Engineering Solutions

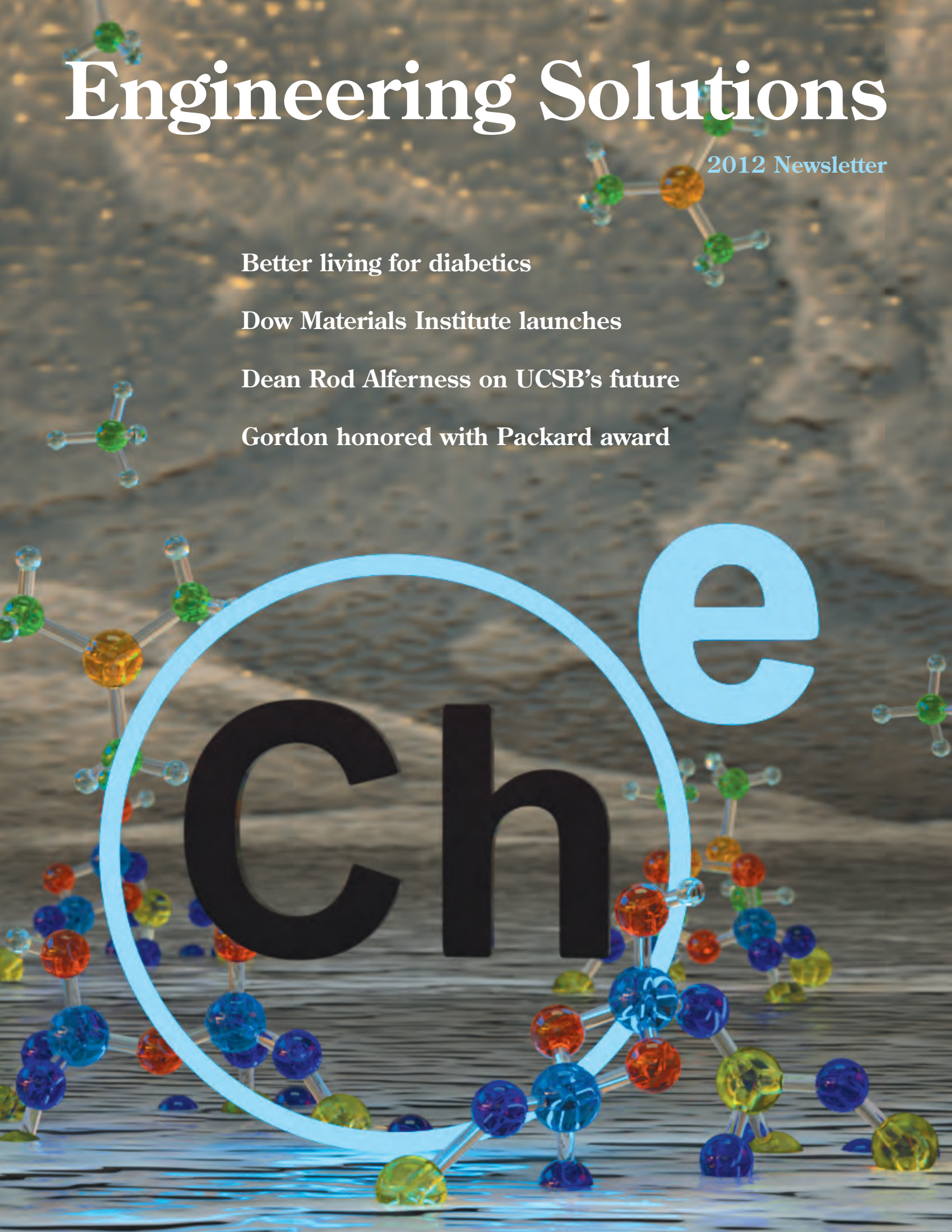
2012 Newsletter

Better living for diabetics

Dow Materials Institute launches

Dean Rod Alferness on UCSB's future

Gordon honored with Packard award



Dear Alumni & Friends,

No matter what news you have heard about the current situation in the State of California, I am writing to tell you that the news is good from the Chemical Engineering Department at UC Santa Barbara. I am a bit of a skeptic about the modern system of ranking academic departments (my preference is to rank them in categories like bonds, AAA, AA, etc, rather than numerical league tables like baseball teams), but I can tell you that since our national ranking of #2 was announced by the National Research Council of the National Academies in October, 2010, we have experienced remarkable upward trends in almost every aspect of departmental life. The number of student applicants has shot upwards – this year for example, we had 1167 applicants for our freshman BS program (up from about 900 last year), which is remarkable considering that we graduate fewer than 50 students per year. Moreover, the quality of the applicants is increasing, which I did not think possible (average high school GPA of admitted students is 4.19 and average SAT score is 2028). Graduate admissions have seen similar trends – we had over 50 highly qualified candidates (from among the hundreds of excellent applicants) visiting campus for the Spring graduate recruiting, which is a record. The average undergraduate GPA of admitted students was 3.8 on the 4 point scale. The incoming classes of 2012 are outstanding.

Fortuitously, in the depths of the economic crisis of 2009 we began planning a student fellowship campaign to provide fully funded Discovery Fellowships to our most outstanding students, which has led to a convergence of increased student support along with increased student achievement. The campaign was officially launched in January 2011, and we have already seen an outpouring of support with over $3 million donated or pledged in the first year alone. We are hoping and planning to match or exceed this number for 2012. Almost all these funds will be endowed, so that the annual payout from the endowment will provide fellowship support in perpetuity for our brightest and bravest thinking students. Last year's major donors included Warren and Katharine Schlinger, The Dow Chemical Company, Air Products & Chemicals Inc., Mitsubishi Chemical Corp., and CSP Technologies. We thank them and all our donors who continue to help us to help our students achieve great things.

During 2011 we hired two new assistant professors who bring young talent to the department. Dr. Michelle O'Malley and Dr. Matt Helgeson both joined our department full-time in March 2012. This brings our total number of faculty to 17, which is closer to the right number for our student size. Michelle's research within biotechnology and Matt's in transport and rheology are highlighted in this annual newsletter. We are delighted to welcome Michelle and Matt to the department and look forward to their scholarly and collegial contributions.

Many other good things have happened in the department during the last year which you can read about in this newsletter. The department has a clear vision for its future and the faculty, friends, and alumni are providing the resources to implement that vision (for it is said, "a vision without resources is a hallucination!").

Best wishes,
Mike Doherty, Chair

Dow Chemical Company Endows Two Doctoral Fellowships in Chemical Engineering and Creates the Dow Materials Research Institute at UCSB

In January, 2011 the Chemical Engineering Department at UC Santa Barbara officially launched its Discovery Fellowship Campaign to raise significant new funds to support ChE students at the cutting edge of disruptive engineering research and scholarship. Such research involves taking risks, including the risk of failure. A key characteristic of this type of research is that results cannot be scheduled. This is completely out of step with current funding models, which are schedule-driven and mission-oriented; or in many cases, training-oriented. Many funding agencies in the United States are no longer geared to funding long-term, brave thinking, high risk research. This is bad for the future of the nation and bad for the best and bravest students since their funding is tied almost exclusively to short-term research grants. Our goal is to become the leading concept-driven (in contrast to proposal-driven) department of chemical engineering in America. We will be the provider of novel solutions to problems that must be solved and we will achieve this by giving our students the freedom to perform their scholarship unhindered, in one of the world's leading collaborative research institutions with no boundaries. Our metric of success will be impact not quantity.

To prepare and nurture the technical workforce of the future, we must create research leaders who have been allowed to practice game-changing research and scholarship during their degree programs. To do this we need to attract significant endowment funds to support our best and bravest students in order to free them from the artificial constraints imposed by the modern proposal system.

Of the 11 universities supported by this Dow program 5 are in the mid-west, 3 are in the east and 3 are in California (UCSB, Caltech and UC Berkeley). Dow donated $2 million to endow Dow Doctoral Fellowships in chemical engineering at UCSB and $13 million in current use funds to support research. "The creation of the Dow Materials Research Institute significantly strengthens our existing collaborative relationship with Dow, to tackle some of society's most pressing materials problems," says Craig J. Hawker, the new director of the Institute, (he is also director of the Materials Research Laboratory and professor of materials, chemistry, and biochemistry at UCSB). Dow had previously supported small individual programs at the school. The new materials research effort, in contrast, will garner $13 million over the next five years and support 25 to 30 graduate students (many of them chemical engineers) each year. The program is renewable for another five years.

Andrew N. Liveris, Dow Chemical Company's Chief Executive Officer, and William F. Banholzer, Dow's Chief Technology Officer both agree with our philosophy and have embarked on a massive academic investment program. Dow Chemical says it will spend $250 million over the next 10 years to support breakthrough chemical technologies at 11 major universities. The funds will help to significantly increase the number of chemistry and chemical engineering Ph.D's at the schools. "This is a massive outreach program," Dr. Banholzer said. Over the next decade, about $25 million will go annually to the universities. The funding more than doubles what Dow has been spending each year on chemical engineering, chemistry, and materials programs at U.S. academic institutions, he said.

"Preshit Dandekar receives inaugural Dow Chemical Company Discovery Fellowship."

The Dean's Perspective

Department of Chemical Engineering welcomes our new Dean of Engineering, Rod Alferness, who joined UCSB in Fall 2011. We had a conversation with Dean Alferness about his arrival at UCSB.

Rod C. Alferness is the Richard A. Auhll Professor and Dean of the College of Engineering at University of California, Santa Barbara. Alferness comes to UCSB as the former Chief Scientist at Bell Labs, following an accomplished career in optoelectronics and electrical engineering.

Alferness is world-renowned for his work on integrated-optic devices and optical switching technology and networks. His research has been central to the development of global fiber optic communications networks. As Chief Scientist at Bell Labs, he was responsible for strategic directions, technical excellence, and global partnerships - including universities. In a prior role as Senior Vice President of Research, he had overall responsibility for the company's global research laboratories. In his role as Chief Technical Officer for Bell Labs' parent company, Lucent Technologies, Alferness was responsible for transferring the optical technology he worked on to the business units.

Alferness received an M.S. and Ph.D. in Physics from the University of Michigan. He is a member of the National Academy of Engineering and a Fellow of the Institute of Electrical and Electronics Engineers (IEEE) and of the Optical Society of America (OSA). In 2001, Alferness was the recipient of the IEEE Millennium Award. Alferness received the 2005 IEEE Photonics Award and the 2010 OSA Leadership Award. He has served as President of the OSA and of the IEEE Photonics Society. He is the author of more than 100 journal articles and holds more than 30 patents for his work in optoelectronics and optical networks.

Your road to UCSB has been unconventional. What made you come to a University and UCSB in particular?

It is indeed unconventional that you make a transition from the Chief Scientist of a business to the Dean of Engineering of a university. It was a combination of three factors. First, I had worked at Bell Labs in multiple roles for more than thirty years and was beginning to feel that I had accomplished everything I had dreamed and planned for at that institution. Of course, I could have stayed there and done additional things, but I felt that it was time to do something different. Second, I was also beginning to get concerned about the overall attitude towards innovation in the U.S, wherein we have moved from a culture where we invested heavily in innovation because of its long term pay-offs for society to a culture where we focus on short term deliverables. I have always felt that for our continued success in Science and Engineering it is essential for us to maintain global economic leadership as a nation and our universities are critical to meet this need. Third, I had known a number of the faculty at UCSB in my field of optoelectronics and optical communications for quite some time.

What were the biggest surprises after you moved to UCSB?

The biggest surprise was how uniformly excellent UCSB is across many departments. I had known a few colleagues from my personal interactions with the faculty in Electrical and Computer Engineering prior to coming to UCSB; however, I was not completely aware of the excellence in other areas, for example, Chemical Engineering. As I got to interact with the faculty after I joined UCSB, I was blown away with the quality of individuals in the College. Synergies between various faculty members across the departments and colleges make us a lot stronger than the summation of our individual accomplishments. Another surprise was the uniqueness of Santa Barbara and its impact on UCSB. Santa Barbara is a small community and the residents take pride in UCSB. They support UCSB in various ways and that's a tremendous asset for us.

UCSB Engineering departments have recently seen a dramatic rise in ranking. What do you attribute this rise to and more importantly, how do you sustain this excellence?

It's phenomenal and that was part of the reason I was attracted to UCSB. It also makes me feel responsible to keep it going. There are two key attributes to this rise. The first is the faculty and I have to give credit to my predecessors for that. UCSB has managed to attract outstanding faculty and that in turn has attracted top-notch students, the so called virtuous cycle. We need to continue to reinforce that. Another point that we need to keep in mind is that whatever we do, we need to be the best. We are a medium-size school and we need to focus on excellence not size. We need to explore partnerships, cooperation and synergies. However, the world around us is changing and we need to continually ask ourselves who we are and how do we adapt to the world around us.

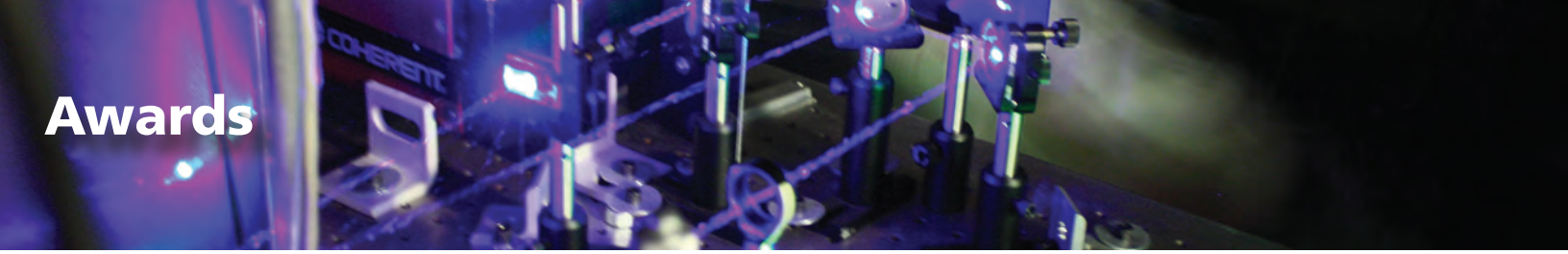
There is a perception out there that fiscal challenges will limit UCSB's progress. What do you have to say about that?

Challenges are there but the opportunities are bigger. People who know UCSB faculty and students are well aware of its reputation; however I don't think people outside that circle know enough about us. That presents us with a huge opportunity. We know that we are excellent; however it is also important that we are also perceived by others in that way. To accomplish that, we have to reach out to the larger community. Our empowerment against fiscal limitations is going to come from both companies and individual donors who see our excellence and the opportunities that it will open. My job is to reach out to people who believe in UCSB and its mission and I have already taken strong steps in that direction. I want UCSB's College of Engineering to be widely recognized as one of the top engineering colleges in the world.

Dean Alferness addressing new students at Discover Engineering

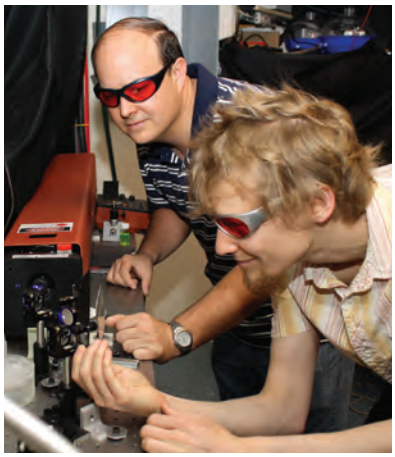
How do you expect COE to evolve over the next 10 years?

In the next decade, we need to keep our focus on continued excellence in research and graduate programs while also working to do the same for our undergraduate education. University's job is to educate the next generations of young minds. That can be done in the classroom and in the lab, and the two are related. In the past, we have made great progress in the latter and that has already made a huge impact. I believe that we now should leverage our excellence in research to further excel in our undergraduate educational mission. That to me is an important element in the popular perception of a great university. My goal as the Dean, however, is to reach a point where we don't have to point to rankings to convey our excellence. In addition, I believe that it is important to focus the application of our knowledge generation on areas important to society. When we come together as faculty, we can leverage our collective knowledge in areas important to humanity to have an impact on how people live.



Awards

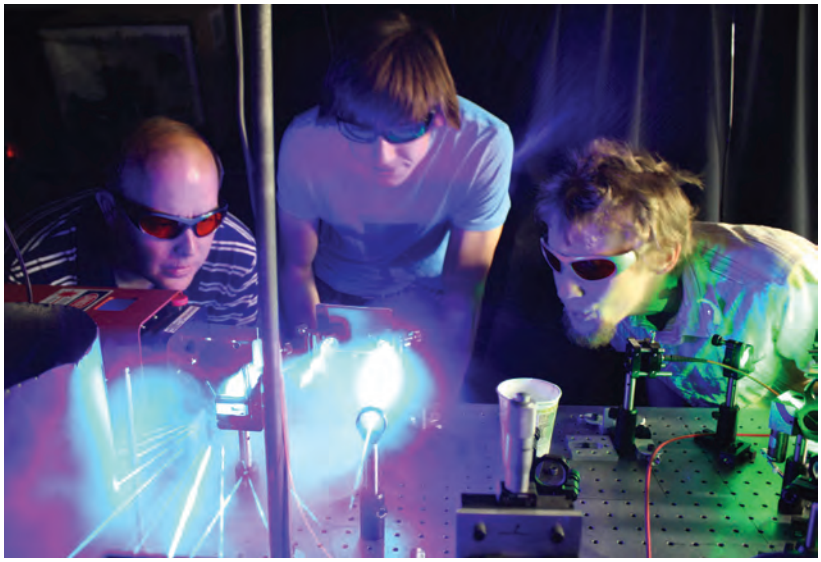
Mike Gordon receives prestigious Packard fellowship



Gordon with Ph.D. student Isaac Riisnes

Assistant Professor Mike Gordon received the prestigious Packard Foundation Fellowship for Science and Engineering in 2010. He is one of the only 17 recipients of this award in 2010. The Packard fellowship is one of the largest non-governmental fellowships in the country that provides $875,000 over five years to support ground-breaking research in various areas of Science and Engineering. Professor Gordon's research aims at nano-scale imaging of surface chemistry, a new take on the field of Scanning Probe Microscopy (SPM). SPM uses a tiny probe to locally measure different forces that allow characterization of surfaces. Unlike existing SPM methods that primarily focus on imaging local architecture of surfaces, Professor Gordon's tools aim to image the local chemistry of surfaces at the nanoscale. This "chemical microscope" will provide high-resolution imaging and label-free detection of biomolecules on surfaces at spatial resolutions going down to the nanometer scale. The tools being developed by Prof. Gordon will also enable detailed chemical interrogation of material surfaces in many different venues. Professor Gordon is also a recipient of the National Science Foundation CAREER award and outstanding Chemical Engineering Faculty award in 2010 and 2011.

Graduate student Alex Heilman with the home-built scanning chemical microscope system.



Professor Mike Gordon with graduate students Alex Heilman and Isaac Riisness (left to right) showing the argon ion laser used with the scanning chemical microscope system.

E. V. Murphree Award in Industrial & Engineering Chemistry, ACS 2012

Our Chair, Professor Michael Doherty has been honored as the 2012 recipient of the E. V. Murphree Award from the American Chemical Society (ACS). The Murphree Award is one of the few given by ACS that primarily honors the work of chemical engineers. The award aims, "to stimulate fundamental research in industrial and engineering chemistry, the development of chemical engineering principles, and their application to industrial processes."

"Michael Doherty is a rare ideal chemical engineer who is able to take fundamental concepts from chemistry, combine them with advanced mathematics, and then establish new and useful quantitative methods for modern process design," says John M. Prausnitz, a professor of Chemical and Biomolecular Engineering at UC Berkeley and himself a winner of this award, in 1979.

Doherty received a B.Sc. from Imperial College, University of London, in 1973, and a Ph.D. from Trinity College, University of Cambridge, in 1977, both in chemical engineering. Among his many honors, in 2008, Doherty was named one of the "100 Chemical Engineers of the Modern Era" by the American Institute of Chemical Engineers.

Gary Leal, Glenn Fredrickson and Ed Kramer elected to the American Academy of Arts and Sciences

Professors Gary Leal, the Warren and Katharine Schlinger Professor of Chemical Engineering, Glenn Fredrickson, director of Mitsubishi Chemical Center for Advanced Materials, and Ed Kramer were elected to the prestigious American Academy of Arts and Sciences, an institution founded in 1780 by John Adams, James Bowdoin John Hancock, and other scholar-patriots. The Academy has elected as members and honorary members the finest and most influential leaders from each generation, including George Washington and Benjamin Franklin in the 18th century, Daniel Webster and Ralph Waldo Emerson in the 19th, and Albert Einstein and Winston Churchill in the 20th.Today, members of the academy include more than 250 Nobel Prize laureates and 60 Pulitzer Prize winners. The academy provides a forum for its members, a highly select group of scholars, to work together on various issues including science and technology policy, global security, social policy, the humanities, and education, among others.

Professor Fredrickson's research has unraveled the behavior of complex systems such as self-assembling polymers, complex fluids and block copolymer systems through seminal studies in theoretical and computational polymer science. He is an elected fellow of AIChE and a member of the National Academy of Engineering.

Professor Ed Kramer's research has pioneered understanding of the fundamentals that control the structure, properties, and processing of block copolymers. He is an elected fellow of American Physical Society, American Association of Advancement of Science and a member of the National Academy of Engineering.

Professor Leal's research has pioneered new understanding in the field of rheology and mechanics of viscoelastic fluids, the mechanics of heterogeneous fluids, and the fluid dynamics at interfaces. He is an elected fellow of the American Physical Society and AIChE and a member of the National Academy of Engineering.

Prof. Songi Han receives coveted NIH New Innovators Award

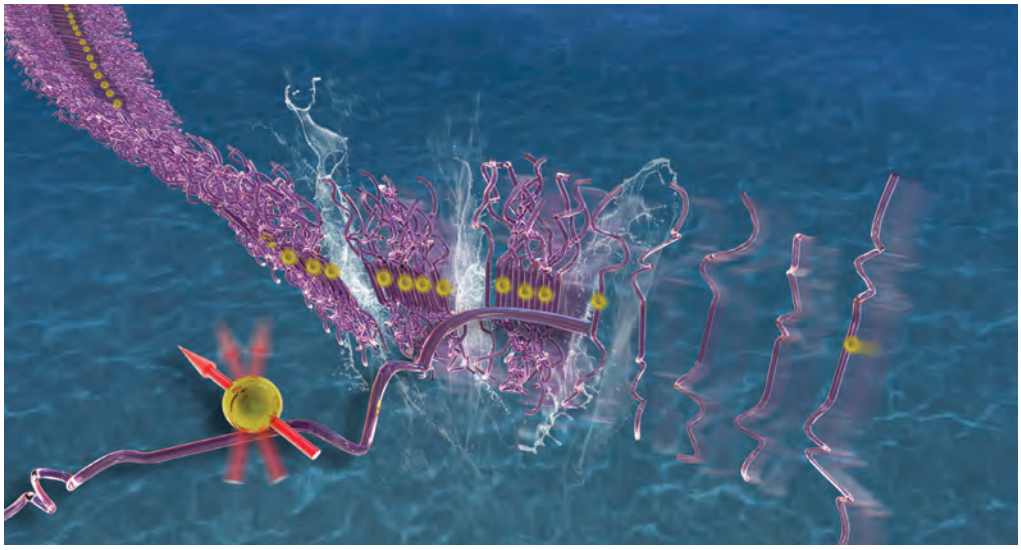
Songi Han, Associate Professor of Chemical Engineering & Chemistry, has been honored with a prestigious New Innovators Award from the National Institutes of Health. Han is one of just 49 New Innovator Award recipients in the United States. The award along with a $1.5 MM grant over five years will support the development of innovative instrumentation and methods for dramatically enhancing the sensitivity of magnetic resonance (MR) spectroscopic tools. These tools are expected to enable unprecedented studies of early protein aggregation events.

Protein misfolding and aggregation cause many devastating diseases. Such diseases include Alzheimer's (involving -amyloid and tau proteins), Parkinson's (-synuclein protein), prion (PrP protein), and polyglutamine diseases (expanded polyglutamines), and frontal temporal dementia (involving mutant form of tau protein). Importantly, there is currently no treatment for these neurodegenerative diseases. How misfolded and aggregated proteins cause neuron cell death remains a mystery.

In an effort to solve this mystery, the Han lab has developed a uniquely useful MR spectroscopic approach to map out the hydration dynamics of proteins. The significance of this approach is that the molecular phenomena of early protein aggregation events can now be effectively studied. These phenomena include protein conformational changes, weak protein interactions, and multimerization events early in aggregation. An enhanced molecular understanding of protein aggregation mechanisms will undoubtably aid the development of improved diagnostic and therapeutic strategies for these devastating diseases.

"This award gives me the amazing opportunity to take instrumental and methodological development to the next level of complexity and relevance," said Prof. Han. "This methodological tool was developed from scratch, from the idea that the structure and dynamics of water hydrating protein surfaces could provide an ultra-sensitive way of detecting intermolecular contact and interaction."

Of Han's award, UCSB Chancellor Henry Yang states, "Our campus is proud of Professor Han and her innovative research on novel spectroscopic instrumentation and methods for measuring essential interactions between proteins, particularly those involved in neurodegenerative diseases. Her research has tremendous potential for practical medical applications. I am delighted that her extraordinary contributions are being recognized with the prestigious NIH New Innovator Award."



Han's approach probes the structure of water around aggregating proteins (purple) using magnetic resonance.

For further information about this award see:

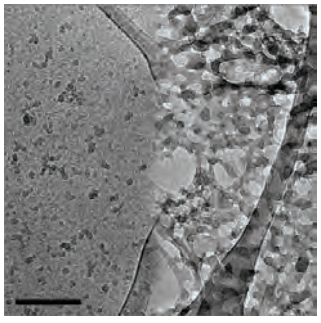
http://commonfund.nih.gov/newinnovator.

Welcoming new Faculty!

Matthew Helgeson joined the Faculty in March 2012, with a Ph.D. in Chemical Engienering from the University of Delaware. Prior to arriving at UCSB, Matt was a postdoctoral fellow in Patrick Doyle's group at MIT.

Prof. Helgeson's research is focused on the thermodynamics and processing of complex fluids and soft matter. Of particular interest are the microstructure and rheology of colloids (nanoparticles, emulsions, biomolecules, etc.) in the presence of surfactants and polymers. Although we encounter these materials in our daily lives - and in high-tech applications including pharmaceuticals, consumer products, and energy production - a more fundamental understanding of these systems that would allow for their direct engineering in new applications has yet to be realized. The primary challenge to such an understanding is how interfacial interactions between the fluid and colloid propogate to larger length scales and, ultimately, how these interactions can be rationally controlled.

To tackle this challenge, the Helgeson lab uses techniques including microscopy, scattering, rheology, and various modeling approaches to link molecular structure and interactions to macroscopic properties and flow behavior. His group is developing new fluidic methods to process self-assembling and stimuli-responsive fluids into colloidal and polymeric materials with new structures and functionalities. The lab is also exploring the use of these materials in applications such as nanomaterial synthesis, smart composites, and biotechnology.

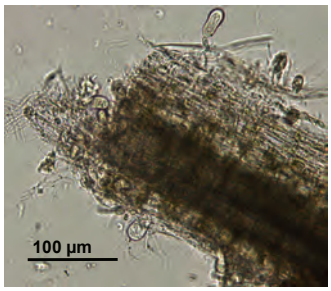


Cryo-transmission electron micrographs of a suspension of nanoemulsion droplets exhibiting a transition from a liquid-like suspension at low temperatures (left) to an "organohydrogel" at high temperatures (right). Scale bar is 200 nm.

Professor Michelle O'Malley joined the Chemical Engineering Department in March of 2012, after a postdoctoral fellowship in the laboratory of Chris Kaiser at MIT and the Broad Institute. Michelle received her Ph.D. in Chemical Engineering from the University of Delaware.

O'Malley's research is focused at the interface of the biological sciences and engineering to study the synthesis, regulation, and functional assembly of proteins in cells. Proteins play an integral role in almost every biological process, and as such, represent attractive targets for engineering cellular behavior. O'Malley's lab employs the simplest eukaryotic microbes (yeast and fungi) as model systems to better understand and influence the cellular processes that underlie protein production for applications in drug discovery and sustainability.

Her group focuses on proteins found in close proximity to the cell surface, where they mediate how cells respond to their external surroundings. In particular they are interested in understanding the interactions between G-protein coupled receptors (GPCRs) within eukaryotic membranes, since these membrane proteins represent over 50% of all pharmaceutical targets.



Anaerobic Gut Fungi

The second major thrust of the O'Malley lab is the investigation of high molecular weight protein complexes called cellulosomes in anaerobic fungi, which could enable economical breakdown of cellulosic biomass for the development of sustainable biofuels. By understanding how these complexes are regulated in their native system, they aim to construct tunable, synthetic cellulase complexes in yeast to aid in cellulosic bioprocessing.

Research Focus: Professor Frank Doyle

Artificial Pancreas for the Treatment of Type I Diabetes

The Chemical Engineering Department at UCSB is playing a leading role in the development of next generation treatments of diabetes. Professor Frank Doyle, Duncan and Suzanne Mellichamp Chair in Systems Biology, is pioneering the development of an artificial pancreas for the treatment of Type I diabetes. In the United States, as many as 3 million people are living with Type I diabetes, an autoimmune disease wherein the body's immune system attacks and destroys the insulin-producing cells of the pancreas. For Type I diabetic patients, regulating blood sugar level currently involves a daily regimen of multiple insulin injections or an insulin pump, in addition to blood sugar testing 8 – 10 times a day.

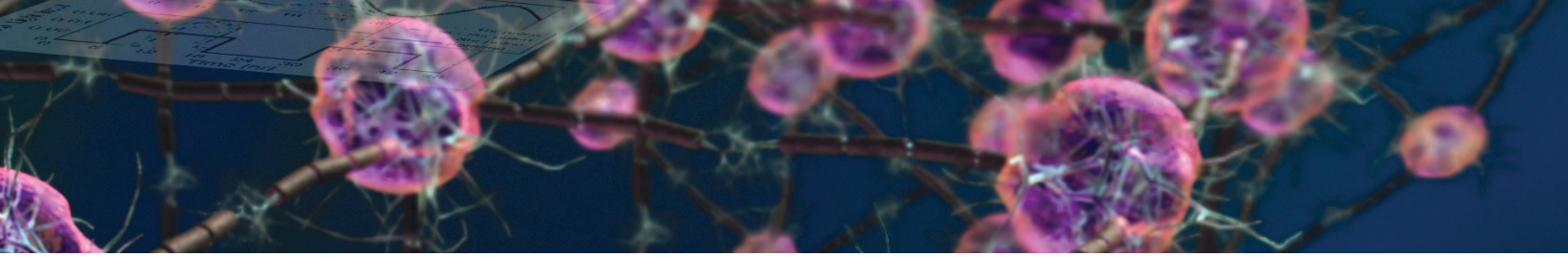
Devices are currently available to diabetic patients to measure blood glucose and deliver insulin via pumps. However, in the absence of any communication between these two devices, the system falls short of an artificial pancreas. In healthy individuals, the natural pancreas continuously communicates between body's indigenous blood glucose sensors and insulin secreting cells. This continuous communication and control is essential for maintaining normal blood glucose levels. The Artificial Pancreas System (APS) developed by Prof. Doyle's team establishes the communication between continuous glucose monitors and insulin pump. The components "talk" to each other using Bluetooth or another wireless communications protocol.

Prof. Doyle's APS is unique in two respects: it's completely automatic, and it's very flexible. It is the first fully automatic closed loop system—it doesn't require any user input, unlike other setups that need human help to transfer data, and it's built upon a software system that's compatible with three kinds of insulin pumps and two glucose monitoring systems, and can be expanded to accommodate other devices. It can also be used with any algorithm, offering researchers around the world a powerful tool for developing artificial pancreas technology. A key feature of the APS is the closed-loop control system which allows normalization of blood glucose levels in spite of numerous physiological changes – such as hormones, meals, stress, exercise and sleep – and mimics the insulin creation function of a healthy pancreas. Another feature of the APS is its predictive control, which allows the device to plan insulin delivery profiles in advance in anticipation of physiological perturbations.

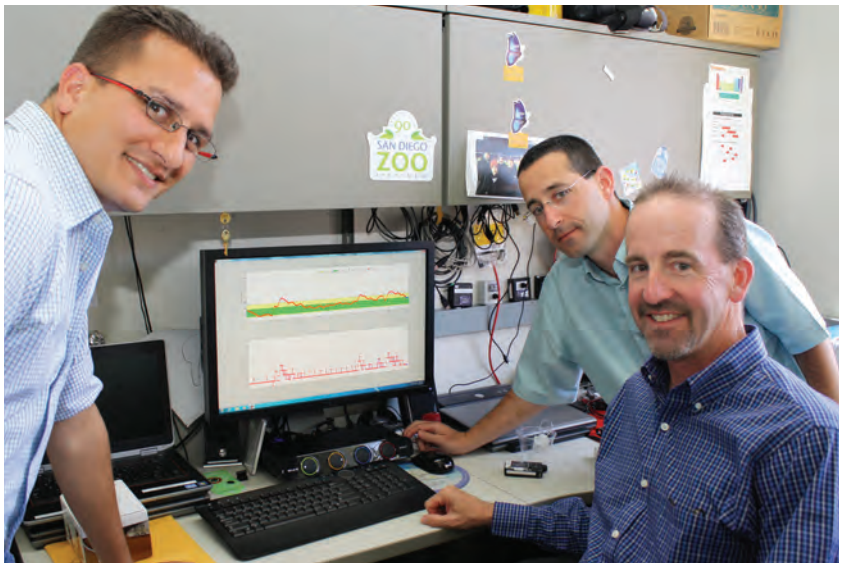
The goal of the APS is to relieve people with Type I diabetes of the burden of monitoring their blood sugar levels and determining and administering an appropriate dose of insulin—a responsibility that can be particularly problematic for children and teenagers with diabetes—and so help them live longer, healthier lives. In collaboration with researchers at the Sansum Diabetes Research Institute, Prof. Doyle started research on APS in 2003 and successfully tested a prototype of the computerized artificial pancreas system in patients with Type I diabetes in 2007. APS has since been licensed at several sites worldwide for clinical trials.

Schematic representation of closed loop artificial pancreas system.

Diabites patient in the clinical trial test



Research on APS has been funded by the Juvenile Diabetes Research Foundation and the National Institute of Health (NIH). Prof. Doyle and his colleagues were awarded $4.5 million from the NIH in 2011 to further APS for testing in outpatient trials. This collaboration between physicians and engineers aims to merge three key aspects of Type I diabetes management – human behavior, physiology, and medical technology – and ultimately to transition their artificial pancreas technology into clinical practice. The project assembles world leaders in biomedical research who aim to develop an artificial pancreas device that can be approved by regulatory agencies and distributed to patients by physicians within the next few years. UCSB is playing the lead role in organizing this international consortium of prominent diabetes researchers, an assembly of world leaders in the fields of computer modeling, control systems, simulation and clinical research.



Frank Doyle, bottomw right, Eyal Dassau, top right, and Ravi Gondhalekar

Besides diabetes, Prof. Doyle's research is also paving new ground in computational research as applied to biological regulatory systems. Prof. Doyle's research applies computer engineering and mathematical modeling to analyze complicated data from biological and ecological processes, from molecular-level chemical exchanges in the human body to broader systems such as coral spawning. His research has helped illuminate the complex pathways that control circadian rhythms, and have applications in understanding diabetes, drug delivery systems, Alzheimer's disease, and post-traumatic stress disorder (PTSD).

Earlier this year, the Santa Barbara Region Chamber of Commerce honored Prof. Doyle as Innovator of the Year for the worldwide impact of his research and development of artificial pancreas technology. Professor Doyle has also been honored as an elected fellow of the American Association for the Advancement of Science (AAAS), the American Institute for Medical & Biological Engineering (AIMBE), the International Federation of Automatic Control (IFAC) and the Institute of Electrical and Electronics Engineers (IEEE).

Frank Doyle receiving his award for Innovator of the year at the Santa Barbara Chamber of Commerce meeting.

ESTEEM scholarships for first generation college students

A new scholarship and support program for engineering undergraduates, funded by the NSF, was launched in late 2011 under the direction of Chemical Engineering Professor Susannah Scott. The ESTEEM (Enhanced Support, Training and Experiences for Engineering Majors) program will provide financial resources, academic support, networking with engineering professionals and internship opportunities for first-generation college students.

ChE undergraduate Antonio Ortiz (Middle) receives Esteem Fellowship. Phyllis Brady, Antonio Ortiz, Susannah Scott

The NSF has committed $600,000 to the UCSB program over 5 years; 85 % of the funds will be distributed as scholarships, with the remainder for associated activities which include private tutoring, lunches with mentors, and attendance at professional meetings.

First-generation college students often have fewer financial resources, and fewer connections to the engineering profession, than students whose parents are college-educated. Consequently, they are less likely to make full use of the University's resources, and they tend to have lower graduation rates. The goal of the ESTEEM program is to facilitate their integration into the university and, eventually, into the engineering profession. The scholarships are worth up to $10,000 annually, and are renewable until the student graduates.

The first cohort of ESTEEM Scholars was announced in Winter, 2012. Three Chemical Engineering undergraduates are among this group: Behzad Anbarani, Antonio Ortiz, and Katherine Santizo. They were selected on the combined bases of academic merit and high financial need. Their awards were formally presented by the Dean of Engineering, Rod Alferness, at a ceremony on February 24th.

All UCSB ChemE alumni who visit the Santa Barbara area are warmly invited to visit the ESTEEM common room and meet the ESTEEM Scholars. Your experience and encouragement are extremely valuable to these students. Please contact us at esteem@engineering.ucsb.edu.

Dean Alferness presenting Chemical Engineering student, Behzad Anbarani,with Esteem Fellowship award.

Students receiving Esteem Fellowship awards

AIChE Student Chapter News

Dear Alumni & Friends,

The UCSB student chapter of the American Institute of Chemical Engineers (AIChE) aims to promote professional development, industry awareness, and networking among students, faculty, and alumni for undergraduate chemical engineering students.

The weekend before the school year began our AIChE student chapter was given a tour of the nearby oil seeps off the Goleta shore by respresentatives from Venoco, an AIChE sponsor. During our tour, we were able to see the natural oil seeps in the water and even saw Platform Holly, the oil platform off the coast of northern Goleta, up close and personal. During the Fall quarter AIChE toured TriSep (Goleta, CA) who also recruited full time hires from UCSB and sponsored AIChE. And during Winter quarter, we toured Baxter Inc. (Thousand Oaks, CA).

During the past year, the student chapter co-organized informational sessions with TriSep, SpaceX, and Clorox. These events provide valuable opportunities for students to learn about new companies and network with their representatives. UCSB AIChE has maintained a strong relationship with Clorox, who again sponsored UCSB AIChE and hosted a dinner for the officer board, allowing them to network with Clorox employees.

We also hosted events to promote professional development of UCSB undergraduates in the Chemical Engineering Major. Before the Fall Career Fair we hosted a resume workshop where students could bring in their resume and have it critiqued by experienced seniors. Dedicated gaucho alum Christina Borgese visited campus and delivered a presentation on "How to Rock the Interview." We are grateful for alumni like Christina who continue to actively support our program.

AIChE organized a student lunch with faculty this year, giving students the opportunity to meet and engage our professors. The luncheon provided a platform for students to learn more about the various courses offered and research that takes place in our department.

This past year, our student chapter participated in an outreach program with Isla Vista Elementary School where we assisted with their robotics program. Volunteers work with kids on LEGO Mindstorm robots to teach basic principles of science and engineering.

Social events where students of all years were able to interact and network with fellow students. We have had several BBQs, including one joint with the UCLA AIChE chapter, providing our members additional networking opportunities.

To learn more about our very active student chapter, I invite you to visit us online (www.ucsbaiche.com.)

Sincerely,
Martin Clemson Bryant, AIChE Student Chapter

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Congratulations to our 2011-2012 PhD graduates!

Student	Advisor	Dissertation	Affiliation
Sophia Kenrick	Daugherty	Development of High-Affinity, Specific Peptide Ligands for Diagnostics and Therapeutics	Wyatt Technology, Inc.
Keith Kirkwood	Leal	Stress Relaxation of Comb Polymers	Valspar
Jerry Thomas	Daugherty	Proligands: Protease Activated Binding Ligands	Adimab LLC
Mark Elsesser	Pine	Core-Shell Clusters: A New Class of Colloids for Dynamic and Structural Studies	NYU
Youn Jin Min	Israelachvili	Investigation of Static and Dynamic Surface Forces between Soft-condensed Matter	MIT
Travers Anderson	Israelachvili	Adhesive Interactions of Biologically Inspired Soft Condensed Matter	Clorox
Matthew Percival	Doyle	Modeling and Control of Glycemia in Type 1 Diabetes Mellitus	Theranos
Nishit Doshi	Mitragotri	Biomimetic Approach for Drug Delivery and Diagnostic Applications	Theranos
Abeer Jabaiah	Daugherty	Methodologies for Characterizing the Extended Substrate Specificity of Proteolytic Enzymes	UC Irvine
Andrew Pascall	Squires	Investigations of Induced Charge Electrokinetic Phenomena	LLNL
Benjamin Wong	Zasadzinski	Advancing the Vesosome, A Multifunctional Drug Delivery Platform,Toward Applied In Vivo Testing	USAMRICD
Brian Vicente	Scott	Molecular Level Insights into the Structure of Active Sites for Catalyst Components Used in Tandem Alkane Metathesis	Greenyug
Theresa Yuraszeck	Doyle	Quality Control Mechanisms for Protein Folding and Consequences for Failure	Merck
Tracy Hsu	Mitragotri	The Use of Peptides for the Topical Delivery of Macromolecules	Amgen
Ramzy Shayib	Chmelka	Molecular Compositions, Structures, and Acid Properties of Silica-Alumina, Silicate, and Aluminosilicate Catalysts and Supports	Dow Chemical Co.
Si Young Choi	Squires	Investigation of Rheological Properties of Fluid/Fluid Interfaces	Post-doc, KAIST
Michael Lovette	Doherty	Prediction and Modification of Crystal Shapes	Eli Lilly
Vindhya Mishra	Kramer	The Effect of Film Thickness and Molecular Structure on Order and Disorder in Thin Films of Compositionally Asymmetric Block Copolymers	DuPont Central Research and Development
Matthew Black	Tirrell	Self-Assembled, Multifunctional Micelles Containing Therapeutic Peptide Amphiphiles	UC-Berkeley
Ryan Depuit	Squires	A Theoretical and Computational Study of Active and NonLinear Microrheology	Dow Chemical Co.
Rachel Marullo	Tirrell	Design Strategies for Peptide Amphiphile Micelles	Cooper Vision
Robert Farina	Tirrell	Polyelectrolyte Properties in Mono and Multi-Valent Ionic Media: Brushes and Complex Coacervates	UC-Berkeley
Su-Mi Hur	Fredrickson	Field-based Simulations for Directed Self-Assembly of Polymeric Systems	UW-Madison

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