

MSE News

WINTER 2008

The Newsletter of
the Department of
Materials Science and
Engineering

MMS Picnic: A Tradition

Celebrating MMS Picnics at the Hosfords Since 1964



In this issue of the MSE newsletter, we gratefully acknowledge the hospitality and friendship that Bill and Peg Hosford (above with MSE junior, Sarah Wang) have extended, since 1964, to the students, staff and faculty in MSE by hosting the MMS picnic at their Traver Road home. Since then, generations of students have enjoyed picnicking “in the country” and enjoying games, good food and good friends. The Hosfords moved to Traver Road in August 1963.

Bill recalls that the first MMS picnic he attended was at Delhi Park. In the spring of 1964, the officers of MMS asked if they could come to the Hosford home for their spring picnic. And the picnic has been held there twice a year since then, except for one year when it was held at Fred Bliecher’s home in Saline. Many recall taking shelter from rain and snow (Michigan sunshine!) in the old barn that was moved in 1969-70 by the Hosford family and friends, board-by-board and timber-by-timber, from its original location on the farm that is now Leslie Park Golf Course. In fact, as Bill remarked recently, Professor Richard Flinn elected to spend the night at the Hosfords after one particularly snowy spring picnic, rather than risk the two-mile drive up the steep hills to his home. We thank Bill and Peg for all the fine memories and look forward to many more. If our friends and alumni have photographs from picnics past they would like to share, please send them to Professor Jones (jonesjwa@umich.edu) and we’ll post them on our website.

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Letter to the Alumni



Much has happened since my last letter and I write to share some exciting developments in the department. Our undergraduate enrollments

continue to increase at a rate that is faster than the increase in the enrollment of the College of Engineering. With regard to teaching, the number of faculty-student contact hours continues to be competitive with other departments in the college, which is noteworthy for a department as small as ours. The department's research expenditures per faculty, from external resources, continue to increase and remain among the stronger in the college. In short, our overall research/teaching portfolio is strong. Perhaps the most significant development this year is that we completed our strategic plan. I would like to highlight three things in this letter: (1) MSE student enrollments, (2) strategic goals, and (3) a current fundraising drive, initiated by University of Michigan President, Mary Sue Coleman, regarding first year graduate student fellowship support.

With nearly 150 undergraduates, primarily composed of sophomores, juniors, and seniors, our enrollment is now at an all time high. Forty-five students graduated with BS degrees in materials science and engineering during 2007. Approximately half of our students went to graduate school in materials science, biomedical engineering, chemical engineering, or to professional schools. The others went to business consulting positions and to engineering positions. Of those who took positions with engineering firms, many of them went to microelectronics, biomaterials, or pharmaceutical industries. Lately,

we have seen an increasing number of students going to the metals industry. In fact, I am told there are long-term concerns about the availability of students in metallurgy positions. Based on my exit interviews, I learn that students find the field of materials science and engineering attractive for many reasons: the excitement of nanotechnology; the size and collegiality in our department; the opportunities for a research experience that they can't readily get in large departments; a major that enables flexibility to specialize in other areas; and last, but not least, an interest in working or doing advanced study in MSE.

In our new strategic plan, we have identified strategic goals that will enable us to realize a vision "to educate the very best materials engineers and researchers, and to provide an environment where innovative and productive interdisciplinary materials researchers and engineers engage in the development of new fundamental knowledge of materials science and technology, responding to the needs of our state, the nation, and the world..." In addition to identifying our competitors and understanding the reasons they are successful, a number of key issues were considered as we developed our goals.

We considered the central role that our department plays in research, education, and technology transfer at the University of Michigan. It is evident that while materials research is conducted in departments across the entire university, materials research is not the primary emphasis of such programs. However, the ability of these programs to perform high quality materials research, and to educate students in the relevant aspects of the discipline, depends on the existence of a first-rate collaborative and vibrant MSE department. Effects of globalization

were also considered; issues confront us on two fronts. Competition to attract the very best students, graduate and undergraduate, from around the world, promises to become more intense as the quality of the educational and scientific infrastructure of non-US institutions continues to improve. The student body we educate must be diverse and our graduates will compete for jobs with other students educated by other institutions from around the world for jobs.

The goals we developed have the following key elements: (1) building strength in the areas of materials for energy storage and energy conversion, and of structural materials, specifically metals; (2) developing and acquiring resources that would ensure coherency among the diverse materials research activities throughout the entire university; (3) enhancing the educational experience of our students by increasing the quality of our teaching, developing new innovative educational curricula, and increasing the diversity and quality of our student body; (4) enhancing our educational outreach; and (5) improving graduate recruitment and financial support for first year graduate students.

I now draw your attention to a program with a goal to provide matching funds for fellowships for first-year graduate students at the University of Michigan. President Mary Sue Coleman initiated this new program wherein any donations you make to the department specifically for graduate student fellowship support would be matched one-to-one until December 2008 (Mat. Sci. & Eng. Fellowship Challenge Fund). This is particularly important as this would have a significant impact on our ability to support first-year graduate students when they are taking courses and are not able to perform research. It, moreover, is

an excellent recruiting tool for talented graduate students.

I end by noting that our newsletter highlights a number of new things that include, a new course "Energy, Light Visualization," an article on integrating teaching and technology, national awards won by faculty, start-up companies based on research in the department, and a highlight article on research on biosensors. As always, we value your interest in and support of our department. Go Blue!



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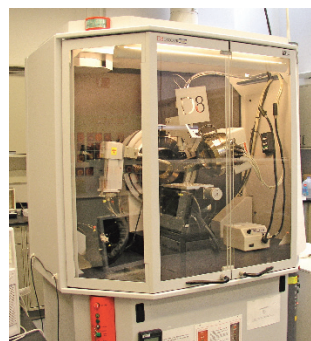
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New Hanawalt X-Ray MicroAnalysis Laboratory

The MSE department recently consolidated its X-ray characterization facilities into one central location in the basement of the Gerstacker Building. Now known as XMAL (X-ray MicroAnalysis Laboratory), the goal is to provide state-of-the-art nanostructural characterization capabilities to members of the University of Michigan materials community.

The Hanawalt XMAL laboratory in Gerstacker is located in an open common space next to several MSE laboratories, and is on a stable foundation. Access to the facility is controlled by keycard, and we have implemented



a remote instrument sign-up and time recording system similar to that that has been in place for some time at EMAL. In addition to our Rigaku rotating anode system and Bede high resolution diffractometer, we have also added a Bruker D8

Discover system with an x-y-z translation stage, video imaging system, and fine-focused optics, along with a Bruker NanoStar small-angle X-ray scattering system.

Ying Qi, MSE Department Engineer, oversees the safety and operation of the equipment, and Professor David C. Martin is overseeing the laboratory itself.

New Role for Jones with ADVANCE Program



Professor J. Wayne Jones was appointed associate director of the ADVANCE Program at the University of Michigan and director of the ADVANCE

Program in the College of Engineering, beginning September 2007.

In this role, Professor Jones will work on improving the successful recruitment, retention, and promotion of women and underrepresented minority faculty. In his new role, he will work with department chairs, faculty, and engineering administration to strengthen the coordination of activities of the College as well as campus-wide and national ADVANCE efforts. Information regarding the ADVANCE program can be found at: <http://sitemaker.umich.edu/advance>.

MSE 493 – Energy, Light, Visualization

Story by Bill Clayton

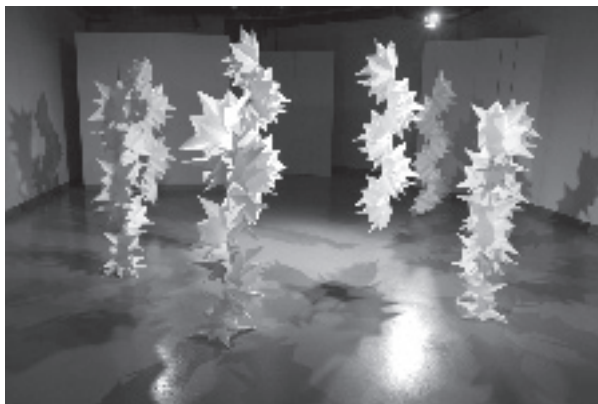


Photo courtesy of Matt Shlian

Intricate paper sculptures demonstrate that engineering, art and design have a lot in common.

In the hands of those who know how to use them, words are excellent tools for communication. Unfortunately, not everyone uses them well, and the problem becomes more difficult when trying to explain complex concepts. But communication gets much easier when images – graphs, illustrations, photos – are part of the mix. That simple fact is in part responsible for the creation of “MSE 493/Art and Design 303 – Energy, Light, Visualization,” an upper-division class that brings together engineers, artists, architects, and designers to work and learn together.

Max Shtein, an assistant professor in Materials Science and Engineering (MSE), Chemical Engineering, and Macromolecular Science and Engineering, is an enthusiastic advocate of combining engineering and art to heighten communications and creativity. “Advertisers know how to get an idea across in thirty seconds,” he said. “Billboards do it in five words or with a single picture. So, how do we teach engineering students to communicate that well – to visualize complex concepts and explain them accurately, completely and quickly? We teach them about visualization and how to use it in communicating complex subject matter, but without trivializing the content.”

Engineering students in MSE 493/ArtDes 303, as well as artists and designers from the U-M School of Art & Design face the challenge of analyzing, visualizing and solving open-ended problems – real-world problems – with connections to society, politics, law, and business. “More specifically, we give them the challenge of harvesting energy from renewable sources, and using it wisely in efficient lighting systems,” Shtein said. “Effective visualization is essential to coming

up with solutions, because more and more often that process involves cross-disciplinary collaboration, where jargon differences can impede progress.”

Matt Shlian, a visiting scholar at the School of Art & Design, is a paper artist whose work is a distinctive blend of three-dimensional imagery and engineering. He plays a key role in this collaborative class. “I use engineering principles to design interactive paper structures,” he said. “Pop-up books, packaging, paper sculpture, and all manner of paper engineering are robust ways to reduce complex concepts to something visual, spatial and tactile – something that engineers can ex-

Dead Light Bulbs

Materials Science and Engineering students Mark Shevin and Jason Rhode McGauley developed an exhibit to help visitors to Ann Arbor’s Hands-On Museum understand various aspects of energy. “They created a display explaining how different types of lighting works. In one demo, a dead light bulb is put in a microwave oven,” Shtein said. “When the oven is turned on, the dead light bulb lights up, the reason being that the microwave energy excites the gas within the bulb, and the gas and the bulb coating glow. It’s a startling visual demonstration that microwave energy can be converted to visible light, and it helped Mark and Jason teach the kids about the different concepts in lighting. Students also developed posters that showed the energy content of various things – food, minerals, you name it – in such a way that it got the message across clearly enough for kids to consume and understand: There’s energy everywhere waiting for us to find ways to harvest it. It was a great way for our students to learn about visual communication and do a little outreach at the same time.”

amine and even appreciate as art.” (Check out Shlian’s work: <http://www.mattshlian.com>.)

Shlian is helping students to visualize ways in which to control potential and kinetic energy using modular unit systems that could be used, for example, to make solar cells cheaper and more efficient. A few months prior to co-teaching the class, he and Shtein had started working on concepts for non-conventional electronic devices that could lead to products such as textiles for clothing that also functions as a solar cell, harvesting sunlight to produce electricity – for a wristwatch, perhaps, or to power a personal global positioning system, or for sensing and unobtrusive health-monitoring systems.

A common thread in visualization and engineering is the need to consider and illustrate the scaling laws, dimensional analysis, computer-aided design, and modular and spatial thinking. "Scale analysis can be especially powerful in problem-solving and visualization," Shtein says. "A grasshopper can jump dozens of times its height, but an elephant can't jump at all, although it's much stronger. That's because mass increases proportionally with the cube of the height." He smiled as he said, "Now, how many grasshoppers working together will it take to lift an elephant? In some ways, solving the energy problem is like answering this question."

Like the grasshoppers and the elephant, MSE 493/ArtDes 303 is easy to visualize: an uplifting but heavyweight course in the education of Michigan Engineers.

This article first appeared in the fall 2007 issue of Michigan Engineer

Technology in Michigan Engineering Education

Story by Bill Clayton

Incoming undergraduate students have only a foggy idea of what engineering is really all about. They know technology is part of the equation, but they're not sure about all of the variables. ENG 100: Introduction to Engineering clears up that issue. ENG 110: the Engineering Profession exposes students to Michigan Engineering's 11 departments and the type of engineering that each offers. The objective: to give students enough information to decide where to cast their lot.

Each department gets a week to present itself in ENG 110. In that week, students attend two lectures. The first describes the department's particular discipline. The second lecture poses a problem that an engineer of this type might encounter. The instructor metes out just enough information so that students can tackle the problem and, in the process, get a handle on that department's brand of engineering.

It's during ENG 110 that students get a first taste of the technology that makes a Michigan Engineering education so dynamic.

This past year, the College has been simulcasting ENG 110 to the U-M Flint campus. It's been a sensational experience for students and instructors.

On a large screen at the front of a lecture hall in Ann Arbor, the Flint classroom and students are visible on the left; a slide presentation appears on the right. Students in Flint see a screen with slides on the left and, on the right, a video of the

instructor in Ann Arbor. The system also captures audio from the instructor and, when possible, from the students.

The system can produce "live streaming" and "video-on-demand." The former shows the class in real-time. Students have to watch the lecture as it's transmitted because once it plays, it's gone – unless the system records the class as it's captured. With a recorded lecture, students can get video-on-demand. So, if they miss a lecture, they can watch it on the web, when they want, as many times as they want.

Undergraduates get another taste of technology in education in MSE 220: Principles of Engineering Materials, taught by Joanna Mirecki Millunchick, an associate professor in the Department of Materials Science and Engineering. She incorporates tablet PCs into the curriculum. "It's a notebook computer with a screen that swivels around flat so that I can write on it using a stylus," she said. "I use it to write up my notes. The recognition software converts my digitized handwriting to text. Tablets also have a keyboard and a mouse."

During a class, Mirecki Millunchick's slides appear on her tablet and on the big screen for the students. "It's a powerful tool," she said. "I can annotate slides in handwriting and sketch figures, and the visuals are excellent. I can save my presentations to use again. It's easy to convert my notes to PowerPoint presentations, if I want. Or I can distribute them to the class."

Mirecki Millunchick also uses her tablet to prepare annotated homework solutions. "I use a software package that captures what happens on the screen along with audio. So I write on the screen and discuss how to do the problem. A click of the mouse puts the work on their computers. Later, when they're working, it's as if I was sitting right next to them and talking them through the problems. The solutions are indexed, so students can skip around to the parts they need to concentrate on."

Students who use tablet PCs generally love them. They're able to jot notes right on the screen, then reorganize, highlight and search them later. They can share notes by email or post them to a shared space on the web. If students get the lecture slides prior to class, they can take notes directly on them. And they can cut and paste text, audio and video files from multiple sources to create rich, detailed notes.

"MSE 220 is an eye-opener for students," Mirecki Millunchick said. "They learn about the technology specific to each department, they use some sophisticated technology in the process and," she added with a smile, "with tablet PCs, they save some trees."

This article first appeared in the fall 2007 issue of Michigan Engineer

MSE Professors Spin New Ventures

Story by Kimberlee Roth

Much of the research conducted in Materials Science and Engineering labs makes its way from bench to business venture, thanks to the current of entrepreneurship that runs through the department. These start-up endeavors offer students unusual work-study and internship experiences, potential job opportunities after graduation, and the chance to see how university-based research can evolve into practical, potentially profitable, commercial applications.

Solid oxide fuel cell from Adaptive Materials, Inc.

Professor John Halloran co-founded Adaptive Materials, Inc. (AMI) with then-PhD candidate Aaron Crumm in late 1999. For his thesis, Crumm had been developing a co-extrusion technique for the microfabrication of optimally-designed, piezoelectric hydrophones. He soon realized that the same process could be used to make tubes for solid oxide fuel cells. The two received a small grant to produce prototype tubes; a second grant helped them answer a key question: could they produce a fuel cell that would generate electricity? The answer was yes. "We made completely portable solid oxide fuel cells using camping gas (propane), and that has grown into a company that now has 50 employees," says Professor Halloran, who serves as AMI's chief technology officer.

The U.S. Marine Corps Special Forces are using prototype AMI fuel cells, as is the U.S. Air Force in some

of its unoccupied aerial and ground vehicles. The company's fuel cells last 11 times longer than conventional UAV batteries. And they're mechanically robust and can withstand repeated on/off cycling, something conventional batteries can't. The propane they require is inexpensive and universally available.

With a recent 21st Century Jobs Fund award, AMI will focus its efforts on refining the prototypes and commercializing them. "Getting feedback from the field is a learning experience that no amount of lab testing could have reproduced," says Halloran. He expects that one of the first



commercial applications will aid emergency personnel: portable, propane-fueled chargers for wireless communication devices. Several MSE graduates are working to make that a reality. "The core of the team here are all U-M MSE alumni," says Halloran.

Biocompatible electrodes from Biotectix, LLC

Professor David Martin and two group members, Post-Doctoral Research Fellow Sarah Richardson-Burns and graduate student Jeffrey Hendricks, formed Biotectix in 2007. The company grew out

of research in Martin's laboratory on the microfabrication of neuroelectrodes for medical devices. "At Michigan, there's been a long history developing electrodes designed for communication between wires and tissues—essentially brain-machine interfaces," he says.

For the past decade, Professor Martin has been testing different materials, trying to improve the interaction between soft, organic human tissue and inorganic metal wires. Conventional electrodes, found in a number of medical devices including cortical probes and deep brain stimulators as well as pacemakers and cochlear implants, are not energy efficient. They can cause tissue damage and scarring. Other inefficiencies reduce battery life, and battery replacement means an additional procedure for patients.

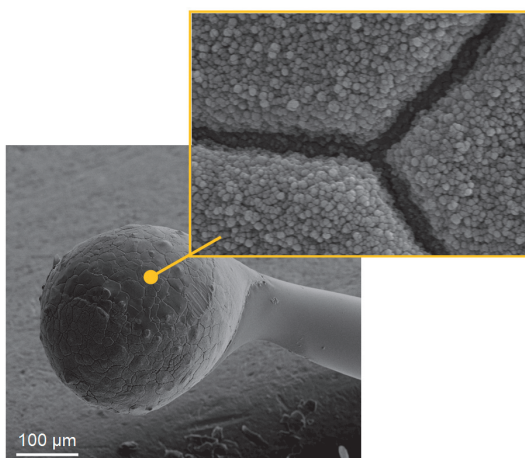
Martin and his group began working with conductive polymers, which are relatively stable chemically and don't lose their electrical conductivity. He says the group has learned from its more recent research using PEDOT, a doped semiconductor, that these materials "are chemically very similar to living tissue already." A coating of Biotectix' conductive polymer—from five to ten microns thick—can lower electrode impedance by two to three orders of magnitude without changing the geometry of device components, adds Martin, who also serves as chief scientific officer.

A recent early stage venture capital investment is allowing the firm to conduct two studies on brain and ear implants. Martin is also hoping to find an industry partner to develop biocompatible electrodes for pacemakers. And he recently received a \$6 million grant from the U.S. Army to support work he

and his team have begun on the skin-prosthetic interface with artificial limbs.

Nanocubes by Mayaterials Inc.

Professor Richard Laine's scientific interests "really boil down to doing things that are practical," he says. A synthetic chemist by training, Prof. Laine has been working for the past two decades on producing chemicals from rocks and the beach, he says, only partially in jest. "The only thing we've had to make silicon materials from is sand," he says. "But it's a brute process, done at 1200 degrees Celsius in a furnace with electrical arcs. It's not a trivial process, not even today." Laine subsequently developed a process using lye and recycled antifreeze to extract the silica chemically. He then began to wonder if there wasn't another good, clean source of silica beside sand. He learned that there is: rice hull ash.



Scanning Electron Microscope (SEM) image of the conducting polymer poly(ethylenedioxythiophene) (PEDOT) / poly(styrene sulfonate) (PSS) electrochemically coated onto a platinum-iridium cochlear ball electrode. The close-up view shows the high surface area nanofibrillar texture that leads to a significant reduction in the impedance and increase in charge capacity. These materials are being investigated both in-vitro and in-vivo for their ability to improve the performance of biomedical devices intended for long-term implantations in living tissue. Image taken by Jeffrey L. Hendricks at the North Campus Electron Microscope Laboratory (EMAL).

During the processing of rice for consumption, the hulls are removed. Since they're inedible, food processors often burn them. Laine uses the methods he has developed to extract from the ash relatively pure, high-surface-area silica. And he's left with another useful byproduct: "beautiful molecules" known as octasilsesquioxanes, or perfectly symmetrical one-nanometer-square cubes.

"At the vertices of the cube you can attach functional organic groups that make the cubes chemically reactive. It turns out there is almost no other organic or inorganic molecule that has a cubic, 3-D shape," he says. And those that are currently known are too expensive to mass produce.

There's a great deal of interest in such three-dimensional shapes. "Imagine if you want to build something and you can do it nanometer by nanometer," he says. "If you do a good job, you can control the global properties. If you have control at the nanometer level, you have reproducibility, and then you can predict behaviors. If you can do that, you can tailor the properties and build to the best specifications possible."

Four years ago, Laine formed Mayaterials Inc. to produce and market octasilsesquioxanes. To date, most of the company's customers are in Asia. Interest is stirring in the United States and Europe too among firms in the electronics, photonics, and packaging industries. Several Small Business Innovation Research grants have provided support, and now Laine is seeking investment to expand. "We expect big things," he says.

L. H. Van Vlack Lectureship



(From L to R): Manfred Rühle, Tresa Pollock, Bruce Van Vlack (Professor Van Vlack's son), Laura Van Vlack-Ailes and Robert Ailes (Professor Van Vlack's daughter and son-in-law), and Xiaoping Pan.

The 2007 Van Vlack Lecturer was Professor Manfred Rühle. He presented lectures on "Amorphous Grain Boundary Films in Ceramics" and "Structure of Internal Interfaces: Approaching the Atomic Level" on April 17 and 18, 2007. Professor Rühle has been the executive director at the Max-Planck-Institut für Metallforschung (MPI-MF) in Stuttgart since 1991. Professor Rühle has done groundbreaking work in developing and using quantitative high-resolution electron microscopy to understand interfaces in materials. His research addresses a range of structural issues, including grain boundaries in pure metals, semiconductors, and intermetallic or inorganic compounds, to heterophase boundaries between very different materials, particularly metal/ceramic interfaces. He has received numerous awards for scientific achievement (notably Foreign Member of the National Academy of Engineering). He was president of the German Society for Materials Science in 2001-2002, and chairman of the Scientific Council of the Max Planck Society in 2000-2003. He is on editorial boards for 10 materials journals, has published 630 papers; and supervised 60 PhD students.

Faculty Kudos

Rod Ewing received an honorary doctorate at the University of Pierre et Marie Curie.

Michael Falk received the 2008 Educator of the Year Award from the National Organization of Gay and Lesbian Scientists and Technical Professionals.

Steve Forrest received the 2007 IEEE Daniel E. Noble Award.

Ron Gibala received the 2007 MRS Woody Award for outstanding service to the society.

Sharon Glotzer received a 2006-2007 Horace H. Rackham School of Graduate Studies Faculty Recognition Award. Sharon was also the 2007 Jerome B. Cohen Lecturer in the Department of Materials Science and Engineering at Northwestern University, and the 2007 Bertman Lecturer in the Department of Physics at Wesleyan University. She completed a 3-year term on the Solid-State Sciences Committee of the National Academy of Sciences.

Rachel Goldman was promoted to professor with tenure. She also served as a member of the board of directors of the AVS, and member-at-large of the APS Forum on Industrial and Applied Physics.

Peter Green was named the Vincent T. and Gloria M. Gorguze Professor of Engineering. This year, he was a member of the board on Physics and Astronomy, National Research Council, and member of the National Research Council committee that wrote "Condensed-Matter and Materials Physics (CMMP2010):

The Science of the World Around Us." He also served as the 2007 MRS Immediate Past President.

John Kieffer received the 2007 Materials Science and Engineering Outstanding Achievement Award.

Jinsang Kim received a 2007 National Science Foundation CAREER Award and was named one of the 2007 "Emerging Investigators" by the *Journal of Materials Chemistry*.

Nick Kotov's work on "transparent steel" was named to the Top 10

Scientific Breakthroughs of 2007 by *Wired* magazine. Nick and his team (E. Arruda, A. Kaushik, A. Podsaidlo, and A. Waas) were also selected to receive the 2008 Robert M. Caddell Memorial Award from the University of Michigan. Nick's start-up company 3D Biomatrix was named a finalist the 2007 Nanochallenge business plan competition.

Joerg Lahann received the 2007 Young Investigator Award from the Nanoscale Science and Engineering Forum of the American Institute of Chemical Engineers.

MSE 250 in China



Continuing the tradition of teaching MSE in China, this past summer, Professor Yalisove traveled to Shanghai Jiao Tong University (SJTU) to teach MSE 250 – Principles of Engineering Materials, as part of the Joint Institute between SJTU and the University of Michigan. The Joint Institute was established in 2001 to provide degree programs for students at both universities. Of the students enrolled in MSE 250 during Summer 2007, 71 were from all over China and 9 from the University of Michigan.

Joanna Mirecki Millunchick was named one of the 14 under 40 DePaul alums of 2006 by the *DePaul Magazine*.

Xiaoqing Pan was named the 2007 Visiting Professor of Zhejiang University, Hanzhou, China.

Tresa Pollock received the 2007 Distinguished Alumni Award from the College of Engineering of Purdue University. Tresa also presented the 2007 Zay Jeffries Honorary Lecture at the ASM Cleveland Chapter.

Ann Marie Sastry received the 2007 Gustus L. Larson Memorial Award from Pi Tau Sigma/ASME.

Katsuyo Thornton was selected to receive the 2008 Early Career Faculty Fellow Award from TMS.

Michael Thouless was elected a 2007 Fellow of the American Society of Mechanical Engineers.

Gary Was was named the Walter J. Weber Professor of Sustainable Energy, Environmental and Earth Systems Engineering, and was the 2007 Distinguished Lecturer in the Department of Chemistry at the University of Toronto. He also served as a member of the National Academies Committee on Assessing Corrosion Education in the U.S.

Shtein Receives Holt Teaching Award



Max Shtein received the 2007 Jon R. and Beverly S. Holt Award for Excellence in Teaching from CoE. Since he arrived at U-M in 2004, Shtein

has taught a number of courses. He redesigned the senior capstone course, MSE 489 – Materials Processing Design, offered in the fall semester. The course now focuses on materials, devices, and systems for efficient, renewable energy conversion, storage, and utilization. Students in this course form teams, each addressing a portion of the energy challenge. Some focus on improved batteries, some on designing new materials and processes for producing low-cost

solar cells, while others examine the feasibility of hydrogen generation, storage, and utilization.

Shtein also introduced a new course, MSE 693 – Organic Electronics, drawing considerable interest from students in MSE, BME, ChE, Macro, ME, and EE. Since the course's introduction in 2005, Prof. Shtein has been incorporating elements of this course (e.g. organic-based solar cells or LEDs for solid-state lighting) into MSE 489 and MSE 500. The latter is a core graduate course on Solid State Physics offered in the winter semester. Mirroring the growing effort in the department in semiconductor materials for energy applications, in MSE 500, Shtein has emphasized fundamentals important in understanding the electronic, thermal, and optical properties of materials.

Jones Receives Johnson Diversity Award

Professor J. Wayne Jones received the 2007 Harold R. Johnson Diversity Service Award during a recognition ceremony and dinner, May 24, at the Alumni Center. The Harold R. Johnson Diversity Service Award was established in 1996 in honor of Harold R. Johnson, former dean of the School of Social Work. The award recognizes University of Michigan faculty members on the Ann Arbor

campus who have exhibited outstanding leadership in the area of cultural diversity and outstanding contributions to the multicultural mission of the University

The honor includes a \$5,000 award that Jones can use to further his research and teaching efforts. He plans to use these funds to improve demonstration and outreach materials used in the Van Vlack Undergraduate Laboratory.

Alpha Sigma Mu – Michigan Gamma



(L/R, starting at left top): Emma Chan, Han Wang, Samson Lai, and Sejal Tailor answer questions about MSE and recruit freshmen engineers at this year's Welcome Day.

This year, Alpha Sigma Mu (the professional honors society for materials science and engineering) has been working to gain more recognition and to become more active around the engineering campus. Within the materials science department, Alpha Sigma Mu offers both personal

and group tutoring sessions for introductory courses MSE 220/250 and MSE 350, fundamentals of materials science courses. To encourage more interaction between students in the department, Alpha Sigma Mu has put in place a new mentoring program this year, where each recently declared student is given an upperclass "mentor" from the society. These mentors give the new students a peer perspective on classes, scheduling, and methods of studying.

Recently, Alpha Sigma Mu worked jointly with the Michigan Materials Society (MMS) to host this year's annual "ASM International University Night" at the University of Michigan. At this event, undergraduate and graduate students present

research posters and have the opportunity to spend the evening interacting with professionals from the field. This year, we had a record high in attendance and participation. The winner of the 2007 poster session was Katharina Maisel, who presented her research on "Signal Amplifying DNA Microarray by Using Conjugated Polymer and Intercalating Dye for Sensitive Label-Free DNA Detection." She will be awarded an ASM International Reference Book and ASM publication for her work.

Alpha Sigma Mu also sent volunteers to Detroit for this year's MS&T Conference at Cobo Hall. Alpha Sigma Mu members served as guides at the conference's "Materials Camp" put on by ASM International, where they escorted outstanding high school students, who are interested in materials science and engineering, as they visited materials demonstrations.

For more information, please visit the Michigan Gamma chapter's new website, www.engin.umich.edu/soc/asm, which has been completely updated this academic year.

2007-2008 Alpha Sigma Mu Officers

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Vice President: Eric Sterling, asm.vicpres@umich.edu

Treasurer: Tom Carter, asm.treas@umich.edu

UMEC Rep: Kate Gallup, asm.UMECrep@umich.edu

A Little Game of Volleyball



Fall MMS picnic, held at Professor Hosford's house. Attendance was high as usual!

Michigan Materials Society



(From L to R): MMS officers Kevin Bury, Emma Chan, and Stu Smith.

This year, the Michigan Materials Society (MMS) continues to host guest speakers from industry to educate students about how materials science and engineering is integrated into the corporate world, where innovation and creativity is not only rewarded, but is the standard. Please contact Steve Coryell at steve.coryell@gmail.com if you are interested in speaking at an MMS luncheon!

The MMS officers have contributed toward supporting the development of high school students' engineering skills, as well. In conjunction with the materials science honor society Alpha Sigma Mu, MMS volunteered at the MS&T Conference's Materials Science Camp held in Cobo Hall in September of 2007.

2007-2008 MMS Officers

President	Emma Chan
Vice President	Steve Coryell
Treasurer	Stuart Smith
Secretary	Eric Sterling
Junior Representative	Samson Lai
UMEC Representative	Tom Carter
Social Chair	Kevin Bury

Fall 2007 MMS Speakers

Kathy Hayrynen
Technical Director, Applied Process Inc.

John (Chip) Keough (BSE '77)
CEO, Applied Process Inc.

Tom Cayia and Paul Horning (BSE '07)
Mittal Steel

Steve LeBeau
CEO of Thixomat Inc.

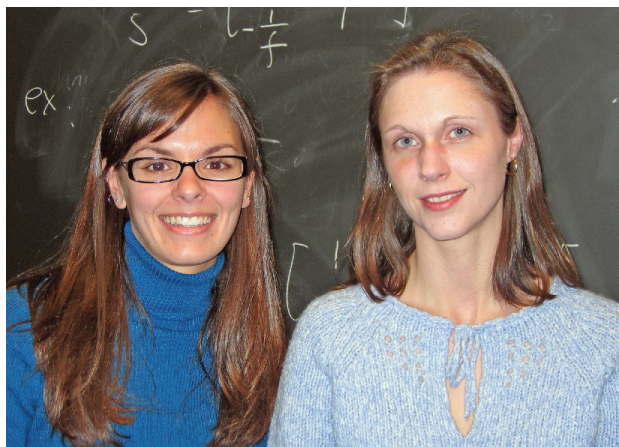
Roger Brewer (BSE '86), Robert Kaminski (BSE '84), Tim Rickard (BSE '96), and Scott Strongman (BSE '87)
US Steel

Sheila Kornlyo (BSE '06) and Laura Ely Sinclair (BSE '98)
Ford Motor Company

Brian Clayson (BSE '06)
Toyota

Mike Beffel
Vice President and General Manager, PCC Airfoils

Amanda Head (BSE '07), Angie Sheedlo, and Nate Tortorella
Kohler Co.



The Michigan Materials Society (MMS) has featured a number of our graduates as speakers at this term's luncheons. On November 2, the featured speakers were Sheila Kornlyo (Class of 2006) and Laura Ely Sinclair (Class of 1998). Sheila is currently a products materials engineer, and Laura is also a materials engineer, both at Ford Motor Company.

2007 Scholarships and Awards

Richard A. Flinn Scholarship

Da Mao
Robert Rhein
William "Andrew" Sharp

Mars G. Fontana-William C. Leslie Scholarship

Thomas Carter
Emma Chan

James W. Freeman Memorial Scholarship

Stephen Coryell
Andrew Koltonow
Tianhan Wang

John Grennan Scholarship

Sarah Behling
Samson Lai
Charles Mocer
Samanthule Nola
Paul Wolcott

Jack J. Heller Engineering Scholarship

Bradley Frieberg
Kaitlyn Scott
Denar Van Drasek

William F. Hosford Scholarship

Da Mao
Robert Rhein
William "Andrew" Sharp

Schwartzwalder Memorial Scholarship

Taylor Blair
Conlan Hsu
Andrew Lesko
Chen Zhang

Clarence A. Siebert Memorial Scholarship

Warwick Anderson
Michael Bartlett
Hailey Foco
Michael Mathieu

Claudia Ng
Ilana Riback
Simarjeet Sethi
Stuart Smith
Christopher VanDeusen
Sarah Wang
Douglas Yeung

Alfred H. White Memorial Scholarship

Tamir Arbel
David Bilby
Pieter Cook
Kaitlin Gallup
Michael Kravchenko
Eric Sterling

Brian Worth Award

Michael Bartlett

MMS Anvil Award

Emma Chan
Amanda Head

A.D. Moore

Kelly Sanderson

Distinguished Achievement Award

Undergraduate–Rene Moreno
Graduate–Lang Sui

Best Overall Doctoral Written Exam

Sibasish Mukherjee

Best Overall (Graduate) GPA (tie)

Changgua Zhen
Shuo Chen

Best Overall Teaching Assistant

Christopher Szczepanski
Nicholas Saddock

Department of Education GAANN Training Grant

Michael Aldridge
John Thomas
Michael Katz
Michael Warren

MSE Graduate Service Award for Recruiting

Lindsay Shuller
Rob Nidetz
Adam Ganuza

2007 Hosford Scholarship Awardees



(L/R): Rob Rhein, Professor Hosford, William "Andrew" Sharp. (Not pictured, Da Mao)

Rob Rhein is a junior undergraduate student in the Materials Science and Engineering Department. During the Winter 2007 term, Rob was involved in metallurgy research with Professor Tresa Pollock and graduate student Jonathan Madison. This research was concerned with the microstructural characterization of nickel superalloys. Last summer, Rob interned at General Motors, where he investigated the properties of interior materials used in GM vehicles. He is also an active member of Tau Beta Pi, through which he participates in a

Congratulations to our 2007 MSE Graduates

Undergraduate Degrees

April 2007

Thomas Carrol
Christian Catalan
Garret DeNolf
Kasra Farsad
Steven Freis
Devin Halliday
Amanda Head
Vineet Hingwe
Paul Horning
Katelyn Howay
Laura Lacasse
Chichen Liu
Juhaida Mat Usof
Andrew McCrum
Alexander Melville
Kathryn Miller
Jingga Morry
David Preston
Jason Rhode McGauley
Zachary Shemom
Mark Shevin
Jin Shi
Philip Standiford
Nathaniel Tindall
Joel Voshol

Hannah Wendt
Fan Zhao
Ryan Zhao

August 2007

Gio Bacigalupo
Christopher Fitzgerald

December 2007

Warwick Anderson
Thomas Carter
Emma Chan
Bhavya Choudhary
Eugene Chun
Lorea Coronado-Garcia
Jane Fiedler
Amanda Kerr
Michael Kirka
Michael Kravchenko
David Krug
Rene Moreno
David Nance
Simerjeet Sethi
Jennifer Wecker

Graduate Degrees

April 2007

Fang Cao, Ph.D.
Yoosuf Picard, Ph.D.
Timothy Augustin, M.S.
Carrie Bayer, M.S.
Michael Katz, M.S.
Chi Sheng Yu, M.S.

August 2007

Benjamin Furman, Ph.D.
Gaurav Gupta, Ph.D.
Xiaoxia Zhu, Ph.D.
Onas Bolton, M.S.
Christopher Hill, M.S.
Sameer Kumar, M.S.
Joseph Lai, M.S.
Jonathan Madison, M.S.

December 2007

Fabio Albano, Ph.D.
Arnold Allenic, Ph.D.
Yanbin Chen, Ph.D.
Sigrun Karlsdottir, Ph.D.
Nicholas Saddock, Ph.D.
Jessica Bickel, M.S.
Hyun Joon Oh, M.S.
Lindsay Shuller, M.S.

variety of community service activities. In his spare time, he enjoys cycling, gardening, and reading.

Da Mao is working on his bachelor's degree in materials science and engineering, with a minor in economics. He has received numerous honors and awards, and is involved in many community service projects such as building houses for Habitat for Humanity, volunteering at the Detroit Science Museum, and co-chairing the community service committee at his residence hall. He also served as a prayer leader in the Inter- varsity Chinese Christian Fellowship and

performed in the annual Huaren Cultural Show. He has held a part-time position in the department, doing research in Professor Rachel Goldman's group. During the summers, he has held internship positions at the Tyndall National Institute, Cummins Inc. and the 3M Company. He hopes to pursue a graduate degree through the Engineering Global Leadership program.

William "Andrew" Sharp is currently a third-year undergraduate student. He worked on research projects with Professor Tresa Pollock and graduate student Nick Saddock, studying the creep properties of high

temperature magnesium alloys, and with Professor Rick Laine, studying the effects of silsesquioxane-based treatment agents on mechanical properties of wood. Last summer he received a RISE fellowship and researched the sintering kinetics of metal injection molded titanium powders at the GKSS Institute in Geesthacht, Germany. He is a member of the varsity cheerleading team as well as a member and greek week coordinator for the fraternity Phi Gamma Delta.

Gifts from our Donors

January 1, 2007 to October 31, 2007

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Thank you for your generous gifts to our department or to the College of Engineering for the benefit of the department. If we have missed someone, please accept our sincere apology, and let us know so that we can correct our records.

MSE Advisory Board Meets

The MSE Advisory Board held its annual meeting during homecoming weekend. The Advisory Board currently has 14 active members from across the country representing industry and academia, large companies and small ones, material producers and end users. The group reviewed the state of the department and the new/revised undergraduate curriculum. Professors Jinsang Kim and John Kieffer presented some of their current research, which led to an interesting discussion on how industry and alumni can help support the department with start-up businesses. The group also met with students during lunch to share some experiences from their varying professional careers.

The current board is a result of a recent merger of the MSE Advisory Board and Alumni Committee. The board hopes to meet the needs of the department more efficiently by combining the diverse backgrounds and professional experiences of the members of each previous group. The first order of business is to formalize the mission, membership, and meeting objectives. Other topics of discussion and support include: the recent increase in enrollment and the strain on teaching and lab facilities; first-year graduate fellowship support; and stronger MSE representation to the college.

Stay tuned for more information from this group. Anyone interested in serving on the board can contact Peter Green at pfgreen@umich.edu.

Staff Members Retire



Judy Hyde

Two long time employees of the department, **Judy Hyde** and **Nancy Polashak**, recently retired after 17 years.

Judy served as our graduate services secretary for a number of years, and most recently as our undergraduate services secretary. Upon retirement, she and husband Bob immediately took a road trip to Alaska.



Nancy Polashak

Nancy served as our undergraduate services secretary and then receptionist for a number of years. Most recently, Nancy was responsible for purchasing research supplies and equipment for the department. She and husband Gerry are planning a trip to New Brunswick in the near future.

Hall Receives the 2007 Alumni Society Award



Jody N. Hall (BSE '84, MSE '89, PhD '94) is the winner of the 2007 MSE Alumni Society Award. Dr. Hall serves as engineering group

manager of Global Die Standards & Materials Applications at General Motors Manufacturing Engineering in Pontiac, Michigan. In this capacity, she is responsible for developing die design standards for GM worldwide.

Prior to this position, Dr. Hall held posts as engineering group manager and senior project engineer of industrial engineering at General Motors Metal Fabricating Division in Troy, Michigan. Her extensive manufacturing experience ranges from research and development of new materials and manufacturing processes to solving current production problems. Her background includes engine and transmission components, body sheet metal, stamping die design and construction, plant floor data management, and manufacturing strategic planning. A founding member of the College of Engineering's Alumni

Society, Dr. Hall served as chairperson of the Board of Governors from 1996-1999. She continues to be active in the College, focusing on mentoring and recruiting both undergraduate and graduate students.

The recipient of numerous professional awards, Dr. Hall received the GM Die Engineering Services Award for Leadership in 2005, the USCAR Special Recognition Award for Outstanding Contributions to USAMP Auto/Steel Partnership in 2004, and the General Motors Chairman's Honors Award in 2001.

Article by the College of Engineering

Alumni News

Keith Bowman (PhD '87) was recently named head of the Department of Materials Science and Engineering at Purdue University. Keith is author of the textbook *An Introduction to Mechanical Behavior of Materials*, (Wiley, 2004).

After several positions in research and development in the semiconductor industry, **Kevin Chang** (PhD '89) is currently general manager of the Taiwan regional business sector for Varian Semiconductor. One of his personal goals is to convince his sons to come to Michigan for their undergraduate or graduate degrees.

Michael Bilos (BSE '97) recently joined Material Sciences Corporation in Elk Grove Village, Illinois, as Strategic Account Manager. Mike is focused on developing Quiet Steel™ solutions for the Consumer Product Division of MSC. Besides his new job, Mike and his wife Margaret recently welcomed home their first child, Peter John.

Catherine Kuo (MSE '97, PhD MACRO and Biomaterials '02) has joined the School of Engineering at Tufts University as an assistant professor of biomedical engineering. Following graduation, she was a

postdoctoral fellow at the National Institutes of Health in the Cartilage Biology and Orthopedics Branch of the National Institute of Arthritis and Musculoskeletal and Skin Diseases, investigating the effects of gene transfer, signaling biofactors, scaffolds, and mechanical stimulation on adult mesenchymal stem cells using 3D tissue engineering models.

Chris Soles (PhD '98) received a 2006 Presidential Early Career Awards for Scientists and Engineers (PECASE), the nation's highest honor for professionals at the outset of their independent research careers.

Christopher Smith (BSE '02) recently took an associate position at Kirkland and Ellis L.L.P. in Los Angeles focusing in patent litigation.

Carl McIntyre (MSE MACRO '05) received an East Asian Pacific Summer Institute NSF Fellowship for summer 2007 in which he spent three months at Tsinghua U. in Beijing, China working with Prof. Yongang Meng on magnetorheological elastomers, an extension of his PhD thesis.

James P. Lettieri Undergraduate Award Fund

Colleagues and friends of James P. Lettieri (BSE, '97) are starting a memorial endowment fund* that will provide for an annual award to be given to a senior undergraduate student in the department. James, who passed away in 2003, was an exceptional student, researcher, friend, and colleague. It is envisioned that this award will be given to a student who exhibits many of James' qualities. You can contribute to the fund by designating your gift for the "James P. Lettieri Undergraduate Award."

** The fund constitutes a gift for endowment, and distributions will be made in accordance with the University's then existing endowment distribution policy. Any surplus distributions from the fund during any period may be accumulated for later use for the above purposes or may be added to the principal of the fund at the University's discretion.*

Please send us a news update—about your job, a recent move, milestones in your life, your accomplishments, and more. Send a note to: mse-alumni-update@umich.edu.

You make the difference

Every year we strive to offer our students in Materials Science and Engineering the best possible educational and research opportunities. Your annual gifts to the department provide the funding for that margin of excellence which prepares our graduates to compete successfully in today's world and to contribute substantially to society. We count on you to help us continue our offering of exceptional educational opportunities in our department. Please use this form to send your gift.

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