2009

2008-2009 ChE Newsletter

Department of Chemical Engineering, Michigan Technological University

ChE

Chemical Engineering
2008-2009

Michigan Technological University

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Brian & Julie Zielke
Donald & Kathleen Zielke
Mae & Gregory Zyjewski

Please contact Komar Kawatra skkawatr@mtu.edu if you have any questions.

DEAR FRIENDS,

The past year has been extremely challenging all over the world. Here at Michigan Technological University, it continues to be busy with exciting promise for the Department of Chemical Engineering in 2009. By all measures—student enrollment, donations, scholarly activity, student achievements, and diversity—the department is moving forward at a very rapid pace, as a result of the collective efforts of the faculty, staff, students, and friends. Both undergraduate and graduate enrollments are up in the past year, and the number of female students in our incoming first-year class has increased by a very substantial 68 percent.

Each semester, I speak with every incoming freshman and every outgoing student to discuss interests and concerns and work out how to address them. Many students express the desire to meet with people in industry in order to learn more about what chemical engineers do for a living. As a result of these discussions, we recently held a Workshop on Chemical Engineering Challenges and Opportunities. Company representatives came to campus and talked to our students about challenges faced by their companies, and opportunities available for students who choose to work in the field. Our guests also offered suggestions and opinions to students in a casual setting. This workshop was exceptionally well attended and much appreciated by students and sponsors alike. We plan to hold a similar workshop next year. In addition, some of the proceeds were used to help several students travel to, and participate in, the AIChE Chem-E Car competition.

Research funding is up substantially. We have received funding for several projects: The US Department of Energy awarded Dr. Michael Mullins major funding for the Center for Fundamental and Applied Research in Nanostructured and Lightweight Materials; and the National Science Foundation provided support to establish a new Advanced Sustainable Iron and Steelmaking Center, which is based in our department. In addition, several worldwide patent applications have been filed, one dealing with Biomass Utilization and the other Carbon Dioxide Sequestration. The department has developed world-class facilities for studies of industrial sustainability, and we expect to be able to attract additional research support in this area in the year ahead.

Two new faculty members have joined our department. Dr. Ching-An Peng is the first holder of the James and Lorna Mack Endowed Chair. His research interests include bio-based products, drug/gene delivery, and tissue engineering. Before coming to Michigan Tech, Dr. Peng was a full professor at National Taiwan University. Dr. Wenzhen Li comes to us from the College of Nanoscale Science and Engineering, SUNY at Albany. His area of research is electrocatalysis, fuel cells, and nanostructured materials.

What is most important to us is to make our educational program one of the best in the country and to be sure that we serve the chemical industry well. We have worked to provide our students with a good understanding of actual industry opportunities, including several class plant trips to facilities in Michigan and Wisconsin. We are always looking to improve our educational activities. Dr. Raymond Smith, a former President of Michigan Tech, recently visited and toured our Unit Operations Laboratories, providing many helpful suggestions.

This year we plan to hold a Chemical Engineering Practicum to provide students in grades nine and ten with a solid understanding of the basics of chemical engineering. This effort will focus on members of minority groups who are currently underrepresented in the chemical industry. Students will be selected based on recommendations by teachers and/or chemical engineering professionals. We envision a one-day course that starts with an hour-long session on chemical industry careers, featuring several experts in the field. Students would then break up into small groups for a series of hands-on experiments at several different stations, experimenting with fuel cells, polymer production, separations, purification, and chemical kinetics.

I welcome any suggestions or comments you have—please contact me at skkawatr@mtu.edu. Let me know if you would like to participate in any of the happenings described above.

Best wishes to you in 2009!
Dr. S. Komar Kawatra

About the department

THE DEPARTMENT OF CHEMICAL ENGINEERING at Michigan Tech is among the world's leaders in providing quality education and research. As of April 2009, we have sixteen faculty, nine staff, 325 undergraduate majors, and forty graduate students, including twenty PhD students. We are housed in the Chemical Sciences and Engineering Building at the center of Michigan Tech's campus in Houghton. We offer programs leading to the Bachelor of Science in Chemical Engineering, Master of Science in Chemical Engineering, and the Doctor of Philosophy (PhD) in Chemical Engineering.

Our mission is to provide a high-quality educational experience which prepares graduates to assume leadership roles within the chemical and associated industries; to foster the pursuit of new knowledge and innovative scholarship in the chemical sciences and engineering; and to provide leadership to the chemical engineering profession through scholarship, teaching, and service. Our facilities—including the Process Simulation and Control Center, Hazards Laboratory, and Carbon Technology Center—are state-of-the-art. Our new BASF and Kimberly-Clark classrooms offer multimedia equipment, videoconferencing, and audiovisual technology.

Our Faculty

Our world-class faculty have published nationally recognized textbooks on safety, environmentally sensitive engineering, rheology, and polymer engineering. They have won numerous honors for their achievements in research and teaching, including the A.M. Gaudin Award for Mining, Metallurgy and Exploration from the American Institute of Metallurgy, the Norton H. Walker Award from the American Institute of Chemical Engineers, and Michigan Tech's Distinguished Teaching Award.

Faculty research areas include chemical process design, polymers, advanced process control, chemical process safety, minerals processing engineering, catalysis and particulate processing, environmental engineering, polymer rheology, biochemical engineering, as well as alternative energy and sustainability. We also offer one of the only dedicated technical communication courses for chemical engineering in the US.

Chemical Engineering Faculty

Gerard T. Caneba, PhD
University of California-Berkeley
Carbon nanotube/polymer composites precipitation polymerization

M. Sean Clancey, PhD
Michigan Technological University
Technical communications

Tomas B. Co, PhD
University of Massachusetts
Process integrity, process modeling, plant-wide control

Daniel A. Crowl, PhD
Herbert H. Dow Professor for Chemical Process Safety
University of Illinois
Chemical process safety

Joseph H. Holles, PhD
University of Virginia
Pseudomorphic overlayer catalysts, encaged heteropolyacids

S. Komar Kawatra, PhD
University of Queensland, Australia
Iron and steel making, particle technology

Jason M. Keith, PhD
University of Notre Dame
Fuel cells, alternative energy, pollution control modeling, composite systems, engineering education

Julia A. King, PhD
Mechanical Engineering, University of Wyoming
Thermally and electrically conductive resins, composites

Wenzhen Li, PhD
Chinese Academy of Sciences
Electrocatalysis, fuel cells, nanostructured materials

Faith A. Morrison, PhD
University of Massachusetts
Rheology of complex systems, chemical engineering education

Michael E. Mullins, PhD
University of Rochester
Environmental kinetics and thermodynamics, engineered nanostructures

Ching-An Peng, PhD
James and Lorna Mack Endowed Chair
University of Michigan
Drug/gene delivery, nanobiotechnology, cellular/tissue engineering

Tony N. Rogers, PhD
Michigan Technological University
Environmental thermodynamics, process design and simulation

John F. Sandell, PhD
Michigan Technological University
Fire protection and environmental engineering

David R. Shonnard, PhD
Richard and Bonnie Robbins Chair
in Sustainable Materials
University of California, Davis
Biological engineering, alternative energy, sustainability

Research Scholars

Xie Bo, PhD
Process safety

Sandra Lucia Moraes
Pelletization

Martin Hermus
Fuel cells

Ching-An Peng selected as James and Lorna Mack Endowed Chair

THE DEPARTMENT OF CHEMICAL ENGINEERING at Michigan Tech is pleased to announce the appointment of Professor Ching-An Peng as the first holder of the James and Lorna Mack Endowed Chair.

Peng comes to Michigan Tech from the National Taiwan University School of Engineering. His research interests include bio-based products, drug/ gene delivery, nanomedicine, and tissue engineering. He earned a BS in Chemical Engineering at National Taiwan University in 1985; an MS in Chemical Engineering at the University of Notre Dame in 1990; and a PhD in Chemical Engineering at the University of Michigan in 1995. After earning his doctoral degree, he worked as a joint postdoctoral fellow at the University of British Columbia and STEMCELL Technologies.

In 1997, Peng started his assistant professorship at the University of Southern California in the Chemical Engineering Department. Since 2003, he has been promoted as an associate professor of chemical engineering and materials science with tenure. After taking his sabbatical leave in 2005, he joined the Department of Chemical Engineering at the National Taiwan University with the rank of full professor. He has published more than fifty papers, holds two patents, and sits on the Editorial Advisory Board of the *Open Biotechnology Journal*.

Michigan Tech chemical engineering alumnus James A. Mack '59 and his wife, Lorna, donated $2 million to establish an endowed chair in cellular and molecular bioengineering. They are dedicated to helping Michigan Tech achieve its vision—to grow as a premier research university of international stature, delivering education, new knowledge, and innovation for the needs of our technological world.

Mr. Mack recently retired as president and chief executive officer of Cambrex Corporation, a developer and marketer of specialty chemicals. His company has successfully combined biology with engineering—especially in the rapidly emerging field of tissue engineering and cell therapy, and the development of small molecule therapeutics. He is a native of Mackinaw City, Michigan, and received his BS in Chemical Engineering from Michigan Technological University in 1959. Mr. Mack is also a trustee of the Michigan Tech Fund, a member of the President's Club, and serves on Michigan Tech's National Advisory Board.

L to R Komar Kawatra, Lorna Mack, James Mack, Ching-An Peng, Glenn Mroz

Please join us for a welcome reception at 2 PM on Thursday, August 6, at Michigan Tech's Rosza Center. RSVP 906-487-3132

Jason Keith honored with ASEE Raymond W. Fahien Award

ASSOCIATE PROFESSOR JASON KEITH received the 2008 Raymond W. Fahien Award from the American Society for Engineering Education (ASEE) at their annual meeting held in Pittsburgh, Pennsylvania.

The award is given in honor of Raymond W. Fahien, who was editor of the archival journal, *Chemical Engineering Education,* from 1967 to 1995. The award is based upon two equally weighted criteria: outstanding teaching effectiveness in the training of undergraduate and/or graduate students and educational scholarship through contributions to education in the field of chemical engineering.

"I consider engineering education to be my hobby, and it is an honor to be recognized by my peers for my hobby," said Keith in his awards speech. "I would like to thank the Lord for giving me the opportunity to do what I love. I would like to recognize the support of Michigan Technological University, and especially the Department of Chemical Engineering, for their support during the past eight years. I would also like to thank my colleagues around the country who wrote letters of support for my application. Finally, I would like to thank my wife and three children. I am blessed to have them."

Keith has written two book chapters, two journal publications, and sixteen conference publications in the field of engineering education.

"I always enjoy attending the American Society for Engineering Education annual meeting. It is held in mid-to-late June, a perfect time to recharge my teaching batteries," notes Keith. "Every year I try to take home one or two small things to improve my teaching effectiveness. At the same time, it gives me an opportunity to talk in an international meeting about the wonderful things that we do at Michigan Tech to provide one of the best chemical engineering undergraduate experiences in the world."

Jason Keith

A few years ago, Keith decided to throw away all of his lecture notes and totally revamp his mainline course, Transport II. "I now use the traditional lecture style just to provide enough information to the students and then turn the learning over to them—usually in the form of an in-class problem." Keith circulates around the room to make sure students are making progress on the problem. "Even though I have read the literature, which shows that active learning has immediate benefits for students, I have been amazed with student performance on my homework and exams."

Keith is also an active researcher in the chemical engineering fields of emissions control, fuel cells, and alternative energy.

Michigan Tech's Strategic Faculty Hiring Initiative: David Shonnard and Wenzhen Li

IN A BOLD, FIRST-EVER strategic faculty hiring initiative (SFHI) that cuts across academic disciplines to focus on a research theme, last August Michigan Tech named three professors to endowed chairs and hired seven additional new faculty members. Their research focuses on sustainability.

Sustainability is already a central theme of research across many disciplines at Michigan Tech. The University's goal is to make Michigan Tech a world leader in creating and communicating the science and technology necessary to support a sustainable future.

A committee representing all of Michigan Tech's colleges and schools crafted a unique hiring and selection process that incorporated evaluation of candidates by existing faculty whose interests were close to those of the applicant, and invited feedback on the live and videotaped presentations of the candidates by the entire University community. The goal was to ensure that the faculty selected would be the very best, regardless of their academic field.

DAVID SHONNARD, professor of chemical engineering, was named to a Robbins Chair in Sustainability. Shonnard, who came to the Department in 1993, was recently named one of four Tech faculty members in the state's first Center of Energy Excellence. He is the deputy director of the University's Sustainable Futures Institute, and a founding participant in Michigan Tech's Wood-to-Wheels research initiative, in which he works on the development of processes to produce more efficient and cleaner-burning ethanol from wood and other forest-based biomass.

David Shonnard

One of Shonnard's goals is to improve all of the processing steps needed to convert woody biomass resources to liquid fuels by fermentation. "Biofuels for transportation from sustainably harvested forest resources could establish a closed cycle of carbon, and thereby reduce human impacts on climate change," he explains. "These fuels would not compete with scarce food resources as other biofuels do." Future commercial biorefineries will process mixtures of woody species. Research to understand mixture effects on sugar yields has been completed. However, other aspects pose challenges: Enzymes called cellulases that convert cellulose in wood to sugars are frustratingly slow in nature.

Shonnard's research team is isolating the genes for those enzymes from naturally occurring microorganisms, approaching the problem using recombinant DNA techniques to engineer the enzymes to be much more active and specific in their reactions in converting cellulose to sugars.

> THE GOAL WAS TO ENSURE THAT THE FACULTY HIRED WOULD BE THE VERY BEST, REGARDLESS OF THEIR ACADEMIC FIELD.

WENZHEN LI, assistant professor of chemical engineering, came to Michigan Tech last August from the College of Nanoscale Science and Engineering at the State University of New York–Albany.

Wenzhen Li

Li works with proton exchange membrane fuel cells (PEMFCs), a renewable electrochemical energy device, which can efficiently convert chemical energy stored in hydrogen or methanol into electrical energy, with zero emissions. More specifically, his current research focuses on design, synthesis, and characterization of nanostructured materials as highly active and durable electrocatalysts for PEMFCs. Li was a Packard Foundation postdoctoral researcher in the Department of Chemical and Environmental Engineering at University of California-Riverside, as well as a part-time researcher at the Pacific Fuel Cell Corp in Riverside. He did additional postdoctoral research at the Clean Energy Research Center, University of Yamanashi, Japan. In 2003 he won the President Scholarship Excellence Award from the Chinese Academy of Sciences.

Camelina seed oil shows promise as jet fuel

JET FUEL MADE with the oilseed crop camelina could cut greenhouse gas emissions by up to 84 percent compared with jet fuel from petroleum, according to Professor David Shonnard. He recently completed a study in conjunction with Michigan Tech's Sustainable Futures Institute. The research was funded by UOP LLC and Targeted Growth Inc. and was conducted on jet fuel derived from camelina seeds developed by Sustainable Oil, a Bozeman, Montana company.

Camelina, a member of the mustard family, can be grown in more arid climates compared to many other plants that oil is derived from. Targeted Growth Inc. has identified five million acres across the country where camelina would be suitable as a rotation energy crop that would not interrupt food production. This could produce approximately 800 million gallons of camelina oil for conversion to renewable diesel or jet.

Shonnard, along with then master's student Ken Koers, conducted a life cycle analysis comparing camelina with petroleum. They factored in greenhouse gas emissions from fertilizer production and use; growing and harvesting; oil recovery and conversion to jet fuel; and the use of the camelina jet fuel in application. "Conventional camelina, that is camelina grown with current seed stock, can cut greenhouse gas emissions by 60 to 70 percent with no loss of performance for the fuel," says Shonnard.

The 84 percent reduction in greenhouse gases was based on a new strain of camelina, one that needs less fertilizer and yields more pounds per acre. "Next generation biofuels are true hydrocarbons and on a molecular level indistinguishable from fossil fuels," he notes.

New center opens for fundamental studies of advanced sustainable iron and steel making

PROFESSOR S. KOMAR KAWATRA, chair of the Department of Chemical Engineering, has recently founded the Advanced Sustainable Iron & Steel Making Center (ASISC). The National Science Foundation-funded, industry-University cooperative research center will operate as a partnership between Michigan Tech and the University of Utah, with Michigan Tech serving as the lead institution. Its goal is to improve sustainability in the iron and steel industry by making maximum use of renewable resources and developing innovative methods to prevent pollution and reduce emissions while increasing energy efficiency. Thirteen companies have already committed to participating.

Kawatra's primary areas of research are instrumentation and online analysis for monitoring and control of chemical and particulate process plants, as well as treatment/remediation of chemical and industrial wastes. He has served as principal investigator on twenty-two funded research projects, and he has received eight awards for his research. He has authored or edited numerous books and over 150 technical publications.

"My general philosophy is to carry out research in close cooperation with industry—and to make sure that all of my students start with fundamental research, and carry it all the way to implementation in operating plants," he says.

Kawatra serves as editor-in-chief of the *Minerals & Metallurgical Processing Journal* and the *Mineral Processing & Extractive Metallurgy Review Journal.*

For more information on the Advanced Sustainable Iron and Steel Making Center, visit www.chem.mtu.edu/asisc.

Advanced
Sustainable
Iron & Steel Making
Center

US Department of Energy funds fuel-cell materials research

MICHIGAN TECH'S CENTER for Fundamental and Applied Research in Nanostructured and Lightweight Materials has just been awarded $1.23 million in continuing funding from the US Department of Energy, bringing its total DOE support since 2004 to nearly $3 million.

The center had its genesis almost nine years ago, when Chemical Engineering Professor Michael Mullins was tapped to serve on a National Academy of Sciences review panel charged with evaluating America's transportation energy needs for the 21st century.

Super-clean hydrogen fuel cells seemed like a perfect alternative to greenhouse-gas producing internal combustion engines, but the panel identified some major shortfalls. "We determined that the main problem with fuel cells was the materials," says Mullins. Specifically, they rely too heavily on precious metals, including platinum, to be affordable. The polymer electrolyte membrane, a key part of a fuel cell, also needed to function better at high temperatures and to better dissipate the main byproduct: water. To do that, different materials needed to be developed. And since current fuel cells are fairly heavy, making the components lighter is advantageous.

Armed with this intelligence, Mullins wrote a proposal for a Michigan Tech research center that would focus on using better materials to build better fuel cells. Since it received its first $1.1 million in 2004, the center has assembled the talents of several researchers working on a variety of projects.

Chemistry Professor Bahne Cornilsen and Chemical Engineering Professor Tony Rogers have developed a nickel hydroxide battery electrode that can deliver more power than the batteries now in use at half the weight. Chemical engineering faculty members Julia King and Jason Keith, along with Jeff Allen, an assistant professor of mechanical engineering, are experimenting with designs and materials to lighten fuel cells and improve water management. Stephen Hackney, a professor of materials science and engineering, contributes his expertise in lithium ion batteries.

Michael Mullins

Mullins is working on new, more heat-tolerant materials to replace the polymer electrolyte membrane. Joe Holles, an assistant professor of chemical engineering, is studying a new class of metal electrodes that show promise as a replacement for platinum. And, in a research spinoff, Ryan Gilbert, an assistant professor of biomedical engineering, is working with his post-doc researcher, Han Bing Wang, on nanofibers that could be used as a lattice to regenerate nerve fibers. That work is being conducted in cooperation with Johns Hopkins University.

U.S. DEPARTMENT OF ENERGY

Hydrogen curriculum development expands at Michigan Tech

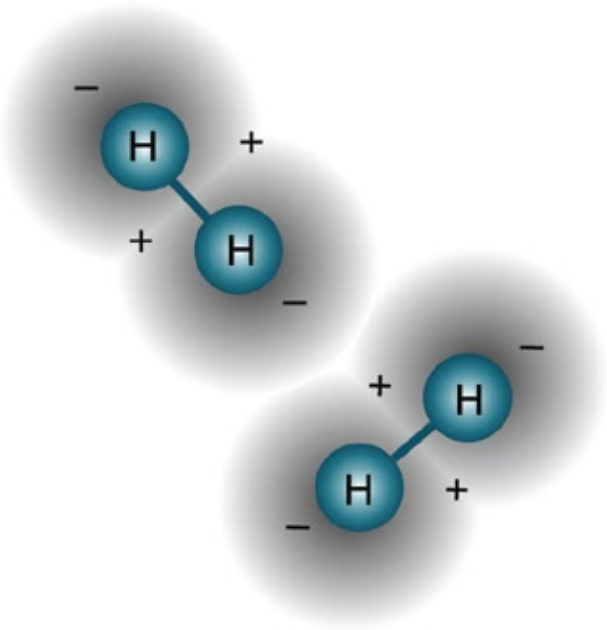
ASSOCIATE PROFESSOR JASON KEITH is leading a team of Michigan Tech faculty and staff on a US Department of Energy project entitled "Hydrogen Education Curriculum Path at Michigan Technological University."

The DOE has awarded the University $375,000, with $107,244 in matching funds coming from Michigan Tech. Participating faculty and staff include: Professor Daniel Crowl and Dave Caspary, chemical engineering; Associate Professor Jeff Naber and Assistant Professors Jeff Allen, Abhijit Mukherjee, and Dennis Meng, mechanical engineering; Associate Professor John Lukowski, electrical engineering; Professor Barry Solomon, social sciences; and Jay Meldrum, Michigan Tech Keweenaw Research Center.

"Our first goal is the development of courses specifically related to hydrogen technology for undergraduate and graduate students," Keith explains. One new course, Hydrogen as an Energy Carrier, overviews traditional and alternative energy sources, with an added emphasis on generation of hydrogen for use in fuel-cell applications. Hydrogen policy issues will also be addressed.

Hydrogen Measurements Laboratory, another new course, features hydrogen safety training, hydrogen measurements, fuel-cell operation and analysis, and investigation of other hydrogen-related technologies. The project will also refine two existing fuel-cell courses at Michigan Tech. These courses are CM 3974 Fuel Cell Fundamentals (1 credit) and MEEM 4990/5990 Fuel Cell Technology (3 credits), which introduce the basics of fuel cells and calculation of important parameters for fuel-cell operation.

A second goal is the development of hydrogen technology-related course material for core courses currently within chemical engineering, mechanical engineering, and electrical engineering curricula. Many



of these "modules" are available online at www.chem.mtu.edu/~jmkeith/fuel_cell_curriculum. They are partially supported by the CACHE (Computer Aids for Chemical Engineering) Corporation.

The third goal of the project is to develop detailed hydrogen curriculum for three required chemical engineering courses: Fundamentals of Chemical Engineering 1; Transport and Unit Operations 1; and Transport and Unit Operations 2.

Last, but not least, a final goal is integration of the new courses and course material into the Alternative Fuels Group Enterprise, a project-based program unique to Michigan Tech. For more information on the team, check out their website at www.enterprise.mtu.edu/afg.

Karen Mikkola Swager presented with Presidential Council of Alumnae Award

DEPARTMENT OF CHEMICAL ENGINEERING advisory board member, Karen Mikkola Swager, has been inducted into Michigan Tech's Presidential Council of Alumnae (PCA). Members of the PCA are recognized for achievements in a number of areas—educational excellence, professional accomplishments, past student service, current community service, University support, and other personal successes. The PCA's main responsibility is to advise the president on campus climate issues and to provide suggestions for enhancing the University's environment for students, especially women.

Mikkola Swager graduated in 1992 from Michigan Tech with a bachelor's degree in metallurgical and materials engineering. She went on to earn a master's degree in metallurgical and materials engineering in 1994.

She started her career in 1994 as a plant metallurgist and shift supervisor in the fertilizer division of Cargill Corporation. Over the next ten years, she held several supervisory and managerial positions at Cargill. In 2004, Cargill Crop Nutrition and IMC Phosphates merged to form Mosaic Company. At the time of the merger, Mikkola Swager was an engineering manager, responsible for four phosphate mining operations, including management of a $38 million budget.

Now a veteran with over fourteen years in the fertilizer industry, Karen is the manager of mine strategy and execution for Mosaic Company, Mosaic Phosphates MP Inc. In this capacity, she is responsible for developing and executing strategies for medium- and long-term mining and for developing mine alternatives for existing and future mines. In 2007, Karen was named a "Hero of the Phosphate Industry" by the Society for Mining, Metallurgy and Exploration (SME). She is the first woman to receive this award from the society, chosen for her years of service to the phosphate industry, the community, and the local chapter of SME, which she headed for two years. Karen is

Karen Mikkola Swager and Lesley Lovett-Doust

also active on advisory committees at the Florida Institute of Phosphate Research and has been an organizer and co-chair of the Beneficiation of Phosphates Conference and the Florida Regional Phosphate Conference. Karen is a licensed Engineer in the State of Florida.

While a student, Mikkola Swager was a member of the Society of Women Engineers, chairing several committees and serving as president. Starting as a staff writer for the *Lode*, Karen worked through the ranks to news editor, business manager and finally, editor-in-chief.

She also served on the Presidential Student Advisory Board and the President's Cabinet.

Active in her community, she is on the school board for the St. Paul Lutheran School in Lakeland, Florida, and also teaches kindergarten Sunday School. She and her husband, David, live in Lakeland, Florida. They have six children.

Metz earns academic award from *ESPN The Magazine*

Andrea Metz

ANDREA METZ, who graduated with a BS in Chemical Engineering in spring 2008, was named to the *ESPN The Magazine* Academic All-District Team for cross country and track and field last June.

"Andrea embodies what a student-athlete should be," said Director of Athletics Suzanne Sanregret. "This award represents all the hard work she puts in both athletics and academics."

Metz, a 3.99 student in chemical engineering, won the 1,500-meter run at the GLIAC Championships in a school record time of 4:38.33. Her time also provisionally qualified her for the NCAA Track and Field Championships. The Marathon, Wisconsin, native also ranks fifth in school history in the 3,000-meter run (10:31.20) and eighth in the 5,000-meter run (18:35.86). Metz joins Rachelle Malette of Wayne State as the only athletes (men or women) to be named to the first team for cross country and track and field. To be nominated, a student-athlete must be a starter or important reserve with at least a 3.20 cumulative GPA (on a 4.0 scale).

Metz was the recipient of no less than seven scholarships while at Michigan Tech. She now works in Rothschild, Wisconsin, as a chemical engineer for the Siemens Corporation.

ANDREA EMBODIES WHAT A STUDENT-ATHLETE SHOULD BE.

David Edwards elected to the Order of Arts and Literature of France

DAVID A. EDWARDS '83, author and Gordon McKay Professor of the Practice of Biomedical Engineering, School of Engineering and Applied Sciences at Harvard University, has been elected to the Order of Arts and Literature of France. He recently received the knighthood designation Chevalier de l'Ordre des Art et es Lettres, recognizing his contributions to the arts and literature.

David Edwards

Edwards's artistic work includes his founding and direction of Le Laborartoire, (ww.lelaboratoire.org) a new innovation space in downtown Paris, where artists and scientists perform collaborative experiments. The outcomes of these experiments are exhibited to the public in the form of contemporary art and design installations. Since its opening in October 2007, Laboratoire exhibitions have attracted broad international attention, with exhibition themes ranging from contemporary art, to industrial design, to humanitarian advocacy.

The principal of Le Laboratoire as an artscience catalyst for innovation is described in David's recent book, *Artscience: Creativity in the post-Google Generation* (Harvard 2008), which draws on the experience of many contemporary innovators in Boston and internationally. His French novel, *Niche (Ecole de Beaux Arts de Paris)*, co-written with novelist Jay Cantor, is the first of a series based on creation at Le Laboratorie. For more info, check out the website at www.lelaboratoire.org.

Educational assessment and improvement efforts

The Accreditation Board for Engineering and Technology (ABET) is a non profit organization that certifies the quality of US undergraduate degree programs in applied science, computing, engineering, and technology. Associate Professor Faith Morrison is leading the department's efforts to assess our educational programs as we undergo a major ABET review during the 2009-2010 academic year. Many readers of this newsletter have already graciously responded to requests by Dr. Morrison to provide survey responses and review student assignments. More such responses will be needed over the coming months to help the department renew its ABET accreditation.

Candid feedback from friends of the department is the lifeblood of our assessment efforts. We welcome improvement opportunities for the department's educational programs, and we strive to educate students that are prepared and capable. In addition to assessment activities, Dr. Morrison and Academic Advisor Katie Torrey are providing guidance to help each student chart a personalized curriculum path that suits the student's interests and goals. Comments on our course offerings, the technical content of our curriculum, and student preparedness are welcome and can be directed to Dr. Morrison at fmorriso@mtu.edu.

Noel Scrivner receives DuPont Lavoisier Medal

NOEL C. SCRIVNER is the 2008 recipient of the Lavoisier Medal for Technical Achievement, awarded to DuPont scientists and engineers who have had a career of outstanding achievements in their chosen fields.

Scrivner, a retired DuPont Fellow for Engineering, built a competency in DuPont on thermodynamics of aqueous systems. He is a recognized international authority, and made valuable contributions across many DuPont businesses, particularly DuPont Titanium Technologies.

Since 1991, DuPont has been one of the sponsors of a long-running project in Michigan Tech's chemical engineering department to compile, measure, and evaluate chemical property data under the auspices of AIChE's Design Institute for Physical Properties (DIPPR). For much of this time, Scrivner has been a technical representative on the project's steering committee, and he has recently served as the committee's chair.

"Over the years, Noel has been a great friend of the department," says Associate Professor Tony Rogers. "He has worked with our research group to assemble chemical property data needed by industry under the new EU regulatory framework called REACH—Registration, Evaluation, Authorization and Restriction of Chemicals."

A hallmark of Scrivner's career has been mentoring fellow engineers and using collaborative research with universities and institutes to expand knowledge in the field.

Scrivner earned a PhD in Chemical Engineering at Carnegie Mellon. He is internationally recognized as an authority on using aqueous electrolyte thermodynamics to solve problems in manufacturing processes, waste treatment, and environmental remediation. He co-authored the *Handbook for Aqueous Electrolyte Thermodynamics*.

"The Lavoisier Medal is the highest honor that scientists and engineers can aspire to," said DuPont Senior Vice President and Chief Science and Technology Officer Uma Chowdhry.

Want to make a gift to the Department of Chemical Engineering?

ALTHOUGH MICHIGAN TECH is a state institution, it receives less than one-third of its funding from state appropriations. Your gift helps keep our department on the cutting edge. There are three ways to give:

Use Michigan Tech's online gift form at www.mtf.mtu.edu/gift. • Call the Michigan Tech Fund at 906-487-2310. • Mail a gift to the Michigan Tech Fund using the enclosed envelope. • In order to make sure 100 percent of your gift goes to the Department of Chemical Engineering, please specify chemical engineering account #3198. Many, many thanks!

2008 Industrial Advisory Board attendees

The Department of Chemical Engineering Industrial Advisory Board (IAB) met on campus at Michigan Tech last October 2008. The agenda included discussions with chemical engineering students. The next IAB meeting is scheduled for September 31–October 1, 2009.

Karen Mikkola Swager
Mosaic

James Sanderson
Dow Corning Corp.

Mary Korppi
Newmont Mining Corp.

Gene Chamberlain
Archer Daniels Midland

Chris Gosling
UOP, LLC

Mark Mleziva
Kimberly-Clark Corp.

Dave Reif
Emerson Processing

John Wright
Pfizer Inc.

Donald Dixon
Distinguished Academy Member

Tom Prausa
3M

Scott Truscott
Dow Chemical Corp.

Joshua J. Carlson, a PhD student in chemical engineering, received the Exceptional Graduate Student Leader Award for 2009. Carlson was chosen for the award by the Michigan Tech Graduate Student Council. "Whether he is presenting his graduate research at a technical conference or greeting the family of a prospective undergraduate student, Josh represents the department very well. He has a rare combination of a down-to-earth personality, exceptional technical ability, and reliability," observes Executive Committee Chair Tony Rogers.

Convocation 2009

THE CONVOCATION is held each year to honor graduating seniors, as well as to recognize the support of industrial partners, alumni, and friends. Drs. Tony Rogers and Faith Morrison served as masters of ceremony at the event, which took place in the Memorial Union Ballroom on April 8.

Ms. Susan Lewis '87, global manufacturing director, Dow AgroSciences Division, gave the keynote speech. Lewis is responsible for Dow production facilities in the US, India, South Africa, and England. In this role, she works with the division's business teams to implement the strategy of the individual units and to provide a safe and sustainable supply of products for customers. She started in Dow Chemical after graduating from Michigan Tech and has worked in several different areas, including Ag Chemicals, Cellulosics, Emulsion Polymers, and Polyglycols and Surfactants. She and her husband, Ray Lewis '87 recently moved back to the US after working on international assignment in Europe. They have three sons.

Susan Lewis

"You've all worked very hard, now take time to celebrate your success," said Lewis during her speech. "Take a moment to thank your parents. In fact, my father, a Michigan Tech alumnus, is here with me today. We drove up here together with my son, who also graduated from Tech last year."

In her twenty-two years with Dow, Lewis has worked in eighteen countries and five business units. She offered some thoughtful words of advice to graduating seniors:

"First, be uncomfortable. There's a steep learning curve in this field. Keep a part of that feeling, not every day but enough to keep you on your toes. Decide where you need to grow and propose new ideas to your employers. You don't want to be so comfortable that you stop learning.

"Second, embrace foundational learning—this learning first came from your parents and your family and through your schooling over the years. It also came from Michigan Tech. But where does the next layer come from? It's you. Enhance your own education. Remember that each new learning situation, no matter how desirable or undesirable, is an opportunity.

"Last but not least, be aware of the world around you. That means world news and world problems. As an engineer, you're a problem solver. You will play a role in the world economy and the standard of living for people across the globe. Your decisions will impact many people even though you don't realize it right now."

DECIDE WHERE YOU NEED TO GROW AND PROPOSE NEW IDEAS TO YOUR EMPLOYERS. YOU DON'T WANT TO BE SO COMFORTABLE THAT YOU STOP LEARNING.

Awards

L to R Daniel Fisher, Tony Rogers, Heather Chaillier, Dave Caspary

TEACHER OF THE YEAR
Dr. Tony Rogers
and Mr. David Caspary

RESEARCH MENTOR OF THE YEAR
Dr. Tony Rogers

TEACHING ASSISTANT OF THE YEAR
David J. Wiegand

PAWS *(Prevent Accidents With Safety)* AWARDS

Spring Semester
Tiffany Pashby
Brittany Richert
Brian Schanhals
David Sharp
Michael Spliedt
Lee Sullivan

Fall semester
Heather Chaillier
Elizabeth Haibel
Crystal Higginbotham
Melissa Lewis
Tiffany Pashby

MARIOTT W. BREDEKAMP AWARD

Sponsored by Dow Chemical, this award recognizes outstanding performance in the Chemical Engineering Unit Operations Laboratory.

Brandon Gay
Rebecca Heimerl
Kyle Mick
Daniel Durbin

KIMBERLY-CLARK COMMUNICATIONS AWARD
Melissa Lewis

KIMBERLY-CLARK PROFESSIONAL ETHICS AWARD
Jasween Jagjit Singh

DAVIS W. HUBBARD PLANT DESIGN TEAM AWARD

Sponsored by UOP, this is award is given to the outstanding team in Chemical Engineering Plant Design during each academic year. It recognizes technical ability, consideration of the safety and environmental aspects of process design, outstanding written and oral communication skills, and overall teamwork and professionalism

Daniel McGrath
Brian Schanhals
David Sharp
Michael Spliedt

EXEMPLARY SERVICE AWARD
Brittany Richert, for working for three years in the Department office.

AIChE STUDENT CORNER
CHEMICAL ENGINEERING DEPARTMENT FESTIVITIES

Chem. Eng. department picnic

Despite the uncooperative weather, last year's department picnic went off without a hitch. Approximately seventy students and faculty showed up during the three-hour event. The grills were fired up early, hot dogs and hamburgers were cooked, and the faculty supplied desserts. After the food was served, a variety of intense games took place, ranging from Bocce Ball to Catch Phrase. Overall, the picnic was a hit. Our next picnic? Early Fall 2009. Consider yourself invited! Call 906-487-3132 for more info.

Industry reps share pointers with students

The Department hosted an on-campus "Challenges and Opportunities" event for students last fall prior to the Michigan Tech Career Fair. Professional engineers from Archer Daniels Midland, Dow Corning, Grain Processing Corp., Kimberly-Clark, and Mosaic spoke informally about the companies they choose to work for, decisions they've made, and the resulting impact on their careers—things you won't know until you have been there. The event is being planned again for Fall 2009. If you are interested in participating, contact Chris Abramson, cmabrams@mtu.edu.

One of eight teams at this year's chemical engineering golf outing. *From left to right:* Dan Fisher, Katie Roxbury, Colin Crabb, Spencer Doyle.

President of Michigan Tech's AIChE chapter Heather Chaillier *(left)*, and Vice President Beth Haibel *(right)* at the K-Day celebration at McLain State Park.

One can never get enough oobleck

Keweenaw Day (K-Day) 2008 was held outside at McLain State Park. This was the first time it has been held at the park since 2005 due to poor late summer weather. AIChE created oobleck, a non-Newtonian fluid, and samples were available at the booth for students to explore how a non-Newtonian fluid behaves. The oobleck was made using water and cornstarch donated by Grain Processing Corporation. This event helped to attract many new members to the organization, almost tripling the current membership.

HAPPENINGS

Presentations

- Bemis Corporation
- Amway
- Hemlock Semiconductor/ Situational Leadership
- Graduate School by Dr. Jason Keith

Plant trips

- Georgia Pacific
- Keweenaw Brewing Company

Conferences

- AIChE National Conference
- Chem-E Car Safety Conference in Philadelphia, Pennsylvania

Student tours

Senior members of AIChE gave tours of the Unit Operations Laboratory to chemical engineering underclassmen to help get them excited about the years to come.

About the Chem-E Car

THE CHEM-E CAR is a chance for undergraduates in chemical engineering to experience using what they've learned in classes in a real-world situation. They use the techniques learned in Kinetics, Transport, Process Control, and even Introduction to Engineering.

The objective is to create a small vehicle that will be powered and controlled by a chemical reaction. This means a vehicle that will fit in a "large shoe box" and a chemical reaction stopping the vehicle once it reaches a given distance. The cars are also given a payload of water to further test the reliability of the chemical drive and stopping systems.

Chem-E Car teams are comprised mainly of AIChE members. This means that members get to reach outside of the chemical engineering field and get practice in mechanical and often electrical engineering.

Teams from across the nation compete in regional competitions in the spring, and qualifiers from regional competitions continue on to compete at the Annual AIChE conference in the fall. This means that Chem-E Car team members get the opportunity to travel to other colleges in the region, and possibly even across the country. Michigan Tech's Chem-E Car team has been to Akron, Chicago, Philadelphia, San Francisco, and Salt Lake City.

FUNDING

If you would like to fund AIChE for activities such as Chem-E Car, plant tours, or regional conferences, please contact Dr. Komar Kawatra at skkawatr@mtu.edu.

The secret to their success

Consumer Product Manufacturing (CPM), hosted by the Department of Chemical Engineering and advised by Drs. Tony Rogers and Sean Clancey, took first place among the thirty-two Enterprise teams competing at the 2009 Undergraduate Expo in April.

CPM has won the Enterprise competition at the Expo no less than five times over the past nine years. What is the secret to their success? Actually, there is no single secret, but a number of factors continue to make the CPM Enterprise attractive to students and sponsors.

Front row, left to right: Alex Ash (3M project vice-president), Megan Cook (secretary), Ahmed Bahabry (3M project financial team manager), Scott Docsa (3M project quality team manager), Zachary Lemieux (operations manager, Expo team leader), Dr. Tony Rogers (advisor). *Back row, left to right:* Dr. Sean Clancey (advisor), Joseph Korepta (KBC project vice-president), Ben Kusterer (president), Alex Sedlacek, Bryan Belvin, Isabel Wescoat (3M project process team managers). *Not shown:* A'Lisa Krawciw.

PROJECT VARIETY

CPM's purpose is to explore the steps required to design and manufacture products that are new to the consumer market. Typically, CPM students begin a new project by brainstorming product ideas. The ideas are reviewed and constrained to those that can be designed, prototyped, and tested at Michigan Tech. This review process further prioritizes the ideas by looking at the end business and consumer benefits. Manufacturing requirements, market and IP research, consumer use studies, and profitability analyses assist in selecting a class project. The result is a business plan or project proposal submitted to a potential sponsor. By following this process, CPM students learn to combine traditional engineering work with an awareness of business and economic motives. CPM students talk directly with sponsors to secure funding for proposed projects. Our current sponsoring partners are 3M, along with the local Keweenaw Brewing Company, with locations in Houghton and South Range.

STUDENT OWNERSHIP

CPM students pick their projects and define the path to success. Their ideas are valued and encouraged within the Enterprise. A lot of effort by the students goes into improving their CPM Enterprise and positioning it for future success.

ACCOUNTABILITY

CPM students are accountable to each other and to their team leaders and executive officers. An environment is created in which each person is expected to contribute so that the big goals are achieved. The students also learn the importance of keeping CPM management and their sponsor regularly informed about progress.

MENTORING

The faculty co-advisors to CPM, Tony Rogers and Sean Clancey, mainly act to facilitate the students' efforts. The advisors are members of the Enterprise. They offer advice and suggestions, but it is the prerogative of the students to adopt their own path and goals. They are free to fail or succeed, in a low-stress environment, and their track record is overwhelmingly positive.

INCLUSIVENESS

CPM currently has approximately fifteen students from several majors, the majority of whom are chemical, mechanical, and biomedical engineers. Technology and business students also regularly join. About one-half of our students are women, and CPM continues to attract students from underrepresented groups.

FLEXIBILITY

Practical experience is obtained by students interested in the consumer products industry without requiring the commitment of a formal co-op. Smaller, in-depth senior design projects for up to three students allow CPM to pursue complementary areas of consumer product research in addition to the main class projects. These reinforce CPM's vision of being a consumer product "idea incubator".

Alumnus Chris Copeland graduated from Michigan Tech with a PhD in Chemical Engineering in 2007. He is now associate engineer at Conoco Phillips in Bartlesville, Oklahoma.

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