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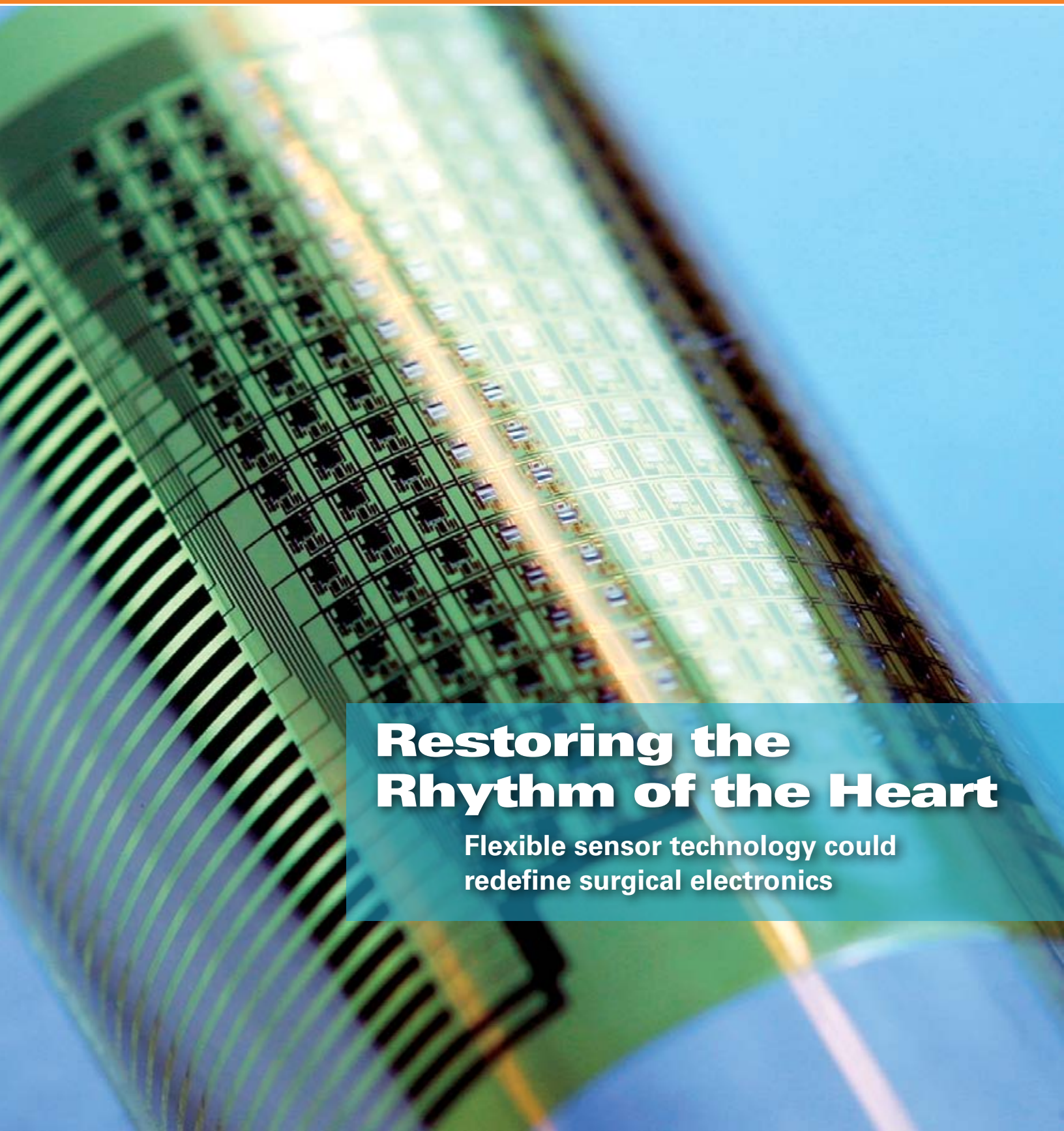
Department of Materials Science and Engineering **News**

University of Illinois at Urbana-Champaign | Winter 2010



Restoring the Rhythm of the Heart

Flexible sensor technology could redefine surgical electronics

Cahill Named Department Head

David Cahill became the new head of the Department of Materials Science and Engineering on August 16, 2010. Cahill is no stranger to MatSE, having been a faculty member in the department for almost 20 years. Cahill received his B.S. in engineering physics in 1984 from the Ohio State University and his Ph.D. in experimental condensed matter physics from Cornell University in 1989. His Ph.D. work concerned lattice vibrations of disordered solids. Before joining the faculty at the University of Illinois in 1991, he worked as a post-doctoral research associate at IBM Watson Research Center, where he conducted research on metal-semiconductor interfaces and scanning tunneling microscopy.

Cahill's research program focuses on developing a microscopic understanding of thermal transport at the nanoscale; the development of new methods of materials processing and analysis using ultrafast optical techniques; and advancing fundamental understanding of interfaces between materials and water. Thermal management is a critical issue in a variety of applications, from state-of-the-art microprocessors to turbine engines. Cahill's group studies the basic science of thermal transport in materials, and they have developed powerful methods of characterizing nanoscale thermo-physical properties using ultrafast laser metrology. Ultrafast optical spectroscopies also are used to determine the rate at which energy is exchanged between various elementary excitations in a solid and to study fundamental limits for the rates of phase transformations. Cahill's group is developing novel methods for probing the thermodynamics of material interfaces with water. A highly sensitive optical probe of surface curvature provides data on the changes in polymer thin film stress produced by changes in the composition of aqueous suspensions. Rutherford backscattering spectroscopy is used to measure the partitioning of inorganic ions in commercial RO and nanofiltration membranes.

Cahill has published nearly 170 papers and has delivered more than 100 invited presentations. His research has been recognized by the Peter Mark Memorial Award of the AVS in 1998, the Xerox Award for Faculty Research in 2000, the University Scholar from the University of Illinois in 2000, the Willett Faculty Scholar Award from the College of Engineering in 2002, fellowship status in the AVS in 1998 and APS in 2005, and the Donald B. Willett Professor of Engineering in 2005. He serves on the editorial boards of *Nanoscale Thermophysical Engineering* and *Review of Scientific Instruments*.

Greetings from Urbana

My experiences so far as the head of the Department of Materials Science and Engineering have given me a new perspective and appreciation of the strengths of our department. Working with our dedicated staff has been a pleasure, and I have met many amazingly accomplished and supportive alumni. I have learned just how highly valued our degree programs are to both our students and employers. With more than 300 students enrolled in the B.S. program, we are the largest, and—I think many will agree—the best undergraduate materials program in the country.

We are placing renewed emphasis on equipping and modernizing our undergraduate laboratories and are working to improve the significance and quality of the senior design class. Soon, we will add a modern low-vacuum "table-top" scanning electron microscope to the Kiln House that will be available to students enrolled in the design course and all of the senior year laboratories. The motivation for this new instrument—and many of the new experiments we implemented last academic year in the junior laboratory—is to provide a more hands-on learning environment and to give students freedom to explore. The purchase of the electron microscope was predominately supported by donations from alumni.

Our department has incredible strengths, but I must also acknowledge one of the challenges we face. The decline in state support of the University has resulted in rapid increases in tuition; freshmen entering an engineering program in 2011 face nearly $19,000 in tuition, surcharges, and fees. Faculty are committed to ensuring the high value of the education that we provide, but rising costs are threatening to disrupt the long tradition of top-tier land-grant universities as a mechanism for upward mobility. Due to the generosity of donors, we currently provide $130,000 per year in scholarships and awards to undergraduate students. I hope that our department can do even more in the future to ensure that our program remains accessible to everyone with the drive to succeed.

Research universities are built on the idea that great teaching and research go hand-in-hand. Please join me in congratulating Assistant Professor Jianjun (JJ) Cheng, who recently achieved the academic equivalent of a double-double: he received the Director's New Innovator Award from the National Institutes of Health and has been on the University's list of "Teachers ranked as excellent by their students" for five consecutive semesters.

Sincerely,
David Cahill
Willett Professor and Head

MatSE undergraduates Jonathan Naber and Hari Vigneswaran enjoy some time with a young patient at the clinic in Guatemala.

Illini Prosthetics Team Tests Prototypes in Guatemala

The following is an interview with Jonathan Naber, a senior in MatSE, who was featured in the summer 2010 MatSE News *for winning the $30,000 Lemelson-MIT Illinois Student Prize. Naber and members of his Illini Prosthetics Team (IPT) traveled to Guatemala this summer to field test their prosthetic arm prototypes.*

Tell us about your experience in Guatemala. How did your prototypes work out?

IPT's trip to Guatemala was an amazing experience—the culmination of months of product development and production. We worked in partnership with a non-governmental organization, the Range of Motion Project (ROMP), which operates a clinic based in Zacapa, Guatemala, and provides prosthetic arms and legs to amputees throughout Central America. This organization was founded by a University of Illinois alumnus, David Krupa.

During our time at the clinic we interacted with seven different patients, ranging from a seven year-old girl who had lost her arm in a vehicular accident to a forty-three year-old man who lost his arm in a machete attack. Each patient was intensively interviewed using a patient interview that IPT had developed, and we tested the three different "concept arms" which we had developed over the months preceding our trip. We observed many things about each prototype, many of which we hope to incorporate into our future design. Particularly powerful moments included watching a bilateral (double) amputee write his name with a marker and another amputee tie his shoelace, both using the prosthetic arms we had developed.

What were some of the reactions to your prototype?

The amputees we worked with were very intrigued by the hope of a new technology that could improve their quality of life. All of our patients were extremely willing to work with us and try the new solutions we were proposing. Their feedback was collected in great detail, and some even made suggestions, both of which we are taking into serious consideration for future designs.

What did you learn that you wouldn't have known if you hadn't gone to Guatemala to do the field test?

Our testing in Guatemala was necessary to understand the amputee of the developing world, who lives a fundamentally different life than the amputee of a developed nation. This is where our detailed survey of each of our seven patients came into play, and will have a strong effect on the future designs we create. Additionally, it was very important for us to evaluate the design of the prototypes in the country specific to the amputees—testing in the United States does not tell us enough about how the prototype will be received by amputees in Central America.

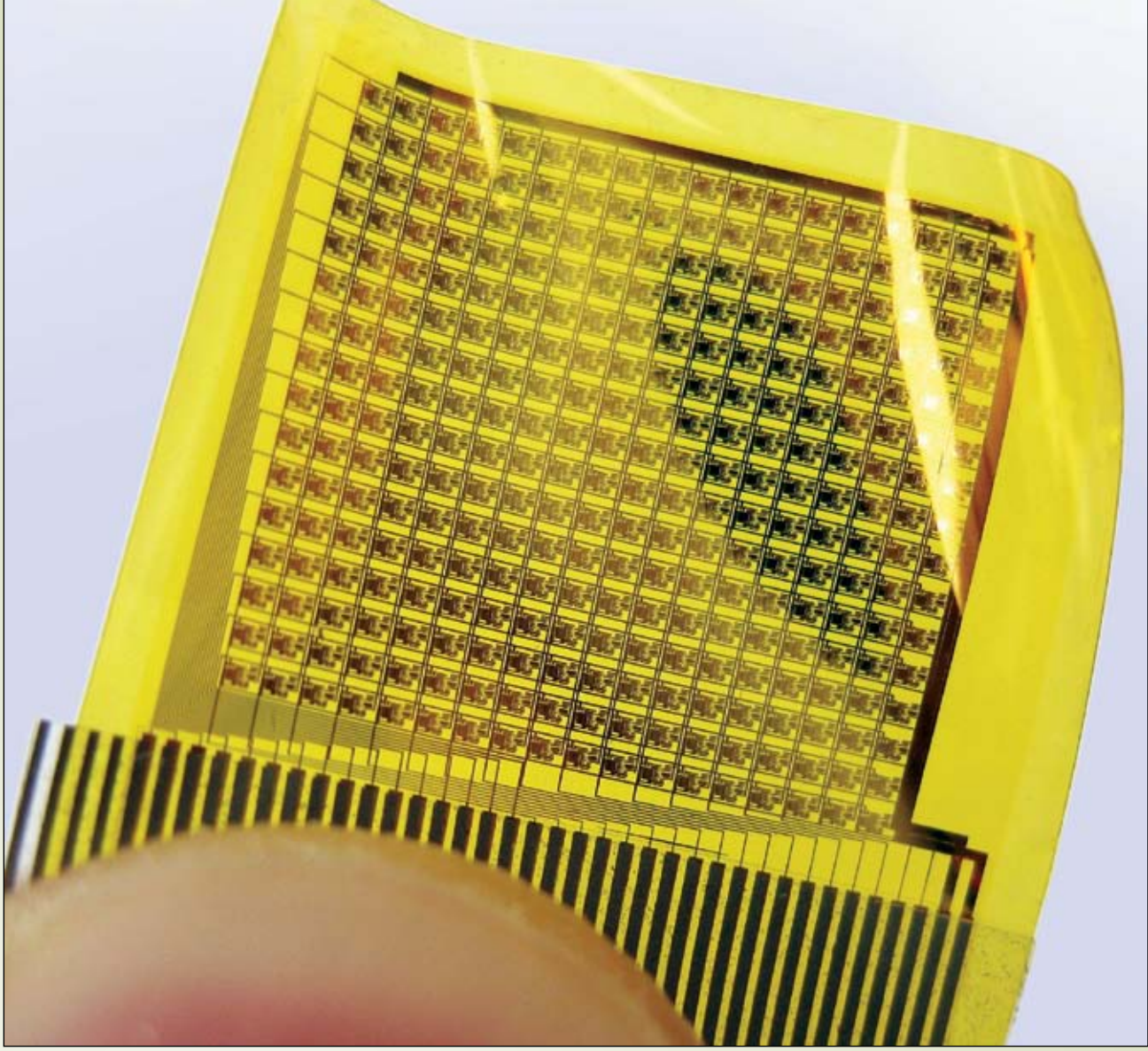
What are some things that IPT is working on right now?

IPT is extremely busy balancing the product development and business workstreams of our organization. From the product development angle, we are currently concluding the analysis of our first iteration of product development and writing a Report of Lessons Learned as a mechanism for conducting this analysis. We are also beginning the second iteration of product development, which will likely culminate in domestic testing sometime next semester. From the business development angle, we have now become a non-profit organization and a charitable organization, and we are working to obtain 501(c)(3) status. IPT is also raising funds, writing grants, and formalizing our partnership with ROMP.

Are there plans to return to Guatemala or go to another country to field test?

We are anticipating another field test in Guatemala within the next year to follow up with the volunteer patients with whom we worked this summer. Every iteration and field test, whether domestic or abroad, moves IPT closer to our vision of supplying the developing world with affordable prosthetic arms.

Flexible Electronics Could Put Off-beat Hearts Back on Rhythm



Thin sheet of waterproof, silicon-on-plastic electronics designed for in vivo mapping of cardiac electrophysiology.

Arrhythmic hearts soon may beat in time again, with minimal surgical invasion, thanks to flexible electronics technology developed by a team of University of Illinois researchers, in collaboration with the University of Pennsylvania School of Medicine and Northwestern University. These biocompatible silicon devices could mark the beginning of a new wave of surgical electronics.

Co-senior author John Rogers, the Lee J. Flory-Founder Chair in Engineering Innovation, and his team published their breakthrough in the March issue of *Science Translational Medicine.*

Several treatments are available for hearts that dance to their own tempo, ranging from pacemaker implants to cardiac ablation therapy, a process that selectively targets and destroys clusters of arrhythmic cells. Current techniques require multiple electrodes placed on the tissue in a time-consuming, point-by-point process to construct a patchwork cardiac map. In addition, the difficulty of connecting rigid, flat sensors to soft, curved tissue impedes the electrodes' ability to monitor and stimulate the heart.

Rogers and his team have built a flexible sensor array that can wrap around the heart to map large areas of tissue at once. The array contains 2,016 silicon nanomembrane transistors, each monitoring electricity coursing through a beating heart.

The Pennsylvania team demonstrated the transistor array on the beating hearts of live pigs, a common model for human hearts. They witnessed a high-resolution, real-time display of the pigs' pulsing cardiac tissues—something never before possible.

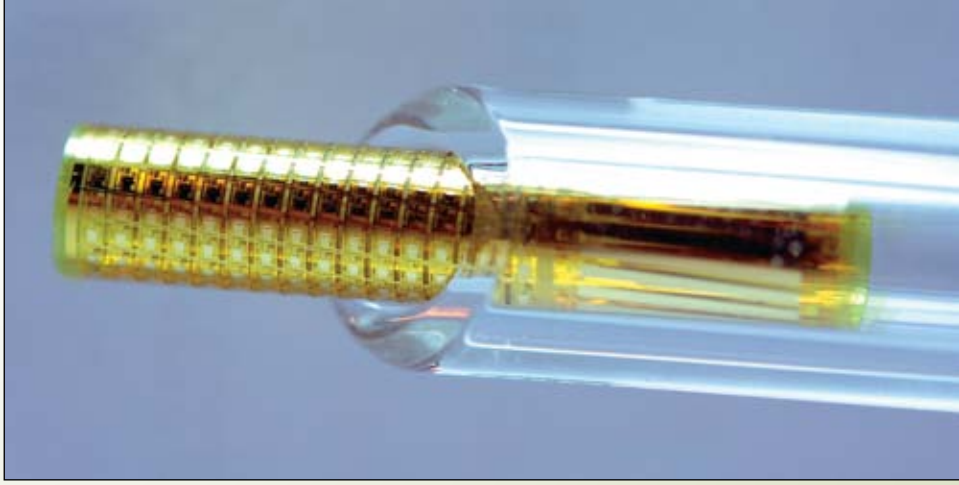
"We believe that this technology may herald a new generation of devices for localizing and treating abnormal heart rhythms," said co-senior author Brian Litt, of the University of Pennsylvania. "This allows us to apply the full power of silicon electronics directly to the tissue," said Rogers, a renowned researcher in the area of flexible, stretchable electronics. As the first class of flexible electronics that can directly integrate

with bodily tissues, "these approaches might have the potential to redefine design strategies for advanced surgical devices, implants, prosthetics, and more," he said.

The biocompatible circuits—the first ones unperturbed by immersion in the body's salty fluids—represent a culmination of seven years of flexible electronics study by Rogers' group. The researchers build circuits from ultrathin, single-crystal silicon on a flexible or stretchy substrate, like a sheet of plastic or rubber. The nanometer thinness of the silicon layer makes it possible to bend and fold the normally rigid semiconductor. "If you can create a circuit that's compliant and bendable, you can integrate it very effectively with soft surfaces in the body," such as the irregular, constantly moving curves of the heart, Rogers said.

Collaborations with a theoretical mechanics group at Northwestern University, led by Younggang Huang, yielded important insights into the designs.

The patchwork grid of cardiac sensors adheres to the moist surfaces of the heart on its own, with no need for probes or adhesives, and lifts off easily. The array of hundreds of sensors gives cardiac surgeons a more complete picture of the heart's electrical activity so they can quickly find and fix any short circuits. In fact, the cardiac device boasts the highest transistor resolution of any class of flexible electronics for non-display applications.



Flexible silicon integrated circuit wrapped into a tube, capable of insertion into the body as an advanced monitoring device.

The team's next step is to adapt the technology for use with non-invasive catheter procedures, Rogers said. The U of I and Pennsylvania teams also are exploring applications for the arrays in neuroscience, applying grids to brain surfaces to study conditions of unusual electrical activity, such as epilepsy. "It sets out a new design paradigm for interfacing electronics to the human body, with a multitude of possible applications in human health," Rogers said.

This work was supported by the U.S. Department of Energy, a National Security Science and Engineering Faculty Fellowship, the National Institutes of Health, and the Klingenstein Foundation.

– University of Illinois News Bureau

Cheng Recognized with NIH New Innovator Award

Jianjun Cheng has been chosen to receive the New Innovator Award from the National Institutes of Health (NIH). Cheng's winning proposal, "Developing Clinically Applicable, Cancer-Targeting Polymeric Nanoconjugates," aims to "develop a new paradigm of drug delivery nanomedicine with characteristics distinctly different from the current polymeric nanoparticles."

According to Cheng, current polymeric nanomedicine still relies on conventional conjugation or encapsulation for drug incorporation, which results in inevitable heterogeneity during nanomedicine formulation.

"The formulation heterogeneity in particle size, size distribution, drug distribution, and variation between batch-to-batch for the drug loading and incorporation efficiency creates tremendous problems for the clinical translations of these nanomedicine delivery vehicles and for utilizing nanomedicine for cancer targeting," Cheng explained. "We propose to study an unprecedented approach to bridge the gap between the control offered by modern polymerization chemistry and the lack of control of current nanomedicine formulation. More specifically, we aim to develop polymer-drug nanoconjugates that can target cancer cells precisely and deliver anticancer agents to kill these cancer cells."

Using various multifunctional chemotherapeutic agents as the model drugs, Cheng's research group has demonstrated that gram- or larger-scale, highly loaded nanoconjugates can be formulated with several hours. The simplicity for the preparation of large-scale nanoconjugates with controlled loading and release characteristics suggests its great potential for clinical translation. "To study the *in vivo* applicability of nanoconjugates, we aim to develop polylactide-docetaxel nanoconjugates with integrated aptamer ligand for the targeted treatment of the advanced prostate cancer," he added.

According to the NIH website, "The NIH Director's New Innovator Award addresses two important goals: stimulating highly innovative research and supporting promising new investigators. Many new investigators have exceptionally innovative research ideas, but not the preliminary data required to fare well in the traditional NIH peer review system. As part of NIH's commitment to increasing opportunities for new scientists, it has created the NIH Director's New Innovator Award to support exceptionally creative new investigators who propose highly innovative projects that have the potential for unusually high impact. This award complements ongoing efforts by NIH and its institutes and centers to fund new investigators through R01 grants and other mechanisms."

– Engineering Communications Office

Materials Science & Engineering Scholarships and Awards 2010–2011

Paul A. Beck Scholarship
Sarah Treece

Harry J. Beckemeyer, Jr. Scholar
Rachel Garrick

Clifton G. Bergeron Scholarships
Francis Yuen
Michael Campion

Louis R. Berner Scholarships
Lars Gunnar Bjaalie
Brian Choragwicki

Gerson B. Bilow Scholarship
Hari Vigneswaran

Robert Bohl Scholarships
Anthony Griffin
Siva Nalla
Andrew Nelson
Ehsan Noursalehi
Hsuan An Pao
Ryan Trumbo
Mason Walgrave

Otto Sr. and Mildred Capek Scholarship
Elliott Rill

Caterpillar Scholarships
Eugene Cho
John Glauber
Dylan Stradley

Earl J. Eckel Scholarships
Matthew Dejarld
Michael Campion

M. Laird and Charisann Froberg Scholarships
Colin Stewart
Jared Weiss

Phillip H. Geil Scholarship
Zachary Dahl

Joseph and Wyvona Lane Scholarship
Justin Hesterberg

Robert E. and Karen Martin Luetje Scholarship
John Sadlik

MatSE Industrial Scholarship
Jonathan Naber

Kevin Moore Memorial Scholarship
Jonathan Morales

G. Ronald and Margaret H. Morris Scholarship
Scott Navel

James A. Nelson Scholarship
Sam Martin

Cullen W. Parmelee Scholarships
Eric Anderson
Aleksander Bapst
Erich Diesel
Daniel Mosiman
Spencer Wells

Cullen W. Parmelee International Research Scholarships
Timothy Dunne
Sibu Kuruvilla
Yost Smith

Frederick A. Petersen Scholarship
Douglas Kelkhoff

Norman L. Peterson Scholarships
Matthew Callahan
Curtis Peterson

Larry D. and Carol Rakers Scholarships
David Broschka
Daniel Fairfield
Jonathan Michel

Lucille and Charles Wert Scholarships
Divija Alluri
Rudi Bredemeier
Frederick Brinlee
Natalie Broadhurst
Gavin Campbell
Aaron Dahlke
Jason Febery
Noah Gajda
David Jung
Jaime Kelleher
Andrew Lee
Kenneth Long
Linas Sulas
Suzanne Sullivan
Yiran Xiao
Erick Yu

Alfred W. Allen Awards
Eric Anderson
Aleksander Bapst
Jian Wei Cheng
Varistha Chobpattana
Erich Diesel
Jingtian Hu
Kang Jie Lim
Daniel Mosiman
Brett Wagoner
Spencer Wells

Arthur L. Friedberg Award
Donald To

Laird Froberg Award
Stephanie Miller

Sheryl Blair Tipton Award
Lisa Mazzocco

Materials Science and Engineering Alumni Board Award
Stephen Menke

Illinois Hosts ASM Materials Camp for Teachers

This year marked the fourth summer the MatSE Department at the University of Illinois has hosted the weeklong ASM Materials Camp for Teachers. At the camp, teachers learn 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. This year's participants included 12 middle and high school teachers from four states. On July 15, the teachers visited the Construction Engineering Research Laboratory (CERL) in Champaign. CERL is part of the U.S. Army Engineer Research and Development Center, which is the Army Corps of Engineers' integrated research and development (R&D) organization. As in years past, the 2010 teachers gave the camp high marks. "I really enjoyed the camp and came away with more than expected," said one participant. "The instructors were great and the hands-on approach to the class makes me more confident in implementing the curriculum in my classroom." After participating in the camp, a teacher commented, "I have a heightened interest in promoting engineering careers along with some knowledge and experience to back it up!"

Why Did You Choose MatSE at Illinois?

We asked a few of our undergraduates to tell us what made MatSE at Illinois their top choice.

My father was an engineer. I met a metallurgist through him who encouraged me to join MatSE.

Wayne Harlow (junior, Norris City, IL)

My dad was an engineering professor here and he suggested joining the MatSE Department. I did and really enjoy it.

Amber Choquette (junior, Urbana, IL)

I was interested in microfab. I was uncertain what field to apply to. I investigated ChemE, MatSE, and ECE. MatSE seemed to provide many opportunities and directions.

Gavin Campbell (junior, Wilmette, IL)

I started out in mechanical engineering, but when I started taking courses in chemistry, I realized that I was very interested in it. Upon doing research about MatSE, I realized that the interdisciplinary nature and new future careers in MatSE was what I really wanted. Now I am a proud MatSE student and enjoy it.

Jordan Turner (junior, Danville, IL)

The thing I like most about MatSE is the wide array of post-graduation opportunities. In addition to the variety of engineering fields within MatSE itself, materials science engineers go on to careers in business, finance, and medicine.

Yost Smith (senior, Downers Grove, IL)

I had always been interested in science, but chemistry and physics always struck me as too abstract. So I chose MatSE because it lies at the intersection of many disciplines and is applicable to almost anything.

Spencer Wells (sophomore, Wildwood, MO)


Wayne Harlow


Amber Choquette


Gavin Campbell


Jordan Turner


Yost Smith


Spencer Wells

MatSE Goes to Texas

Alumni, faculty, and students gathered for an Illini reception hosted by the MatSE Department in Houston, TX, on October 18. Nearly 50 people attended the reception, held in conjunction with the MS&T meeting at the Hilton Americas-Houston.

Brad Johnson (M.S. MatSE '96, Ph.D. MatSE '01), Toshi Tani (M.S. Cer '93, Ph.D. Cer '94), and Xiaoli Tan (Ph.D. MatSE '02) have a discussion at the reception.

Drew Kofahl (B.S. Met '97) visits with May Martin, a Ph.D. student in Ian Robertson's group.

MatSE Department Head David Cahill meets alumni Ed Cox (B.S. Met '73, Ph.D. TAM '78) and Cliff Bigelow (B.S. Met '88).

Jim (B.S. Cer '66) and Alice Stephan, seated in front, visit with Bob (B.S. Cer '63) and Jenny Radtke.

Lohse and Moore Elected Fellows of the American Chemical Society

David Lohse

Jeffrey Moore

David Lohse (Ph.D. Met '78) is a distinguished research associate in the Corporate Strategic Research Labs of ExxonMobil Research & Engineering Co. in Annandale, NJ. His work focuses on the thermodynamics of mixing polymer blends, nanocomposites, neutron scattering from polymers, the control of rheology by molecular architecture, polymer crystallization, the use of block and graft copolymers to enhance blend compatibility, and the application of such knowledge to develop improved polymer products. Lohse was elected a fellow of the American Physical Society in 2000 and a Polymeric Materials: Science and Engineering (PMSE) fellow in 2005.

Jeffrey Moore (Ph.D. Met '89) is the Murchison-Mallory Professor of Chemistry at the University of Illinois. His research focuses on large organic molecules and polymers in three main areas: macromolecule construction, self-healing polymers, and materials for energy storage. He was elected a fellow of the American Academy of Arts and Sciences in 2008 and Polymeric Materials: Science and Engineering (PMSE) fellow in 2009. Moore is also an affiliate in the Department of Materials Science and Engineering.

Department Notes

A manuscript by **Zeba Parkar**, Ph.D. student in Jim Economy's group, was selected for a 2010 SPE Automotive Composites Conference & Exhibition Best Paper Award.

The Industrial Research Institute (IRI), in partnership with the National Science Foundation (NSF), has awarded $500,000 to Phillippe Geubelle (Aerospace Engineering), **Nancy Sottos** (MatSE), and John Kieffer (University of Michigan) for "Multiscale Modeling and Assessment of Interfacial Adhesion Failure in Polymeric Coatings and Multilayered Devices."

Jim Zuo has been promoted to the rank of Full Professor.

Ian Robertson has been appointed as Division Director for Materials Research in the Mathematical and Physical Sciences Directorate of the National Science Foundation, effective January 3, 2011.

Nancy Sottos

Jim Zuo

Postdoctoral researcher **Sharlotte Kramer** and **Brett Beiermann** received best paper honors at a meeting of the Society for Experimental Mechanics. Kramer and Beiermann are members of the Sottos research group. Authors of the paper are Sharlotte Kramer, Brett Beiermann, Doug Davis, Nancy Sottos, Scott White, and Jeff Moore.

Sibu Kuruvilla won the Undergraduate Poster Contest at the MS&T conference in Houston with his poster "Top-down fabrication of patterned, vertically-aligned silicon nanowires."

Cassandra Kingsbury, Ph.D. student in Nancy Sottos' research group, was runner-up in the poster competition of the annual meeting of the Society of Engineering Science, October 3-6, in Ames, IA.

Hire a MatSE Grad

Is your company hiring MatSE graduates? If so, why not recruit from the materials department ranked #2 in the nation? MatSE at Illinois offers the following placement services to employers:

Résumé Book and CD

MatSE Résumé Books and CDs contain the résumés of students at all levels of education—B.S., M.S., and Ph.D.—as well as students seeking summer jobs, alumni, and postdoctoral associates of the MatSE Department. The Résumé Book is printed once a year, in the fall semester, and is free of charge.

Career Management Tool (matse.illinois.edu/jobs)

Using the Career Management Tool, powered by AfterCollege, you can post your materials job openings on our website. Additionally, you have online access to MatSE student and alumni résumés.

Student Interviews

Our placement office will assist you in coordinating on-campus interviews of MatSE students. If you send us your position opening, we will distribute it to our students and collect résumés from those interested in and qualified for the position. You can contact these students directly or we can contact them for you and set up an interview schedule according to your needs.

If you have any questions about the MatSE Placement Office, please contact Cindy Brya, brya@illinois.edu or (217) 333-8312. If you have questions about recruiting engineering graduates in other engineering disciplines, contact Engineering Career Services, ecs@engineering.illinois.edu or (217) 333-1960.

2010 Alumni Awards

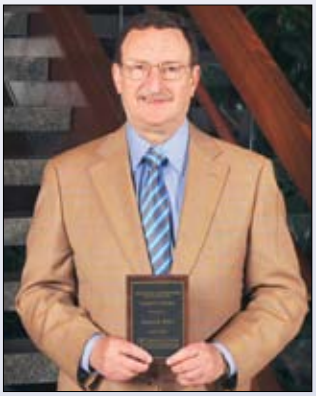
James V. Barnett

2010 Distinguished Merit Award

James Barnett (B.S. Cer '67) worked for a number of semiconductor companies before co-founding Xilinx, Inc., with Ross Freeman (M.S, Physics '71) in San Jose, CA. Barnett and Freeman first discussed the process for founding a company during a business trip to Hong Kong in January 1983 based on Barnett's experience in two startup companies. Six months later, Freeman came up with an idea for a new semiconductor product. Barnett reviewed the idea and recognized the potential for an architectural breakthrough in programmable logic technology. Within a month of the founding, the new company had solved technical and cost limitations by going to a static RAM-based volatile technology similar to microprocessors instead of non-volatile e-prom or ee-prom technology used in earlier, small PLD devices. The FPLD, field programmable logic device was born.

The company was funded on January 9, 1984, and went public in June 1989. Presently, there are 3,000 employees, 2,000 patents, 20,000 customers, and revenues of $2 billion a year. As vice president of marketing and sales, the job of naming the new venture fell to Barnett. Freeman's original notes described the product as a semiconductor chip with an array of logic blocks containing an X representing logic connected by metal links. Barnett interpreted this as X link X. This became Xilinx for ease of pronunciation. An unknown student at the University of Illinois renamed the company 2X Illini.

Barnett is the recipient of three U.S. patents and a member of the Band of Angels in Palo Alto, CA, the first "angel investor" organization. He has served on many boards of directors, including Xilinx. Retired from Xilinx, Barnett does private venture investing through Barnett Ventures.



Gary Bilow

Gary Bilow

2010 Loyalty Award

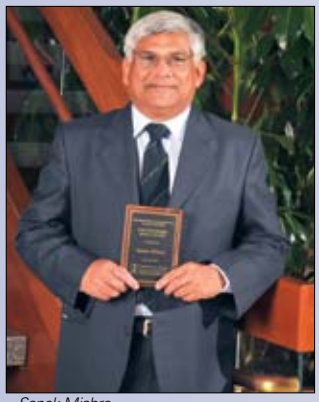
Gary Bilow (B.S. Met '65, M.S. Met '67) began his career in industry in St. Louis after graduating from the University of Illinois. He worked in the Materials and Process Development Department at McDonnell-Douglas (now Boeing). While there, Bilow conducted R&D programs on refractory metals, beryllium, and metal matrix composites. He then transitioned to the development of carbon fiber reinforced polymer matrix composites for aircraft structural applications. He supported the development of these materials and associated manufacturing processes for the initial production of F/A-18 and AV-8B aircraft. He also led multidiscipline integrated product teams. Bilow led a team developing lightweight and more efficient LO materials. He then rotated to the Quality Processes/QA Division as Department Head for Quality Engineering and Planning and all of the Quality Laboratories in St. Louis. He then rotated to Manager Manufacturing Engineering on the F/A-18 E/F Program. Bilow currently leads the Next Generation Composites Fabrication multi-site team in Boeing Research and Technology. This team is focused on the development of innovative, low cost, and high output manufacturing processes for military and commercial aircraft. He also has responsibility for several international composite R&D collaborations. Bilow is an active member of the Materials Science and Engineering Alumni Board at the University, and in 2007, he established the Gerson B. Bilow Scholarship for undergraduates in Materials Science and Engineering at Illinois.

George Matamis

George Matamis

2010 Young Alumnus Award

George Matamis (B.S. MatSE '97) is a director of process development for the Memory Technology Group at SanDisk Corporation in Milpitas, CA, where he has worked for 10 years. Matamis received an M.S. in chemical engineering from Arizona State University in 2000. He was previously a senior process development manager working on both NAND and 3D ReRAM memory process development from August 2008 to February 2010. Matamis spent three years in Japan, from 2002 to 2005, where he managed all process modules within SanDisk while collaboratively working with technology and business partner Toshiba. Prior to joining SanDisk in 2001, Matamis was a senior process engineer at Motorola working on MEMS and micro-controller processing. He was also a thin film process engineering intern at Advanced Micro Devices during his senior year at the University of Illinois. Matamis has held several key engineering positions in both R&D and production in advanced memory, logic, and MEMS technologies. He is currently developing next generation NAND Flash, 3D ReRAM and alternative memory process technologies. Matamis and his group are responsible for providing alternative memory solutions as Floating Gate NAND scaling reaches its fundamental limit. He also supports process and material solutions in order to improve memory density, performance, and reliability for current and future memory devices. He is a member of the SanDisk patent committee and holds over 30 issued patents, 20 pending patents, and 15 published papers in the area of advanced memory, logic, and MEMS processing/device applications.



Sanak Mishra

Sanak Mishra

2010 Distinguished Merit Award

Sanak Mishra (M.S. Met '68, Ph.D. Met '73) carried out his graduate studies at the University of Illinois with Professor Paul Beck. He is presently the CEO of the India Greenfield Projects of ArcelorMittal, the world's largest steel company. He was recently elected as president of the Indian Institute of Metals, India's premier professional organization of metallurgists and materials scientists engaged in industry, research, and academia. The Institute is recognized by the Ministry of Steel, Government of India, and has around 10,000 members, primarily engineering graduates. Mishra is well known as the architect of the "SAMSKAR" concept, which is a unique code of leadership practice. He designed and implemented it when he was handed over the charge of the then-heavily loss-making Rourkela Steel Plant, as its managing director, and brought about a dramatic transformation and a remarkable financial turnaround. He was a member of the Board of Directors of the Steel Authority of India Limited from 2002 to 2005. Mishra was an Alexander von Humboldt Fellow in Germany from 1980 to 1981. He was honored in 2009 by the Indian Institute of Science in Bangalore with the Centenary Year Distinguished Alumni Award. A technologist of international reputation, he received the prestigious National Metallurgist Award of the Ministry of Steel, Government of India in 2003. Mishra is a fellow of the Indian National Academy of Engineering and the National Academy of Sciences, and a Member of the Asia-Pacific Academy of Materials.

New Award Established by MatSE Alumna

Thanks to Sheryl Tipton (B.S. Met '80), the MatSE Department has its first student award named after a female MatSE alumnus: the Sheryl Blair Tipton Award. Tipton endowed the award as her way of giving back to the University of Illinois in appreciation of the outstanding education she received. "I was inspired by [fellow alumnus] Gary Bilow and his award," Tipton said, "and I hope that I can inspire others like he inspired me." Bilow (B.S. Met '65, M.S. Met '67) endowed an undergraduate scholarship in the department in 2007.

After graduating from the U of I, Tipton went to work for Caterpillar, Inc. During her 32-year career at Cat, she held various manufacturing, quality, and engineering positions with increasing responsibility, including dean of technology at Caterpillar University, Six Sigma Deployment Champion for Human Services Division, and global Steel Technology Leader. She holds seven U.S. patents in the areas of heat treat processing and controls.

Tipton has been very loyal to the University of Illinois in the giving of her time and talents, and received the Materials Science and Engineering Alumni Association's Loyalty Award in 1999. She recruited for many years at the U of I, taught guest lectures to MatSE students, and helped organize student tours. She served on the MatSE Alumni Board for more than 10 years, serving as vice president from 2002 to 2005 and as president from 2005 to 2008. She helped establish the MatSE Alumni Board Award, and was the driving force for a substantial increase in the award during her tenure as president.

Tipton is married with two grown children, and she and her husband Bruce enjoy country living at their home in rural Illinois.

The first Sheryl Blair Tipton Award was presented to Lisa Mazzocco at the departmental awards banquet this past spring. Mazzocco graduated from the University in May and now works in Chicago for Bain & Company, a strategy consulting firm. "It sounds like a departure from materials science, but engineering taught me how to learn effectively, and that's proving hugely valuable now," Mazzocco said. Within the next five years, she aims to spend some time in the non-profit sector and "eventually find economic development work that speaks to me." Long term, she said she would love to teach. Outside of work, Mazzocco has been training for the Indianapolis Marathon and exploring all the cultural treasures that Chicago has to offer. "I'm also getting back into writing, a long-time love that I put on hold during college, and I'm eagerly awaiting opportunities to start serving the University as an alumnus," she said.

Donor and student enjoyed getting to know each other at the banquet. "I am very pleased to present this award to someone with such outstanding accomplishments. In addition to her excellent academic record, she also has leadership skills, is active in the community, and is a published author," Tipton said. Mazzocco felt equally inspired. "Listening to her talk about her career and her accomplishments was very inspiring, especially considering that she worked her way to success when engineering was a much more male-dominated field."

Class Notes

Phil Frederick (B.S. Met '50) hosted a tour of his log cabin home in Manito, IL, on June 19 to raise money for Manito's Veterans Park. Proceeds from the tour were also used to bring The Wall, a traveling veterans tribute, to the Manito community. Frederick planned to build a little log cabin in the woods, close to his birthplace. His log cabin grew into a three-bedroom, 2½ bath log home with a wrap-around deck. The home has an energy efficient geo-thermal heating and cooling system. The walls of the home are covered in photographs from his travels around the world. In a letter to the *MatSE News* editor, Frederick reminisced about his days at Illinois. "Under Professor Harry Czyzewski's guidance during my senior year, I conducted an elective project entitled, 'Casting of Stainless Steel in Ceramic Molds,'" Frederick said. "The paper won first prize in the American Institute of Mining & Metallurgical Engineers contest in 1950." Following graduation, Frederick spent three years in the U.S. Air Force. He took a job with Allegheny Ludlum Steel Corp, then the largest stainless steel manufacturer in the United States. After 32 years in the steel industry, Frederick retired as sales vice president from Altech Specialty Steel Company. He then enjoyed an additional 22 years as president/owner of a window manufacturing company in Saratoga Springs, NY. Last year he sold the window company, retired again, and returned to Manito to build his log home.

David Franklin (B.S. Met '65, M.S. Met '67, Ph.D. Met '70) has received the ASTM International William J. Kroll Zirconium Medal. He retired in July from the Bettis Atomic Power Laboratory in Las Vegas, NV, following 20 years of service. The William J. Kroll Zirconium Medal recognizes outstanding achievement in the scientific, technological, or commercial aspects of zirconium production and utilization, and encourages future efforts, studies, and research. An ASTM fellow, Franklin was recognized for his outstanding achievement in nuclear fuel component performance through leadership and work on creep, corrosion, and hydriding and their consequences.

Chuck White (B.S. Met '65) was given honorary faculty status by the Graduate School of the Esslingen University of Applied Sciences in Germany. He has taught as a guest lecturer in the Master of Science in Automotive Engineering program since the Graduate School was founded in 1999. White is a professor in the Industrial and Manufacturing Engineering Department at Kettering University (formerly GMI General Motors Institute) in Flint, MI. Along with teaching as a guest lecturer in Germany, White promotes faculty exchanges and partnership between the Esslingen University of Applied Sciences and Kettering University.

Mark Schnake (B.S. Cer '72) visited campus on October 27 and presented an alumni seminar to MatSE undergraduates. Schnake is a Senior Application Specialist for Harbison-Walker Refractories Company in Mexico, MO.

Joe Pecina (B.S. Met '81) is a licensed professional engineer in Florida and Illinois. He has held positions in engineering, quality, and manufacturing, concentrating on product development of engineered products. He has been with Concurrent Technologies Corporation since 2001, where he is a metallurgical advisory engineer. He is the inventor on three U.S. patents.

Drew Kofahl (B.S. Met '97) is a district sales manager for Nucor Corporation. He is responsible for the corporation's sales efforts in Texas and the southwest U.S. for bars used in oil and gas applications. Kofahl earned his MBA in 2008 from Loyola University Chicago.

Lakeisha Walker (B.S. MatSE '01) works at Oak Ridge National Lab in the Spallation Neutron Source, the world's most intense pulsed accelerator-based neutron source.

Lauren Kolodziej and Kyle Wilcoxen

Kyle Wilcoxen (B.S. MatSE '06) married Lauren Kolodziej (B.S. Biochemistry '06) on July 17. She is finishing her Ph.D. at the University of Chicago in Medicine-Gastroenterology. He works for The Clorox Company in Glad Research & Development with fellow alumnus **David Hoying** (B.S. MatSE '06), and has started the part-time MBA program at Loyola University Chicago.

Laura Copp (B.S. MatSE '04) married Nathan Kooistra on August 14, 2010.

Alp Sehirlioglu (Ph.D. MatSE '05) received the Young Investigator Program Award from the Air Force Office of Scientific Research to support his work on examination of hetero-interfaces for extreme environment electronics. The objective of this program is to foster creative basic research in science and engineering, enhance early career development of outstanding young investigators, and increase opportunities for the young investigators to recognize the Air Force mission and the related challenges in science and engineering.

In Memoriam: Jonathan Smith

Jonathan Smith (B.S. Met '47) passed away on July 26. He is survived by his wife of 64 years, Kay, three children, and three grandchildren. He was born on May 18, 1920, in County Durham, England, and raised in Staunton, IL. He served with distinction as an Army Sergeant stationed in the South Pacific with the U.S. Army Coast Artillery. He was awarded a Bronze Star during his time overseas.

Smith spent nearly his entire career with Sunbeam Corporation. He joined the company in 1947 as a sales engineer with the Industrial Furnace Division, and rose through the ranks in the ensuing years. In 1980 he was named the company's Executive Vice President. He retired from Sunbeam in 1984 and the following year, he and two business associates formed Seco-Warwick Corporation. He officially retired when he sold the company in 1989 at the age of 69.

An active alumnus of the University of Illinois, Smith was a valued member of the school's Foundation and Presidents Council. He was a member of the MatSE Department's Senior Advisory Committee and a long-time supporter of the department. He had an abiding interest in his alma mater throughout his life, and he took great pride in the University's many successes over the years.

Smith leaves a remarkable legacy—distinguished alumnus, decorated war veteran, outstanding businessman and community leader, and loving family man. In his eulogy, it was said that he will be remembered for the qualities he embodied—warmth, kindness, humor, generosity, and loyalty. He lived long and well, and his family and many friends will think of him often with love, appreciation, and admiration.

Class of 1996: Where are they now?

The summer 2010 issue of *MatSE News* featured a picture from the 1996 MatSE graduation lunch with a caption, "Class of 1996: Where are they now?" Here are a few of the responses we received from our alumni.

Marty Brotschul (B.S. Cer '96) was recently promoted to partner within the Management Consulting practice of Accenture in Chicago. He has been at Accenture since leaving Illinois, with a stint getting his MBA at Northwestern's Kellogg School of Business.

Aaron Amstutz (B.S. MatSE '96, M.S. MatSE '98) joined Caterpillar after graduation. "I was fortunate to return to C-U for a couple years more as a design engineer at Caterpillar's liquid filter plant in north Champaign (called Advanced Filtration Systems Inc.)," he said, "then landed in the Peoria area as an engineer for rubber components and later spent five years as a rubber compounder." For the past two years he has been working in Caterpillar's patent department as a technical resource for determining the novelty for new ideas generated by engineers from around the company. "I consider the base general engineering training and strong theoretical and morphological understanding of materials as critical to taking on the projects I've worked on during my time with Caterpillar."

Brad Johnson (M.S. '96, Ph.D. '01) joined Pacific Northwest National Laboratory in Richland, WA, after receiving his graduate degree. He has continued in the field of materials science, with a strong emphasis on electron microscopic characterization of interfacial phenomena, as well as non-oxide materials synthesis. He is currently a technical group manager responsible for the operations and personnel management of approximately 50 staff. "I received an excellent education at Illinois, and still consider the analytical facilities there to be among the best in the country. Keep up the great work!"

Cory Padfield (B.S. Met '96) began his employment with American National Can Company, working in a testing lab performing mechanical testing and failure analysis for beverage cans (soda, beer, etc.). He then worked for General Motors, performing materials selection, design and drawing review, manufacturing support, and failure analysis for vehicle components. He worked for OMNI Metals Lab, an independent testing and consulting business performing mechanical and corrosion testing of petroleum-production products and automotive products, and Hyundai-Kia America Technical Center. He is currently employed at American Axle and Manufacturing, working in the materials engineering department performing materials selection, writing specifications, reviewing new product designs and drawings, supporting manufacturing facilities, and analyzing failed vehicle components. "Along the way, I also got my professional engineer license and M.S. degree in materials engineering from Purdue University, both in 2001," he said.

Toby Padfield (B.S. MatSE '96) has also spent his career working for different companies within the automotive industry. He is currently a senior materials engineer at the ZF NAO Technical Center in Northville, MI (suburban Detroit), where he has been employed for the past 10 years. He works in a product engineering group doing materials and coating selection, failure analysis, and supplier development. There is a lot of diversity in terms of materials (steel, aluminum, magnesium, powder metals, plastics, organic coatings, electroplated metals) and processes (sheet metal stamping, seamless and welded tubes, metal casting, forging, cold heading/extrusion, plastic injection molding, machining, heat treating). "On a personal note, my wife Michelle just gave birth to twin boys in July," he said. "Aaron Michael and Benjamin Wilson join our oldest son Andrew, who is now four."

Brandon Stambaugh (B.S. Cer '96) started his employment with Pittsburgh Corning Corporation at the Sedalia, MO, facility, an equal equity affiliate of PPG Industries Incorporated and Corning Incorporated. The Sedalia facility manufactures FOAMGLAS® cellular glass insulation, which is used extensively as moisture and fire resistant insulation in industrial and building applications worldwide. Within five years he

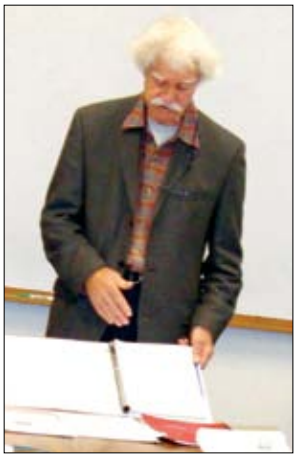
continued on page 12

Class of 1996 continued

became a senior engineer at the facility. In 2007, he was offered and accepted a position as the new product development manager at Pittsburgh Corning's Corporate Headquarters in Pittsburgh, PA. In 2008, he was awarded responsibility for managing the product offering (market) for Pittsburgh Corning's FOAMGLAS® Industry Division. "My degrees and experience with the company have created opportunities to advance my career," Stambaugh said. "My areas of responsibility have allowed me to travel extensively around North America and Western Europe, and my engineering expertise was instrumental in the startup of two new Pittsburgh Corning FOAMGLAS® Insulation facilities—one in Texas (2005) and the other in the Czech Republic (2008)." He currently resides in a suburb of Pittsburgh with his wife, Troas (M. Ed. '98 Illinois), and their two children, Sydney (6 yrs.) and Landon (1 yr). This fall he started an MBA program at the University of Pittsburgh Katz Graduate School of Business.

Alumni Seminars Show Students How Industry Works

Paul Trester (B.S. Met '65) visited the MatSE Department on October 4 and gave a seminar to members of Keramos, the materials honor society. He talked to the students about his career of providing materials and processing science and engineering in industry. Trester was a materials research engineer for McDonnell Douglas Astronautics in Santa Monica and Huntington Beach, CA, from 1967 to 1974 and for General Atomics in San Diego from 1974 until his retirement in 2010. He recently started his own consulting company, Trester Metallurgical Corporation. Some of the tips he shared with the students included how to write an effective report and make a good presentation. He told the students how to use a digital camera to "tell a story"—to photograph steps, specimens, set-ups, results, and examinations. "Don't just show them the electron microscope image," Trester said. "Photographs help to tell the story." He explained to them the importance of paying close attention to detail when writing or editing technical documents. Trester encouraged students to hold onto their textbooks after graduation. "It's surprising how often you go back to textbooks you still have," he said. The students enjoyed the opportunity to meet an alumnus who had successfully used his degree in materials. "There is nothing better than looking back and saying, 'I love my job,'" Trester told them as he wished them well in their own future careers.



Pigs and Good Times: Fond Memories From an Alumnus

by Clarence Hoenig (B.S. Cer '55, M.S. Cer '56)

The class of 1955 in ceramic engineering consisted of only five hopeful graduates—a close-knit group that included Vic Tennery, Pete Shalek, Bob Cowan, Loren Day, and myself. Vic was at the top of our class in skill and initiative. I was near the bottom. As I recall, during recruiting interviews there were about 90 companies looking for ceramic engineers. Those were years of promise for young graduates.

Making our pigs for the annual celebration with faculty was a joyful shared experience. We were told that in preparation for earlier pig roasts actual suckling pigs were roasted in the Kiln House but that was beyond our meager resources and talent.

When slip casting ceramics it is always easy to make a few extra and have fun in the special decorations. Of course, U of I colors were a must. As I recall, the black mustaches on some of the extras were a poke at that tyrant Adolph Hitler.

Even today, a half-century later, it is easy to recall the good times and great learning we had in ceramic engineering at dear old U of I.

Pictured on the computer monitor is a photo of Vic Tennery with two of his ceramic pigs.

Are you planning a visit to campus during the 2010-11 school year?

If you are interested in giving a seminar to our students to talk about your experiences or give a company presentation, contact Cindy Brya, Coordinator of Alumni Relations and Development, at brya@illinois.edu or (217) 333-8312.

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Brilliant Futures, the Campaign for the University of Illinois, is an ambitious undertaking to raise $1.5 billion. The resources generated through the Campaign will ensure that Illinois continues to create a better world through our teaching, research and public engagement. Gifts to the campaign will provide more scholarships and fellowships, endow more faculty positions, improve programs and research and update facilities across the campus.

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Robert Degenkolb (B.S. Cer '49, M.S. Cer '50)
Joseph Dow (B.S. Met '62)
Abigail Ebbing (B.S. MatSE '01)
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Terry Rosborough (B.S. Cer '79)
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M. Vance Seitzinger
Vanece Seitzinger
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and Marie (B.S. Cer '86) Tredway
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The Presidents Council was established by the Foundation in 1964 and is named in tribute to the presidents who have guided the University to the highest levels of quality for more than 130 years. The Council provides an opportunity for private investors to share in the substance and success of the University's distinguished programs in teaching, research and public service.

The interest and involvement of members of the Presidents Council helps assure the University of Illinois' role as a leader in American higher education. The resourcefulness and leadership qualities of the Presidents Council membership make it much more than an organization of fiscal support. Members regularly share their professional experience, insight, and informed counsel with University officials and faculty to advance the mission and the scope of the University.

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"Scholarships let students witness how much alumni truly appreciate what the University of Illinois did for them. It inspires students to fully embrace their opportunities here, and hopefully one day become donors themselves."

– Lisa Mazzocco (B.S. MatSE '10), scholarship recipient

Back-to-School Picnic

Seniors pose for the camera at the MatSE Undergraduate Picnic on September 21. The picnic was held behind Engineering Hall, which afforded a beautiful view of the Engineering Quad and Grainger Engineering Library. Students and professors enjoyed burgers, hot dogs, and fellowship before the arrival of mid-terms.

Ceramics Alumni Reunite on Campus

The Ceramic Engineering class of 1984 held a reunion on campus the weekend of November 6 and 7. The reunion was organized by Tony Taglialavore and Eugene Ylo. Pictured from the top row of stairs to bottom: Dennis Eichorst, Mary Lou Morris, Eugene Ylo, Angie Bernardi, Jim Jaskowiak, Jim Durham, Geoff Morris, Joyce Yamamoto, Karen Paulson, Prof. David Payne, Toby Greenwald, and Tony Taglialavore.

Professors David Payne, Clif Bergeron, and Jennifer Lewis joined the alumni for a tour of the Ceramics Building.

The classmates enjoyed catching up on years past, eating at campustown restaurants (Zorba's, Papa Del's), and touring the Illinois campus.

Would you like to get together with your class?

The MatSE Department can help. Contact the department's alumni relations office at (217) 333-8312 or brya@illinois.edu, to find out how you can get in touch with lost classmates.

Department of Materials Science and Engineering
University of Illinois at Urbana-Champaign
1304 West Green Street
Urbana, IL 61801

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Celebrating 100 years of Homecoming at Illinois

MatSE alumni, students, and families enjoyed the Engineering at Illinois Homecoming Brunch at the new campus recreation center before watching the Fighting Illini beat the Indiana Hoosiers 43-13. Pictured from left to right: Quentin Sims (B.S. Cer '81), Alec Byl (sophomore), Kelly Nygren (senior), Yost Smith (senior), and Al Klein (B.S. Met '55).