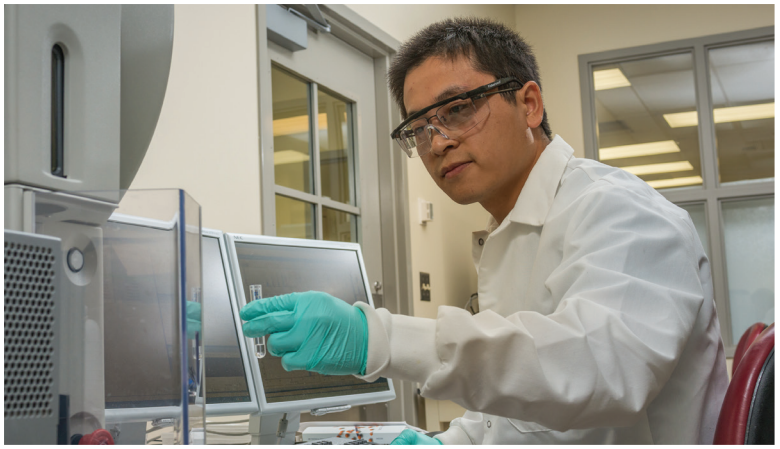
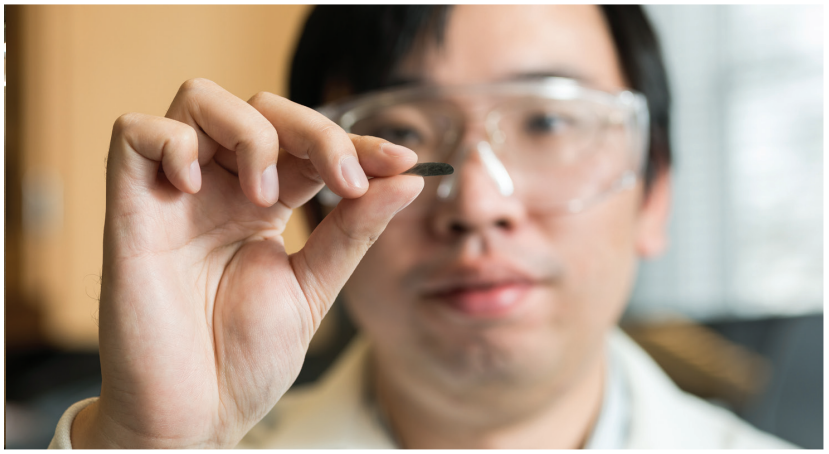
UNIVERSITY *of* DELAWARE

CHEMICAL AND BIOMOLECULAR ENGINEERING *NEWS*

2015

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UNIVERSITY OF DELAWARE | DEPARTMENT OF CHEMICAL & BIOMOLECULAR ENGINEERING

MESSAGE FROM THE CHAIR

DEAR FRIENDS AND COLLEAGUES,

In writing to a community of chemical engineers, I probably don't have to apologize for being a geek, so I can probably safely note that preparing this alumni newsletter each year reminds me of the frequency response methods in CHEG 401 (Chemical Process Dynamics and Control), a course that I've taught for the past few years. Our annual cycle is marked by the seasons, an academic year, a fiscal year and other cycles, and, although frequency response methods are based on a cyclic steady state, each year brings its own fluctuations, positive and negative. That so many of our alumni and friends are sufficiently engaged to care deeply about the department is exceptionally gratifying to us, and it's our pleasure (and sometimes our sad responsibility) to keep you up with the goings on in Colburn Lab and beyond.

The 2014–15 year started off on the highest of highs with our Centennial celebrations. Another landmark high was the election later in the year of **NORM WAGNER** to the National Academy of Engineering, joining four other current faculty and emeritus faculty in this distinction. Sadly, we also sustained two major losses among the faculty this year with the passing of **JON H. OLSON** in October and the sudden illness and death of **RICHARD P. WOOL** in March. In his more than half-century association with the department, Jon established himself as a scholar with an encyclopedic knowledge, and perhaps more importantly, as a mentor and adviser unfailingly dedicated to student welfare and success. Richard joined us about 20 years ago, and left his mark as a passionate champion of sustainability both in his research and popular elective courses.

Another fixture in the department, who left us by retirement at the end of the 2014–15 year, is **GEORGE WHITMYRE**. George spent more than 40 years with the department, for most of that period occupying, and indeed defining, the position of laboratory manager. His responsibilities included the undergraduate and research labs as well as Colburn Lab overall, but his most important legacy is the culture of lab safety that he was instrumental in developing about 35 years ago. Those of you in industrial labs are aware of the poor image that academic lab safety has in the chemical sciences overall, and those of you in academia are aware of recent efforts to improve it. Thanks largely to George, we were several decades ahead of the curve, although we certainly aren't complacent. We are fortunate to have Dr. **WEIHUA DENG** as our new laboratory manager and alumna **YAMAIRA GONZALEZ** D'05 as laboratory safety coordinator.

These losses and departures are reminders that, amongst the many mathematical models that we use in the department, one with a particularly high predictive capability is that of our faculty age distribution. This gives rise to celebrations—such as ours this year of **STAN SANDLER**'s 75th birthday—as well as challenges. About a third of our faculty is likely to turn over in the next decade or so, which will necessitate a focus on hiring new and retaining existing faculty to maintain the high quality of our programs and our associated stature in the chemical engineering profession. Two gifts reported on pages 4 and 5—chairs endowed by **ALLAN FERGUSON**, '65 and **MYRA FERGUSON**, AS'65 and by **BILL SEVERNS**, D'50—will aid this effort. Their exceptional generosity, and that of others, brings total gifts to the Centennial Campaign well over $10 million. In various alumni events, large and small, I've remarked on how proudly we celebrate the accomplishments of all our alumni and revel in their ongoing engagement with us. That such engagement is often complemented by great generosity is especially gratifying.

The recruitment of new faculty is indeed moving forward, and in the 2015–16 academic year we welcome **JOSH ENSZER** as our first assistant professor of instruction. Josh's responsibilities lie within our undergraduate program, including roles inside and outside the classroom. While we have for many years prided ourselves on the commitment of all of our faculty to excellence in the undergraduate program, hiss expertise in pedagogical methods will certainly enhance the undergraduate experience.

Buttressing our undergraduate teaching is critical in view of the continued popularity of the chemical engineering major: our 2014–15 freshman class numbered about 150 and we graduated about 90 seniors. We would like to see these numbers reduced somewhat to ensure the continued high quality of the education we provide. Of course, larger graduating classes require larger numbers of jobs, and although most of our students manage to navigate this challenge successfully, we would be grateful if those of you who hire chemical engineers in your own organizations would make such positions known to us, either through the department or the UD Career Services Center.

If you've managed to read beyond my sad frequency response metaphor, you may have noticed that I've used most of my space discussing fluctuations rather than the cyclic steady state. It would be misleading to overlook the latter: the students recruited, classes and labs taught, design projects completed, papers published, dissertations defended, proposals written and funded (or not funded). We continue to seek, and attain, the Delaware tradition of excellence to which we have all become accustomed. That excellence is especially well represented in the accomplishments of our alumni, and we continue to ask you to keep us informed, especially by visiting us in person. We plan to bring more "round-number" reunion classes back to Newark during the campus-wide Alumni Weekend held in early June each year. I would especially ask that you contact me if you are willing to help entrain your classmates in such an effort.

We are grateful for your continued interest in the department and your support of its activities.

Best wishes,

Abraham Lenhoff
Allan P. Colburn Professor and Chair

2015
Chemical and Biomolecular Engineering *News*

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UNIVERSITY OF DELAWARE

CHEMICAL AND BIOMOLECULAR ENGINEERING

NEWS

2015

SECTIONS

100 Centennial Campaign

Multi-Million Dollar Gifts Create Endowed Chairs

Chemical engineering alumni commit a total of $7.5 million to establish

Double Dels Allan Ferguson, EG'65, and Myra Ferguson, AS'66, committed $3.5 million to establish the Allan and Myra Ferguson Distinguished Chair of Chemical and Biomolecular Engineering.

Allan Ferguson was in the first engineering class taught by the late Jon Olson at the University of Delaware.

"He was absolutely brilliant, and here we were, these young, malleable minds, ready to learn the really complex things he would teach us," the 1965 chemical engineering graduate recalls. "And then he gave the first exam."

Ferguson flunked, but he wasn't the only one.

And yet having his students fail that exam might have been one of the best things to happen to Olson. As legend has it, he went home and told his wife, "They didn't get it," to which she responded, "Maybe you ought to talk in an everyday kind of way."

After hearing Olson's story, Ferguson held on to the message: keep it simple.

"I've been good at figuring out ways to simplify—to make things cheaper, better, faster; to analyze problems; to not accept the norm," he says.

Like the time he looked at separators in the food industry to find more efficient processes for a biotech company that was using a device similar to an ordinary kitchen blender. They needed one that would mix things up, but not too fast, in order to preserve the integrity of the fragile, human cells.

Or when he managed process engineering for the Domestic Operating Company within Johnson & Johnson during the energy crisis of the 1970s and reduced energy costs by 80 percent by simply turning off a valve.

"My professors taught me how to analyze and assess problems, to look at them more broadly," Ferguson says.

In honor of such mentorship, the Fergusons recently committed $3.5 million to establish the Allan and Myra Ferguson Distinguished Chair of Chemical and Biomolecular Engineering.

"I love the smile on his face when he talks about what he learned from his professors and classmates," says Myra Ferguson, a 1966 graduate of UD's College of Arts and Sciences. "We want to support professors who are gifted with the art of teaching, who want to share their knowledge, who have that desire to nurture young minds à la Gerster and Olson and Pigford."

The future of the Department of Chemical and Biomolecular Engineering is the ultimate goal for Ferguson.

"The strength of our faculty is absolutely necessary for the quality of the program to continue," he says. "Chemical engineering is a star at UD, and we want to keep it that way." ■

Centennial Campaign Update

The Centennial Campaign was launched in 2014 as part of the events marking the completion of the first 100 years of chemical engineering at Delaware. Many of our alumni and friends—this year's list begins on page 44—are generous donors in support of our programs in the Department of Chemical and Biomolecular Engineering or other programs at UD, and the Centennial Campaign serves as the focus for gifts to any purposes within the Department.

With the two landmark gifts announced on these pages, the Centennial Campaign has exceeded $10 million in a period of little more than a year. These include several new scholarships, and major lead gifts from **KAREN A. FLETCHER** '81 M'82 and **RICHARD E. EMMERT** M'52 D'54 allowed the establishment of the Thomas H. Chilton Fund that is intended to support the Thomas H. Chilton Professorship of Practice.

Distinguished Chairs in Chemical and Biomolecular Engineering

William "Bill" Severns learned from the giants of chemical engineering.

As a University of Delaware doctoral student researching vapor-liquid equilibrium in the late 1940s, he studied under Allan Colburn, Robert Pigford, Jack Gerster, and other "outstanding engineers, brilliant minds."

Many of these professors helped build UD's venerated Department of Chemical Engineering. During his tenure, Colburn brought in additional faculty to serve as adjunct and visiting professors, allowing individuals widely regarded as leaders in more specialized fields to teach specific courses at the graduate level.

"Right here in Delaware, I was exposed to top faculty from all over," Severns says. "I admired that."

To continue this tradition of faculty excellence, he and his wife, Jacqueline, recently committed $4 million to establish the William Severns Jr. Distinguished Chair of Chemical and Biomolecular Engineering.

An endowed chair is the highest academic award a university can bestow on a faculty member, and the Severns' gift will provide research support for a faculty member in the department.

Severns received his PhD from the University in 1950 and spent many years in industry, beginning in the pigments department of DuPont, where he worked on titanium dioxide white pigments, before moving on to the manufacturing of titanium metal, a strong, lightweight element that has been referred to as "the luxury metal of the future." When his division was sold to Ciba-Geigy, Severns moved as well, including spending extensive time in Europe.

Bill and Jacquie Severns are inspirational in their belief in higher education and what it can accomplish in society. They have been long-time benefactors to the University, creating and sustaining the William H. and Jacqueline Severns Scholarship, which, since 1992, has supported more than 150 UD students enrolled through the Division of Professional and Continuing Studies.

They also made a gift in memory of Severns' son, UD alumnus Matthew Severns, to support construction of the Patrick T. Harker Interdisciplinary Science and Engineering Laboratory.

Severns credits Colburn and Pigford with his considerable professional success, and he says the recent gift supporting the distinguished chair position is his way of honoring their legacy and nurturing the same kind of talent and ambition that the legendary professors embodied. ■

William "Bill" Severns '50, pictured with his wife, Jacqueline, committed $4 million to establish the William H. Severns Jr. Faculty Support Fund and Distinguished Chair in Chemical and Biomolecular Engineering.

Wagner elected to National Academy of Engineering, named AAAS fellow

NORMAN J. WAGNER, the Robert L. Pigford Chaired Professor of Chemical and Biomolecular Engineering—who is noted for his groundbreaking research in fluid mechanics and molecular thermodynamics—has been elected to the prestigious National Academy of Engineering.

Wagner joins four other department members and emeritus faculty as members of the NAE: **MARK BARTEAU**, professor emeritus and former chair of the Department of Chemical and Biomolecular Engineering (honored in 2006); **BABATUNDE A. OGUNNAIKE**, dean of the College of Engineering, William L. Friend Chair of Chemical Engineering and a professor in the Center for Systems Biology at the Delaware Biotechnology Institute (2012); **T.W. FRASER RUSSELL**, Allan P. Colburn Professor Emeritus of Chemical Engineering (1990); and **STANLEY SANDLER**, H.B. du Pont Chair of Chemical Engineering (1996).

"We welcome Norm Wagner's election to the National Academy of Engineering, a well-deserved honor that recognizes an outstanding career that has encompassed research, innovation, entrepreneurship and education," said Ogunnaike.

ABRAHAM M. LENHOFF, chair of the department, hailed Wagner for compiling a "record of accomplishment that is appreciable in almost every conceivable category of professional activity: experimental, theoretical and computational research; scholarship, education and mentoring; invention and entrepreneurship; and academic and professional leadership."

Wagner was also recently elected a Fellow of the American Association for the Advancement of Science for distinguished contributions to the field of soft matter and engineering, particularly the fundamentals of colloid and particle science and rheology, and for academic leadership.

Wagner chaired the department from 2007–12, and currently directs the University of Delaware's Center for Neutron Science (CNS).

He leads an active research that studies the rheology of complex fluids, neutron scattering, colloid and polymer science, applied statistical mechanics, nanotechnology and particle technology.

Wagner's research areas include the effects of applied flow on the microstructure and material properties of colloidal suspensions, polymers, self-assembled surfactant solutions, and complex fluids in general. ■

OGUNNAIKE HONORED BY AICHE AND NAI FOR PROMOTING DIVERSITY AND INNOVATION

Dean of Engineering and William L. Friend Chair of Chemical Engineering **BABATUNDE A. OGUNNAIKE** was honored this year by both the American Institute of Chemical Engineers (AIChE) and the National Academy of Inventors (NAI). The two national honors—the 2014 MAC Eminent Chemical Engineers Award from AIChE and induction as a Fellow of the NAI—recognize his leadership and example in fostering a diverse talent pool of engineers and for advancing innovation and entrepreneurship among engineering students and faculty.

"Good teachers teach well, great teachers inspire," said Ogunnaike, the son of an educator who understands the power of sharing his knowledge of others. "I want to inspire students to be catalysts for change."

Today he remains a catalyst for change, supporting entrepreneurship as a natural extension of engineering education and encouraging students to develop a global mindset.

Ogunnaike leads research in control and systems theory and in systems biology, considering the development of effective control techniques with application to complex industrial processes and also working to understand biological control systems.

One of his recent inventions is technology for a next generation "regulatory controller" developed with his graduate student, Kapil Mukati, for which they were granted a patent in 2007.

"Inspiration comes in many forms, and diversity—of thought, discipline, gender, culture—are all important to addressing 21st century challenges," says Ogunnaike. ■

RAUL LOBO NAMED CLAIRE D. LECLAIRE PROFESSOR OF CHEMICAL & BIOMOLECULAR ENGINEERING

RAUL LOBO, professor and director of the University of Delaware's Center for Catalytic Science and Technology (CCST), was appointed the Claire D. LeClaire Professor of Chemical and Biomolecular Engineering.

Since joining the chemical and biomolecular engineering faculty in 1995, Lobo has been instrumental in the research of zeolites and other nanoporous materials.

Zeolites, porous synthetic minerals with a precise crystalline structure, can perform separation of molecules with size differences of merely a fraction of an angstrom, making them useful as molecular sieves for separation and catalytic processes in the chemical and petroleum industries.

Lobo's research centers on expanding the catalytic properties of zeolites by creating new reaction sites, understanding their synthesis and developing applications of these materials to help solve societal problems such as sustainable energy conversion and pollution abatement.

As director of CCST, he helps to coordinate and disseminate the research efforts of more than a dozen faculty members, with studies ranging from catalyst discovery, to characterization and modeling of catalysts for industrial applications, all of which provides a rich training ground for students at the graduate and undergraduate levels.

This named professorship was made possible by the endowment of the late Mr. Claire D. LeClaire, formerly of Dover, in support of chemical engineering efforts at the University. ■

Faculty Highlights

ROBERTS PROMOTED, LEADS NEW BIOTECHNOLOGY INITIATIVES

CHRISTOPHER ROBERTS, whose research focuses on the quantitative prediction, design and control of protein degradation in solution, and of degradation of pharmaceutical and bio-pharmaceutical molecules in amorphous solids (glasses), has been promoted to professor. The research in his group has long been distinctive for being steeped in the fundamentals but being of great interest to colleagues in the pharmaceutical and biotechnology industries. This characteristic is shared by the research of a significant fraction of the faculty in the department with research interests in bioengineering, which has grown enormously over the past decade with new faculty hires at both senior and junior levels.

The department's newfound great strength in this area led to the emergence in the past year of multiple new structures, under Roberts's leadership, that reflect the collaborative research and shared resources and facilities to cement the leadership of UD, especially the Department of Chemical and Biomolecular Engineering, in this critical area for research and societal impact. The Center for Biomanufacturing Science & Technology (CBST) brings together faculty that tackle a wide array of problems and fundamental challenges in areas including: cell culture processes and bioreactors; high-end and scalable purification processes; product formulation and stability; drug delivery; manufacturing; and analytical technologies, instrumentation, and algorithms to support all of these areas. The Center supports cutting-edge research facilities on campus, educational activities including seminars, workshops, and short courses, as well as

industrial research consortia. Participating faculty from the department are: **MACIEK ANTONIEWICZ**, associate professor; **WILFRED CHEN**, Gore Professor; **DAVID COLBY**, assistant professor; **PRASAD DHURJATI**, professor; **ERIC FURST**, professor; **APRIL KLOXIN**, assistant professor; **CHRISTOPHER KLOXIN**, assistant professor; **KELVIN LEE**, Gore Professor and director, Delaware Biotechnology Institute; **ABRAHAM LENHOFF**, Allan P. Colburn Professor; **TUNDE OGUNNAIKE**, William L. Friend Chair; **TERRY PAPOUTSAKIS**, Eugene DuPont chair; **MILLIE SULLIVAN**, associate professor; **NORMAN WAGNER**, Robert L. Pigford Chair.

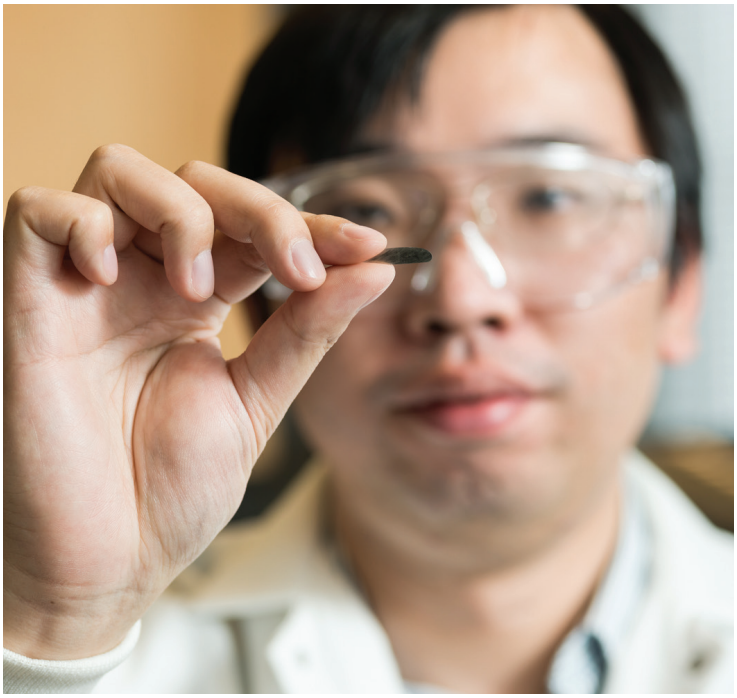
Roberts also directs the Biomolecular Interaction Technologies Center (BITC), which has been operated at the University of New Hampshire for some years but is moving to a new home at UD. The center is an academic-industrial consortium that provides advanced research capabilities as well as being a forum for technology transfer and support of innovative research in the area. ■

PRASAD DHURJATI, professor of chemical and biomolecular engineering, is now president-elect of the University of Delaware Faculty Senate for the 2015–16 academic year. Dhurjati's expertise is in biotechnology and artificial intelligence, with research in the area of systems biology, systems medicine and modeling of engineering systems. He also applies mathematical models and knowledge-based approaches to convert biological and medical data to useful knowledge. ■

THOMAS H. EPPS III, Thomas & Kipp Gutshall Professor of Chemical Engineering, associate professor, joint professor, Materials Science & Engineering and DuPont Young Professor, was selected to attend the 2014 US-Japan Frontiers of Science Symposium in Tokyo, Japan. The symposium was cosponsored by the National Academy of Sciences at the Japan Society for the Promotion of Sciences. ■

ERIC FURST, professor and director, Center for Molecular & Engineering Thermodynamics (CMET), was awarded the 2014 NASA Exceptional Scientific Achievement Medal. ■

E. TERRY PAPOUTSAKIS, the Eugene du Pont Chair of Chemical Engineering, was elected a fellow of the American Institute of Chemical Engineers (AIChE). His research focuses on areas of systems biology, metabolic engineering, experimental and computational genomics with applications in stem-cell biology and prokaryotic biology for the production of biofuels and chemicals from biomass. ■



Jiao selected Outstanding Junior Faculty Member

FENG JIAO, assistant professor of chemical and biomolecular engineering, was selected as the College of Engineering's Outstanding Junior Faculty Member for 2015. Jiao's research interests focus on design and synthesis of nanostructured materials for solving critical issues in producing solar fuels through artificial photosynthetic systems and developing next generation Li-ion batteries. ■

Welcome Joshua Enszer

We are delighted to welcome **JOSHUA ENSZER**, who has joined the department as assistant professor of instruction, with responsibilities that cover teaching and academic innovation in the undergraduate program. His goal is to bring knowledge from the scholarship of teaching and learning to improve opportunities in the department's undergraduate courses. He hopes to apply some of his earlier work in the areas of game-based learning and metacognition to his new position at UD. Before starting at UD, Josh was a lecturer in chemical engineering at the University of Maryland Baltimore County. Prior to that, he was interim program coordinator for first-year engineering at the University of Notre Dame. Josh holds undergraduate degrees in chemical engineering and mathematics from Michigan Technological University and graduate degrees in chemical engineering from Notre Dame. ■

FORMER FACULTY HIGHLIGHTS

Doyle named SEAS dean

FRANCIS J. DOYLE III, professor of chemical engineering at UD from 1997 to 2002, is the new dean of the Harvard School of Engineering and Applied Sciences (SEAS) effective Aug. 1. Most recently, Doyle was a distinguished scholar in chemical engineering at the University of California, Santa Barbara (UCSB), serving as associate dean for research at UCSB's College of Engineering, where he instigated a major push into bioengineering. As founding associate director in 2003 and more recently director of the multicampus Institute for Collaborative Biotechnologies, Doyle brought together the research and educational efforts of 55 faculty spanning 15 departments and the campuses of UCSB, Caltech, and the Massachusetts Institute of Technology. ■

Lehigh bestows honorary degree on Denson

COSTEL 'COS' DENSON, former UD professor of chemical engineering, interim dean of engineering and vice provost for research, received an honorary Doctor of Science from Lehigh University as one of the most respected minds in the world in the field of fluid mechanics.

Denson is currently managing member of Costech Technologies, LLC, a company that advises on environmental issues. He has served on numerous advisory boards, more recently including the U.S. Department of Defense: Scientific Advisory Board, the U.S. Environmental Protection Agency: Science Advisory Board, and the National Research Council: Board on Environmental Studies and Toxicity. ■

Antoniewicz receives journal's prestigious Daniel I.C. Wang Award

MACIEK R. ANTONIEWICZ, DuPont Young Professor in the Department of Chemical and Biomolecular Engineering, received the 2015 Daniel I.C. Wang Award for his contribution of experimental, computational and analytic techniques that elucidate cell function.

Antoniewicz received the award last spring from the journal *Biotechnology and Bioengineering* at the 2015 American Chemical Society National Meeting in Denver, where he delivered the Daniel I.C. Wang Award lecture titled "Toward a Holistic Understanding of Cellular Metabolism."

He studies metabolism in microbial and mammalian cells, working on problems relevant to the biofuel industry and to health care. "The key expertise we offer is that we're able to look at what's happening inside the cells," said Antoniewicz.

"We're developing techniques that allow us to visualize, using isotope tracer techniques, how cells take up nutrients and convert them into useful products," a field known as metabolic flux analysis, he said. "Essentially what we're doing is developing a quantitative understanding of how metabolism is regulated."

That understanding can help researchers design more efficient microbial cells, or "cell factories," for biofuel applications, using species like *E. coli*. It can also assist in studies of metabolism in cancerous cells. "With cancer, we're trying to find targets that will stop the growth of cancer cells, but not impact healthy cells," he said.

Antoniewicz's team has developed a software package called Metran, which researchers can use to study cellular metabolism, and has distributed it to more than 100 labs worldwide.

Until recently, the team has been able to study metabolic flux in only one species or cell type at a time, but that is changing. "We've been able to extend our technique to study multiple biological systems grown together—so we can now grow a fungus and a bacterium together and study how they interact with each other."

New generations of biofuel applications are being developed that rely on such combined systems. This type of analysis can also be useful for studying diseases like diabetes.

"If we can study how multiple cells interact, we can better visualize the development and progression of diabetes, with the goal of eventually finding ways to intervene before full-blown diabetes sets in." ■

Antony Beris wins Willem Prins Award

ANTONY BERIS, the Arthur B. Metzner Professor of Chemical and Biomolecular Engineering, received the Willem Prins Lecture Award from Delft University of Technology (TU Delft) in the Netherlands for his contributions in the field of polymer science and engineering.

Beris delivered the lecture, "Nonequilibrium Thermodynamics Modeling of the Flow and Deformation of Complex Materials with Internal Microstructure," in July at the 7th International Workshop on Nonequilibrium Thermodynamics.

The award was named to honor Prins, who played a key role in establishing the tradition of polymer science and engineering at TU Delft, working on polymer networks and entanglements. The prize is awarded by the Delft Association for Polymer Technology.

George Whitmyre retires

GEORGE WHITMYRE, known to everyone who was educated in Colburn Lab since the 1970s, retired at the end of June 2015 after 41 years of service.

George's official title was Laboratory Manager, and manage he did: there isn't a corner of the building or its individual labs that he didn't know in detail, and his institutional memory and proactive leadership were instrumental in maintaining the high quality of our labs. Most importantly, when concerns about lab safety were raised in the late 1970s, George took the lead in developing suitable practices in the department, in the course of which he became a nationally recognized authority on lab safety. The full history of the safety effort is recounted in Reggie Blasczyk's history of the department published last year, from which the following extract tells much of the story:

> "After receiving his bachelor's degree in Zoology from the Pennsylvania State University in 1967, Whitmyre worked on a master's degree in Entomology and Applied Ecology at the University of Delaware, finishing in June 1973. 'I performed all of the machining work for this project in the Chemical Engineering Machine shop, supervised by Jackie Hollobaugh,' Whitmyre later remembered, 'so I was acquainted with most of our ChEG Grad Students, Post-Docs, and some of the Faculty.' Arthur B. Metzner hired Whitmyre as a research machinist in October 1973. He was eventually promoted to the position of master instrument maker, and then to laboratory coordinator in 1978–79.

"The name of George Whitmyre became synonymous with safety and utility in the department. . . . Every department needs a George."

> "Whitmyre learned a good deal about Colburn Laboratory from his work on occupational safety, applying these lessons to the subsequent renovation and expansion of the facility. His responsibilities also included the construction and maintenance of countless undergraduate laboratory experiments. The name of George Whitmyre became synonymous with safety and utility in the department. Mike Klein later recalled: 'One of the first things I noticed when I left the University of Delaware to become a dean at Rutgers University was that no single person had oversight for the Rutgers chemical engineering laboratories. They didn't have anyone like George Whitmyre. Every department needs a George.'"

We would wish George a quiet and restful retirement, but know that that is impossible. He's still as busy as ever working on new projects in his own shop. ■

JON H. OLSON, PROFESSOR EMERITUS, REMEMBERED FOR SELFLESS SERVICE TO UD

JON H. OLSON died October 26, 2014, in his cottage at Jenner's Pond, Pennsylvania, attended by his friends, family, and wife Nancy Olson; he was 80 years old. He had been diagnosed with biliary adenocarcinoma in June 2013.

Jon's family moved frequently during his childhood, such that Jon attended 14 schools before college. He graduated from the Lawrenceville School and then earned a bachelor's degree from Princeton University in 1955 and a doctorate in chemical engineering from Yale University in 1961.

He worked at the Applied Physics Laboratory at the DuPont Experimental Station in Wilmington for three years. His interactions with Robert Pigford, then a consultant at the Engineering Research Laboratory of DuPont, led him to appreciate the creativity that Bob had for engineering science and inspired Jon to join the University of Delaware faculty.

Jon found the intellectual vitality at UD invigorating. His research focused on chemical kinetics, models for reaction engineering and transient kinetic processes. He approached these topics experimentally, using flash photolysis to study reaction kinetics, particularly for partial oxidation of hydrocarbon systems, and used mass spectrometry to study diffusion in polymers. However, his expertise extended well beyond these areas, and his teaching spanned the breadth of the chemical engineering curriculum.

Jon's unique strength was his concern for students, and he served as a formal academic advisor to generations of students and as an informal mentor to many more. He guided to higher levels of accomplishment those who were doing well, and helped many who were not to get back on track. Hundreds of alumni over a period of decades give credit to Jon for their own career successes.

He was honored for his advising attention to undergraduates with a University Excellence in Academic Advising Award, marked by a named brick in the sidewalk at Mentors' Circle.

Jon was the first president of the Faculty Senate in the 1970s and active in forming the faculty union. During his career at the University of Delaware he also served as the associate and acting dean of Engineering, director of the cooperative engineering program with Delaware State College, and director of the minority engineering program at UD. He was honored by the Faculty Senate in 2014 by the naming for him of the award for service to the Senate.

Jon retired from the Chemical Engineering Department after 40 years, in 2002. He then became an ardent volunteer in the department, advising undergraduates, coordinating alumni relations and working on research, until his health began to decline in 2013.

Jon had three children with his first wife, Jean Clift Olson: Eric Jon Olson, Kirsten Ann Olson, and Greta Olson, all of whom earned doctoral degrees. He is also survived by his second wife, Nancy Haldeman Olson, nine grandchildren and two step-grandchildren. ■

He guided to higher levels of accomplishment those who were doing well, and helped many who were not to get back on track. Hundreds of alumni over a period of decades give credit to Jon for their own career successes.

Professor Richard Wool eulogized as "remarkable scientist, genuinely good person"

RICHARD PATRICK WOOL, professor of chemical and biomolecular engineering since 1994 and director of UD's Affordable Composites from Renewable Sources (ACRES) laboratory—where with colleagues and students he created revolutionary industrial materials with reduced impact on the environment and human health—died unexpectedly on March 24, 2015. He was 67.

"Richard was a remarkable scientist, engineer and researcher," said **BABATUNDE OGUNNAIKE**, dean of the College of Engineering and William L. Friend Chaired Professor of Chemical Engineering. "But above all of that, he was a genuinely good person."

ABRAHAM LENHOFF, Allan P. Colburn Professor of Chemical and Biomolecular Engineering and chair of the Department of Chemical and Biomolecular Engineering, said, "Richard's passion for developing materials from renewable resources included mentoring the next generation of green engineers, and made him a highly visible spokesman for the area. At UD his elective courses in bio-based materials and green engineering were enormously popular with students in chemical engineering and beyond. We will miss his irrepressibly positive outlook, good humor and, of course, his leadership of a very important field in our discipline."

"Richard was an outstanding teacher, researcher, adviser and mentor," said **JOHN (JACK) W. GILLESPIE**, director of the Center for Composite Materials. "He was also founder of Affordable Composites from Renewable Sources, for which he was world renowned."

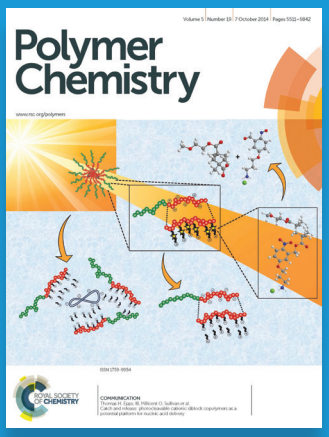
Among Wool's professional accomplishments were winning the Presidential Green Chemistry Challenge Award and being elected a fellow of both the Royal Society of Chemistry and the American Physical Society, Division of High Polymer Physics.

Contributions can be made to the Department of Chemical and Biomolecular Engineering to support the Dr. Richard Wool Award for Women in Green Chemistry. Please send contributions to: University of Delaware, Gifts Processing, 83 East Main St., Third Floor, Newark, DE 19716. Make checks payable to "University of Delaware" and include on the memo line "in memory of Dr. Richard Wool." Gifts can also be made on the University of Delaware's secure website, www.udel.edu/makeagift. ■

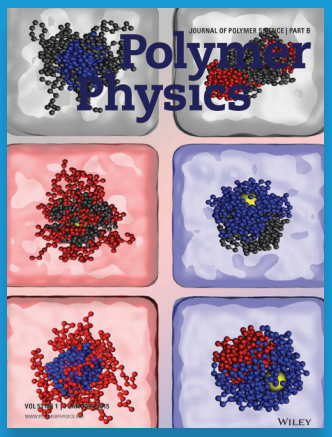
BOOKS, MONOGRAPHS AND JOURNAL

that were highlighted on covers selected from more than publications by our faculty this past year.

"πάντα ῥει: Everything Flows" by Anthony N. Beris and A. Jeffrey Giacomin

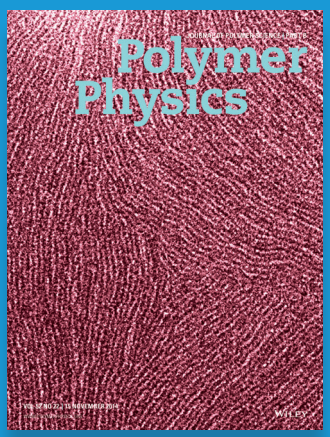


"Catch and release: photocleavable cationic diblock copolymers as a potential platform for nucleic acid delivery" by Matthew D. Green, Abbygail A. Foster, Chad T. Greco, Raghunath Roy, Rachel M. Lehr, Thomas H. Epps, III, and Millicent O. Sullivan



"Effect of Homopolymer Matrix on Diblock Copolymer Grafted Nanoparticle Conformation and Potential of Mean Force: A Molecular Simulation Study" by Carla E. Estridge and Arthi Jayaraman

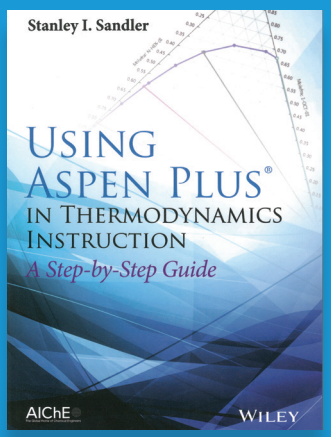
"Design of Thiol-ene Photoclick Hydrogels Using Facile Techniques for Cell Culture Applications" by Lisa A. Sawicki and April M. Kloxin



"Enthalpy of Fusion of Poly (3-hexylthiophene) by Differential Scanning Calorimetry" by Roddel Remy, Emily Daniels Weiss, Ngoc A. Nguyen, Sujun Wei, Luis M. Campos, Tomasz Kowalewski, and Michael E. Mackay

"Shear Enhances Thrombopoiesis and formation of Microparticles That Induce Megakaryocytic Differntiation of Stem Cells" by Jinlin Jiang, Donna Woulfe, and Eleftherios T. Papoutsakis

"The Clostridium Sporulation Programs: Diversity and Preservation of Endospore Differentiation" by Mohab A. Al-Hinai, Shawn W. Jones, Eleftherios T. Papoutsakis

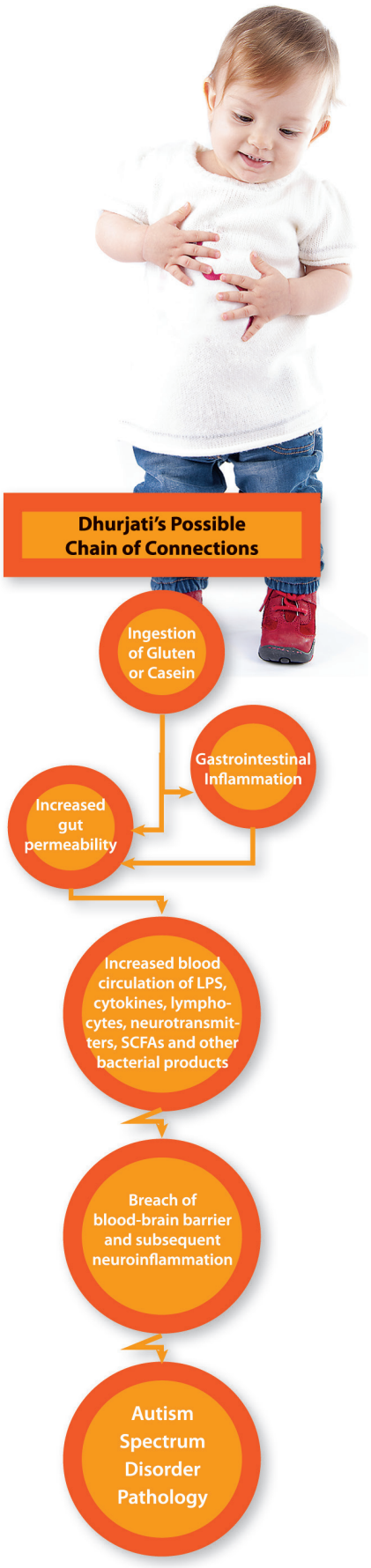


"Using Aspen Plus in Thermodynamics Instruction: A Step-by-Step Guide" by Sandley I. Sandler

ARTICLES 250

"Dually Click Hydrogels for Controlled Degradation and Protein Release" by Prathamesh M. Kharkar, April M. Kloxin, and Kristi L. Kiick

"Layering, melting, and recrystallization of a close-packed micellar crystal under steady and large-amplitude oscillatory shear flows" by Carols R. Lopez-Barron, Norman J. Wagner, and Lionel Porcar



Dhurjati introduces quantitative modeling approach to study gut bacterial link to autism

PRASAD DHURJATI, professor of chemical and biomolecular engineering with a joint appointment in mathematical sciences, was recently featured in the *Wilmington News Journal* for developing a computer-simulated human gut microbiome to advance the search for the cause of autism.

Dhurjati's work looks at a possible connection between autism and the bacteria found in the digestive system. Many with autism experience digestive issues. Research now suggests that issues in bacteria and their genes found in the human gut may be triggering autism, as opposed to the earlier assumption that autism leads to digestive problems.

Dhurjati's work to develop a systems connectivity model of autism is supported, in part, by a research grant from the science and advocacy organization, Autism Speaks. Joined by three UD researchers, back in 2013, he built a lab-scale artificial gut reactor to simulate the microbial dynamics in the gut microbiome hoping to develop system-level models and tools for analysis of interactions between the digestive system and brain. More recently, the team constructed an artificial autistic genome made up of microbes implicated in autism.

"The goal is to compare that to a model of a normal gut to determine what the autistic microbes are eating, what they are making and how that changes the intestinal gut permeability and the blood-brain barrier," said Dhurjati. ■

Graphic courtesy of a story that appeared in the *University of Delaware Messenger* magazine, which can be viewed at www.udel.edu/udmessenger

Papoutsakis team seeks patents on techniques to produce platelets, engineer bacteria

ELEFTHERIOS "TERRY" PAPOUTSAKIS, Unidel Eugene du Pont Chair of Chemical and Biomolecular Engineering, and his team from the Delaware Biotechnology Institute have two patents pending for research that could prove "game changing" for such biomolecular advances as platelet formation and a newly engineered strain of *E. coli*.

The team's work on paving the way to accelerating and enhancing platelet production using megakaryocytes, or large stem cells found in bone marrow, was featured as the cover story of *Blood*.

"It turns out that biomechanical forces are necessary for biogenesis of all three types of particles that can be generated from megakaryocytes—pre-platelets, platelet-like particles, and megakaryocyte microparticles. Until recently, these microparticles were viewed as inconsequential cell debris," said Papoutsakis.

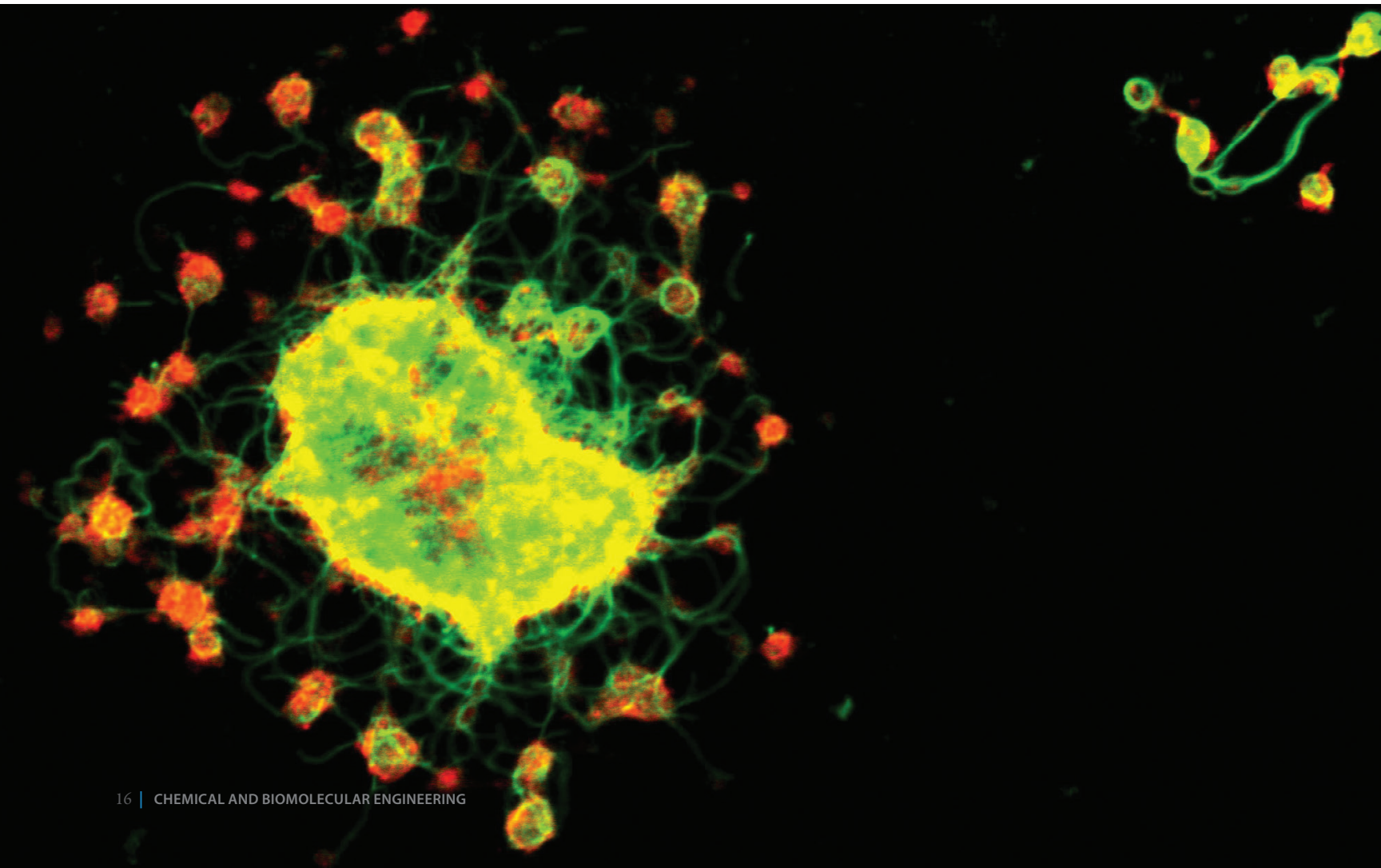
"We now know that they play a significant biological role in platelet formation," he continued. "The enhanced generation of pre-platelets and platelet-like particles under shear stress correlates with physiological observations—in healthy adults, both acute and prolonged exercise leads to elevated platelet counts. Now, these findings can be used to develop better bioreactor technologies for producing platelets, pre-platelets, platelet-like particles, and megakaryocyte microparticles for transfusion medicine, using stem cells as starting material."

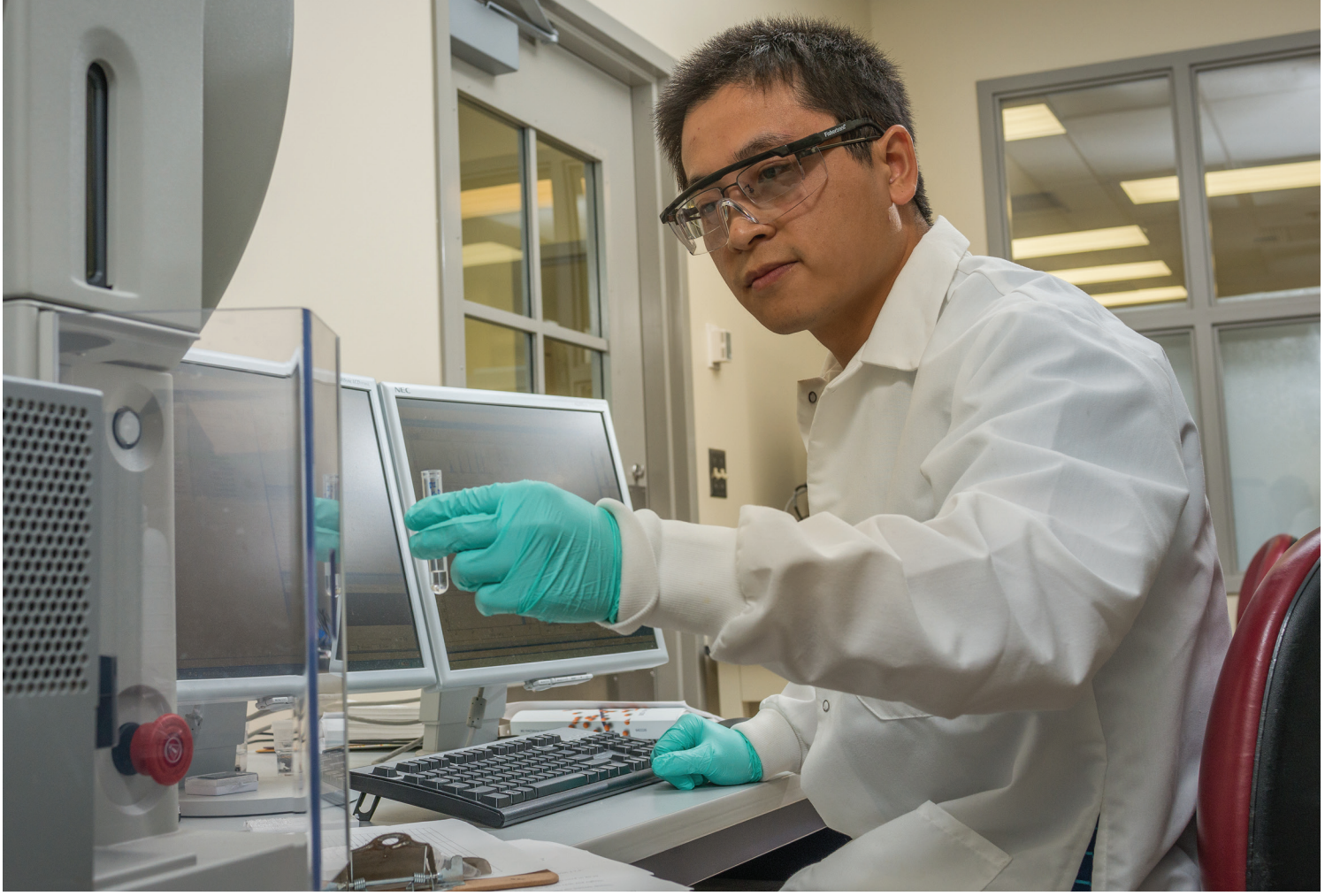
Reviewers of the paper, titled "Shear Enhances Thrombopoiesis and Formation of Microparticles that Induce Megakaryocytic Differentiation of Stem Cells," referred to the findings as "very exciting," "highly novel," and even "game changing."

Papoutsakis is hopeful that his team's discovery can break the vicious cycle of diseases that cause reduced platelet count and cause life-threatening bleeding.

The second patent stemming from Papoutsakis' research group is for research highlighted in *Nature Communications* on a new technique to

An immunoflourescent image of a partially disintegrated human polyploidy megakaryocyte, featured on the cover of the journal *Blood*.





Doctoral student Jinlin Jiang is credited with making the breakthrough finding in research that sheds new light on the mechanism of platelet formation, paving the way to accelerating and enhancing their production using stem cells found in bone marrow.

create specially engineered *E. coli* bacteria that will host, recognize and respond to the genes of numerous other bacterial species.
The paper's two lead authors are **NICHOLAS SANDOVAL**, a postdoctoral researcher, and **STEFAN GAIDA**, D'13, who is now doing postdoctoral work in Germany.

Because so little is known about how they live, researchers still can't grow most microbes in the laboratory, limiting what can be learned from them.

Scientists have sidestepped this problem by creating metagenomic libraries. They extract the DNA (the metagenome), obtain random bits and pieces of genetic material from many different organisms, and then insert each fragment of DNA into an *E. coli* bacterium, so that each bacterium contains a different fragment, a "volume" from the larger library.

Searching through the functions and products of DNA cultivated this way, known as a functional screen, lets researchers find new proteins or cellular activities without having to pinpoint a specific gene beforehand, or even know what species it belongs to.

"The goal of this work was to engineer bacteria that would be able to better express a larger variety of genes coming from the metagenome," said Sandoval, "so that when we do perform these functional screens with *E. coli*, we're getting a much broader representation of the actual genetic population."

The researchers found that when they engineered *E. coli* to produce the RpoD sigma factor from the microbe *Lactobacillus plantarum* (*Lpl*), it allowed *E. coli* to recognize *all* gene promoters it encountered, from any source.

They had created a strain of bacterium that would be able to transcribe any fragment of foreign DNA that was still connected to a promoter.

"It was surprising and really fantastic that the *Lpl* sigma factor worked on every library that we tested, and extremely well with the metagenomic library," said Sandoval. "We found something that is very robust in its efficacy. We can now can screen a much larger proportion of the metagenomic or heterologous genomic DNA libraries that were previously not functional."

The authors believe the newly engineered strain of *E. coli* will have broad use among genomics researchers.

Said Sandoval, "Hopefully this work will greatly enhance the ability to do functional screens on the metagenome and allow everyone who does these screens to look for interesting health and industrial applications, much more efficiently and much more easily." ■

Nature Communications highlights Yan's organic zeolite advance

In a landmark paper published in the international scientific journal *Nature Communications*, **YUSHAN YAN**, Distinguished Professor of Engineering, describes a new approach to creating organic zeolites.

"There is a dream out there to build organic zeolites," he said. "If you can create organic zeolites, you can do more and even better catalysis and better separations. It opens the door for applications previously thought impossible."

Traditionally, zeolites have been derived from inorganic materials like silicon or aluminum. For the past several years, Yan has focused on combining zeolites with organic polymers whose main components are carbon, oxygen, hydrogen and nitrogen.

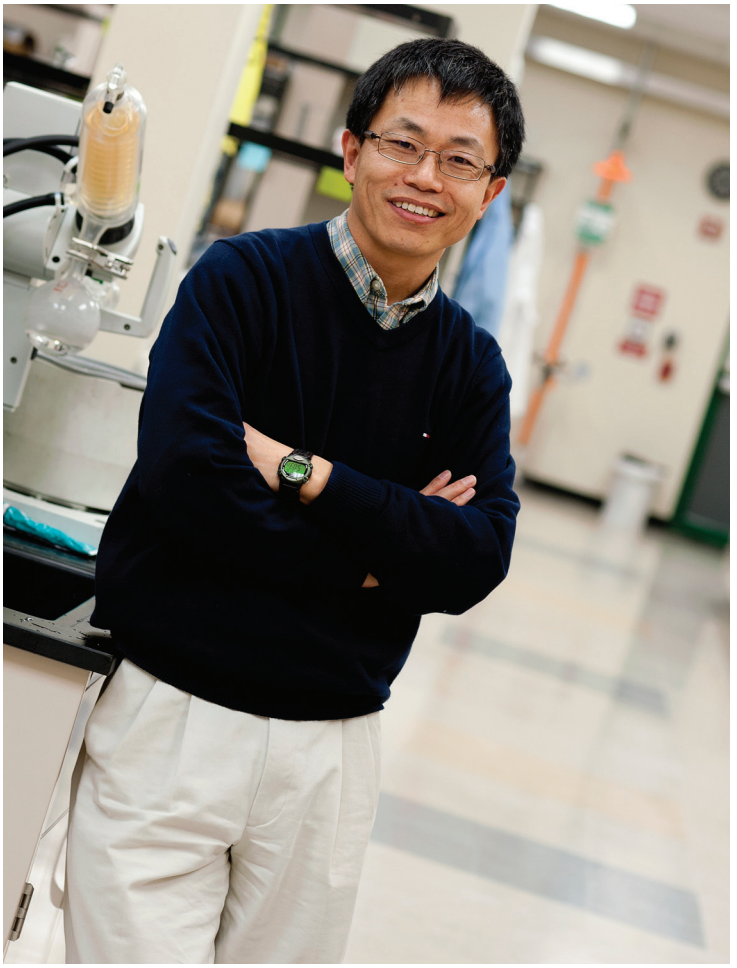
According to Yan, converting these polymers into a crystalline material is difficult because it requires reactions that are reversible. But polymers typically are created when identical molecules (or monomers) react and form an irreversible bond.

"Think of building a house," he explained. "If the moment a builder touches one metal beam to another they become stuck together, it would make construction very difficult. In the same way, molecules don't always bond perfectly the first time, and they may need to detach, adjust and reattach to achieve a desired structure. If the reaction is irreversible, molecules can get stuck in a non-ideal position."

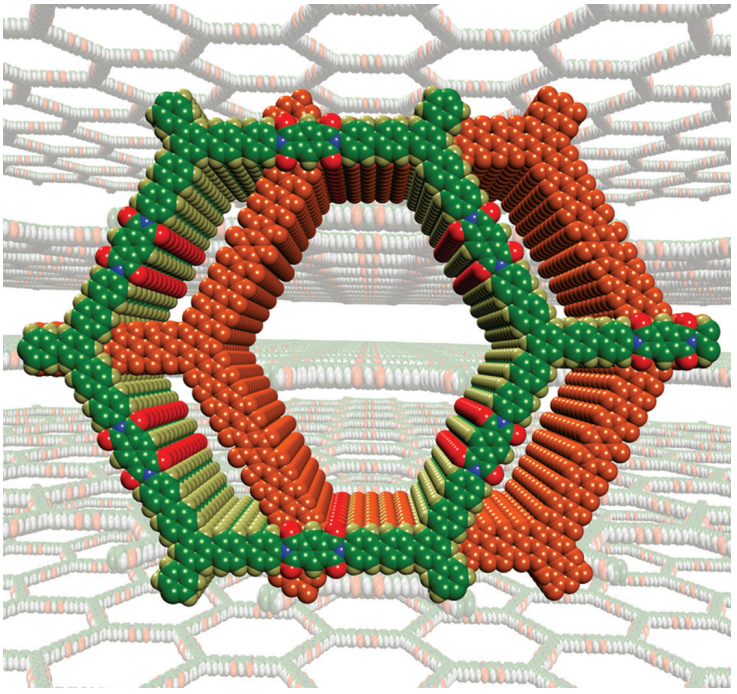
Yan's research team devised a way to slow the polymer's intrinsic reactivity down, allowing it to be reversible. At the same time, lowering the temperature reduced the molecules' reactivity and lengthened the reaction time, allowing the molecules to adjust their alignment before becoming connected.

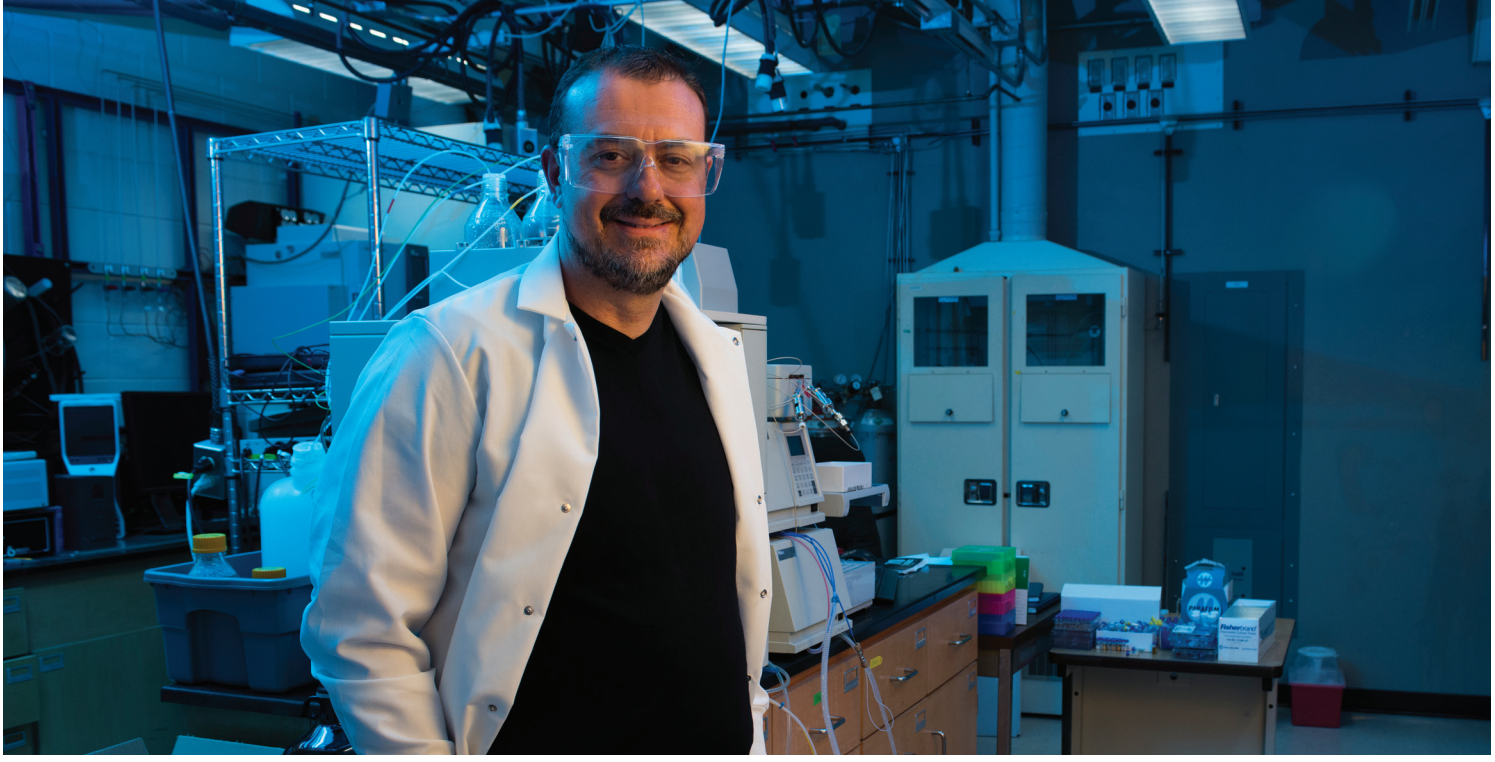
The result is a crystalline porous material with large pores, a large surface area (2,346 square meters—the equivalent of nearly half an American football field—per gram) and excellent thermal stability (530 degrees C).

The technique and the new materials it produces can be immediately useful in catalysis and separations for chemicals production and hydrocarbon conversion for energy applications. Yan also sees potential for organic zeolites to influence energy research, particularly in membrane development, and fuels cells and battery applications. ■



Yushan Yan has reported a significant advance in the creation of organic zeolites in the journal *Nature Communications*.





Dion Viachos directs UD's Catalysis Center for Energy Innovation, which has announced a cooperative research program to explore methods of producing renewable beverage bottles, packaging, automotive components and fabric from biomass.

CCEI ADVANCES RENEWABLE PLASTICS RESEARCH, SIMPLIFIES CHEMICAL ANALYSIS PROCESS

Two significant innovations have stemmed from the University of Delaware's Catalysis Center for Energy Innovation (CCEI) this year.

The first is a research program with the Plant PET Technology Collaborative (PTC) to explore methods of producing renewable beverage bottles, packaging, automotive components and fabric from biomass. The second is the invention of the Quantitative Carbon Detector (QCD), a device that identifies and quantifies chemical compounds in complex mixtures, such as fuels, oils, chemicals, pharmaceuticals and food, and will significantly impact the amount of time required for chemical analysis.

CCEI is a multi-institutional, UD-led research center comprised of 20 principal investigators from nine academic institutions and one national research laboratory. Funded by the U.S. Department of Energy as part of the Energy Frontier Research Center (EFRC) program, it also includes an industrial consortium. The center's research focuses on discovering new technologies for the production of renewable fuels and chemicals using lignocellulosic (non-food) biomass and such feedstocks.

Using renewable materials such as trees and grasses to manufacture plastics provides companies flexibility in resources, while also addressing the global challenge of discovering new materials for sustainable packaging, explained **DION VLACHOS**, CCEI director and Elizabeth Inez Kelley Professor of Chemical and Biomolecular Engineering.

The work builds on a 2012 CCEI advance that led to a new process for creating high yield (>90 percent) p-xylene from renewable biomass, which is used to produce PET plastics. The program is part of a larger effort by CCEI to create breakthrough technologies for the production of biofuels and chemicals from lignocellulosic biomass.

PTC is a strategic working group consisting of the Coca-Cola Co., Ford Motor Co., H.J. Heinz Co., Nike Inc., and the Procter and Gamble Company.

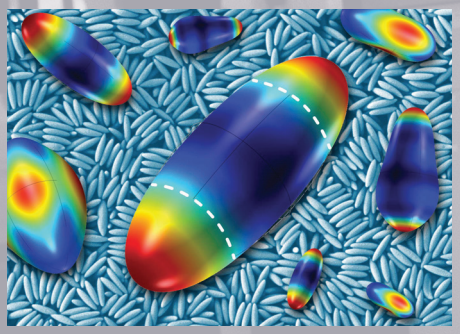
Activated Research Company (ARC), a new start-up based in Minnesota, is developing the Polyarc QCD technology. Using an integrated microreactor design, multiple catalytic reactions break down complex chemical mixtures into single compounds, significantly reducing the time and effort required for characterization analyses. Microchannels that surround a built-in heating system allow for high-resolution chemical detection, as well as integration of hardware and software within existing chemical analysis devices.

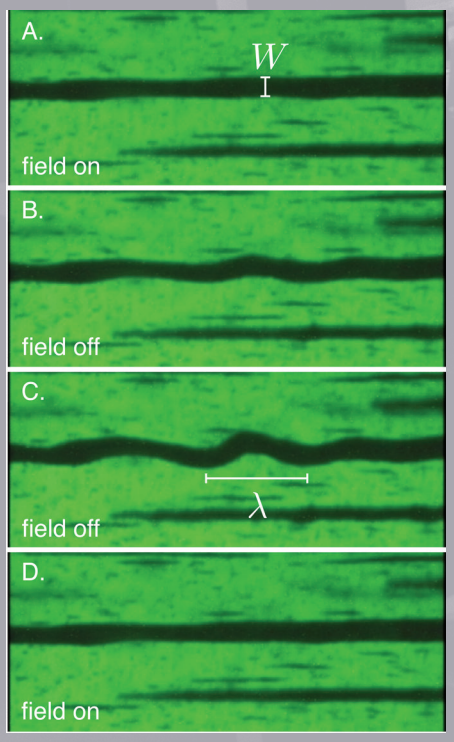
"A major challenge in any energy and fuels laboratory is identifying the chemicals within liquid substances," said **ALEX PAULSEN**, CCEI researcher and co-inventor. "After being identified, each compound must be quantified, and this can be a time-consuming procedure for complex mixtures. By breaking down the mixtures into single compounds, the QCD simplifies the process so we have more time to focus on research."

"The QCD is really the holy grail of chemical analysis," said **PAUL J. DAUENHAUER**, associate professor of chemical engineering and materials science at the University of Minnesota and co-director of CCEI. "Utilizing this new technology allows us to focus our effort on catalytic science rather than tedious and expensive chemical calibrations."

The research was published in the January issue of the journal *Lab on a Chip*, a publication of the Royal Society of Chemistry. ■

Ellipsoidal particle films fabricated by directed self-assembly exhibit unique phonon structures that tailor the propagation of acoustic energy. Materials such as these could be used for acoustic applications and also serve as models for emerging thermal barrier nanomaterials.





The buckling of a self-assembled column of magnetic colloids from recent InSPACE studies. The magnetic field is oriented left to right. The column is about 30 micrometers in diameter, about a third of the diameter of a human hair.

FURST PUBLISHES ON BUCKLING PHENOMENON OBSERVED IN INSPACE EXPERIMENT, IMAGINES NEXT GENERATION OF SMART MATERIALS

ERIC FURST has spent the last two decades studying colloidal particles, most recently exploring nano-particles suspended in magnetorheological (MR) fluids as part of a series of experiments on the International Space Station. But even this veteran researcher was surprised by an unexpected buckling phenomenon first observed as part of research supported by NASA through the InSPACE (Investigating the Structures of Paramagnetic Aggregates from Colloidal Emulsions) project.

When exposed to magnetic fields, MR fluids—tiny magnetic particles in suspension—line up and form chains, so that the mixture becomes almost solid. When the magnetic field is removed, the fluids disassemble and buckle. Furst and his team expected the disassembling noted in their InSPACE experiment, but they had never seen anything like this buckling in ground-based experiments.

Buckling is seen—and properly designed to avoid—in buildings and mechanical devices. However, this property had not been observed in MR fluids or more generally, in colloidal soft matter systems, before now.

Furst, who is director of UD's Center for Molecular and Engineering Thermodynamics (CMET) and professor of chemical and biomolecular engineering, managed to replicate the buckling in earthbound MR fluids by setting up multiple magnetic fields, bringing the team another step closer to understanding it. Under Earth's gravity, the magnetic particles are usually sitting against the bottom of their container, and friction may prevent the chains from warping the way they do in space.

His team described the phenomenon in an article on the propagation of sound waves through a field of self-assembling polystyrene particles published last fall in the American Physical Society's *Physical Review Letters*.

"NASA was interested in developing the research portfolio of the Space Station," said Furst. "What kind of experiments can you do in space? What kind of ground benefits will there be? It's a whole new laboratory, where gravity has less power," he said. "Having [the MR fluids] in microgravity is the key for us to be able to do these experiments."

Astronauts aboard the Space Station conduct the experiments, and potential projects are vetted carefully based on the benefits they might have for the rest of us.

"We've learned a lot about the process of self-assembly, especially in magnetic fields," he said. "We apply those principles to materials here on Earth."

"There's a growing interest in buckling phenomena in terms of manipulating, in particular, soft materials," said Furst, "Whether we want to induce buckling or not, I'm not sure. That's the engineering question we have in front of us. What can we do with this really beautiful, physical, fundamental result?"

Furst's lab is investigating several types of self-assembled materials that can control, block and direct the flow of different types of energy, leading to technologies such as more efficient lighting.

"We think [self-assembly] will allow us to not only make new materials with new functions, but make them faster and cheaper and more ubiquitous. They'll be important components of making whole devices function the way they do." ■

CBE researchers develop safer electrolytes

A research team led by **THOMAS H. EPPS III**, the Thomas and Kipp Gutshall Associate Professor of Chemical Engineering, is designing novel solid electrolytes using tapered block co-polymers to replace liquid electrolytes and reduce the risk of spontaneous fires due to failures in lithium-ion batteries.

In recent years, block co-polymers have received considerable attention as viable rechargeable conducting and transport membrane materials, due to their unique combination of thermal, mechanical and electrochemical stability. Epps and his team have taken the concept of block co-polymers a step further by tapering the interface—or the transition region between blocks—so that the properties of the different polymer blocks are interspersed.

A primary challenge in using block co-polymers lies in controlling and analyzing the location and spatial distribution of the various nanoscale and atomic-scale components in these self-assembling materials. Any methods used to evaluate the materials must be able to "see" the structure at the nanoscale without causing damage that confuses or otherwise confounds analysis.

In collaboration with researchers at MIT, Epps helped apply a new technique—C60+ depth-profiling x-ray photoelectron spectroscopy (XPS)—to nanostructured polymers. "Although we've successfully applied

the technique to evaluate materials for battery applications, we believe that its unique capabilities make it a powerful tool for the analysis of nanostructured polymer thin films in applications ranging from energy storage and generation to surface coatings and nanoscale templates."

The team's work was documented in *RSC Advances*, coauthored by graduate students **WEI-FAN KUAN** and **RODDEL REMY** in the Department of Chemical and Biomolecular Engineering, and **MICHAEL MACKAY**, Distinguished Professor of Materials Science and Engineering; and in *ACS Nano*, coauthored by **MING LUO**, graduate student in the Department of Chemical and Biomolecular Engineering and team members from the Massachusetts Institute of Technology. ■

Silver electrocatalysts may aid long-term space travel

FENG JIAO published two articles in *Nature Communications* this past year, one attracting NASA's attention for its potential to help astronauts breathe in space, and the other using a copper-titanium mix to more efficiently create hydrogen fuel in an environmentally friendly way.

Researchers at NASA's Glenn Research Center reached out to Jiao, assistant professor of chemical and biomolecular engineering, after reading of his team's work. The paper described a silver electrocatalyst that, due to its carefully designed nanoscale structure, could convert CO_2 to carbon monoxide (CO) with 92 percent efficiency, freeing oxygen in the process.

Oxygen tanks cannot be shuttled out to resupply the astronauts, so air must be recycled. Current systems are only about 50 percent efficient at recovering used oxygen from carbon dioxide.

Jiao and NASA scientist Ken Burke are co-principal investigators on a $750,000 NASA-funded grant, one of four teams trying to create the most efficient oxygen recycling system possible. If their system is one of the two chosen by NASA for further exploration, they will be granted $2 million to adapt the system for large-scale use.

Green hydrogen fuel

Jiao is also working on a cheaper way to produce hydrogen fuel, a promising renewable energy source that can be made from water.

One of the hurdles in making the technology mainstream, however, is its high cost. Producing hydrogen fuel from water requires precious metal catalysts to drive the reaction. Platinum is the standard, and, currently, it's more than $1,000 an ounce.

Jiao and his colleagues have figured out how to use a copper alloy as a catalyst instead. "If you put a little bit of titanium into copper," he said, "you change the hydrogen binding energy on the surface, which makes it about right." The combination of metals works even better than platinum at a fraction of the cost.

Jiao is also investigating whether a copper-titanium mix might also work to drive the reverse reaction, and efficiently burn hydrogen in a fuel cell. "Eventually we will have a device for hydrogen production and another device for energy conversion to get that electricity back," said Jiao. "One catalyst can probably do both things."

Jiao's work on green hydrogen fuel was featured this past year on *newsworks.org* for Philadelphia, and his NASA work in the science section of *Economic Time*, India's leading business newspaper. ■

CONGRATULATIONS TO THE CLASS OF 2015!

Kevin Abraham
Raheel Ahmad
Radwan Alalawi
Joseph Ambrosi
William Ballance
Justin Beatty
Thomas Benz
Aaron Bevenour
David Biederman
Adrienne Blevins
David Blickwedel
Elizabeth Boedeker
Frank Cheng
Lauren Cordova
James Craig
Hailey Cramer
Nicole Daly
Ryan Davella
Alexander Delluva
Mitchell Dennison
Monica Du
Ryan Dudek
Mohamed Eltahir
Charles Evans
Gregory Facas
Eugene Feeley
Carlos Fernandez
Marianna Fleischman
Edward Garcia
Ryan Gardner
Chris Garner
Nicholas Gelardo
Bryan Goldman
Joshua Gorton
Philip Hastings
Erik Hobbs
Alaina Howe
Alexander Jedruszczak
Jacqueline Johnson
Rachel Kennel
Kevin Kuttler
Paul LaShier
Alex Lauderback
Ian LeBlanc
Ryan Leimbach
Zhexi Lin
Christopher LoPorto
Will McCormick
Bill McKechnie
Samantha Meehan
Chirag Mevawala
Bill Michelsen
Adam Moyer
Daniel Muna
Joseph Nitsche
Andrew O'Connell
Nicholas Pentimone
Eric Peters
Timothy Peterson
Spencer Pontell
Abdul-Rasheed Rabiu
William Rehrig
Melanie Rinbrand
Saul Salonga
Bryan Schaeffer
Samuel Schenkman
Michael Schott
Chelsea Shockey
Christina Simmons
Stephen Smith
Mark Stader
Meredith Steenkamer
Michael Stevenson
Kevin Stone
Ian Strawser
Michael Thomas
Trevor Tougas
Yun-Cheng Tsai
Jiyuan Xiin
Keyi Xu
Jiancheng Yang
Jeff Yu
Suli Zhang
Yazhou zhou
Erik Zimmerman
Jacob Zimmerman

PhD graduates

Daniel J. Blackstock
Matthew A. Christiansen
Timothy D. Courtney
Amanda Kate Gurnon
Jinlin Jiang
Yannick C. Kimmel
Nicholas E. Levy
Sarah E. Mastroianni
Jacob A. McGill
Andrea N. Naranjo Erazo
Nima Nikbin
Trong Dinh Pham
Jonathan E. Sutton
Kristin N. Valente
Kathryn A. Whitaker
Laj Xiong
Jang Ho Yun
Bingzi Zhang

M.Ch.E

Andrew P. Black
Long Chen
William Diercxsens
Stephen M. Edie
Yun Soo Kim
Ryan P. Murphy
William Tytgat

WHERE DID THEY GO?

Graduate School

Carnegie Mellon University
Columbia University
North Carolina State University
Rensselaer Polytechnic Institute
Rutgers
UCLA
UD (Particle Technology Program)
University of Colorado, Boulder
University of Delaware
University of Illinois–Urbana Champaign
University of Minnesota
University of Texas at Austin
University of Washington
West Virginia University

Industry

Air Products and Chemicals, Inc.
Applied Control Engineering
Axens
Braskem
Croda
Deloitte Consulting
Department of Defense
DuPont
Environmental Resources Management
ExxonMobil
Georgia Power
Gore
Merck
NAVSEA
Norfolk Naval Shipyard
SABIC
Schneider Electric
The Dow Chemical Company
UOP/Honeywell
W.L. Gore & Associates
West-Ward Pharmaceuticals

Kloxin group brings science to public through museum kiosk and radio show

APRIL KLOXIN thinks science rocks, and she wants everyone from grade-schoolers to grandparents to think that, too.

Her research group is reaching out to the public through an interactive kiosk at the Delaware Museum of Natural History, as well as through a radio show on the University's student-run radio station, WVUD.

The *Mimicking Nature* kiosk, which demonstrates how animals and humans mimic nature, greets the 75,000 people who visit the museum every year. The radio show—*Science Rocks!*—has the potential to reach thousands more.

Kloxin's research focuses on the design of materials that mimic and respond to specific biological systems and their use for understanding and directing these systems to heal the body. The kiosk demystifies these materials through simple explanations, engaging graphics, analogies and photographs.

"The goal of our work is to develop technologies that improve human health, and we want to show science in a positive light," said Kloxin, who has joint appointments in the departments of Chemical and Biomolecular Engineering and Materials Science and Engineering.

The kiosk is supported by a National Science Foundation Faculty Early Career Development Award Kloxin received in 2013.

The radio show was launched in the fall of 2013, when several of Kloxin's students applied to be DJs on WVUD The Basement. The show is divided into segments including

April Kloxin

a guest researcher interview, science news and discussion of today's latest science issues, interspersed with music ranging from classic rock to folk.

AMBER HILDERBRAND, **PRATHAMESH KHARKAR**, **MATTHEW REHMANN**, **LISA SAWICKI** and **MEGAN SMITHMYER**—all graduate students with the April Kloxin Lab Group—take turns broadcasting every Wednesday evening on 91.3HD-2 or online at wvud.org from 6:30–8:00.

"We try to convey the importance of science communication and how people get into scientific fields," said Sawicki. "That's key to bringing science to the general public and making it more accessible."

Kloxin sees the kiosk and the radio show as a way to build bridges, both between scientists and the public and between research and education "Both of these are great platforms that enable us to reach a broad audience," she said.

Funding for *Science Rocks!* is provided by Kloxin's NSF award and UD's IGERT program in Systems Biology of Cells in Engineered Environments. ■

SCIENCE ROCKS

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STUDE

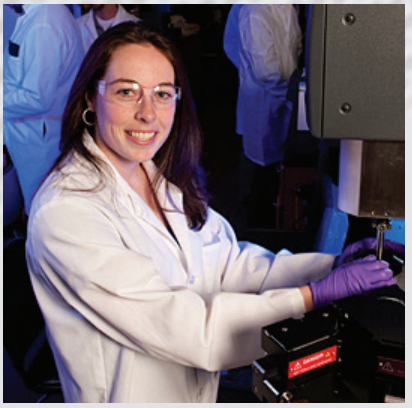
GREG BENNETT won the poster award at the 2014 ECI Conference.

JINGSI GAO won 2nd place in the student poster session at the Society of Rheology's 86th Annual Meeting.

STIJN KOSHARI has been awarded the IAR-CIT Master's thesis award at KU Leuven for his work on characterization of iysozyme adsorption in cellulosic chromatographic particles using small-angle neutron scattering.

KALEIGH RENO was chosen to attend the 2015 Lindau Nobel Laureate Meeting.

KATE GURNON, PhD '14, below, was awarded the 2015 Allan P. Colburn Dissertation Prize.



NT Reconigtion

NICHOLAS SANDOVAL, right, postdoctoral research associate, received an NIH NRSA postdoctoral fellowship proposal entitled, "Transcription engineering for biosensor-based screening of metagenomic libraries."

DOUG GODFRIN, center, jointly advised by **NORMAN WAGNER** and **YUN LIU**, was awarded the NIST Sigma Xi Most Outstanding Poster Presentation Award for Biotechnology, Biology, and Polymers. His poster, entitled "Cluster Mediated Dynamics and Viscosity in Concentrated Protein Solutions," was posted in the NIST Main Admin building for two weeks.

NSF Fellows

UNDERGRADUATE

Lauren Cordova, attending University of Texas

GRADUATE

Lauren Dorsey
Jannatun Nayem
John Ruano-Salguero
Mahlet Woldeyes

Jonathan Galarraga (right), a chemical and biomolecular engineering major and McNair Scholar, explains the research he is doing on bone adhesives to McNair coordinator Matthias Seisay.

Summer Scholars program introduces undergrads to world of research

When a student moves into research, there's a lot to learn—and not all of that learning comes from reading, writing or laboratories.

UD's Summer Scholars program offers undergraduates a 10-week summer job with a faculty researcher, giving them the chance to experience the work, learn research protocols and develop questions and ideas for senior theses. Undergraduates are included in all kinds of investigations that could lead to better strategies for addressing everything from cholera to storm water management.

When McNair Scholar **JONATHAN GALARRAGA** needed bone samples to test a new bone adhesive for work on treatment of cartilage defects, he had no idea where to get them and felt a bit like the proverbial "mad scientist" calling the local meat market as advised by more senior members of his research team. What he did with those cow bones was part of his presentation at the Undergraduate Research Summer Scholars Poster Session that drew more than 100 students to the Trabant University Center earlier this year.

Galarraga, who does research in the lab of **CHRISTOPHER KLOXIN**, assistant professor of materials science and chemical and biomolecular engineering, is exploring defects in cartilage and how to address the cavities that undermine that joint-cushioning material. He said his work on Kloxin's team has given him a richer understanding of how synthetic materials could contribute to successful treatment for osteoarthritis, a condition that affects about 30 million people in the United States alone.

Summer scholar **DOUGLAS SCOTT**, a chemical and biomolecular engineering major, worked on aligning polymer films with **THOMAS H. EPPS III**, the Thomas and Kipp Gutshall Associate Professor of Chemical and Biomolecular Engineering. The experience exploring ways to use nanotemplates to increase processing power and improve other features of electronic devices opened a whole network of other resources, Scott said.

"He {Epps} knows all these people at all these different universities," Scott said. "Why don't you check what so-and-so has done? And if you contact them, they give you all kinds of ideas." Using nanotemplates makes it possible to expand capacity without expanding bulk, Scott said, an important feature as devices continue to shrink.

The circuitry could be etched into thin polymer films and aligned as desired, he said. In his Summer Scholars poster session, he showed how the letters "UD" had been etched into one model to illustrate the custom possibilities.

"We're looking at many properties of these films," he said. "Tech is everything today."

KEVIN BICHOUPAN, a chemical and biomolecular engineering major, works with **JOSHUA ZIDE**, professor of materials science and engineering, in a project that makes nanocomposites for use in semiconductors.

The process has allowed them to characterize and investigate new materials, he said. But the collaborative investigative work does much more for these young researchers.

"This is a different type of learning," Bichoupan said. "In classes, this is the information you have to know. In research, we don't know. You're building off previous knowledge rather than learning about stuff that's already been done. There's an uncertainty."

And that uncertainty is a powerful magnet for inquiring minds. ■

UD students (from left) Dakota Hanemann-Rawlings and Alex Northrop listen as Douglas Scott explains his research in polymer films.

Alumni News

Send us your updates!

All in the department take great pleasure in hearing what our alumni are doing, and especially of course hearing of their personal and professional successes. The updates below are based on updates sent to us by individuals, news items gleaned from the media and elsewhere, and information obtained by direct contacts with individuals. We have also enjoyed having small get-togethers with even a handful of alumni when one of our faculty has the opportunity on visits around the country; for instance, a group of our faculty had dinner with **JIM SPEAROT** M'70 D'72, **BECCY SPEAROT** M'71, **ERIN FINEHOUT** '00 and **SCOTT CROWN** D'13 while in Denver for the ACS National Meeting in March. Please send news and updates to Bramie Lenhoff (lenhoff@udel.edu), and also let him know if you'd be interested in a local reunion when one or more of our faculty are in your area.

1960s

Cepheid, a leading molecular diagnostics company co-founded by **THOMAS GUTSHALL, '60**, has received emergency use authorization from the U.S. Food and Drug Administration for Xpert Ebola, a molecular diagnostic test for Ebola Zaire virus that delivers results in less than two hours. Tom served as Cepheid's first CEO and as chairman of the board from 1996 to 2013. A longstanding member of the department's advisory council, he served as co-chair of his 50th class reunion giving program in 2010, and is an honorary co-chair of the Centennial Campaign. He and his wife, Kipp, endowed a career development faculty chair in the department in 2011.

Thomas and Kipp Gutshall have endowed a position in the Department of Chemical and Biomolecular Engineering.

LOUIS EDWARDS, M'60, was the 2014 recipient of TAPPI's Pulp Manufacture Division Technical Award and Johan C. F. C. Richter Prize. Lou spent 50 years as a professor of chemical engineering at the University of Idaho, and in retirement was honored by the university's creation of the Lou Edwards Endowed Chair in Chemical Engineering. In the 1970s, he led the development of a modular computer software simulation program that became one of the first technologies of its kind in the pulp and paper industry, later known as GEMS. Today, companies around the world use versions of the program to model and design papermaking processes that are more sustainable and energy efficient.

STANLEY L. PAULS, '65, worked for a year at BF Goodrich Chemical Co. in Kentucky after graduation and then spent 2 years in the army at Ft. Gordon and in Korea. He began work for Celanese in Greenville, SC in 1968 as a process engineer in the PET fiber production plant, then transferred to the Celanese PET film plant in Greer, SC in 1975 and worked there in the PET bottle resin production unit until he retired in 2013. This extended period included numerous changes in ownership, but Stan's positions progressed consistently to higher levels of responsibility, from Process Support Engineer to Process Development Engineer, Senior Production Engineer and Process Manager.

Stan married in 1971 and he and his wife still live in Greer, SC. They have 3 boys, all married, and 8 grandchildren. Two of the families are in Charleston, SC, and the other is in Greer. Stan has had an active lifestyle that has included running, tennis and golf. Since retiring he has started hiking with a local group and also took up digital photography. He and his wife are spend time at their condo at Edisto Beach, SC, and hope also to travel abroad over the next few years.

1970s

ROLAND HECK, D'75, worked 32 years for Mobil Oil Corporation, about 1/3 in research, 1/3 in engineering and 1/3 in administration and technology planning. While at Mobil he received 21 US patents and authored 22 papers in petroleum processing. One of his more interesting assignments was his four years in Calgary, Alberta on the front end of an $8 billion Oil Sands Project. While at Mobil he also served part-time as an Adjunct Professor at Penn State and as an ABET evaluator; he is now an ABET Commissioner. Roland retired in 2000 when Exxon bought Mobil and became an academic, with appreciable interactions with other UD connections. First, while teaching at Penn State, Roland found himself only a few lessons ahead of his students, but long-time chair, the late **LARRY DUDA, M'61 D'63**, told him, "The first time you teach any course you learn a lot. The second time the students learn a lot, and the third time" he wasn't sure anybody learned much of anything. In 2001 Roland became Associate Dean of Engineering and Applied Science at Princeton University, where his first dean was James Wei, his thesis advisor at UD. Over the next seven years he worked with four different deans while helping to steer the engineering school through the renovation of more than 90% of its lab and classroom space as well as teaching a course on the roots and principles of engineering, from which he developed a freshman course on "Technology in America" that he has been teaching for eight years at UD.

Since 1968 Roland has enjoyed life with Donna, his wife and high school prom date. They have lived in Chester County, PA, for almost 20 years and have three children and nine exceptional (of course) grandchildren ranging in age from two to fifteen, whom they enjoy watching grow up and spoiling every chance they get.

DAVE PRILUTSKI, '75, writes that "my education at the University of Delaware and degree in Chemical Engineering was the foundation for my career success. (Although the hours spent playing Star Trek on the old computers in Colburn basement probably didn't help a lot)." Dave only "officially" practiced engineering for two years before moving down a business path, which includes an MBA from Drexel. The first 10 years of his career were spent in the Philadelphia area, but over the next 26 years he and his family moved 10 times to locations including Dallas, Los Angeles, Houston and Rotterdam in The Netherlands, along with return trips to the Philadelphia area. Ultimately he was Vice President, Global Supply Chain for Lyondell Chemical and later President Europe for Lyondell. Dave left Lyondell in 2008 after they merged with Basell to form LyondellBasell and he joined Foamex (renamed FXI) as Chief Operating Officer. He left FXI in 2011 and now enjoy semi-retirement as an adjunct Professor of Management at West Chester University and Adjunct Professor of Decision Sciences at Drexel University. He has been married to the former Eileen Moran for 36 years. They have two grown daughters. The broader Prilutski family is very much part of the UD chemical engineering family, with both Dave's brother, **GERARD PRILUTSKI, '77 D'84**, and his sister, **CHRISTY PRILUTSKI DORRIS, '98**, being alumni; Christy also completed her MBA, at MIT.

J. GARY MCDANIEL, '78, became CEO of ABSMaterials, Inc., an Ohio-based company that makes absorbent materials solutions that remove pollutants from water, in the timeliest of ways. The appointment came the same day his previous employer, catalyst technology company Catacel, was acquired by London-based Johnson Matthey. Gary got the call to become CEO of ABSMaterials as he was closing the deal to sell Catacel, which no longer required its own CEO. Gary previously helped turn around UOP, and previous management positions at other advanced materials companies include W.R. Grace & Co. and Akzo Nobel.

1980s

KEVIN MCQUADE, '80, has been named CEO of Germany-based materials supplier Styrolution. Kevin joined the company in 2011 and was most recently its president of Europe, Middle East and Africa. Styrolution is a global styrenics supplier operating production sites in 10 countries. Kevin began his career in 1980 at Mobil Chemical Company.

UD ChE heavily represented in awards at ACS BIOT national meeting

UD chemical and biomolecular engineering was a major player in the awards presented as part of the Division of Biochemical Technology (BIOT) programming at the ACS National Meeting in Denver. In addition to Maciek Antoniewicz's award noted earlier, **MIKE BETENBAUGH, D'88**, professor of chemical and biomolecular engineering at Johns Hopkins, won the prestigious Marvin J. Johnson Award, and **PETER TESSIER, D'03**, associate professor in RPI's Department of Chemical and Biological Engineering, won the 2015 BIOT Young Investigator Award. Mike was one of the speakers in the department's Centennial Seminar Series and Pete returned to UD to present the Allan P. Colburn Memorial Lecture in 2012. Rounding out the ACS BIOT awards, former faculty member Anne Robinson presented the David Perlman lecture.

Alumni News

STEVE DAVEY, '81, vice president of Bio-Based Products & Services USA for global science-based DSM, helped craft a letter to President Obama highlighting the role that the Renewable Fuel Standard (RFS) plays in encouraging investment in the biofuels industry. In part, he wrote: "The RFS gives the advanced biofuel industry an opportunity to break into a motor fuel supply chain dominated by oil interests. The long-range policy certainty created by the RFS—together with your administration's commitment to the industry—made it possible for our companies to invest billions of dollars to commercialize our technologies and build the most innovative refineries in the world."

As a high school student, Steve won a chemistry scholarship of $250 (which he says he promptly spent on a stereo). But winning it made him think that if he was good enough to win an award, then maybe he should be an engineer. He earned his BS in chemical engineering from UD, which, in a recent interview with Biofuels Digest, he said is "one of the best schools in the northeast in chemical engineering."

PETER KIRLIN, D'87, was promoted from president to chief executive officer of Photronics, Inc., and also serves on the board of directors for the worldwide manufacturer of photomasks. Peter joined the company in 2008 as a senior vice president for U.S. and Europe, and was promoted to president in 2013. He spent the 25 previous years in leadership positions in the photomask and semiconductor industries, as vice president of business development at Entegris, chairman and CEO of DuPont Photomasks and group vice president of ATMI. He was also executive chairman of privately-held Akrion, Inc. Peter was one of the speakers in the department's Centennial Seminar Series.

RONALD G. FORSYTHE JR., '89, is president and chief operating officer and interim chief information officer of Quality Health Strategies. Ron previously served as vice president for planning, assessment, technology and commercialization, and as chief information officer with the University of Maryland Eastern Shore, where he established new academic programs, expanded research capabilities, supported innovations in renewable energy and pioneered efforts to make the UMES campus and lower Eastern Shore more eco-friendly in its use of energy. Forsythe brings expertise in strategic and tactical planning, information technology, engineering, renewable energy, economic and workforce development and healthcare. He was recently appointed to the board of directors of Chesapeake Utilities Corporation serving the Delmarva Peninsula

1990s

UDIT BATRA, '91, who has served as CEO and president of Merck Millipore since 2014, now leads the combined life science business following Merck's acquisition of Sigma-Aldrich earlier this year. Prior to joining Merck in 2011 to head the group's consumer health business, Udit headed global public health and market access for Novartis Vaccines and Diagnostics. Karl-Ludwig Kley, chairman of the Executive Board of Merck, described Udit as "a proven leader who has demonstrated his ability to work successfully with his leadership team to guide large organizations, drive performance and deliver to our customers."

MATTHEW NEUROCK, D'92, was awarded the 2015 Robert Burwell Lectureship in Catalysis, sponsored by the North American Catalysis Society. Matt is the Shell Professor of Chemical Engineering and Materials Science at the University of Minnesota, where he recently moved from the University of Virginia. The lectureship recognizes substantial contributions to one or more areas in the field of catalysis with emphasis on discovery and understanding of catalytic phenomena, catalytic reaction mechanisms, and identification and description of catalytic sites and species.

JESSE GOELLNER, '95, currently lives in Pittsburgh with his wife, Sonja Kerby (UD A&S '94), and his 5-year old son Freddy. He leads the local office of Booz Allen Hamilton where his primary responsibility is to leverage his management and engineering experience to assure quality delivery of energy analysis and planning support from the Booz Allen team to the Department of Energy's National Energy Technology Laboratory and Strategic Petroleum Reserve, occasionally the Tennessee Valley Authority, and all of the service branches of the Department of Defense.

Before joining Booz Allen, Jesse served as Vice President at Capital Technologies International, an early-stage firm with venture funding from Merrill Lynch, where he led a team that performed technology development, market analyses and techno-economic assessments for emerging technologies and to inform investment decisions. His teams were active in several aspects of the energy arena, with operational interests on three continents. Prior to joining CTI, Jesse drove the growth of Powercast, a leader in the wireless delivery of electrical power, from start-up above a bar to the team that won the Best Emerging Technology Award at the 2007 Consumer Electronics Show. Jesse's involvement in Powercast started while he was James R. Swartz Entrepreneurial Fellow at Carnegie Mellon University's Tepper School of Business (where he earned an MBA). Prior to this Jesse was at

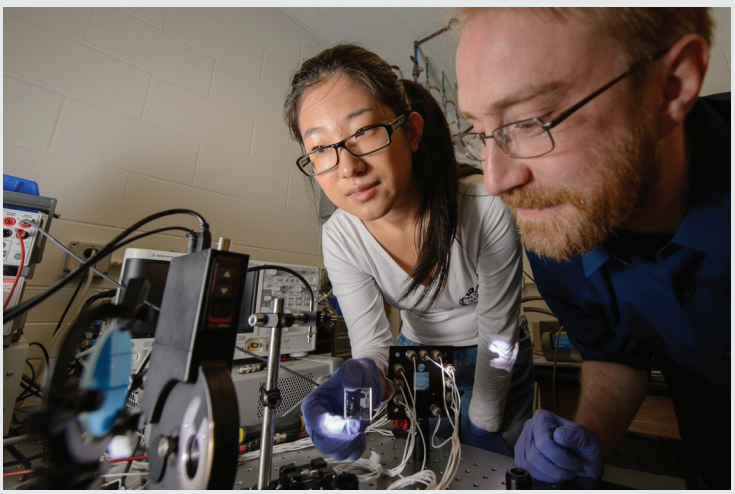
ExxonMobil Chemical in Baytown, TX, where he started after finishing his PhD in catalysis at the University of California at Davis under the mentorship of former UD faculty member, Bruce Gates. His graduate work included a concurrent appointment as a visiting scholar at the Technical University of Munich and Ludwig Maximilian University of Munich, where he applied theoretical chemistry to advance the understanding of the metal-support interface in catalysts.

SUJATA BHATIA, '99 M'99, was voted a "favorite professor" by Harvard's classes of 2014 and 2015. Sujata is a physician, bioengineer, author, professionally licensed chemical engineer and Harvard University professor and received a UD Presidential Citation for Outstanding Achievement in 2006.

2000s

RICHARD R. LUNT, '04, who has been an assistant professor at Michigan State since 2011, has developed a new type of solar concentrator that, when placed over a window, creates solar energy while allowing people to see through the window. This transparent luminescent solar concentrator can be used on buildings, cell phones and any other device that has a clear surface, and was featured on the cover of a recent issue of the journal Advanced Optical Materials. Richard was one of the speakers in the department's Centennial Seminar Series. He returned to campus this past spring as a guest speaker in the department's Centennial Seminar Series. His talk, "Unique Opportunities for Excitonic Photovoltaics and Solar Concentrators or: How I Learned to Stop Worrying and Love the Exciton," focused on his team's pioneering work developing transparent photovoltaic and solar concentrator materials that are creating new paradigms for building integrated solar harvesting and autonomous mobile electronics.

Article adapted from a Michigan State University press release
Photo courtesy of G.L. Kohuth, Michigan State University



Yimu Zhao, a doctoral student in chemical engineering and materials science ast MSU, and Richard Lunt, assistant professor of chemical engineering and materials science at Michigan State and a UD alumnus, run a test in Lunt's lab. Lunt and his team have developed a new material that can be placed over windows and create solar energy.

COLLEEN (RODGERS) SNOW, '05, has been a patent examiner at the US Patent and Trademark Office since about a month after she graduated. Her job is to determine subject matter patentability in the area intersecting chemical and electrical engineering, specifically the chemical compositions and processes involved in the formation of semiconductor devices. Colleen writes that she got married in 2008 to a wonderful man named Michael Snow, and that they have two children so far: Keira Rose (born October 2012) and Declan Michael (born December 2014). They live in Fairfax, VA, and are contemplating a move to San Antonio, TX, shortly.

WILLIAM A. TISDALE, '05, the Charles and Hilda Roddey Career Development Professor in Chemical Engineering at MIT, is using ultrasensitive spectroscopy and other techniques to study how exitons—paired groups of electrons and holes—behave in quantum dots. Will was part of the group of MIT researchers who reported the first observation of exitons in action in April 2014. "It's a little bit less common for a lot of these spectroscopy techniques that we're using to be used in chemical engineering departments, and that is a role that I am excited to play in helping to bring a lot of these advanced spectroscopy techniques to bear on problems that chemical engineers care about," he said.

YAKOV LAPITSKY, D'06, celebrated his part in internet history on the tenth anniversary of his filming of what would become the first-ever video to be uploaded to YouTube back in 2005. Yakov was in San Diego at the time to present his research, with Eric Kaler, on the interactions of surfactants with polyelectrolyte at an ACS meeting. While in town, he met up with a high school buddy at the San Diego Zoo, who asked Yakov to video him in front of the elephants. That friend was Jawed Karim, one of the three founders of YouTube. Karim uploaded Yakov's 18-second clip to the new website on April 23, 2005 and "Me at the Zoo" became the first YouTube video in what has since become a cultural phenomenon. Yakov is now an associate professor in the Department of Chemical and Environmental Engineering at the University of Toledo. A native of Leningrad in the former Soviet Union, he says he was drawn to UD for his doctoral work "because it has one of the best chemical engineering programs in the country."

Alumni News

AARON CHOCKLA, '07, was included in Forbes 2015 30 under 30 in energy who are mixing the clean and dirty for what comes next in energy. A self-described engineer turned entrepreneur passionate about commercializing cutting-edge technologies, Aaron received the distinction as co-founder and CEO of Lucelo Technologies, Inc., in Austin, TX, where he had previously completed his doctoral degree at the University of Texas. Lucelo is developing a novel energy harvesting platform to provide a renewable and sustainable source of power to run remote or mobile electronics with low power requirements without the need for batteries or cords to plug into electrical outlets. He also serves as senior consultant for Foresight Science & Technology and is on on-ice official for USA Hockey. Aaron's next stop is a dual MBA/JD program at Northwestern University.

BRIAN ROSEN, '08, has been appointed assistant professor of meterials science and engineering at Tel Aviv University. Brian did his graduate work at Illinois under Richard Masel and Paul Kenis.

MATTHEW HELGESON, D'09, received the 2015 Northrop Grumman Excellence in Teaching Award in recognition of his outstanding efforts as an early career undergraduate educator at UC Santa Barbara, where he has been an assistant professor of chemical engineering since 2012. He researches the structure and flow behavior of colloids (including nanoparticles, emulsions and proteins) in structured liquids, with the aim of engineering novel gels and particulates for applications in biotechnology, nanomaterials and energy.

"I always love meeting engineers in DuPont who have also graduated from UD and seeing how it has set them up for success in their careers."

– CAROLYN (SLUSSER) HAMILTON, '10

2010s

CAROLYN (SLUSSER) HAMILTON, '10, started working for DuPont about 2 weeks after graduation as a Field Program Engineer. This program has allowed her to be a Process Engineer based in Wilmington, DE on large capital projects all around the world, a Manufacturing Technology Engineer in Charleston, SC helping to engineer and improve Kevlar, and soon to be a Process Development Engineer back in Wilmington, DE at the Experimental station. She and her husband, David, along with their two dogs are looking forward to being back in Delaware, close to family, friends, and UD. Carolyn writes, "UD holds a special place in our hearts, as we met through the Engineering department and we hold many fond (and stressful) memories of our times spent there. I always love meeting engineers in DuPont who have also graduated from UD and seeing how it has set them up for success in their careers, I even found one down here in Charleston! It's a special bond we have and I'm looking forward to seeing it grow."

JULIE ALBERT, D'11, now an assistant professor of chemical engineering at Tulane University, was selected for the Gulf Research Program Early Career Research Fellowship.

KELLY SCHULTZ, D'11, now an assistant professor of chemical and biomolecular engineering at Lehigh, was named a TA Distinguished Young Rheologist.

JOANNA ADADEVOH '12 is in the doctoral program in chemical engineering at the University of Virginia, where her advisor is **ROSEANNE (GIVLER) FORD '84**. Joanna's project is on bioremediation, using bacteria to clean groundwater by removing chemical contaminants. She knows from her childhood in Nigeria that clean water is a precious resource and that the lack of clean water is a major issue in parts of her country and in Africa in general.

In Memoriam

WILLIAM H. CALKINS, age 96, adjunct professor of chemical engineering specializing in fuel sciences until 1999, died in his home in Hockessin on January 24, 2015.

He thrived on sharing his expertise and knowledge in chemistry with students, colleagues and family. He loved learning, as well as teaching, throughout his life, and was a frequent attendee and instructor at the University of Delaware's Academy of Life Long Learning.

Calkins spent his career with the DuPont Company, where he worked in various research and managerial positions until he retired in 1985.

FREDERICK HUGHES CHAPMAN '51 passed away October 2, 2014, in Lewes. He was 87. He enlisted in the U.S. Navy at the age of 17 and served until the end of World War II. He then finished 12th grade and enrolled at the University of Delaware, where he was a member of Sigma Chi Fraternity.

He was employed by the DuPont Company, Haveg Industries and the Thiokol Company, and operated his own business, Benchmark Technical Sales, through which he sold, serviced and produced fine instrument replacement parts for analytical devices.

DAVID E. FIELD M'58 of New Jersey, died January 26, 2015. at the age of 83. He started his career at the former Atlantic Richfield refinery in South Philadelphia and worked as a project design manager at the Savannah River nuclear site for United Engineers & Constructors, retiring in the early 2000s. In retirement, he was a high school substitute teacher.

While a chemical engineer and design manager by profession, Field's first love was making dulcimers. The New Jersey Folk Festival honored him with a lifetime achievement award for his craft, which attracted such renowned artists as Judy Collins and Doc Watson.

JAMES JOHN BEHEN III '61 of Williamsburg, Virginia, died October 24, 2014, after a brief bout with pancreatic cancer. He was 75.

Behan worked briefly for Merck & Co. before being assigned to the Army's Chemical Center in Maryland for two years. After leaving the Army, he returned to Merck where he served at manufacturing plants in Rahway, New Jersey; Danville, Pennsylvania; and Elkton, Maryland before becoming manager of Merck's Flint River plant in Albany, Georgia. In 1982, he moved to England to serve as the company's first managing director of European operations. He returned to the U.S. in 1987 and was based at the company's Whitehouse Station, New Jersey headquarters.

Giving Back

We extend our sincere appreciation to the following alumni and friends of Chemical and Biomolecular Engineering who made gifts between July 1, 2014, and June 30, 2015. Contributions from these generous individuals help us to provide the vital resources that allow our students, our faculty and our campus to thrive.

We have made every effort to ensure accuracy in both gift reporting and the listing of donors. To report an error, please contact Barbara Maylath, Director of Development, at 302-831-7273 or bmaylath@udel.edu.

* Indicates gift was designated directly to the Department of Chemical & Biomolecular Engineering.

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Haines fund continues to support women in engineering

When **RICHARD HAINES**, '57, graduated with a degree in chemical engineering, the number of women graduates in engineering could literally be counted on one hand. Today, one out of every four engineering undergraduates at UD is a woman, but Haines knew that a large, permanent base of dollars could help nudge the percentage upward. In 2013, he and his wife, Janet, gave a $300,000 gift to the College of Engineering to help advance women in engineering. "The chance to help make a difference at the University of Delaware now is very satisfying to both of us," Haines said. He has fond memories of his time at UD, including a lifelong friendship with the late **ART METZNER**, who Haines calls "a true role model of a professional engineer."

Last spring, Women in Engineering hosted an engineering career panel attended by over 75 students, faculty and staff. "The Haines gift has allowed us to access greater networking opportunities for our students and to develop ties with more industries across the country, reaching out to the broadest diversity of speakers, both geographically and professionally, than we've ever had," said **HEATHER DOTY**, assistant professor of mechanical engineering and a faculty adviser to the WIE graduate student steering committee. Panelists included **MELISSA ST. ARMAND**, D'13, National Institutes of Health (NIH) and **KELLY SCHULTZ**, D'11, assistant professor at Lehigh University. ■

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