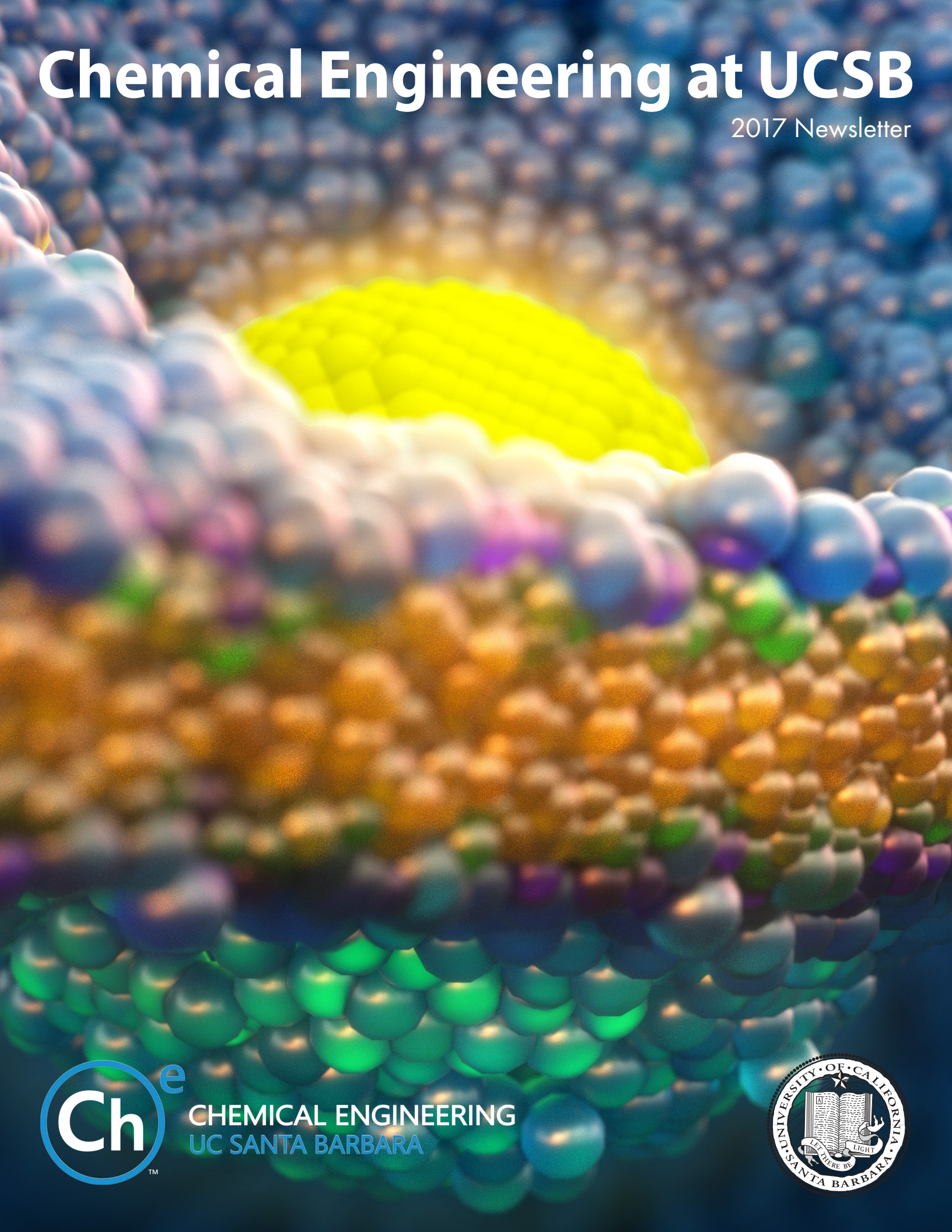
Chemical Engineering at UCSB

2017 Newsletter



CHEMICAL ENGINEERING
UC SANTA BARBARA

A Letter From The Chair

Dear Alumni & Friends,

In 1966-67 a fledging UCSB Chemical Engineering Department began its journey toward being one of the top-ranked chemical engineering departments in the nation. In the beginning, the department was shepherded by the visions and energy of founders Bob Rinker, Duncan Mellichamp, Jack Meyer, and Orville Sandall. In more recent years, the department has had the honor of being home to renowned scholars Sanjoy Banerjee, Gary Leal, Jacob Israelachvili, Henry Weinberg, Glenn Fredrickson, and Mike Doherty, just to name a few. And after 50 years, UCSB Chemical Engineering has reached the upper echelons and is now regarded among the very best programs in the country, producing top students, researchers, professors, and research with high impacts in the field and society. I am just as enthusiastic about the future of our department as I am about our past. It is with great pride that we bring you this latest edition of "Chemical Engineering at UCSB."

Since our last edition, there have been many exciting changes, innovations, and awards; in this edition we will cover a small portion of them. I am truly amazed at the breadth and depth of the talent of UCSB Chemical Engineering Faculty. This talent has been demonstrated by various awards, including: Michelle O'Malley's Presidential Early Career Award for Scientist and Engineers (PECASE), Samir Mitragotri's induction into the National Academy of Engineering (NAE) and the National Academy of Medicine (NAM), Mike Doherty's induction into the National Academy of Engineering (NAE), and Brad Chmelka's election to the Royal Swedish Academy of Sciences. Our students, both graduate and undergraduate, and postdoctoral scholars are of the highest caliber and continue to successfully transition into chemical engineering careers in academia and industry.

We have had new additions and a few departures. Recently we added Siddharth Dey as our newest Assistant Professor. Sid completed his PhD at UC Berkeley and is currently finishing his postdoctoral appointment at the Hubrecht Institute in The Netherlands, and will join our faculty in the Winter of 2017. We have also had another addition by way of Berkeley, specifically, me. After completing my PhD at UC Santa Barbara, I was very happy to return to Santa Barbara and the Chemical Engineering Department after a 10 plus year tenure at UC Berkeley. We have also welcomed to the department our new Mellichamp Chair in Green Chemistry Mahdi Abu-Omar (primary appointment in Chemistry) and Assistant Professor Christopher Bates (primary appointment in the Materials Department). Two of our distinguished faculty members, Professor Gary Leal and Professor Jacob Israelachvili, have transitioned this year to new statuses as Research Professors. Both continue to have active research laboratories and advise students in the department. Finally, after leaving an indelible mark on UCSB Chemical Engineering and the world of Process Control, Frank Doyle departed UCSB to assume the role of Dean at the School of Engineering and Applied Sciences at Harvard.

I wish I could convey all the awards, research and news within the pages of this newsletter but there simply is not room. For more news please visit the UCSB Chemical Engineering website, or if you are near UCSB please feel encouraged to stop by. 50 years ago, UCSB Chemical Engineering was just spreading its wings preparing for the future. Today the department is soaring to new heights, and has truly grown into a world-class program. We look forward to staying in contact with you as we embark on our next 50 years.

R. Segalman

Rachel Segalman
ChemE Department Chair

ON THE COVER: based on the research of Professor Scott Shell, Nanoparticles, increasingly prevalent in consumer products, can induce toxicity through physical disruption of cellular membranes. This molecular simulation features a nanoparticle collision with an idealized membrane in the form of a lipid bilayer to provide insight into the physics, and consequently, the toxicity. (illustration by Peter Allen)

Chemical Engineering's 50th Anniversary Celebration!

50 Ch^e Years™

April 27th - 28th 2017

University of California, Santa Barbara

For more information, visit: www.chemengr.ucsb.edu/50th



background: Ansel Adams "Arts Building, Residence Halls, Lagoon" (1967). faculty photos, left to right: 1969, 1984, 2017

The Dean's Perspective

Rod Alferness, Richard A. Auhll Professor and Dean of the College of Engineering shares his thoughts on UCSB and the growth of the Chemical Engineering Department over the past 50 years.

photo by Sonia Fernandez

The College of Engineering has reached its 50-year milestone, and the international reputation of the College, UCSB, and the Department of Chemical Engineering continue to grow significantly. I am very fortunate to be the Dean of an engineering college that boasts five remarkable engineering departments that continue to educate and train our next generation of engineers. The educational and research culture of UCSB provides an extraordinary environment for developing creative and interdisciplinary approaches for students and faculty to confront evolving societal and commercial challenges and opportunities.

One of the sparkling jewels in the College of Engineering's "crown" is of course the Department of Chemical Engineering. In my tenure at UCSB, I have been truly impressed with the dedication, leadership, innovation and inspiration that the chemical engineering faculty demonstrate. This in turn has produced highly trained chemical engineering graduates who go on to successful careers in industry, academia, and entrepreneurial enterprises.

This year the Department of Chemical Engineering has also reached its 50-year milestone. Building on the vision and efforts of departmental founders and subsequent stewards, I was very fortunate to join the College of Engineering when Chemical Engineering was already one of the best programs in the world. I am dedicated to not only maintaining UCSB Chemical Engineering's current status, but proactively pursuing avenues that will make the program even stronger. Currently I continue to work extensively with Department Chair Rachel Segalman to recruit the most renowned senior faculty, rising junior faculty, post-doctoral scholars, doctoral students, and undergraduates.

As a whole the University of California, Santa Barbara continues to be recognized as an influential public university. In my view the College of Engineering is a cornerstone to the well-deserved reputation that UCSB enjoys and the Department of Chemical Engineering is a key factor that makes UCSB a great place to learn, teach, conduct research, and live.

Chemical Engineering Professor Mike Doherty can often be heard recounting the old proverb, "Nothing succeeds like success." In my opinion, this succinctly sums up UCSB Chemical Engineering. The department is currently succeeding and is well poised for even greater success in the future. Through hard work, dedication, inspiration, and excellence, UCSB Chemical Engineering has and will continue to set new standards of excellence.

50 years is a relatively short time to have built something so profound. My congratulations to all past and current Chemical Engineering faculty, students, and staff for all that the Department has achieved over the last 50 years, and I look forward to the exciting opportunities and achievements to come during the next 50.

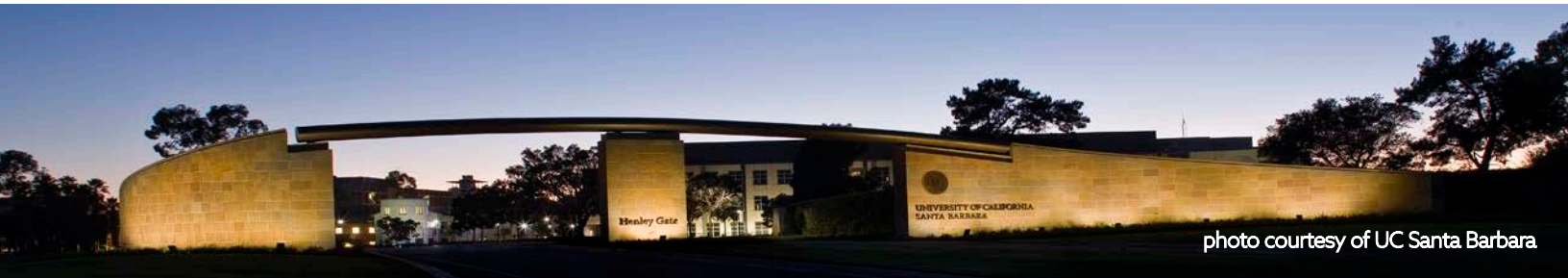


photo courtesy of UC Santa Barbara

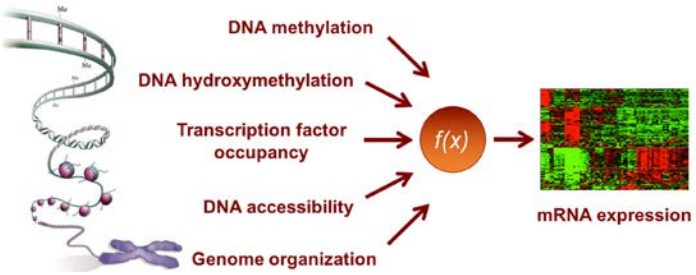
OUR NEW FACULTY

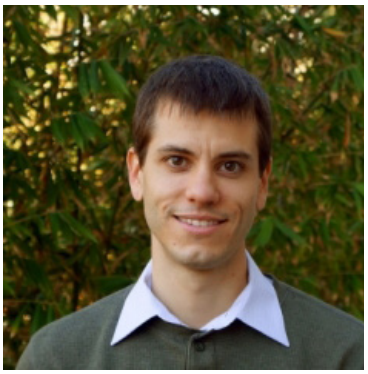
Chemical Engineering will welcome Assistant Professor Siddharth Dey to the department, starting in March 2017.

Professor Dey's research focuses on understanding how the genome or epigenome regulates gene expression, thereby influencing cellular functions. His group will be developing novel integrated technologies that enable simultaneous genome-wide measurements of the epigenome and transcriptome from the same cell to gain insights into early mammalian development, maintenance and regeneration of adult tissues, and mechanisms contributing to tumor progression. They will also be employing tools from single-cell genomics to unravel the evolutionary relationship between cells, also known as developmental lineage trees, that are currently not well known in complex multicellular organisms. Reconstructing these lineage trees will offer significant new insights into cellular differentiation with important applications in regenerative medicine.

When he arrives at UCSB in March, Professor Dey looks forward to collaborating with the Center for Bioengineering (CBE) to bring engineering and biology groups closer together to study both fundamental and applied questions in biology. He also looks forward to setting up his research group and encouraging students to explore interdisciplinary scientific problems. The Dey group will use single-cell genomics approaches to study how the epigenome regulates gene expression dynamics in biological systems.

Professor Dey will come to UCSB from the Hubrecht Institute in The Netherlands, where he is currently a postdoctoral scholar. He received his B.S. in Chemical Engineering from the Institute of Chemical Technology and his Ph.D. in Chemical and Biomolecular Engineering from the University of California, Berkeley.

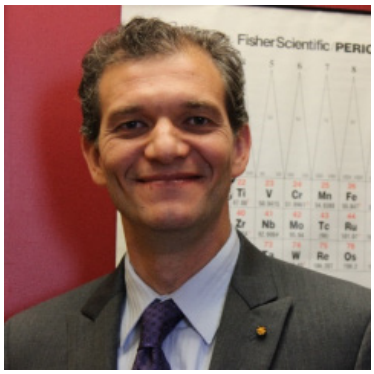




Assistant Professor Christopher Bates joined the Materials Department, with a courtesy appointment in Chemical Engineering in July of 2016.

Prof. Bates is part of the Materials Department's Macromolecular and Biomolecular Materials research group. His research sits at the intersection of chemistry, materials science, and physics, leveraging a variety of synthetic and physical experimental techniques to design, create, and probe the structure and properties of soft matter. His current endeavors span a variety of topics including polymer mesostructure and dynamics, energy storage, and crystallization. Prof. Bates's research program emphasizes student development in a world-class research environment. He believes that the culture of collaboration at UCSB will shape future leaders in the scientific community, and believes strongly in the synergy between students, faculty, and departments on campus.

Prof. Bates comes to UCSB from the California Institute of Technology, where he was a postdoctoral scholar. He received his B.S. in Chemistry from the University of Wisconsin – Madison, and his Ph.D. in Chemistry from The University of Texas at Austin.



Professor and Mellichamp Chair in Green Chemistry, Mahdi Abu-Omar, joined the Department of Chemistry and Biochemistry, with a courtesy appointment in Chemical Engineering in July of 2016.

Professor Abu-Omar's research focuses on biomass conversion and bio-inspired chemistry, and seeks to develop monomers to serve sustainable materials and renewable energy. His research group has developed catalysts for making alkenes and allylic alcohols from glycerol, a waste byproduct of biodiesel, and have implemented catalysts that convert lignocellulose biomass to valuable materials. Alongside his work at UCSB, Abu-Omar is the Founder and President of Spero Energy, Inc., a green specialty chemicals company. He also serves as associate director for the Center for Direct Catalytic Conversion of Biomass to Biofuels (C3Bio), a DOE Energy Frontiers Research Center which bridges the disciplines of Chemistry, ChemE, Biology and Bioengineering.

Prior to his appointment at UCSB, Prof. Abu-Omar was the R.B. Wetherill Professor in the Department of Chemistry and Professor of Chemical Engineering at Purdue University. He received his B.S. in Chemistry from Hampden-Sydney College and his Ph.D. in Inorganic Chemistry from Iowa State University.

Q&A
with Professor Emeritus L. Gary Leal

Q: At the time you came to UCSB, what opportunities did you see in the Chemical Engineering Department that brought you here?

A: I had been educated, as an undergraduate, at a public university. Coming to UCSB was an opportunity to return to those roots. At the time, the department here was not at the same standard as the one I was already at, Caltech, and I would not have come here if I did not believe that it would be possible for the department at UCSB to be at least as good as the one I was leaving. What was evident was that UCSB had already hired several world-class faculty, but that these faculty were not particularly well-known at the time in the chemical engineering world. I did not know too many of the faculty very well, and I also did not really understand the shared-governance style of UC, and so I thought that coming as Chair was important in trying to change the department. In retrospect, it became clear that being Chair was really being a faculty member with a bit more of a "bully pulpit" than other faculty, but not more. We do not have a system with Department Heads that can make unilateral decisions on faculty hiring and the like, so my job was one of convincing my new colleagues that we should hire certain people and make some changes in the rules of how the department operates. As far as hiring faculty was concerned, I thought, "how hard can it be" to bring great faculty into the UC system with a location like Santa Barbara? At that time, the support for faculty and at the department level was actually better than at Caltech, where I was coming from. Shortly after I was hired, the department decided to hire my Caltech colleague, Henry Weinberg, and not long after that we hired Glenn Fredrickson. A big breakthrough was hiring Brad Chmelka. Brad was a junior faculty candidate who was being pursued by all of the top departments in the country, but decided to come to UCSB, attracted I think, primarily, by the spirit of collaboration that had already been established at UCSB (before almost every other university). The arrival of these faculty gave us instant visibility in the chemical engineering world to complement the great faculty who were already here. The big challenge that I anticipated was to bring top graduate students to UCSB. Graduate students are actually more conservative about taking a chance on a "new" place than faculty. I thought it would take at least 5 years to begin to attract the best graduate students. However, much to our surprise, we got a number of first-class students almost immediately. The funny thing was that these were students coming from top departments, where the faculty knew about the changes at UCSB and were recommending us to some of their best undergraduate students. We were getting very few students from lesser-ranked departments, and virtually no foreign students (the quality students we were seeking were also being admitted to established places like MIT and they were difficult for us to recruit). Soon however, it became evident to the top departments that we were competing with them for the best students, and they stopped recommending us with such enthusiasm, but by then students and faculty from other departments and other countries had recognized the changes that had occurred, and we began to be able to recruit the best students from those departments and countries. So, surprisingly, recruiting top quality graduate students was never the problem that we thought it would be.

ChE Department Faculty, early 90s

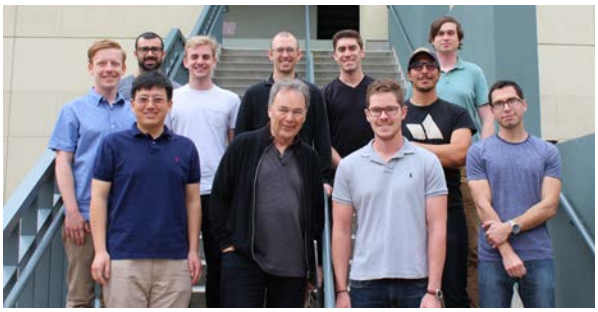
Q: UCSB Chemical Engineering has become a world renowned department. What do you consider to having been the key ingredients to this success?

A: This is a difficult and complicated question to answer. However, one obvious key element is the quality of the faculty and students that we have been able to bring here. Another, is the "personality" of the department. Academic departments tend to fall into two categories: one in which a department is no better than (or even less) than the sum of the individual parts and another in which faculty are concerned with the whole, as much as with their independent activities, making a department even more than the sum of the individual talents. Our department at UCSB falls into the latter category. As a result, being department chair is less difficult, as all of the various things that need to be done are fully shared by all faculty. Furthermore, we all work together to recruit the best students, not just for ourselves, but for the department as a whole. The faculty fully trust each other's judgment. Another factor, related to the quality of the junior faculty we have recruited, is that we have not had an unsuccessful tenure case since I arrived in 1989. Our philosophy in recruiting faculty has consistently emphasized quality of scholarly achievement and promise above any other

consideration. The specific research directions of a prospective faculty are secondary. In some departments, the senior faculty decide that they think the field is going in some direction in the future and they then recruit to find somebody in that area. The philosophy we have followed here is that the field of chemical engineering will evolve as a result of the ideas of the best young faculty. We should hire the best, and they will surely pull us in the "right" directions. Finally, the size of the department faculty (around 20) is small enough that there are meaningful interactions among virtually all faculty. A department that is bigger tends to fracture into a collection of smaller groups, and it is really difficult to maintain the culture of collaboration and cooperation. Last but not least, the spirit of collaboration in research is built into the DNA, not only of the department, but also into the whole of UCSB, and this is truly unique even today. Every university and department talks about this, because it is now recognized that this is likely an important part of the future for research, though most institutions are still talking rather than doing.

Q: Looking back on your time at UCSB, how have the growth, strengths, & direction of the department compared to your original vision & goals for where the department would be in 2017?

A: I think that the department today is every bit as excellent as I anticipated it could be. My "goals and vision" were never aimed at specific research directions, as much as being an outstanding collection of scholars pursuing what they see as the most exciting directions in their fields. We have an excellent graduate program. We have retained our identity as a broad, yet integrated, chemical engineering program, rather than "Chemical Engineering and XX," where XX may be some version of bio- or materials or other topics, which might otherwise fragment departmental cohesion. Another transition that we have less control over, but has occurred nevertheless, is the quality of our undergraduate students. We have maintained the quality of our curriculum and the requirements that every student be well educated across the core topics of chemical engineering. This is really important for our students, so they acquire and can apply the broad set of core chemical engineering fundamentals and principles, and to maintain our sense of identity as a department.



Leal Research Group, 2017

Q: Looking ahead, what do you hope for the future of UCSB Chemical Engineering?

A: I think that we are fully established as one of the top few programs in the country and our faculty, students, and staff can take tremendous pride in what we've built and achieved. However, we cannot become complacent or take this for granted. We must continue to recruit faculty for quality, especially at the junior level. We also cannot take the internal dynamics of the department for granted. It is not easy to achieve the level of collaboration and cooperation that we enjoy, but which can be easy to lose, and once lost it is extremely difficult to get it back. I think that one thing that will be a major challenge for us, as well as the rest of the UC system, is the demise of the ladder-based system for merits and promotions. The determinant of faculty accomplishment in the UC system is one's position on the faculty ladder, and until recently there was a close association between that measure of accomplishment and salary. However, recent budget factors have gradually eroded this to a system that is more or less "everyone for themselves", with salaries determined by outside pressures and factors only loosely connected to the ladder system. The huge advantage of the UC system has been that all faculty are involved in the decisions of merit and promotions and thus everyone's salaries. This has been a system of ultimate fairness, transparency, and open access to all, with the result, that it incentivises high levels of faculty performance in research, teaching, and service, building high morale that pervades all other aspects of the department. Beyond all of that, let's keep having fun with what we do. I look forward to the exciting years ahead for our department.

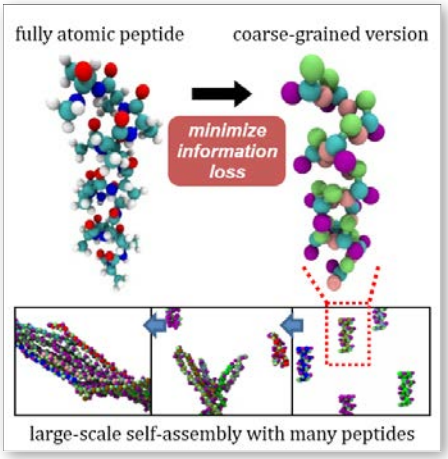
Construction of Engineering II, ca. 1985

RESEARCH FOCUS: Professor Scott Shell

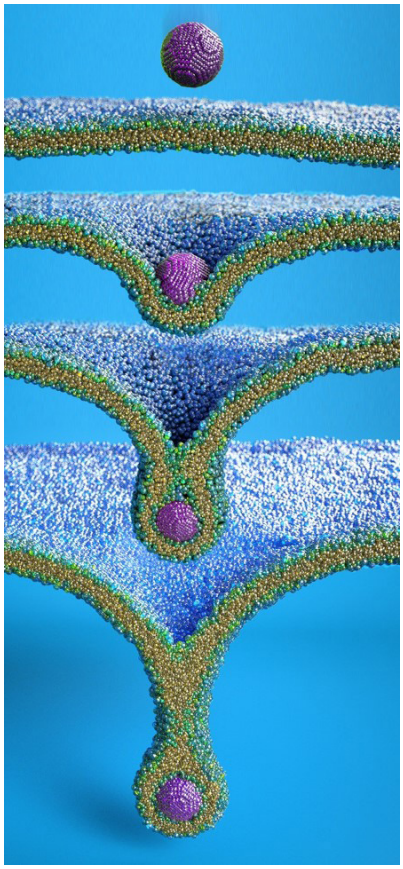
Reaching New Scales in Molecular Simulations with Coarse-Grained Models

Research in theory and computation has long been a strength for Chemical Engineering at UCSB, and in the past decade, the department has grown world-class expertise in the modern area of molecular modeling. This work touches upon major efforts in the Doherty, Fredrickson, Peters, and Shell groups, among others, and is bolstered by the recently-established campus-level Center of MASS (Multiscale Modeling, Analysis, Simulation, and Software, https://mass.ucsb.edu) that brings together over 35 faculty with computationally-oriented research.

In particular, Professor Scott Shell and his group are developing state of the art approaches for modeling and understanding the thermodynamic properties of complex soft-matter systems, including their interaction forces, molecular structures, and behavior in response to external conditions like temperature. Such simulations inform simpler theoretical models and scaling laws that can provide transparent ways to design molecular architectures or compositions to effect desired properties. In this "bottom-up" and inverse approach, systems are modeled at atomic detail using fundamental interaction forces and can include thousands to tens of thousands of atoms. In turn, bulk properties and structures emerge from a complex concert of atomic motions, but the simulations are free of fit parameters, offer predictive power, and illuminate molecular mechanisms and driving forces.



Molecular modeling of this sort has become an extremely active chemical engineering subfield, particularly with the decreasing cost and growing capabilities of commodity computing hardware. However, a central problem has been the stark limitations posed by the sheer size of most systems of interest. Even with major hardware improvements, routine simulations are still limited to tens of thousands of atoms and time scales up to hundreds of nanoseconds, owing to the computational cost of evaluating the detailed forces between every pair of atoms. This poses a tremendous limitation for engineering optimization problems when one must evaluate system properties by performing a simulation every time a design parameter is changed.



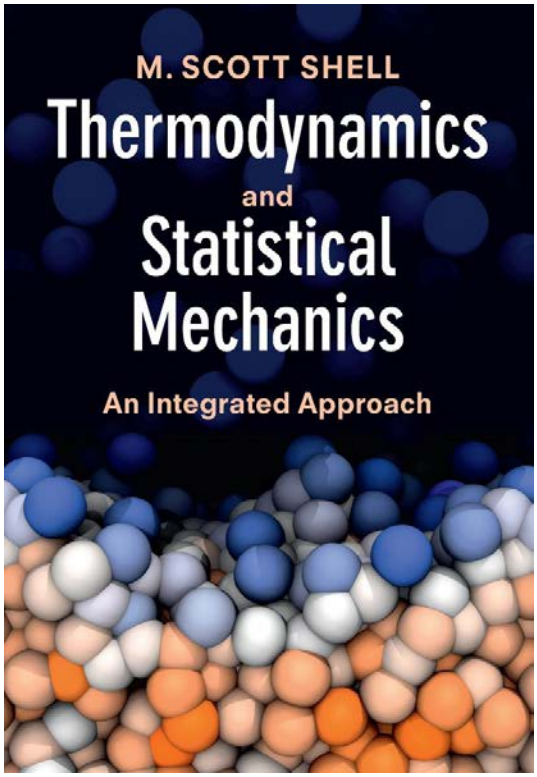
Over the past decade, the Shell group has developed powerful ways to advance beyond the limitations of conventional molecular simulations using "coarse-graining." In this approach, system details are removed by representing molecules using a small set of superatoms that replace entire subgroups of actual atoms. To determine how to coarsen without losing accuracy or predictive capability, the Shell group pioneered a remarkably general theory that measures how much information is lost during the coarse-graining process – giving a quantitative score against which the coarse models can be optimized. The theory led to automated algorithms that, for any system of interest, produce optimized coarse-grained models that now enable dramatically larger, longer, and more complex simulation studies of many kinds. For his work in this area, Professor Shell received an NSF CAREER Award (2009), a Sloan Research Fellowship (2012), and the Dudley A. Saville Lectureship at Princeton University (2015).

Professor Shell and his students have used their coarse-graining approach to study self-assembly problems in peptide systems, which are normally out of reach for atomistically-resolved simulations. In a recent project, for example, they are understanding how the attachment of polymers can be used to tune and improve the stability of surface-attached peptides. Such systems underlie emerging strategies in antibacterial surfaces, drug delivery vehicles, and diagnostic arrays, but lack well-defined design rules for engineering specific functionality. The Shell group found, for example, the existence of "sweet-spot" polymer attachment locations along any given peptide that maximize its stability, and showed that these emerge as a consequence of polymer-surface entropies.

The Shell group also collaborates with the Leal and Mitragotri groups to use coarse-grained models to understand nanoparticle interactions with cellular membranes. Nanoparticles of various sizes, chemistries, and shapes are becoming widespread in consumer products, but little is known about how they interact with cells and potentially pose toxicity issues. Large-scale, coarse simulations allow this collaboration to probe how different nanoparticles interact with model lipid bilayers, an important factor in the overall toxicity profile.

Beyond enabling complex molecular simulations, Professor Shell's more recent work has shown that the coarse-graining theory in fact offers a much broader framework for the development of simple physical models. For example, he showed that the theory automatically detects emergent transport properties in molecular mixture models, predicting simple scaling laws for fluid diffusion constants with temperature and density. This work united several major themes in liquid state theory and was selected as a part of the Journal of Chemical Physics' 80th anniversary collection in 2013, highlighting 80 seminal papers. More recently, Professor Shell has collaborated with Professor Will Noid at Penn State to show that the theory suggests emergent resolutions in complex molecular systems – the length scales at which these systems should be thought about and modeled in the first place.

Outside of research, Professor Shell is an enthusiastic teacher in the department, and has been recognized by the college-level Northrop Grumman Excellence in Teaching Award (2011) and the university-wide Distinguished Teaching Award (2014). This year marks the tenth time that he has taught ChE110A, the sophomore-level introductory thermodynamics course and one of his favorites to teach. Professor Shell now runs the class as an engineering firm, complete with homework assignments in the form of memos to the students (the "junior engineering associates") and a mini design project involving, for example, optimization of a jet engine or steam power plant. He also holds the very popular weekly "Professional Fridays" (pictured above) in which he uses group activities and interactive Q&A to teach the students about skills like resume creation, elevator pitches, internship hunting, and career planning.



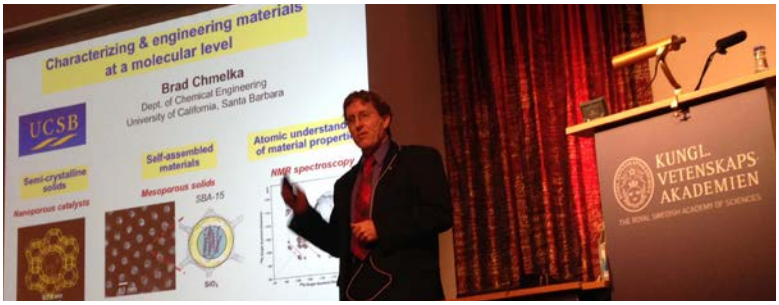
This year also marks the tenth time that Professor Shell has taught the introductory graduate thermodynamics course, ChE 210A. Much like the themes of his research on coarse-graining, he emphasizes the way in which a molecular picture based on fundamental laws translates into the coarser macroscopic, classical thermodynamic equations relating bulk phases and quantities like entropy and free energy. Unlike the conventional approach to teaching the subject matter, Professor Shell presents these perspectives side-by-side to facilitate intuition for the oft-murky thermodynamic framework. Based on his class experiences, Professor Shell turned this unique pedagogical slant into a graduate-level textbook, *Thermodynamics and Statistical Mechanics: An Integrated Approach*. Published by Cambridge University Press in mid 2015, his textbook has already sold nearly a thousand copies and is being adopted by a growing number of chemical engineering programs around the country.

For the past year and a half, Professor Shell has been excited to serve as the Graduate Advisor and the Vice Chair for Graduate Education in the Chemical Engineering epartment. He has helped to facilitate a number of improvements to the graduate program and community, including a one-stop online forum for guidance and program requirements, a graduate student lounge, a newly-formed Chemical Engineering Graduate Student Association, and several diversity awareness and inclusion initiatives.

National Academy Elections

Professor Michael Doherty is elected to the National Academy of Engineering (2016)

Academy membership honors those who have made outstanding contributions to "engineering research, practice, or education, including, where appropriate, significant contributions to the engineering literature," and to the "pioneering of new and developing fields of technology, making major advancements in traditional fields of engineering, or developing/implementing innovative approaches to engineering education." Professor Doherty was elected to the NAE "for the design of methods for complex distillation and crystallization processes," techniques that can lead to advanced design and manufacturing of pharmaceuticals, specialty chemicals and improved crystal quality. Professor Doherty's research interests span a variety of topics: combining reactions and separations, crystallization of organic materials, and systems with complex chemistries. His work involves theoretical, experimental and computational methods, and focuses on applications in specialty chemicals and pharmaceuticals. Professor Doherty joined the Chemical Engineering faculty in 2000 and served as Department Chair from 2008-2013.



Professor Bradley Chmelka is elected to the Royal Swedish Academy of Sciences (2015)

The Royal Swedish Academy of Sciences is an independent organization, renowned for the annual awarding of the Nobel Prizes in Physics, Chemistry, and Economics. Election to the Royal Swedish Academy of Sciences is an exclusive honor that recognizes significant research achievements in science and engineering. Professor Chmelka's research in the area of nanoscience and technology explores new materials for energy applications. His research seeks to understand, at a molecular level, the fabrication and functions of new catalysts, structural materials, optoelectronic and electrochemical materials, porous ceramics, heterogeneous polymers, and biominerals. He specializes in developing and applying multi-dimensional nuclear magnetic resonance (NMR) spectroscopy measurements to characterize the atomic scale compositions, structures, and interactions in complex materials and processes. Professor Chmelka joined the faculty of the Department of Chemical Engineering in 1992, his research interests include the synthesis and characterization of self-assembled inorganic-organic and mesoporous materials; molecular dynamics and structure in hierarchically ordered polymers, liquid crystals, nanocrystals, and biominerals; and the development and application of nuclear magnetic resonance spectroscopy methods.

Professor Samir Mitragotri now holds elected positions in the National Academy of Medicine (2016), National Academy of Engineering (2015), and National Academy of Inventors (2013)

Professor Mitragotri was elected to the NAM for major contributions to the advancement of the medical sciences, health care, and public health, his election to the NAE honored his "development, clinical translation and commercialization of transdermal drug delivery systems," and his election to the NAI recognized his "highly prolific spirit of innovation." Professor Mitragotri and his group have developed technologies that involve ultrasound, penetration enhancers and liquid microjets to overcome the skin barrier to enable delivery of proteins, peptides and small interfering RNA (siRNA). His research focus also includes bio-inspired technology that uses or mimics the body's own functions for targeted drug delivery that increases the effectiveness of therapies.

Professor Mitragotri joined the UCSB faculty in 2000 as an Assistant Professor of Chemical Engineering. He is now the director of the UCSB Center for BioEngineering, he has authored or co-authored more than 200 scholarly publications, and his research has led to dozens of current and pending patents.

FACULTY HONORS & AWARDS

PROFESSOR GLENN FREDRICKSON

Professor Glenn Fredrickson was recently awarded the 2016 William H. Walker Award from the AIChE, presented annually to a member of AIChE who has made an outstanding contribution to chemical engineering literature. Professor Fredrickson received the William H. Walker Award for "major contributions to the chemical engineering literature, including 'The Equilibrium Theory of Inhomogeneous Polymers,' published by Oxford University Press in 2006."

Professor Fredrickson's research involves the theoretical analysis of complex fluids and polymers, and concerns efforts to develop new computer simulation tools for analyzing statistical field theory models of polymers and complex fluids.

PROFESSOR EMERITUS DALE SEBORG

Professor Emeritus Dale Seborg was made a Fellow of the International Federation of Automatic Control (IFAC) in 2016, a recognition given for his "technical accomplishments in process control education, research, and professional leadership." The IFAC Fellow Award is given to persons who have made outstanding and extraordinary contributions in the field of interest of IFAC, in the role as an Engineer/Scientist, Technical Leader, or Educator.

Professor Seborg will receive the Fellow certificate and pin in a ceremony at the IFAC World Congress in Toulouse, France in July of 2017.

PROFESSORS RACHEL SEGALMAN & TODD SQUIRES

Professors Rachel Segalman and Todd Squires were elected Fellows of the American Physical Society in 2015. Professor Segalman joins the Division of Polymer Physics for "pioneering contributions to the understanding of conjugated, polypeptoid, and ion-containing polymers and co-polymers." Professor Squires, elected to the Division of Fluid Dynamics, was selected for "advancing the quantitative and qualitative understanding of fundamental processes in microfluidics and nonlinear electrokinetics, colloidal hydrodynamics, and active and nonlinear microrheology of bulk materials and complex fluid interfaces."

PROFESSOR MATTHEW HELGESON

Professor Matt Helgeson was awarded the 2016 Unilever Award from the American Chemical Society's Division of Colloid and Surface Science. The Unilever Award is given in recognition of fundamental work in colloid or surfactant science carried out in North America by researchers in the early stages of their careers. Professor Helgeson's research focuses on the design of complex fluids, especially those involving colloidal species in self-assembling & structured liquids.

Professor Helgeson also recently received early career awards from the US Department of Energy's Early Career Research Program, for "Rheo-structural Spectroscopy: Fingerprinting the in situ Response of Fluids to Arbitrary Flow Fields," and the National Science Foundation, for "Engineering colloidal assembly of nanoemulsions for material design."

FACULTY HONORS & AWARDS

PROFESSOR BRADLEY CHMELKA

Professor Bradley Chmelka was selected as the 2016 Braskem Award winner for the Materials Engineering & Sciences Division (MESD) of AIChE, an award bestowed annually to a leading researcher in materials science and engineering.

Professor Chmelka's research interests include the synthesis and characterization of self-assembled inorganic-organic and mesoporous materials; molecular dynamics and structure in hierarchically ordered polymers, liquid crystals, nanocrystals, and biominerals; and the development and application of nuclear magnetic resonance spectroscopy methods.

PROFESSOR SAMIR MITRAGOTRI

Professor Samir Mitragotri was awarded the Prestigious Andreas Acrivos Award for Professional Progress in Chemical Engineering from the AIChE. The award recognizes his outstanding achievements in drug delivery and biomaterials research.

As part of the award, Professor Mitragotri presented the Andreas Acrivos Award for Professional Progress in Chemical Engineering Lecture at AIChE 2016. His lecture was titled, "Understanding and Overcoming Body's Biological Barriers for Drug Delivery."

PROFESSOR MICHELLE O'MALLEY

Professor Michelle O'Malley was chosen to receive a prestigious Presidential Early Career Award for Scientists and Engineers (PECASE) in 2016 for her work with "deciphering the role of enzymes in the gut fungal microbiome." The award is the highest honor the nation can bestow on a scientist or engineer at the beginning of his or her career, and was presented to Professor O'Malley by President Barack Obama at a ceremony in Washington, DC this past May (pictured below).

Also in 2016, Professor O'Malley received an NSF CAREER Award for the proposed work "CAREER: Designing Synthetic Anaerobic Communities for Bioproduction," which will construct new partnerships between microbes that are inspired by natural anaerobic consortia. And, she was the 2016 Alan P. Colburn Lecturer at the University of Delaware. In 2015 she was named one of MIT Technology Review's "35 Innovators Under 35." The publication recognized O'Malley as a pioneer in the field of nanotechnology and materials.

Professor O'Malley's current research, recently published in *Science* and profiled on BBC News, focuses on the biotech potential of microbes, which may have significant applications in the realms of renewable energy and advanced chemicals. Her most recent work investigates the functions of relatively little-understood anaerobic gut fungi — primitive microbes found mainly in large herbivores — whose unique functions and enzymes may offer new sources of biofuels and methods of producing next-generation pharmaceuticals.

See if you can find Professor O'Malley and President Obama in the group picture below!

Official White House Photo by Lawrence Jackson

Professor Emeritus Duncan Mellichamp: Half a Century of Service

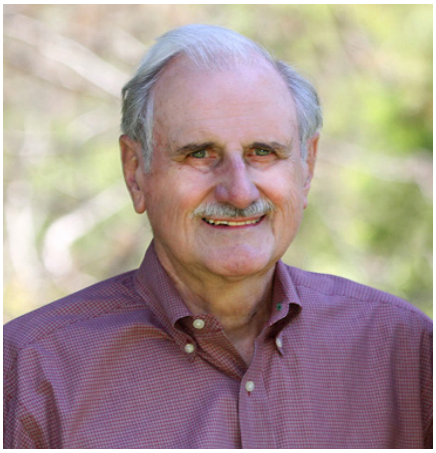
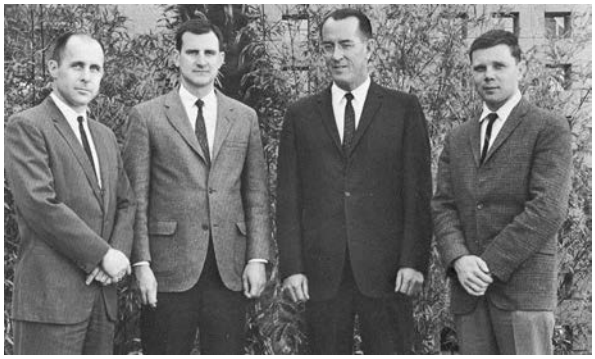


photo by Monie Photography

Not many people can say they have worked in one place for half a century, Duncan Mellichamp can. Dr. Mellichamp, Professor Emeritus of the UCSB Department of Chemical Engineering, marked 50 years as a professor at UC Santa Barbara this past December. Although he has been a fixture on this campus for decades, he has ventured far beyond labs and classrooms throughout his life, leaving an indelible impression in wide-ranging areas including academia, the arts, business, non-profits, and philanthropy.

Mellichamp was a founding member of the UCSB Chemical Engineering Department faculty, starting the process dynamics and control programs in 1966-67. He earned his bachelor's degree from Georgia Tech and his Ph.D. from Purdue University, both in Chemical Engineering.

At its beginning in 1966, UCSB's Chemical Engineering Department was situated in the Arts building, where it built its reputation over the next 20 years. There, Mellichamp and others in the department developed undergraduate and graduate curricula, constructed laboratories, designed new courses, and hired additional faculty, all of which attracted an ever-higher caliber of students. Today, UCSB's Chemical Engineering Department is among the best in the world. In 2015, U.S. News & World Report ranked the program No. 5 among public universities. It tied with the University of Delaware and Mellichamp's alma mater, Georgia Institute of Technology, for that honor.



Professors Robert Rinker, Duncan Mellichamp, Jack Meyers, and Orville Sandall (1967 UCSB yearbook photo)

Although retired from the full-time faculty since 2003, he returns winter/spring to give a series of guest lectures in a senior course and continues to do research and publish. During his career, he has mentored more than 50 graduate students to degrees, including the first Ph.D. granted in Chemical Engineering and the first female Ph.D. in the College of Engineering. Mellichamp has a long and impressive list of accomplishments. He is author of more than 100 research publications on process modeling, large-scale systems analysis, and computer control. His early computer work led to an edited book in 1983, "Real-Time Computing with Applications to Data Acquisition and Control." He co-wrote the award-winning undergraduate textbook, "Process Dynamics and Control," now in its 4th edition. His recent research focuses on the potential profitability of new, large-scale chemical plants.

Mellichamp was elected chair of the UCSB Academic Senate (1990-92) and of the UC system-wide Academic Senate; the latter position includes serving as Faculty Representative on the Board of Regents (1995-97). For seven years before his retirement, he served half-time as special assistant to the Chancellor for long-range planning.

Mellichamp and his wife, Suzanne (UCSB M.A. Education '70 and a teacher for 30 years), have endowed 13 faculty chairs at UC Santa Barbara, beginning in 2001 with a single chair in process control. Currently, three areas are targeted for growth through these new chairs: systems biology, globalization, and sustainable chemistry. The couple also actively support half a dozen local arts and performing arts groups, including Opera Santa Barbara, where Mellichamp served on the Board of Directors for 12 years (three years as its president). Mellichamp was elected Trustee of the UC Santa Barbara Foundation in 2003, was made an honorary alumnus in 2009, and chaired the highly influential Trustees Advisory Committee on IV Strategies in 2014.

December of 2016 marked both Duncan Mellichamp's 80th birthday, and his 50th year at UCSB.

Duncan Mellichamp and Chancellor Henry Yang
photo courtesy of UC Santa Barbara

Adapted from "2016 Graduate Division Commencement speaker Dr. Duncan Mellichamp" by Patricia Marroquin, published in the UCSB GradPost May 18, 2016

GRADUATE STUDENT
Awards & Achievements

MATTHEW IDSO

Schlinger Fellowship for Excellence in Chemical Engineering Research, 2016-17

JONATHAN MARTIN

Mitsubishi Chemical Fellowship from the Mitsubishi Chemical Center for Advanced Materials for the period 2016-19

ALEXANDRA BAYLES

CSP Technologies Teacher-Scholar Fellowship for 2016-17

RAHUL SANGODKAR

2016 Technology Management Program Graduate Commencement speaker

Winner of 2016 UCSB New Venture Competition, with OSMO

JOHN HENSKE

UCSB Affiliates Graduate Dissertation Fellowship

JOE PETERSON

CSP Technologies Teacher-Scholar Fellowship for 2016-17

UCSB Technology Management Program New Venture Competition Selects OSMO as 2016 Winner

OSMO, a company started by UCSB students Kyle Neumann, Rahul Sangodkar (Chemical Engineering), Edixon Puglisi and Anjana Krishnan, took home the grand prize of $12,000 for their advanced and versatile portable water sampling instrument following a day of pitching ideas and demonstrating technical and business expertise to a room full of peers, mentors and tech entrepreneurship veterans.

For showing the most business promise, OSMO bested five other student-team finalists, who in turn were selected after a rigorous half-year of TMP and NVC entrepreneurial training that started with over 30 student groups. Working with mentors who themselves have successfully built and promoted technology companies, the students learned how to take an innovative idea and turn it into a solid plan from which a promising tech venture can grow.

CHEMICAL ENGINEERING CURRENT EVENTS

Duncan & Suzanne Mellichamp Emerging Leader Lecture

In 2015 Duncan & Suzanne Mellichamp generously endowed a new lecture series in the Department of Chemical Engineering to highlight up and coming Chemical Engineers. On October 25th, 2016 the department hosted the inaugural "Duncan & Suzanne Mellichamp Emerging Leader Lecture" at UCSB. Associate Professor Jeffery Rimer from the University of Houston was the inaugural Mellichamp lecturer, giving an outstanding talk titled "Identifying New Paradigms in Crystal Engineering for Energy and Biomedical Applications". The Mellichamp Emerging Leader Lecture will be an annual event featuring up and coming researchers in a wide variety of Chemical Engineering disciplines supported by the generous endowment.

NSF-funded ESTEEM program, led by Professor Susannah Scott, helps aspiring engineers complete their undergraduate degrees

ESTEEM (Enhancing Success in Transfer Education for Engineering Majors), a program led by Professor Susannah Scott, targets promising engineering transfer students, offering scholarship funding, outreach, and academic counseling to help them move toward their degrees. The initiative builds on a previously successful smaller-scale effort to reach out to third-year engineering undergraduates on campus and give them that critical push to complete their degrees.

In a move that promises to help level the playing field for future engineers at UCSB, and with the help of $4.8 million in education funding over five years from the National Science Foundation, Scott and colleagues are rolling out an ambitious and wide-reaching program to assist academically talented low-income engineering students.

9th Annual Clorox-Amgen Graduate Student Symposium

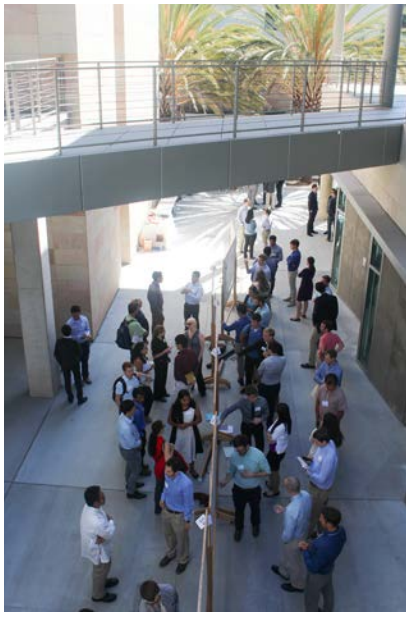
On Friday September 30, 2016 Chemical Engineering graduate students hosted the 9th Annual Clorox-Amgen Graduate Student Symposium at UCSB. The Symposium was a great success and featured oral presentations by senior students, and a poster session showcasing research projects. The intent of the Symposium is to highlight ongoing work in UCSB Chemical Engineering to stimulate industrial collaborations and facilitate interactions with students seeking future employment opportunities. The 2016 student awards went to:

BEST TALKS

Emily Davidson (Segalman Group)
"Self-Assembly and Crystallization of P3EHT Containing Block Copolymers"
Niels Zussblatt (Chmelka and Squires Groups)
"New non-precious-metal mesoporous carbon electrocatalysts and their properties"

BEST POSTERS

Kelly Ibsen (Daugherty Group)
"Mapping conformational epitopes via random peptide display and high-throughput sequencing"
Jimmy Liu (Fredrickson Group)
"Phase field mapping for fast and accurate polymer simulations"



The 10th Annual Clorox-Amgen Graduate Student Symposium will be held on Friday October 6th, 2017 at UCSB.
→ visit www.chemengr.ucsb.edu/graduate/symposium for more information

UCSB AIChE Student Chapter News

As one of the most active professional societies on campus, UCSB AIChE is fully invested in catalyzing the professional development of our members through industry speaking events, plant tours, career building workshops, and research seminars. The goal of our organization is to create an opportunity-enriched environment in which students can fulfill their true potential.

Speaker Series

Since Fall 2015, we have hosted, co-hosted, or otherwise promoted over a dozen events with companies ranging from small start-ups to global corporations. Some notable corporate appearances include Proctor and Gamble, Amgen, Gilead, and EcoServices (formerly Solvay). We've hosted process engineers from local startups (ZPower) as well as chief executives from large-scale technology developers (NuSil). These information sessions typically go hand-in-hand with on-site tours, one notable tour being at Dow-DuPont's AgroSciences plant in Pittsburg, CA. Our organization also holds strong ties with Clorox, our main sponsor, who has continued to return in support of UCSB AIChE and to recruit multiple interns each Fall. Each quarter, we invite chemical engineering faculty to speak to the general student body. These presentations serve a dual purpose: (1) an opportunity for faculty to introduce themselves and their background stories to the students, and (2) an opportunity for faculty to expand on technical or professional topics of interest to the students. Recently, some faculty- Dr. Samir MItragotri, Dr. Baron Peters- have focused on their own research. Others have taken this opportunity to speak on 'bigger picture' issues: Dr. Eric McFarland on "The Energy 'Crisis'" and Dr. Michelle O'Malley on "Emerging Trends in Biotechnology".

Career-Building

Apart from exposure to industry and academia, UCSB AIChE also strives to promote professional development of our student body through career-building workshops. We have worked closely with the university, hosting Maddie Foster of UCSB Career Services for a Resume Building Workshop as well as a highly informative LinkedIn tutorial. To gain perspective into what industry recruiters are looking for, we have worked closely with Chemical Engineering alumni Jackie Nguyen of NuSil Technology. In Fall 2016, Jackie hosted a workshop in which she critiqued dozens of real student resumes, giving insider tips on what she looks for when considering a pool of potential new hires.

Social and Community Involvement

At MESA Day (a K12 outreach event), we presented science-related activities to elementary school students. Liquid nitrogen ice cream is a fun and educational way to teach kids about science. Community service events such as the Coastal Fund Restoration, where we planted dozens of trees in a local ecosystem, allowed us to make a positive impact while building favorable relationships with the community. Furthermore, we promote comfortable student-faculty relations through our annual Lunch with Faculty. Taking place every Spring, this provides a unique opportunity for students to interact with faculty in a relaxed social setting. A similar event, although more of a celebration, is the annual Senior Banquet organized by UCSB AIChE every June. This is an opportunity for our faculty to congratulate and say farewell to the graduating class.

Future Plans

We have much in store for the remaining months of the school year. In Winter 2017, we will welcome Andrew Cosbie of Amgen, attend a plant tour at local membrane developer TriSep, and host Dr. Scott Shell for a presentation on "How to Give a Presentation". We are also welcoming something entirely new to the UCSB AIChE agenda- a Recent Graduate Panel with members of the Class of 2016 who now work as professional engineers and graduate students. There are additional professional and outreach events planned for Winter and Spring 2017, as well as the January distribution of our popular UCSB Chemical Engineering apparel.

Visit UCSB AIChE's website at www.ucsbaiche.com for event updates and schedules, video interviews with industry and academia professionals, and more!

UCSB AIChE Student Chapter Officers (2016 -2017)

Co President: Francis Cunningham
Co President: Isaac Robledo
External Vice President: Jacob Orlowicz
Internal Vice President: Dorian Bruch
Treasurer: Mia Zimmer
Industry Chair: Zach Sawaya
Internal Department Chair: Melissa Morales
Project Coordinator: Juliana Uro-May
Media Chair: Quentin Kim

UCSB Chemical Engineering Class of 2010

Alumni Profile

Jackie Nguyen, BS 2010

photo courtesy of Jackie Nguyen

Jackie currently works for Bluestar Silicones as a Business Development Manager. She is responsible for the development and execution of global market strategy. In her position, Jackie helps engineers and scientists solve material challenges by working alongside her customers to develop custom solutions using the chemical and physical capabilities of silicone. She works from designing proof of concept through production, interacting with R&D, engineering, and manufacturing, as well as testing for quality and scale-up for production, with the ultimate delivery of the end product to the customer. Putting all the pieces together to create the optimal solution, Jackie collaborates holistically with colleagues from every department.

Last summer, Jackie graduated with her Master's in Business Administration (MBA) from the Graziadio School of Business and Management at Pepperdine University, integrating her engineering background with her interest in finance and strategic marketing. Over the past two years, Jackie brought her engineering education and professional training together in a real-time academic and industrial experience; she spectacularly attended school full-time and continued as a full-time employee. During this time, Jackie honed her already impressive time management skills and strengthened her personal portfolio with the gift of self-reflection and self-awareness.

Jackie's perspective on time management and work-life balance, attitude, and team work, and the importance of self-reflection and awareness are complexly intertwined. As an undergraduate student, Jackie felt supreme work-life balance, which quickly shifted to an imbalance as she entered the workforce with Schlumberger Oilfield Services. As Jackie moved to her position in R&D at NuSil Technology, she focused on trying to find a more sustainable work-life balance, the importance of which really clicked while working and attending school full-time. In all aspects of life, Jackie now uses self-reflection and awareness to help manage her time to meet her goals, continuously improve to excel at her career, and maintain the balance of life most important to her.

Jackie truly loved her four years at UCSB as a Chemical Engineering undergraduate student and remembers the time fondly. She was heavily involved with the UCSB student chapter of AIChE. Jackie continues to retain strong connections to Chemical Engineering and UCSB with annual visits for professional development talks on campus. In February of last year, the student chapter of AIChE interviewed Jackie as part of an Interview Series to document diverse chemical engineers' career experience followed with advice for current and future students. As Jackie moves through her professional life, she meets fellow Gauchos all around the world. Jackie recognizes the importance of maintaining good relationships and continuing to build new ones as she continues through her career.

Jackie graduated from UCSB with a B.S. in Chemical Engineering. She then worked for Schlumberger in Texas designing and pumping cement downhole to case the wellbore on oilfield land rigs prior to accepting a position at NuSil, located in Carpinteria, CA, in R&D. Jackie is currently working at Bluestar Silicones and hopes to one day run her own company.

ALUMNI UPDATES

Todd Smith B.S. 2011

Todd Smith received his B.S. from UCSB ChE in 2011 and now works as an R&D Engineer at Spirometrix, Inc., a medical device company based in Pleasanton, California which focuses on breath-based diagnostic and monitoring devices to improve the lives of those with respiratory conditions like asthma, COPD, cystic fibrosis and pulmonary hypertension. He recently got married and lives with his wife in Sunnyvale, CA.

Elisa Takahashi B.S. 2001

Elisa Takahashi received her B.S. from UCSB ChE in 2001 and now works as a Controller at Trion Worlds, a video game developer and publisher. She previously worked for LiveRail, a monetization platform for video publishers, and then for Facebook after they acquired LiveRail. She got married in September 2008 and has two boys, Toshi and Ari.

Charles Hages B.S. 2010

Charles Hages received his B.S. from UCSB ChE in 2010. In 2015 he graduated with a Ph.D. in Chemical Engineering from Purdue University, where he was part of Rakesh Agrawal's laboratory. Charles is currently working as a Postdoc in Germany at the Helmholtz-Zentrum Berlin researching photovoltics, and he will be applying for an academic position in the near future.

Darryl McCall B.S. 1978

Darryl McCall received his B.S. from UCSB ChE in 1978, he worked at Proctor & Gamble for almost 30 years, and then at Coty until his retirement in 2014. He currently owns his own consulting company, Darryl McCall Consulting, LLC in Santa Fe, New Mexico. Darryl has remained active in the UCSB ChE department, and he has served on the department's External Advisory Board since 2006.

Kristy Morgan, née Schmit B.S. 2005

Kristy Morgan, née Schmit, received her B.S. from UCSB ChE in 2005 and recently started a new job at Tesla as a Global Supply Manager working on the much anticipated Model 3, a more affordable model with a range of 215 miles/charge.

She married an alum of UC Davis and lives in the Bay Area.

See what our alumni have been up to!

Robert Young Ph.D. 1988

Robert Young received his PhD from UCSB ChE in 1988. After receiving his PhD Robert worked for 28 years in the chemicals and refining industry, most recently with ExxonMobil, before joining the the faculty as an Associate Professor of Practice at USC where he teaches Computer-Aided Design, Process Plant Design, the Undergrad ChemE Lab courses, and Process Control.

Maya Alhashem B.S. 2015

Maya Alhashem received her B.S. from UCSB ChE in 2015. She recently graduated from King Abdullah University of Science and Technology (KAUST) with a Masters in Mechanical Engineering. At KAUST, she worked in Dr. Robert Dibble's laboratory in the Clean Combustion Research Center and wrote her thesis on designing and building a biodiesel reactor.

Sam Louke B.S. 1978

Sam Louke received his B.S. from UCSB ChE in 1978. He got a job with Intel right out of college and worked in microchip manufacturing, manufacturing tool development, and microchip R&D; where he was co-inventor on 3 patents. He remained at Intel for his entire career, until his retirement in 2005. In his free time he enjoys playing in local musical groups and volunteering for local non-profits such as the Oregon Museum of Science and Industry.

Brittany Hall B.S. 2013

Brittany Hall received her B.S from UCSB ChE in 2013. After her graduation, she stayed in the Santa Barbara area and worked for Toyon Research Corporation, a technology development and defense systems analysis company. Brittany recently moved to Norway with her fiancé to pursue a Masters degree in Chemical Engineering from the Norwegian University of Science and Technology.

Tad Wilkinson B.S. 1988

Tad Wilkinson received his B.S. from UCSB ChE in 1988 and works as a Sr. Completion Engineer at Chevron, designing and implementing optimizing completion techniques to help maximize oil and gas production. Tad is currently on resident assignment in Luanda, Angola and enjoys vacationing to nearby Europe and South Africa.

Keep in Touch! www.chemengr.ucsb.edu/alumni

Congratulations to our PhD Graduates!

Name	Advisor	Dissertation	Affiliation	Year
Edward Toumayan	Fredrickson Hawker	Development of polymeric coatings for antifouling applications	Intel	2016
Juntae Kim	Helgeson	Understanding rheology and microstructure of thermoresponsive nanoemulsions as a model system of colloidal suspensions	Intel	2016
Rahul Sangodkar	Chmelka Doherty	Understanding and controlling hydration and crystallization of inorganic structural materials	Amgen, Boston	2016
Michael Rapp	Israelachvili	Amphiphilic and bio-inspired adhesive interactions at hydrophobic and hydrophilic surfaces	Clorox	2016
Joon Bok Lee	Doyle	Personalization and enhanced designs for automated glucose control in artificial pancreas	Insulet Corporation	2016
Lauren Huyett	Doyle	Impact of sensing and actuation characteristics on artificial pancreas design	Agilent Technologies	2016
Jennifer Guerrero	Daugherty O'Malley	Methods for redesigning the specificity of secreted proteases	Amgen	2016
Daniel Coller	Scott	Variable-temperature kinetic analysis of reaction profiles for the rapid assessment of heterogeneous catalysts	Spero Energy Inc.	2016
Michael Zakrewsky	Mitragotri	Ionic liquids as antimicrobials, solvents, and prodrugs for treating skin disease	Gilead Sciences Inc.	2016
Nirala Singh	McFarland Metiu	Electrocatalysis for energy storage: screening, understanding and improving hydrogen electrocatalysts in h2-br2 flow batteries	Univ. of Washington (Post-Doc)	2015
Sean Paradiso	Fredrickson	Computational design and morphology engineering of multiblock polymer films	Citrine Informatic	2015
Kathryn Camacho	Mitragotri	Discovery and delivery of synergistic chemotherapy drug combinations to tumors	Bristol-Myers Squibb	2015
Martin Keh	Leal Squires	Adhesion and detachment of capsules in flow	Avon Products, Inc.	2015
Bryan Goldsmith	Peters	First-principles modeling of catalysts: novel algorithms and reaction mechanisms	Fritz-Haber-Inst. (Post-Doc)	2015
Peter St. John	Doyle	Mathematical approaches to understanding mammalian circadian rhythms	NREL (Post-Doc)	2015
Alan Derk	McFarland Metiu	Understanding and controlling light alkane reactivity on metal oxides: optimization through doping	Intel	2015
Federico Lora Gonzalez	Gordon	Bio-inspired, subwavelength surface structures to control reflectivity, transmission, and scattering in the infrared	UCSB (Post-Doc)	2015
Anthony Fong	Peters	Computational mechanistic study of the reactivity of metal oxide catalyst towards olefins		2015
Katherine Barteau	Fredrickson	Poly(glycidyl ether)-based battery electrolytes: correlating polymer properties to ion transport	Cornell University (Post-Doc)	2015
Aaron Anselmo	Mitragotri	Blood-cell inspired polymeric drug delivery systems	MIT (Post-Doc)	2015
Ryan Mullen	Peters Shea	Mechanisms of rare events in condensed phases	Notre Dame University (Post-Doc)	2014

Congratulations to our PhD Graduates!

Name	Advisor	Dissertation	Affiliation	Year
Joo-Hyun Jeon	Shell	Computational studies of sequence-specific driving forces in peptide self-assembly	Samsung	2014
Ming-Feng Hsieh	Chmelka	Measuring, understanding, and controlling heteroatom distributionin layered and zeolite boro- and alumino-silicate frameworks	University of Houston (Post-Doc)	2014
Serra Elliott	Daugherty	Discovery of disease-associated antibody biomarkers and their binding targets using bacterial displayed peptide libraries	Stanford University (Post-Doc)	2014
Saurabh Das	Israelachvili	Bio-inspired adhesion, friction and lubrication	Intel	2014
Scott Carmichael	Shell	Multiscale methodologies and simulations of emergent self-assembly phenomena	NREL (Post-Doc)	2014
Sunyia Hussain	Han	Studies of proteorhodopsin to investigate transmembrane protein function and dynamics	Johns Hopkins (Post-Doc)	2014
Preshit Dandekar	Doherty	Modeling solution growth of inorganic crystals	Dow Chemical Co.	2014
Joel Paustian	Squires	Microscale solution manipulation using photopolymerized hydrogel membranes and induced charge electroosmosis micropumps	Greenlight BioSciences	2014
Justin (Jahng-Soh) Lee	Doyle	Development of artificial pancreas using enhanced control algorithm and insulin delivery	Exxon-Mobil	2014
Louis Jones	Gordon Chmelka	Distinguishing molecular environments in supported pt catalysts and their influences on activity and selectivity	UCSB (Post-Doc)	2014
Brian Giera	Squires Shell	Primitive model simulations and mean-field studies of electric double layers	Lawrence Berkeley National Laboratory	2014
Chia-Chun Fu	Leal	Multiscale modeling, analysis and simulation in multiphase systems	iZON Corporation	2014
Christopher Carach	Gordon	Understanding polymer-fullerene morphology in organic solar cellsvia photoluminescence, raman scattering, and spectroscopic imaging	Intel	2014
Mansi Seth	Leal	Microstructural transformations in concentrated, charged vesicle suspensions	Intel	2014
Dong-Woog Lee	Israelachvili	Surface interactions in biological systems- myelin membrane and articular cartilage	UCSB (Post-Doc)	2014
Donghun Kim	Chmelka	Functionalized mesoporous silica and carbon materials for fuel cell applications	University of Minnesota (Post Doc)	2014
Taeho Hwang	Scott	Kinetic analysis of organometallic catalyst precursors in solution and on surfaces	Air Products	2014
Natalie Forbes	Zasadzinski Daugherty	Hybrid thermosensitive liposome- nanoparticle drug carrier with triggered release	Naval Research Laboratory	2014
Stephen Donaldson	Israelachvili Chmelka	Developing a general interaction potential for hydrophobic and hydrophilic interactions in self-assembled systems	Ecole Normale Superieure, France	2014
Zachary Zell	Leal Squires	Probing interfacial properties of polymeric and soluble surfactants- new tools, new insights	Intel	2013

Congratulations to our PhD Graduates!

Name	Advisor	Dissertation	Affiliation	Year
Bradley Spatola	Daugherty	Antibody repertoire profiling using bacterial display random peptide libraries for biomarker discovery	Gaten Biotech	2013
Ann Siaw Ting	Han	Dynamic nuclear polarization instrumentation and methodology for generating high signal sensitivity and signal contrast	JEOL, Inc.	2013
Justin Jahnke	Chmelka	Understanding and controlling the interactions of photo-responsive species within nanostructured inorganic-organic composite materials	Army Research Lab (Post-Doc)	2013
Nathan George	Seshadri Chmelka	Correlating long-range order and local structure to the properties of inorganic solids	Solara	2013
Isaac Riisness	Gordon	Development of multiscale spectroscopy methods and instrumentation to probe conjugated polymer solar cells	Intel	2013
Adetunji Onikoyi	Kramer	Bulk and monolayer ordering of block copolymer blends		2013
Zoltan Mester	Fredrickson	Field-theoretic studies of phase coexistence and supramolecular assembly in block copolymers	Princeton University (Post-Doc)	2013
Travis Koh	Gordon	Nanomaterial synthesis using high-pressure microplasma jets	Applied Materials	2013
Rebecca Harvey	Doyle	Development and implementation of the health monitoring system for the artificial pancreas	Air Products	2013
Debra Audus	Fredrickson	Field-based simulations of nanostructured polyelectrolyte gels	Natl. Inst. of Science & Tech.	2013
Kyu-Han Kim	Squires Zasadzinski	Linear and non-linear microrheology of model lung surfactant monolayers at the air-water interface	KAIST (Post-Doc)	2013
Nathan Duff	Peters	New computational methods for solute precipitate nucleation	North Carolina State University (Post-Doc)	2013
Aviel Chaimovich	Shell	A multiscale study of water via the relative entropy	Max Planck Inst. (Post-Doc)	2013
Benjamin Smith	Chmelka Israelachvili	Influences of organic-inorganic surface interactions on crystallization in liquid-solid systems	Intel	2013
John Frostad	Leal	Fundamental investigations of phase separation in multiphase fluids	Stanford University (Post-Doc)	2013
Jing Yu	Israelachvili	Adhesive interactions of mussel foot proteins	Argonne National Laboratory	2012
Michael Villet	Fredrickson	Advanced computational field theory methods for fluctuating polymer solutions	DSM Research, Netherlands	2012
Zubin Kuvadia	Doherty	Morphology prediction and manipulation of real-complexity organic molecular crystals	Dow Chemical Co.	2012
Brandon Knott	Doherty Peters	Mechanistic studies of nucleation from solution	NREL (Post-Doc)	2012
Jennifer Getz	Daugherty	High-affinity, stable peptide ligands engineered from a kalata b1knottin library	Omniox, Inc.	2012
Ian Shieh	Zasadzinski	Three-dimensional visualization of interfacial phenomena using confocal microscopy	Genentech	2012
Robert Messinger	Chmelka Squires	Multi-scale properties and processes in hierarchically-structured organic-inorganic solids and surface-based microfluidic systems	City College of New York (Assist. Prof.)	2012

Chemical Engineering Donors

2013 -2017

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