priority issue that the company would like to see resolved, but is unable to dedicate the manpower to complete the project. MSE students benefit from applying knowledge obtained in other MSE courses to an actual problem where they can participate in the research process from initiation to completion, including lab/modeling work and synthesis and data design analysis. Project teams are advised by a faculty member and sponsoring company liaison.

In addition to helping students develop engineering problem solving skills, Senior Design also allows students to gain broad professional skills such as business writing, presentation skills, knowledge of research methods, team-building and networking opportunities, and confidence in their ability to communicate with a diverse audience. These skills have proven to be invaluable to employers once the students enter the workforce.

Sponsoring companies have the opportunity to not only network with their own project team, but also with the entire MSE undergraduate population, during events like Student Night held each spring. Large framed project posters featuring sponsor logos, and developed by the project teams are displayed in the main hallway of the Neil Armstrong Hall of Engineering for a period of one year, allowing all visitors to the building to learn from the project.

To get more information or to become one of our corporate partners for next year, please contact our main office.



THANKS TO OUR 2012-13 SPONSORS



Graduate Student Profile

Mohamad Zbib

Hometown: Noumayrieh, Lebanon

What attracted you to Purdue University's graduate programs?

The graduate program in Materials Engineering at Purdue has a great reputation, and that made me consider having a degree from here. The depth to which you get involved in your field of study as a grad student is incredible. There are a lot of opportunities to learn and gain great experience using well-equipped laboratories and cutting edge materials characterization facilities. Being able to use excellent tools and collaborating with other researchers on a variety of projects is what I like the most.

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

I've only been here a year, so there's an excitement about being around so many people that are stretching the boundaries of learning. It's very easy to interact with other students and faculty, and everyone's willing to help (and ask for help). This kind of environment allows me to have better achievements in my research and my academic area. The connections that have been made with the professors in our department and across campus are very helpful.

What is your area of research?

My research focuses on the characterization of a relatively new form of polycrystalline silicon used for making solar cells. I do mechanical testing, chemical analysis, and structural analysis of granular polysilicon. So far, we have been able to improve the fracture behavior of polysilicon by about 45% since the beginning of my research. Our results have helped improve the processing of bulk silicon in the process of making solar cells, reducing dust, contamination, and losses that occur during materials handling.

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

Not yet, but I'm planning to get involved because there are very active and useful organizations at Purdue that range between academic, research, and social interests.

It seems like there's a new club or callout each week.

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

I consider Materials Engineering very important because it connects most of the other engineering and science majors. We're a critical step in any process of making any products, from

consumer products to new energy sources. I like it because I see how my understanding of materials can impact a very wide range of needs in almost all industries and applications. This is true both for when Materials Engineers try to enhance current materials, and also when we develop new ones. As mentioned earlier, the environment at Purdue in Materials (including faculty, staff, and students) is great and I think this is important to take into consideration: you should be happy while working on projects you think are important. Also, the range of research areas in the school is very broad, more so than I'd expected originally. It's very likely any MSE student could find an advisor here that worked in an area they are interested in.

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

Studying and working at Purdue is something I'm very proud of. It very much has made me feel more confident about my abilities, and opens up more doors after graduation. The network of alumni from Purdue is amazing. Of course everything in school is challenging, but being a Purdue graduate clearly will put me in a better position in the future. I hope to have a research career that couples materials characterization (I've learned a lot of microscopy methods) with materials development, probably in the energy sector. Also, I consider the knowledge and experience I've gained from Purdue comes with a responsibility that I will keep improving myself and the school and future students over time.

New Instructor Brings Materials and Manufacturing to the Classroom

The School of Materials Engineering welcomes Chris Owen to its team of instructional professionals. Owen, who has spent most of the last 30 years with Alcoa, will be teaching several undergraduate courses this fall in addition to advising two Senior Design Projects. With his vast industrial experience, most recently as the Director of Quality for Alcoa Forgings and Extrusions, he will be a huge asset to the School. Owens holds a BS in Metallurgical Engineering from the University of Utah (1976), an MS in Materials Engineering as well as an MBA (1978) from Rensselaer Polytechnic Institute, and an MA (1996) in Applied Behavioral Science from Bastyr University.



Outstanding Materials Engineer Award Recipients



Dr. Kenneth E. Blazek
Principal Research
Engineer
ArcelorMittal

Dr. Kenneth E. Blazek is a principal research engineer at ArcelorMittal Global Research and Development Laboratory in East Chicago, IN. He has thirty-seven years' experience in the steel industry as a research engineer with the majority of his research focused on continuous casting of steel. He has also spent significant time devoted to the following areas: electromagnetic, containment for strip casting, steelmaking, ladle refining, and cold rolled motor lamination product metallurgy and development. The first twelve years of his career were spent at U.S. Steel, and the past twenty-five, he has been with ArcelorMittal (formerly Inland Steel Co., Ispat Inland, and Mittal Steel).

Dr. Blazek has authored more than sixty technical papers, has been granted seven U.S. patents and has received several awards and honors for his work in the steel industry. In 2008, the Association for Iron & Steel Technology (AIST) presented Dr. Blazek with the first place Hunt-Kelly Outstanding paper Award for his paper, "Calculation of the Peritectic Range for Steel Alloys."



Mr. John E. Barnes
Leader
**CSIRO Titanium
Technologies**

Mr. John E. Barnes is the leader of CSIRO Titanium Technologies in Melbourne, Australia, a position he has held since January 2011. In this role, he leads research teams of scientists and engineers working to expand Australia's titanium processing industry through development of advanced additive manufacturing technologies and powder production technologies for titanium. Projects support the aerospace industry and the titanium fabrication industry. CSIRO is Australia's national science agency.

Prior to joining CSIRO, MR. Barnes had extensive experience with the aviation, defense and aerospace industry in the United States including the positions of senior manager of manufacturing exploration and development at Lockheed Martin Aeronautics and marine engines product manager at Honeywell International. In his role at Lockheed Martin, he managed research and development projects leading to the implementation of state-of-the-art technologies on the F-22 and F-35 stealth aircraft systems.

Mr. Barnes holds three U.S. patents with two additional patents pending. He has more than twenty-five publications.



Dr. Mary Lee Gambone
Head, Materials
Engineering
Rolls-Royce

Dr. Mary Lee Gambone joined Rolls Royce North America in Indianapolis in 1998. With over twenty-five years of work in the aerospace materials industry, she is currently head of materials engineering at Rolls Royce, a position she has held since February 2011. From July 2008 to December 2010 she was chief of research and technology strategy, and from July 2005 to June 2008 she was chief of materials and processes. She has also served as manager of critical part lifting.

Dr. Gambone's early career as a materials engineer was with Allison Gas Turbine Division of General Motors, and she enjoyed several years with the US Air Force as team leader for metal matrix composites research in the Air Force Research Laboratory Materials Directorate.

Dr. Gambone is a member of the Indianapolis Chapter of ASM International and was the keynote speaker at the 2012 National Association for Surface Finishing Manufacturing & Technology Tradeshow & Conference.

Dr. Gambone is a member of Purdue University's Materials Engineering Advisory Board and serves on the Materials Engineering Head Search Committee. During the fall 2011 semester, she gave a presentation on her career to MSE 390, our undergraduate seminar.

In addition to her BS from Purdue in 1982, Dr. Gambone received an MS in materials engineering in 1984 from MIT and a PhD in materials science in 1995 from the University of Virginia.

Student Award Recipients

**MSE Outstanding Graduating
Graduate Student**
Valerie L. Wiesner

MSE Outstanding Graduating Senior
Sarah F. Vaselaney

John L. Bray Memorial Award
Sarah F. Vaselaney

**Estus H. and Vashti L. Magoon
Graduate Teaching Award**
Logan T. Kearney

Outstanding Graduate Student Teacher (CETA)
Kara E. Luitjohan

**Reinhardt Schuhmann, Jr.
Best Undergraduate Teacher Award**
Rodney W. Trice

**College of Engineering Outstanding Graduate
Student Researcher**
Pylin Sarobol

**College of Engineering Outstanding
Graduate Student Service Scholarship**
Valerie Wiesner

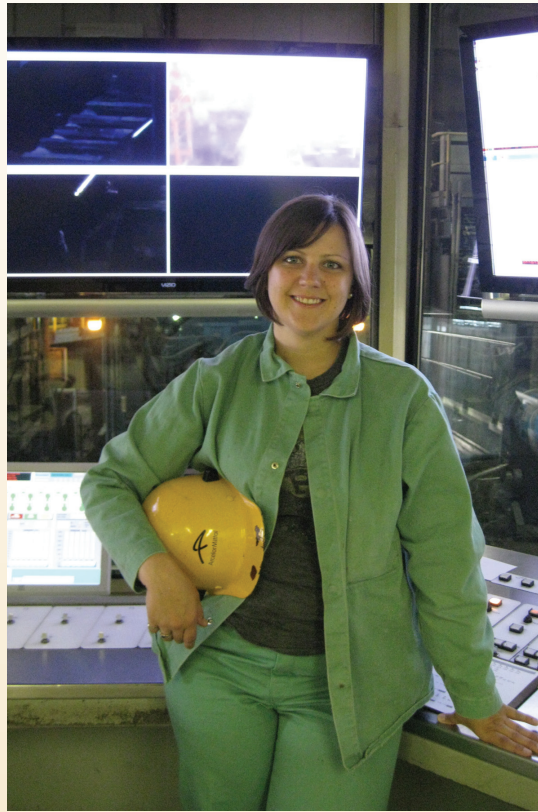
Alumni Profile: Barbara Turk (BS 2008)

Materials Engineering alumna, **Barbara Turk (BS 2008)** has been employed with ArcelorMittal since 2008. She was hired as an Associate Engineer in Quality at the Riverdale, Illinois facility. After rising to increasing levels of responsibility in Quality, she moved into Operations and was promoted to the role of Process Manager. As Process Manager she is responsible for both technical and operational aspects of the Riverdale Hot Strip Mill.

During her employment with ArcelorMittal, Barbara has made significant contributions to help advance the field of Materials Engineering. Using her knowledge of customer needs and the hot rolling process, she has played a pivotal role in developing new thermo-mechanical process designs for producing high carbon and alloy hot bands. This resulted in the elimination of microstructurally induced hot band edge cracks and the elimination of a spinel scale on these same products. Barbara was responsible for implementing the process change on the shop floor and communicating these improvements to customers. These changes resulted in a major step forward in customer satisfaction with these products. Among her current work are projects including roll wear optimization and the continuous improvement of hot rolled HSLA steels, primarily for the growing energy market.

Barbara gained a strong understanding of quality processes and the applications of steel in various markets through her role in Quality. She describes the start of her career saying that "Quality exposed me to many facets of the business from operations to customer service. More importantly I saw the impact of the steelmaking process not only in manufacturing but in the cars, appliances, and infrastructure in my everyday life." She used her early experience in customer quality disposition and metallurgical process design to develop various training programs for other departments, including sales and shop floor employees.

For the last two years, Barbara has been responsible for initiating and managing the ArcelorMittal Senior Design Project within the Purdue Materials Engineering Department. As an extension of her work with high carbon and alloy steels, she has served as a mentor and advisor to a group of MSE seniors who conducted valuable research in the area of scale formation on



high alloy steel grades, in particular SAE grade 6150. Through her work with the Senior Design projects she has been able to share her experiences with the students and has helped them gain real-world, hands-on research and problem solving experience.

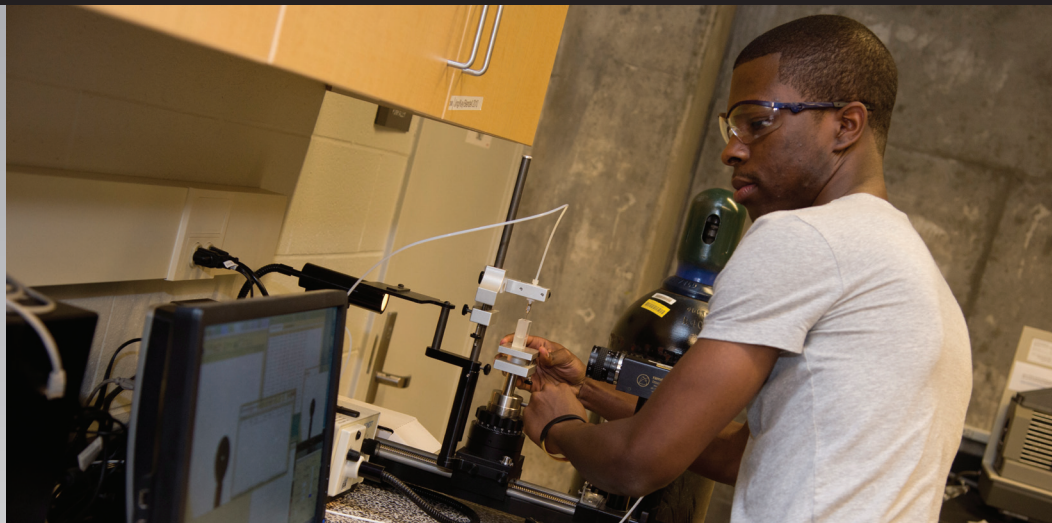
Barbara is an active member of the ArcelorMittal recruiting team, aimed at hiring Purdue engineers for full-time and intern positions, and has played a key role in the training and development of new hires within ArcelorMittal. In addition to recruiting Purdue Materials Engineers, Barbara serves as a member of the Purdue Society of Women Engineers Industrial Advisory Board and has been growing the relationship between ArcelorMittal and PSWE. Beyond her work on campus, Barbara has also been

instrumental in the development of the ArcelorMittal Ambassador training program, designed to educate and prepare new members of ArcelorMittal recruiting teams for their efforts on campus.

In celebration of the School's 50th anniversary, Barbara led fundraising efforts for a gift on behalf of all the Efron Scholars, a commissioned art piece that hangs in the Materials Engineering Efron Undergraduate Lounge. While a student at Purdue, she was recognized as an Efron Scholar. "As one of the 'Efron Scholars' I feel an obligation to give back to the people and the school that so profoundly impacted my life and career. Barry Efron's (BS, 1967) mentoring has been a tremendous gift to me, not only as a student but ongoing still today," explains Barbara. The motivation of the artwork is to remind students to live up to the Winston Churchill quote "We make a living by what we get, but we make a life by what we give." The mixed-media piece integrates that quote with art and science in an abstract interpretation of a phase diagram that exemplifies not only the example of her mentor Barry Efron, but the true spirit of Barbara.

As she moved on from the classrooms and labs of Purdue to a successful career in the steel industry, Barbara has remained a fervent supporter of the School of Materials Engineering. She attends alumni events and actively participates in opportunities to raise funds for the School. Most importantly, she is a proud alumna and remains loyal to the School that helped launch her career.

Undergraduate Research



With over 50% of undergraduates participating in supervised research before they graduate, the School of Materials Engineering is leading the way in the College of Engineering. Undergraduate research offers students the opportunity to conduct supervised research with a faculty advisor, and graduate student, and combined with other forms of work experience, is often the deciding factor when employers are making hiring decisions.

Purdue University administers The Summer Undergraduate Research Fellowship (SURF) program, which includes students from the Colleges of Engineering, Agriculture and Science. This program allows students to earn wages for conducting hands-on research during the summer, while simultaneously learning public speaking

and presentation skills. SURF students have the opportunity to participate in professional development and research seminars as well as networking events with other SURF students. This summer, 7 MSE Professors mentored 12 SURF students.

In addition to the SURF program, MSE students are also actively participating in independent research projects through the MSE 499 course. Similar to the SURF program, these students are paired with an MSE faculty member and graduate student and earn course credit for their work. Although completely optional, generally this course is completed during the fall or spring semester along with regularly scheduled courses. During the 2012-2013 academic year, 83 students participated in the course

and were mentored by 12 MSE faculty members.

Participating in undergraduate research enables students to develop not only problem solving and other professional skills, but it also offers them the chance to determine if a career in research or a future in graduate school might be right for them. Because students can participate in research endeavors at the sophomore level, this leaves plenty of time to explore other hands-on experiences such as internships.

A new program for companies and individuals to sponsor an individual undergraduate research project has been started, please contact Robyn Oldfather for more information. Help keep MSE the leader in undergraduate research in Purdue Engineering.



Outreach Lights a Fire Under High School Students

As part of an ongoing effort to recruit and attract high school students to Purdue, and specifically Materials Engineering, several professors and graduate students in the School have participated in hosting the Multiethnic Introduction To Engineering (MITE) program. Through this program, high school juniors who meet selection criteria such as grade point average, PSAT scores and have an interest in the field of Engineering, spend 5 weeks on the Purdue campus learning about life as a Purdue Engineering undergraduate student while focusing on math-building skills.

In addition to the MITE program, MSE faculty and graduate students have also participated in hosting Seminar For Top Engineering Prospects (STEP) participants as they tour various engineering schools at Purdue. These high school seniors, who have demonstrated an interest in an engineering career, spend a week learning about engineering through both hands-on and collaborative classroom experiences.



MITE students casting new alloys in July 2013

Materials **Matter** @Purdue

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

PRSRT STD
U.S. Postage
PAID
Permit 74
Lafayette, IN

UPCOMING EVENTS

Mark Your Calendar!

September 13

MSE Alumni and Current Student Mixer

5:30 – 7:00 pm

Neil Armstrong Hall of Engineering

Cost: Free



October 28

MSE Alumni Reception at MS&T Conference

6:30 – 8:00 pm

Pointe-à-Callière, Montréal Museum of Archaeology and History

Montreal, Canada

Cost: Free

May 9

David R. Gaskell Memorial Lecture

3:30 – 5:00 pm

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.

Alumni Survey for 2009 and 2010 MSE Graduates

The faculty and staff in MSE take great pride in our undergraduate program, and we are continually looking for ways to improve the curriculum. That is where you come in. Each year we ask our Bachelor of Science graduates, approximately three years after their graduation, a series of questions. By asking how your career, whether in industry or graduate school, is proceeding the School can continue to excel and continuously improve the experience for future students. We also greatly appreciate hearing about specific experiences you have had that represent times that your Purdue MSE experience was particularly helpful.

The online survey we have developed can be found on our Undergraduate Program webpage and at:

<https://engineering.purdue.edu/MSE/InfoFor/Alumni/alumnisurvey>

Your input really does make a difference!