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MS news

MATERIALS SCIENCE AND ENGINEERING

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Exploring Interfaces in Materials

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INSIDE

A Note From the Department Head

Gregory S. Rohrer, W.W. Mullins Professor

Dear MSE Graduates:

Every four years, the President's Advisory Board at Carnegie Mellon visits the Department of Materials Science and Engineering, and makes recommendations that are intended to improve MSE. We were last visited in the Spring of 2005, and are now preparing for a visit in the Spring of 2009. Following the 2005 visit, one of the recommendations was to upgrade the facilities in Wean Hall (originally called Science Hall). The Advisory Board report noted the need for cosmetic changes (paint and floor tiling), as well as laboratory upgrades to promote soft materials research.

The MSE faculty agreed completely with the Advisory Board's recommendation, and we have made a number of changes in response. In all, the Department has invested more than one million dollars to improve its Wean Hall facilities. Approximately half of this investment was used to completely renovate our laboratories for soft materials research, where the research groups of **Professors Michael Bockstaller** and **Mohammad Islam** now house their experimental programs. Another large portion of this money was used to create an electronic materials laboratory for the research group of **Professor Robert Davis**. Three additional Wean Hall labs were repainted, and new floors were installed. Many of the offices have had carpets and furniture replaced. Perhaps the most noticeable change is in the corridors, which have been painted and tiled for the first time.

Most recently, we added an outdoor deck to the end of Wean Hall's third-floor corridor—a project that is described on page 5 of this newsletter. In warm weather, this new outdoor space provides an informal gathering spot for MSE students, faculty, and staff.

While these "housekeeping" activities might seem mundane, an attractive infrastructure promotes morale—and shows visitors to the Department that the quality of our facilities is consistent with the quality of our scholarship. Following the successful renovations in Wean Hall, we are now making plans for the renovation of our facilities in Doherty Hall.

Another key indicator of the quality of our Department is the quality of our alumni—which is evidenced each time I meet with MSE graduates. The recent Saltminers Dinner, held in October in Roberts Hall, provided yet another opportunity to be impressed with our MSE alumni (see page 6). Those who attended had a unique opportunity to relax and reminisce with fellow members of the extended MSE family.

For those of you who could not make it, please put this event on your calendars for next year. The Saltminers Dinner is held annually during the Materials Science and Technology (MS&T) Conference and Exhibition—and this meeting is scheduled to be held again in Pittsburgh in 2009. I hope to see many of you on campus then.

In the meantime, the Department is also hosting a "Welcome Home" Happy Hour on April 17, 2009, that coincides with the annual Carnegie Mellon Carnival. If you attend, I hope you will enjoy seeing the many changes that have taken place within the Department—improvements which we consider an important investment in MSE's future.

Gregory S. Rohrer
W.W. Mullins Professor and Department Head

COVER STORY

Exploring Interfaces in Materials

The Materials Research Science and Engineering Center (MRSEC) at Carnegie Mellon is the site of aggressive new efforts to characterize interfaces in polycrystals. The main tool of investigation is electron microscopy, which provides images of polished cross sections of polycrystal specimens. These images consist of a regular grid of points (pixels) similar to images produced by a digital camera—but electron microscopes also show topology and/or crystal orientation. To obtain a comprehensive view of polycrystals, 3-D images are built by using stacks of such images.

A grain boundary can be drawn between points in different grains (or phases), but the pixilated nature of the image means that the boundaries are rather rough—too rough for an accurate determination of boundary planes, for example, which is critical in measuring boundary properties. To deal with this issue, an MSE research team led by **Professor Anthony D. Rollett** is generating a surface mesh between the grains, which—when viewed in three dimensions—consists of a network of triangles. Each triangle represents a small piece of the boundary, with a well-defined size and inclination. The surface meshes, as generated, are rough, but MSE researchers smooth them using several different techniques.

The image shown on the cover is an example of a surface mesh that represents the grain boundary network in a sample of cubic zirconia. The mesh was smoothed with a gradient-weighted moving finite element code that allows researchers to simulate grain growth in the computer. Use of this code highlights one of MSE's many collaborations—in this case, a partnership with the Los Alamos National Laboratory.

Zirconia has rather equiaxed, nearly spherical grains that are consistent with its relatively isotropic grain boundary properties. Other materials, by contrast—such as nickel alloys—have many flat-sided grains because of the presence of annealing twins, indicating that the grain boundary energy is highly anisotropic. In the MRSEC, MSE researchers are exploring not just the properties of grain boundaries, but also microstructural design with interfaces—and how interfaces control materials properties such as strength, anisotropy, corrosion resistance, and creep resistance.

In addition to Professor Rollett, key contributors to this effort are **Professor Gregory S. Rohrer**, graduate student **Steve Sintay**, and postdoc **Sukbin Lee**. **Shen Dillon** (now a faculty member at the University of Illinois at Urbana-Champaign) and **Jason Gruber** (now a staff member at the Bettis Laboratory) also made major contributions while at MSE.

Alum Visits MSE

Dr. Lane Martin and MSE X-Ray Supervisor Jason Wolf

Dr. Lane W. Martin *(B.S. '03)* stopped by the Department during a visit to Pittsburgh for the MS&T meeting in October. After receiving his B.S. degree at MSE, Martin continued his studies at the University of California, Berkeley, where he was a *National Science Foundation IGERT Fellow in Nanoscale Science and Engineering* and the *Robert Noyce Fellow in Microelectronics*. Martin received his M.S. in May 2006 and his Ph.D. in March 2008, with a designated emphasis in Nanoscale Science and Engineering. Currently a post-doctoral fellow in the Materials Science Division at Lawrence Berkeley National Laboratory, Martin's research focuses on two major areas: multiferroic and multifunctional materials and devices and solar energy conversion—specifically, oxide materials for photovoltaics and photocatalysis of water. In July, Martin married Sophi Ionova, a Ph.D. student at Berkeley. He is currently applying for faculty positions at a number of top US institutions.

DEPARTMENT NEWS

ICOTOM Draws a Worldwide Audience

In June, Carnegie Mellon University hosted the 15th International Conference on Textures in Materials (ICOTOM)—which drew 300 attendees from around the world. In fact, a full 75 percent of attendees traveled from abroad, making this a truly international event. Held every three years, ICOTOM has not been hosted in the US since 1987.

The American Ceramics Society provided the professional management for the conference, and many leaders from the US texture and anisotropy community also helped with ICOTOM. **Professor Anthony D. Rollett** served as the Conference Chair, with support from many colleagues, students, and post-docs in the Department of Materials Science and Engineering.

In a first for ICOTOM, the 2008 conference featured a two-day "Summer School on Texture," in which six different short courses were offered, covering a variety of topics. These courses drew approximately 100 engineering students, making the Summer School a definite success in its inaugural year.

The main conference, held in the University Center, featured a wide variety of topics, including steels, hexagonal metals, welding, thin films, novel methods, and biomaterials. The proceedings of ICOTOM are now published as Volumes 200 and 201 of *Ceramic Transactions*.

Dr. Ian Dillamore, Dr. S. Lee Semiatin *(M.S. '72, Ph.D. '77)*, and Mrs. Dillamore

"It is an honor for Carnegie Mellon and MSE to have the opportunity to host this prestigious international event, which has not been held in the US in more than two decades," says Rollett. "Both informal and formal surveys of ICOTOM attendees indicated that it was a very successful meeting—and that a great deal of useful scientific exchange took place here in Pittsburgh."

Rollett also notes that there was a high level of participation from the Carnegie Mellon community, especially from the NSF-supported Mesoscale Interface Mapping Project (MIMP).

Dr. Jeff Simmons *(M.S. '85)* and Professor Anthony Rollett

Professor Rollett

Dr. Abhijit Brahme

Dr. Sukbin Lee *(M.S. '03, Ph.D. '08)*

Dr. Tricia Bennett *(M.S. '02, Ph.D. '06)*

MSE Holds Symposium

The Department of Materials Science and Engineering held its second Graduate Student Symposium on Friday, October 17, in the Singleton Room.

The MSE Symposium provides a conference-style atmosphere in which graduate students present their research to the Department and to external attendees. The Symposium promotes a culture of scientific discussion, intellectual excitement, and cohesion among graduate students, faculty, visiting scientists, and external attendees.

The October 17 event featured oral presentations by fourth-year students and poster presentations by third-year students. The faculty judges who evaluated this year's presentations were **Professors Katayun Barmak, Michael Bockstaller, Marc De Graef, Michael McHenry**, and **Anthony Rollett**.

The panel recognized **Hui Du** for his oral presentation, "Revisiting the Slip System of (Ba,Sr)TiO_3 Perovskite by Studying the Strain Relaxation Mechanisms of Differently Oriented Films." Du's co-authors are Shanling Wang, Thomas N. Nuhfer, **Paul A. Salvador**, and **Marek Skowronski**.

Matthew Walker and **Hyung Ju Ryu** were recognized for their poster presentations. Walker's poster, entitled "Thermodynamics of Carbothermic Reduction of Alumina," was co-authored by **Richard J. Fruehan**. Ryu's poster, "Defect Structures in Block Copolymer/Nanoparticle Blends," was co-authored by Bockstaller.

A Modern Engineering Marvel

The Spring 2008 edition of *MSE News* previewed the Department's efforts to beautify a neglected area between Doherty and Wean Halls—and transform it into an outdoor living space that could be enjoyed by faculty, staff, and students.

This ambitious renovation project was completed in August, thanks to the vision and hard work of Professor Larry Cartwright of the Department of Civil and Environmental Engineering, as well as the students in his Senior Design and Construction class.

Once overlooked, today this outdoor space is home to a beautiful deck, constructed with structural plastic, treated lumber, granite counters, zinc side walls, and concrete columns and footings. It offers a counter with stools, additional seating to accommodate larger groups, and power outlets so that MSE students, faculty, and staff can work outdoors.

The work in progress

Already the site of a "kickoff" graduate student Happy Hour, today this beautifully renovated space is typically filled with MSE Department members working, studying, holding lively discussions, or simply enjoying the outdoors.

Alumni News

2008 Saltminers Dinner: An MSE Reunion

Mrs. Ellen Wagner Roberts and Dr. George A. Roberts *(B.S. '39, M.S. '41, Ph.D. '42)*

The annual Saltminers Dinner is held each Fall in conjunction with the Materials Science and Technology (MS&T) Conference. Since Pittsburgh played host to the 2008 Conference, the Department of Materials Science and Engineering had a unique opportunity to host this event on the campus of Carnegie Mellon. The dinner, held on October 5 in the Singleton Room of George A. Roberts Engineering Hall, represented a homecoming for many of MSE's extended family members. More than 50 alumni and faculty members enjoyed the chance to reunite with old friends, as well as share news about the Department.

In Memoriam

Robert E. Boni *(M.S., Ph.D. 1954)* died in July at age 80. Boni joined Armco in 1956 as a Research Engineer. He would remain with the company for the next 34 years, holding such positions as Vice President of Research and Technology, Chief Operating Officer, and eventually President and CEO. Boni was the 1990 recipient of the ASM International's *Medal for the Advancement of Research*. Other honors include the *1970 University of Cincinnati Distinguished Engineering Alumnus Award* and the *1987 Benjamin F. Fairless Award* from the American Institute of Mining, Metallurgical and Petroleum Engineers. Boni is survived by his wife Janet and two daughters, Susan and Leslie.

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MSE Alum Honored at Homecoming

Carnegie Mellon honored 19 alumni, students, and friends for their achievements and service to the University as part of its Homecoming weekend, held October 23-26.

Dennis M. Dimiduk *(M.S. '84, Ph.D. '89)* was one of five Carnegie Mellon graduates honored with an *Alumni Achievement Award* at a special ceremony on Friday, October 24, held in the Rangos Ballroom at the University Center. Dimiduk was recognized for his leadership of Air Force research in advanced metallics and simulation methods, which has had a major impact on both his technical field and the nation's security.

For nearly two decades, Dimiduk has led an internationally recognized team investigating advanced metals and simulation methods at the Wright-Patterson Air Force Base in Ohio. He is an author or co-author of more than 140 technical papers, a member of the editorial board for *Intermetallics*, and an Adjunct Professor at The Ohio State and Wright State Universities.

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Carnegie-Japan Celebrates a Milestone

Carnegie-Japan met this past April for its 10th annual meeting. The meeting was marked by good fellowship and pleasant memories of the group's time in Pittsburgh. We are indebted to **Dr. Kunitake, Dr. Tsubakino, Professor Tsukihashi**, and **Professor Nagasaka** for their dedication in annually organizing this event for the benefit of Carnegie Mellon, the Department of Materials Science and Engineering, and its alumni.

MSE Alumni Remember Their Alma Mater

In fiscal year 2008, 349 loyal MSE alumni and friends of the Department contributed a total of $419,657 to Carnegie Mellon University. Of these contributors, the 130 alumni and friends listed below donated almost $187,110 directly to the Department of Materials Science and Engineering.

These generous donations directed toward MSE make it possible for the Department to fund scholarships and fellowships, upgrade laboratories, and make other investments that improve the quality of student life. The continuing generosity of these donors is greatly appreciated.

ASM International
Abramowski, Cobey L.
Albert, Robert L.
Allison, John E.
Arnone, Donald R.
Bayowski, Andrew C.
Bickford, Dennis F.
Bish, Ronald E.
The Boeing Company
Brantley, Vivian A.
Brennan, Richard B.
Brown, Kevin C.
Bytnar, James Henry
Carmichael, Paul Denney
Chan, Chee
Chen, Ruby
Ching, Kalani
Clum, James A.
Cox, Thomas B.
Crews, Andrea M.
Crosbie, Gary M.
Darby, Dennis
Dersh, David A.
Dieter Jr., George E.
Dixon, Darius A.
Donovan, Dennis M.
Dukelow, Donald A.
Emerick, Harold B.
Fidelity Charitable Gift Fund
FitzSimmons, John E.
Forbes, Robert E.
Fountain III, Alton N.
Fox, Arthur V.
Francis, Andrew J.
Franz Jr., William A.
Gilbert, Thomas W.
Goldman, Kenneth M.
Goodwald, Jerry A.
Gordon, Barry M.
Graziano, Anthony F.
Ha, Seoyong
Harrover Jr., Robert E.
Hart III, Joseph H.
Hartfield-Wunsch, Susan E.
Hartman, Thomas L.
Heckel, Richard W.
Hirth, John Price
Hoffman, Emily E.
Horne, Gerald T.
Hunter, Harry B.
Hyland, Mary Elise
Integran Technologies USA
Jaffe, Donald
Jesanis, Janet
Joseph, Thomas M.
Kachur, Victor
Kashar, Lawrence J.
Katunich, Linda S.
Kelly, Paul C.
Kline, Martin A.
Knoth, Roy J.
Kraisinger, Charles J.
Landerman, Edgar
Lange, Jason Andrew
Larsen, James Milligan
Latrobe Specialty Steel Co.
Lee, Hyun K.
Lee, Paul Seungyong
Lewandowski, Amy E.
Lherbier Sr., Louis W.
Littman, Lawrence E.
Liu, Yinshi
Mapes, Steven E.
Marinis Jr., Thomas F.
Maxton, Robert C.
McFadden, Robert Simboli
McInteer, William A.
Mighton, John W.
Miller, Herbert M.
Miller, Timothy Alan
Mitchell, Conrad
Mizikar, Eugene A.
Montgomery, Allen M.
Moon, Jaehyun
Mullins, Garrick R.
Murray Jr., Allan D.
O'Connell, Thomas E.
Ortiguera Jr., Apolonio M.
Park, Yong-Jin
Perepezko, John H.
Philips, Brett A.
Phinichka, Natthapong
Pierce, Michael
Pomraning, Stephen R.
Pyle Jr., George M.
Ramalingam, Balamuralikrishnan
Rapp, Robert A.
Reichenecker, William J.
Reynolds Jr., William T.
Rimnac, Clare M.
Roberts, Scott N.
Russell, Kenneth C.
Schlitt III, W. Joseph
Schlosberg, William H.
Semple, James T.
Shen, Kai
Shields, Bruce M.
Sieber, Kurt G.
Siebert, William R.
Simkovich, Alexander
Simmons, Jeff P.
Smith, Paul Andrew
Sohn, Il
Squire, Frederick J.
Steyer, Todd E.
Stosuy, Athan
Swanson, Robert E.
Sward, James A.
Taheri, Mitra
Teske, Aaron Paul
Turgut, Zafer
Van Saun, John B.
Weaver, Robert W.
Weertman, Johannes
Willard, Matthew Ashe
Williams, Robert K.
Wolf, Robert E.
Wolfe, Richard A.
Wood II, William Thomas
Wyda, Autumn M.

Welcome Home, Alums!

Every year, the Department has numerous visits from MSE alumni who travel back to the campus to attend the annual Carnegie Mellon Carnival. If you plan to be here for Carnival 2009, please mark your calendars for Friday, April 17, 2009, so you can attend the MSE "Welcome Home" Happy Hour.

Watch your mail for details closer to the date.

See you in the Spring!

FACULTY NEWS

Laughlin Wins Three Awards

There is an old adage that says good things come in threes—and this seems true for **Professor David Laughlin**, who has recently won three prestigious awards.

Two of Laughlin's honors are from The Minerals, Metals & Materials Society (TMS), a professional organization with nearly 10,000 members—including metallurgical and materials engineers, scientists, researchers, educators, and administrators—from more than 70 countries on six continents.

Early this year, Laughlin was elected as a *Fellow of the TMS Society*, and he was inducted at the organization's 137th Annual Meeting in March, held in New Orleans.

Laughlin, the ALCOA Professor of Physical Metallurgy in MSE, was cited for excellence in teaching, research, and outstanding service. He has edited the TMS publication *Metallurgical and Materials Transactions* for the past 25 years.

More recently, the Society's Electronic, Magnetic, and Photonic Materials Division (EMPMD) chose to present Laughlin with its *Distinguished Scientist/Engineer Award*. This honor recognizes an individual for research excellence in one or several areas related to electronic, magnetic, and photonic materials science; technological impact; broad, sustained commitment to teaching or mentoring; service to TMS and/or the profession; and impact upon governmental or policy-making bodies. EMPMD will hold an honorary symposium at the 2009 TMS Annual Meeting in recognition of Laughlin's many achievements.

Professor Laughlin's 2008 awards are only the most recent honors that he has received during a long and distinguished career.

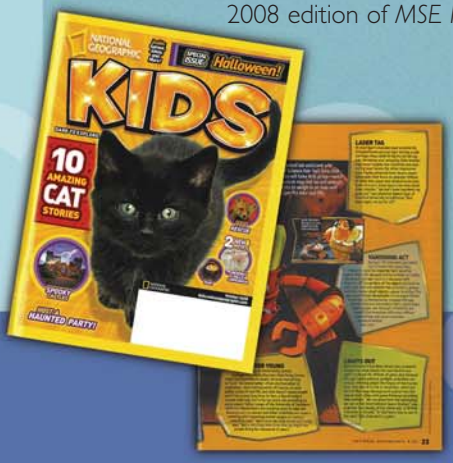
Professor Laughlin's accomplishments were also celebrated this year by his alma mater, Drexel University. He received the *2008 Distinguished Alumnus Award* from Drexel's Department of Materials Science and Engineering for his "outstanding contributions to the science and practice of materials science and engineering and to engineering education in materials and related industries." A plaque was presented to Laughlin by Professor Roger Doherty, the A.W. Grosvenor Professor at Drexel University, in May.

These are only the most recent honors that Laughlin has received during a long and distinguished career. Carnegie Mellon recognized Laughlin for his teaching excellence with the *Teare Award* in 1999 and for his outstanding research with a *CIT Outstanding Research Award* in 2003. The CIT award was given to Dr. Laughlin, along with David Lambeth of ECE, for their work with Dr. Li-Lien Lee on the invention of NiAl and other B2 structured underlayers for magnetic recording.

Faculty News Bits

Assistant Professor Mohammad F. Islam, who holds a joint appointment in Chemical Engineering, has been invited to participate in the 2008 National Academy of Sciences Kavli Frontiers of Science Symposium, held each November in Irvine, California. This annual symposium brings together approximately 25 young scientists to report on current research within their disciplines to an academically trained and scientifically diverse audience. They highlight major research challenges, methodologies, and limitations to progress at the frontiers of their respective fields. All attendees participate actively in a general discussion period, during which they learn from and form collaborative relationships with other young scientists in different fields.

The research of **Professor Michael Bockstaller** recently received some attention from an unusual source: *National Geographic Kids*. In its October issue, the magazine—which is aimed at young scientists—highlighted Bockstaller's ongoing efforts to create an "invisibility cloak" for nanoparticles that shrinks their visible size by a factor of thousands. To learn more about this exciting research, see the Spring 2008 edition of *MSE News*.



McHenry Featured on Engineering TV

Engineering TV—an online video program produced by engineers for engineers—has recently showcased the magnetic nanoparticle research of **Professor Michael E. McHenry**. Focused on technical B2B engineering topics, Engineering TV covers emerging technologies, best practices, new products, the latest developments, behind-the-scenes footage, and insights into the people at the forefront of design engineering.

McHenry's episodes can be viewed at these links:

- http://engineeringtv.com/blogs/etv/archive/2008/07/14/magnetic-nanomaterials.aspx
- http://engineeringtv.com/blogs/etv/archive/2008/07/15/cut-core-power-transformer.aspx
- http://engineeringtv.com/blogs/etv/archive/2008/07/16/rf-plasma-torch-synthesis.aspx
- http://engineeringtv.com/blogs/etv/archive/2008/07/17/ferrofluids.aspx

Pistorius Joins MSE Faculty

Dr. P. Chris Pistorius joined the MSE faculty as a Professor in July. Pistorius conducts research in the area of metals processing and will work with the Center for Iron and Steelmaking Research (CISR).

Pistorius received both his B.Eng. (1987) and M.Eng. (1988) in Metallurgical Engineering from the University of Pretoria, South Africa. He completed his Ph.D. in Corrosion at the University of Cambridge in 1991.

Prior to joining Carnegie Mellon, Pistorius enjoyed a long and successful career as a Professor at the University of Pretoria's Department of Materials Science and Metallurgical Engineering. He also served as Department Head from May 2002 to June 2008.

Pistorius is a Member of the Academy of Science of South Africa, and a Fellow of the South African Academy of Engineering. He has recently become a member of the Editorial Board of *Corrosion Engineering Science and Technology (CEST)*, with an initial appointment of three years. This international publication provides broad coverage of research and practice in corrosion processes and corrosion control, with a strong emphasis on effective design and materials selection to combat corrosion. *CEST*'s scope encompasses all metallic and non-metallic materials and composites.

The focus of his research in the Center for Iron and Steelmaking Research will be on steel cleanliness, reaction kinetics, ironmaking, and electrochemistry.

Rohrer Honored by ACS

Professor Gregory S. Rohrer, W.W. Mullins Professor and Head of the Department of Materials Science and Engineering, has been honored by the American Ceramic Society with its *Robert B. Sosman Award*, the highest recognition of scientific accomplishment given by the Society's Basic Science Division. This award is given in recognition of outstanding achievement in basic science of an area that results in a significant impact to the field of ceramics. As part of the award, Rohrer will present a plenary lecture at the Annual Meeting, where a symposium will be held in his honor. This prestigious lecture is given each year by the awardee who has been deemed by the award committee to have made the most significant contribution to the field of ceramics.

MSE Profs Win NSF Funding

MSE faculty members **Michael Bockstaller, Michael McHenry,** and **Elias Towe**—working in collaboration with researchers at the Departments of Civil and Environmental Engineering, Chemistry, and Philosophy—have been awarded $200,000 in funding from the National Science Foundation (NSF).

The grant will be used to establish an Interdisciplinary Undergraduate Program in Nanotechnology (IUPN) at Carnegie Mellon University. The primary goals of IUPN are to establish an integrated training program for undergraduate students that will engage them in the study of nanoscience and engineering.

IUPN will facilitate a cross-disciplinary education in the fundamental aspects of nanotechnology that appeals to students with diverse backgrounds and interests, as well as provide an experimental infrastructure that will support existing educational activities on campus in the area of nanotechnology. The program will also stimulate students to engage in research in the area of nanoscience and promote longer-term relationships between students and involved researchers.

IUPN will offer a research fellowship program that will provide students with monetary support for pursuing independent nanotechnology-related research projects across the Carnegie Mellon campus. More information on the application process for participation in this fellowship program will be publicized soon.

STUDENT NEWS

Doctoral student **Jason Gu** attended the "Fostering US-Australian Research Collaborations in Materials Program" held in Sydney, Australia, in July. The program was part of the 2008 International Conference on Electronic Materials. The goals of the program were to connect US and Australian graduate students in order to establish collaborations on materials-based research, and to provide students with project leadership training. Gu was one of only 12 American students nationwide selected to attend.

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Junior **Rhiannon Low** is among the 2008 winners of the *David L. Boren Scholarship for Study Abroad*. Boren Scholarships are funded by the National Security Education Program (NSEP), which focuses on geographic areas, languages, and fields of study deemed critical to US national security. Low is a Third-Class Midshipman in the Carnegie Mellon Naval Reserve Officer Training Corps Unit, with a dual major in MSE and Chemistry. This nationally competitive, prestigious scholarship was awarded to only 150 students in 2008. Low received $7900 to fund an eight-week summer study at Peking University in Beijing, where she studied Mandarin.

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Doctoral student **Charudatta Phatak** won a *Presidential Student Award* from the Microscopy Society of America (MSA). This award allowed Phatak to attend Microscopy & Microanalysis 2008, MSA's annual conference, which was held in Albuquerque, New Mexico, in early August. MSA awards are based on the quality of the papers submitted for presentation at the meeting.

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MSE doctoral student **Hyung Ju Ryu's** article on a novel synthesis method for gold nanorods that appeared in the September 22 issue of *Angewandte Chemie International Edition* has been featured in news media across the US and Europe. For example, Ryu's research has been showcased in *Medical News Today* and *Biomedical Engineering News*, as well as being featured on major German and Austrian chemistry news Web sites. Co-authors of the article include **Professor Michael Bockstaller** of MSE, as well as Luz Sanchez, an undergraduate student from New York City University who visited the Bockstaller research group as a participant in MSE's Research Experiences for Undergraduates (REU) program in 2007.

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Steven Spurgeon, a senior majoring in MSE, is the recipient of a *Steel Engineering Education Link (STEEL) Scholarship* from the American Iron and Steel Institute and the Association for Iron and Steel Technology Foundation. Only 10 students receive these scholarships each year, which include a $5000 tuition award for each of two years, as well as a paid summer internship at a North American steel company. Last summer, Spurgeon interned at Carpenter Specialty Alloys in Reading, Pennsylvania—where he worked for the R&D department on high-temperature alloys. STEEL applicants are judged on their academic performance, as well as their demonstrated interest in the iron and steel industry.

Linking Ph.D. Students With Opportunities

CrossLink is an engineering graduate student group at Carnegie Mellon—based in the Materials Science and Engineering Department—that promotes networking opportunities between engineering Ph.D. students and the Pittsburgh/Western Pennsylvania business community.

During monthly lunch events, Carnegie Mellon doctoral students meet with representatives from local businesses and engineering organizations, in order to learn about employment opportunities for engineers in the Pittsburgh region.

During the Spring 2008 semester, representatives from Timet, PPG, and the ASM Pittsburgh Chapter provided CrossLink participants with an understanding of the roles for Ph.D. graduates in their own organizations.

Funded in part by the Pennsylvania Infrastructure and Technology Alliance (PITA) and the Institute for Complex Engineered Systems (ICES), CrossLink was created to address the professional development needs of Ph.D. students, while simultaneously promoting regional development in Western Pennsylvania. This effort helps doctoral candidates—who are often immersed in their own studies—to also remain focused on exploring post-graduation employment opportunities.

If you are a Carnegie Mellon alum, or work for a company that employs engineers in the Pittsburgh area, please e-mail crosslink.cmu@gmail.com to learn more about this unique student-industry partnership.

For general information—or to see the current schedule of CrossLink events—visit http://www.ices.cmu.edu/crosslink/.

Fatma Uyar and Emine Gulsoy

MSE Celebrates Commencement 2008

It its annual Commencement Ceremony, held on May 18, the Department of Materials Science and Engineering awarded more than 50 degrees. There were 19 B.S. recipients, 17 M.S. honorees, and 15 Ph.D. awardees.

Some members of the MSE Class of 2008 plan to continue their studies at Cambridge, Carnegie Mellon, the University of California, and the University of Florida. Others have accepted positions with leading companies such as GE Aviation, IBM, Intel, Praxair, Samsung, and Xerox.

Special awards given at the May event included:

- *The William W. Mullins Undergraduate Award:* **Sophia Woodley**
- *The Hubert I. Aaronson Undergraduate Award:* **John Berezney**
- *The James W. Kirkpatrick & Jean Kirkpatrick Keelan Award:* **Hannah Soll-Morris**
- *The William T. Lankford Jr. Memorial Scholarship Award:* **Rebecca Snyder**
- *The ASM Golden Triangle Chapter Outstanding College Senior Award:* **Courtney Ondeck**
- *The Paxton Award for Best Doctoral Dissertation:* **David Berry**
- *The Krivobok-Brooks Awards:* **Youngeun Kim** (undergrad); **Sukbin Lee** and **Stephen Sintay** (grad)
- *The Philbrook Prize in Engineering:* **Professor Michael Bockstaller**

Leon Tsiven and Rebecca Snyder

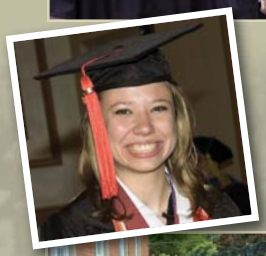
In addition to being recognized by the Department, Rebecca Snyder—who earned a dual degree in MSE and Biomedical Engineering—has been chosen by the United States Department of State, Bureau of Educational and Cultural Affairs, as a 2008 recipient of the international *Fulbright Scholarship*. Snyder is currently using Fulbright support, awarded by the US government's flagship program in international educational exchange, to conduct nine months of funded biomedical research in Singapore. In 2009, Snyder will begin her graduate studies at Stanford University, where she plans to earn a Masters in bioengineering with a theme in medical devices, a Masters in medicine, and a doctorate degree in bioengineering with a concentration in regenerative medicine.

Whatever career path they choose to pursue, the Department wishes a bright future for the Class of 2008!

Prof. Barmak with Dr. David Berry

John Berezney

Chris Manganello, Sophia Woodley, and Darin Clark



Courtney Ondeck

Dr. Chao-Voon Samuel Lim and family

Left to right are: Kelsey Miller, Soyoung Park, Jaewon Lee, En Yang, Kazuo Nakama, and Ronen Berechman

MSE news

Department of Materials Science and Engineering
Carnegie Mellon University
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