Chemical Engineering College of Engineering **Fall 2012**

ChE*news*

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Stem-Cell-Growing Surface Enables Bone Repair

By Kate McAlpine, Marketing & Communications, College of Engineering

Joerg Lahann and a team of researchers at Michigan have proven that a special surface, free of biological contaminants, allows adult-derived stem cells to thrive and transform into multiple cell types. To prove the cells' regenerative powers, bone cells grown on this surface were then transplanted into holes in the skulls of mice, producing four times as much new bone growth as in the mice without the extra bone cells. Their success brings stem cell therapies another step closer to reality.

An embryo's cells really can be anything they want to be when they grow up: organs, nerves, skin, bone, any type of human cell. Adult-derived "induced" stem cells can do this and better. Because the source cells can come from the patient, they are perfectly compatible for medical treatments.

In order to make them, Paul Krebsbach, a professor of biological and materials sciences in the School of Dentistry, said, "we turn back the clock, in a way. We're taking a specialized adult cell and genetically reprogramming it, so it behaves like a more primitive cell."

Specifically, they turn human skin cells into stem cells. Less than five years after the discovery of this method, researchers still don't know precisely how it works, but the process involves adding proteins that can turn genes on and off in the adult cells.

Before stem cells can be used to make repairs in the body, they must be grown and directed into becoming the desired cell type. Researchers typically use surfaces of animal cells and proteins for stem cell habitats, but these gels are expensive to make, and batches vary depending on the individual animal.

"You don't really know what's in there," said Joerg Lahann. For example, he said that human cells are often grown

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Note From the Chair

Another year and another set of great accomplishments! Much has happened in the department, as you can see from the pages that follow. We continue to grow in every aspect, and the awards and accolades continue to accrue!

I say growing because we are now at 24 tenured and tenure-track core faculty, the largest we have been in recent memory. We were extremely fortunate to be able to attract Mark Barteau to the department and university. Mark is the inaugural DTE Energy Professor of Advanced Energy Research and is the director of the Michigan Energy Institute. We are also lucky to have Fei Wen from the University of Illinois and Greg Thurber from MIT join our faculty to add to and strengthen our core research areas of energy and biotechnology.

On the undergraduate front, the big news is that we were reaccredited by ABET (Accreditation Board for Engineering and Technology) with flying colors! The accreditation team looked over every aspect of the undergraduate curriculum including samples of student work, lecture notes, and student transcripts, interviewed faculty and students, and then summarized their findings in a report and "grade." ChE essentially received an "A"—no deficiencies, weaknesses, or concerns—and is now set for the next 6 years. ABET also noted three things that stood out at Michigan: our new product design course (thanks Barry!), our industrial mentor program (thanks mentors!), and our high quality of advising (thanks Susan!). Dr. Susan Montgomery guided us through this process and we owe her a great deal of gratitude.

Speaking of Susan Montgomery, the University unveiled a new award this year for outstanding lecturers. After receiving nominations from all over the campus, three lecturers were named Collegiate Lecturers. One was from Engineering and, you guessed it, that person was Susan. She is now the G. Brymer Williams Collegiate Lecturer.

We had many other faculty awards in the department including Sharon Glotzer being named a Simons Investigator, Nick Kotov being named the first Joseph B. and Florence V. Cejka Professor of Engineering, and Lola Eniola-Adefeso winning a U-M Teaching Innovation Prize. Senior Engineer Pablo LaValle won the Judith A. Pitney Service Career Award from the College of Engineering. These are just a few of the many awards received this year.

The graduate students organized a one-day symposium to highlight the wonderful research that is going on in the department. The keynote speaker, alumnus Dr. Sundaresh Brahmasandra, gave an engaging talk about his successful experience starting up HandyLab with fellow alumnus Dr. Kalyan Handique, and eventually selling it for a tidy sum. Industrial sponsors, faculty, and students attended the talks presented by many of our current graduate students as well as a poster session showcasing more examples of ongoing research. The symposium was an overwhelming success, and it will now become an annual tradition.

There is so much more that has happened, from the generous gift given to the department by Dan and Nancy Chapel to the upcoming retirement of Barry Barkel. But I don't want to spoil it—have fun reading the newsletter yourself!

And, as always, Go Blue!

Mark A. Burns

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The First Annual ChE Graduate Symposium

The department held its first annual Graduate Symposium on May 1 on North Campus. The symposium, organized entirely by our graduate students, brought together about 130 people, including faculty, alumni, current graduate students, and industrial representatives. Visitors from industry attending the symposium included friends and alumni representing BASF, Dow Chemical, Dow Corning, Chromalloy, Dupont, General Motors, Praxair, BP, and Phillips66.

The symposium featured a keynote address by alumnus Sundu Brahmasandra (PhD '01), president of Life Magnetics, in which he described his experience in starting two different biotech companies and shared lessons learned along the way. There were 18 talks presented by doctoral students such as 5th year student Hao Chen, to the left, who will be graduating within the next 18 months. The symposium also included 19 posters in the afternoon poster session. Awards for best presentation, best poster, and outstanding research, service, and teaching were presented to graduate students at the symposium banquet.

Watch the department newsletters and webpage for information about the second annual ChE Graduate Symposium, which will be held in May 2013. There are opportunities for companies to be symposium sponsors, which is very much appreciated by the students and the department. Contact Professor Phillip Savage (psavage@umich.edu) for more information about sponsorships and attending the symposium next year.

Jeremy Patt (BSE '97, PhD '03; Dow Chemical Company), Cory Phillips (BSE '93; Phillips66), and Dr. Susan Montgomery visit during the symposium.

Jake Dickinson (3rd year student) talks to Shawn Hunter (BSE '00, PhD '05; Dow Chemical Company) about his research during the poster session.

Introducing the 2012-2013 Chemical Engineering Alumni Board

*Laurie Stevenson Altman BSE '80 **
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*Sid Sapakie BSE '67 **
Warren Seider, MSE '63, PhD '66
Steven Waier, BSE '88
William Wulfsohn, BSE '84

** new members*

(Only U-M degrees listed)

Come meet the board at the 2012 "Lunch with the Department" on October 12. Information about the event is on page 25.

More information about the board members is at www.che.engin.umich.edu/people/alumniboard.html.

Welcome to Our New Faculty

MARK A. BARTEAU

DTE Professor of Advanced Energy and Director of the U-M Energy Institute

By Kate McAlpine, Marketing & Communications, College of Engineering

Mark Barteau has been appointed the new director of the University of Michigan Energy Institute and the inaugural DTE Energy Professor of Advanced Energy Research and will also serve as a professor of chemical engineering.

Barteau joined the U-M in September. His research into chemical reactions at the surfaces of materials laid the foundation for a new approach to driving reactions. He has received numerous honors and awards for his work, including election to the National Academy of Engineering in 2006 and, in 2009, was selected by the American Institute of Chemical Engineers as one of the "100 Chemical Engineers of the Modern Era." Along with his outstanding record in research, Barteau brings years of experience in university administration to his new roles.

"I am delighted that Mark Barteau is joining the university as director of the Michigan Energy Institute, inaugural DTE Energy Professor of Advanced Energy Research and member of the chemical engineering department," said David Munson, the Robert J. Vlasic Dean of Engineering. The Energy Institute aims to chart the path to clean, affordable and sustainable energy by tapping U-M's strengths across a variety of disciplines. Its holistic approach to energy research encompasses storage, transportation, policy, economics and societal impact.

"Energy is the grand challenge of our time," said Barteau. "There's no silver bullet—we need a variety of energy research and technologies."

As director of the institute, Barteau will oversee efforts to develop, coordinate and promote multidisciplinary energy research and education across the university.

"The ultimate measure is going to be impact outside the institute—whether we can make a difference at the national and international level," Barteau said. "I see the challenge of the job as that big, and I'm very excited to have the opportunity to tackle it. I'm really looking forward to working with faculty across the university and partners in industry and government to make a difference."

"Mark is an outstanding scholar, innovator and leader, and as director of the Michigan Energy Institute, he will be an inspiration to campus-wide efforts to ensure that U-M is a world leader in energy research," said Stephen Forrest, U-M vice president for research.

Fred Shell, vice president of corporate and government affairs for DTE Energy and president of the DTE Energy Foundation, said that Barteau will provide unique insight into the research and policy issues that impact the state, the university and the company.

"This $1.5-million grant, one of the largest our foundation has ever made, underscores DTE Energy's commitment to leading our industry, state and nation in creating a sustainable energy future," Shell said. "The partnership strengthens our connection to the university, but more importantly, our legacy as a leading energy and engineering company."

Chemical Engineering is pleased that Barteau has joined the faculty of the department. "Mark's knowledge, expertise, and world-renowned reputation will solidify our already strong energy and catalysis research thrust," said Chair Mark Burns.

FEI WEN

Assistant Professor

We welcomed new assistant professor Fei Wen this fall. Wen grew up by the Grand Canal in the mid-eastern part of China and went to Tsinghua University (Beijing) for her undergraduate studies in chemical engineering, where she quickly became interested in recombinant DNA technology and synthetic biology. To further study this emerging field, she joined Huimin Zhao's lab at the University of Illinois at Urbana-Champaign to work on a PhD in chemical and biomolecular engineering. During her doctoral studies, Wen applied genetic and protein engineering principles and cell surface display technology to address biomedical applications and biofuels production issues. She developed new tools to identify antigenic peptides from the genome of the flu virus, cloned homing endonuclease mutants targeting altered DNA sequences, and engineered yeast cells to produce ethanol from lignocellulosic biomass.

After graduation in 2010, Wen accepted a postdoctoral fellow position with Mark M. Davis at Stanford University, to conduct research on human immune responses to pathogens/vaccines. There, she developed a panel of metal-labeled antibodies that allow the detection of 40+ phenotypic and functional protein markers on a single immune cell.

Wen's research interests as she starts her new appointment at Michigan focuses on two main themes—immune cell function engineering and detection, with a focus on T cells, and renewable biofuels production.

T cells play pivotal roles in human adaptive immune response and have been implicated in a wide array of diseases, such as autoimmunity, allergy, cancer, and infectious diseases, as well as vaccine design and evaluation. The research goal is to harness the immunological power of T cells to fight cancer and infections and to control their undesired behaviors associated with autoimmunity and allergy. To achieve this goal, Wen's group will focus on developing molecular engineering tools, such as protein-based nanoparticles, multiplexed T cell functional marker biosensor, and synthetic gene/antigen delivery viral particles.

In the second research area, she is interested in engineering microbes that are capable of converting lignocellulosic biomass to alternative biofuels. The focus here is biomass-degrading enzyme activity engineering with the aim of identifying protein mutants that could break down biomass efficiently. Meanwhile, microbial metabolic engineering is used to improve the biofuel production yield and titer.

Wen says although she likes making proteins in the lab the most, she also enjoys hiking, music, and Latin dancing.

GREG M. THURBER

Assistant Professor

Greg Thurber joined the faculty as an assistant professor in September. He completed his BS in chemical engineering with a minor in biochemistry and molecular biology at Penn State University and obtained his PhD in chemical engineering from MIT in 2008. Working in the laboratory of Dane Wittrup, inventor of a protein engineering technique called yeast surface display, he used mathematical modeling and two-photon microscopy to study the distribution of novel therapeutic proteins in tumor tissue. By measuring fundamental properties of the proteins, Greg developed methods to predict how far the therapeutic antibodies would penetrate into tumors. These models are now being used to design more effective therapies.

After finishing his PhD, he joined the laboratory of Ralph Weissleder at Massachusetts General Hospital and Harvard Medical School. As part of the Center for Systems Biology and Center for Molecular Imaging, Greg was able to investigate the distribution of a wide variety of imaging agents, from small molecule cancer drugs and peptides targeting insulin-secreting beta cells in diabetes to nanoparticles used to locate atherosclerotic plaques in heart disease. Combining his microscopy experience and mathematical models with intravital imaging, he helped develop an imaging technique to measure small molecule drug distribution in real time. This opens the door to more accurate predictions of how new drugs and imaging agents will behave in humans. Using these models, his work on *in vivo* click chemistry was recently published in the *Proceedings of the National Academy of Science*.

Currently, the pipeline for new drugs and imaging agents relies heavily on animal models and trial-and-error experiments with little understanding of how the drug actually works, and this approach is quickly becoming prohibitively expensive in drug design. Greg's research will focus on developing simulations to predict the distribution of imaging agents and therapeutics across a wide range of molecular properties, from small molecules to nanoparticles, and measuring the distribution in their target tissue. By applying fundamental chemical engineering transport models, the distribution on the whole body, organ, and tissue level can be predicted based on molecular and cellular properties, providing design criteria for new agents with significant cost and time savings. Using these models, novel agents will be designed for more specific and earlier diagnoses of disease such as diabetes and better prediction of drug efficacy and synergy in cancer therapeutics.

In addition to research, Greg is looking forward to teaching at the university. Medicine is just one of the diverse fields that chemical engineers can impact, and teaching is a way to maintain contact with ChE's core strengths. In his spare time, Greg enjoys traveling, reading, and playing tennis, and he is looking forward to exploring Ann Arbor and Michigan.

Alumni Help Prepare ChE Grads for Workplace

By Kate McAlpine, Marketing & Communications, College of Engineering

The 2012-13 Class of Chemical Engineering mentors with Barry Barkel and Johannes Schwank.

Last spring about 100 new U-M chemical engineers celebrated the transition from university student to young professional. And thanks to senior design projects they worked on, all of them have a good idea of how to use their skills in industry. With alumni serving as project leaders, the capstone course closely mimics the real-world work that students begin after graduation.

Over the course of the term groups of four students designed chemical plants that can transform raw materials into a target product in a cost-effective way. "It's as if they were artists who had been trained in colors, shading and perspective, and suddenly they're given a canvas and told 'Paint!'" said Lecturer Barry Barkel, who has helped teach the course since 2000.

But they didn't face the task alone. Each group had a supervisor. For some groups, that was Barkel, with his 35 years of experience in industry, or Professor Johannes Schwank, but many teams worked with our alumni. These volunteers brought experience from workplaces such as chemical companies, oil refineries and pharmaceuticals.

For example, Don Ray, who graduated with Barkel in 1965, led a team of four students in designing a plant to turn 25,000 tons of tobacco into niacin every year. "We met with him every week," says recent graduate Sarah Groeneweg. "He could help us with any issues we were having. If we were making a huge mistake he could point it out and say, 'maybe you should look into this further.'"

Ray, who retired from Ford Motor Company in 2002, started working with Barkel and Schwank in 2009. Ray often visited campus to meet with his team, but Michael Dunsky, a 2006 alumnus who works for BP in Houston, TX, didn't have that luxury. Still, with Skype video chats and file sharing, Dunsky said, "I was surprised to find out how easy it was to communicate with the students."

Dunsky began mentoring for the course last year, when Barkel and Schwank realized that they would exhaust the local volunteers if they didn't recruit more. A call for help over the alumni email list revealed a pool of willing advisors. "I felt that it was an interesting way to give back to the university and the chemical engineering discipline," said Dunsky. In addition to allowing him to share what he has learned, the mentoring experience helps him grow as a professional.

Katie Kubacki, who was a student from one of Dunsky's two groups, said that he was very good at answering her team's questions with questions, forcing them to figure out the answers. "It made us learn more without being dependent on him," she said. She also credited Dunsky and Barkel for not letting unrealistic details "slide by" in their plant designs.

Groeneweg considers Barkel's instruction one of the best aspects of the course while the worst part was the workload. "It's a pretty demanding course. The week before the rough draft of our report was due, I spent 60 or 70 hours on this project," she said, having kept track of her time as part of the economic analysis.

Barkel believes the intense time demands are best illustrated by an incident in 2005. "A group of students actually pitched a tent in the Duderstadt Center to eliminate travel time between working on their reports and the few quick naps they could squeeze in," he recounted.

Lecturer Bids Farewell

Barry Barkel will retire at the end of this year. A familiar figure to anyone who took senior design in the last 12 years, Barkel came back to teach at his alma mater after 35 years in industry. As an engineering manager at BASF, he was a liaison from the company to the ChE department. When he announced his retirement as BASF's liaison, then depart-

ment chair, Ralph Yang, challenged Barkel to help move Michigan's design program to a more "real world" model. So what started as a 2-3 year "hobby job" for Barkel, turned into a second career.

Since Barkel arrived on the scene, fresh from the chemical company BASF, he has been slowly transforming the capstone course, bringing it into line with industrial practices. The alumni mentoring program is the most recent of these changes, and by all accounts, it is a success. "This class is as close as it gets to actually doing real engineering in the field," said Groeneweg, who compares it to her internship experiences.

"It brought together all the concepts we'd been learning for the past 2 years," said Kubacki, adding with a laugh, "It showed me I learned more than I thought I did. It gave me more confidence in being a chemical engineer."

Although Barkel retires this year, he hopes that through the up-to-the-minute information from the alumni who aid the course, it will continue to equip chemical engineering graduates for the ever-evolving industry for many years to come.

Mentors who have already served include Rich McEnhil (MS '77), Jim Brown (BSE '61), Chris Domke (BSE '95), Michael Dunsky (BSE '06), John Getsonion (BSE '84), Tommy Golczynski (BSE '97), Bobby Glied (BSE '06), Kyle Goszyk (BSE '07), Don Ray (BSE '65), Norb Roobaert (BSE '63), Brian Mills (BSE '76), and Dave Figg, friend of the department.

The 2012-13 mentors are Lisa Blount (BSE '98), Bill Bernstein (BSE '75), Dennis Cima (BSE '81), Jason Corradi (BSE '91), Christine Curran (BSE '10), John Kassarjian (BSE '62), Justine Madonna (BSE '07), Dan Stafford (BSE '97), and Maron Raymon (BSE '96).

to His Second Career

During his time in the department, Barkel introduced significant revisions to both the process design and the process control courses. He also developed two new courses, product design and solids handling and processing. Students soon discovered Barkel delighted in assigning unusual projects, such as the one asking students to develop a process for producing gelatin from slaughterhouse wastes. For another project, Barkel, a diabetic, had his process control class design a control program for an insulin pump and, at the end of the class, tried the best program on himself. One student team was heard to remark, "We'd better do good on this. It wouldn't look good on our resumes if we killed Professor Barkel."

In 2011, he introduced a program that uses ChE alumni from industry as distance mentors and team leaders for student design teams (story above). "So far," says Barkel, "over 20 of our alumni have volunteered their talent and experience to teach our current students." Barkel's accomplishments were recently recognized when the ABET accreditation team named his product design course and the distance mentoring program as two of the department's three major strengths.

"I guess I've taught every chemical engineer who has graduated since 2000," says Barkel, "and some for more than one class. It's the contact with the students that has kept me here." He adds, "I've always said a person's career is divided into three parts: First you try to prove to others how good you are. Then, you spend your mid-career trying to prove to yourself how good you are. But eventually, if you are any good, you teach the next generation so what you've learned isn't lost."

Professor Johannes Schwank can attest to Barkel's dedication to his teaching here at Michigan. "His contribution to the teaching of both process as well as product design has been of critical importance to the department," says Schwank. "He has always made time to meet with students, and freely shared with them his wisdom gained over many years of industrial practice. He has also served as a great role model for ethics and professionalism in engineering."

Good luck in your retirement Barry! Over 1,000 U-M graduates can assure you that your wisdom and expertise have helped a new generation of chemical engineers.

Stem Cells

CONTINUED FROM PAGE 1

over mouse cells, but they can go a little native, beginning to produce some mouse proteins that may invite an attack by a patient's immune system.

The polymer gel created by Lahann and his colleagues in 2010 avoids these problems because researchers are able to control all of the gel's ingredients and how they combine. "It's basically the ease of a plastic dish," said Lahann. "There is no biological contamination that could potentially influence your human stem cells." The dish is displayed in the cover photo with Lahann and graduate student Aftin Ross.

Lahann and colleagues had shown that these surfaces could grow embryonic stem cells. Now, Lahann has teamed up with Krebsbach's team to show that the polymer surface can also support the growth of the more medically-promising induced stem cells, keeping them in their high-potential state. To prove that the cells could transform into different types, the team turned them into fat, cartilage, and bone cells.

They then tested whether these cells could help the body to make repairs. Specifically, they attempted to repair 5-millimeter holes in the skulls of mice. The weak immune systems of the mice didn't attack the human bone cells, allowing the cells to help fill in the hole.

After eight weeks, the mice that had received the bone cells had 4.2 times as much new bone, as well as the beginnings of marrow cavities. The team could prove that the extra bone growth came from the added cells because it was human bone.

"The concept is not specific to bone," said Krebsbach. "If we truly develop ways to grow these cells without mouse or animal products, eventually other scientists around the world could generate their tissue of interest."

In the future, Lahann's team wants to explore using their gel to grow stem cells and specialized cells in different physical shapes, such as a bone-like structure or a nerve-like microfiber.

Joerg Lahann's webpage:
www.che.engin.umich.edu/people/lahann.html

Faculty Honors

Lola Eniola-Adefeso won a U-M Teaching Innovation Prize. The award, sponsored by the provost, recognizes faculty that have developed innovative ways "to engage students in the learning process." Eniola-Adefeso developed an "each-one-teach-one" approach to engaging engineering students in creative learning while simultaneously introducing engineering to K-12 students in a chemical engineering classroom. The project involved ChE juniors (in ChE 342), their course project, and a science fair style presentation to local high school students.

Nick Kotov has won the Charles M. A. Stine Award from the American Institute of Chemical Engineers (AIChE). The Stine Award recognizes Kotov's outstanding scientific and technological contributions to materials engineering and science.

Kotov also won the Ted Kennedy Family Team Excellence Award, with Ellen Arruda (Mechanical Engineering) and Tony Waas (Aerospace Engineering). The award was given for the advancement of ultrastrong transparent composites manufactured using layer-by-layer assembly processes developed in the Kotov's laboratory.

Joerg Lahann has been appointed director of the Biointerfaces Institute (BI). Biointerfaces is pursuing joint work among engineering, the health sciences, and the physical sciences, and includes faculty from ChE, Materials Science and Engineering, Biomedical Engineering, the Medical School, Dentistry, Pharmacy and LS&A. Twenty faculty are expected to participate during the next two years, with the potential to double in size over the next several years. Read more about the Biointerfaces Institute on page 18.

Suljo Linic won the Monroe-Brown Foundation Research Excellence Award. The central objective of Linic's research is the development of predictive theories of surface chemistry related to heterogeneous catalysis, electro-catalysis, and photo-electro-catalysis.

Sunitha Nagrath received a 3M Nontenured Faculty Award. For over twenty-five years, this award has recognized outstanding new faculty, helping them achieve tenure, remain in their teaching positions and conduct research.

Phil Savage was named a Fellow of the American Chemical Society (ACS) this summer. Savage's was selected for his excellent, environmentally friendly, work with high-temperature, high-pressure water reactions and for his service to various publications, including his current position as an associate editor of *AIChE Journal* and *Industrial* and *Engineering Chemistry Research.*

Angela Violi has won a Henry Russel Award. This award is given out by the Rackham Graduate School to recognize the outstanding accomplishments of mid-career faculty and "encourage their potential for even more notable achievements in the future."

Student Honors

Christine Andres (Kotov Lab) was awarded the Intel PhD Fellowship for this fall. Fewer than 25 students nationwide are granted this fellowship.

Christine also received the College of Engineering's Towner Prize for Distinguished Achievement.

Steve Edmund (Schwank Lab) was selected by the Rackham Graduate School as an Outstanding Graduate Student Instructor for 2012. He also received the College of Engineering's Outstanding Graduate Student Instructor Award.

Mike Nelson (Lin and Wang Labs) received a U.S. Department of Agriculture (USDA) Fellowship.

Trung Dac Nguyen (Glotzer Lab) was awarded the VEFFA Scientific Award, the most prestigious award given by his fellowship program, the Vietnam Education Foundation. Trung received his PhD in December 2011.

Indranil Saha Dalal (Larson Lab) was recently awarded the College of Engineering's 2012 Ivor K. McIvor Award. This award is given annually to a senior graduate student who has demonstrated excellence in research and scholarship in any area of applied mechanics. Indranil is working primarily in the area of polymer viscoelasticity and membrane biomechanics.

Nick Stuckert (Yang Lab) and **Bobby Levine** (Savage Lab) were named Rackham Predoctoral Fellows for 2012.

Peter Valdez (Savage Lab) was named an EPA Fellow.

Huanan Zhang (Kotov Lab) was awarded PI funding to attend the East Asia and Pacific Summer Institute, where he will serve as a guest researcher in China at Jiangnan University.

Susan Montgomery Named Collegiate Lecturer

By Kate McAlpine, Marketing & Communications, College of Engineering

"Dr. Montgomery is your mother; treat her as such." This was the advice that 2010 ChE alumnus Abdullah Awamleh received from an older student and close friend when he started the program. Soon, Awamleh shared the sentiment, as do hundreds of U-M Chemical Engineering students and alumni.

In addition to her excellence as an advisor, Susan Montgomery is recognized in the field as an outstanding teacher of engineering, and her contributions to Michigan Engineering have recently been honored on the university level. On April 18th, the American Institute of Chemical Engineers (AIChE) student chapter at U-M hosted a reception to celebrate her new title, the G. Brymer Williams Collegiate Lecturer.

Montgomery's mission is simple: in her words, "to encourage and support Chemical Engineering and minority students to get the most out of their time at Michigan." Fully dedicated to this pursuit, she left the tenure track in 1999 so that she could spend more time helping undergraduate students achieve goals and overcome challenges. Ronald Larson, chair of the department from 2000 to 2008, called her skills "matchless". "Susan is, quite simply, the glue that holds our undergraduate program together," he said. He and Chair Mark Burns, spoke of her service to the department and connection with the students at the reception. Another former chair, Ralph Yang, also spoke about Susan's many accomplishments.

Montgomery's innovative teaching methods are featured in videos from the Center for Research on Learning and Teaching. She is a strong proponent of active learning. "You can't tell if you really understand something unless you try to do it yourself," she said, which is why her students work on simple examples in class before they are faced with assignments. She shares her expertise in the method with about 30 graduate students and post-doctoral researchers each year in her Teaching Engineering course.

"In this way, Susan is influencing engineering education nationally as these students

take faculty positions throughout the country, in all engineering departments," said Larson.

One such faculty member is Professor Leigh McCue of Virginia Tech, 2004 alumnus of the U-M College of Engineering and former student of Montgomery's. "Susan quite strongly formulated who I am as a teacher and faculty member," said McCue. She continues to reflect on her experiences in Montgomery's course and lends her lecture notes to colleagues and students.

Montgomery's accomplishments are many, from creating a CD-ROM that details the purpose and operation of various pieces of chemical engineering equipment (online version in progress) to strengthening ties with alumni, whose careers she follows with pride. Even so, students and faculty alike always come back to Montgomery's personal touch. Both Awamleh and McCue can recount times when she went out of her way to help them. Having spent much of her youth in Peru and Nicaragua, Montgomery is particularly successful at reaching out to students from Hispanic backgrounds. She also takes a proactive approach to keeping students on track for graduation by reviewing their grades at the end of each semester and contacting those who seem to be struggling.

But her concern goes beyond the academic performance of her students, and she helps those who face mental health difficulties such as self-doubt, anxiety, and depression to address and overcome them. "She frequently gives up evening and weekend hours to attend to students' needs," said Larson.

"I am very mindful that I am continuing the tradition of caring for students that was embodied by Professor G. Brymer Williams," said Montgomery. Williams, who retired in 1984, shared her talent for making time to help students and remembering the details of their lives. She and Burns commemorated Williams by choosing his name as the modifier to her title, and Professor Emeritus James Wilkes spoke of Williams' 68 years of service to the department at the reception.

The AIChE student chapter presented Montgomery with a memory book full of photos and reminiscences from undergraduate students, and at the conclusion of the reception, the students, faculty, and staff toasted Montgomery with sparkling apple cider. "I have always felt the appreciation of my colleagues and students, but this honor is a very tangible demonstration of it. I am touched," said Montgomery.

Our Newest Endowed Chairs

Nick Kotov

Nick Kotov was named the Joseph B. and Florence V. Cejka Professor of Engineering and was honored at a ceremony in the Lurie Engineering Building on April 23. Chair Mark Burns, Professor Erdogan Gulari and Nick's wife, Dr. Elvira Stesikova, spoke at the event about Nick and his distinguished career. The highlight of the ceremony was Kotov's lecture entitled "Nanoparticles vs. Cancer: A Continuing Battle." At the conclusion of the program, David C. Munson, Jr., the Robert J. Vlasic Dean of Engineering, presented Kotov with his medal and chair as the Cejka Professor of Engineering.

Kotov, who received his degrees from Moscow State University in Russia, joined the department in 2008. He has received many national and international awards, including recognition as one of the world's top 100 chemists and as a top 25 materials scientist from 2000-2010 by Thomson Reuters. Most recently, he received the American Institute of Chemical Engineer's Stine Award for his outstanding scientific and technological contributions to materials engineering and science.

One of the research areas Kotov and members of his group are working on is the biocompatible plasmonic nanoparticles that are designed for early diagnostics and treatment of cancer. This work was particularly relevant to the donor who wished to support research in the study and treatment of cancer.

Joseph B. Cejka (MS ME '40) was a first-generation American and profoundly thankful for the opportunities this country offered. He delighted in helping others to attain a fine education and to learn the values of hard work, honor, and integrity. For him, each day was a gift to be cherished, enjoyed, and wisely used—in particular, to help others and give back to society.

We were honored to have Joseph and Florence Cejka's daughter, Barbara Littleton, join us at the ceremony in April. She is with Nick Kotov in the photo below.

Nick Kotov and Barbara Littleton, Joseph and Florence Cejka's daughter.

Mark Burns

Mark Burns was installed as the T. C. Chang Professor of Engineering on March 30. Colleagues David Burke, Professor of Human Genetics, and Burns' former graduate student Sundu Brahmasandra (PhD '01), president of Life Magnetics, spoke at the ceremony last spring honoring Burns. David Munson, the Robert J. Vlasic Dean of Engineering, also participated in the event. Burns, a pioneer in developing integrated devices for the analysis of DNA, delivered a lecture entitled "Microfluidics and Lab-on-a-Chip."

In 1998, Burns and his colleagues were able to transform a concept—performing DNA analysis in a device the size of a child's finger—into a reality. The results were reported in a first-authored *Science* publication. The work is widely recognized as the first integrated DNA analysis device, and the device is part of the permanent collection at the National Science Museum in London, England.

During this time period, Burns was also educating and training the next generation of microfluidic researchers. Through his collaborative work with faculty in the Medical School, the College of Literature, Sciences and the Arts, and other units throughout the University, his research group established a seminar program and workshop series on the topic of microfluidics. This program grew until, in 2005, the University was awarded the T32 Institutional Training Grant from NIH

entitled “Microfluidics in Biomedical Sciences.” He served as the founding director of this training program that involved 40 faculty from 14 different departments.

Burns has won numerous awards including a College of Engineering Research Excellence Award and a College of Engineering Teaching Excellence Award. He is a Fellow of the American Institute for Medical and Biological Engineering.

The T.C. Chang Professorship of Engineering was endowed in 2007 by T.C.’s son and daughter-in-law, Wai (MSE EE ’75) and Glenda (MPH ’75) Chang. Wai Chang, principal of DBG, Ltd., has served on the Engineering Advisory Council for the college since 2004. Both Mr. and Mrs. Chang attended the ceremony in March.

Wai’s father, Tsi Chun (T.C.) Chang, was born in Shanghai, China, in 1921. He moved to Hong Kong in 1948 to found the Great China Trading Company, a Far East distributor for Sumitomo Chemical, and the first of several successful entrepreneurial endeavors.

He relocated to Tokyo, Japan, in 1954 to establish a new company to distribute pharmaceuticals for Schering Berlin, A.G. In 1974, Mr. Chang sold his share of the company and returned to Hong Kong to start two new investment companies focused in the stock, bond and real estate markets, Stata Corporation and CTC Corporations. He passed away in 1985.

Mark Burns with donors, Wai and Glenda Chang, after the ceremony in March.

New Simons Investigator

By Kate McAlpine, Marketing & Communications, College of Engineering

To kick off its new Investigators program, the Simons Foundation asked panels of mathematicians, theoretical physicists, and theoretical computer scientists to nominate leading lights in their fields. After whittling down that list, they named chemical engineering professor Sharon Glotzer among the inaugural class of 21 researchers for her work on predicting how nanoparticles assemble.

The Simons Foundation will support Glotzer’s work over the next five years with a $660,000 award, anticipating renewal for another five years. Like the MacArthur Fellow “genius” awardees, Simons Investigators can use the funds in an unrestricted way to pursue their best and boldest ideas. The Simons Foundation, a private foundation based in New York City, was founded by James Harris Simons, an American hedge fund manager, mathematician, and philanthropist, dubbed the “world’s smartest billionaire” by the *Financial Times* in 2006. The Foundation’s mission is to advance the frontiers of research in mathematics and the basic sciences.

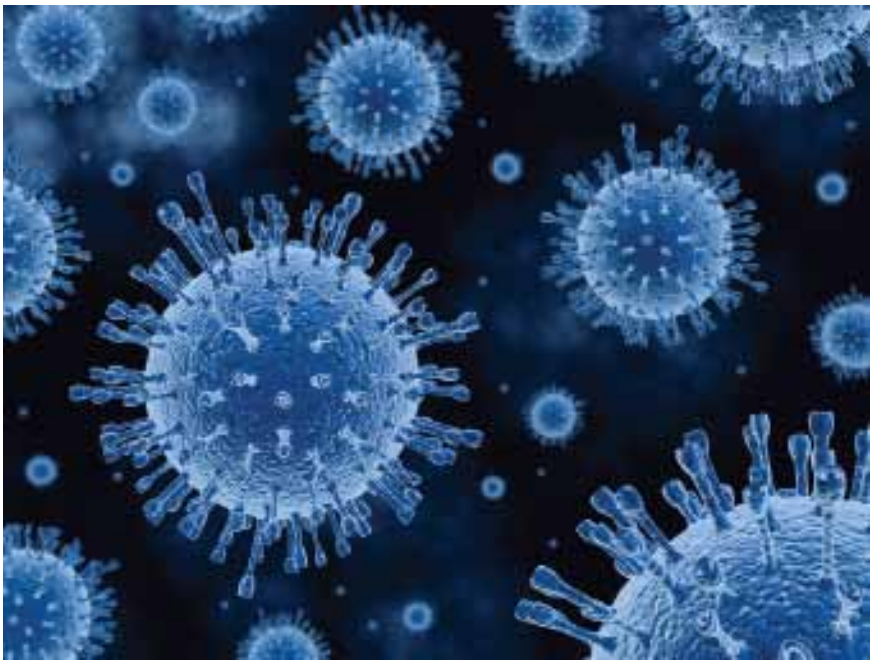
As evidence of Glotzer’s capacity to further these fields, the Foundation cites her breakthrough theoretical work in the late 1990s showing how molecules move in liquids that are solidifying into a glass. She demonstrated that molecules move in single-file lines as the liquid becomes more sluggish, much like people following each other through a crowd. The Foundation also describes her “ambitious program of computational studies,” which revealed many of the ground rules for assembling nanoparticles into predetermined structures. Glotzer’s “development of a conceptual framework for classifying particle properties and their relation to the ultimate structures the particles form have had a major impact on the new field of self-assembly,” according to the award announcement, advertised in *The New York Times*.

Glotzer’s latest work in this vein extends the unintuitive idea that particles can spontaneously form structures through entropy, a property that is typically associated with disorder. In most cases, there are more ways for particles to be randomly placed than to be arranged in an orderly structure, so disorder is favored. However, for some particle shapes, there may be more options for structure than for disorder. In these cases, Glotzer says that entropy can push particles into ordered positions and hold them there like bonds between molecules. She intends to use the funding to further investigate the fundamental role of entropy in the emergence of order from disorder and pursue connections to geometric principles that could lead to next-generation nano- and micro-machines.

“I am excited and honored by this opportunity,” said Glotzer. “I am deeply grateful to the Simons Foundation for recognizing my group’s work in this way, and for providing me with the funds to develop some of our more ‘out there’ ideas that I hope will further push the boundaries of assembly science and engineering.”

Nanoparticle Spies Give Scientists a Better View Inside Cells

By Kate McAlpine, Marketing and Communications, College of Engineering



Smooth operators: the nanoassemblies made by Kotov and colleagues infiltrate cells as easily as viruses.

Although metabolism makes life tick, we don't have a clear picture of how it works on its most fundamental level: inside a single cell. Yet over time, minute changes in cellular metabolism can lead to major health problems, such as cancer and Alzheimer's disease. Nicholas Kotov and colleagues from Jiangnan University in Jiangsu, China have teamed up to find a new way to spy on a cell's engines.

Usually, when scientists want a peek inside a living cell, they attach a sort of reflector to the molecule they want to see. Then, when they shine a laser at the cell, these tags light up and give away the positions of the interesting molecules. Unfortunately, some molecules are too small to be tagged this way, including the sugars that fuel biological cells. In molecules that do take tags, the attachment can change how the molecule behaves.

"It is very hard to investigate what's actually happening inside cells," says Kotov. To get around these problems, Kotov, student Wei Ma, and their colleagues explored a new way to spot these molecules. Rather than looking for a tag, this method seeks out the molecule itself. While the 'reflector' molecules absorb and emit light without changing their wavelength, all molecules can interact with light in another way, by donating small amounts of energy to it or stealing energy from it. The change in energy shortens or lengthens the wavelengths of the light collected by the researchers, and the pattern of these shifts is unique to the molecule.

"The great advantage of looking for these shifts is that they can identify small molecules, such as sugars, amino acids, DNA, and others. The problem is that the effect is very weak," says Kotov.

The presence of a rough metal surface near the molecule can amplify the shifts, first concentrating the light that hits the molecule and then magnifying the molecule's response. Nanoparticles, with diameters about a thousand times smaller than the width of a strand of hair, can form such surfaces. Differently-shaped assemblies amplify different parts of the spectrum, and ideal structures maximize the light that the molecules can shift in energy. This makes the molecules easier to detect, like shining a spotlight on them. However, creating custom structures is challenging: many teams can build complicated assemblies with nanoparticles, but until now, Kotov says that no one had reliably made assemblies with differently-shaped components.

He and his colleagues found a way to do this by attaching strands of DNA to gold nanorods and nanoparticles. The DNA around the rod would either connect with the DNA on the spherical nanoparticle or else prevent the particle from attaching. In this way, they could attach spheres to the ends of the rod, affix them only to its sides, or allow them to completely encircle the rod.

Kotov describes the assemblies as "non-infectious inorganic viruses": they easily infiltrated the cell wall of the human cervical cancer cells used in the team's experiment. Unlike traditional markers, which bind to their target molecules, the nanostructures float freely inside the cell and broadcast the presence of molecules that happen to come between two spheres or between a sphere and a rod. By illuminating the cells with a laser, Kotov and his colleagues were able to get a positive ID on the membrane surrounding a mitochondrion, the cell component responsible for turning sugary fuel into usable energy. However, they have seen signs of other small molecules that they think could be part of the metabolic cycle. Future work will reveal their identities.

Nicholas Kotov's webpage:
www.che.engin.umich.edu/people/kotov.html

New Twist on Ancient Math Problem

By Kate McAlpine, Marketing & Communications, College of Engineering

A hidden facet of a math problem that goes back to timeworn Sanskrit manuscripts has been exposed by nanotechnology researchers at Michigan and the University of Connecticut. It turns out we've been missing a version of the famous "packing problem," and its new guise could have implications for cancer treatment, secure wireless networks, microelectronics and demolitions, the researchers say.

The "filling problem" seeks the best way to cover the inside of an object with a particular shape, such as filling a triangle with discs of varying sizes. Unlike the traditional packing problem, the discs can overlap. It also differs from the "covering problem" because the discs can't extend beyond the triangle's boundaries.

"Besides introducing the problem, we also provided a solution in two dimensions," said Sharon Glotzer.

That solution makes it immediately applicable to treating tumors using fewer shots with radiation beams or speeding up the manufacturing of silicon chips for microprocessors.

The key to solutions in any dimension is to find a shape's "skeleton," said Carolyn Phillips, a postdoctoral fellow at Argonne National Laboratory who recently completed her PhD in Glotzer's group and solved the problem as part of her dissertation. "Every shape you want to fill has a backbone that goes through the center of the shape, like a spine," she said.

For a pentagon, the skeleton looks like a stick-drawing of a starfish. The discs that fill the pentagon best will always have their centers on one of those lines. Junctions between lines in the skeleton are special points that Glotzer's team refers to as "traps." The pentagon only has one trap, right at its center, but more complicated shapes can contain multiple traps. In most optimal solutions, each trap has a disc centered over it, Phillips said.

Other discs in the pattern change size and move around, depending on how many discs are allowed, but those over the traps are always the same. Phillips suspects that if a design uses enough discs, every trap will have a disc centered over it.

Research Scientist Joshua Anderson (left) and Sharon Glotzer (right) discuss their new mathematical exploration into the space of filling solutions.

In their paper, published online in *Physical Review Letters*, the researchers report the rules for how to find the ideal size and spacing of the discs that fill a shape. In the future, they expect to reveal an algorithm that can take the desired shape and the number of discs, or the shape and percentage of the area to be filled, and develop the best pattern to fill it.

Extending the approach into three dimensions, Glotzer proposes that it could decide the placement of wireless routers in a building where the signal must not be available to a potential hacker in the parking lot. Alternatively, it could help demolition workers to set off precision explosions, ensuring that the blast covers the desired region but doesn't extend beyond a building's outer walls.

Phillips expects filling solutions to be scientifically useful as well. Glotzer's team developed the new problem by trying to find a way to represent many-sided shapes for their computer models of nanoparticles. In addition to nanotechnology, biology and medicine often need models for complex shapes, such as those of proteins.

"You don't want to model every single one of the thousands of atoms that make up this protein," Phillips said. "You want a minimal model that gives the shape, allowing the proteins to interact in a lock-and-key way, as they do in nature."

Sharon Glotzer's webpage:
www.che.engin.umich.edu/people/glotzer.html

Are Flow Batteries Key to a Renewable Grid?

By Kate McAlpine, Marketing & Communications, College of Engineering

Graduate student Aaron Shinkle works on building a liquid battery cell.

So-called flow batteries could be the answer to storing solar, wind, and other renewable energy on the scale that power companies need, but it will take engineers and scientists to get them to that level.

"People say they're putting a solar panel on their house," said Charles Monroe. "They don't say they're putting a gigantic battery in their attic." But if homeowners want to get the most out of those solar panels, they had better install a means to store the energy they harvest. And that's just the small version of the problem—as renewable energy sources integrate with the grid on a large scale, batteries fit for power stations are a crucial piece of the puzzle.

With current lithium-ion technology, batteries the size of semi-truck trailers can hold 500 kilowatt hours (kWh)—or enough to power about fifteen US houses for a day. Unfortunately, they degrade somewhat with each recharge and survive for only about a thousand recharges. In order to develop batteries that can hold as much energy as lithium-ion designs and also last for many years, Monroe's team has joined forces with that of Levi Thompson.

Thompson and Monroe set their sights on flow batteries. This design has two major advantages: long life, and a variable capacity. In many battery designs, including lithium-ion, the electrodes participate in the reaction, which means that they degrade with every charge-discharge cycle. Because the liquids that react to store and release energy are separate from the battery's electrodes, the battery isn't damaged by regular use. "Some vanadium flow batteries have been reported to survive for more than ten thousand recharges," said Monroe.

Also unlike traditional batteries, the available energy or storage capacity of a flow battery is limited only by the amount of fluid available to flow through its reactor. For instance, if you harvest wind energy with a battery connected to a turbine, you would have to replace a standalone battery the moment it was fully charged. But for a flow battery, raising its capacity is as simple as adding more fluid to a tank.

While these benefits are appealing, flow batteries have a long way to go before they can compete with lithium-ion designs. "Flow batteries are not as energy dense and cost more than lithium-ion batteries, but with further development, there's the expectation that they can out-perform [lithium-ion batteries]," said Thompson. "We've only scratched the surface."

Their particular challenge is energy density, or the amount of energy a battery can store in a set volume. Thompson and Monroe's teams are exploring three main options for packing more energy into flow batteries. One way is through voltage—the difference in charge between the positive and negative sides of the battery. The higher the voltage, the more energy carried by each electron.

Most researchers use water in their flow batteries because it's cheap, ecofriendly, and a great solvent. But it has a problem: it breaks apart when the difference between the positive and negative side of the reactor is as low as 1.2 volts (V). That limits the energy a flow battery can provide per electron.

Instead of water, the team is working with acetonitrile, a solvent often used to manufacture drugs. It can take voltages up to about 5 V. The voltage of the battery depends on the metal that is dissolved into solution. Vanadium can manage voltages up to 2.2 V, but the team found that chromium can do much better, with a voltage of 3.4 V.

Another way to increase the energy density is to use a metal that can donate multiple electrons. By releasing two electrons rather than one in a reaction, the metal essentially doubles the amount of energy it can provide. Both vanadium and chromium can donate two electrons.

However, chromium falls behind vanadium on the third factor: the acetonitrile solvent can hold much more vanadium than it can chromium. This is largely due to the nest of other molecules that surround the metal, helping it to dissolve. In order to reach higher concentrations, the team is working with Melanie Sanford, a professor of chemistry. In addition to experimenting with different metals and their surrounding molecules, the researchers will try different solvents. "If we're successful, in a few years we will have chemistries that could yield a battery with [an energy density higher than lithium-ion designs]," said Thompson.

Charles Monroe's webpage:
www.che.engin.umich.edu/people/monroe.html

Levi Thompson's webpage:
www.che.engin.umich.edu/people/thompson.html

Up Close With Asphaltenes

By Kate McAlpine, Marketing & Communications, College of Engineering

As long as the world continues to get over 30% of its energy from oil, the industry will have to go after unconventional reserves such as tar sands to meet the demand. In some of these reserves, tar-like particles that gum up pipelines, refineries and even the oil reservoir itself, are likely to become a more significant problem. Scott Fogler's group has turned the conventional wisdom about them on its head.

The particles emerge when oil experiences a drop in pressure. That happens in the well as oil rises through it and in the reservoir as oil is extracted. Oils also feel an effective change in pressure when mixed with another oil of a different density. In response to the pressure drop, chemicals called asphaltenes begin sticking together, and the resulting particles narrow wells and transport lines, coat refinery equipment in filth, and plug up holes in the porous rock that holds the oil. Cleaning up the deposits costs time and money, contributing to higher prices.

"Potentially, it can block up the entire reservoir if handled badly," said Michael Hoepfner, a graduate student in Fogler's group, in the photo above. In order to prevent these problems, engineers need to know how asphaltenes grow.

The industry had assumed that asphaltenes only appear if the pressure change is big enough, and experiments with hydrocarbons seemed to bear this out. Hydrocarbons are molecules made up of hydrogen atoms clinging to a carbon backbone. The more carbon atoms, the heavier the hydrocarbon. Crude oil is a cocktail of hydrocarbons, and different reserves are heavier or lighter depending on their hydrocarbon mixology.

Researchers added lighter hydrocarbon fluids to crude oil to mimic a pressure drop or mixing in the pipelines. "For example, at a refinery, you could get oils from a bunch of different locations around the world," Hoepfner explained.

If the researchers didn't add much of the lighter hydrocarbon, they didn't see asphaltenes. It seemed like the particles only appeared beyond some threshold amount of the light stuff. Then, former student Tabish Maqbool (PhD '10), schooled the field in patience. He performed a similar experiment, using heptane as the lighter hydrocarbon, but he was prepared to wait.

When Maqbool checked samples after just ten hours, it seemed that he needed at least 47% heptane to trigger the asphaltene particles to form. But by letting them stand for hundreds of days, he showed that even at 40% heptane, asphaltenes appeared in the crude oil. Hoepfner explained that they had existed before but were too tiny to see through a microscope.

"We have invalidated approximately 25 years of research and at least one book by showing that asphaltene precipitation is a time-dependent process," said Fogler.

Using a technique called neutron scattering, Hoepfner sees asphaltenes at their smallest—another hundred times smaller than microscopic. Particle accelerators and nuclear reactors create beams of neutrons, the neutral particles at the centers of atoms. Hoepfner puts the oil mixture in the beam's path and looks at how the neutrons are deflected. It's a little like figuring out the shape and size of an object by looking at its shadow except that neutrons give a precise, 3D picture.

Hoepfner ran experiments with neutron beams at major laboratories in France and Tennessee. Typically, he is allowed 24 to 48 hours to use the beam, and it's up to him to get the data he needs in that time.

With the help of the neutrons, Hoepfner has learned more about the shapes and interactions of the nano-sized asphaltenes. He describes them as cylindrical pellets, composed of individual molecules that are flat in the middle where the carbon atoms form rings. The flat centers layer together to create the pellet. "In addition, these aggregates are attracted to one another and associate into larger clusters, resulting in a complex structure," said Hoepfner.

Already, knowing what asphaltenes look like and how they grow will help companies devise more effective ways to stop them in refineries and pipelines. Researchers at companies such as Schlumberger have incorporated the findings from Fogler's team into their models for asphaltenes.

"Heavier oil reserves tend to be much higher in asphaltenes," said Hoepfner. So as the oil and gas industry goes after denser stuff the importance of controlling asphaltenes will rise.

Scott Fogler's webpage:
www.che.engin.umich.edu/people/fogler.html

READ THESE STORIES ONLINE !

Entropy can lead to order - Computer simulations by Sharon Glotzer and her colleagues show that entropy can nudge particles to form organized structures. By analyzing the shapes of the particles beforehand, they can even predict what kinds of structures will form.

www.engin.umich.edu/newscenter/feature/entropy-nanostructures

Nano-origami project uses art to advance engineering - Engineers and artists at U-M, including chemical engineering's Nick Kotov and Sharon Glotzer, will receive nearly $2 million from the National Science Foundation for a four-year research campaign to find out whether the ancient art of origami could bring nanotechnology into the third dimension.

www.engin.umich.edu/newscenter/feature/nano-origami

Engineer Extraordinaire

Pablo LaValle (BSE '82), senior engineer, won the 2012 Judith A. Pitney Service Career Award from the College of Engineering this year. He was honored at a ceremony in the Chrysler Center on Thursday, May 3, 2012. Recipients of the Pitney Award are chosen on the basis of their exemplary work and unique achievements. Pablo has also received the College of Engineering's Excellence in Staff Service Award (1993) and the Candace J. Johnson Staff Award for Excellence (2004), presented by the University annually.

In 1987, when Pablo LaValle was hired by the department as an engineer, he was charged with the responsibility of maintaining and upgrading equipment in the undergraduate laboratories. According to Professor Erdogan Gulari, who has worked with Pablo in the senior lab (ChE 460) since the 80s, Pablo was "instrumental in replacing decades-old large equipment, which could never reach steady state operation in the limited time of an afternoon. In the senior laboratory alone Pablo built the equipment for five new experiments and then added computer-based data acquisition and control to all of them."

Over the years, Pablo's lab responsibilities have expanded. Today, Professor Ralph Yang, who works with Pablo in the junior lab (ChE 360), says that Pablo trains all of the lab Graduate Student Instructors prior to each semester, making sure that the GSIs know the details of each experiment. "Once the daily lab sessions begin," Yang says, "he makes rounds of the lab to make sure everything is working properly, and also to answer questions from the students and GSIs. His office is often filled with students seeking help with their data analysis and other lab questions. Pablo is a critical part of the lab course."

Pablo receives high praise from the students as well. As one of his students commented, "Pablo is dedicated to providing students with practical engineering experiences not found in the pages of a textbook. He maintains high standards of performance and has created an environment where students are encouraged to challenge their technical knowledge in order to learn. Pablo's collaborative approach to problem solving in engineering makes him an invaluable instructor and asset to the department."

Another student says, "Pablo puts the students in the chemical engineering lab first, every time. I think that the phrase 'Should I go get Pablo?' is one of the most frequently uttered statements and testifies to his amazing knowledge of the theory, equipment, and processes that we as students are trying to learn. I have never finished a conversation with him without a more rich understanding than when we started. The chemical engineering lab experience wouldn't be what it is without Pablo."

Even though Pablo's job title is "Senior Engineer" and his main responsibility is to keep the undergraduate labs up and running, he coordinates and handles countless other projects in the department. His ability to "wear multiple hats," as Professor Henry Wang, who has worked with Pablo in both labs, says, "amazes just about everyone in the engineering community, particularly around the Dow and G.G. Brown buildings. Pablo's willingness to help others is legendary. He is often called on to help out with many other assignments that are not described in his job duties and he accepts these additional responsibilities very seriously and gives 100% of his attention so that these can be done on time. Pablo makes a big difference in our daily routine in the department with a cheerful and compassionate attitude."

We congratulate Pablo on his most recent award and thank him for his truly "exemplary work and unique achievements" in the department for the last 25 years!

Mehmet Rasin Tek

Mehmet "Ray" Rasin Tek, 85, of Kailua Kona, Hawaii, died August 13 at his residence. A native of Turkey, he came to America in 1946 to attend the University of Michigan, where he received his bachelor's, master's and PhD degrees. After working at Phillips Petroleum in Bartlesville, Oklahoma, for four years, he returned to the University to join the faculty. Tek was a leading authority in the underground storage of natural gas, and served as a consultant and a worldwide expert in evaluating the performance of natural gas fields.

While at Michigan, he initiated and taught courses in production and processing of petrochemicals for several hundred engineers, introducing them to the principles of reservoir engineering, processing, and storage of crude oil and natural gas. One former student remembers that Tek "brought a delightful human face to an otherwise very challenging educational experience. I used the skills he taught me many times in my engineering practice and in passing the PE exam. The world is diminished without him." Another student remarked that "Tek's passion for the petroleum industry steered me into an over 30-year career in the oil & gas and refining industry."

In addition, he was advisor to more than a dozen doctoral students, many of whom became leaders in the petroleum engineering field. Upon Tek's retirement in 1986, he and his wife, Gretchen, moved to Hawaii.

Biographical information is from *A Century of Chemical Engineering at the University of Michigan.*

Scott and Janet Fogler Celebrate Their 50th Anniversary

Professor Scott Fogler and his wife, Janet, recently celebrated their 50th wedding anniversary at a party organized by their three children, Robert, Peter and Kristin, with four grandchildren doing their part to liven up the occasion by entertaining the guests. The party took place "up north," on Mackinac Island, July 1, and was attended by family, friends and colleagues. Alumni of Scott's research group will not be surprised to learn that, as is tradition at Fogler group parties, there was a friendly after-dinner competition to see which table of guests knew the most about the Foglers. Among the questions was "According to Jan, what is the secret to a happy marriage?" The correct answer: "Picking the right person in the first place." It seems they both learned that secret early! We wish Professor and Mrs. Fogler much continued happiness in the years to come.

Good Luck, Ruby!

Ruby (Sowards) Wicklund retired in August after 25 years of service to the University. The department hosted a reception in her honor on August 30. Chair Mark Burns and Ralph Yang thanked Ruby for her professionalism in the job and her willingness to assist others to get projects completed. Staff, students, and faculty wished her well as she begins the next phase of her life.

She had been in her position in Chemical Engineering for 11 years. She worked previously in the Electrical Engineering and Computer Science and the Industrial and Operations Engineering Departments.

Growing into a New Research Facility

Recognizing the importance of interdisciplinary research, the University of Michigan created the Biointerfaces Institute (BI), co-locating 18 research groups from the physical sciences and medicine into state-of-the-art laboratory and office spaces. Of the nearly 51,000 square feet of dedicated Biointerfaces Institute space, about 27,000 square feet provide researchers with exceptional laboratories for wet chemistry, biologic engineering, cell and tissue culture, drug delivery research, microfluidics, and nanotechnology. The remainder of the BI footprint comprises superb office and team spaces with advanced collaboration technologies.

Chemical Engineering's Joerg Lahann was appointed director of the Institute. In addition to Lahann, ChE faculty Nick Kotov and Sunitha Nagrath have already moved their offices and labs to the new building to be a part of the new Institute. Later this year, Ron Larson, Sharon Glotzer and Mike Solomon will join them. Of the 18 research labs moving 11 are from Engineering, 2 are from the College of Pharmacy, 1 is from the Dental School, and 4 are from the Medical School.

The Biointerfaces Institute is located at UM's North Campus Research Complex (NCRC) whose mission is to provide a novel research framework to accelerate scientific progress through translational research, partnerships, and collaboration. NCRC was a former Pfizer research facility and provides an extraordinary physical plant for biomedical research. The University has also located six Biomedical Research Core Facilities on the NCRC campus. These cores are a collection of centralized labs and services offering state-of-the-art instruments and resources to researchers on a fee-for-service basis.

The following core labs are located at NCRC and are available to the BI researchers: the Bioinformatics Analysis Core, DNA Sequencing Core, Flow Cytometry Core, Embryonic Stem Cell Core, Microscopy and Image Analysis Laboratory, and the Biomedical Research Store. In the near future, U-M will also locate its Electron Microbeam Analysis Laboratory Core at NCRC.

In July 2012, the Biointerfaces Institute hosted their first workshop, Noble Metal Nanoparticles for Biomedical Applications. By all accounts, the workshop was a great success, with lively discussions and extensive opportunities for the exchange of ideas. Additional workshops will be offered this fall.

The Biointerfaces Institute's webpage: www.ncrc.umich.edu/research/initiatives/biointerfaces

Photos by Laura Rudich and Joseph Xu, Communications & Marketing, College of Engineering

Annual Lecturerships and Seminars

Donald L. Katz Lecture

Jay D. Keasling, the Hubbard Howe, Jr. Distinguished Professor of Biochemical Engineering at the University of California, Berkeley, was the 2012 Katz Lecturer. The topics for his lectures at the two-day event were “Life 2.0: Engineering Biology for Sustainable Development” and “Engineering Microbial Hydrocarbon Metabolism for Production of Advanced Fuels.” He was honored at a dinner at the Lurie Engineering Center on May 3.

Keasling, in photo above with Chair Mark Burns, received his PhD from the department in 1991. He is also a professor in the Chemical and Biomolecular Engineering Department at Berkeley, director of the Lawrence Berkeley National Laboratory and the Synthetic Biology Engineering Research Center, and is chief executive officer of the Joint BioEnergy Institute.

During the dinner, Emeritus Professor Jim Wilkes spoke about Donald Katz and his many contributions to the department and to the profession. Mark Burns congratulated faculty on the many awards and honors received during the past year, and Phil Savage recognized graduating doctoral students.

Walter J. Weber Lecture

Ignacio E. Grossmann, the R. R. Dean University Professor at Carnegie Mellon University, gave the 2012 Walter J. Weber, Jr. Distinguished Lecture in Environmental and Energy Sustainability at the Gerald R. Ford Presidential Library on February 16, 2012. The title of his lecture was “Optimal Synthesis and Planning of Sustainable Chemical Processes.”

Grossman is currently director of the Center for Advanced Process Decision-making, an industrial consortium that involves 20 petroleum, chemical, engineering and software companies. His research interests lie in the application of mathematical programming to the design and operation of chemical plants and process supply chains. He is a member of the National Academy of Engineering and was named one of the "100 Chemical Engineers of the Modern Era" by AIChE in 2008.

Awards were presented at the event to graduate students working in the area of environmental and energy sustainability. Nick Stuckert (Yang lab) received the first place award. Second and third place awards went to Bong-Gi Kim (Kim lab) and Adam Holewinski (Linic lab), respectively.

Annual U-M/MSU Joint Lecture

William J. Koros, the Roberto C. Goizueta Chair and Georgia Research Alliance Eminent Scholar in Membranes at the Georgia Institute of Technology, was the guest speaker at the 30th Annual University of Michigan and Michigan State University Joint Lecture on November 3, 2011 in Ann Arbor. The topic of his talk was “Engineering a Revolution in Membranes and Sorbents.”

His research has been recognized by the AIChE Institute Award for Excellence in Industrial Gases Technology in 1995 and the AIChE Separation Division Clarence Gerhold Award in 1999. He was elected to the National Academy of Engineering in 2000, and was named a Fellow of the American Institute of Chemical Engineers in 2002 and a Fellow of the American Association for the Advancement of Science in 2003.

Koros is shown above with chair Mark Burns, and Martin Hawley, chair of the Chemical Engineering & Materials Science Department at MSU.

Udall Scholar Sita Syal's Global Travels

In a village in Rajesthan, India, playing with her new friends and studying the local non-governmental organization development practices.

Chemical Engineering junior Sita Syal was at an internet café in Goa, India, when she learned she was one of 80 students to become a 2012 Udall Scholar. Nearly 600 students applied for this honor, awarded to college student leaders with strong academics based on their commitment to careers in the environment, health care, or tribal policy.

Sita was in India through an energy program at Michigan State University. After an intense three weeks of classes on social economics and advanced Hindi, she visited the rural state of Rajasthan for a week, and completed a 6-week internship at the Ministry of New and Renewable Energy. In her internship she spent her first three weeks in Delhi, then traveled the country to study renewable energy projects, such as solar and thermal installations in Raipur. This trip was also a great opportunity to get reacquainted with her grandmother, Biji, and other family members on her father's side.

Sita learned that "the energy scenario in India is very different than in the US. Here in the US, there is an excess of energy and our lifestyles have adjusted to that excess. In India, there is a low supply of energy compared to what is demanded. In many parts of the country, it is not even possible to connect the conventional grid to these areas; in these cases, renewable energy becomes not a question of saving the planet, but a survival technique."

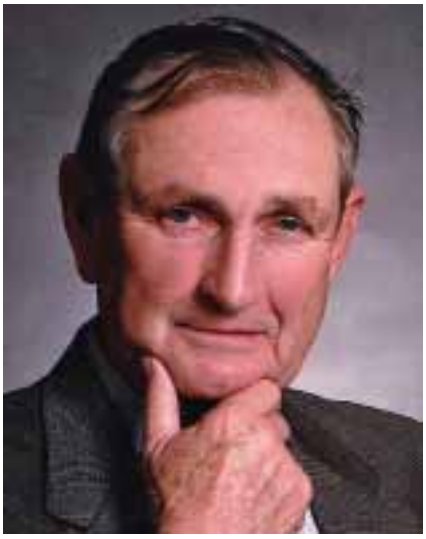
Shortly after returning to the United States she left for Nueva Santa Catarine Ixtahuacán, Guatemala, to join her teammates in BLUELab's Woven Wind team (www.umich.edu/~wwind). The team, which she co-founded, is collaborating with a local women's weaving cooperative to design wind turbines with blades made of woven textiles that will be sold to other rural villages. During their visit they completed and tested their prototype turbine and gained a better understanding of alternative energy projects and the economic needs of their collaborators, and the pride they took in their traditional back strap weaving methods. That alone would make for an exciting summer, but Sita was not done. Her summer ended with an internship at BP, working at the Thunder Horse deepwater producing platform.

This August, Sita also attended the orientation session for the Udall Scholarship where she had the opportunity to meet the other Udall scholars, alumni scholars (as facilitators for the scholar small groups), faculty experts, and members of Morris and Stuart Udall's family. She said it was a great chance to work with others who don't think the same way she does, as she was one of the few engineers. Probably the best part of the orientation for Sita was meeting the other scholars. "Everyone is doing super cool things, both in the US and abroad," she says. "We were all eager to share our story and to listen to everyone else's stories. It was inspiring to be around such motivated people!"

With her first person experience in fossil fuel, solar, and wind-based energy, and a passion for implementing renewable energy solutions in developing countries, it's easy to see why the Udall committee selected Sita as one of their scholars.

BLUElab student members, including team leader Sita (first left) and Guatemalan women weavers, test a prototype of a Woven Wind Turbine model in a Guatemalan village of Nueva Santa Catarina Ixtahuacán, Guatemala. *(Photo by Marcin Szczepanski, Communications & Marketing, College of Engineering)*

Michigan Made the Difference for Alumnus



Dan Chapel (BSE '60, BSC '60) was born in Brainerd, MN but spent his formative years not far from Ann Arbor, in Howell, MI. While attending high school, he worked as an usher at Michigan football games and developed an interest in the university. When he was ready to go to college, Dan says, "Michigan was the only place I applied, and was the school I wanted to attend." His love for math and science led him to a dual major in chemical engineering and chemistry.

As a student, Saturdays in fall meant football, of course, and Dan was always on the sidelines rooting for the Wolverines. He loved Saturday nights at the Pretzel Bell, where he celebrated his twenty-first birthday. While at Michigan, he ran track for coach and future athletic director, Don Canham, and developed a deep respect for the role of the student athlete.

In 1961, Dan married Nancy Hays, a native of Detroit. He worked briefly for the Bechtel Corporation in San Francisco before going back to school to earn a master's degree in chemical engineering from the University of Southern California. Dan joined the Fluor Corporation and worked for them for forty-two years, retiring as the senior vice-president of technology. During his years at Fluor, Dan traveled extensively and the family lived for several years in Dusseldorf, Germany. There, he and Nancy developed a love of wine and a strong respect for owner-operated wineries.

Today, Dan and Nancy are the owners of Cardwell Hill Cellars, a boutique winery located in the Willamette Valley of Oregon near Corvallis. The winery produces Pinot Noir, Pinot Gris, Rosé from Pinot Noir, Blanc de Noir and a Reserve Pinot Noir. All Wolverines are most welcome at the tasting room. Cardwell Hill wines are found in fine restaurants and wine shops in Michigan.

Dan follows Michigan football and tries to attend at least one game per season. He is also keenly interested in the Department of Chemical Engineering and has served as a member of the alumni advisory committee for the department. Dan and Nancy have two children, Scott and Denise.

Dan and Nancy Chapel Choose Michigan

Recently, Dan and Nancy Chapel established a fund at Michigan to create the Dan Chapel Professorship in Chemical Engineering.

Dan has always felt that the University of Michigan provided him with an excellent and affordable education, and that his life would have been very different had he not been able to attend a school of Michigan's caliber. He says his Michigan education challenged him and prepared him well for his future career and life. Dan is proud of his alma mater and wanted to give others a chance to have the opportunities he had at Michigan.

Because Dan and Nancy both grew up in Michigan and wanted to support their home state and Dan's alma mater, the decision to give to the Chemical Engineering Department was an easy choice. They know that the budgets are often tight at state universities and they wanted to make a significant contribution to provide more opportunities for faculty and students at Michigan.

Dan and Nancy have always been impressed that the Chemical Engineering Department has been able to keep its high academic standards. They hope their gift will help the department maintain its excellent reputation throughout the US and the world by allowing the department to support faculty research at a financial level that was not possible previously.

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Alumni Notes

Milton Meckler (MSE '55), president of Design Build Systems in Los Angeles, CA and St. Petersburg, FL, collaborated with Dr. Amip Shah, Senior Research Scientist, Hewlett Packard Laboratories, Palo Alto, CA to publish another peer reviewed paper entitled "A Generalized Exergy-Based Framework for Sustainable Design of IT Systems" which appeared in the *International Journal of Exergy*.

Manesh Shah's (MSE '57) wife, Margarita, passed away on January 8, 2012 after a brief illness due to complications from Alzheimer's Disease.

Dr. **Dennis Stover** (BSE '67, PhD '75) was named Chief Operating Officer of the Energy Metals Corporation (EMC). Prior to joining EMC in 2005, he led a private consulting firm founded in 2002 that provided technical services to both domestic and international uranium mining ventures. An author of several papers regarding in-situ uranium recovery, he has co-authored three IAEA guidebooks and manuals related to both acidic and alkaline uranium ISR technology and has authored six patents relating to ISR technology.

Thomas L. Schwenk (BSE '71; MD '75) has moved from the University of Michigan, where he served as chair of the Department of Family Medicine for 25 years, to the new position of dean of the University of Nevada School of Medicine and Vice President for Health Sciences.

Doug Vander Molen (BSE '75) started work as a contractor for Matheson Gas, New Johnsonville, TN as a plant engineer in October 2011.

Douglas Douthitt (BSE '79) was named vice president of operations for Kay-Flo Services in North Sioux City, SD. Kay-Flo Services is an Agricultural Chemical manufacturer providing fertilizer and feed supplements through their Nutra-Flo, Nulex, Ultra-Phos, Kay-Dee, and Nutraferma companies. Doug is also the CEO and a director on the board for Nulex, Inc.

Jim Lee (MSE '80; PhD '85) is professor and head of the Chemical & Biomolecular Engineering Department at the National University of Singapore. He is also a senior principal fellow at the Energy Studies Institute. He is pleased to see so many of his mentors still working in the department – Scott Fogler, Erdogan Gulari, Henry Wang and his advisor, Johannes Schwank. Jim is using Scott's text for his undergraduate chemical reaction engineering course. He would also like to add that he is pleased that Rodriguez is no longer coach of the Michigan football team!

Oncobiologics, Inc. named **Scott Canute** (BSE '82), a former president at both Eli Lilly and Genzyme, to its board of directors. Over the course of his 30-year career, Mr. Canute played a vital role in leading Eli Lilly's global manufacturing operations. Most recently, he spent more than a year as president of Global Manufacturing and Corporate Operations for Genzyme, where he led a major turnaround effort. Scott earned an MBA from the Harvard Business School.

Jay Seaton (BS '82 LSA; BSE '82; MSE '85) was named vice president of silicon operations at Netronome. Most recently, Seaton was the founder and managing member of Evolutionary Operations Consulting, a provider of consulting services to the fabless semiconductor industry with an emphasis on start-up and early- to medium-growth phase companies. Jay has more than 20 years of experience in the semiconductor industry specializing in process engineering, manufacturing, quality systems, and global supply chain management.

In Memoriam

Timothy A. Kelly (BSE '84) passed away on August 3, 2012. His obituary is at www.muellerparker.com.

Rick Oakley (BSE '84) is working in Dow AgroSciences based in Indianapolis as the Environmental Health and Safety Business Operations Leader.

After several years of leading BP's relationship with mining sector giant Rio Tinto, **Tony Orlando** (BSE '87) has recently changed roles. As vice president of Strategic Cooperation, Tony now has global responsibility for several of BP's largest B2C customers in the retail sector. Tony serves on the ChE Alumni Advisory Board. He and his wife, Mary, reside in Winnetka, Illinois, just north of Chicago, and recently celebrated their daughter Olivia's first birthday.

David Goldblum (PhD '88) was recently transferred to another office in the Army Headquarters. He now works in the Army Environmental Programs Division under the Army Chief of Staff for Installation Management (ACSIM) at the Pentagon.

Manos Mavrikakis (MSE '89; MS '93 LSA; PhD '94) was one of the "Top 100 Chemists, 2000-2010" listed in Science Watch (Thompson Reuters) in February 2011. The Top 100 is intended to celebrate the achievements of chemists and chemical engineers whose papers, published since January 2000, have had the highest impact in the discipline.

John Rakowicz (BSE '89) recently completed upgrading the controls on the #6 turbo blower on Zug Island, which feeds one of Motown's blast furnaces.

David Erfert (BSE '90) continues to work for Phillips66, as a refinery manager at the Bayway Refinery outside of New York City. He recently sold the Trainer Refinery to Delta Airlines. David is married with two girls, 16 and 12, and is working hard to "coerce" them into going to Michigan. He still misses all of his friends in the ChE program, and the faculty in the department. As he looks back on his experience at U-M and in the working world now, he is very thankful for everything about the ChE program, and think it is tops!

Debra (Feldman) Singer's (PhD '91) daughters are both at Michigan; the oldest is in the School of Architecture and the younger one is studying mechanical engineering. Her son is in 9th grade. Debra is no longer

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a practicing engineer. She worked for DuPont for 10 years then took a turn as a full time stay-at-home mom and now has her own personal computer training business, Apple a Day.

Karsten E. Thompson (PhD '96) is the new chairman for the Craft and Hawkins Department of Petroleum Engineering (PETE) at Louisiana State University. Thompson, the Lowe Professional Development Professor, is also on the faculty of the Cain Department of Chemical Engineering.

Ali Siahpush (PhD '92) is now working at Dendreon at Seattle as vice president of product development.

Liz (Batesole) Hainey (PhD '93) says they will probably be visiting Michigan in the fall because her son, Paul, is interested in majoring in engineering at U-M, with a minor in music. Liz also attended the Michigan-Alabama football game in Cowboys stadium.

Casey Logan (BSE '93) has joined Anaphore's senior management team. Casey will work with senior management to execute Anaphore's strategic business plans, including securing additional partnerships and potential future fundraising activities. He worked previously at Anadys Pharmaceuticals and Eli Lilly and Company.

Matt Birchmeier (BSE '94) and his wife, Amy, welcomed their third child, Eli, to their family in December 2010.

Chris Hermanson (BSE '94) along with his wife and dog, moved from San Diego, CA to Raleigh, NC in September 2011. Chris is now employed at Cree, where he works in the RF Product Development group as a packaging engineer.

Serena Hung (BSE '94) recently moved from academics to industry and is working now for Biogen Idec (a biotech company) in Cambridge, MA as an associate medical director, working on multiple sclerosis drug development. Although she is no longer seeing patients on a regular basis, she will be looking for opportunities to provide free care to patients with Huntington's disease. She would love to meet up with fellow ChEs in New England.

Pete Valianatos (BSE '94) was promoted to director of process development at E Ink Corporation in May 2011. E Ink is the technology behind the Amazon Kindle and Barnes and Noble Nook e-readers. He and his wife, Tricia, celebrated their 10-year wedding anniversary in September 2011. He invites any ChE's in the Boston area to get in touch with him (pvalianatos@gmail.com)!

Jim Waldecker (BSE '95; PhD '00) has been doing hydrogen fuel cell research at Ford Motor Company for seven years, and has recently been promoted to the position of Technical Expert - Fuel Cell Systems with an emphasis on membrane electrode assemblies (MEAs). Before coming to Ford, he worked at both ExxonMobil and NASA Glenn Research Center. He spent two years as the industry co-chair on the FreedomCAR Fuel Cell Tech Team, working with the Department of Energy (DOE) and the other American automotive OEMs to set research targets and evaluate projects funded by the DOE.

Tommy Golczynski (BSE '97) and his wife welcomed their second son, Mason Anthony, into the family recently. Mason joins his older brother, Brady Thomas (with a name like that he better go to Michigan). He has started his own oil/gas consulting company, Assured Flow Solutions LLC, in Houston, providing engineering support for the energy industry.

Andy Rusiniak (BSE '99, MSE '01) is now in his tenth year of working at Eli Lilly in bioproduct development. Andy recently received the LRL president's award for his development and technical transfer of a commercial cell culture process to manufacture a monoclonal antibody to treat Alzheimer's disease. Andy enjoys spending time with his wife and two year old son, who likes to point out the letter "M" on the television during football games.

Eric Bernath (BSE '00) completed his third corporate relocation as part of the Commercial Leadership Program at the biotechnology company, Amgen, and moved from Malibu, CA to join Amgen's health policy team in Washington, DC. In addition, 2011 brought four new stamps in the passport with his 46th country visited during his years of post-Michigan travel abroad (all them with a lucky maize & blue t-shirt).

Julie (Messacar) Rivard (BSE '00) and her husband, Todd, and daughter, Jocelyn (3), welcomed twins to their family in May. She continues to work at Dow Corning, in Midland, MI, supporting the specialty chemicals business as a business evaluator/portfolio manager.

Nick Ortiz (BSE '00) and his wife recently welcomed their first child, Samuel Nicolas Stern Ortiz. He was born on October 27, 2011 and, at two-weeks-old, he started smiling when he hears *The Victors*.

Matt Ross (BSE '00) is pursuing a PhD in finance at Wayne State University. At the moment, he is busy teaching undergrads and doing corporate finance research.

After 6+ years, **Brandon "BT" Cesul** (BSE ChE '01, MEng SpSys '02) successfully defended his PhD dissertation at the Air Force Institute of Technology in June. The new Dr. Cesul's research was on suitability of inorganic polymers for space applications. He continues his work as the Team Lead for Orbital Anti-satellite Threat Analysis at the USAF's National Air & Space Intelligence Center in Dayton OH and has served as a judge for the AIAA/Utah St Small Satellite Conference's Student Scholarship competition in August.

Liz (Fernandez) Kamali (BSE '01) was married in November 2010. She and her husband, Ashkan, reside in Boston where she works in environmental, health and safety at Merck pharmaceutical. They welcomed a baby boy, Kamron, in October 2011.

Nate Hoffman (BSE '01) and his wife had twins on December 11, 2011—a boy and a girl.

Carl Lenker (BSE '01) married Alyssa Beach on July 28th, 2012.

CONTINUED ON PAGE 24

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Alumni Notes

CONTINUED FROM PAGE 23

Brian Teller's (BSE '01) son, Ethan Christopher Teller, was born on April, 11, 2011 in Newburgh, IN. Brian still works for Sabic Innovative Plastics.

After completing his MBA at IESE Business School in Barcelona, Spain, **Ben Wong** (BSE '01; MSE '03 IOE) started working as a management consultant at BASF at their headquarters in Ludwigshafen, Germany.

Michelle Wu (BSE '01) is the director of Quality Services at Ximedica, a medical and healthcare product development company. She lives in Providence, RI with her husband and 11-month-old daughter. She visited the department at homecoming this year and encourages more people to come back!

Kelvin Lau (BSE '02, MENG '03) has been promoted to senior scientist at Abbott Worcester. In addition to his day job, he promotes science, technology, engineering, and math to middle school students.

Aaron Napier (BSE '02) and his wife had their third daughter, Aubrey Hope, in May 2012.

Cathy (Ehehalt) Way (BSE '03) completed her master's in business administration from St Bonaventure University in May 2011. She accepted an operations engineer position for BASF in Michigan so she and her husband, Lucas Way (CSE '03,) and son, Andrew, have moved from Allegany, NY back to Michigan.

Amit Nagar (BSE '03) graduated from Columbia Business School in May and rejoined his former employer, Booz & Company, in New York City.

Tawnya Sowerwine (BSE '03) started a new position as a quality engineer for Veyance Technologies, Goodyear Engineered Products in Sun Prairie, Wisconsin. Her duties include a Six Sigma and Lean Manufacturing approach to process changes, waste reduction, and other quality initiatives. Tawnya and her husband live in downtown Madison and just celebrated their 8-year wedding anniversary in May. Her little brother, Kenny Sowerwine, started the chemical engineering program at U-M in Fall 2011 after transferring from Albion, and just completed his first full year of core ChE courses. She couldn't be more proud of him!

Doug Urquhart (BSE '03, MSE '04) recently moved to Blacksburg, VA with his wife, Sara. He is working as an environmental engineer for CHA Consulting.

Jessica Mattis (BSE '04) was promoted to assistant superintendent of production in Paint at Flint Assembly at General Motors. Previously she has worked at GM as a supervisor, a senior process engineer at Pontiac Assembly, and most recently was the VLT Launch Coordinator for the Orion Small Car Program.

Adam Redstone (ChE '04) completed his MBA from NYU Stern School of Business and has a new job with IBM Global Business Services as a senior consultant on their Strategy & Transformation team, with a focus in life sciences.

Gary Chia (BSE '05) finished his PhD in chemical engineering at MIT in May 2011, and started a master's program in classical composition at the Manhattan School of Music in New York.

Lin Ho (BSE '05) is currently living in Australia and is doing a post-doc at the University of Melbourne.

Andrew (Bean) Getsoian (BSE '05; MSE '07) and Elizabeth Ranney Getsoian (BSE '06, PhD '11) were married in June 2011. They live in the San Francisco Bay Area, where Liz is working for an engineering software firm, and Bean is finishing his PhD at the University of California, Berkeley.

Joseph Cheng (BSE '06; MSE '08) left Genentech in July 2011 after 4 years to pursue his PhD in ChE at the University of Texas at Austin, and joined the Alper group at UT. He says they have a nice stadium at UT Austin... but it's no Big House!

Elizabeth Fiorani (BSE '06) is living in San Jose, CA working for Abbott Vascular on their exciting new bioresorbable vascular scaffold - ABSORB(TM). She is engaged to Christopher Thoma, who is unfortunately a Spartan!

Elizabeth Ranney Getsoian (BSE '06, PhD '11) see Andrew (Bean) Getsoian (BSE '05; MSE '07).

Joseph Casler (BSE '07) and his wife, Dawn, got married in 2009. They had their first child, Juliana, in December 2011. He is still working for First Solar based in Toledo, OH but now as a reliability engineer.

Ashley (Sullivan) Velez (BSE '08; MSE '09) got married on June 4, 2011.

Soon after graduation, **Justine (Tesch) Madonna** (BSE '07) married another U-M engineering student (CSE), whom she met her freshman year at Bursley Hall. She initially worked at an engineering consulting firm near Ann Arbor. After she obtained her P.E., she took a job as a project manager for the Wyandotte Engineering Department at BASF where she has managed projects up to $15 million to date.

Nikki and **Kyle Goszyk** (BSE '08) were married on March 10, 2012.

Stuart Krueger (BSE '09) and **Abby (Vonck) Krueger** (BSE '09) had a baby girl, Emma, on December 26, 2011.

Daniel Byrd (BSE '10) has been volunteering in the penguin colony at the New England Aquarium. He is also working for Dow Chemical in Marlborough, MA but that's obviously less exciting than "playing" with penguins every week.

Arshat Xembayev (BSE '10) is working for TengizChevrOil (TCO, a Chevron subsidiary) in Kazakhstan as a process engineer. On a volunteer basis, he is also involved with a non-profit foundation in Kazakhstan aimed at bringing high-quality education to rural areas and good medical/rehabilitation services to disabled children.

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Your Invitation to Subscribe to a New Edition of the Department's History Book

We published our history, *A Century of Chemical Engineering at the University of Michigan,* in 2002. It contained 640 pages and 560 photographs, spanning the years 1898–2002, and was extremely well received, particularly by our alums. Our original print run of 850 copies is now depleted, and we shall be preparing a second and updated hardcover edition, which we expect to publish in late 2012, to include between 50 and 100 additional pages—again with lots of photographs. You are invited to become a "subscriber" to the second edition, which will ensure that your name is printed at the beginning of the book. The names of the approximately 400 subscribers to the first edition will still be retained, and if you have subscribed to both editions, it will be noted. If you wish to subscribe, would you please fill out the form below.

Yes, I would like to be a subscriber to the updated chemical engineering history book, with the understanding that a copy will be mailed to me when ready.

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Thank you for your interest and support.

Alumni Events

Friday, October 12, 2012
12:00-1:30 p.m.
Lunch with the Department
Johnson Rooms
3rd Floor, Lurie Engineering Center
1221 Beal Avenue

Please join us on October 12 for our annual alumni lunch in the department during Michigan Alumni Homecoming Weekend at 11:30 a.m. Mark Leidy (BSE 1979), our Alumni Society Award Winner, will be our guest of honor at the lunch. Students and faculty will be at the lunch to answer your questions about our program.

If you would like to join us, sign up for "Lunch in the Departments" when you register for the alumni weekend. If you have not made reservations yet, you can register online at www.engin.umich.edu/alumni/homecoming or call 734-647-7046. If you are not participating in other activities during alumni weekend, but would like to join us for lunch, please contact Sandy Swisher (734-764-7413, sandys@umich.edu).

Note: The Johnson Rooms are on the 3rd Floor of the Lurie Engineering Center, on Beal Ave. near Bonisteel Blvd.

Monday, October 29, 2012
7:00 p.m.-9:00 p.m.
2012 Annual AIChE Meeting Open House
Westin Hotel, Crawford West/East Rooms
Pittsburgh, PA

We invite you to join us for our annual open house in Pittsburgh. If you are attending the AIChE meeting, or if you live nearby, please stop by and visit faculty, students, and fellow alumni. If you have any questions, please contact Pamela Bogdanski at 734-764-7368 or pbog@umich.edu.

Update your contact information with the University at www.engin.umich.edu/alumni

Gifts from Alumni, Friends, and Research Partners July 1, 2011 to September 13, 2012

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Air Products Funds New Fellowship

Air Products and Chemicals, Inc. and the Department of Chemical Engineering are pleased to announce a new Air Products Graduate Fellowship. This fellowship will be awarded annually to a PhD student in chemical engineering who is doing research in an area that is of interest to Air Products and Chemicals.

The Air Products Fellowship provides the recipient with a stipend from September to May, and it covers all tuition and health insurance costs. The fellowship also includes a 3-month paid internship with Air Products & Chemicals, which the recipient is expected to complete as a condition for accepting the Fellowship.

Recently, our first recipient, Jing Liu, was selected. Her advisor is Charles Monroe and she is working on lithium/oxygen-battery modeling. We would like to thank Scott Siegmund and Air Products for their support of the department.

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