

Pen-on-Paper Electronics

Printing Conductive Inks on Paper to Create Flexible Electronics “on-the-fly”

Greetings from Urbana



At the beginning of this academic year, we welcomed a record number of new students to our department: 104 freshmen officially began their undergraduate studies in our department and 42 new Ph.D. students started their research careers with us this fall. We also accepted many transfer students from other departments that increased the number of students in the junior year core-courses and instructional laboratories to >100. We are working as quickly as possible to expand the equipment and space available in our instructional laboratories so that the educational experience of students is not negatively impacted by these large enrollments.

The past few months have also brought an unprecedented level of visibility to our research accomplishments. John Rogers received the \$500,000 Lemelson-MIT Prize, one of the world's most prestigious honors for inventors. John's work on flexible electronics for health and energy has been reported on by MSNBC, NPR, and The Economist. Paul Braun's innovations in fast-charging battery electrodes have also attracted international attention through reporting by The Economist and the BBC. A vigorous culture of innovation is widely thought to be a key to continued economic growth in the internationally competitive era that we live in. We are justifiably proud of the tremendous impact the work of our faculty and students is having across a broad spectrum of science and technology.

We are pleased to welcome outstanding new faculty and staff to the department this fall. Prof. Kris Kilian and his students are busy setting up their laboratories in the Materials Science and Engineering Building and the Micro and Nanotechnology Laboratory. Dr. Bill Wilson, the new director the facilities of the Materials Research Laboratory, also has an appointment in our department as a research professor. Allison Winter joined us this fall as our Assistant Director of Advancement. She will be meeting with alumni across the nation to help establish connections with the department. I hope many of you will have the opportunity to meet Allison in the near future.

Sincerely,

A handwritten signature in blue ink that reads "David Cahill".

David Cahill
Willett Professor and Head

Letter from the Alumni Board



The Fall Board Meeting marked a period of transition for the UIUC MatSE Alumni Board. Jim Burk, President of the Board, finished his term and I was elected as the new President. I would like to thank Jim Burk for his leadership as President for the past three years. He has helped focus the Board to find new ways for the Alumni to serve the faculty and students of the Department. Our new Vice-President is Britt Turkot and I look forward to working with her to continue finding ways for the Alumni Board to help the Department. I would especially like to recognize and thank several board members who have diligently served the Board and ended their terms this year: Rick Anderson-Decina, Dwight Diercks, Joe Harmon, Mike Daly, Matt Zaluzec and Matthew Janet. We also selected three new board members: Howard Savage, Angela Gonzales and Geoff Brennecka. If you are interested in becoming a member of the Board, please contact Cindy Brya. One initiative that we will be undertaking in the next year is a roll-out of a mentorship program trying to pair alumni with students. The goal of the program is to have alumni share real-world experiences, provide career advice, and possibly help with senior design projects. The program will be started as a pilot program using Alumni Board members as the pool of mentors. After the program is established, we plan to open the program up to all Alumni. One method that we will be using to connect students with alumni is through LinkedIn. The MatSE Department has established a LinkedIn Group "MatSE at Illinois." Please join this group if you have an interest in connecting with current students or other alumni of the Department.

A handwritten signature in blue ink that reads "David F. Teter".

David F. Teter (BS Met '90, PhD Met '96)
Alumni Board President

Silver pen has the write stuff for flexible electronics



Jennifer Lewis

The pen may have bested the sword long ago, but now it's challenging wires and soldering irons.

University of Illinois engineers have developed a silver-inked rollerball pen capable of writing electrical circuits and interconnects on paper, wood and other surfaces. The pen is writing whole new chapters in low-cost, flexible and disposable electronics. Led by Jennifer Lewis (BS Cer '86), the Hans Thurnauer Professor of materials science and engineering at the U of I, and Jennifer Bernhard, a professor of electrical and computer engineering, the team published its work in the journal *Advanced Materials*. "Pen-based printing allows one to construct electronic devices 'on-the-fly,'" said Lewis, the director of the Frederick Seitz Materials Research Laboratory at the U. of I. "This is an important step toward enabling desktop manufacturing (or personal fabrication) using very low cost, ubiquitous printing tools."

While it looks like a typical silver-colored rollerball pen, this pen's ink is a solution of real silver. After writing, the liquid in the ink dries to leave conductive silver pathways – in essence, paper-mounted wires. The ink maintains its conductivity through multiple bends and folds of the paper, enabling devices with great flexibility and conformability.

Metallic inks have been used in approaches using inkjet printers to fabricate electronic devices, but the

pen offers freedom and flexibility to apply ink directly to paper or other rough surfaces instantly, at low cost and without programming.

"The key advantage of the pen is that the costly printers and printheads typically required for inkjet or other printing approaches are replaced with an inexpensive, hand-held writing tool," said Lewis.

The ability to create freestyle conductive pathways enables new possibilities in art, disposable electronics and folded three-dimensional devices. For example, the researchers used the silver pen to sketch a copy of the painting "Sae-Han-Do" by Jung Hee Kim, which portrays a house, trees and Chinese text. The ink serves as wiring for an LED mounted on the roof of the house, powered by a five-volt battery connected to the edge of the painting. The researchers also have demonstrated a flexible LED display on paper, conductive text and three-dimensional radio-frequency antennas.

Next, the researchers plan to expand the palette of inks to enable pen-on-paper writing of other electronic and ionically conductive materials.

The U.S. Department of Energy supported this work. Co-authors were graduate student Analisa Russo and postdoctoral researchers Bok Yeop Ahn, Jacob Adams and Eric Duoss.

-University of Illinois News Bureau

See the pen in action:

<http://www.youtube.com/watch?v=dfNByi-rrO4&feature=youtu.be>

<http://boingboing.net/2011/10/17/how-to-make-silver-ink-that-conducts-electricity.html>



Rogers receives \$500,000 Lemelson-MIT Prize



John Rogers

John Rogers, the Lee J. Flory-Founder Chair in Engineering at the University of Illinois, has won the 2011 Lemelson-MIT Prize. The annual award recognizes outstanding innovation and creativity.

Rogers accepted the \$500,000 prize – one of the world's largest single cash prizes for invention – and presented his accomplishments to the public at a ceremony during the Lemelson-MIT program's annual EurekaFest at the Massachusetts Institute of Technology.

Renowned for his recent pioneering work with semiconductor materials and flexible, stretchable electronics, Rogers applies his expertise to devise technology solutions across such broad fields as solar power, biointegrated electronics, sensing, thin film metrology, and fiber optics. Rogers combines soft, stretchable materials with micro- and nanoscale electronic components to create classes of devices with a wide range of practical applications. His recent work has produced devices from tiny eye-like cameras to less-invasive surgical tools to biocompatible sensor arrays.

Ilesanmi Adesida, dean of the College of Engineering at Illinois, cited Rogers' ability to span across incongruent fields of work as a reason for his success.

"Rogers can move effortlessly from science to technology and to practical applications with a unique vision for the translation of science to products," Adesida said.

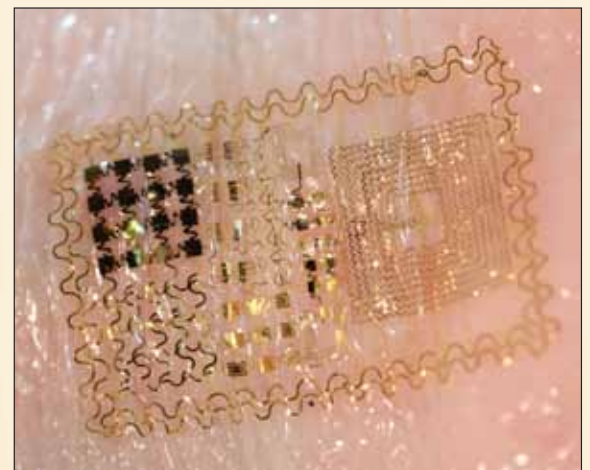
An ultrathin, electronic patch with the mechanics of skin, applied to the wrist for EMG and other measurements.

"His work exemplifies how to effectively bolster sciences and technology so the United States can successfully compete and prosper in the global community of the 21st century."

Not content to merely invent, Rogers also is an entrepreneur. He is co-founder and director of the device companies MC10 Inc. and Semprius Inc., both of which work to apply and commercialize technology he has invented. Previously, he co-founded a successful company, Active Impulse Systems Inc., that commercialized his picosecond laser techniques for analysis of thin films used in the semiconductor industry and was later acquired by a large company. The son of a physicist and a poet, Rogers earned his doctorate in physical chemistry from MIT in 1995. Since joining the Illinois faculty in January 2003, he has distinguished himself as a mentor, encouraging his large group of students to collaboration, perseverance and innovation. Dubbed the "Oscar for Inventors," the Lemelson-MIT Prize is awarded to outstanding mid-career inventors, who have developed a patented product or process of significant value to society, which has been adopted for practical use, or has a high probability of being adopted. By recognizing and funding younger, mid-career inventors, the prize is designed to spur inventive careers and provide role models for future generations of inventors.

Jerome H. Lemelson, one of America's most prolific inventors, and his wife, Dorothy, founded the Lemelson-MIT Program at MIT in 1994. It is funded by The Lemelson Foundation, a private philanthropy that sparks, sustains and celebrates innovation and the inventive spirit. It supports projects in the U.S. and developing countries that nurture innovators and unleash invention to advance economic, social and environmentally sustainable development.

-University of Illinois News Bureau



New faculty in MatSE



Kristopher Kilian

The MatSE Department welcomes three new faculty members in the area of biomaterials in the 2011-2012 academic year: Kristopher Kilian, Andrew Ferguson, and Cecilia Leal.

Kristopher Kilian joined MatSE in August after completing a National Institutes of Health postdoctoral fellowship at the University of Chicago. He received his B.S. and M.S. degrees in chemistry from the University of Washington in 1999 and 2003, respectively, and his Ph.D. in chemistry from the University of New South Wales, Australia, in 2007.

Kilian's research focus is the development of materials for stem cell and tissue engineering research. A primary effort is the design of surfaces that mimic the structure and composition of the cell and tissue microenvironment towards elucidating the physical, chemical and biological cues that guide cell fate. The materials and systems developed in his group will serve as novel tools for fundamental biological research and for the fabrication of clinically relevant biomaterials.

"My work is highly interdisciplinary, spanning the fields of materials chemistry and cell biology. When I first visited Illinois, I immediately saw that this was a place without boundaries where my brand of science could thrive," said Kilian.



Andrew Ferguson

Andrew Ferguson will join the MatSE Department in April at the conclusion of his postdoctoral fellowship at the Ragon Institute of Massachusetts General Hospital, MIT, and Harvard. He received his M.Eng. degree in chemical engineering from Imperial College, England, in 2005 and his Ph.D. in chemical and biological engineering from Princeton University in 2010.

Ferguson's research interests lie at the intersection of materials science, biophysical simulation, and machine learning. His research interests include the integration of novel machine learning techniques with molecular simulation to provide mechanistic insight into self-assembly phenomena and accelerate simulations of protein folding. Other interests include the application of multi-resolution simulation techniques to trans-membrane pore formation, and the development of data driven models of viral evolution.

Cecilia Leal will be joining the faculty in April after her post-doctoral work at University of California, Santa Barbara which was supported by a fellowship from the Swedish Research Council. She received her M.Sc. in industrial chemistry from the University of Coimbra, Portugal, in 2000 and her Ph.D. in physical chemistry from the University of Lund, Sweden, in 2006.

Leal's research deals with elucidating structures and interactions of biomaterials at the molecular level to the micrometer scales using X-ray diffraction, nuclear magnetic resonance and microscopy tools. Developing a fundamental understanding of the self-organization of biologically relevant molecules such as nucleic acids, lipids, peptides, and proteins is crucial because their distinct structures are directly related to their specific functions in vivo. Such biomaterials can then be functionalized for a variety of applications, e.g., drug and gene delivery, enzymatic encapsulation, and biosensors.

"Before visiting the University of Illinois, I already knew I was stepping into a top school and research institution," Leal said. Still, the interdisciplinary work, research infrastructure, and extremely collaborative environment impressed her. "Illinois values and fosters a collaborative environment that encourages diffusion of ideas and knowledge between fields," Andrew Ferguson agreed.



Cecilia Leal

2011 Alumni Awards

Distinguished Merit Award

Dianne Chong (MS Met '83, PhD Met '86)



Dianne Chong

Dianne Chong is the Vice President of Materials Assembly, Factory & Support Technology in the Boeing Engineering, Operations & Technology organization. In this position she leads the organization responsible for development and support of manufacturing processes and program integration for the Boeing Enterprise. Prior to this Chong was the Director of Materials & Process Technology for Boeing Commercial

Airplanes. She was also the Director of Strategic Operations and Business for IDS Engineering. In this capacity, she was the lead director defining and implementing a solid strategy for all Boeing Engineering. She has also been the Department Head / team leader of MSE, liaison, and process control groups in Phantom Works and Integrated Defense Systems.

Dianne Chong received her bachelor's degrees in biology and psychology from the University of Illinois and her masters' degrees in physiology and metallurgical engineering. In 1986, she received her Ph.D. in metallurgical engineering from Illinois. She also completed an Executive Master of Manufacturing Management at Washington University.

She has served as the St. Louis representative to Military Handbook 5 where she has chaired the Aerospace Users' Group and the titanium casting group. She is a member of TMS, AIAA, ASM International, SME, SWE, Beta Gamma Sigma, and Tau Beta Pi. She has been recognized for managerial achievements and as a diversity change agent. She was also recognized as an outstanding alumna of University of Illinois in 2006. She has been a member of the National Materials Advisory Board. She has served on the Board of Trustees and is a Fellow of the ASM International. In 2007-08, she served as the President of ASM International. She is currently serving on the NAS Board on Global Science and Technology and is a commissioner to the ABET EAC. In 2010, she received the AAEOY award for corporate management.

Distinguished Merit Award

Vonne Linse (BS Met '62)



Vonne Linse

A native of central Illinois, Vonne Linse enrolled at the University of Illinois in September 1958 and graduated with a B.S. in metallurgical engineering in January 1962. Following graduation, he joined Esso Oil and Refining at the Bayway Refinery in Linden, NJ as a materials, welding and corrosion engineer. In 1963, he joined Battelle Memorial Institute in Columbus, OH, where he was

involved in research and development in advanced materials processing. Early in his career at Battelle, he began working on high energy rate processing of materials using explosives, including forming, shock wave treatment, powder compaction and welding/bonding. During his 26 years at Battelle, he gained a full working knowledge of the explosion welding process ranging from process fundamentals to commercialized applications. Also while at

Battelle, he served as the principal investigator in a large DARPA funded study to gain a complete fundamental understanding of the explosive/high energy rate consolidation and inter-particle bonding of metal and ceramic powders at temperatures up to 1100 degrees C.

In 1989, Linse joined the Edison Welding Institute as Manager of the Materials Department where he specialized in the joining of advanced materials and composites, particularly the metallurgical and materials related aspects of the joining processes while continuing to direct explosion bonding activities. In 1993, with the assistance of the Edison Welding Institute and the Ohio Department of Development, he founded the Regal Technology Corporation where he has applied his extensive knowledge of the explosion bonding process to the production of explosion clad products. He is currently the CEO and Director of Technology for Regal Technology Corporation.

Vonne Linse has served on numerous technical committees in the area of explosion and high energy rate fabrication processes including serving as Chairman of a National Academy of Sciences Materials Advisory Board Committee for the Dynamic Processing of Ceramic Powders. In addition, he has chaired and served on several committees to prepare handbook chapters on explosion bonding/welding for the ASM and AWS. He has authored or coauthored 19 published papers and more than 35 technical reports with respect to explosion fabrication. He has six U.S. patents and two Canadian patents all of which, with the exception of one U.S. patent, are in the field of explosion bonding/welding.

Loyalty Award

Larry Rakers (BS Met '85, MS Met '88)



Larry Rakers

Larry Rakers is a 1985 bronze tablet graduate in metallurgical engineering from the University of Illinois. After graduation, he stayed at the department and received his master's degree in 1987 doing research work with Professors Chen, Wayland, and Beck. Upon receiving his master's degree,

he took a position as a project engineer at the Honeywell Electro Optics Division in Lexington, MA, where he led a small team producing infra-red detectors for military applications. While at Honeywell, Larry went to Northeastern University part-time at night to receive his MBA. Upon graduating from Northeastern, he was able to make a career switch and became an equity research analyst at Fidelity Investments. After nine years as an equity research analyst, Rakers was asked in 2002 to run the Fidelity Balanced Fund. In 2008 he was reassigned to the \$11 billion Fidelity Dividend Growth Fund. He has been a successful fund manager, beating over 90% of his peers and twice being named by Barron's magazine as one of the top 100 Fund Managers in the country.

While an undergraduate at Illinois, Larry Rakers received a small annual academic scholarship from the department. Professor Bob Bohl, the undergraduate advisor at the time, was able to fund this from a variety of corporate sponsors. A few years ago, Rakers thought it would be a good idea to pay the MatSE Department back for their previous generosity by endowing an undergraduate scholarship for the department.



David Wilcox and Ilesanmi Adesida, Dean of the College of Engineering.

Loyalty Award

David Wilcox (MS Cer '59, PhD Cer '61)

David Wilcox received his master's and doctoral degrees in ceramics from the University of Illinois. Following a two-year military duty, he joined IBM where as a Senior Engineer and manager he led the development of ceramic technologies for packaging the electronics used in IBM's mainframe computers. He also led the development of ceramic magnetic recording technologies for IBM's disk file business. When an early retirement program was established to help reshape the workforce skills, Dave and his wife Claire were able to fulfill their dream of serving in the U.S. Peace Corps. They had an incredible 2-year experience as volunteers in Costa Rica where Wilcox helped several rural groups establish small businesses.

Following the Peace Corps experience, he joined the Ceramic Engineering Department at the University of Illinois as an adjunct professor. He lectured and led a lab associated with electronic packaging technologies, chaired the Glass Problems Conference and the Department's Federation of Advanced Materials Industries (FAMI), organized a major symposium on multichip electronic packaging and obtained state funding for and initiated a College wide research program focused on the associated technologies. He particularly enjoyed time with his graduate students and helping both undergraduate and graduate students gain exposure to the electronics business as advisor to the department's IMAPS student chapter.

He has enjoyed his association on the advisory boards in the Materials Science and Engineering, Ceramic Engineering and Chemical Engineering Departments at the University of Illinois, Rutgers University and the University of New Mexico. A fellow of the American Ceramic Society, he has served on the Board of Directors of the Society, served as director of the Electronics Division and is active as a reviewer of papers for the Society.



Paul Braun

Young Alumnus Award

Paul Braun (PhD MatSE '98)

Paul Braun is a Professor of Materials Science and Engineering, and an affiliate of the Frederick Seitz Materials Research Laboratory, the Beckman Institute for Advanced Science and Technology, and the Department of Chemistry at the University of Illinois at Urbana-Champaign. Braun's research focuses

on the synthesis and properties of 3D architectures with a focus on materials with unique optical, electrochemical, thermal, and mechanical properties.

He received his B.S. degree with distinction from Cornell University in 1993, and his Ph.D. from Illinois in 1998, both in Materials Science and Engineering. Following a postdoctoral appointment at Bell Labs, Lucent Technologies, he joined the faculty at Illinois in 1999.

Braun has co-authored a book, authored over 100 peer-reviewed publications, and has been awarded multiple patents. He is the recipient of the Friedrich Wilhelm Bessel Research Award (2010), the Stanley H. Pierce Faculty Award (2010), Beckman Young Investigator Award (2001), a 3M Nontenured Faculty Award, the 2002 Robert Lansing Hardy Award from TMS, the Xerox Award for Faculty Research (2004, 2009), and multiple teaching awards. In 2006, he was named a University Scholar by the University of Illinois.



Dan Lillig

Young Alumnus Award

Dan Lillig (BS Met '93, PhD MatSE '00)

Dan Lillig received a bachelor's degree in metallurgical engineering in 1993 and a doctorate in Materials Science and engineering in 2000. During his undergraduate studies, Lillig was active in his fraternity and president of the University of Illinois Metallurgical Society. As a senior, he began working for Professor Ian Robertson

who became his advisor during for his graduate degree. He remained involved with campus activities during graduate school as the co-chair of the Graduate Student Advisory Council, member of the Graduate Deans Advisory Committee and University Senate Educational Policy Committee.

After graduation, he joined ExxonMobil Upstream Research Company in Houston, TX. He worked on a variety of projects including development of cryogenic steel and associated welding technology, oil and gas well stimulation technologies, and natural gas transportation technology planning.

In 2005, Lillig transferred to the ExxonMobil Development Company where he provided expert support and technical leadership for welding & inspection issues directly to ExxonMobil's worldwide oil and gas resource development projects. In conjunction with the project support, he was actively involved with technology programs to qualify materials and process for project use including Invar™ pipe, fatigue resistant welding, advanced weld inspection tools, and materials for high performance pipelines. He advanced into a variety of leadership and managerial roles.

In 2009, Lillig took his current position as lead engineer with the Alaska Pipeline Project, a joint development between ExxonMobil and TransCanada. He has coauthored some twenty-five technical papers, given many technical presentations, and chaired several technical symposia related to materials engineering in the oil and gas industry. He has participated in national and international standards committees. He is also the co-inventor of three patented technologies.

He is married to Dorothy Puch Lillig (UIUC Bachelor of Science Sociology Master of Education '99). They live in Calgary, Alberta, Canada, with their two children: Jack, 12, and Anna, 8.

Morris Opportunity Scholarship established in MatSE

Thanks to the generosity of Ron and Peg Morris, the MatSE Department has a new endowed scholarship, the G. Ronald and Margaret H. Morris Opportunity Scholarship. In 2008, the Morrises endowed their first scholarship at the University of Illinois, the G. Ronald and Margaret H. Morris Scholarship for undergraduates in Materials Science and Engineering. The first recipient of their scholarship, Evelyn Huang, graduated in 2010 with her bachelor's degree in MatSE and is now in medical school at the University of Illinois, Chicago.

When Ron and Peg began their studies at the University of Illinois, scholarships were not as common as today. Since then tuition has risen exponentially and more students are relying on student loans to pay for their education. For the 2011-2012 academic year, tuition and fees for students enrolled in the College of Engineering at the University of Illinois is \$19,238 for Illinois residents and \$33,380 for non-residents. "Neither of us endured financial hardship as do some students today," Ron Morris said. "We remain mindful of our success, and continue to search for ways to repay for the value that we received at the University of Illinois."

The recipient of the new G. Ronald and Margaret H. Morris Opportunity Scholarship for 2011-2012 is Michael Katz, a junior from Buffalo Grove, IL. Katz chose MatSE for his major after talking to a family friend who had graduated from the U of I metallurgy program in the 1980s. He is enjoying his classes,

especially MSE 201 (Phases and Phase Relations) and said his favorite place to study is on the second floor of Grainger Library. After graduation, he plans to attend law school and become a patent attorney. "When I am, hopefully, successful one day, I will give back to the school that has given me so much," Katz said.

Scott Navel has held the G. Ronald and Margaret H. Morris Scholarship for the past and current academic year. He is a senior from Mattoon, IL. He said his favorite MatSE class is MSE 452 (Polymers Lab) because the students get to examine topics which are applicable to real-world materials engineering situations. Navel is the president of the U of I chapter of Material Advantage, a student organization under AIST, ASM, ACerS, and TMS. He plans on going into industry and has received an offer from Boeing, where he worked last summer. Scholarships have helped ease his burden of paying for college. "I personally will have to pay off many school loans after graduation," Navel said, "and it is nice to be able to focus on my studies instead of worrying about my financial situation."

Ron and Peg Morris visited with Scott and his mother at the departmental awards banquet in April. "We are extremely proud that we can be involved with the education of such a promising MatSE student," Ron said. "We have invited Scott to contact us at any time to discuss issues that he would like our input or support."

In 2000 the couple endowed a professorship in the MatSE Department, the G. Ronald and Margaret H. Morris Professorship currently held by Ken Schweizer. Ron is a member of the MatSE Department's Senior Advisory Committee and has received distinguished alumni awards from the department and the College of Engineering at the University of Illinois.



Ron and Peg Morris with Scott Navel, one of their scholarship recipients.



Richard Friedberg and the Arthur L. Friedberg Award recipients, Sarah Teece and Jonathan Naber. Richard is the son of Art Friedberg, former professor and head of the Ceramics Department. Sarah and Jonathan graduated in May. Sarah is employed with Texas Instruments. Jonathan is working at the nonprofit he founded, Illini Prosthetics Technologies (IPT), and plans to attend Harvard Business School.



The Norman L. Peterson Scholarship recipients, Curtis Peterson and Erick Yu, with Mary DeBoer, who established the scholarship in her husband's memory. Curtis is a senior from Wheaton, IL, in the metals area of concentration. After graduation, he plans to go into industry. Erick is a senior from Libertyville, IL, in the polymers area. He plans to attend graduate school for his Ph.D.

A big Thank You

The student awards highlighted in this issue would not be possible without your support.

Gifts to the MatSE Department provide scholarships for outstanding and in-need students, allow us to continuously improve the quality of our instructional laboratories, and support special events featured in this issue such as our back-to-school picnic and annual awards banquet. Alumni gifts also support travel by undergraduate researchers to attend professional conferences and enable us to provide beneficial services such as our job placement program.

This list of donors includes alumni and friends who have helped maintain MatSE's outstanding reputation. Included are individuals who have directed their gifts to MatSE between July 1, 2010, and June 30, 2011. We check the list carefully, but if we have overlooked you, please contact us so that we can correct our records. Individuals listed in **boldface** are first-time donors to MatSE.

Some MatSE alumni choose to support other units of the University of Illinois; those gifts are not listed here but will be acknowledged by those units. Gifts to "Engineering at Illinois" are directed to the College of Engineering, not the MatSE Department. If you wish to direct gifts to MatSE, please indicate MatSE on your check and on the donor form. You can donate online at www.matse.illinois.edu/support or use the form included in this newsletter.

For further information about making a gift, contact Allison Winter, awinter@illinois.edu, (217) 244-8307.

Thank you for your support of MatSE!

Patrons - \$1,000 or more

Gerson Bilow (BS Met '65, MS Met '67)
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Ian and Victoria Robertson
Paul Russell (MS Cer '91)
David (BS Met '90, PhD Met '96) and Heather Teter
Britt Turkot (BS Met '90, MS Met '92, PhD MatSE '96)
David Wilcox Sr. (MS Cer '59, PhD Cer '61)

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“Your support means a lot”



“The support I have received for my academic achievement from alumni is appreciated more than they can know. It is wonderful to know that such successful alumni recognize the work I'm doing and their success and support inspires me every day in my studies.”

Karen Lamb,
Gerson B. Bilow Scholar



“I am incredibly grateful to the sponsors of my scholarship—working abroad in London has given me the experience I need to succeed anywhere my career might take me.”

Colin Stewart,
**Cullen W. Parmelee International
Research Scholar**

Teachers become students at Materials Camp

The MatSE Department hosted a week-long ASM Materials Camp for Teachers this summer on the University of Illinois campus. At the camp, 16 middle and high school teachers learned how to incorporate low-cost or no-cost materials science and engineering experiments into their curriculum. The camp is free of charge to teachers, who as an added bonus may earn CEU or graduate credit for their participation. The teachers gave the camp high marks. "The camp experience increased my enthusiasm for the teaching of the physical sciences," said one teacher. "The instructors were well versed in their craft and were patient with teachers who were tentative in utilizing labs with fire involved. They also helped the teachers to see ways in which the material presented may be utilized in the various disciplines of teaching science." Another teacher said, "This experience has given me confidence as a science teacher to try new things." For information on next year's camp, go to <http://www.matse.illinois.edu/teacherscamp.html>.



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Department News



Allison Winter

Allison Winter joined the MatSE Department in July as Assistant Director of Development. Her responsibilities include the MatSE Department as well as support for other College of Engineering initiatives. Allison previously worked for Human Kinetics Publishing as the Southeast sales manager for the Science, Technical and Medical Department. She is a 2003 graduate of the University of Illinois.

Ian Robertson and Petros Sofronis, Mechanical Science and Engineering, have received the 2011 Delivery Team Award from the U.S. Department of Energy's Hydrogen and Fuel Cells Program.

Nancy Sottos has received two awards from the Society for Experimental Mechanics. The 2011 Frocht Award recognizes Sottos as the Experimental Mechanics Educator of the Year. The 2011 Lazan Award recognizes Nancy's distinguished technical contributions to the field of experimental mechanics.

Jianjun Cheng was promoted to associate professor.

Joshua Kacher (MSE 307), **Hailong Ning** (MSE 307), and **Xuan Zhang** (MSE 401) were selected as Racheff Teaching Fellows for Fall 2011.

Joseph Yasi, a Ph.D. student in Dallas Trinkle's group, received an Acta Student Award, worth \$2,000, for his paper "First-principles data for solid-solution strengthening of magnesium: From geometry and chemistry to properties." The award was presented at the MS&T'11 conference in Columbus, OH.

Rachel Garrick, junior in MatSE, won the J. Keith Brimacombe Presidential Scholarship, worth \$5,000, from TMS. TMS will pay for Rachel to attend the TMS 2012 Annual Meeting & Exhibition in Orlando, FL, March 11-15, where the award will be presented. She also received one of three ASM Materials Education Foundation Outstanding Scholar Awards worth \$2,000. ASM paid for her expenses to attend the MS&T'11 conference where the award was presented.

Jason Febery, senior in MatSE, won more than \$15,000 in cash and in-kind prizes at the 2011 Cozad New Venture Competition. Since the start of this year, he has been working with Zachary Tratar (junior in Computer Engineering) to build an exciting new start-up, Contendable, which is a centralized website for universities and companies to manage competitions and crowdsource innovation. Their efforts were rewarded with the following prizes: Most Fundable Venture (tie), Best Venture Pitch, Illinois Technology Association Incubator Prize, Singleton Law Firm prize, and the Enterprise Works Incubator Prize.



Zachary Tratar and Jason Febery
at the Cozad New Venture Competition

Field Trip

On October 28, students in Prof. Pascal Bellon's MSE 443 course (Design of Engineering Alloys) went on a field trip to Olin Brass, in East Alton, IL. Recent graduate Sam Waldo (BS MatSE '08) organized the tour. The class visited a Cu alloy casting facility and a brass mill.



MatSE undergrads excel at MS&T'11



Student Speaking Contest

Parul Koul, a junior, won the Student Speaking Contest for her talk "Hex Mesh Degradation Investigation." She competed against 17 contestants from universities across the country. As the first place winner, Koul was awarded \$200 as well as a \$300 travel grant. Her talk was based on a project she worked on at her internship last summer with Chevron in Richmond, CA. "My talk was about the degradation of hex mesh which is an abrasion-resistance protective lining used in oil refineries," Koul said. "The degradation has been seen industry-wide and the lost profit opportunity is worth at least \$400,000/day." She combined the classical thermodynamic theories from her studies at the University of Illinois, laboratory data from the investigation, and fundamental corrosion knowledge to come up with a proposed mechanism. Koul's recommendations are being incorporated into the Chevron FCC best practice in order to provide immediate solutions for Chevron refineries.

Keramos

The University of Illinois chapter of Keramos won the Most Improved Chapter Award at MS&T'11. The chapter won the award for emphasizing professional development and promoting bonding between fellow members. Keramos has added a professional chair to the executive board and sponsored career workshops and alumni luncheons. Last year Keramos started a successful mentoring program for freshmen and upperclassmen. Thanks in part to these new initiatives, Keramos has seen an increase in its membership. The University of Illinois chapter of Keramos tied with the Missouri University of Science and Technology for the Diamond Award for exceptional achievement.

Mug Drop Competition

The University of Illinois mugs wouldn't win a beauty contest, but the mugs, made of geopolymer, performed well at the annual ACerS mug drop competition at the MS&T conference. According to Professor Trudy Kriven, geopolymer is a ceramic material because the definition of a ceramic is "a refractory inorganic material." Geopolymer is an oxide, aluminum silicate. The only difference between other aluminum silicate ceramics and glass is the firing process. "This time they made us fire it so we fired it at 300 C, and the performance was a little less," said Kriven. "The first time we made a geopolymer mug, in 2005, we dropped it from the 5th floor of the Baltimore Marriott hotel and it kept bouncing." Unfortunately, this year's geopolymer mugs were disqualified, because the University of Illinois students made the mug's handle of fiber instead of encasing the handle in ceramic material.



The mugs were dropped from various heights during the competition.



The geopolymer mugs from the University of Illinois are the three mugs from the right on the front row.

Alumni event in Ohio

Alumni, faculty, and students gathered on October 17 for the University of Illinois reception hosted by the MatSE Department. Over 50 people attended the reception, which was held in conjunction with the MS&T conference in Columbus, OH.



Bob (BS Met '59) and Karen (BS Recreation '58) Luetje visit with Lissa May Mudrick (at center). Lissa, a Director of Development with the Foundation, represents the Urbana-Champaign campus and travels in a five-state region which includes Ohio. The Luetje Scholar for 2011-2012 is Jason Febery, who is featured on page 12.



Prof. Trudy Kriven, Kevin Anderson (BS Met '86, MS Met '87, PhD Met '90), Mike and Donna Rigsbee



Department Head David Cahill, Beth Opila (BS Cer '81), and Jeff Ferguson (BS Met '85)



Brian Stack (BS Met '74) visits with Bob Shull (MS Met '73, PhD Met '85).

Materials Science and Engineering Student Scholarships and Awards 2011-2012

A. I. Andrews Scholars

Hsuan An Pao
Wen Yang

Paul A. Beck Scholar

Sarut Chayanupatkul

Harry J. Beckemeyer Jr. Scholar

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Louis R. Berner Scholars

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Frederick Brinlee
Andrew Nelson

Gerson B. Bilow Scholar

Karen Lamb

Robert Bohl Scholars

Natalie Broadhurst
Christopher Johnson
Mason Walgrave
David Wente
Thomas Williams
Yiran Xiao

Otto Sr. and Mildred Capek Scholar

Spencer Wells

Caterpillar Scholars

Eugene Cho
Erich Diesel
John Glauber

Earl J. Eckel Scholars

Gavin Campbell
Michael Campion

M. Laird and Charisann Froberg Scholars

David Bruk
Yu-Ting Hsu

Phillip H. Geil Scholar

Zachary Dahl

Henry E. Grein Jr. Scholar

Anthony Griffin

Joseph and Wyvona Lane Scholar

Justin Hesterberg

Robert E. and Karen Martin Luetje Scholar

Jason Febery

Kevin Moore Memorial Scholar

Jonathan Morales

G. Ronald and Margaret H. Morris Scholar

Scott Navel

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Michael Katz

Jim Nelson Memorial Scholar

Rico Sebastian

Cullen W. Parmelee Scholars

Dominic Bonucci
Luke Shi
Ryan Smith
Jonathan Streufert
Bo Er Tew

Cullen W. Parmelee International Research Scholars

Maninpat Naviroj
Colin Stewart
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Eric Anderson

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Kyle Lamson
Sam Martin
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Lucille and Charles Wert Scholars

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Michael Collins
Aaron Dahlke
Jacob Gruber
David Jung
Samantha Kane

Jaime Kelleher
Parul Koul
Gregory Kutyla
Andrew Lee
Eric Lui
Andrew Mannix
Johnathan Michel
Kelly Nygren
Taegon Oh
Lingxuan Peng
Congshan Wan
Jared Weiss

Alfred W. Allen Awards

Dominic Bonucci
Brian Choragwicki
Yu-Ting Hsu
Jingtian Hu
Aibar Nurmukhanov
Rico Sebastian
Luke Shi
Aik Jun Tan
Teng-Sing Wei

Arthur L. Friedberg Awards

Jonathan Naber
Sarah Treece

Laird Froberg Award

Sibu Kuruvilla

Materials Science and Engineering Alumni Board Award

Yost Smith

Sheryl Blair Tipton Award

Arielle Gross

Class Notes



Robert Wells

Robert Wells (BS Met '55) visited the University of Illinois in July and took a tour of the undergraduate laboratories. This was his first trip back to campus in 25 years. Wells is retired from Northrup Grumman Corporation, where he was a manager in the B-2 program. He resides near Sun City, AZ.

Suresh Sachdev (MS Cer '80) is Senior Director-Sourcing in the Worldwide Operations Group at Xilinx in San Jose, CA.

Tony Tagliavore (BS Cer '84) is the North American Sales Manager for Cerobear in Colorado Springs, CO. He and his girlfriend, Leilani, are planning a May 2012 wedding.

Paul Fons (PhD Met '90) is a senior research scientist and research group leader at the Japan Synchrotron Radiation Research Institute. He specializes in materials characterization, in particular structural studies and use techniques to probe both long-range (diffraction) and short-range (EXAFS) order in materials among other techniques. One current research focus is to understand phase changes in optical recording media, particularly in near-field optics-based recording media. Another focus is to look at how atomic structure (local atom arrangements) changes on the tens-of-picoseconds time scale using synchrotron sources. Fons is fluent in Japanese and one of the first permanent staff members of one of the largest Japanese national laboratories.

Charles Lakeman (MS Cer '91, PhD MatSE '94) is business development manager for AREVA Renewables in Bethesda, MD.

JJ Strahle (BS Cer '93) is Director of Operations at EoPlex in California.

Chris Schuh (BS MatSE '97) was named head of the Department of Materials Science and Engineering at MIT. He is the Danae and Vasilios Salapatas Professor of Metallurgy and a MacVicar Faculty Fellow. His current research focuses on experiments, analytical theory and computer simulations that explore the processing-structure-property relationships in structural metals.

Abby Ebbing (BS MatSE '01) married Matt Klarner in

August 2010 in Greenville, WI. She is the Quality Systems and Process Improvement Manager at Presto Products Company, and her husband is a middle school math teacher and high school Varsity boys basketball coach.

Kristen Holverson (BS MatSE '01) married Matt Tutlis in October 2011 in Vermont. She is employed at IBM.

Mark and Grete (Savage) Veliz (both BS MatSE '02) welcomed their fourth child, a son, Adam, on March 1, 2011. The family also includes three daughters, Maria (age 5), Norah (age 4) and Elena (age 2). Mark is a Senior Engineer with Caterpillar, Inc. in Peoria, IL.

Adam Stevenson (BS MatSE '03) graduated from Penn State University with a PhD in MatSE in December 2010 and took a postdoc position in Paris. He is now a Research Engineer for Saint Gobain CREE at the Laboratoire de Synthèse et Fonctionnalisation des Céramiques (LSFC) in Provence, France.

Qi Li (MS MatSE '05, PhD MatSE '07) is currently working in the Institute of Metal Research, Chinese Academy of Sciences.

Meena Banasiak (BS MatSE '06) and her husband, Joe, welcomed the birth of their first child, a girl, Sarra Margaret on August 14, 2011. Sarra weighed 6 lbs., 8 oz. and was 20.5 inches long. Banasiak is working at General Mills as a Senior Quality Engineer in their Belvidere, IL, manufacturing facility. Her husband is a Senior Antenna Engineer with Motorola Mobility.

Kate Jakubas (BS MatSE '06) is a regulatory specialist for SRAM Corporation in Chicago. She is also working towards her master's degree in environmental engineering.

Kristina Bond (BS MatSE '08, MS MatSE '09) married Ryan Galis on April 30, 2011. She is an engineer at Baxter Healthcare in Round Lake, IL. Her husband is a 2008 graduate of the UIUC Institute of Aviation and is currently flying as a First Officer for American Eagle Airlines. The couple resides in Palatine, IL. Kristina is the daughter of Tom (BS Met '77, MS Met '78) and Lynn (Industrial Engr. BS '77, MS '78).



Elena, Maria, Adam, and Norah Veliz



Meena, Joe, and Sarra Banasiak



Kristina and Ryan Galis

Campus visit brings back memories

Tom Read and his family dropped by campus on August 31 to look at the plaque on the first floor of the Materials Science and Engineering Building which honors Tom's father, Thomas A. Read. Thomas A. Read was Head of the Department of Mining and Metallurgy at Illinois from 1954 until his premature death in 1966. Several years later, the department established the Thomas A. Read annual lecture and commissioned a memorial plaque. Tom has been living on the west coast since the 1960's and this was his first trip back to campus. His daughter and her family live in Chicago, so he and his wife, Rosemary, joined them on a day trip to Urbana-Champaign. They also visited the house where Tom grew up and University Laboratory High School where he was a student.



Tom and Rosemary Read with their daughter, Sarah; son-in-law, Richard Coffey; and granddaughter, Jane Coffey-Read.



With members of the newly inaugurated nano-laboratory at the Baku State University: Aynoor Amrahova (graduate student), Dr. Guncha Khanum, Ismat Shah, and Prof. Mustafa Muradov

Alumnus receives Fulbright

Ismat Shah (PhD Met '86) has received a 2011-12 Fulbright Scholar grant to conduct research and lecture at Baku State University in the Republic of Azerbaijan. Shah's research focuses on the synthesis and characterization of nanoscale materials, with a particular focus on energy applications. His expertise in thin-film photovoltaics is of special interest to scientists in Baku State University's Nano Center because solar power has not been utilized in Eastern Europe as in the United States. In addition to research with his colleagues at Baku State University, Shah will advise graduate students and teach courses on thin film and nanomaterials processes and the ethics and social implications of nanoscale materials. He is working with the U.S. Embassy in Azerbaijan to coordinate community speaking engagements with local high school and college students, and plans to lecture at universities in the region. Shah has also received a grant from the State Department and plans to establish an organic solar cell research laboratory at a university in Pakistan before returning to the United States.

Ismat Shah is a professor at the University of Delaware with joint appointments in the Department of Materials Science and Engineering and the Department of Physics and Astronomy. He joined the Delaware faculty in 1999 after 12 years as a senior staff scientist with DuPont. Shah received the University of Delaware's highest teaching award, the Excellence in Teaching Award in 2011. He has taught at universities across the globe in Germany, Italy, Greece, Turkey, Spain, France and Taiwan.

Japanese volunteer corps to help with nuclear crisis

Our generation who has, consciously or unconsciously, approved the construction of the Fukushima nuclear power plants and enjoyed the benefits of the vast supply of electricity generated, in particular those of us who hailed the slogan that "Nuclear Power is Safe" should be the first to join the Skilled Veteran Corps to install or repair the cooling system. This is the duty of our generation to the next generation and the one thereafter.

- SVC web site
<http://svcf.jp/english>

"The crisis was caused by human error, and the mess created by scientists and engineers should be cleared up by scientists and engineers themselves."

After the devastating earthquake and tsunami struck Japan, Nobuhiro Shiotani (MS Met '66) and his friend Yasuteru Yamada decided to take action. Shiotani, a retired scientist, and Yamada, a retired plant engineer, laid the foundation for a volunteer corps to help control the damage at the Fukushima Daiichi nuclear power plant. The Skilled Veterans Corps (SVC) which they founded consists of volunteers of veteran technicians and engineers who have the skills needed, and because of their advanced age, are at less risk of getting cancer and other diseases that develop as a result of exposure to high levels of radiation.

On July 13, the Tokyo Electric Power Company (Tepco) allowed five delegates of the SVC, including Nobuhiro Shiotani, to visit the crippled nuclear power plant site. "To my sadness," Shiotani said, "at the central operation building I saw too many young and middle-aged workers going out and coming in." One of the objectives of the SVC is to spare them from being exposed to radiation.

Japan's state-run insurance plans do not cover volunteers, and private plans do not cover radiation risks. This made Japan's government and the Tepco reluctant to

permit the SVC to assist at the power plant. In response, the SVC became a registered corporation and can now cover its members with worker's accident compensation insurance or industrial injury insurance.

"The SVC has also established a health care plan for its members, and a legal section, although small," said Shiotani, "and a section of safety control for our members, all of which are required by the law." The SVC is now trying to become a registered public corporation, the status of which is higher than the present one.

Even with the SVC's change in legal status, the Tepco was still unwilling to accept the SVC's offer to work at the nuclear reactor site. In August, the SVC proposed to the government to take over the task of radiation monitoring in areas within a radius of 20km from the crippled reactors. These areas have been evacuated because of heavy radioactive contamination since the accident. The task had been carried out by the Tepco's workers once a week.

One of the government agencies periodically provides training for radiation measurements on the site and has now authorized SRC members to participate in the training. Shiotani is in charge of organizing the SVC radiation monitoring team and sends team members to training to refresh their knowledge and expertise. "The purpose is for the SVC to be recognized as an 'established' institution by our government and the Tepco," he said. "I just hope our government will hire us for the radiation monitoring in the areas within a radius of 20km from the crippled reactors sometime soon."

In Memoriam

John Sass (BS Met '40)

John Sass died June 4, 2011, in Tawas, MI. He was a World War II veteran, having served in North Africa, Sicily and Italy as a Captain with the 5th Army Engineers. He married Jean Fitzgerald on May 2, 1942. She died in 1964. On February 12, 1968, he married Maxine Wilkins, who passed away in 1997. He worked at U.S. Gypsum, Anderson Coach, and Bopp-Busch Manufacturing before retiring at age 70. He was a member and usher at St. Joseph Catholic Church, president of the local Investment Club, a longtime member and president of the Lion's Club, member and leader of several other local civic associations and an avid member of local golf leagues. He and Maxine lived part-time in Bradenton, FL, from 1987 until 1997 when he moved there fulltime. In Florida, he played and taught bridge and continued his love of golf and investing. He returned to Tawas in October 2010. Survivors include seven children and many grandchildren and great-grandchildren.

Stan Paprocki (BS Met '46, MS Met '48)

Stan Paprocki died July 14, 2011. He served in the USAAF, 8th Air Force, and was held as a POW in Malmo, Sweden, towards the end of the war. In 1947, he began work with Battelle Memorial Institute as a Development Engineer and during the following years served as a Division Chief, Associate Manager, and Manager of the Materials Engineering Department. From 1971 to 1974 he was an Associate Director of the Battelle Columbus Laboratories. He retired in 1974 and assumed the presidency of Material Concepts, Inc., a pioneer company in the research, development, and production of metal composites. In January 1989, he retired from Material Concepts and began private consulting. He authored over 60 papers and reports concerning materials technology and was a member of the American Society for Metals, American Nuclear Society, American Institute of Aeronautics and Aerospace, and the Society for the Advancement of Material and Process Engineering. He served as Chairman of the AIAA Technical Committee for Materials and as Chairman of the Materials Division of the American Nuclear Society. He is survived by his wife, Carole; son, Paul; and grandchildren.

Donald Rassner (BS Cer '49)

Donald Rassner died on May 28, 2011, in Madison, MS. Rassner served in the United States Air Force as a navigator on B-17 aircraft during World War II, making 53 missions over North Africa, Italy, and Sicily. After returning to the United States from his overseas assignment, he was sent to Cuba to train navigators for B-29 missions. He retired from the USAF Reserve as a Major after 21 years of service. Rassner was a member of Parkway Hills United Methodist Church where he actively participated until his health prevented it. He could be found every Saturday morning at the Walter Scott Coffee Club, and was also a member of the Retired Officers' Association and the Military Officers' Association of America. He was a talented pianist, and frequently entertained friends and family with his musical renditions of old favorites. He is survived by his beloved wife of almost 66 years, Helen; daughter, Kathryn; and two grandchildren.

Roger Arnold (BS Cer '55)

Roger Arnold died on September 16, 2011, in Oberlin, OH. He served as a Lieutenant in the U.S. Army. He worked as a Ceramic Engineer for General Electric for 25 years. He enjoyed barbershop singing, which took him on tours of Russia and China. He loved being surrounded by his family and friends. He was an avid baseball fan, in particular the Chicago Cubs, and was always up for a card game. He was a member of the Cameron United Methodist Church. He is survived by his former wife, Alice, and his five children and 13 grandchildren.

William Robinson (PhD Met '66)

Bill Robinson, a pioneer of earthquake protection technology, died in Christchurch, New Zealand, on August 17, 2011. In the 1970s Robinson developed lead rubber bearing technology which can be incorporated into a building's foundation to dampen the force of earthquake movement. Robinson's son Michael, who lives in Christchurch, said his father was a great family man and a lot of fun. "He was very adventurous and travelled the world giving lectures about his work," he said. Robinson joined the Physics and Engineering Laboratory (PEL) of the Department of Scientific and Industrial Research (DSIR) in 1967 with a PhD in metallurgy from the University of Illinois. During his time at PEL he developed experimental techniques using ultrasonics in solid state physics, initiated a research program in the Antarctic on sea ice and invented devices to reduce the damage to structures during earthquakes. In 1985 he was appointed director of PEL and in 1995 he founded Penguin Engineering Ltd (later changed to Robinson Seismic) to commercialize his inventions. He was awarded many honors, including the Rutherford Medal for Technology, the Michaelus Medal, an honorary DSc, a Fellowship of the NZ Royal Society and the NZ Royal Society's Gold Medal for Technology. In 2007 he was appointed Companion of the Queen's Service Order for services to engineering. Robinson is survived by his wife Barbara; sons, Eric and Michael; and daughter, Sian.

Robert Spor (MS Met '67)

Robert Spor died February 22, 2011, in Decatur, AL. He retired as an engineering manager and steel industry executive. He was a loving family man, cyclist, music enthusiast, and enjoyed drawing, painting, and travel. He is survived by his wife of 43 years, Mary; two daughters, Elizabeth and Susan; and four grandchildren.

Robert Scherer (BS Cer '74)

Robert Scherer died July 22, 2011, after a four year battle with brain cancer. He began his career with PPG, followed by Pfaulder. He worked for Parker Hannifin Hydraulic Valve Division in Elyria for 24 years. He enjoyed coaching soccer and was the Junior Achievement Volunteer of the Year in 2006. He was a member of St. Jude Catholic Church. His greatest achievement was the integral role he played as husband and father. His loving influence shaped his children's character, while his gentle guidance served to ensure their success. He is survived by his wife Barbara; sons, Robert and Thomas; and daughters, Katherine and Mary.

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Back to School

Spencer Wells, Marek Mroczek, Alicia Cintora, and Jacob Gruber enjoy free food at the MatSE undergraduate picnic on August 30. The event was held under a tent in behind Engineering Hall.

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