



Topographical Surface Patterning to Control Cell Behavior

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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 always, you will find this issue of *MSE News* packed full of the successes of our students, faculty, and alumni.

I have now been the Head of the MSE Department for 10 years. The time has truly flown by. You may ask, what has changed in the Department in the last 10 years?

First and foremost, the Department is larger. In 2005, we had 16.5 full-time equivalent faculty and today we have 21, including tenure-track, research, and teaching faculty. We had about 65 undergraduate students in three classes in 2005, and today we have 125. In 2005, we had one or two master's students and now we have more than 40. Ten years ago, we had 58 doctoral students and now we have 86. This growth has allowed us to build successful efforts in the materials science of polymers, which we did not pursue before 2005. Our research expenditures in 2005 were \$4.0 million, and in 2014 they were \$7.6 million.

At the same time, the Department's rankings (as published by *U.S. News & World Report*) have risen from 11 to 9 for the undergraduate program and from 13 to 10 for the graduate program.

All of these accomplishments have been achieved by the hard work of the faculty, students, and staff who demonstrate a commitment to excellence and continuous improvement.

I would like to highlight some of the successes celebrated in the pages that follow. First, two of our undergraduate students, **Catherine Groschner** and **Joshua Kubiak**, have received the prestigious *Churchill* and *Goldwater Scholarships*, respectively. Among the faculty, **Professors Adam Feinberg** and **Christopher Bettinger** have been awarded the National Science Foundation's *Faculty Early Career Development Award* and the Defense Advanced Research Projects Agency's *Young Faculty Award*, respectively. The highly selective honors that MSE students and faculty receive are signs of our continued excellence in research and education.

With sadness, I must also note the passing of **George Biddle**, who supervised the MSE Machine Shop for 56 years. George was a tremendous force for good within MSE, always making a positive impact on the students, faculty, and staff. Simply because of the longevity of his time in the Department, there is probably no single individual associated with MSE who impacted it more, and is known to more of our alumni. George was always able to make anything work better than it did before he touched it — whether a scientific instrument or a party. He is missed by all of us who knew him.

Gregory S. Rohrer



In the 2014 rankings from *U.S. News & World Report*, MSE was ranked #9 among undergrad programs and #10 among graduate programs.

ON THE COVER:

Topographical Surface Patterning to Control Cell Behavior

The cover of this edition of *MSE News* shows details of nanopatterned proteins on a microtopographically patterned surface in 3D — imaged using a laser scanning confocal microscope. **Assistant Professor Adam Feinberg** and his research group have developed new techniques to engineer these surfaces to control cell behavior with financial support from the National Institutes of Health.

These nano- and micro-structured biomaterial surfaces are of interest because they contain both topographical (physical) and protein (chemical) surface features that are able to direct behavior of attached cells. This is important because the long-term performance of many medical devices is dictated by the stability of the cell-material interface.



The cover image shows vertically oriented 20 micron wide micro-ridges engineered into the surface of a rubber-like polymer called polydimethylsiloxane. On top of this in a crisscross pattern are PoT printed 20 micron wide, 10 nano-

meter thick layers of the proteins fibronectin (purple) and laminin (green), which show as white where the two proteins overlap. Note that the protein patterns are completely conformal, meaning they are on the top and side of the ridges and in the trenches between the ridges.

This top-down view of the surface was imaged using a laser scanning confocal microscope that generates 3D optical images and rendered in 3D using specialized image analysis software. Cells that attach to these types of surfaces can respond to both physical and chemical features, providing insight into cell behavior in complex microenvironments similar to conditions inside the human body.

MSE Bids Farewell to Valued Employees

Because of the close-knit nature of the MSE Department, it is always difficult when our staff members move on. We wish the following members of the MSE family the best as they embark on new adventures!



Dora Moscatello will be retiring in June after nearly 32 years at CMU. She began as a temp in the Engineering and Public Policy Department and quickly was hired as Secretary to the Director of Federal Compliance & Safety. In 1985, she began as Production Editor for *Metallurgical and Materials Transactions*, her current position. One of Dora's proudest accomplishments is earning her master's degree in Literature from CMU.

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Jason Wolf has accepted a position at the Alcoa Technical Center in New Kensington as an X-Ray Engineer. Jason joined MSE in 1989 as an X-Ray Technician and was promoted to Supervisor of the X-Ray Laboratory in 1998. During his 25-year career, Jason has been one of MSE's biggest cheerleaders; his enthusiasm and pride were

always evident in his work. Thankfully, Jason earned his M.S. degree in MSE while here, so he will remain connected as a proud alum!

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Right after Faculty Secretary **Valerie Thompson** announced her retirement, the MSE copier mysteriously stopped working. It's obvious that she will be missed! Valerie's nearly 35-year career at CMU began as a Secretary/Receptionist in the Social Science Department. She joined MSE as a Faculty Secretary in 1983. In 1988, Valerie became an Administrative Assistant working with the Department Head. But in 1992, she realized that her heart was really in working with the faculty and she chose to return to that role.



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Anita Connelly, MSE Business Manager since 2004, recently accepted a position with the College of Engineering's Research Administration and Compliance Office as a Research Administrator. Anita was an integral part of the smooth operation of the Business Office. Her dedication and professionalism will be sorely missed, as well as her outgoing and friendly demeanor.



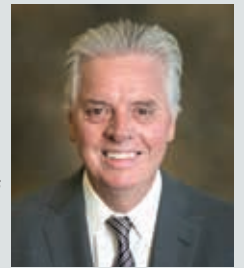
◀ Jason Wolf with daughter Michelle (B.S. 2014)

FACULTY NEWS BRIEFS



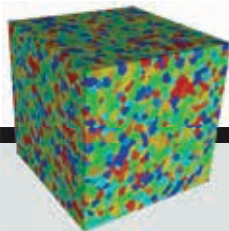
Carnegie Mellon President Subra Suresh, who is also a Professor in MSE, was inducted into the Institute of Medicine (IOM) on October 19 in Washington D.C., making him the only university president to be elected to all three national academies. Election to a National Academy is among the highest professional distinctions accorded to engineers, scientists, and medical and health professionals. As one of only 16 living Americans to be elected to all three national academies (IOM, the National Academy of Sciences, and the National Academy of Engineering), Suresh's work reflects CMU's interdisciplinary nature and collaborative spirit. At Carnegie Mellon, Suresh continues to focus on his own groundbreaking research. Last year, he and his collaborators designed, built, and patented a microfluidic device to isolate rare circulating cancer cells using tilted-angle standing surface acoustic waves. In the last six months, they have made the device faster by 20 times and validated the device using blood samples from three breast cancer patients. Their findings were published in the *Proceedings of the National Academy of Sciences*. Suresh's team has also initiated a new collaboration with Mcgee Womens Hospital in Pittsburgh for follow-up research.

Former MSE Department Head **Alan W. Cramb** has been named the ninth President of Illinois Institute of Technology (IIT). Cramb, who has been Provost and Senior Vice President for academic affairs at IIT since 2008, will be inaugurated on September 18. He is also the Charles and Lee Finkl Professor of Metallurgical and Materials Engineering at IIT and a Fellow of the National Academy of Engineering. At MSE he co-directed the Center for Iron and Steelmaking Research. In 1997 he was awarded the POSCO Chair in Iron and Steelmaking, and in 2000 he became the MSE Department Head. Cramb is the author of more than 200 publications, holds two patents, and is the recipient of many academic and industry honors.



Assistant Professor Christopher Bettinger received a 2014 *Young Faculty Award* from the Defense Advanced Research Projects Agency (DARPA) for his proposed research, "Orthogonal Parameterization of Bioinspired Peripheral Nerve Interface Materials." DARPA's Young Faculty Award (YFA) program offers funding and mentoring to promising faculty early in their careers, as well as contacts with industry and the Department of Defense (DoD). In addition, Bettinger recently was awarded a *Dean's Early Career Fellowship* by the CMU College of Engineering. These fellowships are awarded to untenured faculty members who have been nominated by their department heads and have been selected to receive the fellowship after review and discussion of the nomination package by the CIT Review Committee. Recipients receive discretionary funding for their groundbreaking research. Bettinger holds a dual appointment in Biomedical Engineering.





Professor Michael Bockstaller has been elected a Fellow of the American Physical Society (APS), nominated by the Division of Polymer Physics.

In making the announcement, the APS cited Bockstaller for “his fundamental contributions to the understanding of block polymer–nanoparticle composites, leading to control of novel photonic and plasmonic properties.” In addition, Bockstaller was recently issued a U.S. patent for his work on core-shell systems with controlled optical properties. Issued on October 21, the patent is called “Hybrid Particle Composite Structures With Reduced Scattering.” Co-authors on the patent are CMU Chemistry Professor Krzysztof Matyjaszewski and Lindsay Bombalski (Ph.D. 2007, Chemistry).



Professor Elizabeth Holm served as Summit Organizing Chair for the Diversity in the Minerals, Metals, and Materials Professions

(DMMM1) Summit held in Washington, D.C., last July. Holm’s participation as a panelist, speaker, and organizer — in addition to her contribution to various summit workshops and activities — helped shape the content of this event, sponsored by The Minerals, Metals & Materials Society (TMS). The final report and toolkit from the Summit are available for free download at www.tms.org/DiversityReport.



A paper co-authored by **Professor Anthony Rollett** has been honored as an *Editor’s Highlight* in the April 2015 issue of *Computational Materials Science*. Titled “Calculating Probability Densities Associated With Grain-Size Distributions,” the paper describes a methodology for calculating approximate, yet accurate analytical expressions for the probability density function of grain diameter as obtained from experimental microstructures.

Rollett and his collaborators tested their methodology by characterizing two data sets obtained from the microstructures associated with polycrystalline, high-purity Al_2O_3 samples. Co-authors of the paper are Jeffrey Rickman, Abigail Lawrence, and Martin Harmer of Lehigh University. The work was supported by a Multidisciplinary University Research Initiative (MURI) from the Office of Naval Research, in which CMU is partnered with Lehigh University.



Assistant Professor Adam Feinberg has been selected for a *Faculty Early Career Development (CAREER) Award* from the National Science

Foundation (NSF). Feinberg will receive \$500,000 in funding over five years to support his proposed research project, “3D Printing of Heart Muscle Using Soft Hydrogels.” “Additive manufacturing for biological applications, also called 3D bioprinting, has the potential to revolutionize the fabrication of medical devices and engineered tissues by making custom shapes that can integrate with a person’s unique anatomy,” says Feinberg. “However, additive manufacturing processes that work well for metal or plastic parts are unable to print with hydrogels and living cells at high fidelity.” Feinberg is developing a new process that will enable deposition of hydrogels and cells in complex

3D structures and will be used to bioprint heart muscle. Not only does Feinberg envision printing tissue that can be used to repair heart defects, but he believes it will be possible to 3D print a fully functioning human heart in the future. In other news, Feinberg co-authored a paper that was published in *Nature Methods* in December. “Conformal Nanopatterning of Extracellular Matrix Proteins Onto Topographically Complex Surfaces” discusses a novel Patterning on Topography (PoT) printing technique that enables fibronectin, laminin, and other proteins to be applied to biomaterial surfaces in complex geometries that are inaccessible using traditional soft lithography techniques. Feinberg holds a joint appointment in Biomedical Engineering.

REMEMBERING GEORGE BIDDLE, 1928 — 2014

Former Supervisor, MSE Machine Shop

It is with sadness that we report the passing of **George Biddle**, who worked in the MSE Machine Shop from 1947 to 2003. George died at the age of 86 on October 11. He was the beloved husband of the late Margaret L. “Peg” (Rummel) Biddle; loving father of Thomas, Sandra, and David; and a devoted grandfather and great-grandfather.

George was a beloved member of the MSE family as well. He joined the Department in September 1947 as an Assistant Foreman in the Machine Shop. Over the years, he climbed the ranks until he eventually was appointed Supervisor of the Machine Shop, a position he held until his retirement from full-time work at the end of March 2000. George then continued in a part-time capacity until 2003. At that time, his beloved Peg was ill, and George was needed at home full-time to care for her.

A RENAISSANCE MAN

In the Machine Shop, George amazed generations of students and faculty alike with his ability to fabricate unique experimental apparatus—things nobody else had ever imagined or seen before. As MSE’s “consultant at large,” he was able to solve incredibly complex problems and conduct delicate repairs on complicated machinery and devices.

But George was also well known for his many passions—which included building and flying his own remote-controlled model airplanes; card games including 500, bridge, and poker; and riding his motorcycle well into his sixties (possibly longer). When a friend from MSE visited him a month before his death, George was still actively working in his shop at home.

A FRIEND TO ALL

George will be most remembered as someone who made the Machine Shop a lively and welcoming place for thousands of visitors over the years. He was well-known for collecting and selling scrap metal throughout the year, in order to fund Department holiday parties

“I am very sorry to hear about George’s passing. He was a great guy, and a terrific poker player. I don’t think I ever beat him, but I didn’t mind losing money to him. He was one of a kind, very special.”

John Anderson
Former Dean of CIT

in the shop. The Machine Shop was also home to many raucous happy hours at which George presided. He made the shop a place where any member of the MSE Department could stop by for a consultation, advice, or a venting session.

George was awarded the inaugural *CIT Staff Recognition Award* in January of 1995, created to honor outstanding College of Engineering staff members for their creation and dissemination of engineering knowledge in a friendly and supportive atmosphere for the benefit and welfare of all people.

We can think of no one more deserving of this award than George Biddle. If we added up the number of students and faculty he touched during his 56 years at MSE, the total would be astounding. He will be dearly missed by his MSE family.

“George was an inspiration in his own way. I talk about him often to my colleagues—about his ‘everything is possible’ attitude, and above all, his passion for his work.”

Balamuralikrishnan Ramalingam
(M.S. 1992, Ph.D. 1998)



“As one of the hundreds of CMU students that experienced the guiding hand of George Biddle, I’m sure I can speak for all of them in stating that our lives have been enriched because he was here on Earth for a while. As much of an educator as any of the professors, he was also a patient friend to those of us that took the time to get to know him. George always had a twinkle in his eye when he greeted you with that firm, leathery handshake, sculpted by the countless hours spent making things, or teaching others how to make them.”

Roy Matway
(B.S. 1979, M.S. 1979, Ph.D. 1986)



“When I first came to CMU in 1995, I quickly made the acquaintance of George and strongly appreciated the fact that I could turn to him for help on almost anything of a practical or mechanical nature. He had an uncanny ability to extract high-quality machining from past-sell-date equipment. He was a genial host for happy hours in amongst the machinery, which is something I should probably not admit in this day and age. And that was only one of the many ways in which he sympathized with and helped out the graduate students down in the salt mines of Doherty Hall.”

Anthony D. Rollett
MSE Dept. Head
1995-2000



“No one person makes or breaks a department, but we would have been very different without George — Mr. Fixit. I think he was already in the Department working for Tom Doyle when I was a grad student in 1949. He was the ultimate team player in good and bad times, and as far as I know, did not have an enemy in the world — and he had generations of friends! I can’t say that about many people (including me!).”

Harold W. Paxton
MSE Dept. Head
1966-1971



“George was a stalwart in the Metallurgical Engineering and Materials Science Machine Shop. I can honestly say he was a fantastic mentor to me, and I will always remember the help and kindness that he brought to me during my years there.”

Herbert Ho
(B.S. 1984, Ph.D. 1991)

“One of the things that I admired most about George Biddle was his impartial interactions with people and his ‘can do’ attitude toward tasks. This was evident in the annual party he hosted for faculty, staff, and graduate students around Christmastime. The party was held in the Machine Shop with newly cleaned machine tops covered with cloths and used as serving tables. I once asked him how it was financed. He told me that throughout the year he saved scraps of unusable metal and used the proceeds from their sale. You can call it ‘ScrapGate’ if you want, but it was money well spent. The event was always well attended and improved communication among members of the Department more than any other social event I can remember. Kudos to you, George.”

Robert Sekerka
MSE Dept. Head
1976-1982



ALUMNI NEWS BRIEFS

Trisha Bennett (M.S. 2002, Ph.D. 2006) is currently working as a freelance materials science editor. As the job title suggests, she edits materials science manuscripts before they are sent to journals for publication and reports that she is really enjoying it so far.

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Cong Wang (M.S. 2008, Ph.D. 2009) has recently accepted a faculty position at the School of Materials and Metallurgy, Northeastern University, China, under government support.

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Li Li (M.S. 2010, Ph.D. 2012) has been chosen as the recipient of the 2015 *Young Leaders Professional Development Award*, given by the Extraction & Processing Division of The Minerals, Metals & Materials Society (TMS). This

honor was created to “enhance the professional development of young, dynamic, and committed members through leadership opportunities and networking.” Li has been very active in energy research and TMS activities. He is a frequent organizer and session chair of international conferences, including symposiums sponsored by TMS in 2013 and 2014, as well as the Materials Research Society (MRS) 2013 Annual Meeting. He is also a member of the Energy Committee and the Young Professional Committee of TMS. In addition, Li served on the board of the 2015 Energy Best Paper Selection Committee.

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Yiling Zhang (M.S. 2010, Ph.D. 2013) has been chosen as the recipient of the 2014 *Energy Best Student Paper Award*, presented by the Light Metals

Division of TMS. This award recognizes the individual excellence of a paper exemplifying the application of science in solving a practical problem related to an energy topic. The award-winning paper, which was published in *Energy Technology 2014*, was co-authored with his advisors **Professor Paul Salvador** and **Professor Gregory Rohrer**. It is entitled “Ferroelectric-Enhanced Photocatalysis with $\text{TiO}_2/\text{BiFeO}_3$.” The formal presentation of the award was made at the Energy Committee Meeting on Tuesday, March 17, in Orlando, Florida, during the 144th TMS Annual Meeting.

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Wei Wu (M.S. 2011, Ph.D. 2014), who is currently an MSE post-doctoral associate, won the *Best Poster* award at the Materials Science & Technology 2014 conference, held October 12-16, 2014, at the David L. Lawrence Convention Center in Pittsburgh. He also won a *Sapphire Award* in the Graduate Excellence in Materials Science (GEMS) student speaking competition at the same meeting.

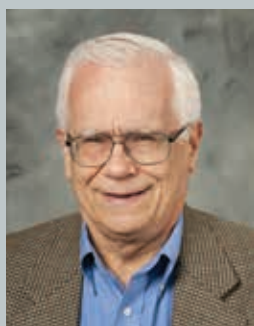
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Brooke Gladstone (B.S. 2013, M.S. 2014) has accepted a position with Boeing in South Carolina.

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Mike Standish (B.S., M.S. 2014) recently accepted a position with Lockheed Martin in the Fort Worth, Texas, area.

In Memoriam: Edward J. Kramer

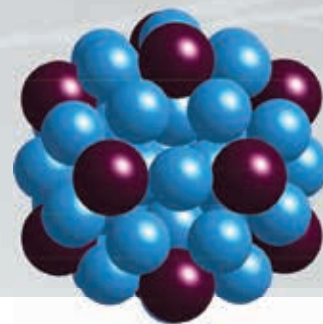


It is with sadness that we report that **Edward J. Kramer** (Ph.D. 1967) passed away on December 27, 2014, at the age of 75. Though he was a faculty member at Cornell for 30 years—and had been a materials professor at the University of California Santa Barbara (UCSB) since 1997—Ed always maintained close ties to the MSE Department at Carnegie Mellon.

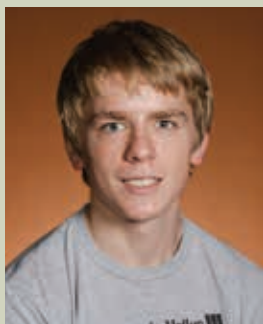
Ed graduated from Cornell University in 1962 with a bachelor's in chemical engineering and earned his Ph.D. in metallurgy and materials science from MSE in 1966. He joined the Cornell faculty in 1967. In 1973, he authored a seminal paper on flux pinning, a phenomenon in which exceptionally conductive materials are suspended in space above a magnet.

While at UCSB, Ed worked collaboratively with various professors, post-doctoral scholars, and Ph.D. candidates, particularly in the area of polymer science, in which he was considered an expert.

Ed is survived by his wife of 51 years, Gail Woodford Kramer, and his children, Eric (Marta) Kramer of Tucson, Arizona, and Jeanne (Michael) Kane of Mountain Lakes, New Jersey, as well as three grandchildren. The Department sends its condolences to the Kramer family.



KUBIAK WINS GOLDWATER SCHOLARSHIP



Junior **Joshua Kubiak** has won the prestigious *Goldwater Scholarship*, awarded by the Barry Goldwater Scholarship and Excellence in Education Foundation.

From a field of 1,206 mathematics, science, and engineering students nominated by faculty members nationwide, 260 scholarships were awarded for the 2015–2016 academic year. The awards are made to sophomores and juniors.

As an undergraduate research assistant in **Professor Michael Bockstaller's** lab, Kubiak is working to improve methods of creating quantum dot backlights for more energy-efficient LCD screens for displays such as those on televisions or portable electronics. Incorporation of more efficient backlights can reduce energy consumption on a global scale, while also increasing the battery life of portable devices. Kubiak also has conducted research with **MSE**



Professor Robert Heard, Mechanical Engineering Professor **Satbir Singh**, and Chemistry Professor **Krzysztof Matyjaszewski**.

Kubiak is a member of the Carnegie Mellon Racing team, Chem-E-Car, and Engineers Without Borders. In the future, he plans to pursue a doctorate in materials science and engineering and investigate novel polymeric materials for alternative energy generation. He also would also like to teach as a university professor.

Goldwater Scholars receive one- and two-year scholarships up to a maximum of \$7,500 per year for tuition, fees, books, and room and board.

The Barry M. Goldwater Scholarship and Excellence in Education Foundation was established by the U.S. Congress in 1986 to honor Senator Barry M. Goldwater. The scholarship program is designed to foster and encourage outstanding students to pursue careers in the fields of mathematics, the natural sciences, and engineering.

GROSCHNER WINS CHURCHILL SCHOLARSHIP



Senior **Catherine "Kate" Groschner** is one of 14 students to receive a *Churchill Scholarship*, which funds a year of postgraduate study at the University of Cambridge in England.

The Winston Churchill Foundation of the United States offers the scholarships to outstanding American students to pursue graduate studies in engineering, mathematics, or the sciences at Cambridge University's Churchill College. The scholarship pays for a year of tuition, fees, and living expenses.

Groschner will pursue a Master of Philosophy in Energy Technologies and conduct photovoltaics research at Cambridge University Professor Judith Driscoll's lab. This research supports the development of solar technology, a subject closely related to the materials Groschner plans to study at the doctoral level.

Groschner has worked as a research assistant in **Professor Michael McHenry's** lab, where they completed a



multi-year study of magnetic minerals found on Mars. Their work, funded by the National Science Foundation's Materials World Network, involved collaboration with researchers from the Instituto Nacional de Técnica Aeroespacial in Madrid and a visit to the National High Field Magnetic Laboratory at Los Alamos National Laboratory.

Groschner co-authored two papers with McHenry and presented at her first professional conference.

This year, she is working with **Professor Jay Whitacre**, founder of Aquion Energy Inc., to develop a process for making grid-scale clean energy storage more affordable.

"My career goals are to research advanced technologies that transition humans away from fossil fuel use and to connect people with information regarding new technologies, their benefits, and opportunities for change," says Groschner. "Studying at Cambridge will introduce me to a diverse, international community of engineers and scientists — connections that will likely continue professionally for decades to come."

STUDENT NEWS BRIEFS



Haosheng Wu



Miaolei Yan

MSE doctoral students **Haosheng Wu** and **Miaolei Yan** have each received the *Liang Ji-Dian Graduate Fellowship* in the amount of \$10,000 to be applied to their tuition. This fellowship was created through the generosity of Liang Ji-Dian to help support the graduate studies of highly deserving CIT Ph.D. students of Chinese heritage.

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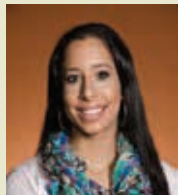
Brian DeCost



Julia Wittkamper

MSE doctoral students **Brian DeCost** and **Julia Wittkamper** were selected to receive a *Bertucci Graduate Fellowship* in the amount of \$20,000 to be applied toward their tuition. This fellowship, created through the generosity of **John** and **Claire Bertucci**, was established to provide merit fellowships to Carnegie Mellon graduate students pursuing doctoral degrees in engineering.

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Dominique MacCalla

Junior **Dominique MacCalla** was a member of the multi-disciplinary Carnegie Mellon team for the International Genetically Engineered Machine competition (iGEM). The team traveled to Boston in October to present its project, entitled "STREAM, Sensors That Report Endocrine Activating Molecules," which tackled the problem of detecting estrogenic compounds in water. The Carnegie Mellon team won

a *Gold Medal Achievement Award*, an *Interlab Study Award*, and the *Best Poster Award*—the most awards received by any U.S. undergraduate team.

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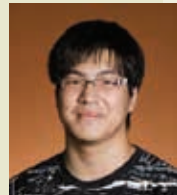


Rachel Ferebee

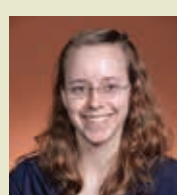
An abstract submitted by Ph.D. student **Rachel Ferebee** has been accepted as an oral presentation at the Chemical and Biological Defense Science and Technology (CBD S&T) Conference in St. Louis, Missouri, in May. Ferebee also received a *Student Scholarship Award* to cover registration and travel expenses.

MSE STUDENTS WIN BIG AT YOUNG MEMBERS' NIGHT

MSE students were in the spotlight on February 19 as the ASM Pittsburgh Golden Triangle Chapter hosted its 2015 Young Members' Night.



Hao-Jan Shue



Heather Bowman

Catherine Groschner won the *Outstanding College Senior* award. Junior **Hao-Jan "Danny" Shue** and sophomore **Heather Bowman** were both honored with the *Past Chairpersons Educational Assistance Scholarship (PCEAS)* award. Students from the Department swept the Graduate Student Poster Competition. **Sudipto Mandal** won first place, **Tugce Ozturk** claimed second place, and **David Sapiro** was awarded third place.

MSE students also dominated the Undergraduate Student Poster Competition. Sophomore **Ann Rutt** won first place, junior **Yeshar Hadi** was awarded second place, and senior **Olivia Dippo** took home the third-place prize.

THREE MINUTE THESIS CHAMPIONSHIP



Ph.D. student **Vincent De George** won the *People's Choice Award* in Carnegie Mellon's second annual Three Minute Thesis Championship, held on April 7 in the Hillman Center's Rashid Auditorium. Three Minute Thesis (3MT[®]) is an internationally recognized competition that challenges doctoral students to present a compelling oration on their thesis and its significance in just three minutes,

in language that anyone can understand. In the championship, De George competed against 10 other doctoral students from across the University. At the conclusion of the presentations, audience members voted for the People's Choice Award winner. De George's presentation—titled "Tomorrow's Electricity: Stadium or Lawn Seating?"—can be viewed on the Youtube channel of Carnegie Mellon University Libraries.

RECENT PH.D. DISSERTATIONS

Andre Assis

"The Phosphorus Reaction in Oxygen Steel-making: Thermodynamic Equilibrium and Metal Droplet Behavior"

Advisors: Richard Fruehan and Sridhar Seetharaman

Aditya Balasubramanian

"Embedded Abiotic Vascular Networks for Rapid Triggering of Soft Polymeric Actuators"

Advisor: Christopher Bettinger

Stephanie Bojarski

"The Effects of Grain Boundary Character and Energy on Complexion Transitions in Ceramics"

Advisor: Gregory Rohrer

June Bott

"Subsurface Aluminum Nitride Formation in Iron-Aluminum Alloys"

Advisor: Sridhar Seetharaman

Sean Donegan

"Spectral Modeling of Residual Stress and Stored Elastic Strain Energy in Thermal Barrier Coatings"

Advisor: Anthony Rollett

Hoan Ho

"Control of Microstructure, Texture, and Magnetic Properties of L10 Granular Magnetic Recording Media"

Advisor: David Laughlin

Emma Humphrey

"Three-Dimensional Magnetic Field Determination in Magnetic Nanoparticles Using Iterative Reconstruction Techniques"

Advisor: Marc DeGraef

Kyu Hun Kim

"Single-Walled Carbon Nanotube Aerogels: Synthesis, Characterization, Application"

Advisor: Mohammad Islam

Xuan Liu

"Electron Diffraction Based Metrology of Nanocrystalline Materials"

Advisor: Katayun Barmak

Jacob Melby

"Characterization and Modeling of Electrical Response of Electrode-Catalyzed Reactions in AlGaIn/GaN-Based Gas Solutions"

Advisors: Robert Davis and Lisa Porter

Sudarshan Narayanan

"Metal Polymer Hybrid Materials for Flexible Transparent Conductors"

Advisors: Michael Bockstaller and Lisa Porter

Suze Ninh

"Reconfigurable Polymer Networks for Improved Treatment of Intracranial Aneurysms"

Advisor: Christopher Bettinger

Jiwon Park

"A Study on the Reaction Between Al-Containing Fe-Melt and SiO₂-Al₂O₃-CaO Slags"

Advisor: Sridhar Seetharaman

Reeju Pokharel

"Spatially Resolved In-Situ Study of Plastic Deformation in Polycrystalline Cu Using High Energy X-Rays and Full-Field Simulations"

Advisor: Anthony Rollett

Lauren Powell

"Optical and Surface Characterization Studies of CdSe Quantum Dots Undergoing Photooxidation"

Advisor: Robert Davis

Sutatch Ratanaphan

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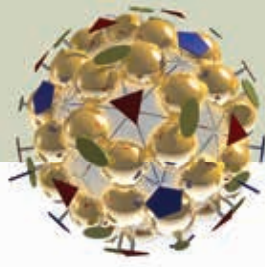
"Magnetic Nanoparticle-Based Solder Composites for Electronic Packaging Applications"

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"Light-Induced Reconfiguration of Polymeric Networks for Biomedical Applications"

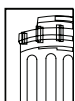
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