College of Engineering
UNIVERSITY OF WISCONSIN–MADISON

FALL 2025 NEWSLETTER

DEPARTMENT OF

CHEMICAL & BIOLOGICAL ENGINEERING

Assistant Professor Quentin Dudley (left) and PhD student Sarah Noga have benefited from recent CBE upgrades, including the new state of the art Bluemke Family Biolab, where they conduct most of their research. Photo: Joel Hallberg.

Greetings!

Like clockwork, another fall semester has begun: welcoming returning students back to campus, and meeting 30 new graduate students and more than 140 freshman. Fall is a season of transition, reaping the harvest of summer and preparing for the oncoming winter. It's an apt time to take stock of our accomplishments and plan for the future.

This year, we have seen a mass of proposed changes at the federal level as agencies that have financially supported universities for decades are shifting priorities, moving to terminate grants, eliminating long-time resources and infrastructure, and delaying review of new awards. Throughout this unprecedented time of challenges and uncertainties, CBE has persevered. Research continues to thrive, with impactful discoveries in plastics recycling, sustainable energy, nutrient recovery and more. Read on to learn about our most recent discoveries in this newsletter!

Our department also continues to invest in new teaching practices. Assistant Professor Styliana Avraamidou is helping to lead the undergraduate sustainability engineering education project, which aims to ensure every undergraduate engineering student learns about sustainability in a manner relevant to their major. As our department already has a strong foundation in sustainability in our research and teaching practices, we are excited that one of our own faculty members is leading the initiative.

Despite this challenging time in academia, we welcomed three new faculty members this academic year: Jeffery Greeley, Joel Paulson and Rahul Sujanani. We are very excited to watch their outstanding research flourish here in Madison and to identify increased educational opportunities. Learn more about their research in the following pages.

Additionally, we are continuing a faculty search through the Wisconsin Research, Innovation and Scholarly Excellence (RISE) Initiative and have begun our search for two new faculty members. With this strategic faculty hiring to accompany our latest hires, we hope to strengthen our ability to pursue cutting-edge research related to sustainability, green chemistry, human healthspan, and treatments for diseases ranging from Parkinson's to cancer.

While the college broke ground for the new Phillip A. Levy Engineering Center in April, we are continuing to renovate our existing spaces to help us accommodate extraordinary demand from students as well as faculty growth in our department. We are investing in shared laboratories for our computational research groups, preparing space for new experimental labs, and looking ahead to additional renovations in our basement to accommodate future faculty and support teaching needs. As we plan for the future amid an uncertain landscape, support from our alumni and friends is critical in moving the department toward our goals to grow our department and to position it as one of the nation's top chemical engineering programs. Thanks to your partnership and support, we continue to grow and meet today's challenges.

On, Wisconsin!

Brian Pfleger
R. Byron Bird Department Chair, Karen and William Monfre Professor, Vilas Distinguished Achievement Professor

Fuel the future: Support our graduate students today!

CBE continues to thrive, and in August we welcomed 30 new graduate students! Many of the students credit the welcoming nature of our department, as well as the research opportunities, in choosing UW-Madison.

"The collaborative environment within and between departments was very appealing to me, and the city and university had a welcoming atmosphere," said one student in a comment after their acceptance.

"UW-Madison has strong research in catalysis—biofuel, energy and sustainability—when compared to other universities I pursued, and I was impressed by the department's hospitality during my visit," said another.

Your generosity now is more important than ever. You can help us ensure we can fund graduate students at a time when we are facing substantial proposed changes in federal funding and exercising increased prudence in our financial decisions. Your support allows us to continue CBE's legacy as a top-tier PhD program and enables our graduate students to deepen their understanding of real-world challenges.

Join us in making a difference!
Contact Mike Holland, senior director of development,
mike.holland@supportuw.org
(608) 440-1178

or scan this QR code to make a donation at supportuw.org.

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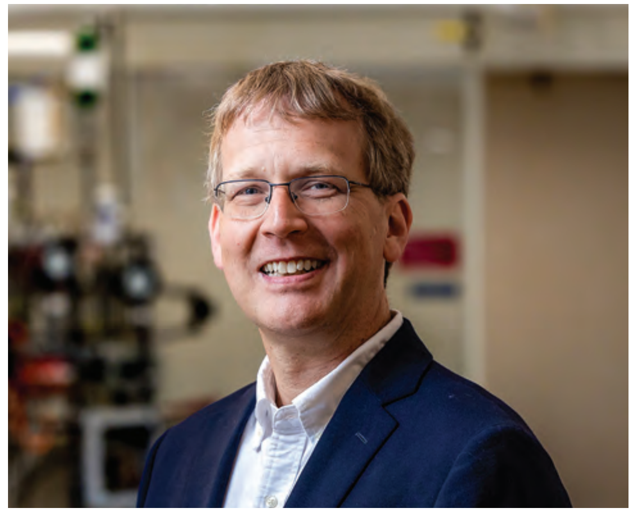
FOCUS ON NEW FACULTY

Jeff Greeley adds new energy to sustainable catalysis research



Twenty-five years after graduating with a PhD in chemical engineering, UW-Madison alumnus Jeff Greeley is returning to his alma mater as the Paul A. Elfers Professor.

Greeley is internationally regarded as one of the top researchers in computational catalysis. For the last 12 years as a faculty member at Purdue University, he's specialized in predictive catalytic design, publishing more than 200 research articles and winning many awards, including a U.S. Department of Energy Early Career Award.

After studying chemical engineering at the University of Texas at Austin, Greeley chose UW-Madison for graduate school. It was a serendipitous choice; the same year Greeley began his studies, Ernest Micek Distinguished Chair, James A. Dumesic Professor, and Vilas Distinguished Achievement Professor Manos Mavrikakis joined the faculty.

Mavrikakis was a rising star in computational catalysis, and Greeley was one of his first two graduate students. "When I came to UW-Madison and had the opportunity to talk with Professor Mavrikakis, I was enthralled by the idea of being able to predict the properties of molecules from first principles," says Greeley. "It was an almost magical concept, and it was clear that this type of work would be endlessly stimulating. We had a wonderful experience working together."

After earning his PhD, Greeley worked as a postdoctoral researcher at the Technical University of Denmark before joining Argonne National Laboratory as a staff scientist, where he worked for six years. There he began research on electrocatalysis, studying the interfaces found in batteries and materials for energy storage. "There was a whole new set of challenges," he says. "The materials are very different from what you find in most catalytic processes. Learning to simulate the processes that are relevant in batteries involved analyzing an entirely new level of structural detail than I had done previously."

Though he enjoyed his work, Greeley decided he missed interacting with students and the academic environment, so in 2013, he joined the faculty at Purdue University. Over the last decade, he and his students have focused on developing computational simulations to predict catalytic and materials properties with sustainable applications. His team has worked on modeling heterogenous catalysis reactions to produce hydrogen and fuel from biomass like agriculture waste. He and his students also have studied electrocatalysis, exploring gas and solid interfaces found in fuel cells and the liquid/metal oxide interfaces important in energy storage materials. The resulting fundamental insights have, in turn, led to successful identification of electrochemical devices with enhanced properties.

At UW-Madison, Greeley plans to continue pursuing such insights while taking his research in some new directions, including focusing even more directly on issues dealing with energy and sustainability. He also hopes to take advantage of the college and campus expertise in machine learning and AI to help accelerate his research.

Greeley says he's excited to rejoin the Wisconsin community and to work with Mavrikakis and other colleagues. "The tradition of scholarly excellence in CBE is pretty much second to none. To be a part of that environment is very exciting and stimulating for me," says Greeley. "There are world-recognized experts in computational modeling, thermal and electro-catalysis, battery science, material structures, materials predictions and sustainability. I'm excited to collaborate with a wide spectrum of experts in those fields and contribute to the broader conversation on campus."

FOCUS ON NEW FACULTY

Rahul Sujanani is developing smarter membranes

Membranes are used for all sorts of important tasks, including desalination, industrial filtration, and even kidney dialysis. Most membranes used today are not able to tackle emerging challenges; more advanced membranes, however, could open up all sorts of new technologies, from filtering PFAS and recovering precious minerals from wastewater to improving devices for cleaner energy, like fuel cells and batteries.

Rahul Sujanani, who joined CBE as an assistant professor in August 2025, is working to realize these potentials by developing design rules for new polymer membranes.

"My research is really at the interface of polymer science, materials engineering and separations," says Sujanani. "I want to understand how ions and other small molecules interact with and transport across polymers in order to design scalable membranes with more favorable properties. The goal for us is to address some of the sustainability crises related to water purification, critical mineral recovery, pollution and clean energy."

Sujanani completed his undergraduate degree in chemical engineering at Rensselaer Polytechnic Institute. He then earned his PhD at the University of Texas at Austin, where he focused on ion and water transport in water-swollen membranes, largely working with off-the-shelf materials to better understand and model their fundamental properties. As a postdoctoral researcher at the University of California, Santa Barbara, he worked on the molecular-level physics of polymer membranes used for batteries and learned new methods for synthesizing novel membranes.

At UW-Madison, he hopes to bring it all together. "I am really excited to combine those unique experiences in a new group that can help us advance beyond the handful of current membrane chemistries so that we can achieve these emerging and critical separations," he says. "We essentially want to connect molecular-level interactions in newly synthesized polymers with separation performance to enable rational design of next-generation membranes."

One key area he hopes to tackle is critical mineral recovery. Current membrane technologies are not selective, meaning that when membranes filter water, they typically separate out all salts indiscriminately.

Sujanani, however, hopes to develop very selective membranes that can filter out specific critical minerals. "If we want to pick out just lithium ions from a wastewater source that has many similar ions, that's a very different design paradigm than desalination," he says. "That's going to be a feature of my group in particular: trying to address the challenge of designing ion-specific selectivity in membranes."

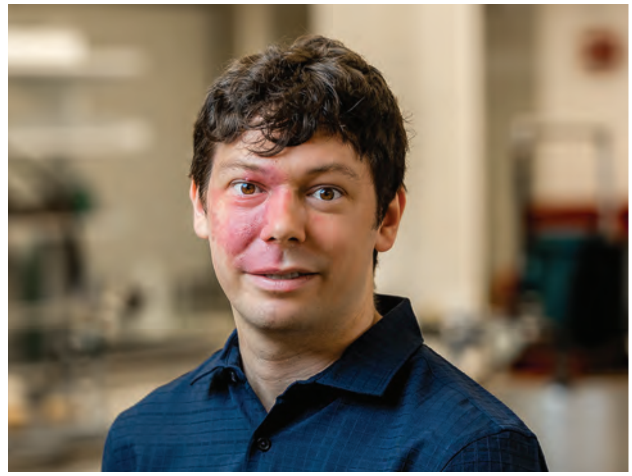
He also says his lab will work on membranes for electrochemical applications and will continue to investigate the fundamentals of water purification.

Though he has no direct links to the extensive UW-Madison chemical engineering academic "family tree," Sujanani says he already feels a strong connection. That's because of his admiration for Chemical Engineering Professors Robert Bird, Warren Stewart and Edwin Lightfoot, who wrote one of chemical engineering's foundational texts, *Transport Phenomena;* and Professor Don Paul, one of his mentors at UT-Austin and a luminary in the membrane field who earned his PhD at UW-Madison.

"The way that I learned the foundational concepts of my field is shaped so much by UW-Madison," says Sujanani. "The chance to come here and mentor and train the next generation and do cutting edge research alongside world-class faculty, staff, and students is just incredible."

FOCUS ON NEW FACULTY

Joel Paulson is using machine learning to make everything better



Algorithms are designed to guide computers and other tech in autonomous decision making. But, just like people, algorithms sometimes have difficulty making good choices, especially when faced with incomplete data or uncertainty. Joel Paulson, who joined CBE in August 2025 as the Gerald and Louise Battist Associate Professor, uses AI and machine learning techniques to make algorithms that improve predictive models and process optimization.

The work has wide-ranging applications; so far, he's applied his techniques to optimize pharmaceutical and semiconductor manufacturing, smart building management, plasma jets, colloidal self-assembly, alloy design, and drug design.

In many ways, Paulson is the ultimate team player, using his techniques to improve processes for other researchers. "I'm very application-forward, but I'm pretty agnostic; we work with all kinds of people," he says. "I'm not the expert in their domain, but I know how to basically accelerate and improve things in their domain, automate more, and get stuff off their plate. That's how I look at it."

After studying chemical engineering as an undergraduate at the University of Texas at Austin, Paulson earned his PhD at MIT, where he focused primarily on stochastic process control for pharmaceuticals, developing systems that could account for uncertainty. Later, as a postdoctoral scholar at the University of California, Berkeley, he worked on process control for semiconductor etching in collaboration with the company LAM Research. There, he became more interested in machine learning and its potential role in process control.

As a faculty member at The Ohio State University, Paulson pursued AI and machine-learning informed process control for engineering and chemistry-related research. That work earned him many honors, including a National Science Foundation CAREER Award, the AiChE 35 under 35 Award, the OSU Lumley Research Award, and the David C. McCarthy Engineering Teaching Award.

Most recently, Paulson has turned his work to molecular design, finding ways to speed up and optimize the discovery of alloys and materials on extremely tiny scales. Some of his most successful work, he says, has been collaborating with chemists seeking to design new sustainable battery materials.

At UW-Madison, he wants take things up a notch. "I want to take those ideas and start doing more high-throughput research. I want to start doing automated design, self-driving systems for molecular design and materials more broadly," he says. "Systems where a human doesn't always have to be fully in the loop. That's what I'm really excited about as I start at UW-Madison."

He's hoping to move into areas that include developing materials for batteries, optimizing catalysis to find new energy-production chemistries, and designing drugs and proteins for potential cancer therapies. But he says he's open to working with the huge variety of projects and collaborators he's likely to encounter at the university.

Over time, Paulson hopes he can take the various and wide-ranging optimization methods he's developed and synthesize them into a single unified AI system, a sort of ChatGPT for process control and optimization. "People could formulate ideas using natural language, like in large language models, then use our algorithms at the back end to connect them together and achieve a goal," he says.

Ahsan receives Grainger Wisconsin Distinguished Graduate Fellowship

PhD student Sara Ahsan received a 2025-26 Grainger Wisconsin Distinguished Graduate Fellowship, a prestigious honor for doctoral students in the College of Engineering.

Ahsan is a member of Duane H. and Dorothy M. Bluemke Assistant Professor Siddarth Krishna's lab, where she studies the reactivity and stability of supported metal catalysts that mediate hydrogen storage reactions in liquid hydrogen carriers. This work could help enable long-duration storage and transport of hydrogen, a potential source of sustainable energy.

Ahsan earned her undergraduate degree in chemical engineering from the University of Engineering and Technology, Pakistan, before working as a process engineer for Engro Fertilizers for six years. She then earned a master's degree in civil engineering focused on water resources/environmental engineering from Florida Atlantic University.

As a third-year graduate student at UW-Madison, Ahsan has already had a productive research career, developing an impressive array of technical skills and publishing work in high-impact journals.

She's also known for her outreach, mentoring undergraduate researchers, volunteering for MRSEC events, and serving as UW-Madison's institutional representative to the Catalysis Club of Chicago. Perhaps most impressive, Ahsan also balances this work with her role as the mother of two small children.

"Sara's immense talent, dedication, and passion for research have enabled her to play an irreplaceable role in the Krishna research group's successes to date," says Chair Brian Pfleger. "I am certain she will continue to positively impact the CBE department and the College of Engineering, continuing her stellar trajectory in her graduate career and beyond."

Modeling discovery in the new Richard Weaver Computational Lab

Over the summer, generous alumni Barbara and Richard Weaver visited campus to celebrate the opening of the Richard Weaver Computational Lab of Multiscale Simulation in Engineering Hall. Submitted photo.

When asked what her ideal lab space would look like, Mike and Virginia Conway Assistant Professor Rose Cersonsky noted she'd like a space with a lot of light, and enough room for her students to work and collaborate.

In July 2025, that vision became real when the department welcomed Richard (PhD ChE '64) and Barbara Weaver (BS Education '57), and their son, David, back to Madison to dedicate the Richard Weaver Computational Lab of Multiscale Simulation. Thanks to the Weavers' generosity and deep commitment to the importance of research, the Cersonsky research group now has a computational lab with large windows, low dividers that double as whiteboards, and state-of-the-art computers that encourage group members to gather and discuss their research.

Cersonsky and her students tackle important questions in computational chemical and materials sciences, with the goal of advancing knowledge and contributing to real-world solutions. "We will use this space to work on applying and developing cutting-edge advancements in artificial intelligence and machine-learning to simulate and understand complex, multiscale molecular problems," she says.

The new space will be a critical part of that. "At its core, theoretical research is, in many ways, about wrestling with ideas—turning them around, challenging them, and identifying strengths and weaknesses of specific arguments. That's not something that happens in silence," she says. "It happens in conversations, in sketches on whiteboards, in casual debates between people who have collective trust and respect. And now, because of the Weavers' support, we have a space that encourages exactly that: driving research insights and the growth of young researchers. We're excited to get to work."

CBE researchers map out a promising future for solvent-based plastics recycling

PhD student Charles Granger and recent PhD graduate Kevin L. Sánchez-Rivera are part of a generation of CBE graduate students who have pushed STRAP recycling technology forward. Photo: Joel Hallberg.

In the more than 100 years since researchers developed synthetic plastic, it has become the world's most common engineered material—used in nearly everything humans produce, from automobiles and food packaging to medical implants and electronics.

While the technology used to produce plastics has advanced rapidly, the opposite is true for methods to recycle them: Of the 400 million tons of plastic produced each year, 9% or less is recycled. Currently, there are no industrial-scale technologies that truly recover and reuse the polymers that make up plastics.

But recycling researchers are trying to catch up. One promising innovation is solvent-based or dissolution recycling, in which plastic polymers are chemically dissolved and separated, ready to be reborn as new plastic products. UW-Madison chemical engineers are on the leading edge of this technology and are eager for industry to adopt dissolution recycling at the commercial scale.

In a paper in the journal *Nature: Chemical Engineering,* they assessed the current challenges and future of solvent-based recycling projects around the world—including their own method, solvent-targeted recovery and precipitation, or STRAP.

UW-Madison PhD student and co-author Charles Granger says one major goal of this paper is to show the research community and industry just how far this type of recycling has advanced. "Dissolution recycling is a viable technology worth adopting," he says. "Even at this early stage, it promises both significant environmental benefits over virgin plastic production and strong economic potential. We're hoping to encourage broader participation in advancing dissolution recycling by highlighting the current state of this technology."

Most plastics recycling today is mechanical, limited to a small, specific set of single-layer plastics. Solvent-based recycling methods, however, can overcome many issues that limit mechanical recycling. Solvent processing removes additives like colors and other chemicals. It can also separate out different types of plastic, allowing recyclers to process mixed plastic materials like electronic waste, unsorted bales of plastic, and multilayer food packaging. Most importantly, solvent processing leaves the plastic's long polymer chains intact, creating a final product that is "near virgin." For example, a recycled water bottle can be recycled into a new water bottle using the recovered resins.

An undergraduate student project led Richard L. Antoine Professor George Huber to the concept of solvent-based recycling, and Huber ran with it. Over the last six years, colleagues Styliani Avraamidou, Victor Zavala and Reid Van Lehn, along with a generation of CBE graduate students, have developed and refined the patented STRAP process. Collaborators at other universities also joined in as part of the U.S. Department of Energy-sponsored Center on the Chemical Upcycling of Waste Plastics led by Huber.

According to the paper, STRAP and similar technologies face two major bottlenecks: removing contaminants and scaling up the process. Researchers are tackling both issues, and currently, the team is close to launching a pilot-scale plant at Michigan Technological University capable of recycling 55 pounds of plastic per hour.

STRAP is just one solvent-based recycling technology nearing commercial viability; other solutions are advancing as well. The UW-Madison team, however, doesn't see the other efforts as competitors; in fact, Van Lehn says he hopes colleagues worldwide can help each other move forward as a field. "There's so much plastic waste material out there and everyone is tuned to processing a particular feedstock," he says. "We estimate that in North America, Europe and Japan, solvent-based recycling could be close to a $25 billion per year business. It's hard to imagine one company capturing that whole market. There's enough plastic for everyone."

In the future, finely tuned transforming catalysts could be more efficient energy converters

Understanding how and why tiny copper nanocatalysts like this one evolve during chemical reactions will aid in the design of new nanocatalysts.

In 2022, a team of researchers at the University of California, Berkeley, recorded real-time movies of extremely tiny nanocatalysts undergoing dramatic changes during carbon dioxide reduction reactions, which are an important step in making sustainable liquid fuels for fuel cells.

With Manos Mavrikakis, the Ernest Micek Distinguished Chair, James A. Dumesic Professor, and Vilas Distinguished Achievement Professor, they've published both theoretical and experimental details in the journal *Nature Catalysis* for why those changes happened.

In research, most mainstream models of catalytic reactions assume that the catalysts themselves maintain rigid, unchanging surfaces during chemical reactions. So when the Berkeley researchers noticed molecules moving and evolving on the surface of the nanocatalyst, they were surprised.

The team—led by Peidong Yang, a professor of chemistry at UC Berkeley, and postdoctoral fellow Yao Yang, now an assistant professor at Cornell University—reached out to long-term collaborator Mavrikakis, along with postdoctoral scholar Marc Figueras-Valls, to better understand the evolution of the mobile molecules they recorded.

The groups' work resulted in a two-year study of copper nanocubes as a model system to explore this emerging model of catalysis.

Recording the actions of nanocatalysts, which can be 10,000 to 100,000 times thinner than the width of a human hair, was an incredibly difficult task, and required the resources and expertise of researchers across several institutions. Using a technique called *operando* transmission electron microscopy, the Berkeley and Cornell teams recorded real-time videos of the copper nanocubes undergoing transformations.

The team also used a technique called Raman spectroscopy to find copper carbonyl, a molecule predicted by Mavrikakis' model that is unusually difficult to detect, confirming that the theory and experimental evidence were converging.

Ultimately, the team found that a lot was going on at the nanoscale: During the carbon dioxide reduction reaction catalyzed by the copper nanocubes, carbon dioxide becomes carbon monoxide. The carbon monoxide then interacts with the copper nanocubes, creating the molecule copper carbonyl while other copper atoms migrate and reform into amorphous copper clusters and copper nanograins, which facilitate the catalytic reaction.

All of that was a good thing: The team used the newfound understanding of the evolution process to fine-tune catalysis. For instance, the researchers found differences in the end product depending on the starting size of the copper nanocubes. They also found that techniques like adding oxide coatings to the nanocubes can affect their evolution.

Armed with the blueprint of this model reaction and these new imaging and analytical techniques, the team can now use similar methods and theories to discover or design other nanocatalysts that could improve sustainable production of chemicals, including fuel for fuel cells, green hydrogen and ammonia for fertilizers.

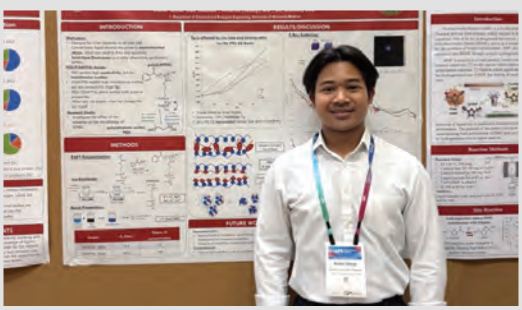
Research helped Aidiel Ikmal Bin Abu Hassan find his path

Graduating senior Aidiel Ikmal Bin Abu Hassan had always been interested in research, but wasn't sure what to pursue. "I struggled to figure out what area I wanted to go into," he recalls.

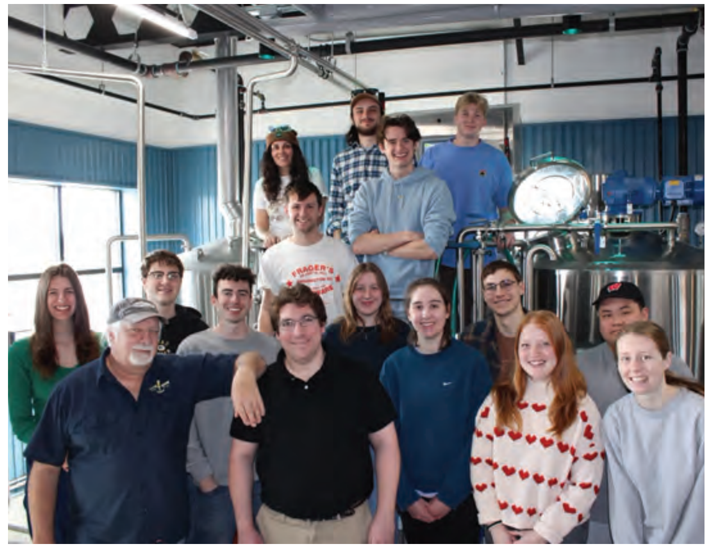
That changed during his junior year when two close friends encouraged him to stay in Madison over the summer with them to try research. One day during office hours, he was chatting with his TA Jenny Wu. "I asked her about her research—and that was the beginning," he says.

Wu, who would later become his mentor, introduced him to her work on polymer electrolytes for solid-state batteries in Assistant Professor Whitney Loo's lab. The topic aligned perfectly with Hassan's growing interest in energy storage.

That summer, Hassan joined the Loo Lab as the only undergraduate member. "I came in every weekday after my morning shifts at the Badger Market downstairs in our building," he says. "Every day I learned something new and got hands on experience in the lab."



In the spring, his passion was recognized with a 2025–2026 Wisconsin Hilldale Undergraduate/Faculty Research Fellowship, one of the university's most competitive and prestigious undergraduate research honors. The award concludes an undergraduate career that is now propelling Hassan toward graduate study and continued research. "Undergraduate research has been one of the most valuable experiences of my life. It opened my eyes to what I really want to do," he says. "Without it, I wouldn't have chosen grad school. Now I feel confident about what's next."



Students in CBE's first fermentation class visited the Lake Louie Brewery in Oconomowoc to get a first-hand look at industrial scale fermentation. Submitted photo.

A fermentation first

In spring 2025, 12 CBE seniors signed up for the department's first fermentation course. Their initial project was to design a recipe for an ESB, extra special bitter beer, that they would brew in the John C. Kuetemeyer Instructional Laboratories.

In teams, the students created their own recipes with different types of malts, hops and other variables to make their brews distinct. For the students' midterm exams, a panel of judges—civil and environmental engineering alum and brewmaster Ryan Koga from Karben4 Brewing, head brewer Eric Brusewitz from Great Dane Brewing Company; and brewmaster Kirby Nelson, bartender Carlyn Ross and Lake Louie Brewing President Kevin Zerman—evaluated the six beers based on whether they adhered to the classic ESB style, which included color, taste, and aroma. The last factor they weighed was the "finish" of the beer—which for Nelson meant a beer he could imagine sitting down with on a warm summer day.

Nelson thought the students did a very good job. "All the recipes were very nice interpretations, and all had great hue to them," he says.

In the end, a brew called Smooth Criminal brewed by Michael Maggiacomo and Jackson Puent won in a close competition. As a surprise, the winning recipe was brewed at the five-barrel scale at the Lake Louie brewery in Oconomowoc, Wisconsin; later, on a field trip to the brewery, the students helped add hops to the brew and learn about the differences between their lab-scale operations and industrial-scale brewing.

Beer wasn't the only topic of the class. Students also learned about fermentation via yeast, SCOBY (a culinary starter) and lactose. For a final project, students pursued their own fermentation projects, including sauerkraut, strawberry hard cider, plum wine, ginger beer, and even Kvass—a Slavic fermented bread drink.

Engineers' Day award recipients

In 2025, two chemical engineering alumni earned College of Engineering honors for outstanding career contributions.

Kevin Nelson
BSChE '79
Senior Fellow, Amcor Global Core R&D

From end-to-end refrigeration to automated preparation and packaging systems, the modern food system is full of mind-blowing engineering feats that transport products from farm fields and processing plants into our cupboards quickly and safely. But perhaps the most impressive—and overlooked—innovations are the plastic bags and pouches used to package everything from fresh potatoes and broccoli to applesauce and snack chips.

Over the last 45 years as a researcher with the Neenah, Wisconsin-based Bemis Company (now Amcor), Kevin Nelson has helped engineer these plastic films, each with its own unique properties.

"Most people probably aren't aware of the complexity that characterizes a lot of these materials," says Nelson. "Well, that plastic bag that wrapped the cheese you bought last week might be made of a dozen layers made of different materials in there to keep it safe and nutritious."

Working in R&D, Nelson has developed many innovations (most are proprietary), leading to 27 U.S. patents and four president's awards for outstanding technical achievement from his company. He has also served on the advisory board of the college's Advanced Materials Industrial Consortium and its Center for the Chemical Upcycling of Waste Plastics. That center is working with Nelson and Amcor on new ways to use chemical solvents to recycle some of the company's multilayer plastic packaging.

Nelson says he's happy to have contributed to the plastics industry—but he's even more excited to move the industry into a new age. "We'll have to look retrospectively to see what the big innovation is, but I think it will have a lot to do with enhancing sustainability and the end-of-life of the things we make," he says.

Cedric Kovacs-Johnson
BSChE '15
CEO and Founder, Flume Health

Over the last decade, Cedric Kovacs-Johnson has held many titles, including engineer, entrepreneur, inventor and CEO. But the title that best describes him is problem-solver.

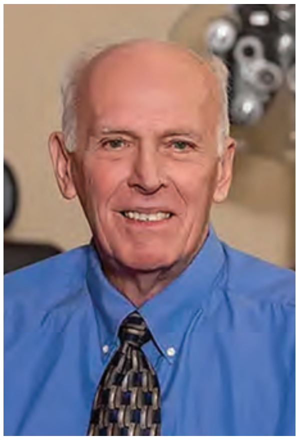
As an undergraduate, he decided to skip traditional internships and instead spend his summers working on engineering competitions. An automated French press he designed (which he called the American press) won second place in the College of Engineering's Innovation Days competition; more importantly, the experience exposed him to 3D printing, which he soon became obsessed with.

The following year, his design for Spectrom, a device that adds color to 3D printers, swept the same competition; even more, it led to two patents, a gold medal at the National Inventors Hall of Fame Collegiate Inventors Competition and, eventually, a company that he sold to major 3D print company MakerBot.

Soon, however, Kovacs-Johnson came across an even bigger problem he wanted to solve: health insurance. "It started with my little sister. I watched her during her ramp up to brain surgery for epilepsy. It was roughly 18 months of back and forth with our insurance plan," he says. "This led me to the conclusion that if you're a patient in the United States, your outcomes probably have more to do with what insurance you have than what doctor you have."

His solution was Flume Health; founded in 2019, the company offers a data integration platform for the healthcare industry. Backend systems within insurance companies and health providers are often fragmented, antiquated and unable to communicate with one another. Flume serves as a universal translation layer across all these systems and formats so they can exchange data—improving communication, transparency and consumer choice.

So far, the company has raised more than $40 million in venture capital and is implementing the platform with a wide array of insurance providers.



Badger beginnings to biomedical breakthroughs

John Martens (BSChE ’68) built a career that spans polymer chemistry, defense, materials science, consulting, and now biochemistry and biomedicine. As a chemical engineering and chemistry double major, Martens credits a formative conversation with Professor Robert “Bob” Byron Bird and the university’s collaborative environment for shaping his path. More than five decades later, his work continues to impact lives through a new venture developing treatments for blinding eye diseases.

At the beginning of his *Transport Phenomena* class, grappling with his passion for both chemistry and engineering, Martens sought Bird’s advice directly. “I asked him, ‘What is the greatest weakness of chemical engineers?’” Martens remembers. “He struck his forehead with the back of his hand and said, ‘They don’t know enough chemistry.’ That was all I needed to hear.”

Martens enrolled in chemistry, becoming a double major. After graduation, he worked for 35 years for 3M, where he took on myriad projects, including developing top-secret carbon fiber for fighter jets and new processes for creating polyester resins. He secured 19 patents that produced $3 billion in revenue annually and was elected to 3Ms innovator hall of fame.

In 2003, he founded Thimble Peak Consulting, helping companies solve technical challenges; in 2009 he co-founded Snyder Biomedical with Dr. Robert Snyder, a fellow UW-Madison alum and physician-scientist. The mission: to develop treatments for blinding eye diseases like glaucoma and age-related macular degeneration. They developed MaculaPM, a patented oral capsule designed to slow the progression of age-related macular degeneration, which recently hit the market.

Martens says he hopes young engineers will consider aligning their careers with personal passion. “Find a mission that matters to you,” he advises. “It’ll fuel you in ways a paycheck never could.”

Faculty news

Howard Curler Distinguished Professor Eric Shusta received a 2025-2026 UW-Madison Kellett Mid-Career Award. The five-year award provides support and encouragement to faculty at a critical stage of their careers.

Sobota Associate Professor Reid Van Lehn received a UW-Madison Vilas Early Career Investigator Award, which recognizes research and teaching excellence and provides flexible research funding for three years.

Duane H. and Dorothy M. Bluemke Professor and Vilas Distinguished Achievement Professor David Lynn is principal investigator on a Research Forward project using machine learning-assisted platforms to detect PFAS in water.

James A. Dumesic Professor Manos Mavrikakis is leading a Research Forward project investigating ways to design inexpensive, abundant, sustainable materials to produce hydrogen. Duane H. and Dorothy M. Bluemke Assistant Professor Siddarth Krishna and Conway Assistant Professor Whitney Loo are co-principal investigators and Duane H. and Dorothy M. Bluemke Assistant Professor Styliana Avraamidou is co-investigator.

Mavrikakis has been appointed Linnett Visiting Professor by the Yusuf Hamied Department of Chemistry at the University of Cambridge beginning in fall 2025. The professorship is the highest honor Cambridge’s chemistry department can bestow on a foreign scientist.

Steenbock Professor and Harvey D. Spangler Professor Mike Graham was named UW-Madison interim associate vice chancellor for research, where he will help oversee the university’s $1.5 billion annual research portfolio and help manage research policy and compliance.

Student news

Undergraduate researcher Grace Zhang received a sophomore research fellowship for her work with Siddarth Krishna.

Undergraduate researcher Aidiel Ikmal Abu Hassan received a Hilldale Ungraduate/Faculty Research Fellowship for his research with Assistant Professor Whitney Loo. Jacob Damro earned the Hilldale Fellowship for his research with Richard H. Soit Assistant Professor Mai Ngo.

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CBE spinoff company wins Governor's Business Plan Contest

Galasys, a spinoff company with roots in CBE, took first place in the advanced manufacturing category of the 22nd annual Wisconsin Governor's Business Plan Contest.

The company was co-founded in fall 2023 by Jarryd Featherman, Richard L. Antoine Professor George W. Huber, and Scott Rankin, chair of the Department of Food Science.

Galasys manufacturing technology, which has been patented through WARF, involves converting a dairy food processing byproduct into tagatose, a natural, low-calorie sweetener. Tagatose has 63% fewer calories and a 95% lower glycemic index than table sugar, while delivering 92% of the sweetness.

This provides the dairy industry with a high-value revenue stream and adds a new sustainable solution for dairy waste disposal while addressing food industry gaps. More than other currently available sugar alternatives, tagatose tastes and functions like real sugar, giving food companies a better option to create reduced-sugar products.

The Wisconsin Governor's Business Plan Contest is produced by the Wisconsin Technology Council and a growing list of partners, led by the Wisconsin Economic Development Corp. It engages contestants in a five-month process that includes the opportunity to work with mentors and receive feedback from judges.

Members of the Galasys team show off the company's pilot plant. From left to right: Jarryd Featherman, Wenjia Wang, Hoya Ihara, and Scott Rankin. Submitted photo.