

**GRAIN MAPPING OF
POLYCRYSTALLINE
COPPER**



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Greetings to our MSE alumni! I am happy to report that the Department of Materials Science and Engineering continues to grow and thrive. As you read the diverse stories in this edition of *MSE News*, you will see that our alumni, students, and faculty continue to celebrate successes in a broad range of endeavors—including winning technical honors, achieving career advancement, and celebrating family milestones.

In this forum, I have written more than once about the emergence of the Materials Genome Initiative and MSE's role in this national effort aimed at creating new materials. This issue of *MSE News* contains an article briefly describing an innovative research project at Carnegie Mellon that is part of this broader national initiative (see facing page).

This project, funded by the National Science Foundation's "Designing Materials to Revolutionize and Engineer Our Future" (DMREF) program, was awarded to **Mohammad Islam** and **Elizabeth Holm**. Their exciting research integrates computation and experimentation in a seamless way to accelerate the development of new materials, based on unique single wall carbon nanotube aerogels that were discovered by Islam's research group. This groundbreaking work will be synergistic with other efforts within the Department to support the Materials Genome Initiative, including hiring new faculty and developing new courses.

In this issue, we also welcome two professors to the Department. Coincidentally, they are also MSE alumni—and the only alumni currently on our faculty. **Bryan Webler** joins us after spending five years at Bettis Atomic Power Laboratory, where he was a senior engineer. Webler will strengthen our research efforts in the Center for Iron and Steelmaking Research, as well as study the properties and performance of materials in extreme environments. **Vincent Sokalski** joins the Department to research materials for spintronic devices. Sokalski uses thin film processing to develop novel materials for magnetic logic and memory applications. He will strengthen MSE's research in the area of magnetics.

Last Fall, the annual Saltminers Dinner was held during the MS&T meeting in Montreal—the only international edition of this event in memory. I was joined by many MSE alumni for an enjoyable event. Mark your calendars for this year's dinner, held much closer to home here in Pittsburgh. The 2014 MS&T conference will be held October 12-16 at the David L. Lawrence Convention Center.

Finally, I should note that the Department's national rankings in *U.S. News & World Report* have increased in the past year. Our undergraduate program is now ranked 9th, and our graduate program is now ranked 11th. These ranking gains reflect the hard work and successes of our faculty, staff, students, and alumni. Thank you for sharing in this collective MSE achievement!

Gregory S. Rohrer

“Our increased national rankings reflect the hard work and successes of MSE faculty, staff, students, and alumni.”

MSE FACULTY WIN DMREF GRANT

Professors Elizabeth Holm and Mohammad Islam of MSE have recently received a *Designing Materials to Revolutionize and Engineer Our Future* (DMREF) grant from the National Science Foundation. This grant will support their work to design, develop, and characterize carbon nanotube aerogels. This award is part of the larger Materials Genome Initiative, which is an effort initiated by US President Barack Obama to develop transformative new materials.

CARBON NANOTUBE AEROGELS: A PROMISING MATERIALS BREAKTHROUGH

Since single wall carbon nanotubes (SWCNTs) have excellent mechanical properties, researchers around the world have been attempting to assemble them into foam-like porous structures. Unfortunately, nanoscale self-assembly of carbon nanotubes into foam-like structures has thus far been unsuccessful. Recently, the Islam research group has fabricated free-standing SWCNT aerogels using a novel sol-gel method.¹ By tuning the pore size distribution and junctions—or “nodes”—between nanotubes at the nanoscale, Islam’s research group has also been able to modulate the mechanics of the macroscale structure.

One exciting consequence is the development of fatigue-resistant, low-density networks.² Consider a stiff but deformable material that can undergo millions of cycles of large strain and always return to its original structure. Since nanotubes are electrically conductive, there are many promising applications in energy technologies. Porous conducting materials with mechanical integrity can be used in next-generation batteries, fuel cells, and supercapacitors.

In addition to developing a novel material with numerous potential applications, the team plans to use computational modeling to design and optimize network structures for enhanced material properties. Simulations of these rigid-rod networks provide unique insight into the science of network integration—and can guide experimental fabrication of three-dimensional nanotube networks. The ability to predict, design, and synthesize these structures via computation, coupled with experiments, will advance the pace at which next-generation materials can be designed. The MSE team’s work will also serve as a model for advancing the optimization of other porous materials.

DMREF: ATTACKING PRESSING MATERIALS CHALLENGES

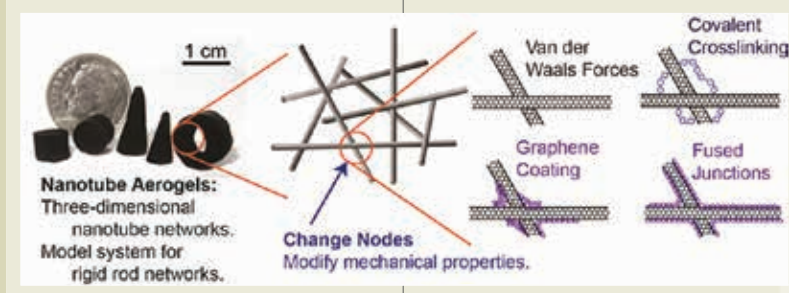
The National Science Foundation (NSF) has created a national materials initiative—called Designing Materials to Revolutionize and Engineer Our Future (DMREF)—in order to advance materials science in the United States. DMREF is the primary program to support NSF’s participation in the Materials Genome Initiative for Global Competitiveness.

Created by President Obama, the Materials Genome Initiative aims to “deploy advanced materials at least twice as fast as possible today, at a fraction of the cost.” A critical national initiative, the Materials Genome Initiative

spans the materials continuum—from materials discovery and development through property optimization, systems design and optimization, certification, manufacturing, and deployment.

According to NSF, the resulting materials

improvements will “synergistically integrate advanced computational methods and visual analytics with data-enabled scientific discovery and innovative experimental techniques so as to revolutionize our approach to materials science and engineering.”



1. K.H. Kim, Y. Oh, and M.F. Islam, “Mechanical and Thermal Management Characteristics of Ultrahigh Surface Area Single-Walled Carbon Nanotube Aerogels,” *Advanced Functional Materials* 23, 377 (2013).
2. K.H. Kim, Y. Oh, and M.F. Islam, “Graphene Coating Makes Carbon Nanotube Aerogels Superelastic and Resistant to Fatigue,” *Nature Nanotechnology* 7, 562 (2012).

Carnegie Mellon University

MSE WELCOMES NEW FACULTY

Bryan Webler and Vincent Sokalski Are Both MSE Alumni

Last Fall, the Department of Materials Science and Engineering welcomed two new faculty members, both of whom received their doctoral degrees here. We are delighted to announce the appointment of **Bryan Webler** as Assistant Professor and **Vincent Sokalski** as Assistant Research Professor. This is a happy “homecoming” for two materials scientists who excelled in their studies here — and will now mentor and instruct a new generation of engineers.



As MSE’s newest Assistant Professor, Bryan Webler will be teaching, advising graduate students, and leading a research program as part of the Center for Iron and Steelmaking Research.

Webler received a bachelors degree in Engineering Physics from the University of Pittsburgh in 2005, before earning both his masters (2007) and Ph.D. (2008) from the Department of Materials Science and Engineering. His graduate research in the Department was focused in the Center for Iron and Steelmaking Research, where he studied high-temperature oxidation of low-carbon steels.

From 2008 to 2013, Webler was a Senior Engineer in the Materials Technology Department of Bettis Atomic Power Laboratory, studying corrosion resistance and the mechanical behavior of stainless steels and nickel-base alloys.

Webler’s current research interests lie in understanding the reactions between metals and their environment. He is particularly interested in metallurgical processing, the in-service performance of metals in corrosive environments, and fundamental thermodynamics and transport phenomena.

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Vincent Sokalski joins the faculty as an Assistant Research Professor of Materials Science and Engineering. Sokalski will be teaching, advising graduate students, and developing materials for applications in spintronic devices.

Sokalski received a B.S. from the University of Pittsburgh (2007) before earning both his M.S. (2008) and Ph.D. (2011) from MSE. Since then, he has been employed as a Post-Doctoral Research Associate in the Department of Electrical and Computer Engineering. While there, Sokalski contributed to the development of perpendicular magnetic

tunnel junctions and spin-transfer-torque induced domain wall motion for magnetic logic devices and memory applications.

At MSE, Sokalski’s research will focus on the exploration of novel magnetic and spintronic materials for memory, logic, and HDD storage applications. He will concentrate on the development of thin films and nanoscale devices that will enable improved energy efficiency, nonvolatility, and scalability to ever-decreasing dimensions.

Sokalski’s current research efforts include crystallographic and microstructural characterization of perpendicular magnetic recording media, materials for spin hall effect devices, spin-transfer-torque magneto-resistive random access memory (STT-MRAM), and magnetic interactions in soft nanogranular composite thin films.



BETTINGER WINS MULTIPLE HONORS



Assistant Professor Chris Bettinger was selected to participate in the National Academy of Engineering's (NAE) fifth Frontiers of Engineering Education Symposium. Bettinger was selected as one of 73 of the nation's most innovative young engineering educators who were invited to take part in this elite NEA symposium. The attendees, aged 30 through 45, were nominated by fellow engineers or deans, which created a highly competitive pool of applicants. The 2013 event, hosted by DuPont, was held September 19-21 in Wilmington, Delaware.

Bettinger has also won a *George Tallman Ladd Research Award* from CIT. This honor recognizes his achievements in building a research program aimed at designing new biomaterials and medical devices that seamlessly integrate with the human body. Bettinger's research, which uses fundamental aspects of polymer chemistry and materials science to create materials and devices for biomedical applications, has established a strong bridge between the Materials Science and Engineering and Biomedical Engineering Departments. The award will be conferred at an event in the Fall semester.

Bettinger holds a joint appointment in MSE and the Biomedical Engineering Department. His Bettinger Research Group focuses on applying principles of polymer synthesis, materials science, and microfabrication for use in a wide range of biomedical applications—including advanced medical devices, regenerative medicine, functional bio-interfaces, and drug delivery.

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PISTORIUS NAMED POSCO PROFESSOR

Professor Chris Pistorius has been awarded the POSCO Professorship in Materials Science and Engineering. Pistorius is a key participant in the Department's internationally recognized Center for Iron and Steelmaking Research (CISR).

The POSCO Chair—previously held sequentially by **Professors Richard Fruehan, Alan Cramb, and Sridhar Seetharaman**—has been an integral part of CISR. The POSCO Chair guides the Department's interactions with POSCO (formerly Pohang Iron and Steel Company), a multinational steel-making company headquartered in Pohang, South Korea.

Pistorius came to Carnegie Mellon in 2008 with 16 years of experience as a Professor of Materials Science and Engineering at the University of Pretoria in South Africa, as well as four years as the Head of that department. During his career, he has built an impressive record of teaching, student mentoring, research, and publications in the area of metals processing. His current research in CISR focuses on steel cleanliness, reaction kinetics, ironmaking, and electrochemistry.

Pistorius was honored at a reception held on November 8. The event featured host and speaker James Garrett, Dean of the College of Engineering, as well as remarks from Mark Kamlet, Executive Vice President and Provost of Carnegie Mellon. **MSE Department**

Head Gregory Rohrer and Eugene Pretorius, Manager of Steelmaking Technology at Nucor, also made remarks. Doctoral student **Karina Lara Santos Assis** presented a gift on behalf of the Pistorius Research Group.



FACULTY NEWS BRIEFS



Professor Michael McHenry has been selected as the recipient of the 2014 *Distinguished Scientist/Engineer Award*, presented by the Electronic, Magnetic, and Photonic Materials Division of The Minerals, Metals & Materials Society (TMS). This honor recognizes McHenry for research excellence in 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. McHenry was presented with the award at the Electronic, Magnetic, and Photonic Materials Division (EMPMD) Council Meeting during the 143rd TMS Annual Meeting and Exhibition. This conference, which took place in San Diego, California, in February, also featured an EMPMD Honorary Symposium that celebrated McHenry's accomplishments.

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Professor Anthony Rollett has received the *Cyril Stanley Smith Award* from TMS for his groundbreaking insights into grain growth and texture development derived from quantitative, mesoscale computer modeling using anisotropic grain boundary properties. This award recognizes an individual who has made outstanding contributions to the science and/or technology of materials structure. The award includes a life membership to

TMS. Winners must have an established record of research, publications, and/or patents in the field of materials structure. This prestigious honor was created by TMS to recognize the quality and relevance of work that has had, or is likely to have, a significant and lasting impact on the development of the discipline. Rollett was honored at the annual Awards Banquet held during the 2014 TMS Meeting and Exhibition held in February in San Diego.



Professor Elias Towe has been awarded a *Visiting Professorship Award* by the Indo-US Science and Technology Forum (IUSSTF) and the American Physical Society (APS). These awards encourage faculty members in India and the United States to collaborate as they travel to the other country to deliver short courses or a lecture series. Up to six recipients are selected annually by a joint APS-IUSSTF Review Committee, with deadlines for proposals twice each year. Towe gave a series of lectures in December at the Indian Institutes of Technology and Indian Institute of Sciences in various cities.

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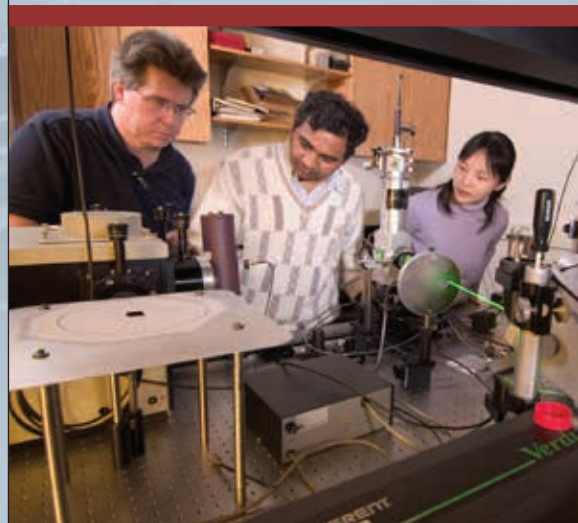
Professor Robert Davis presented an invited Technology, Education, and Design (TED) talk at Penn State University on March 2. His presentation was called "Lighting, a Pathway to Cleaner Air." Davis

discussed the amount of artificial lighting the world's population uses every day, different types of artificial lighting, and potential alternatives for artificial lighting used in today's world. The event was streamed live around the world on the TED.com web site.



Associate Professor Jay Whitacre is the winner of the 2014 *Advanced Materials Award*, presented by the Carnegie Science Center. Whitacre

is being honored for developing a novel sodium-ion battery that can be made using low-cost materials and manufacturing techniques. The technology has resulted in a spinoff venture, Aquion Energy, which is anticipated to grow into a 300-person enterprise by 2015. Whitacre also received an honorable mention for the *Start-Up Entrepreneur Award*. He will be honored at the Center's Awards for Excellence banquet on May 9. In other news, Aquion has been named one of the top 50 "smartest" companies for 2014 by *MIT Technology Review*.



MSE STAFF MEMBERS HONORED FOR THEIR SERVICE



At the Carnegie Mellon “Andy Awards” ceremony in October, two MSE staff members were recognized for their long service to the Department.

Dora Moscatello, Production Editor for *Metallurgical and Materials Transactions*, was honored for 30 years of service. **William Pingitore**, MSE Undergrad Lab Facilities Supervisor, was honored for 35 years of service. The Department congratulates these long-time members of the MSE family — and thanks them for their dedication and commitment.



ESTP PROGRAM WELCOMES NEW EMPLOYEE



Nora Sieworek joined the Department of Materials Science and Engineering in August as the Assistant Executive Director of the Energy Science, Technology, and Policy (ESTP) master’s program.

Sieworek joined the Department from the University of Pittsburgh, where she had been a staff member since 2002 — holding a variety of positions serving faculty, undergraduates, and graduate students. She is pursuing a Ph.D. in the Administrative and Policy Studies Department in the School of Education at the University of Pittsburgh, where she also received her M.S. degree in Information Science.

Sieworek’s research focuses on engineering education, as well as educational assessment and evaluation. Her other interests include higher education administration, along with comparative and international education. In her spare time, Sieworek volunteers for the Pennsylvania Junior Academy of Science (PJAS) as the coordinator of special awards and hands-on workshops for high school students.

MSE STAFF MEMBER SHOWS HER ARTISTIC FLAIR



Faculty Assistant **Marygrace Antkowski** was a finalist in a recent competition sponsored by Pittsburgh’s *City Paper* to design artistic boxes to distribute the free weekly newspaper around the city. Ten finalists, including Antkowski, had the opportunity to display their boxes in different Pittsburgh neighborhoods. Located

in Lawrenceville, the colorful box designed by Antkowski featured “city chickens.” The design was inspired by Antkowski’s son, who raises chickens in the Greenfield neighborhood of Pittsburgh.

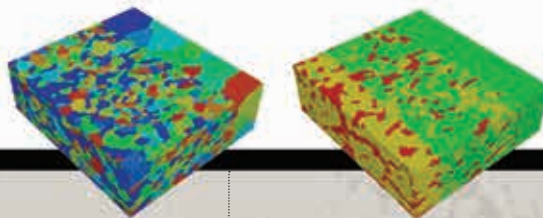
SURESH JOINS MSE FACULTY



Carnegie Mellon President Subra Suresh has officially joined the MSE faculty as Professor. Suresh is the author or co-author of more than 240 research articles in international journals, co-editor of five books, and co-inventor on 22

US and international patent applications. He has authored or co-authored three widely used materials science books: *Fatigue of Materials*, *Fundamentals of Functionally Graded Materials*, and *Thin Film Materials*. He is one of the most-cited scientists in materials science, according to Thomson Reuters Institute for Scientific Information. In 2011, Science Watch/Thomson Reuters selected Suresh as one of the top 100 scientists for the decade 2000-2010 in its worldwide ranking of the field of materials science. Recently, Suresh was elected a foreign member of the Chinese Academy of Sciences (CAS) for his scientific contributions in materials science and engineering, including his work connecting nanomechanical cell structure to disease states. Suresh is the only current US university president to have been named a foreign member of the CAS and a member of all three US National Academies — the Institute of Medicine, National Academy of Engineering, and National Academy of Sciences.

ALUMNI NEWS UPDATES



Kelly Collier (B.S. 2011) and **Paul Ohodnicki** (M.S. 2006, Ph.D. 2008) have been recognized as 2013 "Fast Trackers" by the *Pittsburgh Business Times*. Each year, the local business journal names 40 fast-rising Pittsburgh executives under the age of 40 to this list. Honorees are chosen based not only for their



business achievements, but also their impact on the community. Ohodnicki is a Materials Scientist and Engineer at the National Energy Technology Laboratory (NETL). Collier is Chief Executive Officer of a local start-up company, ActivAided Orthotics, which develops and sells medical devices.

Katie Gallagher (B.S. 1998) has won a *NASA Exceptional Achievement Medal*. She is currently employed as Executive Officer in NASA's Office of the Chief Technologist. According to NASA, this prestigious award is given to government employees for a significant specific achievement or substantial improvement in operations, efficiency, service, financial savings, science, or technology which contributes to the mission of NASA.



Amul Tevar (M.S. 2009, Ph.D. 2011) recently returned to the Carnegie Mellon campus to participate in a panel discussion about career opportunities in the

energy industry. During this session, experts including Tevar discussed preparing a future workforce for the

engineering, economic, and policy challenges that are currently facing the industry. The event was hosted by the College of Engineering's Energy, Science, Technology, and Policy (ESTP) masters degree program. Tevar is a Fellow at the US Department of Energy.



Neerav Verma (M.S. 2009, Ph.D. 2011) has received the 2013 *Willy Korf Award for Young Excellence* for his doctoral research in the Center for Iron

and Steelmaking Research. Verma is currently a Research Engineer at ExxonMobil Upstream Research Company in Houston, Texas.



Cong Wang (M.S. 2008, Ph.D. 2009) has been selected by SME's International Awards & Recognition Committee as one of six winners of its 2014 *Outstanding*

Young Manufacturing Engineer Award. This award is conferred by the Society of Mining, Metallurgy, and Exploration (SME) in recognition of Wang's significant achievements and leadership in the field of manufacturing engineering as a young engineer. Wang is a member of Professor David Dunand's research group at Northeastern University, focusing on the mechanical metallurgy of advanced metallic alloys, composites, and foams.

Jingxi Zhu (M.S. 2008, Ph.D. 2011) has been appointed an Assistant Professor in the SYSU-CMU Joint Institute for Engineering. The SYSU-CMU Joint Institute of Engineering was established by



Sun Yat-sen University (SYSU) and Carnegie Mellon University (CMU) as a collaboration to nurture a passionate and collaborative global community.

The Institute is aimed at creating a network of students, faculty, and professionals working toward advancing the field of engineering through education and research in China and the world. Zhu's research interests lie in materials structure-property relationship studies by advanced characterization; kinetic study of materials phenomena with in situ microscopy techniques; and research concerning materials issues in energy production technologies, including both metallic and non-metallic materials.

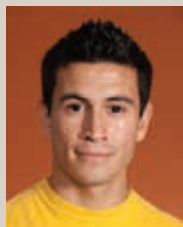


Li Li (M.S. 2010, Ph.D. 2012) is the co-author of a paper in the January 2014 issue of *Nanoscale*, a new peer-reviewed journal publishing experimental and

theoretical work across the breadth of nanoscience and nanotechnology. The paper, called "Photo Catalysts With Internal Electric Fields," focuses on how electric fields within catalyst particles can be used to mitigate the effects of recombination and back-reaction, as well as improving photochemical reactivity. Co-authors of the paper include **Professors Gregory Rohrer** and **Paul Salvador**. Li is currently a Post-Doctoral Fellow in the KAUST-CU Center for Energy and Sustainability at Cornell University.



In Memoriam: **TURI ALCOSER**



It is with sadness that we report the passing of **Turi Alcoser** (B.S. 2012) at the age of 23. Alcoser died on September 23 in Ithaca, New York, where he was a doctoral student in Biomedical Engineering at Cornell University. His Ph.D. research was focused on growing and characterizing the biophysical properties of breast cancer tumor cells.

A native of San Antonio, Texas, Alcoser first came to Carnegie Mellon as a high school student in 2007, when he attended the University's Summer Academy for Mathematics and Science (SAMS) program. Inspired by that experience, he enrolled in the College of Engineering as a freshman in Fall 2008. "SAMS builds dreams that you would not have even thought of had you not come here," Alcoser said in a July 2010 interview. "My dream was specifically research."

As an undergrad in MSE, Alcoser worked in the laboratory with **Professor Kris Noel Dahl** to better understand how materials structures organize inside human cells. An image he created, showing osteosarcoma actin structural response to compression, was featured on the cover of *MSE News* in Fall 2011. Alcoser won the Department's 2011 *Krivobok Brooks Award for Excellence in Metallography* for this image.

Alcoser received his B.S. in Materials Science and Engineering with a minor in Biomedical Engineering. While at

Carnegie Mellon, he was part of the Spanish and Latin Student Association (SALSA), former President Jared Cohon's Diversity Advisory Committee, and Delta Tau Delta Fraternity. A recipient of fellowships through the Howard Hughes Medical Institute, Alcoser was the first undergraduate from Carnegie Mellon to give an oral presentation at the national Biomedical Engineering Society's annual conference. He graduated as co-author of four research publications under the direction of Professor Dahl.

While at Cornell, Alcoser won a *Young Investigator Award* from the Physical Sciences Oncology Network, a *FASEB MARC Travel Award*, and an *Honorable Mention* in the 2013 National Science Foundation's Graduate Research Fellowship Awards. He was a Cornell Sloan Scholar.

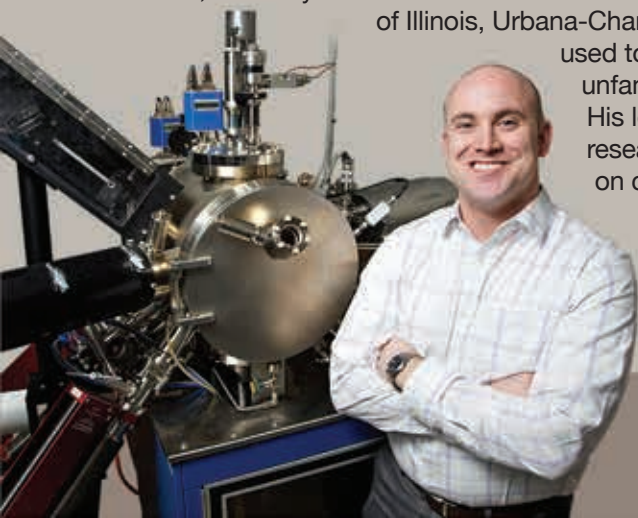
Turi Alcoser will be missed by the entire MSE community. We extend our most sincere condolences to his family for the loss of this promising young man.

EXPLORING NEW TERRITORY

Lane Martin (B.S. 2003) is in the midst of significant life changes — both personal and professional. In July 2012, he and his wife Sophi welcomed their son Stanley. Last December, Martin won the *Presidential Early Career Award for Scientists and Engineers (PECASE)*, the highest honor bestowed by the US government on young science and engineering professionals. This July, Martin will assume a new position as Associate Professor in Materials Science and Engineering at the University of California, Berkeley, with a co-appointment as a Faculty Scientist at Lawrence Berkeley National Laboratory.

Martin, currently an Assistant Professor at the University of Illinois, Urbana-Champaign, is used to entering

unfamiliar territory. His leading-edge research focuses on creating new knowledge of materials behavior, as he



works to enhance natural materials properties for specific applications. "I find my work very exciting," says Martin. "I look at where people have been before, then try to get to a new place. Every day, I work with a team of young people who are also excited and willing to push the boundaries of materials knowledge."

According to Martin, his relationship with his students echoes his own work with **Professor Paul Salvador** as a student at MSE. "I was fortunate that Professor Salvador welcomed me to his team, though I was an undergrad with no research experience," says Martin. "The work I did at MSE on functional oxide thin films still informs my research today."

Martin has received a number of awards for his advanced research, which focuses on the design, synthesis, and study of advanced functional materials — and includes work on controlling and utilizing thermal effects for electronic applications. In addition to the PECASE, which he will receive from President Barack Obama this Spring, Martin has also won the *National Science Foundation CAREER Award* (2012) and the *Army Research Office Young Investigator Program Award* (2010).

In addition to his B.S. degree from CMU, Martin earned an M.S. (2006) and a Ph.D. (2008) in Materials Science and Engineering, both from the University of California, Berkeley.

STUDENT NEWS UPDATES



Doctoral student **Erica Sampson** is the co-author of a paper that recently won a *Best Paper* prize from the Argentine Iron and Steel Institute. Titled “The Effect of Humidity on Oxidation and Cu-Induced Hot Shortness in a Low C-Cr Steel With 0.2% Cu During Conditions Simulating Continuous Cooling and Re-Heating,” the paper was recognized at the 19th Conference of Steel Rolling in Rosario, Santa Fe, Argentina, in November. Co-authors include J.A. Méndez, former MSE faculty member **Sridhar Seetharaman**, and Cini Cicutti of Tenaris Research.

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Doctoral student **Justin Freedman** has been awarded a three-year *Post-Graduate Scholarship/Doctoral Research Fellowship* from the Natural Sciences and Engineering Research Council of Canada (NSERC). The Canadian equivalent of the National Science Foundation, NSERC provides funding to high-caliber students who are engaged in doctoral programs in the natural sciences or engineering.

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Doctoral student **Hang-Ah Park** has been named a *Dowd Fellow* for 2013-14. Established in 2001 through a generous grant from **Philip (B.S. 1963) and Marsha Dowd**, the Dowd Engineering Seed Fund provides support for graduate students working on cutting-edge research projects that do not have other sources of funding. Park presented her research at the Dowd-

ICES Seminar in the Fall semester. Her research proposal is entitled “Novel Nano-Photochemical Cell With Spatially Separated Oxidation and Reduction Channels for Hydrogen Generation From Water Under Visible Light.” Park’s research is advised by **Professors Gregory Rohrer** and **Mohammad Islam**.

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2013-14 year.

Senior **Tejank Shah** received a \$4,500 grant from the Harold A. Gottesman Honorary Scholarship fund toward his college expenses for the

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Seniors **Holly Fitzgibbon** and **Madeline Cramer** have been selected as *Andrew Carnegie Society Scholars* for 2014. Andrew Carnegie Society (ACS) Scholars are selected each year by their deans and department heads to represent their class in service and leadership. These undergraduate



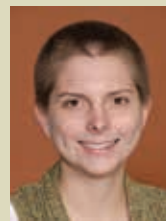
seniors embody Carnegie Mellon’s high standards of academic excellence, volunteerism, leadership, and involvement in student organizations, athletics, or the arts. Since its inception in 1975, the program has recognized nearly 1,000 students. Each ACS Scholar receives a monetary award, made possible by the generosity of ACS members, that supports their academic and personal growth. In addition, they work together as a committee to present a gift back to

the University community. Through this opportunity, the students experience the joy of philanthropy firsthand.

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Three MSE undergraduates have been recognized as *Boeing Scholars*: senior **Heather Thompson**, junior **Natasha Gorski**, and junior **Blair Graham**. Awarded annually to students from across the US who are interested in a career in the aerospace industry, Boeing Scholarships include a grant of \$5000. This program was created to help Boeing build relationships with the nation’s top engineering programs, as well as with especially promising students who may seek internships or entry-level positions with Boeing in the future.



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Sophomore **Tejasvir Singh Rekhi** is a drummer and dancer for Carnegie Mellon Bhangra, which recently performed at the inauguration of new **President Subra Suresh**, as well as the “Bhangra in the Burgh” national competition held in Pittsburgh in November. Bhangra is a fast-paced, beat-heavy form of music and dance originating from Punjab, in Northern India. Developed from traditional folk dances in the region, it has become one of the most popular non-classical forms of Indian dance in North America and the United Kingdom.



COMMENCEMENT 2013: AN MSE CELEBRATION

The Department of Materials Science and Engineering hosted its 2013 Commencement ceremony last May 19 at Winchester-Thurston School, near the Carnegie Mellon campus.

The Department awarded 42 B.S. degrees, 51 M.S. degrees, and 17 Ph.D. degrees. Whether our graduates are pursuing full-time employment or continuing their educations, MSE wishes them the best of luck in all their future endeavors!

AWARDS

- *The William W. Mullins Undergraduate Award*
Recipient: **William Littlefield**
- *The Hubert I. Aaronson Undergraduate Award*
Recipient: **Anya Prasitthipayong**
- *The James W. Kirkpatrick & Jean Kirkpatrick Keelan Award*
Recipient: **Madeleine Kelly**
- *The William T. Lankford Memorial Scholarship Award*
Recipient: **Huan Kiat Koh**
- *The ASM Golden Triangle Chapter Outstanding College Senior Award*
Recipient: **Brooke Gladstone**
- *The Paxton Award for Best Doctoral Dissertation*
Recipient: **Dr. Benjamin Anglin**
- *2013 Krivobok Brooks Award for Excellence in Metallography*
Undergraduate Recipient: **Daniel Shafir**
Graduate Recipient: **Sutatch Ratanaphan**



**DEPARTMENT OF MATERIALS
SCIENCE AND ENGINEERING**

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ON THE COVER: GRAIN MAPPING OF POLYCRYSTALLINE COPPER

The cover image is a grain mapping of the polycrystalline copper prepared by a pulse electroplating process. The inherent interface between grains labeled with different colors represents a grain boundary. This unique grain boundary network, which is similar to “feathers,” is a good example of the processing-structure-property relationship. The macroscopic properties of polycrystals depend on the anisotropy of the grain boundary population distribution. Therefore, the quantitative analysis of the population of different grain boundary types is necessary in relating the structure-property relationship and also assists in microstructural design. This image was created by **Sutatch Ratanaphan** (Ph.D. 2013) for his doctoral thesis. He was advised by **Professor Gregory Rohrer**.



**Carnegie Mellon
ENGINEERING**

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Obtain general information about Carnegie Mellon University by calling 412-268-2000.

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