MS NEWS

MATERIALS SCIENCE AND ENGINEERING
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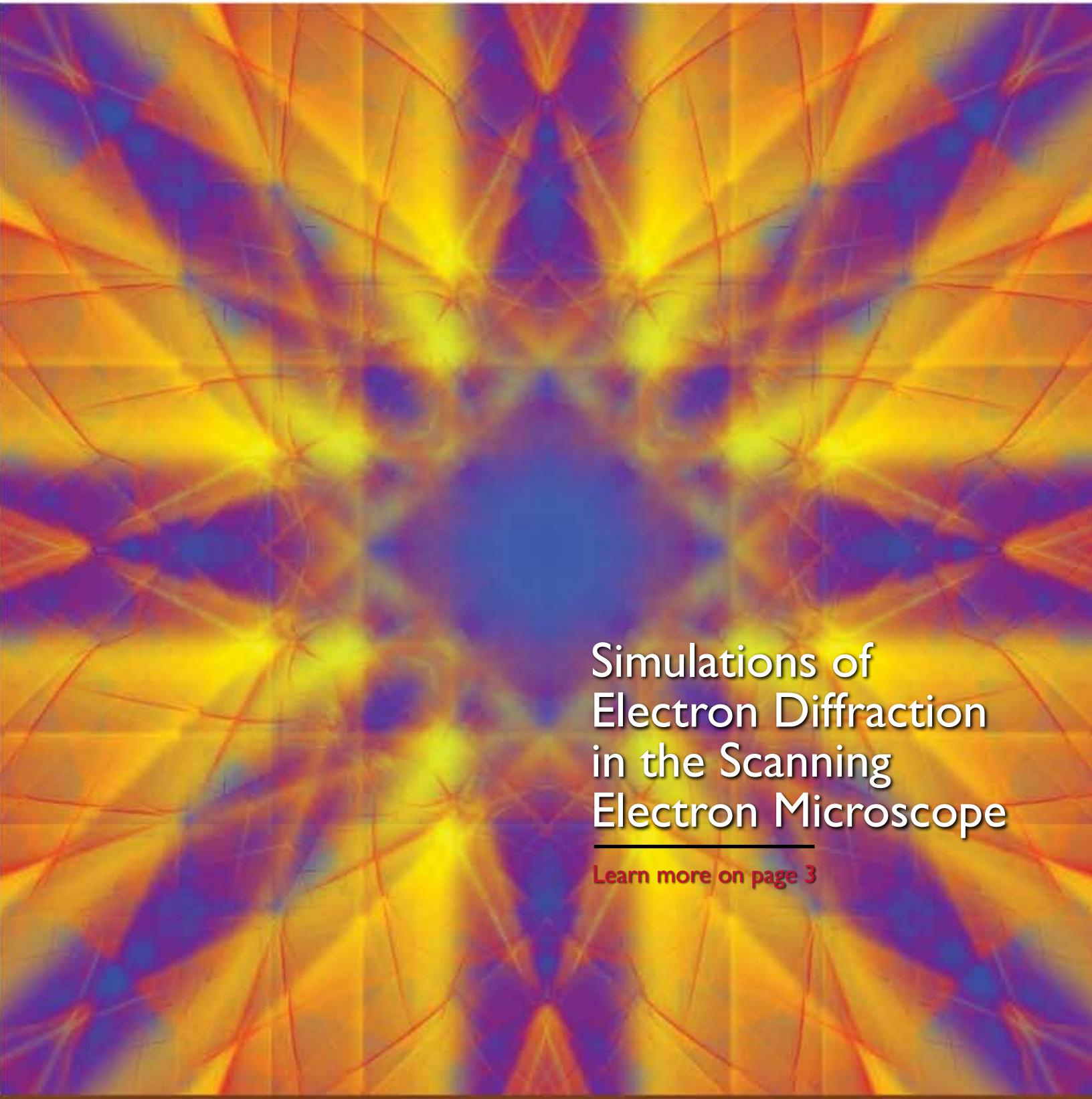


Simulations of Electron Diffraction in the Scanning Electron Microscope

Learn more on page 3

A Note From the Department Head

Gregory S. Rohrer, W.W. Mullins Professor

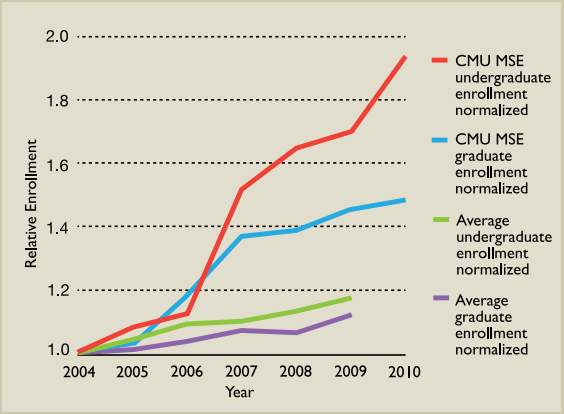
In This Issue:

Greetings to our MSE alumni! In this issue of *MSE News*, we have a lot of great news to share, including the data shown below — which represents exciting news for both Carnegie Mellon's MSE program and our discipline as a whole. Since 2004, our field has seen positive enrollment trends, at both the graduate and undergraduate levels. And Carnegie Mellon has outpaced national growth trends.

In other words, MSE is growing. This means more materials scientists and engineers will have increased impacts in industry, government, and academia. That is great news for all of us already in the field.

This growth follows a period of relatively constant enrollments—which might lead us to ask, what has changed and how do we sustain it?

Locally, we can certainly continue our tradition of having strong faculty who recruit students to our department. We can also continue to offer incentives such as paid research positions to any freshman who shows an interest in materials by taking our introductory level course, "Engineering the Materials of the Future." We can also continue to reach out to young scientists locally, through the Westinghouse Science Honors Institute, our Engineers Week program at Carnegie Science Center, the Society for Women Engineers' "High School Day" event, and other programs (see *MSE News*, Spring 2010). Currently, faculty and staff in the MSE Department are helping to launch a high school materials science course in the Pittsburgh Public Schools.



Data from 2004 – 2009 is available from the ASEE profiles (http://profiles.asee.org/). 2010 Carnegie Mellon data is from the 2010 "factbook" (http://www.cmu.edu/ira/factbook/). Average undergraduate and graduate enrollment is based on the 13 most highly ranked programs, according to *US News & World Report*. All data is normalized to 2004 values. For Carnegie Mellon, undergraduate and graduate enrollments in 2004 were 60 and 62, respectively.

On a national level, awareness of materials science is increasing through outreach efforts by our professional societies. One effort that seems to be working well is the ASM materials camps for students and teachers. As a result of this activity, materials science is now being taught at more than 100 high schools around the country. As more and more students enroll in materials science and engineering courses, our growth should only accelerate, as there are more people to "spread the word."

MSE is taking many steps to address and encourage this growth, including the addition of qualified faculty who broaden our capabilities. **Assistant Professors Adam Feinberg** and **Chris Bettinger**, who are profiled on page 6, both hold joint appointments in MSE and Biomedical Engineering (BME). They will champion our efforts in biomaterials and, considering that a sizable number of our students have a double major in BME, will create an important bridge between the two departments. **Professor David Landis**, also profiled on page 6, has joined our faculty to lead the new Energy Science, Technology, and Policy Masters degree program. He is advising the inaugural class of about 10 students, and will work to grow the program in future.

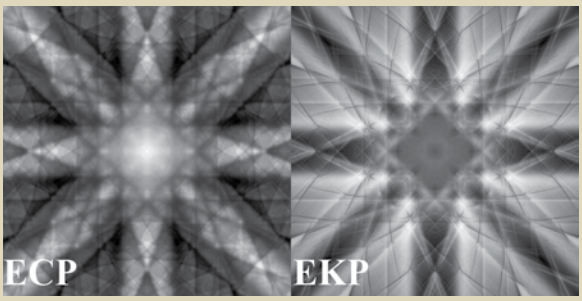
As we award more and more degrees each year, our alumni population continues to grow as well. We encourage you to remain an active participant in our community, to attend alumni events like the Deck Party scheduled for April 15, 2011, and to share in our growth and the other successes detailed in this newsletter. No matter how much MSE grows, one fact is unchanged: each one of you remains an important member of the MSE Department family.

Simulations of Electron Diffraction in the Scanning Electron Microscope

This edition of *MSE News* features a cover image created by simulating electron diffraction patterns in $SrTiO_3$. The simulation of these diffraction patterns requires the numerical solution of the Schroedinger equation for a large number of elastically scattered beams. The code was developed by **Professor Marc De Graef** in collaboration with **Assistant Research Professor Yoosuf Picard**, as part of an ongoing study of defect imaging using a scanning electron microscope (SEM).

The colorful image on the cover is the result of combining two simulated electron diffraction patterns shown in the figure at right: an electron channeling pattern (ECP), shown on the left, and an electron Kossel pattern (EKP), shown on the right.

The cover image is essentially a false-color channeling pattern, with a bluish-purple appearance wherever the Kossel pattern has a low intensity (dark) and a yellowish-orange appearance where the Kossel pattern is bright.



These two images — an electron channeling pattern and an electron Kossel pattern — were combined to create the striking image on the cover of this edition of *MSE News*.

This image was generated using code developed by De Graef and Picard specifically for the simulation of ECPs and EKPs generated in an SEM. The patterns correspond to the [001] zone axis orientation of $SrTiO_3$, with a microscope accelerating voltage of 20 kV. The center of each pattern corresponds to the exact zone axis orientation; moving away from the center corresponds to an incident beam tilt in the same direction.

An ECP displays the intensity of the back-scattered electron (BSE) signal as a function of the incident beam direction; a brighter intensity corresponds to a higher number of detected BSEs. An EKP, on the other hand, represents the probability that an incident beam electron will reach a certain depth inside the crystal before being scattered inelastically; a darker region in the EKP corresponds to incident beam directions that are more strongly absorbed than the brighter regions.

MSE Alums Attend "Inspiring" Shanghai Event

"Inspire Innovation: The Campaign for Carnegie Mellon University" celebrates our University's past and future, bringing Carnegie Mellon leaders together with thousands of alumni, friends, and students around the world.

On October 9, alumni, parents, and friends — including a number of MSE graduates — gathered in Shanghai to celebrate the "Inspire Innovation" campaign and network with members of the Carnegie Mellon community.

President Jared L. Cohon shared the latest University news and updates about breakthrough initiatives led by Carnegie Mellon students and faculty. This inspiring event was hosted by the Beijing and Shanghai alumni chapters.

Shown here, MSE alumnus Guangguang Yu *(M.S. 2006)* met Carnegie Mellon President Jared L. Cohon (left) at the recent "Inspire Innovation" event in Shanghai. Also shown in the background (blue shirt) is MSE alumnus Wanlin Wang *(M.S. 2004, Ph.D. 2007)*.

Whitacre Leads Next-Generation Battery Charge

His MSE Spinoff, Aquion Energy, Is Gaining Global Attention

In a recent *Wall Street Journal* article, **Assistant Professor Jay Whitacre** raised serious concerns about the mandate imposed by the US Department of Energy (DOE) to slash the costs of batteries for electric vehicles by 70 percent by 2014.

"While the government requirement is well intentioned—and electric vehicles certainly cannot be viable unless battery costs come down significantly—I believe it is impossible to achieve these kinds of cost reductions while batteries rely on expensive metals such as nickel, manganese, and cobalt," says Whitacre. "It will be at least a decade before current electric battery technologies become cost-effective."

The problem is a serious one, both for the global automotive industry and car owners. "There is an incredible demand today for green vehicles," says Whitacre, "but their current cost puts them out of the reach of many consumers." As the *Wall Street Journal* noted in its October 17 article, the new Nissan LEAF all-electric compact car will retail at $33,000 — while the similar-sized Nissan Versa retails at about $13,500. The reason for the LEAF's high price tag? The battery pack alone costs Nissan more than $15,000 to produce.

As an energy storage researcher, Whitacre is not just an observer. He has dedicated his full attention to identifying more viable, cost-effective battery technologies, to address both stationary grid-level needs as well as vehicle applications. With help from a West Coast venture firm, Whitacre recently founded an MSE spinoff company called Aquion Energy, with the goal of bringing more practical energy storage solutions to market.

Exploring Alternative Materials: A Common-Sense Approach

Using a $5 million stimulus grant from the DOE, along with matching funds from private investors, Whitacre has founded his new start-up to address the challenge of developing more affordable battery technologies. Based in a 42,500-square-foot warehouse in the Pittsburgh neighborhood of Lawrenceville, Aquion Energy has 20 full-time employees—and plans to add another 10 in the near future.

These researchers are working to commercialize the sodium-ion battery technologies that Whitacre first developed as an MSE researcher in 2008 and 2009 (see *MSE News*, Winter 2009).

Sodium-ion batteries are similar to lithium-ion batteries—found in many portable electric devices—in that they generate and store energy by moving positive and negative ions across an electrolyte medium. But Aquion's next-generation technology relies on much more cost-effective and readily available materials—notably, salt water.

Because Whitacre's new batteries can operate at lower voltages, this technology allows the replacement of organic electrolytes with water-based alternatives. Not only are water-based electrolytes easier to work with and completely non-hazardous, they also require less supporting materials, creating significant manufacturing advantages.

With small prototypes—about the size of wristwatch batteries—already demonstrating the storage potential of Whitacre's innovative sodium-ion technology, the next step for Aquion is to construct a large-scale prototype manufacturing facility. Within the next year, the start-up expects to begin making refrigerator-sized

LEAF photos courtesy Nissan

sodium-ion batteries that will be released for third-party testing and validation. These first-generation batteries will be designed and produced for stationary energy storage applications to support a range of storage needs for the power grid in both the United States and developing countries.

Shining a Global Spotlight on MSE

Whitacre is currently on a leave of absence from the Department of Materials Science and Engineering, allowing him to focus on getting this promising new venture off the ground.

"The race to develop feasible next-generation battery technologies is incredibly competitive," says Whitacre. "Government agencies, environmental groups, utilities, corporations, and even consumers are demanding more practical energy storage devices. We want Aquion Energy to emerge as a major force in bringing these innovations to the world marketplace."

The recent *Wall Street Journal* article was only the most recent coverage of Whitacre's success to date. Aquion has been chosen as one of VentureWire's "50 Start-Ups to Watch" for 2010, the only energy-based business on the prestigious list. In November, Whitacre presented his company's technology and business plans at the annual FASTech Conference in Redwood City, California. And a slew of business publications—from *MIT Technology Review* to *Tech Today* and the *Pittsburgh Business Times*—have recently showcased Aquion Energy.

"The Department of Materials Science and Engineering is delighted by the global attention that Jay Whitacre has recently brought to Carnegie Mellon and MSE," says **Department Head Gregory S. Rohrer**. "He is demonstrating the worldclass innovations that are emerging from our labs and classrooms—and we wish him continued success as he commercializes these leading-edge technologies that promise enormous benefits for the environment."

McHenry's Team Collaborates With Intel

Professor Michael McHenry is leading a Carnegie Mellon research team that is collaborating with Intel Corporation to develop a promising new class of materials—called solder magnetic nanocomposites—to streamline the process of computer electronic packaging. McHenry and Raja Swaminathan, Senior Packaging Materials Engineer at Intel, have devised a technique that can sufficiently heat solders—metal alloys used to bond metals—to eliminate the need to place computer chips in conventional ovens and facilitate the use of environmentally friendly lead-free solders.

Current techniques for electronically packaging computer chips involve the use of hot air convection or infrared ovens. However, these techniques require significant time and energy costs. To solve this problem, McHenry's team is partnering with Swaminathan to develop a new tool that uses radio frequency coils to heat specially designed magnetic particles mixed with solder pastes.

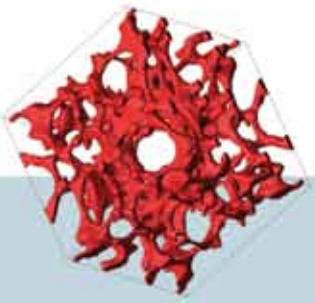
"By varying the concentration and composition of these magnetic particles in the solder materials, we can control the time it takes to heat them, which ultimately helps to improve the speed and cost associated with processing computer chips," says McHenry.

In addition to speeding up the solder process, McHenry's team is also improving the performance of electrical interconnects during the electronic packaging process. Chip warpage is more of a problem at the new lower temperatures enabled by the solder magnetic nanocomposites, and the MSE researchers are working to address this issue. McHenry's team includes MSE Ph.D. candidate **AshFague Habib**, senior **Matt Ondeck**, junior **Emily Walker**, and visiting scientist **Rajat Roy**.

The team has previously leveraged funding from Intel and other sources, and is seeking new funding from the National Science Foundation's Grant Opportunities for Academic Liaison with Industry (GOALI) program.

Doctoral student AshFague Habib demonstrates a radio frequency heating coil for solder melting, as well as a thermal imaging camera that maps temperatures.

FACULTY NEWS



MSE Welcomes New Faculty

The Department of Materials Science and Engineering welcomes three new faculty members who will add to our diversity of expertise and research. We welcome these new faculty to the Department, and look forward to a long and rewarding relationship with each of them.

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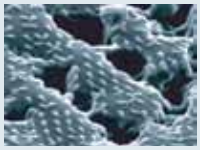
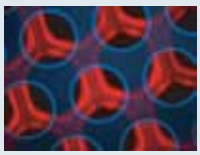
Christopher Bettinger recently joined MSE as an Assistant Professor, with a joint appointment in Biomedical Engineering. His research group, the Laboratory for Therapeutic Biodegradable Microsystems, develops biomaterials-based microelectromechanical systems (MEMS) for use in a wide range of biomedical applications—including regenerative medicine, neural interfaces, and drug delivery. Bettinger's team uses interdisciplinary strategies to develop next-generation medical implants that combine extraordinary properties of biodegradability and biocompatibility with unique mechanical properties and electronic functionality.





Bettinger holds three degrees from the Massachusetts Institute of Technology (MIT): an S.B. in Chemical Engineering (2003), an M.Eng. in Biomedical Engineering (2004), and a Ph.D. in Materials Science and Engineering as a Charles Stark Draper Fellow (2008). He completed his post-doctoral work at Stanford University in the Department of Chemical Engineering as an NIH Ruth Kirschstein Fellow (2010). Bettinger has received many honors, including the *MIT Department of Materials Science and Engineering Award for "Outstanding Ph.D. Thesis,"* the *ACS Akzo Nobel Award for Polymer Chemistry,* and the *Tissue Engineering and Regenerative Medicine Society Young Investigator Award.*

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Adam Feinberg is a new Assistant Professor in MSE, with a joint appointment in Biomedical Engineering. His research group develops materials-based regenerative strategies, with the goal of engineering the self-organization and self-assembly of various cell types into tissue structures. His group also seeks to better understand the emergence of higher-order function in neuromuscular and cardiovascular systems. Feinberg's specific focus is on the interaction of cells and tissues with engineered materials, as well as determining how cells sense, respond, and modulate their environment. This is a problem that spans the molecular (nano) level to the tissue (macro) level, where Feinberg seeks to elucidate how biochemical, electrical, and mechanical signals are propagated across spatiotemporal scales.

Feinberg earned a B.S. in Materials Science and Engineering from Cornell University (1999), followed by a Masters (2002) and Ph.D. (2004) in Biomedical Engineering from the University of Florida. He was a Postdoctoral Fellow at Harvard University from 2005 to 2010, where he developed new biomaterials and cardiac tissue engineering strategies for three-dimensional myocardial regeneration, with a concentration on stem cell-based approaches.

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David Landis has joined Carnegie Mellon as Executive Director of the CIT Masters program in Energy Science, Technology, and Policy. He is responsible for developing, growing, and sustaining this new program, and he holds a special appointment in MSE.

In his previous work, Landis considered problems in integrated circuit design and testing, including chip-scale system architecture, rapid electronic system prototyping, design for testing and self-testing, and defect- and fault-tolerant system design. He is currently interested in problems of embedded systems safety, integrity, and security when applying modern information technology to energy systems.

For the past 10 years, Landis has worked in technology-based economic development for the Pittsburgh Digital Greenhouse and its successor, The Technology Collaborative. Prior to this, he was a Senior Scientist and Professor of Electrical Engineering at the Pennsylvania State University, and Professor of Electrical Engineering at the University of South Florida. He holds a B.S. in Electrical Engineering from Carnegie Mellon, an M.S. in Systems Engineering from the University of Pennsylvania, and a Ph.D. in Electrical Engineering from Penn State.

FACULTY NEWS BITS

Professor Katayun Barmak has been elected to serve for a three-year term on the *International Materials Review* Committee. *International Materials Review* is a widely respected and cited journal, published jointly by ASM International and the Institute of Materials, London. The purpose of the Committee is to suggest suitable review topics and authors, commission those that are approved, provide technical review of submitted manuscripts, and approve final manuscripts for publication.

Professor Marc De Graef is working with scientists at the US Department of Energy's (DOE) Argonne National Laboratory to map the magnetic vector potential—one of the most important electromagnetic quantities and a foundation of quantum mechanics—in three dimensions. De Graef is collaborating with the team to develop a theoretical and numerical reconstruction procedure that is critical to the 3D mapping initiative.

Professor Chris Pistorius recently won a *Gold Medal* award from the South African Institute of Mining and Metallurgy. Gold Medals are awarded to papers that are of a world-class standard, and judged to be publications that will become key references in the mining or metallurgy field in the future. The winning paper was a result of his past work on ilmenite smelting.

Professor Lisa M. Porter and her former doctoral student **Kumar A. Singh** *(Ph.D. 2010)* are co-authors of an article that was recently selected for the frontispiece for *Advanced Functional Materials*. This is a highly coveted honor, associated worldwide with the highest-quality research from the top researchers in the field. Titled "Planarization of Polymeric Field-Effect Transistors: Improvement of Nanomorphology and Enhancement of Electrical Performance," the article's other authors are from the Carnegie Mellon Chemistry Department: Professors Richard D. McCullough and Tomasz Kowalewski, along with recent Ph.D. graduate Tomasz Young.

Professor Anthony Rollett has been elevated to the rank of Fellow by The Minerals, Metals & Materials Society (TMS). This is the highest honor bestowed on TMS members, and recognizes them as eminent authorities in their discipline. Rollett, one of only five Fellows named for 2011, was cited by TMS "for seminal contributions to the understanding of microstructural evolution and his achievements in making texture analysis accessible to the community." Rollett will be inducted as a Fellow at the TMS 2011 Annual Meeting & Exhibition, set for February 27 to March 3 in San Diego, California.

A new book based on the phase transformation lecture notes of the late **Professor Hub Aaronson** has been published as a textbook from CRC-Press/Taylor & Francis. MSE alum **Masato Enomoto** *(Ph.D. 1982)*, who is a Professor at Ibaraki University in Hitachi, Japan, has worked with Professor Jong K. Lee of Michigan Tech to edit Aaronson's notes to produce *Mechanisms of Diffusional Phase Transformations in Metals and Alloys*. Royalties from the book will be equally divided between Carnegie Mellon and Michigan Tech, where they will support memorial funds in Aaronson's name.

To purchase the book, visit: http://www.crcpress.com/

Schlitt Receives SME Award

W. Joseph Schlitt *(B.S. 1964)* was honored by the Society for Mining, Metallurgy, and Exploration (SME) at its 2010 Annual Meeting held in Phoenix, Arizona.

Schlitt received the prestigious *Milton E. Wadsworth Award* from SME's Mineral and Metallurgical Processing Division.

This award, established in 1992, recognizes distinguished contributions that advance the understanding of the science and technology of nonferrous chemical metallurgy. In making the award, SME cited Schlitt "for advancing the science and technology of heap and dump leaching." Schlitt was also invited to deliver the annual Wadsworth lecture, titled "Lessons Learned in 40 Years of Metallurgical Testing and Development."

Schlitt is currently President of Hydrometal, Inc., which provides consulting services for global hydrometallurgy projects. His experience includes engineering, process assessments, research and development, and plant-oriented studies in the nonferrous industry. After earning his B.S. at Carnegie Mellon in 1964, Schlitt earned a Ph.D. degree from the Pennsylvania State University.

Murray Recognized for Lifetime Achievement

Allan D. Murray *(Ph.D. 1970)* received the *Lifetime Achievement Award* from the Society of Plastics Engineers (SPE) Automotive Division at the 40th annual SPE Automotive Innovation Awards Gala, held November 9 in Livonia, Michigan.

This illustrious award recognizes the technical achievements of automotive industry executives whose work in research, design, and engineering has led to significant integration of polymeric materials in vehicles.

Murray is an experienced senior manager of research, manufacturing and product development. He spent 31 years at Ford Motor Company, where he successfully guided many advanced products and technologies from concept through production. Before his retirement, he was Ford's Technology Director for the Partnership for a New Generation of Vehicles, a government/industry initiative established to develop affordable fuel-efficient vehicles. In this position, he led government/industry teams researching a wide range of technologies, including advanced-vehicle construction, power trains, fuel cells, batteries, and power electronics.

Currently, Murray is Chief Technology Officer for Allied Composite Technologies LLC, a start-up company that commercializes proprietary thermoplastic technologies for the automotive, alternative energy, and building/construction industries. Headquartered in Southeast Michigan, the company's mission is to utilize novel composite materials and processes to produce innovative products that meet identified customer needs.

In addition to his doctorate degree from Carnegie Mellon, Murray holds an M.B.A. from Wayne State University and a B.S. from the University of British Columbia.

Nicolaou Named CEO at Lafarge

Perikles D. Nicolaou *(Ph.D. 1994)* has been appointed Chief Executive Officer (CEO) of Lafarge Beton in Greece. Lafarge Beton belongs to the multinational Lafarge, the world leader in construction materials—specifically cement, concrete aggregates, and gypsum. Nicolaou is based in Athens, Greece, and is managing concrete and aggregates activities in that country. He is responsible for an annual turnover of 100 million Euros, as well as 300 employees and 250 full-time subcontractors.

After receiving his doctorate from Carnegie Mellon, Nicolaou worked as a Research Contractor on titanium alloys and composites at the US Air Force Research Laboratory at the Wright Patterson Air Force Base in Dayton, Ohio. After several years, he returned to his native Greece, where he has held various positions in the mining and construction industries, growing through the ranks to his current position.

Nicolaou is married, with five-year-old twins, a boy and a girl. The family lives in his hometown of Megara, 25 miles west of Athens. He remains an avid Pittsburgh Steelers fan, although now he watches the games via the Internet—and hopes for a good connection.

Donors Give Generously to MSE

Nearly 100 alumni and friends supported the Department of Materials Science and Engineering in fiscal year 2010, with donations totaling almost $120,000. These generous gifts help the Department to support innovations in our curriculum, facilities, and research that position Carnegie Mellon at the leading edge of materials science and engineering. The Department appreciates the ongoing support of these graduates and friends. MSE also received corporate matching gifts that are not reflected here.

Robert L. Albert
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Dennis F. Bickford
Ronald E. Bish
The Boeing Company
Kevin C. Brown
Ronald C. Campbell
Joseph L. Caporossi
Laura B. Cerully
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Gary M. Crosbie
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Howard R. Warner
Matthew Ashe Willard
Robert K. Williams
Jessamine Paschal Winer
Robert E. Wolf
Richard A. Wolfe
Autumn M. Wyda

ALUMNI NEWS BITS

Joel Dawson *(B.S. 2009, M.S. 2009)* recently accepted an engineering position with Kennametal's Global RD&E in the Surface Technology Group.

Christopher G. Roberts *(B.S. 2002, M.S. 2004, Ph.D. 2008)* created a poster that won the *Jacquet-Lucas Award* for being judged "best in show" during the 2010 International Metallographic Contest, held in Portland, Oregon. His winning poster was titled "Identification of Secondary Phases in a Ti-Mo Alloy." This award includes $3000, an opportunity to expand on the subject of his poster in an article published in *Advanced Materials and Processes* magazine, and recognition of his accomplishment at a black-tie affair hosted by ASM. Roberts' entry also was awarded first place in Class 3 of the contest.

Guangguang Yu *(M.S. 2006)* is enjoying his work at Danieli, a top metallurgical company in the world, as Sales Manager. Yu is pictured on page 3 of this edition of *MSE News*.

Engineering With a French Accent

While many students travel abroad to brush up on their foreign language skills, MSE senior **Nicole Reilly** was already a fluent French speaker—so she set a more ambitious goal. Last January, Reilly enrolled at the prestigious Polytechnical School at the University of Nantes in Nantes, France, where she spent a semester taking Masters-level engineering courses. Because classes at the University are French-language only, according to her professors Reilly was the first American student to enroll in engineering classes there.

Left to right: MSE's Nicole Reilly is pictured with her lab partners at the University of Nantes, Florent Lebreton and Julien Monet.

"Unlike many of the study abroad experiences I have heard about, my semester in Nantes was neither fun-filled nor easy—but it was an invaluable experience that will benefit me for the rest of my career," says Reilly. "It was exciting, but challenging, to not only be immersed in another language and culture, but to experience an engineering program that was so different from Carnegie Mellon."

Compared to American engineering programs, the curriculum at the University of Nantes is very broad-based. "Many of the required classes I took—such as rheology of polymers, plasticity of metals, and numerical methods—would be electives at Carnegie Mellon," says Reilly. "The structure of the Nantes engineering program offers fewer choices, but it does guarantee that students are well-rounded and receive consistent training as engineers."

An interest in metallurgy led Reilly to follow her intense semester in Nantes with a summer internship at the Metz, France, facility of ArcelorMittal, the world's leading steel company. In her role as a Masters-level intern, Reilly analyzed data on oxide inclusions and wrote a 50-page report, in French, with her own technical recommendations.

While Reilly's eight-month experience abroad was a challenging one, she feels it is the perfect preparation for a career as an international engineer.

"I believe that, with my connections and experience in both the US and France, I have a lot to offer an employer whose business spans both countries," says Reilly. "I am eager to put my unique background and skills to work after graduation, whether I pursue a career in international industry, graduate school abroad, or graduate study here in the US."

STUDENT NEWS BITS

MSE doctoral student **Ayesha Hashambhoy** took the first-place award in the electrochemistry division's poster session of the 218th Meeting of the International Electrochemical Society, held in Las Vegas. Her poster, called "Microwave Synthesis of $LiMnPO_4$: Structural Characterization and Electrochemical Performance in Organic and Aqueous Electrolytes," was co-authored with **Assistant Professor Jay Whitacre**.

Sophomore **Daniel Cardenas Rivero** has been selected as a Boeing Scholar for the 2010–11 academic year. These scholarships are awarded annually to students from across the US who are interested in a career in the aerospace industry, and include a grant of $2500 to support winners' studies in a related field, such as engineering. Boeing Scholars must demonstrate high scholarship, merit, and potential—as well as excellent leadership and communication skills.

Doctoral student **Andrew Schultz** was selected to receive a National Science Foundation (NSF) supported Travel Fellowship to attend the 3rd International Congress on Ceramics in Osaka, Japan, in November. All costs, including registration, were paid by the NSF Fellowship.

Junior **Turi Alcoser** was featured on the home page of the Carnegie Mellon Web site last summer, with an accompanying video interview. Alcoser, who has a dual major in Biomedical Engineering, applied to Carnegie Mellon through the University's Summer Academy for Mathematics and Science (SAMS) program, designed to increase the number of outstanding college-bound students from diverse backgrounds who pursue education in science, technology, engineering, and math disciplines. Read more about Alcoser and watch the interview at http://www.cmu.edu/homepage/health/2010/summer/turi-alcoser.shtml.

Lisa Chan (Ph.D.) and Charadatta Phatak (Ph.D.)

Congratulations to the Class of 2010

The Department's annual Commencement ceremony was held on May 16, as the Class of 2010 gathered to receive B.S., M.S., and Ph.D. degrees in Materials Science and Engineering.

Some members of the class will go on to pursue graduate degrees at Carnegie Mellon, the University of Pittsburgh, Northwestern, Alfred University, and Rensselaer Polytechnic Institute. Others have accepted professional positions at L'Oreal, Nucor Steel, the US Navy, Aquion Energy, Boeing, Kennametal, Intel, PPG Industries, Argonne National Lab, Alcoa Technical Center, Western Digital Media, and ATI Allvac.

Whatever their future holds, the Department congratulates every member of the Class of 2010—and wishes them the best as they move forward.

At the May 16 ceremony, a number of graduates received special recognition.

Brittany Selman (B.S.) with Professor Gregory S. Rohrer

Emine Begum Gulsoy (Ph.D.) with Professor Marc De Graef

Katharyn Gaslowitz (B.S.) with Professor Rohrer

★ **Fiona Cormack** was honored with the 2010 *William W. Mullins Undergraduate Award*, given annually to a graduating senior in the Department who best exemplifies the qualities associated with **Professor William Mullins**: hard work, dedication, scholarship, and breadth of knowledge within a wide range of academic interests.

★ The *Hubert I. Aaronson Undergraduate Award* was presented to **Tsen-Shan Sharon Wang**. Created in memory of the late **Professor Hub Aaronson**, this annual award supports a deserving undergraduate metallurgy student who is planning to attend graduate school.

★ **Katharyn Gaslowitz** was recognized with the *James W. Kirkpatrick and Jean Kirkpatrick Keelan Scholarship Award*. This award honors the graduating senior who best exemplifies the qualities described in the scholarship bequest by "supplementing his/her intellectual abilities with effort and work ethic."

★ The 2010 *William T. Lankford Jr. Memorial Scholarship Award* was presented to **Sean Donegan**. This honor goes to the graduating MSE student who best exemplifies the qualities described in the award bequest: scholarship, commitment to the profession, and future potential.

★ **Brittany Selman** won the *Outstanding College Senior Award*, which is presented each year by the ASM Golden Triangle Chapter.

★ **Sarthak Havelia** won the *Paxton Award for Best Doctoral Dissertation*. Made possible through the generosity of **Ann** and **Harry Paxton**, this honor is intended to promote excellence in doctoral scholarship by recognizing the best Ph.D. dissertation each year.

★ Two students were recognized with the 2010 *Krivobok Brooks Award for Excellence in Metallography*. The undergraduate recipient was **Ankur Gupta**, while the graduate recipient was **Neerav Verma**.

★ The 2010 *Philbrook Prize in Engineering* was awarded to **Professor David E. Laughlin**. This annual honor recognizes an MSE faculty member who has made substantial, sustained contributions to excellence in education, or to the application of materials science to important problems. The award honors the late **Professor William O. Philbrook's** many contributions to the teaching of metallurgy and his successful application of metallurgical principles to practical problems.

Pranay Choudhary (Ph.D.) with his family and Professor Warren Garrison

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Save the Date!

On Friday, April 15, the Department of Materials Science and Engineering will be hosting a Deck Party in conjunction with the 2011 Carnegie Mellon Spring Carnival. We hope to see many of our alums when they return to the campus for this annual event!

Carnegie Mellon
ENGINEERING

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