McCormick

Northwestern Engineering

Materials Science and Engineering

Robert R. McCormick School of
Engineering and Applied Science
Northwestern University

FALL 2014

Millions Awarded for Energy Research

MATERIALS SCIENCE AND ENGINEERING FACULTY PLAY VITAL ROLES IN THE NEWLY FUNDED ENERGY CENTERS

Two Energy Frontier Research Centers (EFRCs) at Northwestern University will continue to receive multimillion-dollar funding from the U.S. Department of Energy (DOE) for projects designed to accelerate the scientific breakthroughs needed to build a new 21st-century energy economy.

In this second round of funding, $100 million will be awarded to 32 projects at EFRCs around the country, U.S. Energy Secretary Ernest Moniz announced. Northwestern's projects were competitively selected for funding by the DOE from more than 200 proposals.

The Center for Bio-Inspired Energy Science (CBES) will receive $12 million over 4 years, and the Argonne-Northwestern Solar Energy Research (ANSER) Center will receive $15.2 million over 4 years. Several members of the Department of Materials Science and Engineering are participants in these two newly funded EFRCs.

Samuel I. Stupp, director of Northwestern's CBES, said the center will use the funds to develop artificial materials, inspired by biological systems, that can change the way we convert and use energy. Stupp is the Board of Trustees Professor of Materials Science and Engineering, Chemistry and Medicine at Northwestern. Monica Olvera de la Cruz, the Lawyer Taylor Professor of Materials Science and Engineering, and Chad Mirkin, the George B. Rathman Professor of Chemistry and professor of materials science and engineering, are also a part of CBES.

The ANSER Center plans to revolutionize our understanding of the molecules, materials, and physical phenomena necessary to create dramatically more efficient technologies for solar fuels and electricity production, said Michael Wasielewski, director of ANSER and a professor of chemistry at Northwestern. Materials science and engineering professors who play a role in the ANSER Center are Michael Bedzyk, Robert Chang, Mark Hersam, and Stupp, along with Tobin Marks and Mark Ratner, who have courtesy appointments in the department.

Samuel I. Stupp, the Board of Trustees Professor of Materials Science and Engineering, Chemistry, and Medicine, directs of the DOE-funded Center for Bio-Inspired Energy Science.

Bedzyk, Hersam, and Marks are also a part of another EFRC, the Center for Electrochemical Energy Science (CEES) at Argonne. Materials science and engineering professors Scott Barnett, Vinayak Dravid, and Christopher Wolverton are CEES researchers as well.

Since their establishment by the DOE's Office of Science in 2009, EFRCs have produced 5,400 peer-reviewed scientific publications and hundreds of inventions at various stages of the patent process. EFRC research has also benefited a number of large and small firms, including start-up companies.

The goal of the centers is to help lay the scientific groundwork for fundamental advances in solar energy, electrical energy storage, carbon capture and sequestration, materials and chemistry by design, biosciences, and extreme environments.

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Letter from the Chair

Dear friends: The past several months have seen big changes in our department, including significant changes to our faculty. In addition to the departure of Kathy Faber, announced in my last letter, Tom Mason will retire at the end of the calendar year. Tom and Kathy made significant contributions to the high quality of teaching, research and the collegial atmosphere in the department. We will miss them, but wish them well in their new endeavors. Both have promised to stay connected, and we hope they will!

In the meantime, I'm very pleased to announce that we have new faculty joining the department. James Rondinelli, an expert in the computational modeling and design of complex oxides and related materials and a former undergraduate in the department, began as assistant professor on September 1, 2014. We're very happy to welcome him back. You can read more about Jim in his profile on page 3. We also anticipate the arrival of two new faculty hires who will start in January, Sossina Haile and Jeff Snyder. We will feature their profiles in our next newsletter.

This month's cover story highlights faculty involvement in new and on-going Energy Frontier Research Centers (EFRCs) funded by the Department of Energy. These collaborative efforts will help advance development of materials related to all aspects of energy production and storage. These are key issues impacting the environment, economy, and future, and topics that many of our students, as well as the faculty, are passionate about exploring. Recognizing the need to address developments in materials related to energy was also the driving force behind our new Energy Materials Lab, inaugurated with a ribbon cutting in May. I'm happy to report that the lab has been a busy place all summer, with graduate and undergraduate students conducting research at the stations in the lab devoted to battery, photovoltaic, and fuel cell research. We especially appreciate the alumni donations that helped us fund this effort.

The Johannes and Julia Randall Weertman Graduate Fellowship continues to grow, and we thank everyone who contributed. Contributions now total more than $175,000 and are well on the way to our Phase II goal of raising $220,000 of the $1 million needed for a fully endowed fellowship. We welcome ongoing donations from those who would like to participate in honoring these two eminent scholars and valued members of the department.

Michael Bedzyk

"New collaborative efforts will advance development of materials related to all aspects of energy production and storage. These are key issues impacting the environment, economy, and future."
Michael Bedzyk

Fall will be a busy time as we welcome new students and new faculty. We also look forward to a short visit from Dan Shechtman, professor of materials science at the Technion in Israel and 2011 Nobel Laureate in Chemistry. Finally, we'd be very pleased to have a visit from any of you, our alumni, especially if you will be on campus for Homecoming weekend. We're planning a departmental reception, and we hope you'll stop by to visit with other alumni, faculty, and students and catch up.

Michael J. Bedzyk
Chair, Department of Materials Science and Engineering

Save the Dates

Homecoming weekend
FRIDAY, OCTOBER 17
MSE Alumni Reception, 1-4 p.m.
RSVP by emailing kstair@northwestern.edu

Dean's Seminar
MONDAY, OCTOBER 20
McCORMICK AUDITORIUM IN THE ALLEN CENTER, EVANSTON CAMPUS
Dan Shechtman, "Technological Entrepreneurship—a Key to World Peace and Prosperity"

Jerome B. Cohen Lecture
TUESDAY, OCTOBER 21
ROOM LR3 IN THE TECHNOLOGICAL INSTITUTE, EVANSTON CAMPUS
Dan Shechtman, "Quasi-Periodic Crystals—a Paradigm Shift in Crystallography"

Support Materials Science

Generous alumni support has enabled endowment of the Fine and Cohen lectures, established the Weertman Graduate Fellowship Fund, enhanced our lab and computing facilities, and created summer support for undergraduate research. Please remember to designate the Department of Materials Science and Engineering when you give to Northwestern.

New Faculty Profile: James Rondinelli

RONDINELLI, A NORTHWESTERN ALUMNUS, JOINS FROM DREXEL UNIVERSITY

The department welcomes James Rondinelli, who joined as assistant professor on September 1, 2014. A Chicago-area native and an alumnus, Rondinelli (BS '06) received a PhD in materials science from the University of California, Santa Barbara in 2010. He was the Joseph Katz Distinguished Fellow in the Magnetic Materials Group of the X-ray Science Division at Argonne National Laboratory before joining the materials science and engineering faculty at Drexel University in September 2011.

Rondinelli's research interests lie at the intersection of condensed matter physics and materials science. His group's main goal is to reliably calculate the properties of any material—either previously synthesized or yet to be realized in the laboratory—using only chemical composition and atomic structure as input. The main focus is on technologically critical electronic, magnetic, and optical materials.

"Returning to Northwestern means than many more of our materials predications may be validated in the lab at a faster rate through iterative cycles with experimental researchers—a key component of President Obama's Materials Genome Initiative," says Rondinelli. "I'm eager to bring the excitement for 21st century materials and functional ferroic properties to the department by creating new courses for undergraduates and graduates that stress these concepts."

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James Rondinelli

While at Drexel, he received a Young Investigator Award from the Physics Division of the Army Research Office Young Investigator Program to devise a route to achieve contraindicated materials that have noncentrosymmetric crystal structures with metallic conductivity, as a means towards the rationally discovery of new superconductors and thermoelectrics. He was also awarded a DARPA Young Faculty Award to uncover new strategies to harness the electronic structure of correlated thin film oxides, which are poised to be a materials platform for transistor applications.

Rondinelli has published more than 45 papers in prestigious journals. Recently, Rondinelli, fellow Northwestern materials science and engineering alum Steve May (PhD '07), also at Drexel, and John Freeland from Argonne National Laboratory, were named the recipients of the 2014 American Ceramic Society's (ACerS) Ross Coffin Purdy Award. This award is given author(s) who "have made the most valuable contribution to ceramic technical literature during the calendar year two years prior to the selection."

Rondinelli is happy to move back to Chicago with his wife, Jessica Nguyen (WCAS '06).

Farewell to Katherine Faber

All Californians now: (left to right) Kathy Faber, Hilliard Symposium Keynote Speaker Andrea Hodge of USC, and Tom Rosenbaum at the third annual Materials Science and Engineering Alumni Banquet.

Katherine Faber, recently elected to the American Academy of Arts and Sciences, has joined the faculty of Caltech as the Simon Ramo Professor of Materials Science. She joins her husband Tom Rosenbaum, who was recently appointed as the ninth president of Caltech. Prior to joining the faculty at Northwestern in 1988, Kathy was assistant and associate professor of ceramic engineering at the Ohio State University (1982-87). Her administrative positions have included associate dean for graduate studies and research in the McCormick School (1992-97) and chair of the Department of Materials Science and Engineering (1998-2003). For the next two years she will co-direct, with Francesca Casadio, the Northwestern-Art Institute of Chicago Center for Scientific Studies in the Arts (NU-ACCESS), which she co-founded. We appreciate Kathy's many contributions to the department's leadership, teaching, research, and collegiality, and we wish Kathy and Tom both well in their new ventures!

Database Accelerates the Development of New Materials

THE OPEN QUANTUM MATERIALS DATABASE CONTAINS ANALYSES OF NEARLY 300,000 COMPOUNDS

When researchers want to create better batteries, solar cells, and medical devices, they often look for answers in new materials.

Materials with optimal properties can improve existing technologies and spark ideas for new ones. But finding materials that have just the right properties can take many years of trial and error.

Christopher Wolverton

"Suppose you want to find a material that would make a good solar cell, but you don't have a design strategy," said Christopher Wolverton, professor of materials science and engineering. "You would have to explore in the dark."

Wolverton's group has created a database that takes some of the guesswork out of designing new materials. The team performed systematic analyses of both known and imagined chemical compounds to find their key properties and established a database of the results. Called the Open Quantum Materials Database (OQMD), it launched in November and is the largest database in the world of its kind.

So far, the OQMD contains analyses of 285,780 compounds and continues to grow. Northwestern's high-performance computer cluster, Quest, was used to construct most of the database, which is available and can be downloaded online. The original paper about the project, "Materials Design and Discovery with High-Throughput Density Functional Theory: The Open Quantum Materials Database," was featured in the November 2013 issue of the journal *JOM*.

The purpose of the OQMD is to identify candidate materials for specific applications by screening them for various properties before they are tested in the lab. This dramatically accelerates the search, narrowing down candidates for possible materials to a mere handful that require further experimentation.

"The calculations are faster and easier with less cost than conducting experiments," Wolverton said. "And it's all on computers, so users can explore things—like toxic elements and radioactive elements—that they probably wouldn't want to do in their labs.

The OQMD allows users to search for materials by composition, create phase diagrams, determine ground state compositions, and visualize crystal structures. Wolverton said his group has also implemented machine-learning models, trained on the database, that can learn chemistry and predict the possible existence of new compounds that have not yet been synthesized.

"Using sophisticated data mining, we could turn materials science into a big data problem," he said. "We could use algorithms to make recommendations for materials the same way Netflix recommends movies you might like."

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> *Christopher Wolverton*

Unlike other similar databases, the OQMD is completely open to the public. Wolverton said closed databases can only be used the way its creators intended. By keeping the database open, more people can use it, adding their own compounds and growing its potential.

"People will use the database in ways that we couldn't possibly imagine right now," he said. "People will improve it, change it, and use it in different ways. They will search for applications of materials that my group isn't interested in, and that's great. They will get value out of it that we never would have."

Alumna Named a Powerful Woman Engineer in Tech

CAROLYN DURAN OF INTEL WAS NUMBER TWO ON *BUSINESS INSIDER'S* LIST

Business Insider magazine recently compiled a list of the "Top 22 Powerful Women Engineers in Tech," and a department alumna took the number two spot.

Carolyn Duran (PhD '98, Wessels) is the conflict minerals program manager and supply chain director at Intel. Most people are aware of "blood diamonds," but precious gems are not the only materials that come from war-torn areas in Africa. Duran has led Intel's efforts to stop using "conflict minerals," which are electronics materials from mines run by warlords. The company now produces chips that are made with 100 percent conflict-free minerals.

Duran's team has met with more than 85 smelters in 21 countries to develop better employee practices and stop using slave labor. The reason *Business Insider* said Duran is powerful: "Imagine personally ending slavery in some of the poorest, most violent places in the world. That's what Duran is doing with her job at Intel."

> "Imagine personally ending slavery in some of the poorest, most violent places in the world. That's what Duran is doing with her job at Intel."
> *Business Insider*

Carolyn Duran

Professor Mason to Retire

Mason group honorees at 2013 alumni banquet: (from left to right) Alex Dolgonos, Prof. Mason, Stephanie Moffitt, Qimin Zhu, Alex Alder, Rachel Beal, Patrick Duffy, and Kelsey Jorgensen.

Professor Thomas Mason has announced his retirement, effective January 2015. A renowned researcher and teacher, he joined the department as assistant professor in 1978 after spending a year as a NATO postdoctoral fellow at the University of Hannover, Germany. Prior to that, he earned a BS in ceramic science at Pennsylvania State University and a PhD in materials science and engineering from MIT.

At Northwestern, he was promoted to associate professor in 1983 and to professor in 1989. From 1987-92, he served as assistant chairman of the department. A fellow of the American Ceramics Society (ACerS) and an ISI Highly Cited researcher, he is known for his work in electroceramics, transparent conducting oxides and semiconductors, solid oxide fuel cell materials, cement-based materials, and nanoceramics.

His excellence in research has been recognized with a number of awards including two ACerS awards: the Schwartzwalder Professional Achievement in Ceramic Engineering Award and the Richard M. Fulrath Pacific Award. He was elected to the International Academy of Ceramics in 1999 and twice won the Edward C. Henry Award (best paper in the *Journal of American Ceramic Society*, Electronics Division, 2006, 2009). His efforts in energy-related materials development were recognized by the James N. and Margie M. Krebs Professorship from 1996-99. His excellence in advising and teaching has been similarly recognized. He was named Adviser of the Year by the McCormick School in 1994. He received an Excellence in Teaching Award from the Northwestern University Alumni Association in 1995 and was a Charles Deering McCormick Professor of Teaching Excellence from 2001-04. In 2006 he was named Outstanding Educator by ACerS. More recently, he developed and led our undergraduate materials science program in the Weinberg College of Arts and Sciences. In addition to advising many undergraduates, he has advised 15 MS and 36 PhD students, many of whom have gone on to be leaders in academia, industry, and national laboratories.

Mason promises that he will "be around" when not visiting children and grandchildren with his wife, Gayle. We wish him a healthy, happy, relaxed retirement following an outstanding and productive career!

Johannes and Julia Randall Weertman Graduate Fellowship Fund

THIS LIST IS COMPLETE AS OF AUGUST 15

$10,000 OR MORE

Prof. Katherine T. Faber and Dr. Thomas Rosenbaum
Prof. Morris Eugene Fine
Mrs. Joanna H. Gwinn ('67) and Dr. Donald G. Gwinn ('72)

$5,000-$9,999

Dr. Debasis Baral ('83)
Prof. Stephen H. Carr and Dr. Virginia McMillan Carr ('76)
Prof. David C. Dunand
Prof. Mark C. Hersam and Mrs. Susan Hersam
Dr. George William Nieman ('91) and Ms. Rita Nathanson
Prof. Gregory B. Olson and Ms. Jane Black
Dr. Christopher A. Schuh ('01)
Dr. Lyle H. Schwartz ('64) and Celesta S. Jurkovich ('83)
Prof. David N. Seidman and Mrs. Shoshanah Seidman
Prof. Samuel I. Stupp ('77) and Dr. Dévora Grynspan ('83)
Dr. Anil V. Virkar ('73)
Prof. Peter Voorhees and Mrs. Maria Voorhees

$2,500-$4,999

Prof. Scott A. Barnett and Mrs. Joann C. Barnett
Prof. Yip-Wah Chung and Mrs. Metty Poei
Dr. James G. Conley ('87, '92) and Mrs. Sally Crawford Conley
Prof. Lincoln J. Lauhon and Dr. Maureen Bolon
Prof. Thomas O. Mason and Mrs. Gayle Mason
Prof. Mark A. Ratner ('69) and Mrs. Nancy Ratner
Dr. Kathleen Stair ('86)
Prof. Bruce W. Wessels and Mrs. Beverly Tiedemann Wessels

$1,000-$2,499

Dr. Abhijit Acharya ('68, '75) and Mrs. Quentine Acharya
Dr. Gunwoong Bahng ('80, '82)
Prof. Zdeněk P. Bažant
Prof. Michael J. Bedzyk and Prof. Monica Olvera de la Cruz
Prof. R. P. H. Chang and Mrs. Bennie Chang
Dr. Tsu-Wei Chou ('66) and Ms. Vivian M. S. Lou Chou
Prof. Vinayak P. Dravid and Ms. Amita Vinayak Dravid ('93)
Dr. Stephen T. Gonczy ('78) and Mrs. Anne Marie Gonczy
Prof. Jiaxing Huang and Mrs. Shaorong Liu
Prof. D. Lynn Johnson and Mrs. LaRae P. Johnson
Dr. Ming-Ren Lin ('84)
Prof. Tobin J. Marks and Dr. Indrani Mukharji
Prof. Masahiro Meshii ('59) and Mrs. Eiko Meshii
Prof. Chad Mirkin
Dr. Andrew Joseph Neuhalfen ('92) and Mrs. Catherine M. Neuhalfen
Dr. V.R. Parameswaran ('70) and Dr. Thangam Parameswaran ('72)
Dr. Takeo Sakai ('73) and Mrs. Yasuko Sakai
Prof. Ramille N. Shah ('00) and Dr. Nirav A. Shah ('08)
Prof. Ken Shull and Mrs. Tammy Shull
Dr. Akio Urakami ('70) and Ms. Keiko Urakami
Prof. Christopher M. Wolverton

$500-$999

Dr. Rong-Tsang Chen ('81) and Mrs. Wang-Ching Chen
Dr. William J. Hillegas ('68) and Ms. Kathleen Branson Hillegas
Dr. Hitoshi Ishii ('71) and Kuniko Imaizumi
Prof. Derk Joester and Dr. Jee Rim
Prof. Leon M. Keer and Mrs. Barbara Sara Keer ('77)
Dr. David A. Kiewit ('68) and Mrs. Michelle R. Kiewit ('63)
Dr. Kanji Ono ('64) and Fumie Asano
Dr. Mark S. Pucci ('82) and Mrs. Anita Pucci
Dr. Mindy N. Rittner ('96) and Dr. John David Rittner ('96)
Dr. Toshiari Saegusa ('78)

$100-$499

Prof. Cate Brinson and Prof. Warren A Kibbe
Dr. Carelyn E. Campbell ('97) and Mr. Mark R. Stoudt
Dr. Rebecca Cortez ('92)
Dr. Doreen D. Edwards ('97)
Dr. Edward L. Hall ('70) and Mrs. Carol J. Hall ('64)
Mrs. Nancy J. Hermanson ('83)
Dr. Brian J. Ingram ('04) and Dr. Tammy S. Lai ('06)
Dr. Joshua J. Jacobs ('77) and Mrs. Faye R. Jacobs
Prof. Erik Luijten
Dr. Harris L. Marcus ('67) and Ms. Leona G. Marcus
Dr. Sally J. Marshall ('75) and Grayson W. Marshall, Jr., Ph.D., DDS ('86)
Dr. Mel I. Mendelson ('66, '73)
Dr. Jospeh S. Santner ('75) and Mrs. Barbara K. Santner
Dr. Carla J. Shute ('91) and Mr. Richard H. Barnes ('86)
Dr. Howard W. Sizek ('89) and Dr. Jacqueline A. Housel
Dr. Semyon Vaynman ('87) and Ms. Dora Vaynman
Mr. Willem Weertman
Dr. Christopher M. Weyant ('05) and Dr. Johnathan Edward Allen ('09)

"Professor" indicates Northwestern faculty affiliation only; many others listed are professors at other institutions.

Faculty News

VINAYAK DRAVID, CHRIS WOLVERTON and colleagues in the Energy Frontier Research Center had findings published in the April 17 issue of *Nature*.

MORRIS FINE was granted an honorary degree from Union College, Schenectady, NY, at the 220th commencement for the school. Hosted by materials science and engineering alumna REBECCA CORTEZ (PhD '92), Fine was honored for his contributions to higher education and the field of materials science and engineering.

In May, MARK HERSAM testified about nanotechnology before US Congress to push for "coordinated, predictable, and sustained federal funding" for nanotechnology research and development.

JIAXING HUANG was awarded a 2014 Guggenheim Foundation Fellowship for his work on ultrafine particles with very weak Van der Waals interaction. He also received the Fissan-Pui-TSI Award from the International Aerosol Research Assembly and the 2014 American Vacuum Society Prairie Chapter Early Career Award.

ERIK LUIJTEN was promoted to full professor in materials science and engineering and engineering sciences and applied mathematics. Luijten also serves as chair of the highly successful applied physics program. His recent article with Kipton Barros in *Physical Review Letters*, "Dielectric Effects in the Self-Assembly of Binary Colloidal Aggregates," was selected as an editor's choice.

LAURENCE MARKS is the recipient of the 2015 American Crystallographic Association Warren Award, which recognizes an important recent contribution to the physics of solids or liquids using x-ray, neutron, or electron diffraction techniques.

CHAD MIRKIN has won the 2014 Distinguished Medical Science Award from the Friends of the National Library of Medicine. He has been selected, for a second time, by the US Department of Defense as a fellow in the department's National Security Science and Engineering Faculty Fellows program. He was also named honorary professor at Nanjing Tech, received the 2014 the ACSNano Lectureship award, and the 2015 Emerson Center Lecture Award at Emory University.

Recent theoretical work by MONICA OLVERA DE LA CRUZ and colleagues, published in *Nature Materials,* was highlighted in the June issue of *Physics Today* as providing a roadmap to designing better battery electrolytes. In separate work, published in the *Proceedings of the National Academy of Sciences,* Olvera de la Cruz and Zhenwei Yao examined the role of topological defects in polydisperse systems and their role in crystallinity.

Student News

DENIZ ALPAY (L. Marks group) was recently awarded the University Fellowship in Leadership. Deniz also received a fall 2013 Campus Life Award.

National Defense Science and Engineering Graduate Fellowships were awarded to graduate students CATHERINE TUPPER, SPENCER WELLS, and senior RACHEL BEAL, who plans to pursue a PhD at Stanford.

Graduate students DEEPTI KRISHNAN, NICHOLAS SATHER, TEJAS SHASTRY, ALEX SMITH, SPENCER WELLS and YU ZHOU were awarded Ryan Fellowships. CHYI-HUEY JOSHUA YEH was awarded a 3M graduate fellowship.

FERNANDO CASTRO and CHRISTOPHER SERRANO were awarded GEM fellowships.

TAEGON OH (Mirkin) was awarded an international fellowship from Korea.

Graduate students ALEX SMITH, TEJAS SHASTRY, and MIKE GEIER founded startup company myPower, which recently received the Consumer Favorite prize and $75,000 in the 2014 Clean Energy Student Challenge, a regional business plan competition sponsored by the US Department of Energy and administered by Chicago-based Clean Energy Trust.

Departmental undergraduate awards: Senior KATIE JAYCOX (Shah) was awarded the 2014 Hilliard Research and Design Award, as well as the McCormick-wide Harold B. Gotaas Undergraduate Research Award. Senior RACHEL BEAL was awarded the Hilliard Leadership, Scholarship, and Service award. Junior LEANNE FRIEDRICH (Joester) received the second annual Fletcher Undergraduate Research Grant Award. EDWARD PANG and SPENCER PARK won the Outstanding Materials Science Junior and Sophomore Awards, respectively. Sophomores YANG YU and ANGELINA LU received Meister Summer Research Awards.

Juniors ANDREW ROWBERG (Hersam) and LEANNE FRIEDRICH (Joester) each won "top presenter" awards at the Chicago Area Undergraduate Research Symposium held April 5 at the Chicago Marriott. Students JACK CAVANAUGH, KATIE JAYCOX, PETER KIM, VICTORIA VACCAREZZA, and KEVIN ZHAO also presented posters.

The MatSci/Chemistry IM soccer team won the Northwestern-wide spring 2014 IM soccer championship. Team members from MSE included graduate students KUN-HO YOON (captain), MIKE WHITTAKER, JAMES RILEY, CHRISTOPHER SERRANO, SAMUEL MILLER, JANAK THAPA, NICHOLAS SATHER, post-doc TOR SUNDE, and faculty member MARK HERSAM.

Hilliard Symposium 2014

Advisers and Advisees reunited (clockwise from left): Prof. Ken Shull and Early Career Achievement awardee Al Crosby (PhD '00, Shull), professor of polymer science and engineering at the University of Massachusetts, Amherst; Prof. Chris Wolverton and Distinguished Career awardee Didier de Fontaine (PhD '67, Hilliard), professor emeritus of materials science and engineering the University of California at Berkeley; Prof. David Dunand and Hilliard keynote lecturer Andrea Hodge. Hilliard Symposium first place winner Jim Riley receives congratulations from Mike Radler of Dow Chemical (PhD '90, Cohen) and symposium organizer Prof. Laurence Marks.

The 27th annual Hilliard Symposium was held May 15 in the McCormick Tribune Center Forum. The keynote address, "Can 'Nano' Save the World or Will It Just Make It Smaller?" was presented by Andrea Hodge (PhD '93, Dunand), associate professor and the Philip and Cayley MacDonald Early Career Chair of Aerospace and Mechanical Engineering at the University of Southern California.

Winners of the student competitions were: JAMES RILEY (1st place), JEFF DOAK (2nd place), MARIA SEBASTIAN (3rd place), and LAILA JABER-ANSARI (AVS Award) for their winning presentations and YONGLI WANG for best poster.

Hilliard Symposium Speakers

Speakers and the titles of their talks were: JEFF DOAK (Wolverton) "First-principles Thermodynamics of Na Solubility, Partitioning, and Segregation in PbTe-PbS Thermoelectric Materials;" LAILA JABER-ANSARI (Hersam) "Mitigating Manganese Loss in Lithium Manganese Oxide Cathodes Through Graphene-Based Surface Modification;" SHIQIANG LI (Chang) "Ultra-sharp Plasmonic Resonance from Monopole Optical Nanoantenna Phased Arrays;" TING LI (Olvera) "Molecular Dynamics Study of DNA Guided Assembly and Crystallization of Nanoparticles;" YUYUAN LIN (Marks) "Bridging the Materials Gap in Surface Science with High Resolution Electron Microscopy;" ELIZAVETA PLOTNIKOV (Seidman) "On the Temporal Evolution of the γ(f.c.c.)- and γ'(L12)-phases in a Ni-12.5 Al at.% Alloy;" JAMES RILEY (Lauhon) "Revealing the 3-D Structure of Next-Generation LEDs;" MARIA SEBASTIAN (Wessels) "Tl_6I_4Se as a New Material for Room Temperature Gamma Ray Spectroscopy;" and I-CHENG TUNG (Bedzyk) "An Atomic-scale in situ X-Ray Study of Reactive Molecular-Beam Epitaxy."

Hilliard Symposium Poster Presenters

Poster presenters and the names of their projects were: GARETH HUGHES (Barnett) "Analysis of Durability and Performance of Solid Oxide Cells for Energy Storage;" AHMED ISSA (Wolverton) "Computational Investigation and Design of Mg-rare Earth Alloys;" ADAM JAKUS (Shah) "From Medicine to Energy: 3D-Printing-Enabled Materials from Particle-Laden Inks" and "3D-Printed Hyperelastic Bone for Hard-Tissue Engineering Applications;" IN SOO KIM (Lauhon) "Dynamic Mechanical Response of Vanadium Dioxide around the Insulator to Metal Phase Transition;" SCOTT KIRKLIN (Wolverton) "The Open Quantum Materials Database: A Resource for Computational Materials Screening;" ARPUN NAGARAJA (Mason) "Inverse Design of Li-doped Cr_2MnO_4 as a Novel p-Type Transparent Conductor;" CHUN-HONG SHAM (Hersam) "Characterization of Molecular Self-assembly on Graphene Using Scanning Tunnelling Microscopy;" CHUANDAO WANG (Marks) "Controllable ALD Synthesis of Platinum Nanoparticles by Tuning Different Synthesis Parameters;" YONGLI WANG (Wolverton) "Hydrogen Dissociation and Diffusion on the Mg-terminated MgB2 (0001) Surface and Hydrogen Diffusion in MgB2 Bulk;" and JIAYI YAN (Olson) "Orthorhombicity of Martensite in Titanium Alloys Explained by Short Range Ordering."

Alumni News

Recent alum BIN LIU (PhD '14, Dravid) made news by proposing to JIE HAN (MS '12), who was in the audience, after he crossed the stage during the PhD hooding ceremony in June. (She said yes.) Congratulations to both!

Huang group alumni JIAYAN LUO and JAEMYUNG KIM (both PhD '13) won the 2014 *Carbon Journal Prize* for outstanding PhD thesis in carbon research. Typically awarded to a single candidate, the award was given simultaneously to both Luo and Kim based on their impressive thesis work.

DR. K. SUJATA (PhD '89, Mason) was honored in July as a Tamil American Pioneer. She serves as president and CEO of Chicago Foundation for Women, a grant-making organization dedicated to increasing resources and opportunities for women and girls in the greater Chicago area.

GRACE JINLIU WANG (PhD '01, Chung) has been appointed deputy assistant director of engineering at the National Science Foundation.

MICHAEL ZEDALIS (MS '82, PhD '85) was named president and chief operating officer of Tingley Rubber Corporation in April.

MSE Celebrates the Opening of the Energy Materials Lab

Clockwise from left: Chair Mike Bedzyk (left) and Dean Julio M. Ottino (right) join Mary, Will, and Kaley Meister in cutting the ribbon at the entrance of the new Energy Materials Lab on May 16; Board member Dmitry Shashkov and Dean Ottino listen to Bedzyk speak during the ceremony; photovoltaics lab equipment includes gloveboxes for air-sensitive synthesis, a photoluminescence spectrometer, and a solar simulator.

Editor: Kathleen Stair and Amanda Morris
Designer: Amy Charlson Design

NORTHWESTERN UNIVERSITY

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