Professor Phillip Savage’s research group is trying to mimic nature by growing microalgae and then using heat and pressure to convert it into a renewable bio-crude oil. The origin of petroleum can be traced back to the organic matter in ancient free-floating marine organisms such as algae. As the organic matter sank to the bottom, it got incorporated into the sediment. Over geologic time scales the combined action of heat and pressure converted these deeply buried single-cell organisms into petroleum.

Rather than wait for millions of years to get the oil, Phil’s group is using different catalysts and processing conditions to accelerate the process. So far, they have been able to make a bio-crude oil that contains all of the chemical energy in the original algae and has roughly the same energy density as petroleum crude oil. Of course, the bio-oil will need to be refined before it can be used as a replacement for gasoline, diesel, or jet fuel. The University has filed two patent applications based on results from this research.

This algae bio-fuel project includes fundamental kinetics, reaction engineering, and catalysis work in addition to the technology development. Algae oils differ from petroleum crudes in that they contain much more oxygen and nitrogen, but less sulfur. Therefore, different catalysts might be needed to refine an algal bio-crude. Also, algae have a different set of trace elements, such as phosphorus, and metals than does petroleum crude. It is not yet known how those materials will influence the processing.

Finally, the process being developed in Phil’s lab is based on hydrothermal (water at elevated temperature and pressure) reactions. Relative to what we know about hydrocarbon chemistry in organic solvents, not much is known about how catalysts and organic molecules behave and react in water. “Even with the uncertainty it is worth the risk because of the potential technological benefits,” according to Phil. “This hydrothermal process is so promising because it eliminates the expensive steps of drying the algae and extracting the oil from the cell. These are two of the main barriers to low-cost algae fuel processing.”

The work in Phil’s lab is one part of a larger project that includes other investigators from chemical engineering and across the university.

Graduate student Bobby Levine and research fellow Dr. Tylisha Brown are part of the research team.

Phil Savage’s webpage: www.che.engin.umich.edu/people/savage.html
Note from the Chair

Another year has passed and with it comes the latest edition of ChE News. We have had another productive year in the department, as you will read about in the newsletter.

On the undergraduate side, Lecturer Barry Barkel continues to expand and improve our new product design course. This course builds upon the department’s long-standing excellence in process design by expanding our students’ opportunities to learn more about the design of products. Students have the option of enrolling in this two-term course in place of the process design course. The reviews so far have been extremely positive.

On the graduate side, we have set up a new graduate teaching fellowship to better prepare students for a career in academia. This effort, pioneered by Suljo Linic and the graduate committee, allows selected graduate students to enhance their undergraduate teaching skills. We hope that this program will assist our future teachers in obtaining assistant professor positions at top universities.

In other news, we hosted several gatherings on campus that brought together old friends and new acquaintances. Our homecoming alumni luncheon was well attended and included an excellent talk by our Alumni Award Winner, Tom Gougeon. I invite you to join us at this year’s luncheon on October 15th! Our Katz Lecture, with Professor Carol Hall (North Carolina State University), our Weber Lecture with Professor Eric Beckman (University of Pittsburgh), and our Blue/Green Lecture with Professor Gary Leal (University of California, Santa Barbara) drew excellent crowds this year too.

Last April we were pleased to honor Sharon Glotzer at a lecture and reception when she was installed as the Stuart W. Churchill Collegiate Chair in Chemical Engineering. After the lecture, we also celebrated the 90th birthday of Stuart, an alumnus and former professor and chair at Michigan. Many of Stuart’s former students were there as well as his colleagues from Penn for this enjoyable evening.

Looking to the future, we were extremely successful in our faculty hiring this year. Sunitha Nagrath, who was on the faculty at Harvard, joined our department this fall and brings expertise in microfluidics and circulating cancer cells to the department. Fei Wen, an expert in biofuels and genetic modification of microorganisms, will join our department in 2012 after a postdoc at Stanford. Both Sunitha and Fei will strengthen and broaden our already excellent research portfolio while providing new course options for our undergraduate and graduate students.

Finally, I want to thank you for your generous support of and involvement with the department. You, our alumni, continue to be vital partners with us in making the Department of Chemical Engineering the Leaders and Best! The department’s alumni advisory board, with four new members will be working hard over the next year to help us raise funds for undergraduate scholarships, our textbook fund, and for graduate fellowships. We are all committed to continue providing our students with a world-class educational experience, even as we see increasing enrollment and an ever more competitive and complex research landscape.

Thank you for your support. Go Blue!

Mark A. Burns, Chair

P.S. I encourage you to reconnect with close to 500 alumni and friends of the department through our LinkedIn professional networking group. Just visit www.linkedin.com and search groups for “Michigan chemical engineering alumni” and stay in touch with old friends and with the department.
We are happy to announce that Dr. Sunitha Nagrath joined our department as an assistant professor in September. Dr. Nagrath received her bachelor’s degree in chemical engineering from Sri Venkateswara University College of Engineering in India. She earned her PhD degree in 2004 from the Mechanical Engineering Department at Rensselaer Polytechnic Institute, working in the field of computational fluid dynamics under the guidance of professors Kenneth E. Jansen and Richard T. Lahey Jr. As a graduate student, she made significant contributions toward the development of novel computational techniques for the simulation of single and multi-fluid incompressible/compressible flows using cutting-edge computational methods and finite element techniques. She applied the level set method to study dynamics of single and multiple bubbles, interfacial instabilities, and non-linear dynamics of free surface flows and cavitation. This subject is considered to be one of the most complex unsolved problems in mathematical fluid mechanics, with applications in nuclear physics, hydrodynamics, and physiology.

After graduation, Sunitha joined the BioMEMs Resource Center at Harvard Medical School and Massachusetts General Hospital (MGH) and worked as a postdoctoral fellow with Dr. Mehmet Toner and Dr. Daniel A. Haber. Her work there involved the use of microelectromechanical systems (MEMS) to manipulate and analyze cells for therapeutic and diagnostic purposes. She developed a novel, point-of-care microfluidic platform, “CTC-Chip,” capable of selective and efficient separation of rare circulating tumor cells (CTCs) from the peripheral blood of cancer patients.

She was most recently an instructor of surgery and bioengineering at Harvard Medical School and MGH where she applied engineering tools for clinical care, specifically cancer diagnosis, prognosis and targeted therapy. Her research goal there was to bring the next generation of engineering tools to patient care, especially in cancer. Her major research focus was to develop advanced MEMS tools for understanding cell trafficking in cancer through isolation, characterization and study of circulating cells in peripheral blood of cancer patients. She recently received the 2009 NIH Director’s New Innovator award in support of her research efforts.

At Michigan, Sunitha will continue her research on isolating and studying rare cells from cancer patients. She plans to focus her lab’s efforts on designing and developing smart chips using microfluidics and nanotechnology to make an impact in medicine and life sciences. Her goal is to create cutting-edge engineering solutions for clinical medicine with novel translational biomedical research tools. She strongly believes in building a team where engineers, biologists and clinicians will come together to solve complex problems with better approaches.

Outside of work, Sunitha enjoys reading books, cooking, and being surrounded by plants; she indulges in gardening whenever she needs to relax. She enjoys participating in many sports, especially team sports. Her husband, Deepak Nagrath, is an assistant professor at Rice University, working on systems biology of human diseases. He not only shares a passion for science but also is her biggest critic, bringing forth many ideas and providing well-needed balance.

Fei Wen

We would also like to introduce you to another new faculty hire, Dr. Fei Wen. She will come to Michigan in 2012 after she completes a postdoc with Mark M. Davis at Stanford University, where she will by studying T cell recognition.

Fei received her PhD degree in chemical engineering from the University of Illinois-UC in 2010 and her BS degree in chemical engineering from Tsinghua University in 2003.

During her doctoral study, she applied genetic and protein engineering principles to address some of the issues in biomedical applications and biofuels production. For example, she developed new tools to identify antigenic peptides and engineered yeast cells to produce bioethanol.

Fei’s current research focuses on immune function modulation with the aim of designing effective reagents for cancer immunotherapy, gene delivery, and infectious disease vaccination.
Sharon C. Glotzer was installed as the Stuart W. Churchill Collegiate Professor of Chemical Engineering in a ceremony on April 23, 2010. Sharon joined the chemical engineering faculty in 2001 as an associate professor, and was promoted to professor in 2005. She also holds appointments in Materials Science and Engineering, Physics, Applied Physics, and Macromolecular Science and Engineering.

Sharon received a BS in physics from UCLA in 1987 and a PhD in physics from Boston University in 1993. Prior to coming to Michigan, she worked in the Polymers Division, Materials Science and Engineering Laboratory at the National Institute of Standards and Technology (NIST) as director of the NIST Center for Theoretical and Computational Materials Science, a center she co-founded as a postdoctoral fellow at NIST.

She is a leader in the simulation of complex fluids and self-assembled materials. Sharon has an active research group of over 20 PhD students, research scientists, and postdocs. She has over 140 refereed publications, and has presented over 200 invited talks and keynote lectures. She has held elected offices in AIChE and APS, and served on numerous National Academies’ committees and editorial boards.

Sharon is a Fellow of the American Physical Society and holds a prestigious National Security Science and Engineering Faculty Fellowship from the DoD. She is the recipient of numerous awards, most recently the Charles M.A. Stine Award from AIChE, the College of Engineering Monroe-Brown Foundation Research Excellence Award, and the Horace H. Rackham Faculty Recognition Award.

She is also the co-founding director of a new Virtual School of Computational Science and Engineering. She currently serves as the director of Research Computing for the College of Engineering, and is the founding director of the new Institute for Computational Science & Engineering.

This collegiate professorship is named in honor of Stuart W. Churchill, the Carl V.S. Patterson Professor Emeritus of Chemical and Biomolecular Engineering at the University of Pennsylvania, and a faculty member of Michigan’s Chemical Engineering Department until 1967. Stuart, who spoke at the ceremony honoring Sharon, received four degrees.

Stuart Churchill Celebrates His 90th Birthday in Ann

Following the installation of Sharon Glotzer into the Stuart W. Churchill Collegiate Chair in Chemical Engineering, a dinner was held at the Gandy Dancer to celebrate Stuart’s 90th birthday. Eleven of his former doctoral students were in attendance, six from Michigan and five from Penn. Between courses, Penn’s Dean Eduardo Glandt presented a toast to Sharon and Stuart, and Professor Warren Seider reflected on 48 years with Stuart. He presented Stuart with a Book of Letters from his former doctoral students and several colleagues. Prior to dessert, remarks were made by Professor Emeritus Jim Wilkes, Hank Kohlbrand (AIChE President), Professor Emeritus David Hellums, Dr. Pete Lederman (student in Stuart’s first class in 1950), and Stefan Zajic (Stuart’s grandson and co-author).

Diane Seider (Warren’s wife) presented Stuart with a photo montage as a present from the faculty of the University of Pennsylvania Department of Chemical and Biomolecular Engineering (above). Before the evening was over, Stuart expressed his great attachment to the University of Michigan and his joy...
Stuart Churchill Celebrates His 90th Birthday in Ann Arbor

at the University, completing his PhD in 1952 under the direction of Professor J.C. Brier. After receiving his doctoral degree, Stuart was a faculty member in the department for many years, serving as chair of the department from 1962-1967.

For over half a century he has made numerous contributions in the fields of combustion, heat transfer and fluid dynamics. He has received numerous awards from national professional groups, including the American Institute of Chemical Engineering, of which he served as president in 1966. In 1974, he was elected to the National Academy of Engineering.

Product Design—A New Option

The process design course has long been an important part of Michigan’s chemical engineering curriculum. However, until recently, product design was not part of that curriculum. In 2008, Lecturer Barry Barkel began developing and teaching a yearlong product design course. “We knew for some time we needed to offer a product design course,” says Barry. “The problems associated with identifying the right format for a course, to make its relevance equal to process design, delayed its introduction.”

Students enroll in the new course for two consecutive terms. During the first term, they learn the basic principles of product design and the required technologies their team will use for its projects. The students begin by conducting a market analysis for the product and eventually create an overall research and development plan for the project, covering all aspects that must be investigated. In the second term, the students learn the principles of directed research and economic analysis, and are required to implement their research and development plans in the lab.

Because of limitations on the lab space, the class is currently limited to 15 students. They are divided up into three teams, each working on different projects. “There are some rather strong limitations for the projects we can use.” Barry points out. “We can’t do projects that require expensive equipment, rare raw materials, or dangerous reactions. Nevertheless, we are able to find projects that require all the elements that appear in industrial settings.”

The labs are open to the students 24/7. They must schedule their own work and order their own materials. They learn real-world lessons that are not included in the lectures such as, under certain conditions, a kitchen blender can serve as a substitute for a homogenizer; material delivery dates are as important as order dates; regulatory requirements such as FDA’s can control your whole development plan; and that, even though many experiments don’t work, you can still learn something from them.

So far students have designed and developed a blueberry sports drink, a blue lipstick and adhesive for use in packaging, liquid dish soap, and a non-petroleum-based equivalent to 3-in-One Oil (photo above).
Computer simulations of hard tetrahedra have uncovered a new type of quasicrystal—the first to be formed from hard or non-spherical particles. The findings, reported in the December 10, 2009 issue of *Nature*, show that particle shape is enough, by itself, to produce highly complex, ordered structures. Sharon Glotzer and her colleagues have investigated the packing of tetrahedra using thermodynamic computer simulations, which allow the system to evolve naturally, in response to simulated compression, towards high-density configurations. The formation of an ordered but non-periodic structure (a quasicrystal) with twelve-fold symmetry is achieved by the self-organization of the tetrahedra into groups of five, and then of these groups into layers. In this way, an intricate structure is created from simple hard objects that interact only by excluding one another in space. (From an article by Nicole Casal Moore, U–M News Service)

The safety of drinking water is a vital issue in many developing countries and in many parts of the United States. Nick Kotov and his colleagues have created a new biosensor that can quickly and inexpensively detect a toxin produced by algae in drinking water.

The paper strips, infused with carbon nanotubes, perform 28 times faster than the complicated method most commonly used today to detect microcystin-LR, a chemical compound produced by cyanobacteria, or blue-green algae. Cyanobacteria is commonly found in nutrient-rich waters.

The technology could easily be adapted to detect a variety of harmful chemicals or toxins in water or food. (From an article by Nicole Casal Moore, U–M News Service)

Recently-graduated PhD in chemical engineering, Himabindu Nandivada (left), and her advisor Joerg Lahann, working together with collaborators at the U-M Medical School, have built a new synthetic growth matrix for the culture of human embryonic stem cells. A paper on the research was published in the June issue of *Nature Biotechnology*.

Stem cell researchers often use naturally-derived matrices or other cell types as substrates for stem cell culture. The new chemically defined matrix has long-term stability, no batch-to-batch variability and does not contaminate stem cells with foreign substances that could interfere with their normal function. This synthetic Petri dish coating could overcome a major challenge to the advancement of human embryonic stem cell research. (From an article by Nicole Casal Moore, U–M News Service)
Professor Ronald Larson and recent PhD graduate, Dr. Susan Duncan (above) are using advanced molecular dynamics simulations to help understand how lung surfactant works.

The inside of the lung contains millions of small air-filled sacks called alveoli, which provide a large surface area for absorbing oxygen into the blood. These alveoli, which expand and contract considerably each time we inhale and exhale, are lined with a layer of surfactant—a mixture of lipids and proteins that reduces and regulates the surface tension.

Without functional lung surfactant, the work of breathing is too hard to perform, resulting in respiratory distress syndrome (RDS), the most common complication in premature infants and a leading threat to the survival of patients suffering from lung injury.

Although surfactant replacements have greatly reduced the mortality rate of neonatal RDS, current replacements are not optimal and acute RDS in patients suffering from lung injury has proven more difficult to treat.

In order to aid the design of effective surfactant replacements, further research is needed to understand the mechanisms that promote physiological surfactant function. To be effective, lung surfactant layers must perform two seemingly conflicting tasks: they must be solid enough to avoid irreversible collapse upon compression, and fluid enough to adsorb and respread readily upon expansion. Both phase and structural (reversible collapse) transitions have been implicated in this process.

In a recent Biochimica et Biophysica Acta: Biomembranes article, Susan and Ron considered the role of individual surfactant components on collapse transitions in individual layers (called “monolayers”) of lung surfactant. They used molecular dynamics simulations, which allow each molecule in a lung surfactant mixture to be tracked on a computer (figure at right). The simulations showed that the addition of surfactant proteins called SP-B and SP-C had a strong impact on monolayer collapse, and allowed these monolayers to fold more readily. In addition, by “mutating” the peptides, they discovered that the peptides needed to be sufficiently “hydrophobic” to induce folding—that is, they needed to be significantly water-repellant, so that they would penetrate more deeply into the surfactant monolayer.

“T h i s research is leading to a better understanding of how lung surfactant does the marvelous work of allowing each of us to take our next breath,” Ron says. “And it could help in the design of effective replacements for those who temporarily lack effective lung surfactant and are at risk of dying because of it.”
Xue Chen, from Ron Larson’s group, was selected for this year’s Chemical Engineering Graduate Achievement award.

Phillip Christopher (Suljo Linic’s group) and Amir Haji Akbari Balou (Sharon Glotzer’s group) were awarded Rackham Predoctoral Fellowships. This prestigious University fellowship is given each year to approximately 50–60 doctoral students.

Robert Levine, from Phil Savage’s group, and his team were one of three winning teams in the Dow Sustainability Challenge in March. His team’s winning idea was a plan to introduce a device called the Biolight for combusting waste to produce light.

Graduating senior Ann Lesnefsky received the 2010 Chemical Engineering Undergraduate Distinguished Achievement Award.

Josh Schaidle, from Levi Thompson’s group, Phillip Christopher, and David Ingram, both from Suljo Linic’s group, won three of five poster awards at the Gordon Research Conference on Catalysis.

Mohammad Fallahi Sichani, from Jennifer Linderman’s group, received a 2010 Phi Kappa Phi graduate student award.
NSF Fellowships

We were delighted to learn that four of our undergraduate students have been awarded National Science Foundation (NSF) Graduate Research Fellowships. These fellowships are one of the greatest honors an incoming graduate student can receive, and offer three years of support for graduate studies, including a significant stipend.

Ran Li plans to pursue a PhD in biological engineering at MIT, focusing on tissue engineering. He became interested in this area while working with Professor Shu Takayama in the Biomedical Engineering Department.

Ann Lesnfsky will pursue a PhD in environmental engineering at Stanford. She is interested in using micro-organisms to help find more sustainable solutions to environmental issues, such as removing recalcitrant pollutants or balancing nutrient cycles. She worked with micro-organisms in Nina Lin’s laboratory.

Edwin Yik, who worked with Johannes Schwank in energy-related research, will attend the University of California at Berkeley to pursue a PhD in chemical engineering, where he hopes to continue performing research in energy-related processes and systems.

Laura Chang has chosen to continue her studies at Michigan, where she has been working with Joerg Lahann on ultra-thin film polymers for biomedical applications.

All four recipients are grateful that NSF funds will result in tremendous freedom and flexibility in choosing advisors and research projects. Ran commented that “the process of applying for the NSF fellowship gave me great practice in formulating my research plans and writing grant proposals, skills that are crucial for graduate students.” With NSF’s emphasis on “broader impacts,” Edwin believes that “the mission of the fellowship inspires the recipient to find direct ways to apply his/her work to the benefit of society. Also, as a fellow, I have a strong sense of responsibility in conducting research ethically.”

We commend these students on receiving NSF fellowships, and wish them the best as they pursue their graduate studies.

More Congratulations

NSF honorable mentions went to Alex Dowling, who worked with Peter Woolf and will attend Carnegie Mellon, and Josh Katzenstein, who just completed his first year at the University of Texas at Austin.

Edwin Yik, who worked with Johannes Schwank in energy-related research, will attend the University of California at Berkeley to pursue a PhD in chemical engineering, where he hopes to continue performing research in energy-related processes and systems.

In 2009, the department established the Graduate Teaching Fellowship program to provide a mentored teaching experience for top students considering academic careers. Graduate fellows are selected by the graduate committee based on previous teaching performance, future plans, and overall academic performance.

Last winter, our first teaching fellow, Mr. David Ingram (above), taught in ChE 344, Reaction Engineering. David, who received his BS in chemical engineering at Texas A&M University, is a member of Suljo Linic’s research group. He served as an undergraduate teaching assistant twice at Texas A&M, and was a graduate student instructor in 2009 for ChE 344.

The faculty instructor and mentor was David’s research advisor, Suljo Linic. During the term, David was an undergraduate teaching assistant twice at Texas A&M, and was a graduate student instructor in 2009 for ChE 344.

The faculty instructor and mentor was David’s research advisor, Suljo Linic. During the term, David was involved in many aspects of course planning and classroom teaching.

The feedback from the undergraduate students in the course has been very positive. According to the teaching evaluations, the students have appreciated having multiple teachers and feel they benefited from the variety of approaches used to teach the course.

The department plans to award one or two teaching fellowships each academic year. Eric Jankoski was selected as this fall’s fellow.
Inspiring the Next Generation

Our department hosted a number of middle and high school students this year, as well as participated in community activities to encourage them to consider engineering and science careers.

Professor Levi Thompson’s lab hosted six high school students in his fuel cell research lab as part of the College’s Leadership, Education, and Development (LEAD) program, a three-week program in which high school sophomores participate in research and take courses in academic, technical communications, and academic preparation topics. Under the guidance of Dr. Valerie Thomas (MSE ’93, PhD ’99), the students researched the difference in the chemical and physical properties of biodiesel prepared from soybean oil and from corn oil.

About three dozen middle school students got to experience chemical engineering as part of the Women in Science and Engineering office’s Girls in Science and Engineering (WISE GISE) program. They visited professors Nina Lin’s (in photo at left) and Mike Solomon’s laboratories, completed experiments involving fluorescent bacteria transformation, and explored the sometimes unusual responses of complex fluids with assistance from graduate and undergraduate students.

Students in Professor Lola Eniola’s material and energy balances class shared their understanding of chemical engineering with visiting 9th graders from Ypsilanti High School through a poster session. ChE 230 students researched and described various chemical engineering processes, including relevant safety and ethical issues. Posters covered a range of chemical engineering applications in industry and researched process such as the refinement of crude oil, making chocolate milk, vodka distillation, production of ethanol from corn, and hydrogen production via steam methane reforming.

A large departmental contingent, including faculty, graduate and undergraduate students and alumni, served as judges in the Southeast Michigan Science Fair (below). This is a particularly special day each year for Dr. Susan Montgomery, who participated in this same fair in 1981. Susan and undergraduate chemical engineering students also visit Huron High School’s chemistry classes each year to introduce students to our profession and help them better understand the transition from high school to college.

In a more international experience, Professor Johannes Schwank hosted exchange students from Ann Arbor’s German sister city Tuebingen who attended Huron High School for three weeks, and their host families. They took a personalized three-hour tour of North Campus, including Johannes’ laboratory, the department, the Lurie Nanofabrication facility, the 3-D lab in the Duderstadt Center, and the Gerald R. Ford Library.

Many of our undergraduate and graduate students are also involved in one-day and ongoing teaching, mentoring and tutoring activities in local middle schools and high schools. It is rewarding to see how eager they are to share their passion for chemical engineering with the next generation.
**Annual Department Lectures**

**Carol K. Hall**, the Camille Dreyfus Distinguished University Professor of Chemical and Biomolecular Engineering at North Carolina State University (above with Mark Burns), was the lecturer for the 40th Annual Donald L. Katz Lectureship on April 15 and 16.

Dr. Hall presented two lectures and was the guest of honor at the lecture dinner. The topics for her lectures were “Thermodynamic and Kinetic Origins of Alzheimer’s and Related Diseases: A Chemical Engineer’s Perspective” and “Self-Assembly of Dipolar Particles: Designing Smart Materials Using Computer Simulation.”

Dr. Hall’s research focuses on applying statistical thermodynamics and molecular-level computer simulation to topics of chemical, biological or engineering interest involving macromolecules or complex fluids. Current research activities include self-assembly of dipolar colloidal particles, nanoparticles for the delivery of cancer drugs, heteropolymers with adjustable monomer sequences, hybridization of DNA, and the formation of fibrils and other molecular aggregates of peptides and proteins.

She is the author of over 190 publications, is a Fellow of the American Institute of Chemical Engineers and of the American Physical Society, and was elected to the National Academy of Engineering in 2005. She is a member of the AIChE Board of Directors.

At the dinner, the department also honored ChE faculty who received awards and other honors during the past year, and recognized graduating doctoral students. A poster session was held before the dinner and Mohammad Sichani Fallahi from Jennifer Linderman’s research group won the award for the best poster.

**Eric J. Beckman** delivered the Walter J. Weber, Jr. Distinguished Lecture in Environmental and Energy Sustainability on December 2, 2009. His topic was “Greening the Chemical Enterprise.”

Dr. Beckman is the George Bevier Professor of Engineering at the University of Pittsburgh’s Department of Chemical Engineering, where he previously served as the department chair. He is a co-director of the Mascaro Center for Sustainable Innovation, and where he is also the primary inventor of the company’s proprietary adhesive technology.

Dr. Beckman received his PhD in Polymer Science and Engineering from the University of Massachusetts. He has held positions in industry at Monsanto Plastics and Resins and Union Carbide’s Silicones and Urethanes Intermediates Division. He received the 2002 Academic Presidential Green Chemistry Challenge Award from the EPA, and was honored by the Engineers’ Society of Western Pennsylvania as the 2005 Engineer of the Year. Dr. Beckman’s research group examines the use of molecular design to solve problems in green engineering and in the design of materials for use in tissue engineering.

**Phil Christopher & Dave Ingram** from Suljo Linic’s research group were the winners of the poster competition held after the lecture.

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**Annual U-M/MSU Seminar**

**Gary Leal**, the Warren B. and Katherine S. Schlinger Distinguished Professor of Chemical Engineering at University of California, Santa Barbara (UCSB), was the featured speaker at the 28th Annual UM/MSU Joint Seminar last fall. Dr. Leal’s topic was “The Effect of Interface Slip on Drop Dynamics: Deformation, Breakup and Coalescence.”

His current research is focused on the dynamics of complex fluids, with a focus on the use of rheo-optical techniques for polymeric liquids, computational studies of model complex fluids, and studies of drop breakup and coalescence to understand the fundamental mechanisms of dispersion in polymer blending processes.

Dr. Leal has received a number of awards, including the Fluid Dynamics Prize of the APS, The Bingham Medal of the Society of Rheology, and the Allan P. Colburn and William Walker Awards from the AIChE. He has also been a Guggenheim Fellow, and received the Camille and Henry Dreyfus Teacher-Scholar Award. He has been a member of the National Academy of Engineering since 1987.
Music & the Chemical Engineer

Many people think of engineering as the opposite of the arts. So they may be surprised to find out that one-third of the Michigan Marching Band is composed of engineers! Our students who participate in band & other musical activities enrich our community, and their experiences make them better engineers.

Christian Hatfield (BSE ’10), currently working at Air Liquide and a Michigan Marching Band member during his time at Michigan, felt that he “learned to manage my time, and continued improving my time management each year. I also learned how to be a more effective leader through being taught by my peers and then teaching them when I was a rank leader. These skills helped in all of my classes including my ChE classes.” Many of our alumni agree with Christian and add that these skills prove invaluable in the work place too. Michelle Wu (BSE ’01), design assurance engineer at Ximedica, notes that “given that students won’t have the years of experience in industry, I always look at extra-curricular activities—the soft skills, such as leading and working with others, organizing projects, working through obstacles—that you learn and develop outside the classroom will take you further than your technical acumen alone.” Of course students don’t participate in music groups to increase their career potential. “In joining the Michigan Marching Band freshman year I instantly went from knowing no one at U-M to having about 400 new friends, all before classes started,” states Nick Parsons (BSE’07, MSE ’08), currently an environmental engineer for the U.S. Environmental Protection Agency in Research Triangle Park, NC. As Matt Gessford (BSE ’03), production engineer at Dow recalls “I just really loved being out on the field performing in front of 110,000 people. The people I met and the experiences I had with the marching band really made my time at Michigan.”

Then there are those students whose love of music is so strong that it leads them to pursue dual degrees in chemical engineering and musical arts. In mentoring incoming dual degree students, he notes that dual degrees are “great for those of us have too much energy and passion for both pursuits to give up professional training in one or the other. It’s not easy to work toward two totally unrelated degrees simultaneously, but it’s also hugely helpful for your mental health to be able to exercise both halves of your brain. I would have been lost if I had only studied music or engineering, because I need to have that balance of analytical and creative sides.”

Andrew Warren, who is earning a BFA in jazz studies in addition to his chemical engineering degree, notes “I frequently use the skills from one major to complement the other. The collaboration and creativity that are so integral to music are helpful for group work and design projects, while the analytical skills from engineering have helped me to identify problems and improve my trumpet playing.” He wouldn’t have it any other way, as his education is preparing him for a future as “a full time engineer who also plays jazz gigs professionally on nights and weekends.”

Playing the violin in the Michigan Pops Orchestra has been a “truly amaz-
ing experience” for senior Amanda Opaskar. “I have really enjoyed the opportunity to continue playing my violin and have met wonderful people and made lifelong friends,” says Amanda (left). “I have also enjoyed the atmosphere of the orchestra which encourages its members to be social but also to work hard to put on great concerts each term.”

Abdullah Awamleh (BSE ’10), recently admitted to our MEng in Pharmaceutical Engineering program, participated in the Men’s Glee Club as an undergraduate. He cites the opportunity to see parts of the country that he had never seen before as one of the advantages of being part of the group. In addition, “the stories that the old guys tell you are really inspiring. It is really special to be involved in something with such a long and rich history.”

These groups also provide our alumni with an additional home when they return to Michigan, as Mike Ferrante (BSE ’93, MBA ’98) experienced when he returned to campus this Spring for the 150th anniversary celebration of the Men’s Glee Club. “I had an amazing weekend; it was great to be back and singing with my friends again. Truly one not to be forgotten.”

### Chemical Engineering Fall Alumni Events

**Monday, September 27, 2010**

Career Fair Reception  
4:30-6:00 p.m.  
3158 H. H. Dow (Podbielniak Lounge)

If you’re going to be in town please join us this year at our alumni reception during the SWE/Tau Beta Pi Career Fair. It’s a great time to visit with other alumni and faculty.

**Friday, October 15, 2010**

Alumni Videotaping  
Starting at 9:30 a.m.  
Location: Johnson Rooms  
Lurie Engineering Center

See below and contact Sandy Swisher

Luncheon in the Department  
11:30 a.m. - 1:30 p.m.  
Location: Johnson Rooms  
Lurie Engineering Center

The department will host a luncheon for alumni during the Michigan Engineering Homecoming Weekend at 11:30 a.m., where we will be joined by our 2010 Alumni Society Merit Award winner, Paul Horst (BSE ’72, MBA ’73). You’re invited to stop by and chat with alumni, faculty and students, and get the latest news about the department.

If you would like to join us on October 15, sign up for “Lunch in the Departments” when you register for the homecoming weekend. If you have not made reservations yet for homecoming weekend, you can register online at http://www.engin.umich.edu/alumni/homecoming or call 734-647-7046.

Note: If you are not participating in other activities during homecoming weekend, but would like to join us for lunch, please contact Sandy Swisher (734-764-7413, sandys@umich.edu)

**Monday, November 8, 2010**

Open House at the  
2010 AIChE Annual Meeting  
7 p.m. - 9 p.m.  
Salt Lake City, Utah

If you are going to be at the meeting or are in the area, we invite you to stop by and visit with faculty, students and alumni at our AIChE open house in Salt Lake City.

We want to hear your stories...
We would like to hear your stories about Michigan. We are going to be videotaping alumni this fall to use in electronic & printed publications promoting the department. We will be looking for volunteers especially during the Career Fair and Homecoming Weekend. Note that we will be starting our October 15 taping sessions a few hours before lunch. If you are going to be in town anytime and interested in working with us on this project, please contact Sandy Swisher (734-764-7413, sandys@umich.edu) to set up a time.
When Bill Wulfsohn’s daughter, Becki, begins her studies at Michigan this fall, it will be a proud day for Bill because it will mark the third generation of Wulfsohns to attend here. His father received a degree from Michigan in 1954, so it’s not surprising that Bill was a big Michigan fan when he was growing up in Illinois. He only applied to two universities for undergraduate studies, University of Illinois and University of Michigan. When he received his acceptance from Michigan, the decision was easy, he was coming to Ann Arbor.

It didn’t take long for him to learn an early lesson about what would be expected of him as an engineer. In his first ChE course, Thermodynamics I, his professor gave the students explicit directions about how to label their homework submissions. The day they turned in their first assignments, the professor sat at the front of the room and leafed through the homework, and, to the horror of many students, tore up some of the sheets as he went through the pile. It turns out he had destroyed the assignments that weren’t in the requested format. The professor told the class, “If you can’t follow my simple instructions for your homework, how will you be able to follow instructions when you are asked to design a reactor?”

“The demanding chemical engineering curriculum went on to teach me about hard work and perseverance,” Bill says. “These qualities learned as a student, in addition to the engineering emphasis on disciplined and analytical thinking and actions, set the tone for my career.” Because the program at Michigan was one of the most rigorous and competitive in the country, he says he felt well prepared for any future challenge when he entered the work world.

This summer, after more than 25 years of industrial and manufacturing experience, Bill became president and CEO of Carpenter Technology Corporation. Carpenter Technology, in Wyominging, Pennsylvania is a leader in the development, manufacture, and distribution of high performance specialty-alloys. Before his move this summer to Carpenter, he had been senior vice president of industrial coatings in the U.S. and Asia-Pacific and previously, in Europe, for PPG Industries.

While Bill was at PPG, he set up internships for Michigan chemical engineering students. This summer, Dustin Chang went to Busan, South Korea to work at an existing PPG resin plant and Eric Chuang went to Shanghai, China. Dustin and Eric worked as a team to help design the process control system for PPG’s first resin facility in China.

Bill will begin a two-year term this fall as a member of the ChE Alumni Board. He and his wife, Stephanie (LSA ’84), have two more daughters at home who they hope will consider coming to Michigan too. By the way, Becki Wulfsohn’s first choice for a major? Chemical engineering.

Meet Our 2010-2011 Alumni Board

Robert Ranger, Chair, BSE ’83
Robert Bratzler, BSE ’68
Margaret Gilligan, BSE ’89
Paul Horst, BSE ’72, MBA ’73
Somesh Nigam, MSE ’85, PhD ’88
Max Pettibone, BSE ’68
Cory Phillips, BSE ’93
Bill Retallick, BSE ’48
Daniel Sajkowski, BSE ’81, MSE ’82
John Santini, BSE ’94
Kevin Seibert, MSE ’93, PhD ’96
Frank Tranzow, BSE ’59, MBA ’61

New Members:
Leslie Mowrey, BSE ’70, MSE ’71
Tony Orlando, BSE ’87
Steven Waier, BSE ’88
William Wulfsohn, BSE ’84

(Only U-M degrees listed)

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

Alumni Profiles—Introducing Two Alumni Board Members

William Wulfsohn, BSE 1984
Margaret Gilligan, BSE 1989

Margaret Gilligan, the youngest of seven children (and only girl) born to James and Marion Gilligan, originally came to the University of Michigan to major in actuarial science. However, with inspiration from her older brother, Thomas, a Michigan chemical engineer, she decided to switch to chemical engineering, a field she felt would offer her many more career options.

When Margaret was working on her degree, she and four classmates were part of Scott Fogler’s original “Think Tank Team.” The team researched a variety of problem-solving heuristics that equipped students with tools for solving real world open-ended problems. Part of this initiative involved visiting companies and collecting information that would later be incorporated into assignments given to students as part of the chemical engineering core curriculum. The end result of this two-year effort was the first draft of Fogler’s book, entitled “A Focus on Developing Creative Engineers.”

After graduating in 1989, she moved to Chicago to start her career in research and development at Kraft Foods as a process research engineer. Her entire career has been in the consumer packaged goods industry, primarily in food & beverage. Her professional development includes stints at Kimberly-Clark, Schreiber Foods, Nestle Ice Cream, and Gatorade. She is now working for Dean Foods as the director of engineering for the Pacific Coast and lives in Yorba Linda, CA with her husband, Abraham.

Although she hasn’t been back to Ann Arbor often, she has continued to be a strong advocate for the University and the department. She was pleased to be asked to become a member of the ChE Alumni Board in 2009. With this appointment, she looks forward to visiting A2 every fall for the next few years.

Margaret actively recruits students who have an interest in the food industry, and takes pride and leadership in mentoring young engineers as they begin their careers. She is also a member of the American Institute of Chemical Engineers and Society of Women Engineers.

Hailing from Plymouth, MI, she has fond memories of listening to Bob Ufer’s “Mee-chigan” football broadcasts. “I loved hearing his “Bo ‘George Patton’ Schembechler horn,” honked three times after every Michigan touchdown, twice for a field goal and safety, and once for an extra point.”

Outside of work, she is an avid golfer and sports fanatic, and is a huge fan of the Detroit Red Wings. Even though the Ufer days are long past, she still enjoys Michigan football. Margaret says, “Although my career has taken me to many cities, I never have any trouble locating Wolverine fans in the area.”

Alumni Award Winner

Thomas W. Gougeon (BSE, ’58, BS LSA ’58) was the 2009 ChE Alumni Merit Society Award winner. He received his award at a dinner on September 25, 2009, and was also the guest speaker at the department homecoming luncheon earlier that day.

For over three decades, Tom enjoyed an interesting and varied career in manufacturing and product development management with Procter & Gamble Co. (P&G). He served in a variety of roles, including: department manager of synthetic granules, and technical brand manager in detergents, household cleaning products, pharmaceutical products Tom holds several U.S. patents for a variety of controlled-release contraceptive articles.

At the end of his tenure with P&G, he served as section head of Professional and Regulatory Services. For many years he was instrumental in recruiting chemical engineers from the University of Michigan.

Tom is a member and past-president of the board of trustees of the Adolescent Health Center at the Cincinnati Children’s Hospital Medical Center; and founding member of the Community Health Education Advisory Committee at the Cincinnati Children’s Hospital Medical Center.

From College of Engineering Communications and Marketing
Alumni Notes

Peter Lederman (BSE ’53, MS ’57, PhD ’61) was appointed a member of the Science Advisory Board of the New Jersey Department of Environmental Protection. It is a board of 17 members that provides advice to the department on science and technology. Pete was also reelected as a director to the Board of the Chemical Heritage Foundation for a second three-year term. The foundation was founded 25 years ago to be the repository of the history and important artifacts, books and papers of the Chemical Enterprise. It is located in Philadelphia.

Paul Theisen (BSE ’85) is a supply chain improvement leader for Dow Chemical. He joined Dow in 1986 and works in Midland, MI. He does a lot of traveling in his current role, helping integrate Rohm and Haas locations into Dow. He and his wife, Kristine, have been married for 17 years. They have two daughters, Casey and Jessica. The travel assignment has allowed the family to visit places like Boston, Philadelphia, Washington DC, and the Great Smoky Mountains. Paul always finds time to hit several U-M Football games each fall.

Last year Greg Poterala (BSE ’86) joined Arkema as the automotive market manager for their Polylamid division, working out of his home office in metro-Detroit. He is responsible for growing business for their Rilsan, Pebax, and Orgalloy resins in the North American automotive industry. Coincidentally one of his colleagues is fellow U-M ChE, Todd Rogers!

Cynthia (Robertson) Essenmacher (BSE ’90) works at the DuPont Washington Works plant in West Virginia as the lab quality manager. She oversees quality requirements for ISO17025 lab accreditation such as proficiency testing, quality staff meetings, and internal audits, and does statistical reporting for global laboratories. The Washington Works laboratory does molding, physical and chemical testing for nylon engineering polymers and fluoropolymers. Since relocating to West Virginia in 2006, Cynthia, her husband and two children are very active in school and their kids’ activities. Her husband works as a stay-at-home dad.

After receiving a bachelor’s and master’s at U-M, Loui Chen Kou (BSE ’98, MSE BME ’99) worked for eight years at Terumo Cardiovascular Systems in Ann Arbor as a quality engineer. Along the way, she got married and now has two children (Xavier, 3-1/2 years, and Lexie, 8 months). They have settled down in the San Francisco Bay Area and plan on being there permanently. She is a stay-at-home mom and is enjoying her time with her children.

Blia (Kue) Ramirez (BSE ’88) and her husband, Tele, live in Gaithersburg, Maryland, just 20 minutes outside of DC. Blia works as an Applications Architect for CapitalSource, a lending firm. They are busy raising their two children, Luca (9) and Lola (4).

Michael Paczas (BSE ’00) completed his MD at the University of Michigan Medical School in 2004. He did a residency in orthopaedic surgery at University Hospitals Case Medical Center in Cleveland, OH, in 2009. He is currently completing a surgical fellowship in hand surgery in Cincinnati, OH, and plans to return to the southeastern Michigan to start his surgical practice.

Mayur Valanju (BSE ’00, MSE ’01, MBA ’06) has started a new job at TetraVita Biosciences as Director of Business Development. Mayur and his wife, Graciela, are expecting twins in November.

A busy 2010 keeps on going for BT Cesul (BSE ’01). He was awarded the 2009 NASIC Civilian of the Year, Cat 3 for the second time since starting in 2002, and passed the prospectus defense of his PhD program at the Air Force Institute of Technology in May 2010. He also taught his 8-month-old daughter, Ella, how to raise her hand at Hail! in “The Victors.”

Julie Champion (BSE ’01) and her husband, Kevin, have moved to Atlanta, GA, where Julie is a new assistant professor in the School of Chemical & Biomolecular Engineering at Georgia Tech. They are enjoying their new city, great Southern food, and their puppy, Pepper.

Janette Nunn (BSE ’01, MBA ’08) recently moved from Singapore to Perth for Chevron. She is wrapping up her last rotation on the Leadership Development Program and enjoying life in Australia.

Tracy (Matson) Brusewitz (BSE ’02) has moved into a new role at Procter & Gamble as the site materials supply manager at the Green Bay plant. She is also the vice-chair on the United Way Emerging Leaders Society board in Brown County. She and her husband,
Andy, got married in September 2008 at Lambeau field, and they have been enjoying married life while spending a lot of time traveling!

After graduating in 2003, Yiping Lim moved back to Singapore to spend 2.5 years in the army. Subsequently he embarked on a PhD with Imperial College in London in 2006 focusing on biotechnology, and has just completed his studies there. He has taken a job at Lonza Biologics in Singapore in their Manufacturing Sciences & Technology group. He got married in 2009 and he and his wife have an 11-month-old son!

In May 2007, Eric Roeder (BSE ’03) married Hilary Alpert (BS ’03, MD ’07) and the couple moved to Durham, NC. After working as a process engineer for Wyeth in Sanford, NC, for two years, Eric left the workforce to pursue his MBA at Duke University’s Fuqua School of Business. Last summer, he worked as an MBA intern for Novartis Vaccines in their Global Manufacturing Strategy group.

Tawnya Sowerwine’s (BSE ’03) work history includes ME Elecmetal, Inc. in Tempe, AZ as a process engineer for a steel castings foundry, and Kraft Foods Oscar Mayer in Madison, WI. She currently works for MillerCoors Watertown Hops Company in Watertown, WI as a process engineer and resource chemist, where she analyzes and ensures control during the process of separating CO2 liquid extracted hops into their components, which are used in both Miller and Coors brand products for flavoring profiles. She and her husband, Matt, have been married since May 2004 and live in downtown Madison.

Daniel Burlingame (BSE ’04, MSE ’05) recently joined General Electric in Minneapolis, MN working on RO/NF membrane research as a lead engineer. This comes after working at Intel as a Lithography Process Engineer in Portland, OR. He and his wife have a boy (2) and a girl (4).

After completing her BSE in 2005, Suchita Shah moved to Southern California to work on the Xience Drug Eluting Stent with Guidant Corporation/Abbott Laboratories in a manufacturing role. After three years of work and two product launches, she decided to get an MBA at the Wharton School of Business at the University of Pennsylvania. She graduated in May 2010 and headed to Chicago, IL to be a consultant with the Boston Consulting Group in a generalist role with hopes of working in the healthcare and non-profit sectors.

Scott Taylor (MSE ’06) spent the past year and a half surfing and kiteboarding in the Dominican Republic. While there, he started a company which has developed a vitamin supplement that helps keep mosquitoes from biting, www.Bite-amins.com. He is also part of an early stage start-up company that is developing a new application of GPS technology.

Erin Knight (BSE ’07) recently moved to Seattle. She is looking forward to hiking, kayaking and of course meeting alumni in the area.

Hayley Smithkort (BSE ’09) finished a co-op at Genentech in South San Francisco in July and returned to Michigan with her fiancé for their August wedding, after eight years of dating. In September she will begin a PhD in Pharmaceutical Sciences at U-M and will likely focus on drug targeting and delivery.

In Memoriam

Maria Ragland Davis, an associate professor of biology at the University of Alabama at Huntsville, was one of three faculty members killed in a campus shooting on February 12, 2010. Dr. Davis received a BSE from the department in 1981. She also received a master’s degree in chemical engineering and a doctorate in biochemistry, both from North Carolina State. She is survived by her husband, Sammie Lee Davis, Sr., and their three children.

Kartic Khilar passed away on November 13, 2009. Dr. Khilar received his PhD from the University of Michigan, under the direction of Scott Fogler. He came back to Ann Arbor for two sabbaticals, working again with Scott. During one of his visits, he taught the undergraduate fluid mechanics class.

Kartic held many important positions at the Indian Institute of Technology-Bombay, including the head of the Chemical Engineering Department and then later, of the Center for Research in Nanotechnology and Nanosciences (CRNTS). Even more importantly, he inspired a culture of research in young faculty members who joined the Institute after him.

Dr. Cedomir (Cheddy) M. Sliepcevich passed away on October 22, 2009. Born in 1920 in Anaconda, Montana, he received all of his degrees: BS (1941), MS (1942), and Ph.D. (1948), in chemical engineering. Cheddy was an assistant professor from 1948-1951, and an associate professor from 1951-1955.

Professor Sliepcevich left the department in 1955 to assume the chairmanship of the Department of Chemical Engineering at the University of Oklahoma, where he also served as associate dean of the College of Engineering from 1956-1962. Cheddy received numerous awards during his career, including our own Donald L. Katz Lectureship in 1976.

Update your contact information with the University at www.engin.umich.edu/alumni
Be a part of Michigan Chemical Engineering—help ensure excellence in research and education

If you would like to give a gift to the Department of Chemical Engineering’s undergraduate program or graduate student fellowship fund, or to any other department fund (e.g., undergraduate scholarships), please complete the form below and send it in with your contribution. Thank you!

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All gifts postmarked by December 31, 2010 are tax deductible for the year 2010.
Clifton Goddin’s Legacy

Longtime supporter of the department, Dr. Clifton (Clif) S. Goddin passed away in 2009. He received his bachelor’s degrees in both chemical engineering and mathematics in 1936, and his master’s in chemical engineering in 1937 at the University of Michigan. Clif’s first job after receiving his master’s degree was in the Research Department at the Whiting Refinery of Standard Oil of Indiana.

In 1946, he joined Standard Oil’s Production Research Department in Tulsa to work on the design of the chemical-recovery section of the large hydrocarbon synthesis plant at Brownsville, Texas. In the 1960s, Clif took an academic leave to pursue a PhD in chemical engineering, again at the University of Michigan. Under the guidance of professors Jim Wilkes and Rasin Tek, he completed his dissertation in 1965, on the numerical simulation and experimental investigation of water flooding of stratified oil reservoirs.

After he finished his degree, Clif established an award to express gratitude for the excellent education provided him by the University of Michigan. The annual Clifton S. Goddin Prize recognizes a third-year chemical engineering student who has displayed outstanding qualities of leadership and scholarship.

Since 1985, the Goddin Prize has been awarded to 26 chemical engineering students. This year’s winner is senior Nicholas Orichella. A top student in his class, he has served as vice-president and is currently president of the student chapter of AIChE. He gives of himself through many other activities, including volunteering for career fair and our Tech Day open house, and participating in research activities.

After graduation, Nick plans to get a job as a manufacturing engineer, and would like to eventually go back to school for an MBA, so he can move into management. “To be a successful manager, one needs to be organized, persistent, have the ability to communicate effectively, and be diligent in all tasks,” he says. “I know that my chemical engineering background has prepared me to be able to achieve this goal.”

In addition to the prize, Clif Goddin also created a fund for undergraduate scholarships.

Thanks to Professor Jim Wilkes for the information about Dr. Goddin
The Faculty of the Department of Chemical Engineering

Barry M. Barkel • Lecturer
Mark A. Burns, Chair • Microfluidics and Biochemical Analysis
Omolola Eniola-Adefeso • Cell Adhesion and Migration
H. Scott Fogler • Flow and Reaction
Sharon C. Glotzer • Computational Nanoscience and Soft Materials
Peter Green • Polymer Physics
Erdogan Gulani • DNA, Peptide Synthesis and Reactions at Interfaces
Jinsang Kim • Smart Functional Polymers
Nicholas Kotov • Nanomaterials, Biomaterials, Self-Organization Phenomena, 3D Tissue Engineering
Joerg Lahann • Biomaterials and Biointerfaces

Ronald G. Larson • Complex Fluids and Biological Macromolecules
Xiaoxia Lin • Systems and Synthetic Biology
Jennifer J. Linderman • Receptor Dynamics
Suljo Linic • Catalysis, Surface Chemistry and Fuel Cells
Michael Mayer • Biomembranes
Charles W. Monroe • Electrochemistry
Susan M. Montgomery • Lecturer
Sunita Nagrath • BioMEMS in Cancer Diagnosis/Therapeutics, Cancer Cell Detection/Trafficking, Microfluidics
Phillip E. Savage • Biofuels, Green Chemistry, Kinetics, and Mechanisms
Johannes W. Schwank • Catalysts, Fuel Cells, and Fuel Conversion

Max Shtein • Optoelectronic and Thermoelectric Materials, Devices, and Processing
Michael J. Solomon • Complex Fluids and Nanocolloids
Levi T. Thompson • Catalysts, Fuel Cells, and Microreactors
Angela Violi • Multiscale Computational Nanoscience
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Robert M. Ziff • Nanostructures, Catalysis, and Modeling