SCHOOL OF CHEMICAL AND BIOMOLECULAR ENGINEERING NAMED IN RECOGNITION OF PHILANTHROPIST ROBERT FREDERICK SMITH ’85
MESSAGE FROM THE DIRECTOR:

DEAR ALUMNI AND FRIENDS OF THE DEPARTMENT,

This summer, I had the good fortune to become the School’s new director in an Olin Hall that has been ringing with excellent news. As the cover story of this issue announces, the School has been an inspiration for and the central benefactor of a historic gift by our alumnae, Robert Smith ‘85. With this gift, we proudly take on a new name, the Robert Frederick Smith School of Chemical and Biomolecular Engineering, and a renewed mission in education and research. Propelled by Robert’s powerful vote of confidence in our track-record and our potential, we are charting a path forward that will support excellence across all our programs and will cultivate the diversity that strengthens both our institution and the industries in which our graduates serve as leaders.

In parallel, the heart of Olin Hall itself has undergone critical reimagining and renovation. As reported on page 10, based on your generous contributions, we have transformed our Unit Operations Laboratory—a center piece of the chemical engineering curriculum—into a flexible, modern space with new and rebuilt experiments. Additionally, the lab’s extended second floor will host a new class of experiments to support our rapidly developing curriculum in product design. This beautiful new space represents an important first step in our ambitious plans to modernize Olin Hall to serve as the school’s home base for another 75 years. There’s more Olin Hall news to come!

All the while, the Smith School’s students have been gaining and bearing our ever challenging program while engaging deeply within the campus and the world. In the profiles on pages 30-34, you’ll find a clarinetist, a captain of the field hockey team, and a leader in the American Indian Science and Engineering Society; they are headed to careers in finance, research, and process engineering. The diversity of these individuals and of their trajectories is the hallmark of Smith School’s graduates. Continued record enrollments (100 B.S. degrees in 2016) provide a satisfying indication of our success and the vitality of the field. Our faculty have been busy making news with their scholarship as well. For example, you will find on page 9, Tobias Hanrath and his lab have made fundamental contributions to a next generation approach to form electronic materials for computing, energy storage and energy capture. On the biomolecular front (page 4), Chris Alabi has applied his growing synthetic toolbox to invent new classes of molecules to guide drug delivery and form potent antibiotics. For his work on this theme, Chris received a CAREER Award, the highest honor the National Science Foundation can bestow upon a young faculty member. Behind the scenes, it is an exceptional group of graduate students that make these advances possible. This year, we named the second class of Fleming Scholars for work in biomolecular topics (page 23), and honored four senior Ph.D. students with the Austin Hooey Graduate Research Excellence Recognition Award (page 29).

One bit of breaking news that did not get into this issue is the arrival of Fengqi You as the inaugural Roxanne E. and Gordon L. Dibble ’50 Professor in and Gordon L. Dibble ’50 Professor in Energy Optimization and Systems Engineering. His arrival opens exciting new opportunities in both our teaching and research programs. In closing, I want to express my gratitude for the exceptional stewardship of the Smith School that Lynden Archer provided over the past six-plus years. As I consider the task that I have engaged, I am humbled by his record of achievements in supporting all aspects of our mission. Further, he has done it with grace and flare, while maintaining a world-class research program (see page 7 to catch a glimpse). Thank you, Lynden! I hope you enjoy the stories assembled here and that they will tempt you back to Olin Hall soon and frequently. Please be in touch when you visit Ithaca.

Abe Stroock, William C. Hooey Director and Gordon L. Dibble ’50 Professor

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Abe Stroock, William C. Hooey Director and Gordon L. Dibble ’50 Professor
Christopher Alabi

Christopher Alabi, Nancy and Peter Meinig Family Investigator in the Life Sciences and Assistant Professor, received a 2016 Faculty Early Career Development (CAREER) Award from the National Science Foundation (NSF). The CAREER Award is the most prestigious recognition given by the NSF to faculty members early in their academic careers. It is designed to support the development of junior faculty who possess exceptional promise and demonstrate a record of accomplishments that hold exceptional promise and demonstrate a record of accomplishments that hold exceptional promise and demonstrate a record of accomplishments that hold exceptional promise and demonstrate a record of accomplishments that hold exceptional promise and demonstrate a record of accomplishments that hold exceptional promise and demonstrate a record of accomplishments that hold exceptional promise and demonstrate a record of accomplishments that hold exceptional promise and demonstrate a record of accomplishments that hold exceptional promise and demonstrate a record of accomplishments that hold exceptional promise and demonstrate a record of accomplishments that hold exceptional promise and demonstrate a record of accomplishments that hold exceptional promise and demonstrate a record of accomplishments that hold exceptional promise and demonstrate a record of accomplishments. The CAREER Award is the most prestigious recognition given by the NSF to faculty members early in their academic careers. It is designed to support the development of junior faculty who possess exceptional promise and demonstrate creativity in research.

Chris Alabi’s NSF CAREER proposal titled “Precise Assembly and Evaluation of Sequence-Defined Macromolecular Superstructures” seeks to understand how molecular composition and sequence influence macromolecular assembly, chain dynamics and ultimately chemical and biological properties. His longer term goal is to leverage this understanding to engineer synthetic macromolecular superstructures that may be used as active biological ligands and scaffolds. An exciting component of the project will employ a powerful sequence-defined oligo-thioetheramide molecular platform pioneered by Alabi and his students to create synthetic antibacterials and RNA delivery agents.

Lynden Archer

Lynden Archer, the James A. Friend Family Distinguished Professor of Engineering, received several recognitions this year. Archer was named by Thompson Reuters as among the world’s most influential scientific minds for 2015 for his research contributions on hybrid materials for electrochemical energy storage. In 2016, DeLisa was invited to join the editorial board of Cell Chemical Biology, which publishes research and reviewed content of exceptional interest for the chemical biology community.

Matthew DeLisa

Matthew DeLisa, the William L. Lewis Professor of Engineering, was recognized with an inaugural Research Award for Research Excellence established in 2015 by the College of Engineering. The award recognized DeLisa’s outstanding contributions in the area of protein engineering. In 2016, DeLisa was invited to serve on the joint editorial board of the American Chemical Society (ACS) journals Macromolecules and ACS-Macro Letters. Finally, Archer was recognized by Cornell Merrill Presidential Scholar Michael Statt ’16 as the member of the faculty who had the greatest influence on his development as a student scholar. This summer, Archer completed his second term as Director of CBE.

Susan Daniel

Susan Daniel, Associate Professor, was recognized with an inaugural Research Award from the Schwartz Research Fund, established by Joan P. ’65 and Ronald H. Schwartz ’65 to honor outstanding women researchers working in the life sciences at Cornell. Daniel’s research focuses on understanding phenomena at biological interfaces and chemically patterned surfaces that interact with soft matter—liquids, polymers, and biological materials like cells, viruses, proteins and lipids. In particular, her group investigates virus-cell membrane fusion and the impact of cell-membrane properties on virus entry and the emergence of new human pathogens.

Matthew Paszek

Matthew Paszek, Assistant Professor, was recognized with the NIH New Innovator Award for his research on mechanobiology of the cellular glyocalyx. Paszek’s research as an NIH New Innovator will examine how spatial arrangements and physical properties of the sugary film that coats cell surfaces, the glyocalyx, regulates the transfer of molecular signals from outside to inside a cell. The project will also develop new technologies for imaging and describing the biophysical properties of the glyocalyx. The research will advance understanding of how cells detect, interpret and respond to chemical and mechanical signals. It also has implications for cancer, aging and diabetes.

Abraham Stroock

Abraham Stroock, Professor, was selected by vote of the Cornell University Board of Trustees as the Gordon L. Dibble ’50 Professor of Chemical and Biomolecular Engineering. This summer, he was elevated to the directorship of CBE. Stroock has been described as an innovator, thought leader, and one of the most creative chemical engineering researchers of his generation. He is also consistently rated by CBE students as one of the school’s most influential teachers and mentors.

Roseanna Zia

Roseanna Zia, the James C. and Rebecca Q. Morgan Sesquicentennial Faculty Fellow and Assistant Professor, was recognized by the College of Engineering with the Sonny Yau ’72 Excellence in Teaching Award for her outstanding contributions to teaching Chemical Engineering Fluid Mechanics. Zia also serves as faculty advisor to the ChemE Car project team, which in the fall of 2015 won the national AIChE Chem-E-Car Competition for an unprecedented fourth time.

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Understanding the Rules of Physiology to Engineer New Drug Carriers

Chris Alabi

One of the unspoken rules of higher education is that getting tenure is more important than just about anything else an assistant professor can do. This is why it is a bit surprising to hear Chris Alabi, Assistant Professor of Chemical and Biomolecular Engineering, say “I care much more about the health of my research program than I do about anything else an assistant professor can do.”

Alabi, who joined the Robert Frederick Smith School of Chemical and Biomolecular Engineering (CBE) faculty in 2013, has had to be excited about science since he got to Ithaca. His lab is making great strides in designing new ways to make synthetic, bio-active polymers.

“We are creating new polymers that can modulate and respond to biological cues,” says Alabi. “We want to use natural biopolymers as a guide, but then improve upon it by adding one modification at a time in a very controlled process. By creating these synthetic biopolymers from the bottom up in an iterative and controlled manner, we can precisely tune their size, composition and properties. This level of control is important, especially when these bio-active polymers are used as scaffolds to shuttle drugs exactly where they can do the most good. To do this, the targeted treatment must be able to sense, respond and adapt to the local environmental cues to reach the desired site of action. Alabi’s research aims to use the synthetic bio-active polymers (from his first line of research) and the knowledge gained in this second line of research to engineer in physicochemical properties that can improve the biological transport and overall efficiency of drug delivery systems. In this way, the development of specific drug delivery systems can be made less scattershot and more efficient and effective.

Ithaca is a long way from Alabi’s hometown near Lagos, Nigeria. His path from Nigeria to Upstate New York passed through England for his A Level schooling; through the New York City area for a B.S. in chemical engineering at Stevens Institute of Technology and a Ph.D. in chemistry at the California Institute of Technology in 2009; and then through one last stop in Cambridge, Mass., for a postdoctoral fellowship at the Massachusetts Institute of Technology (MIT).

At each step of the process Alabi has known his eventual goal. “I have loved chemistry from the get-go,” says Alabi, “but I have always known I had to be an engineer to do anything practical with it. My goal has always been to make stuff that people could use.”

Alabi joined the faculty at Cornell because it was the perfect marriage of chemistry and chemical engineering. “A lot of places I interviewed preached being collaborative, but Cornell truly is,” says Alabi. “I thought I could bring something unique to CBE. The department here is open enough that I could find collaborators from different fields and make some valuable contributions to some tough problems.”

One reason Alabi was so sharply focused on finding a collaborative place to be a professor was the experience he had during his post-doctoral fellowship at MIT. Alabi had a coveted spot in the lab of biochemical engineer Robert Langer. Langer has more than 1,000 patents and has started many companies. He has also been awarded the highest honor in engineering, the Charles Stark Draper Prize. Langer earned his B.S. in chemical engineering from Cornell in 1970.

“I learned the full importance of diversity in the Langer Lab,” says Alabi. “There are people in the Langer Lab from many different fields and having access to that range of knowledge makes all the work better.”

When Alabi came to interview at Cornell, the daughter of the director of CBE babysat for Alabi’s young son. “I knew right away this was the sort of place for me,” says Alabi. “The people in CBE are great both personally and professionally. The opportunities for collaboration here are endless.” In the end, what Alabi hopes to accomplish with his work at Cornell is to improve the drug discovery process. Understanding how drugs and drug carriers interact with cells or with proteins within the cell is essential knowledge for creating new therapeutic macromolecules step-by-step in the lab. “In the end, any process we come up with must be scalable for it to have any real impact,” says Alabi. “If our work pans out, we hope to provide the research community with quantitative tools and metrics to engineer efficient drug systems with improved therapeutic outcomes.”

As Alabi discusses the possibilities, his voice rises just a bit and he speaks just a little faster. It is obvious that what he said at the beginning of our conversation—that discovery is what he gets excited about—is true.

Breaking Rules to See Things More Clearly

Susan Daniel

One day as an undergrad at Lehigh I bumped into a professor’s office,” says Susan Daniel during a recent conversation in her office in Olin Hall. “I told him that I had some free time and wanted to get involved in research.” As luck would have it, the professor, Manoj Chaudhury, had just been struck by an idea he wanted to test out. He welcomed Daniel into his lab and set her to work documenting the movement of liquid drops on a surface with areas of unequal surface tension.

A general rule in academia is that there is an indeterminate period of time when you first enter a field and pay your dues. You do the grunt work in the lab, cleaning equipment, carefully weighing reagents, calibrating measuring devices, and coming in at 3 a.m. to collect time-sensitive data. It can be a few years before you get your name on a published paper.

“Susan Daniel broke this rule right away. It turned out that Chaudhury’s idea produced some interesting and surprising results. The results were so interesting that the Journal of Science published their paper in 2001, before Daniel had even earned her master’s degree in chemical engineering. Fifteen years and 30 publications later, Daniel is now an Associate Professor in the Robert Frederick Smith School of Chemical and Biomolecular Engineering (CBE). Her doctoral research focused on extending Professor Chaudhury’s initial idea in some productive directions. She specialized...

— Daniel

Daniel

Daniel had excelled in her high school chemistry class. She says of chemistry, “It’s the sort of thing you don’t know you’re good at until you do it.” She finished high school with an intent to get a B.S. in chemistry at Lehigh University. “I had no thoughts at all about grad school when I started at Lehigh,” says Daniel. “I had a good undergraduate advisor who directed me to engineering and that is what eventually led me to go and knock on Manoj Chaudhury’s door.”

At several points while telling her story, Daniel emphasized that she had good advisors and mentors all along the way. When asked what characterizes a good advisor, Daniel answers without hesitation: “A good advisor looks at your strengths and directs you to what is right for you—not to what would make you a mirror image of them.”

What has turned out to be right for Daniel is the study of interfaces. There are two main threads to her current research at Cornell. One is biological. She is primarily interested in understanding the roles of membrane lipids and protein-lipid interactions in biological function. Specifically, Daniel looks at exactly what is going on at the place where a virus interacts with a cell membrane. “I think of a virus as a biological machine that is good at introducing its genome into a cell,” says Daniel. “If we can learn how the virus does its job, then hijack the virus and use it to introduce what we want to introduce into the cell that could be very exciting for a lot of reasons.”

Daniel’s lab is one of the few in the world that examines single viruses as they bind to and transfer their genome across cell interfaces. Her group’s quantitative, engineering approach has already taught the virology community new things about virus entry that were difficult or impossible to measure without her team’s pioneering work. For example, her team has been able to measure the speed at which viral genomes are transferred out of a variety of viruses and virus-like particles, including influenza, coronavirus, and ebola.

A related aspect of Daniel’s biological work is her focus on the critical lipid-protein interactions that are necessary for healthy biological function. A cell membrane comprises many different proteins and biomolecules in a patchwork matrix of different lipid phases. Daniel and her team have invented an approach that allows them to control the spatial and temporal location of different lipid phases within a convenient platform. This set-up allows them to study the interactions between the various “species” of lipid. These interactions are thought to be responsible for regulating the overall function of the cell membrane.

The non-biological focus of Daniel’s work is rooted in her graduate work from long ago. She studies how liquid drops interact with chemically-patterned solid surfaces to understand how you can control drop shape and motion for various applications ranging from energy conservation and generation in outer space, to miniaturized droplet reactors for carrying out biological experiments. Daniel and her collaborator, Paul Steen, have assembled a team that will put an experiment on the International Space Station (ISS) to study drop interfaces in microgravity in the coming two years. Daniel says, “Managing liquid droplets on condensers in heat exchangers is a big problem in space when you can’t rely on gravity to remove them. So we plan to study how drops coalesce in space. Microgravity allows us to look at larger length scales than can be examined on Earth. What we learn up there should benefit not only energy management in space, but on Earth as well.”

It’s a dream come true for Daniel, who was inspired in her early graduate school days by the prospect of her research on drop motion impacting applications in outer space. One other interface Daniel has taken a deep and abiding interest in is the intersection of gender and academia. When she first arrived at Cornell Engineering in 2007, some female CBE graduate students were just forming a group to provide support for each other. Daniel became involved as a group advisor right away. The chemical and biomolecular engineering graduate women’s group, CBE Women, is now thriving and Daniel is still actively involved.

Daniel is also part of a group of female faculty known as Women in Science and Engineering (WISE) at Cornell. WISE provides a forum for discussing ideas and concerns specific to female faculty, advocates strongly for women with the upper administration, and unites women across Cornell Engineering. “As a young assistant professor, I benefited from the many positive interactions I had with this group and I believe WISE was a critical factor in my success at Cornell,” says Daniel. “Cultivating competent female faculty leadership will be a key factor in keeping Cornell a top-ranked college of engineering and at the forefront of positive societal change.”

It is clear by now, 17 years after knocking on a professor’s door and starting down the path to an engineering professorship, that Susan Daniel does not do anything halfway. She has been recognized nationally for the quality of her research and for her dedication to supporting and advocating for women in academia. She received an NSF CAREER Award in 2012 and the Denice Denton Emerging Leader Award from the Anita Borg Institute, also in 2012. When talking about her work today, it is clear that Daniel is still just as excited and motivated as she was 17 years ago. “Everything is subject to the same physical and chemical rules,” says Daniel, “but biology adds this extra layer of mystery. Ten years from now I want to be able to say that my work has shed light on some of the mystery. I want to provide fundamental insights into how the cell membrane behaves and how it accomplishes its many complex roles. It all comes down to what is going on at the interfaces.”
It makes doing this sort of fundamental research truly enjoyable.” — Lynden Archer

Tobias Hanrath

C ontrolling the assembly and attachment of semiconductor nanocrystals (also known as quantum dots) into highly-ordered and connected superlattices is a powerful approach with potential for epiphanetic, photovoltaic, thermoelectric and sensor technologies.

Recent research at Cornell, led by Tobias Hanrath, Associate Professor in the Robert Frederick Smith School of Chemical and Biomolecular Engineering, and graduate student Kevin Whitham, has combined experiment and theory to provide a direct link between their electrical characteristics and the detailed atomic structure of the assembly. Just as the single-crystal silicon wafer forever changed the nature of electronics 60 years ago, a group of Cornell researchers is hoping its work with quantum dot solids—crystals made out of crystals—can help usher in a new era in electronics.

The difference between these and previous crystalline structures is the atomic coherence of each 5-nanometer crystal (a nanometer is one-billionth of a meter). They’re not connected by a substance between each crystal—they’re connected directly to each other. The electric properties of these superstructures are potentially superior to existing semiconductor quantum dots, with anticipated applications in solar cells and other electronic devices.

“We know how to push it now, but if someone were to come up with some technology, some chemistry, to provide another leap forward, this would challenge other people to say, ‘How can we do this better?’” Hanrath said the discovery can be viewed as an analogy to previous advances with single crystal silicon wafers.

“It’s equivalent of saying, ‘Now we’ve demonstrated a pathway to make very high-fidelity quantum dot solids, and access to high-quality samples yields, with new understanding and eventually technological advances,’” he said. “There are interesting analogies to previous developments in the growth of single-crystal silicon wafers which led to better understanding of fundamental properties and ultimately enabled game-changing advances in microelectronics.”

This work made use of the Cornell Center for Materials Research, which is supported by the National Science Foundation (NSF) through its Materials Research Science and Engineering Center program. X-ray scattering was conducted at the Cornell High-Energy Synchrotron Source, which is supported by the NSF and the National Institutes of Health.

FOCUS ON LITHIUM-METAL BATTERIES. “Our contributions have been well received by researchers worldwide,” says Archer. Archer’s progress with lithium-metal batteries is due in large part to his growing mastery of a group of nanomaterials called NOHMs. NOHMs are nanoscale organic hybrid materials formed by grafting short organic polymer chains or ionic liquids onto inorganic nanostructures. Both the inorganic root nanostructures and the grafted materials are nanoscale hybrid materials whose structures are carefully controlled through the production processes that create them. Under favorable conditions, the size and the spatial distribution of constituent parts can be controlled to create new hybrid materials with properties not seen in the constituent parts or in poorly prepared mixtures.

The electrolytic material in Archer’s new battery technology is a NOHMs able to anchor a fraction of the negatively charged ions to slow-moving nanoparticles in an electrolyte, which prevents formation of anion-depleted regions between the electrodes and the instability that leads to dendrites. To better understand how these electrolytes prevent dendrites from nucleating, Archer collaborates with Cornell Engineering colleagues from outside of the Smith School of Chemical and Biomolecular Engineering. Professors Lena Kourkoutis and David Muller in the School of Applied and Engineering Physics use electron microscopy to help Archer see inside lithium metal batteries to understand the nucleating events that lead to dendrites.

This research has implications beyond electrolyte composition. Archer hopes that in time his work will lead to a complete understanding of the nanoscale organic hybrid materials (NOHMs) at the heart of his electrolyte designs. “I got into chemical engineering at the age of eighteen not because I wanted to make existing chemicals on even larger scales,” says Archer. “I wanted to change how we use chemistry and physics on small scales to engineer new materials designed for new functions. I was always curious: if I truly understand processes at their most basic level, how will that change things? Is it what I believe drives my passion for basic research.”

By looking backward and wondering “what would happen with lithium-metal batteries if we truly understood their failure modes?” Archer and his students are in the early stages of a revolution in electrochemical energy storage technologies.

“I THREW THE PROBLEM AT MY STUDENTS AND WE ALL WENT AT IT. I’VE BEEN FORTUNATE THROUGHOUT MY CAREER TO BE SURROUNDED BY SOME OF THE BRIGHTEST AND MOST DEDICATED STUDENTS AT CORNELL. IT MAKES DOING THIS SORT OF FUNDAMENTAL RESEARCH TRULY ENJOYABLE.”——LYNDEN ARCHER

horse lithium-ion batteries, that replaced the lithium metal in the battery with a graphitic carbon material that offered only one-tenth of the capacity of their lithium metal precursors. These turned out to be safer and longer lived.

Six years ago, Lynden Archer, the James A. Friend Distinguished Professor, discovered the idea of lithium-metal batteries. “I knew that the problem forty years ago was fundamental and of interfacial origins—metal dendrites would form and grow inside the batteries during the recharge and eventually overwhelm the cells,” says Archer. “I had the idea that maybe this dendrite problem could be solved by taking a fluid dynamics approach. I simply questioned the idea that maybe this dendrite problem forty years ago was fundamental and we all went at it,” says Archer. “I’ve been fortunate throughout my career to be surrounded by some of the brightest and most dedicated students at Cornell. It makes doing this sort of fundamental research truly enjoyable.”

Professor, decided to revisit the idea of lithium-metal batteries. “I knew that the chemistry of nuclear reactors was due in large part to his growing mastery of a group of nanomaterials called NOHMs. NOHMs are nanoscale organic hybrid materials formed by grafting short organic polymer chains or ionic liquids onto inorganic nanostructures. Both the inorganic root nanostructures and the grafted materials are nanoscale hybrid materials whose structures are carefully controlled through the production processes that create them. Under favorable conditions, the size and the spatial distribution of constituent parts can be controlled to create new hybrid materials with properties not seen in the constituent parts or in poorly prepared mixtures.

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“As far as level of perfection, in terms of making the building blocks and connecting them into those superstructures that is probably as far as you can push it,” Hanrath said, referring to the atomic-scale precision of the process.


Whitham, a doctoral candidate in the field of materials science and engineering, did most of the experimentation and is lead author of the work. Also contributing were: Jun Yang, postdoctoral researcher; Benjamin H. Savitzky, graduate student in the field of physics; Lena Kourkoutis, Assistant Professor and Morgan Sesquicentennial Faculty Fellow in applied and engineering physics; and Frank Wise, the Samuel B. Eckert Professor of Engineering.

This latest work has grown out of previous published research by the Hanrath group, including a 2013 paper published in Nanos Letters that reported a new approach to connecting quantum dots through controlled displacement of a connector molecule, called a ligand. That paper referred to “connecting the dots”—i.e., electronically coupling each quantum dot— as being one of the most persistent hurdles to overcome.

“That barrier seems to have been cleared with this new research. The strong coupling of the quantum dots leads to formation of energy bands that can be manipulated based on the crystals’ makeup, and could be the first step toward discovering and developing other novel materials with programmable electronic structure.”

Still, Whitham said, more work must be done to bring the group’s findings from the lab to technological fruition. The structure of the superlattice, while superior to ligand-connected quantum dot solids, still has multiple sources of disorder due to the fact that, in contrast to atoms in an ordinary solid, no two quantum dots are truly identical. This creates defects, which limits how far the electron wave function can spread.

“I see this paper as a challenge for other researchers to take this to another level,” Whitham said. “This is as far as we know how to push it now, but if someone were to come up with some technology, some chemistry, to provide another leap forward, this would challenge other people to say, ‘How can we do this better?’”
THE UO LAB PROJECT: A GIFT FROM TODAY’S ENGINEERS TO TOMORROW’S

The Unit Operations Laboratory, better known as the UO Lab, has been transformed into something ChemE alumni may not recognize after its $2 million renovation. Since the founding of the School in 1938, the UO Lab has been the place where seniors enrolled in the capstone Chemical Engineering laboratory course ChemE 4320, work in teams to conduct experiments, collect data, and learn how to write technical reports, applying the fundamentals taught in their sophomore- and junior-level courses. Historically, ChemE 4320 training focused on the traditional unit operations of petroleum processing, and the School of Chemical Engineering—as it was named at the time—was adding research capacity to meet the new challenges. The UO Laboratory space went from three stories tall to two, its footprint was reduced by a factor of two, and several of the experiments were reconfigured, most notably the famous distillation column.

Around the time I started my service as director six-and-a-half years ago, I had the opportunity to visit chemical engineering teaching laboratories at several of our peer institutions in the U.S. as well as internationally,” said Professor Lynden Archer, who just completed his term as the William C. Hooey Director of the School. “It struck me that there was a disconnect between the narrative I was telling about the important role the UO Lab course has played in educating generations of Cornell chemical engineers and the deteriorating quality of the infrastructure in which current and future generations of our students are receiving this education. The decision to invest in the UO Laboratory space was among the most obvious of my tenure as director.”

Nearly 30 years after the last major project, the UO Laboratory space has been renovated yet again, this time with an eye on both the present and the future. The smell of fresh paint still graces the lab. The main, lower level now sports a stainless steel countertop, a sink, and wooden cabinets. A ceiling now separates the two floors, with the exception of the spiral staircase and the distillation column. A new ventilation system serves upper and lower levels individually, and the distribution system that supplies the basement with domestic water, compressed air, and low-pressure steam now spans three walls instead of two.

“What we have in the basement now is a refurbished, more efficient, more flexible, and more reliable version of what we had before,” said Anton. “And we’ve made the experiments easier to operate, so the students can measure better data.”

This task was easier said than done. Anton began redesigning and rebuilding the existing UO experiments five years ago, one-by-one, in anticipation of the renovation project. The first step was to mobilize each of the experiments by unlatching them from the floor and rebuilding them on carts. Not only did this ease moving the experiments during the renovation, but “now if something breaks or fails, we can wheel the whole experiment out of the lab and into the shop across the hallway for repair and testing,” said Anton.

As he was rebuilding experiments on carts, including the pump curve, control valve, fluidized bed, heat exchanger, and process control experiments, he replaced many piece-parts, including...
THE UO LAB PROJECT

 gauges, rotameters, valves, pumps, and instruments to ensure every measuring and control element would operate in its optimum range. He also modified the overhead and bottom systems at the distillation experiment to solve some lingering controllability problems.

Anton says these upgrades were vital because student enrollment has increased. In 2016, the space had to accommodate approximately 100 seniors. Consequently, lab-time is precious, and opportunities lost to bad data are more costly. “Our undergraduates begin in ChemE 4320 with very little experience, and they only get one shot at all this tricky equipment. It must produce good data easily, and it must be robust to endure heavy use by unskilled hands. If you’re a Ph.D. student, and you’ve built a piece of equipment to get your thesis data, you run it every day, day after day. You figure out all the tricks by trial and error, and eventually you learn how to collect the best data your equipment can give you. But if you’re an undergraduate sharing equipment in a teaching laboratory like this, you’re on a tight schedule—a group before you and a group after you—and you have only one opportunity,” said Anton.

While rebuilding the experiments, Anton used a combination of new and old parts to put a sidelined experiment into rotation—a modular membrane separator that produces oxygen enriched air. The membrane separator worked, but not with the throughput that his calculations predicted, so Anton replaced the aged, ’90s-era polysulfone membrane modules with new modules of similar design. Students use the data they collect from this experiment to design an apparatus that supplies enriched air for people with breathing difficulties.

Perhaps the experiment that had been most challenging to operate is the one alumni would recognize first when they return to the UO Lab today: distillation. It was designed and built by ChemE faculty in the mid-’40s and used to measure heat loads, flow rates, and stage efficiencies for continuous distillation of mixtures of benzene and toluene, both of which are now known to be threateningly carcinogenic. In the ’60s, Professor Peter Harriott replaced the bubble cap trays with sieve trays he designed and transitioned to safer methanol-water mixtures. The column was disassembled again in 1986 and set aside during the renovation. In 1988, Ken Ackley (B.S. ChemE ’61, M.Eng. ’66), the first-ever Industrial Practitioner in the School, and a team of student helpers rebuilt the distillation apparatus again with new heat exchangers, pumps, and other ancillary equipment. Ackley reduced the tray count from fifteen to eight to fit the column into the reduced overhead space. Having fewer trays was actually a clever change as it reduced the purity of the overhead and bottom streams, which made it easier for undergraduate students to measure and understand the performance of the column. Anton painstakingly disassembled the columns against last year, reconstructed it with new gaskets and piping, shuffled rotameters and heat exchangers to balance capacities, and upgraded some hardware, including the feed system and instrumentation. In its newest incarnation, “the distillation experiment routinely generates excellent data that can be analyzed and understood with the classic McCabe-Thiele method we teach in our separations course,” Anton said.

The first students to use the basement of the newly renovated UO Lab were the 96 members of the Class of ’16—a full house indeed. The facility performed almost flawlessly for them, even as construction continued around them. The UO Lab now has a full second floor transforming a 200-square-foot cat walk and a previously adjoining room to approximately 1,000-square-feet of usable, multipurpose lab space with moveable work benches, sinks, exhaust ducts, a fume hood, a glove box, and a 3-D printer. This additional infrastructure will not only allow the lab to house new ChemE 4320 experiments, but has also increased the functionality of the UO Lab. It has created room for in-house prototyping facilities that support rising interest among students and faculty in Chemical Engineering Product Design.

Now that the renovation is nearly complete, Anton will be working with faculty to identify the best new experiments to introduce. “My vision for the upstairs lab is to add several bench-scale experiments that represent the future of chemical engineering,” he said.

The first addition will be installed later this summer. It is a bench-scale plug-flow reactor, donated by Corning Inc., including a syringe pump for feeding reactants and a visible-light spectrometer for detecting products. It was constructed and tested by Corning engineers in France before being shipped to Ithaca. The tests were done with a dye-bleaching reaction that exhibits simple second-order kinetics, but the equipment is flexible and can be used for any liquid-phase reaction that yields an optically detectable product, for example amylase-catalyzed hydrolysis of starch, which exhibits more exotic Michaelis-Menten kinetics.

While the goal is to give students a broad experience that lays the groundwork for a lifelong career, the upstairs lab will also engage new faculty in teaching ChemE 4320. “Because chemical engineering evolves, and our department aspires to lead the field, the new professors we hire sometimes don’t have chemical engineering backgrounds. They may be physicists, biophysicists, or materials scientists, for example. But when you engage them in teaching chemical engineering students, their own way of thinking evolves in a chemical engineering way,” said Anton. “And their way of thinking inspires chemical engineering, moving the whole field in new directions.”

A good example of this is the work Associate Professor Tobias Hanrath and Industrial Practitioner Dr. Alan Feitelberg, are doing integrating product design and development into the curriculum. To better prepare Cornell students for opportunities in this growing field, Hanrath launched a product design course in 2012. Since then, the product design education portfolio has grown to include a two-course sequence (ChemE 4630 and ChemE 4631) that provides instruction to seniors and M.Eng. students in the principles and practice of product design and development. These courses also support a new M.Eng. specialization in product design and a project-based product design course for Ph.D. students.

In ChemE 4630, the project-based product design course, student teams execute a stage-gate product development program. Students learn how to capture the voice of the customer, create a house of quality to establish target specifications, generate and select product concepts, and design experiments to guide prototype development and testing. Among myriad chemical products that have been
support student teams developing non-controlled-environment glove box to, for example, already houses a new learning experience,” said Hanrath. “Beyond food products, we saw converging more quickly and safely on new offers enough space to enable students to design experiences creates the need expansion in size and diversity of product development in the 14-week timeframe. In 2015 and 2016, food products stand out as a convenient example for accelerated product development that are rapidly becoming a powerful and versatile fabricating and prototyping tool for student teams studying product concepts ranging from scaffolds for tissue engineering and materials for energy to emerging printed electronics and many more.

“We are currently developing two 3-D-printing projects for the cohort of students who will enroll in ChemE 4630 next year. The first project focuses on developing 3-D-printable ‘inks’ with engineered formulations that meet customer attributes and engineering characteristics. The second project will integrate design, fabrication and testing of impellers that maximize mixing while minimizing shear. The latter in particular presents compelling opportunities to integrate product design projects with future experiments in the unit operations course for ChemE seniors,” said Hanrath. Looking ahead, the provision of a dedicated chemical product prototyping space enables important hands-on education opportunities to train our graduates for careers in product design and development.

The upper-level UO Lab space is also providing much needed fabrication facilities for Cornell’s ChemE Car student project team. This last year the team designed and built two cars that placed first and fourth at the AIChE 2016 Regional Competition. “The renovated UO Lab offers enough space to enable students to converge more quickly and safely on new ChemE Car prototypes, as it enables more experiments to be run simultaneously than before.” — Roseanna Zia

successfuly developed with this approach, food products stand out as a convenient example for accelerated product development in the 14-week timeframe of a regular semester. In 2015 and 2016, product design students collaborated with the Cornell’s Food Processing Development Laboratory to develop prototypes of their products. “Beyond food products, we saw many compelling opportunities to expand product development projects to include examples in growing areas such as energy- and bio-related products. The expansion in size and diversity of product design experiences creates the need for prototyping capabilities previously not available in Olin Hall. The upper level space in the renovated UO Lab provides the student teams with valuable prototyping space in Olin Hall, allowing us to offer a unique and comprehensive learning experience,” said Hanrath.

The renovated UO Lab space, for example, already houses a new controlled-environment glove box to support student teams developing non-flammable electrolytes for high-capacity next-generation lithium-ion batteries. The Lab also features 3-D printing capabilities that are rapidly becoming a powerful and versatile fabricating and prototyping tool for student teams studying product concepts ranging from scaffolds for tissue engineering and materials for energy to emerging printed electronics and many more.

YINGYING LU PH.D. ’14 NAMED TO FORBES 30 UNDER 30 ASIA

Yingying Lu Ph.D. ’14 has been named to Forbes’ inaugural 30 Under 30 Asia list, which features young innovators and entrepreneurs under 30 years of age who are transforming business, technology, industry and more. Lu made the list in the manufacturing and energy category. A recent graduate of the Archer Research Group, she is currently an Assistant Professor at Zhejiang University in China. Lu was honored during a ceremony at the Forbes Under 30 Summit Asia in Singapore this May.

THOMAS OBER ’08 LANDS JOB AT HAAS FORMULA 1

Thomas Ober ’08 was a Post-Doctoral Associate at Harvard University when the application of Gene Haas, Founder of Haas Automation and Co-Owner of the Stewart-Haas NASCAR racing team, was accepted into the Formula 1 Championship with his newly created Haas Formula 1 racing team.

A motorsports fan in high school and a member of the FSAE team at Cornell, Ober has always been interested in racing. In fact, during his time as a Ph.D. candidate, Ober had interned at Lotus Renault GP, another Formula 1 team in the United Kingdom, working in their aerodynamics department. So when he came across a job opening for a Computational Fluid Dynamics Engineer at Haas Formula 1 during his job search, it quickly rose to the top of his list.

He got the job.

As a Computational Fluid Dynamics Engineer on a racing team, Ober combines his physical knowledge with computer software and the flow field around the race car to improve downforce and reduce drag. The Reynolds numbers he’s working with now are much higher when he was studying viscous fluid flows at Harvard, but, he says, “The overarching fluid mechanics concepts I learned throughout my master’s and Ph.D. coursework relates very well to what I’m doing now; even though it’s not directly related to what I was doing with my Ph.D.”

In a lot of ways, says Ober, the startup atmosphere of the Haas Formula 1 racing team is very similar to working in a research group: It’s a small, passionate team working together closely to solve a particular set of problems. “In a research group, everyone is an expert in their own sub-area,” says Ober, “and you get the chance to learn from everyone else as a result. Because the Haas F1 team is a startup, I’m getting that same type of experience here. I work in a fairly small group of eight or 10 engineers. We are all working on our own small projects, but at the end of the day, we’re using the same types of tools and helping each other develop new solutions and learn more about the performance of our car.”

Designing a race car, he says, is at once both an innovative and iterative process, one that requires engineers to
incrementally improve their car each race to keep up with their competitors but also to outwit them in a groundbreaking way to speed ahead. “Right now, as we develop our first car,” says Ober, “we’ve really been looking at all areas of possibility because we’re designing from scratch. Historically, as a season moves forward, you start to see all the designs of the other teams, you notice the areas of the car that teams are focusing on and try to keep up.

“Oh the other hand,” he continues, “if you want to get ahead of the grid, you have to innovate. I think a lot of that is organic. You try a few things that you think are going to work and find it doesn’t do at all what you wanted—but you discover something new that might have an application for another part of the car. So you have a direction, but a lot of the big successes you have are kind of by accident. Quite a bit like research, in a way.”

Personally, Ober has no intentions of moving onto the next thing any time soon. “If you want to get ahead of the grid you have to innovate. I think a lot of that is organic. You try a few things that you think are going to work and find it doesn’t do at all what you wanted—but you discover something new that might have an application for another part of the car. So you have a direction, but a lot of the big successes you have are kind of by accident. Quite a bit like research, in a way.”

Originally published in MechE Connects

ROBERT LANGER ’70
AWARDED QUEEN ELIZABETH PRIZE

Robert Langer ’70 was awarded the 2015 Queen Elizabeth Prize for Engineering. The ground-breaking chemical engineer was given the prize for his revolutionary advances and leadership in engineering at the interface with chemistry and medicine. Langer was the first person to engineer polymers to control the delivery of large molecular weight drugs for the treatment of diseases such as cancer and mental illness. Over two billion lives have been improved worldwide by the technologies that Langer’s lab has created.

JOHN T. THOMPSON ’76
RECEIVES LIFETIME ACHIEVEMENT INSPIRE AWARD

John T. Thompson ’76, CEO/President, First Electric Supply, received a Lifetime Achievement Award in mentoring from Indianapolis-based nonprofit organization College Mentors for Kids at the 2016 Inspire Awards in February. The Inspire Awards recognize top mentors in the workplace and in the community. Thompson credits the mentors and advocates in his life who gave him educational guidance and helped him to apply to college for his success. Knowing the value of those mentors made him want to give back to his adopted city of Indianapolis.

Thompson shared, “The mentoring that I received from a child to an adult has been tremendously impactful on my life and that of my family so it is imperative that I mentor others. For several years, I’d visit a local tea shop from 10 a.m. to 2 p.m. and meet with any entrepreneur that walked in.”

KATIE BUTTON ’05
PURSUES PASSION FOR COOKING

The Katie Button ’05 story is a life lesson in following your passion. It goes like this: Cornell graduate in chemical and biomolecular engineering moves to Paris to earn a master’s degree in biomedical engineering. Then, as she’s gearing up for a neuroscience Ph.D. program, she has an epiphany.

“It was while reflecting back on my time in Paris that I realized that my true passion was in cooking,” says Button. She quit academia and never looked back. So long lab coat, hello chef’s coat. Button threw herself into the kitchen with the same intensity that characterized her academic scholarship. She worked in Spain at Ferran Adrià’s famed ElBulli, widely regarded as the best restaurant in the world at the time. “From the day I stepped foot in that restaurant, I made it clear that I was trying to prove myself so that I could come back the following year to work in the kitchen.” Button says and did just that, soaping up everything she could from ElBulli’s team. “The more precise and organized you are, the less mistakes are likely to happen—and the best restaurant in the world can’t afford mistakes,” she says.

“That level of organization is something I’m always striving for in my restaurants.” Button was raised in New Jersey, but her roots trail back to South Carolina, and she’s a southern girl at heart. When the opportunity to open her own place arose, she picked Asheville, N.C. “It’s a beautiful town in the Blue Ridge Mountains,” Button says. “There are great outdoor activities, but it also has a wonderful, vibrant downtown full of music, art, great beer and food.” It’s also home to fantastic farmers markets and world-class ingredients, which is what the food at Button’s restaurant Cúrate—a bright, energetic Spanish tapas bar that opened in 2011—is all about.

Her second and most recent concept, Nightbell Restaurant & Lounge, opens Oct. 1 is all about the “small plates” section of the menu, try the shaved asparagus salad with peas, carrots, radishes, pea shoots and petite braised veal cheeks, which are cooked sous vide for 48 hours and served with a red wine bone marrow sauce, a smoked Yukon Gold potato purée and a hint of white truffle butter. Button hopes diners save room for pastry chef Carmen Vaquera’s impeccable desserts, such as the warm molten-center peanut butter cake or the shaved chocolate and potatoe salted caramel sorbet.

Button’s current life is about as far removed as possible from the neuroscientist’s path she had been on for so long, but she wouldn’t have it any other way. “I come from a long line of wonderful female cooks,” she says. “My mother was the first one to take it on as a career, running her own catering business. It was with her that I found my love of food and cooking. It just took me a little while to figure out that I wouldn’t be happy doing anything else professionally.”

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IN MEMORIAM

James M. Davison.................. B.S. ChemE, 1943................. 12/30/2015 .... South Charleston, W.V.
Chester L. Knowles.................. B.S. ChemE, 1945................. 9/9/2015 ................. Cushing, M.E.
Bruce D. Davis.................. B.S. ChemE, 1950................. 2/22/2016 ................. Audubon, P.A.
Jerome M. Jenkins.................. B.S. ChemE, 1951................. 4/30/2016 ................. Copley, O.H.
Paul J. Wisniewski.................. B.S. ChemE, 1953................. 11/1/2015 ................. Mesa, A.R.
Stan Hutchison.................. B.S. ChemE, 1958................. 2/22/2016 ................. Chestertown, M.D.

SCHOOL OF CHEMICAL AND BIOMOLECULAR ENGINEERING NAMED IN RECOGNITION OF THE LEADERSHIP OF PHILANTHROPIST ROBERT FREDERICK SMITH ’85

Support for underrepresented African-American and women students at New York City and Ithaca campuses

In recognition of Smith’s support, the university has named the Robert Frederick Smith School of Chemical and Biomolecular Engineering at Cornell, as well as the Robert Frederick Smith Tech Scholars Program spanning Cornell Engineering and Cornell Tech. Established in 1938, the newly named Robert Frederick Smith School of Chemical and Biomolecular Engineering awards approximately one of every 100 bachelor’s degrees in chemical engineering granted in the United States each year. The school is known nationally for its rigorous undergraduate program of study and has earned a reputation for educating students who can thrive in any field. Now it bears the name of one of its most successful graduates, Robert F. Smith, whose private equity firm focuses on investments in enterprise software and technology-enabled businesses.

The Robert Frederick Smith School will receive an endowment from Smith’s commitment, an investment that will transform the school’s programs at all levels—expanding opportunities for faculty and student discovery and training the next generation of critical thinkers who will solve global problems. A significant portion of the endowment will be dedicated to scholarship and fellowship support for populations traditionally underrepresented in engineering and technology, particularly African-American and female students.

“We are thrilled to receive this gift. It comes at a time of unprecedented growth in student interest in chemical and biomolecular engineering and during a period when research in the school is defining the next frontiers of the field. It also speaks volumes about the impacts the school continues to have in educating students like Robert who go on to become leaders in diverse fields,” said Professor Lynden Archer, who was director of the school when the gift was announced in January.

The gift will also create a program fund for diversity initiatives in engineering and provide the resources to create the Robert Frederick Smith Tech Scholars Program. Through the latter, select high school seniors with financial need—again focusing on African-American
Smith’s gift, including the contribution from the foundation of which he is the founding director, is one of the largest ever from an African-American philanthropist to a higher education institution.

“I have had the privilege of being a Cornell graduate with a degree in engineering,” said Smith. “I credit much of my career success to being an engineer by training. Engineers solve problems and fix things. Along my career I have become increasingly concerned by the lack of diversity across the engineering and tech disciplines. My direct intention here is to work directly with Cornell Tech and Cornell Engineering, in New York City and in Ithaca, to create direct on-ramps for African-Americans and young women to enter tech so that they can help lead us into the fourth industrial revolution.”

Under Smith’s leadership, Vista Equity Partners has become one of the most successful investment firms in the world. Smith’s accomplishments have landed him at No. 268 on the most recent Forbes 400 list of the wealthiest Americans. He is the only African-American male on that list.

Smith is also well known for his philanthropy, receiving the SEO Reginald F. Lewis Achievement Award, the Humanitarian of the Year Award from the Robert F. Kennedy Center for Justice and Human Rights, among other accolades.


Degenfelder is currently Vice President for Global Product Management at Axalta Coating Systems’ Transportation Business. Axalta is a leading supplier of coatings for automobiles, commercial vehicles, and industrial applications. In 2013, Degenfelder was given a special assignment to separate the business from DuPont. He was based in Shanghai from 2008 through 2012 for three roles including Vice President for Asia Pacific. He joined the coatings business in 2002 as Director of New Business Development and Strategy and from 2004 to 2008 he was the North American Business Manager for Industrial Coatings.

From 2000 to 2002, Degenfelder was Director of Strategic Planning for Millenniums Chemicals. Before that, he spent a total of 12 years with Air Products and Chemicals where he had a variety of engineering, operations management, and marketing management positions.

Degenfelder earned a Bachelor of Science in chemical engineering from Cornell University in 1986 and an M.B.A. from Northwestern University Kellogg School in 1992.
DAVID T. ALLEN ’79 DELIVERS 2016 JULIAN C. SMITH LECTURE

David T. Allen ’79 delivered the Julian C. Smith Lectures on April 18 and 19, 2016. This marked the first lectures since Professor Smith’s passing in 2015.

Allen is the Melvin H. Gertz Regents Chair in Chemical Engineering at University of Texas at Austin. His first talk was entitled “Emissions from oil and gas operations in the United States and their air quality implications,” and discussed the energy supply infrastructure in the United States changing dramatically over the past decade. Increased production of oil and natural gas, particularly from shale resources using horizontal drilling and hydraulic fracturing, made the U.S. the world’s largest producer of oil in 2014.

Allen’s second talk, “High school engineering courses: content, structure and implications for university engineering curricula,” involved a broader audience while discussing high school engineering education’s rapid evolution. The talk also detailed “Engineering Your World,” a year-long curriculum developed at the University of Texas at Austin and currently completed by thousands of high school students annually.

REUNION 2016

On June 11, 2016, classes from years ending in six and one gathered on Cornell’s campus. In keeping with tradition, the Robert Frederick Smith School of Chemical and Biomolecular Engineering welcomed close to 100 alumni for breakfast. Ranging from 1946 to 2011, classmates shared reminiscences of beloved faculty and fun times with classmates, and learned what’s new in the school.

William C. Hooey Director, Abe Stroock, welcomed the group. Other faculty who were present to welcome honored returnees include Associate Professor T. Michael Duncan, Professor of Practice Al Center ’65, Professor Lynden Archer, and Assistant Professor Roseanna Zia. Emeritus Professor Claude Cohen, along with Professors Archer and Stroock, gave alumni a tour of the newly renovated Unit Operations (UO) Laboratory.

From left to right: Professor Lynden Archer and David T. Allen ’79.

From left to right: Abe Stroock, William C. Hooey Director addressing Reunion attendees.

Professor Lynden Archer leading a tour of the new UO Lab.

Abe Stroock, William C. Hooey Director, Abe Stroock, welcoming the group. Other faculty who were present to welcome honored returnees include Associate Professor T. Michael Duncan, Professor of Practice Al Center ’65, Professor Lynden Archer, and Assistant Professor Roseanna Zia. Emeritus Professor Claude Cohen, along with Professors Archer and Stroock, gave alumni a tour of the newly renovated Unit Operations (UO) Laboratory.


Philip Gisser ’46 signing the guestbook at Reunion 2016.

Bill Troxell ’66 and Pattie Troxell.
Swan receives 2015 William C. Hooey Outstanding Staff Award

Glenn Swan has received the 2015 William C. Hooey Outstanding Staff Award. The award was established in 2011 by the Smith School of Chemical and Biomolecular Engineering (CBE) to recognize a member of the staff who goes “above and beyond” their job responsibilities in helping the school and its faculty execute all aspects of CBE’s mission.

Swan has worked at Cornell since 1982 and in CBE for the last 17 years. He manages the Olin Hall Machine Shop and supports the school and university by overseeing the design, construction, and repair of complex research and teaching equipment and devices. He interacts with students, faculty, and staff with regards to all aspects of equipment design and fabrication, including materials science, processes, purchasing, and practical applications. He also provides education related to safe lab practices, particularly with regard to the handling of compressed gases and electrical devices.

Swan’s support to CBE and beyond has always and continues to be appreciated. His more recent efforts contributed in a notable way to the efficient operation of the school during a period of unprecedented growth in student enrollment and research activity.

One contribution in particular to note is his commitment to teaching students the basic tenet of equipment design—to clearly define what it is they want to build and how to formulate the design to make it easier to manufacture. He effectively and professionally supports a significant and diverse set of needs and we congratulate him, recognizing his diligent and dedicated efforts.

Tuttle hired as Graduate Student Services Coordinator

Johanna Tuttle was hired into the Graduate Student Services Coordinator position on Dec. 2, 2015. She came to the School after working seven years for the Schuyler County Department of Social Services as a Senior Caseworker in child protective services, prior to which she held positions in disability services and mental health. She is originally from North Carolina and has a bachelor’s degree in psychology with a concentration in social work from the University of North Carolina at Wilmington.

CONGRATULATIONS!
The Smith School of Chemical and Biomolecular Engineering thanks its student colleagues Sean Finnegan, Allison Gabay and Vivian Montes for their contributions to CBE and congratulates them on their May 2016 graduation.

Michelle Sorkin

Since joining the Alabi Research Group in the spring of 2014, Sorkin has continued her previous research experience by investigating the application of degradable polymer scaffolds in drug delivery. Proving that antibody drug conjugates (ADCs), a class of pharmaceuticals designed for targeted delivery of cytotoxic small molecule drugs, are powerful tools in the treatment of cancer. ADCs combine the potency of cytotoxic drugs with the antigen specificity of antibodies to limit cytotoxic effects in healthy tissue.

However, recent studies have demonstrated inherent drug hydrophobicity as the limiting factor for ADC circulation time. The Alabi Group proposes to use sequence-defined polymer synthesis techniques developed in the lab to design drug scaffolds to mask this hydrophobicity, in hopes that these scaffolds will increase the efficacy of ADCs by enabling them to achieve high drug loading while maintaining low plasma clearance.

Tyler Moeller

Moeller’s research focus is using carbohydrates as targets for new vaccines and immunotherapies. He says, “Diverse
Lakshmi Nathan

As an undergraduate, Nathan used her spare time to work closely with several different Engineers Without Borders chapters on projects including a water system in Costa Rica and a solar-powered fruit dryer in Rwanda. In graduate school, she wanted helping others to be the primary focus of her research instead of extracurricular activities. When Nathan joined the Daniel Lab, the largest Ebola outbreak in history was underway in West Africa. Investigating the entry mechanism of Ebola seemed like a natural way to apply the group’s research expertise to address a global health concern.

When a viral particle infects a cell, the virus has to merge its envelope with the membrane of a cellular compartment in order to release its genetic material and turn the cell into a virus-producing factory. For Ebola, the trigger for this fusion of virus and host membranes is not known and there are competing ideas about what properties of the envelope play a role in fusion. Even when it is possible to observe fusion within living cells, it is hard to control the environment the virus experiences, which makes it difficult to determine precisely what triggers fusion.

To overcome this difficulty, Nathan uses microfluidics coated with a cell membrane mimic to control the exposure of the virus to potential fusion triggers. Using special microscopy techniques she can watch individual viral particles fuse with the membrane mimic. This allows her to determine the requirements for fusion and investigate how host factors impact the rate of fusion. Knowing what conditions are the most important for fusion will help to rationally design antivirals that can prevent the virus from entering host cells. Nathan hopes her work will improve responses to outbreaks in the future.

Carolyn Shurer

Shurer’s thesis work in the Paszek Lab presents a fresh new biophysical perspective on how cancer cells acquire a highly motile phenotype in 3-D environments. While the dogma has been that adhesion receptors are impermeable to cancer cell invasion, she has found that fast motility in 3-D requires the breakage of adhesive bonds that anchor the cell in place. Cells overcome adhesive restraints by coating their surfaces with a slimy protein called mucin, which is covered in sugar molecules called glycans. By literally pumping out more slime, cancer cells break their adhesive bonds, enabling them to migrate with remarkably high velocity in 3-D environments. Shurer proposes that the sugary coating on cell surfaces—the glycocalyx—is a complex and dynamic biomaterial which transduces biophysical properties at the cell surface. This work will provide a blueprint for stopping cancer metastasis through therapeutic manipulation of glycosylation and normalization of cell surface polymer synthesis and biophysics.
We realized that it might take just one passionate person or event to open girls’ eyes to the possibilities of careers in science and engineering. From that conversation, the idea of WOMEN was first conceived, and I’m extremely proud that it is still inspiring young girls today.

Twenty-one high school students attended WOMEN that first year, along with their parents. In 2016, there were 34 students and 25 parents present. “Everything went smoothly and the girls really seemed to enjoy themselves,” says Yael Acevedo, Outreach Coordinator for CBE Women. “The parents left inspired and happy to have spent the day with their daughters. We find that the young women who attend are genuinely curious about their opportunities and this event gives them an opportunity to understand what a career in STEM would be, while avoiding all the associated stereotypes.”

This year’s event included lab activities focused on process engineering, materials engineering, and bioengineering as well as faculty research talks for parents to attend. There was also a parent-student lab, a student panel to answer questions, and an information session for parents.

Acevedo, who is a Ph.D. student in CBE, put in a lot of work to get ready for the WOMEN event. To make an event like this successful takes many people working together. “Preparing for a full day of laboratory and educational activities is time consuming, but our team of 35 volunteers is excited and personally motivated to get everything right. Starting in October, we spend time using feedback from the students and parents to improve on lab activities and talks,” said Acevedo after this year’s event. “I could not be more happy with how things went. This year, we ran a new biology lab and many girls named that as their favorite so we are excited to add that to our repertoire. In addition, several students stated they are seriously considering a career in science or engineering. If the students and parents leave feeling empowered to take on a STEM career, we have done our job.”

Susan Daniel, Associate Professor at the Smith School, has been involved in the WOMEN event since its inception. “Many young girls are still not sure what a technical career entails and some do not have any role models to show them, especially those from rural communities,” says Daniel. “And because many parents also don’t know what these careers involve, we felt it was important to involve them.”

While there is certainly a growing awareness of the value of diversity in the STEM fields, the reality in the classroom, the lab, and the tech companies has not yet caught up. Cornell Engineering has been recognized nationally for its efforts to enroll more women in its undergraduate and graduate engineering degree programs. In fact, this year’s freshman engineering class is half female.

Daniel continues, “The WOMEN event gives the girls a lot of confidence that they could be successful in engineering one day. For many, this is their first experience being on a college campus and it makes a strong impression that stays with them and makes them want to work hard in school so they can get here. Of course, parents are still the biggest influence on their kids, so including them is an important part of our program.”

One participant this year said she heard about the event from her chemistry teacher in the small town of Homeyoe—about two hours northwest of Ithaca. “I loved it,” she said. “I am very glad I came today. I got to learn about all the different kinds of engineering.” Another student said, “This was a great opportunity for me to see things I might not be exposed to at my school in Norwich. My trig teacher told me about it and it sounded like something I would like, so I came.

One of the parents in the audience for the question-and-answer session at the end of the day summed it up like this: “This was an excellent experience. My daughter and all the girls got exposure to engineering and to a great campus environment. It’s inspirational—once you see it, you want it.”

CBE Women conducts ongoing follow-up with past participants in the program. Of those responding to the follow-up survey, an impressive 73 percent report that the WOMEN event had an impact on their choice of college major. One anonymous respondent said, “It was at the WOMEN event that I learned about biomedical engineering, I didn’t even know it existed before that.”

Another past participant wrote, “The WOMEN event was a turning point for me. Prior to the event, I had no idea what I wanted to study in college. There seemed to be too many options and no way to decide. I had not even considered engineering until attending the WOMEN event and seeing that I could combine my interest in science with problem solving to solve real-world issues.” If further proof is needed of the effectiveness of the WOMEN event, at least four of the past participants are now enrolled at Cornell in STEM majors.

The members of CBE Women are pleased with how well the event went this year. They can relax and get back to their own research for a while. But, come October, they will start planning next year’s event.
Olivia Hall News

From left to right: Pacman Group - Team Green

nice.

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Cornell Weather Machine
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group was definitely something new
that pushed me out of my comfort zone,
but these experiences have been very

LEADERSHIP POSITIONS
held at cornell:
At Cornell, I co-managed the student organization Cornell Health Advocacy Topics, a group focused on helping local Ithaca residents become more involved in their healthcare. I was also a teaching assistant (TA) for ENGRD 2190: Mass and Energy Balances.

MAJOR ACCOMPLISHMENTS
as a leader:
Having the opportunity to develop relationships with both Ithaca residents and underclassmen made me feel like I was making a positive difference in the community. Being a leader of a large group was definitely something new that pushed me out of my comfort zone, but these experiences have been very rewarding. I think that teaching others is one of the most meaningful ways to make a difference. It has been very satisfying to help people reach their “Aha!” moment.

ADVICE FOR FUTURE STUDENT LEADERS:
Develop your relationships in a few organizations that you care about, but don’t spread yourself too thin. Being involved in student groups can be great with the right people, but can also be a burden if you’re overworked. Above all, find something that you are passionate about and your enthusiasm for it will be infectious. There really is something for everyone at Cornell.

POST-GRADUATION GOALS:
I will be returning to New Jersey after graduation to attend the New Jersey Medical School (NJMS). I have not yet decided what type of medicine I’d like to study, but I’m open to exploring the different strengths of the New Jersey medical community.

FAVORITE OLIN HALL/CHEME MEMORY:
I’m a bit nostalgic, so between the late night/early mornings watching the sunrise from Olin to the kickoff barbecues on the lawn, I don’t know if I can choose a favorite. In recent memory however, I had a lot of fun making costumes for senior design’s Fancy Dress Day. Parading around Olin Hall and Ho Plaza in ridiculously unwieldy Pacman costumes felt like the ultimate reward after weeks spent dressed in business formal.

Held at cornell:

Ithaca residents became more involved in local environmental policy. In particular, I hope the outputs of industrial process can be paired with the capacity of natural processes to suggest change to environmental policy. In particular, I hope to work with the Cornell Energy Policy and Programs Office within the Department of Energy.

FAVORITE OLIN HALL/CHEME MEMORY:
My favorite memory is rehearsing for the senior skit for the Holiday Party in the senior lounge. It was one of the few times in Olin Hall that work was off my mind and acting through a ridiculous script was all that mattered.

Michael Charles ’16

WHY CORNELL?
I decided to attend Cornell because I was impressed with the variety of students at the university. I was considering many technical schools, but realized that I valued the diversity of people and did not find the same wide range of interests elsewhere. I wanted to interact with people studying different majors, coming from different cultures, and sharing stories from different backgrounds.

LEADERSHIP POSITIONS HELD AT CORNELL:
At Cornell, my main leadership role focused on improving the representation of American Indian students and other indigenous cultures within the STEM fields. I held the position as President/Co-President of the American Indian Science and Engineering Society (AISES) for seven semesters and spent two years serving the national organization of AISES as one of seven regional representatives. I also served as the Fundraising Director on the founding executive board of College Mentors for Kids, the last Lecture Chair for Mortar Board National Senior Honor Society, recruitment and Social Chair for the social fraternity Beta Theta Pi, and Leadership Council for Diversity Programs in Engineering. I was also given the opportunity to walk-on to the varsity sprint football team.

MAJOR ACCOMPLISHMENTS AS A LEADER:
My major accomplishments as a leader were mostly found within AISES, as it was my main leadership focus on campus. As a regional representative, it was my responsibility to host a regional conference for all chapters within 12 states and five Canadian provinces. Within the College of Engineering, there are eight engineers (out of 3,150) who identify as American Indian or Alaska Native. I am currently the only American Indian chemical engineer enrolled according to the fall 2015 undergraduate enrollment summary.

However, with a team of about five students, the Cornell AISES chapter was able to bring together about 100 indigenous students and professionals for a weekend to discuss the idea of sustainability. Over my four years, I was also involved in planning 10 total conferences for AISES across six different states with the opportunity to speak in front of 1,600 people at national conferences.

ADVICE FOR FUTURE STUDENT LEADERS:
My advice would be to find something you truly care about, something that makes each day seem like a short opportunity to work with your passion. The worst thing you can do is force yourself into a leadership position for the wrong reason. This will not lead to success as a leader or create the happiness and pride that come with accomplishment. Your passion for a particular cause or organization is what will drive you to be a better leader.

GOALS POST-GRADUATION:
My goal is to earn my Ph.D. at The Ohio State starting in fall 2016. The research I intend to pursue in Ohio is computational modeling and simulation of natural processes as unit operations. My hope is that the outputs of industrial process can be paired with the capacity of natural processes to suggest change to environmental policy. In particular, I hope to work with the Indiana Energy Policy and Programs Office within the Department of Energy.

FAVORITE OLIN HALL/CHEME MEMORY:
My favorite memory is rehearsing for the senior skit for the Holiday Party in the senior lounge. It was one of the few times in Olin Hall that work was off my mind and acting through a ridiculous script was all that mattered.

Maxine Chan ’16

WHY CORNELL?
When applying to college, I wasn’t really sure what I wanted to study. My interests in high school leaned toward biology and chemistry, but were otherwise largely scattered. Cornell appealed to me because it’s a large university and I knew that I would have the opportunity to explore a variety of interests before settling into one major. Additionally, Cornell has an extensive (and very friendly) alumni network, and I felt reassured that I would always be able to reach out for help. The famous Cornell Weather Machine was in full effect the day of my visit, which also probably had a role in influencing my decision to attend. Though I soon found out that the weather isn’t always quite as nice.
Will Gregg ’16

**WHY CORNELL?**

Although I was interested in studying chemical engineering, I wanted to attend a school where I could continue to play bass clarinet in a wind ensemble/orchestral setting. After submitting an arts supplement to my application, I was contacted by the director of orchestras and informed that he had recommended me to the admissions committee. Between Cornell’s broad institutional strengths, the school’s research and teaching emphasis on sustainable energy (my primary academic school’s research and teaching emphasis on); and informed that he had recommended Cornell’s broad institutional strengths, the school’s research and teaching emphasis on sustainable energy (my primary academic school’s research and teaching emphasis on) to me, I thought that Cornell was a great choice.

**LEADERSHIP POSITIONS HELD AT CORNELL:**

I am currently the President of CU Winds (the wind ensembles of Cornell University) and am a member of the Student Advisory Board for the Hunter R. Rawlings III Cornell Presidential Research Scholars (RCPRS). Previously, I was Co-Chair of Engineering Peer Advising and a member of the Executive Board of Cornell’s chapter of the American Institute of Chemical Engineers (AIChE). Additionally, I have served as a teaching assistant (TA) for Introduction to Chemical Engineering as well as Chemical Kinetics and Reactor Design.

**MAJOR ACCOMPLISHMENTS AS A LEADER:**

As Co-Chair of Engineering Peer Advising, I interviewed, trained, and managed over 100 undergraduate volunteers as part of the ENGRG 1050 program. As President of CU Winds, I have spearheaded an alumni outreach initiative which resulted in productive dialogue about how alumni can be more engaged with the ensemble moving forward. As a member of the student advisory board for RCPRS, I have focused on improving social interaction and community within the program by organizing social events on and off campus as well as organizing a peer advising program for students newly admitted to the program.

**ADVICE FOR FUTURE STUDENT LEADERS:**

Taking on a leadership role is a great learning experience, but it is also an important responsibility. Make sure that your schedule is able to accommodate the additional time commitment/responsibilities that come with the role. In terms of locking down a position, whether that involves a written application and/or interview, make sure you can articulate why you care about the opportunity as well as specific ideas you have and skills you can bring to the table. I have interviewed many candidates for leadership positions over the past couple of years and I am always impressed when someone has obviously thought about these things in advance and presents them well.

**POST-GRADUATION GOALS:**

After graduation, I will be joining the Securities Division of Goldman Sachs as a Commodities Trading Strategist in New York City.

**FAVORITE OLIN HALL/CHEME MEMORY:**

Some of my favorite memories of ChemE have been the social events hosted by AIChE, such as the Drink of the Week (DOTW). As an underclassman, DOTWs provided a low-pressure and social environment to interact with upperclassmen and gain valuable advice for the road ahead. More recently, as a senior and a TA, these events have provided me with an opportunity to get to know my students more personally and pass on advice of my own.

McKenzie Hubert ’16

**WHY CORNELL?**

What first attracted me to Cornell was the stellar reputation in undergraduate engineering programs. When I visited during Cornell Days, I fell in love with the campus and surrounding area but what really sealed the deal for me was the diversity of campus organizations. Ranging from club sports to engineering project teams, the opportunity to study abroad, and the extensive network of Cornell alumni and affiliates.

**LEADERSHIP POSITIONS HELD AT CORNELL:**

As a sophomore, I became an Academic Excellence Workshop (AEW) Facilitator, in which I developed interactive lesson plans and created engaging exercises for a weekly two-hour class of about 20 students. My junior year, I became one of the Lead Facilitators of the AEW program who assists in training other AEW facilitators. I am also the President of the Cornell Club Softball Team, and I work as an Undergraduate Teaching Assistant (TA) in Fluid Mechanics, and Mass and Energy Balances.

**MAJOR ACCOMPLISHMENTS AS A LEADER:**

As an AEW Facilitator and Undergraduate TA, I’m able to help students grasp difficult concepts they’re struggling with. As the Club Softball President, my largest accomplishment has been fostering an inclusive team environment and building strong relationships with my teammates.

**ADVICE FOR FUTURE STUDENT LEADERS:**

I never necessarily felt ready to take on these roles, but I took the risk anyway. Pushing myself to take on leadership roles has significantly improved my self-confidence and teamwork skills. I learned how to feel comfortable in uncomfortable situations, which I think is one of the most useful skills I have developed at Cornell.

**GOALS POST-GRADUATION:**

This fall I will pursue my doctorate degree in chemical engineering at Stanford University. I plan to research surface reactions and catalysis with possible applications including biofuel development or carbon sequestration.

**FAVORITE OLIN HALL/CHEME MEMORY:**

My favorite memory is from the ChemE Holiday Party. I performed in the senior skit (which was Harry Potter themed) and played the role of Professor Zia. It was nice to spend an evening with my friends outside of the Scheele Undergrad Lounge and get to know the faculty outside of the classroom.
Marisa Siergiej ’16

WHY CORNELL?
When I was deciding which university to attend, I knew I wanted a strong balance of academics and athletics. The College of Engineering at Cornell University has a great reputation, and the varsity field hockey team was competitive within the Division 1.

LEADERSHIP POSITIONS HELD AT CORNELL:
My most memorable leadership positions at Cornell include being the Varsity Field Hockey Captain, a Community Outreach Chair for the Society of Women Engineers, and the Marketing Director, Cornell’s chapter for Athlete Ally.

MAJOR ACCOMPLISHMENTS AS A LEADER:
On the field hockey team, we have fostered a team culture of personal accountability and hard work to be the best player you can be for the team. We turned the program around from being one of the worst in the Ivy League to consistently finishing in the top three. We were ranked nationally in the top 20 for the first time in program history in 2014 (junior year). This past season in 2015 (senior year), we finished in the top 20 of the Ratings Percentage Index and strength of schedule for the first time in program history. We also set school records for wins, goals, and assists in a season as well as goals in a single game and penalty corners per contest within the last two years.

For the Society of Women Engineers, we have organized and volunteered at multiple events throughout the school year to teach children about science and engineering.

Athlete Ally (a nationwide, non-profit organization that fosters a message of tolerance, respect, and acceptance for the lesbian, gay, bisexual, and transgender (LGBT) community) has evolved into being a place for LGBTs and allies to find acceptance of all people across campus. Over the past two years during my time as Marketing Director, we have brought in speakers including Brendon Ayanbadejo (Baltimore Ravens Super Bowl Champion) and Megan Rapinoe (U.S. Women’s National Team soccer player, Olympic Gold medalist, FIFA World Cup Gold medalist) to educate the campus on LGBT issues.

ADVISE FOR FUTURE STUDENT LEADERS:
As a leader, you will gain responsibility that is integral for the success of the organization. However, it is important to also take the time to check in with others in your organization. Academics at Cornell can be tough, and it’s important that we look out for each other.

GOALS POST-GRADUATION:
I will be working for Procter and Gamble in Albany, Ga., as a Process Engineer in Papermaking.

FAVORITE OLIN HALL/CHEME MEMORY:
The CBE Holiday Party last winter was a great way to end the semester before winter break. It was nice to see our class there with our professors and staff while having some fun through the senior skit.

CORNELL’S CHEME CAR WINS FIRST PLACE AT NATIONAL COMPETITION

Competing in Salt Lake City, Utah, on Nov. 9 at the Annual American Institute of Chemical Engineers (AIChE) Conference against 34 student teams from around the world, Cornell’s ChemE Car took first place in the Chem-E-Car Competition. This makes the fourth time the team has been national champion since 2008. This year, they shared top honors with the team from McGill University of Montreal.

All 34 teams competing in Salt Lake City had earned the right to be there by doing well in regional competitions held earlier in the year. Cornell’s ChemE Car team did remarkably well at the Northeast Regional Competition in Boston in March. Split into two smaller teams, they finished in first place and third place, respectively, in the car competition and also won first for the technical poster competition. Their performance in Boston earned them their trip to Utah.

The ChemE Car competition is not a race. Rather, one hour before the competition, teams are given a specific target distance for their car to travel as well as a specific weight to be carried.

Teams then break out their computers and crunch the numbers to figure out the technical settings for their two allowed runs. On Cornell’s second run, their car came to a stop just 5.3 centimeters from the target.

Cornell’s ChemE Car team has 45 members, representing six different majors. The team leader is chemical engineering senior Dan Recalde (center, back row) and the team’s faculty advisor is Professor Roseanna Zia.
Recipients are chosen by Merck on the basis of scholarship, leadership, and character and receive $5,000 for two years and summer internships at Merck.

This award recognizes the student with the highest GPA after sophomore year. Left to right: Professor Duncan and Matthew Ferguson.

This award is given to exceptional students with career intentions in the oil and energy industry. Left to right: Professor Tester and Tyler McDevitt.

Mrs. Ye is recognized for her continued support to the director and to the faculty to improve the professional and social community of the school. Left to right: Professor Archer and Jean Ye.

The award “recognizes a student’s demonstrated record of ability, indication of leadership, and professional promise.” Left to right: Professor Hanrath and Eric McShane.

Merrill Scholars are selected from across the university for “leadership ability, community involvement, and potential for continued contributions to society.” Left to right: Professor Archer and Michael Statt.

The Mortar Board is a national honor society that recognizes college seniors for outstanding achievement in scholarship, leadership, and public service. Left to right: Michael Charles and Zachary Cesaro.

SSlime recognizes high scholarship, extracurricular contributions, unusual promise of substantial achievement, and a program that advances the engineering profession.” Left to right: Professor Hanrath and Eric McShane.

McKenzie Hubert is recognized for her contributions to Fluid Mechanics, Mass and Energy Balances, and Process Control Strategies. Left to right: Professor Zia and McKenzie Hubert.
CONGRATULATIONS TO THE CLASS OF 2016!

Michael Statt

Statt is recognized for his contributions to chemical engineering thermodynamics and chemical kinetics and reactor design. Left to right: Professor Hanrath and Michael Statt.

Michael Charles

Charles recognizes exemplary undergraduates who have shown leadership, character, and dedication to service. Left to right: Professor Clancy and Michael Charles.

Brian George and Marisa Siergiej

The Society recognizes demonstrated respectable strength of character on top of a dedication to leadership and service at Cornell University. Left to right: Brian George, Professor Tester and Marisa Siergiej.

Daniel Recalde

This award supports engineering students interested in energy issues. Left to right: Professor Center, Ge Qu and Daniel Recalde.

Ge Qu and Daniel Recalde

This award supports engineering students interested in energy issues. Left to right: Professor Zia and Daniel Recalde.

James Raiford

Raiford is recognized for his outstanding research in polymers and electronic materials. Left to right: Professor Zia and James Raiford.

OUTSTANDING UNDERGRADUATE TEACHING ASSISTANT AWARD

QUILL AND DAGGER SOCIETY INDUCTION

SPOHNX HEAD SOCIETY INDUCTION

P&G TECHNICAL EXCELLENCE AWARD

SHELL TECHNICAL SCHOLARSHIP AWARD

XEROX/RODRIGUEZ AWARD FOR RESEARCH IN POLYMERS OR SEMICONDUCTORS

SPHINX HEAD SOCIETY INDUCTION

Michael Statt

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OUTSTANDING UNDERGRADUATE TEACHING ASSISTANT AWARD

QUILL AND DAGGER SOCIETY INDUCTION

SPOHNX HEAD SOCIETY INDUCTION

P&G TECHNICAL EXCELLENCE AWARD

SHELL TECHNICAL SCHOLARSHIP AWARD

XEROX/RODRIGUEZ AWARD FOR RESEARCH IN POLYMERS OR SEMICONDUCTORS
MODERNIZING OLIN HALL INFRASTRUCTURE FOR RESEARCH AND EDUCATION

Creation of a Cornell Institute for Biological Design and Manufacturing

Chemical engineers at Cornell are using the principles of biological and engineering design to harness living organisms for manufacturing chemical products. The Institute for Biological Design and Manufacturing will capitalize on this trend to catalyze progress towards a new ‘biomanufacturing economy,’ in which engineers develop biological systems to manufacture new products—materials, therapeutic drugs and fuels—that address some of the world’s most pressing problems.

Gifts in support of the institute will allow the School to renovate and upgrade space in Olin Hall that will house the institute. Your gift will also provide annual support for research and education programs that embody the mission of the institute.

ENHANCE THE GRADUATE EXPERIENCE

Graduate Fellowships

Attracting talented graduate students to the school is a key goal in our pursuit of excellence in research. Your gift will allow the school to meet its goal of providing competitive graduate fellowships to every first-year graduate student enrolled in the chemical engineering program.

Teaching Immersion Fellowships for Doctoral Students

The goal of CBE’s teaching immersion fellowships is to facilitate the development of doctoral students committed to careers in academia. Gifts in support of these fellowships will be used to fund graduate students who serve as teaching assistants in multiple courses.

Graduate Student Research Symposium

In 2010 CBE launched an annual graduate student research symposium in which advanced graduate students present talks and junior students present research posters to an audience of their peers, faculty and guests from industry. This naming opportunity will provide endowed funds to be used to continuously support the graduate student research symposium.

Energy Economics and Engineering (EEE) Masters Fellowships

Our Energy Economics and Engineering Master of Engineering concentration continues to provide a unique mechanism for preparing students with physical sciences and engineering backgrounds for careers in public policy, engineering management and consulting. The high cost of matriculating in the program presents a barrier to many talented applicants. Gifts will be used to provide named, competitive fellowships for select students pursuing the EEE Master of Engineering concentration.

PRODUCT DESIGN FOR MANUFACTURING (PDM) Masters Fellowships

CBE now offers a Master of Engineering concentration in Chemical Product Design for Manufacturing. The program combines coursework in chemical engineering, principles and practice of product design and new business development with industrial internships to prepare chemical engineers able to innovate and lead the emerging field of product design for manufacturing. As with the EEE concentration, the high cost of matriculating in the Master of Engineering program presents an insurmountable barrier to many talented applicants. With the specific aim of increasing the quality of the student pool enrolled in the PDM Master of Engineering program, gifts will be used to provide named, competitive fellowships for select students pursuing the PDM concentration.

FOR MORE INFORMATION ON THESE OR ANY OTHER GIVING OPPORTUNITIES, CONTACT

June Losurdo, Director of Development
jml235@cornell.edu
607-254-1643

https://www.cheme.cornell.edu/alumni/giving.cfm