College of Engineering
UNIVERSITY OF WISCONSIN–MADISON

SPRING 2026 **NEWSLETTER**

DEPARTMENT OF

CHEMICAL & BIOLOGICAL ENGINEERING

Greetings from Madison!

This spring season, we are managing lots of changes, from faculty recruitment to the new Phillip A. Levy Engineering Center. As we prepare for growth and expansion, we like to imagine all that we can accomplish when projects are completed. But the blood, sweat, tears and hard work we invest are just as valuable—challenging us in new ways and providing us with learning opportunities that keep our minds active and sharp. It's an exciting and transformative time.

Across the street, our college's new building is laying down its roots: The construction team has dug its foundation and is now pouring cement. A 253-foot-tall crane was installed and will remain here until most of the main seven-story structure is complete. From my chair on the second floor of our building, I cannot see the top of it, unless I stand right next to the window and "crane" my neck!

After a successful fermentation lab course last spring, our students will be brewing a German Alt beer this time around for the midterm tasting panel of judges. These brews must be pleasantly malty, relatively hoppy and dark gold to amber in color. Evaluated on taste, aroma and color, the winning recipe will be brewed at five-barrel scale at Lake Louie Brewing in Verona, Wisconsin.

For the second spring in a row, we interviewed candidates for faculty positions under the Wisconsin Research, Innovation and Scholarly Excellence (RISE) Initiative. We are excited to move forward in the hiring process and hope to welcome new faculty this fall. With this strategic hiring, we aim to pursue cutting-edge research related to sustainability, green chemistry, human healthspan and treatments for diseases ranging from Alzheimer's to cancer.

While our college's new building progresses, we continue our own work on existing spaces. Assistant Professor Rahul Sujanani's new lab is moving to final design and demolition, and we're opening the ceiling for electrical and HVAC renovations. He has also acquired the necessary glassware and probes to start measuring membrane permeation for separation science.

We are also planning for grand openings of new state-of-the-art computational laboratories designed to foster collaboration between Paul A. Elfers Professor Jeffrey Greeley and Gerald and Louise Battist Associate Professor Joel Paulson. We are seeking support for both projects and naming opportunities are available.

If interested, please contact WFAA Associate Vice President and Managing Director **Mike Holland**, mike.holland@supportuw.org, (608) 440-1178.

On, Wisconsin!

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

On the cover: CBE students taking part in Summer Lab 2025 in Limerick tour the Ardnacrusha Power Plant, which provided the first hydroelectric power to Ireland in 1929. Submitted photo.

Photo: Joel Hallberg

Ignite the future: Support our undergraduate students today!

CBE continues to grow and in September we welcomed more than 140 undergraduate students. With our renovated Kuetemeyer Instructional Laboratories, we are seeing continuous and growing interest in our program. Combined with recent additions to our faculty, we look forward to welcoming even more students.

Many of our students are inspired to address the world's most pressing challenges, including two students who won awards at the 2025 AIChE annual meeting. "I study chemical engineering because it provides a pathway to address global environmental crises. The broad spectrum of courses highlights how widely applied chemical engineering is across industries, demonstrating versatility and impact," says one student about wanting to be a chemical engineer.

Your support is more important than ever. You can invest in individual students through scholarships, facilitate undergraduate research participation, or help the department celebrate and recognize students' academic success. Supporting them during this critical time can provide students with unique opportunities and allow them to dedicate themselves to their studies. Your generosity allows us to continue CBE's legacy as a top-tier program and enables our students to change the world!

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New project brings sustainability education to all engineering undergrads

A new College of Engineering initiative aims to ensure that every undergraduate engineering student learns about sustainability in a manner relevant to their major while they're at UW-Madison.

Duane H. and Dorothy M. Bluemke Assistant Professor Styliana Avraamidou and Civil and Environmental Engineering Associate Professor Andrea Hicks are leading the Undergraduate Sustainability Engineering Education project.

They have recruited instructors for classes across all of the college's majors, and in biological systems engineering in the College of Agricultural and Life Sciences, who are natural choices to add relevant lessons about sustainability.

"We had the idea to meet with faculty who are teaching required classes that already look like they might be good fits to see if they're interested," Hicks says. "So it's a bottom-up approach, and the idea is that all of the undergraduates get exposed to sustainability in a way that's sympathetic to their field. I think that's more impactful for our students than just taking the same sustainability class across the board."

The team spent the fall 2025 semester planning with interested faculty, and began trialing classes in spring 2026, including Avraamidou's classes, CBE 450: *Process Design* and CBE 470: *Process Dynamics and Control*.

The three-year project, which is supported by the National Science Foundation, uses the Engineering for One Planet framework, which aligns with ABET (Accreditation Board for Engineering and Technology) requirements.

> "A key learning objective will be to develop systems thinking—learning to see beyond the boundaries of their designs and understand how engineering choices influence broader systems."

CBE had already been preparing to incorporate sustainability education into its curriclum, so the project came at an opportune time to bolster those efforts.

Sustainability often brings to mind a focus on environmentally friendly practices. While that is a part of it, Avraamidou and Hicks say the concept extends to economic and societal considerations. Each of the three "legs" of sustainability—environment, economy, society—can interact with the other.

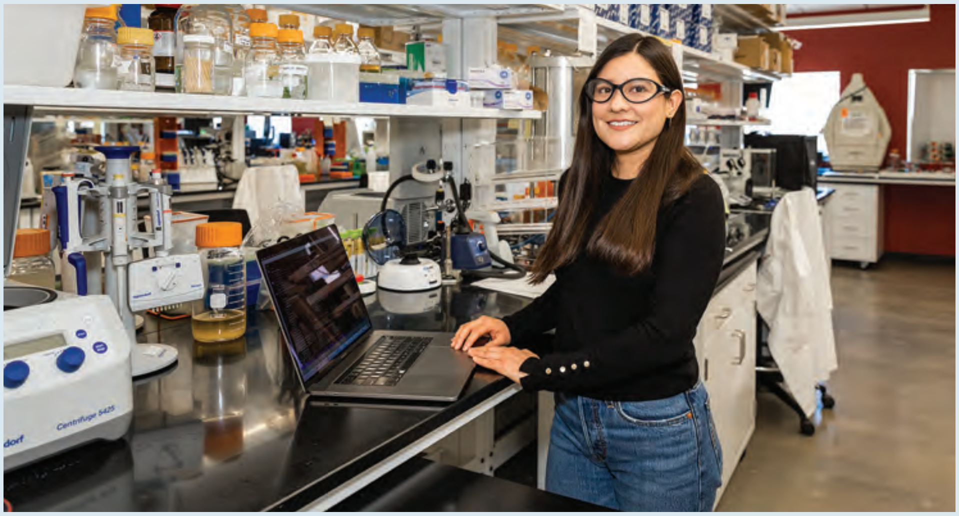
In short, the team says, sustainability is about smart resource stewardship. This includes ideas such as the circular economy, which seeks to minimize waste by recycling, remanufacturing or otherwise reusing products and materials for as long as possible. It can include ensuring that production and supply chains have enough materials to remain resilient in the face of shocks like the COVID pandemic. It can explore how to best use materials for which the United States might not have tremendous domestic supplies.

"A key learning objective for the students will be to develop systems thinking—learning to see beyond the boundaries of their designs and understand how engineering choices influence broader systems," Avraamidou says. "That influence might be environmental, but it also extends to economic and social dimensions. It's not just about reducing greenhouse gas emissions; it's about recognizing the complexity and interconnectedness of the systems we're part of."

Avraamidou and Hicks want to integrate sustainability into the undergraduate education experience in a way that suits each major. Avraamidou says embedding the lessons into core classes in different majors could make them more interesting and applicable to students as they progress through their education and begin their careers.

"One piece of feedback I often get from students is that they know sustainability is important, but they don't really understand how to use it," Hicks says. "So the goal here is that we go beyond just saying this is important to teaching them this is how you might think about this in your discipline so that you can take it with you when you go out into the real world."

The new Undergraduate Sustainability Engineering Education project will add relevant sustainabilty elements to courses, like this environmental engineering mechanics lab, throughout the College of Engineering. Photo: Joel Hallberg



Our future in space may rely on freeze-dried microbes and a lot of patience

When Brenda Cansino-Loeza joined UW-Madison as a postdoctoral researcher three years ago, she had plenty of experience working on earth-bound projects; her research focused on developing tools to make the water-energy-food nexus more sustainable. So, she was a bit surprised when Baldovin-Dapra Professor Victor Zavala offered her the chance to work on a DARPA-funded collaboration focused on designing biomanufacturing systems for space.

Now, she has published a paper and delivered a NASA technical report discussing how choosing the right bacteria and the right preservation method could be the key to long-term survival in orbit.

Why grow microbes in space?

This project was a collaboration with the University of Texas at Austin. Their team was working on the biological side, developing radiation-resistant microorganisms that could survive in zero gravity and produce lactic acid, a platform chemical used to make polylactic acid, a biodegradable polymer that can be used for 3D printing. If you can produce polylactic acid in space, you could use it for 3D printing tools, replacement parts, or even building materials on demand.

We said, OK, let's think of this as a living factory in space that produces a platform chemical that can be used to manufacture a wide variety of products.

What was your role in the project?

In space, there are a lot of resource constraints, and it is very expensive to send everything up from Earth; by some estimates, it costs $10,000 per kilo. One way to produce value-added products in space could be through these biomanufacturing systems.

I conducted a technoeconomic analysis to compare which is better: sending materials directly from Earth to space, or sending the resources needed to deploy a system that could produce those materials in space.

We mapped all the design components, such as feedstocks, power, cooling and equipment into a common basis in terms of mass. By doing this, we could estimate how much material would need to be transported from Earth, estimate the launch costs, and compare different systems designs.

So, what is the best way to grow microbes in space?

One important finding from our research is that preservation strategies that work well on Earth may not be optimal in space. On Earth, microbes are typically preserved in liquid cultures for fermentation.

But in space, factors such as radiation and microgravity can increase the challenges of maintaining liquid cultures. We evaluated lyophilization—or freeze-drying—as an alternative preservation method. This process removes water from the microbes, allowing them to be stored in a dry and stable form at room temperature.

We found we can save a lot of mass by using freeze-dried microbes, since the liquid culture requires continuous cooling, which adds energy demands. We also found that a strain of *E. coli* engineered to produce lactic acid has the best performance.

Is lactic acid the only thing you can biomanufacture in space?

No, many different products could be produced through biomanufacturing. The broader goal is to connect different biomanufacturing systems so that the outputs or waste streams from one process can serve as inputs for another, creating more circular systems and reducing the need to send supplies from Earth.

Could these microbes produce habitats on the moon?

Producing materials for lunar habitats is possible, but it would take time. Biomanufacturing systems produce materials gradually, so they could help generate materials locally during future space missions.

Are there more space projects in your future?

I never thought I would be working on a project related to space, but it was a great opportunity. We even traveled to Cape Canaveral to meet with the team in person, discuss results and visit some of NASA's facilities. This project, for me, was a first step into this field, and it showed me that there are many opportunities for research in this area!

Featured image: By analyzing the mass, cost and productivity of lactic acid biomanufacturing systems, Brenda Cansino-Loeza is helping determine which systems could best support long-term space missions. Credit: Joel Hallberg

Versatile new electrolyte could enable an electric future

Reid Van Lehn

A team including Sobota Associate Professor Reid Van Lehn and CBE affiliate Fang Liu has developed a new electrode-agnostic electrolyte, which is a step toward a more efficient, energy-dense battery that could supplant today's ubiquitous lithium-ion batteries. This new battery type—an initially anode-free sodium-ion battery—is a leading candidate for powering future electric vehicles or storing energy in the electrical grid.

The team is also using the new electrolyte as a model system to understand how to manipulate molecules in the electrolyte so that the medium is compatible with dissimilar battery components.

The team, led by Liu, an assistant professor of materials science and engineering, MS&E PhD student Qianli Xing and CBE PhD student Ziqi Yang, published details of its advance in the journal *Nature Communications*.

Typically, batteries are made up of two electrodes—an anode (negative side) and a cathode (positive side)—as well as a liquid electrolyte. In this case, the "initially anode-free" aspect of the battery means its physical anode forms internally upon the battery's first charge—making it simpler, less expensive and more energy-dense.

Containing solvents and dissolved salts, the electrolyte is the liquid medium that touches all parts of the battery's cells and, in its charging or discharging process, helps ions travel between the electrodes.

In a battery, the anode and cathode are different materials —for example, graphite, hard carbon sodium or lithium for the anode and a transition metal oxide like lithium nickel manganese cobalt oxide or sodium nickel iron manganese oxide for the cathode.

One of the challenges in developing next-generation batteries is that there's not a one-size-fits-all electrolyte that performs effectively with both electrode material types. Conversely, when an electrolyte contains multiple solvent molecules, controlling their interactions and behavior is challenging.

Tweaking the electrolyte is a balancing act involving multiple factors, including how solvent molecules in the electrolyte form a "shell" around ions that could accelerate or impede the ions' movement between anode and cathode—which ultimately affects battery charging and discharging, along with overall battery performance. "Using this model system, we are basically trying to understand whether we can present different molecules to different electrode surfaces—for example, an anode-stable solvent to the anode, and then a cathode-stable solvent to the cathode," says Liu. "In this way, the electrolyte mixture would ideally behave like an anode-stable solvent at the anode, and like a cathode-stable solvent at the cathode."

To create its new electrolyte, the team mixed two ether-based solvents, 2-methyltetrahydrofuran, or 2-MeTHF, which is more stable at the anode, and tetrahydrofuran, or THF, which is more stable at the cathode. Importantly, they found a way to rationalize electrolyte design: Solvents that dominate the first shell around positively charged ions that travel between electrodes are key to anode stability, while "free" or more weakly bonded solvents are important to the stability of the cathode side. "Through this electrolyte engineering work, we were trying to demystify what determines the stability of the anode and cathode separately, and how to present suitable molecules to both electrodes," says Liu. "The key factor is the population of solvents in the first solvation shell versus outside, and their location determines their presentation during the battery formation process."

Computational testing, conducted by Van Lehn, and his student Jung Min Lee, played a significant role in the research as well. They used all-atom molecular dynamics simulations to predict the composition of solvent molecules near sodium ions and determine whether those ions "preferred" one solvent over the other. "Our results indeed found—in good agreement with experiments from the Liu group—that we could identify a single strongly interacting solvent (2-MeTHF) and a weakly interacting solvent (THF)," says Van Lehn. "We further used these calculations to relate this behavior to the relative strength of interactions of each type of solvent, providing molecular-scale insight that can be extended to even more complex mixtures to continue optimizing electrolyte design."

The research lays the groundwork for the next steps in developing not simply sodium-metal batteries, but also other new alternatives to lithium-ion batteries. "Through this research, we start to understand that the solvent and anion interactions become really important," says Liu. "We're trying to expand our solvent library to manipulate these kinds of interactions, to see whether this kind of working principle can be applied to broader solvent libraries and different battery chemistries."

MS&E Assistant Professor and CBE affiliate Fang Liu (left), PhD student Qianli Xi and their team have used both experimental and computational methods to create a new, more efficient electrolyte for future batteries. Photo Joel Hallberg

Looking at education through a chemical engineer's eye

Victor Zavala

At its heart, education is a process. Students move step by step through their curriculum and, if all goes well, this results in an end product: Graduates equipped to thrive in the real world.

That's why we decided to apply our process systems engineering techniques to the chemical engineering undergraduate curriculum. Published in the journal *Computers and Chemical Engineering* last fall, this work provides insights and new ways of thinking for educators in engineering—and in other disciplines—as they assess and update their curricula.

The effort began nearly a decade ago when Baldovin-DaPra Professor Victor Zavala wrote a proposal for a National Science Foundation-funded CAREER award. His research project explored modular chemical processes, or designing processes using standardized units that can be connected like LEGOs instead of designing each new process from scratch.

As part of that proposal, NSF also required him to develop an educational component. "Digging a little bit into the research literature, I realized modularity is a principle that applies in almost everything you do, including education," says Zavala. "If you think about it, a course that you take in undergrad is a module that has topics embedded in it. I thought we could use the same notions of network theory and modularity to try to think about how the topics in the curriculum are connected, and identify which ones make sense to group together and which one are most critical."

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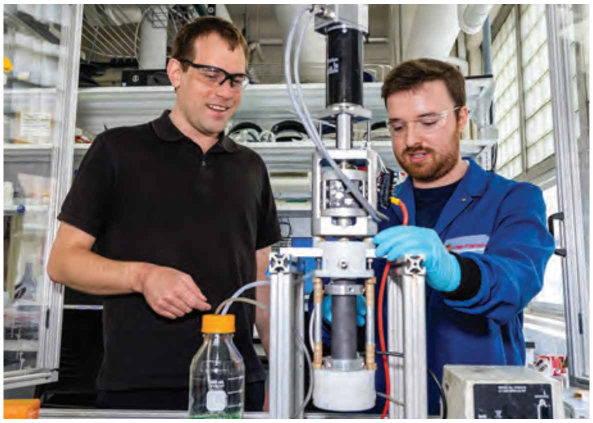
Zavala tapped PhD student Blake Lopez to expand the idea. Lopez talked to instructors of all the core CBE undergrad courses at UW-Madison, developing an extensive database of topics covered in every course in the core curriculum. He also investigated how, in the minds of the instructors, the topics are interconnected to form a logical flow. Then, using algorithms, graph network theory and optimization tools, Lopez evaluated and built visualizations of the curriculum.

In their analysis, Zavala and Lopez found that our chemical engineering curriculum was very close to optimal in terms of how topics are arranged into courses. But the point wasn't really to assess the existing curriculum. Instead, the project's goal was to provide information on what topics are critical for students to master, as they connect with many other topics. This is information that can help instructors reinforce topics and communicate to students the relevance of such topics in later courses. "We need to do a good job making sure students understand these key topics because they are going to be used for everything else," says Zavala. "If they don't master them, they are going to struggle moving forward."

Lopez is now putting some of these ideas into practice as a teaching assistant professor at Lehigh University. Zavala is continuing the research in his lab and is simplifying some of the visualizations from the project to make its conclusions more user friendly. He's also putting the research into action, helping CBE map out and visualize its undergraduate pathway as the department undergoes its periodic curriculum review.

Zavala says these same optimization techniques can apply to other disciplines and educational processes. He hopes to develop tools for a broader set of users. "A network is a universal kind of abstraction, so you can apply it to chemical processes, energy systems or educational topics," he says. "Once you start to see the world as networks, you just cannot stop seeing them."

By thinking of undergraduate education as an abstract network, it's possible to understand how different courses, like the transport lab shown above, and related topics connect. Photo: Joel Hallberg



Marcel Schreier receives Sloan Foundation Fellowship

Richard H. Soit Assistant Professor Marcel Schreier is one of six UW-Madison faculty members awarded a prestigious 2026 Sloan Research Fellowship. The award, presented by the Alfred P. Sloan Foundation, honors the creativity, innovation and accomplishments of researchers who stand out as next generation leaders in their fields.

Schreier investigates fundamental questions in electrochemistry and electrocatalysis, including how electric fields drive chemical conversion and how and when energy is transferred during the catalytic cycle. Understanding these questions could lead to the development of new types of sustainable chemistry, including the electrification of the chemical industry and the interconversion of electrical and chemical energy, leading to new types of energy storage.

Since joining UW-Madison in 2019, Schreier has earned several high-profile awards for his research, including a Packard Fellowship for Science and Engineering, a Beckman Young Investigator Award and a National Science Foundation CAREER Award. He was selected as a Kavli Fellow by the National Academy of Sciences in 2024 and received a UW-Madison Vilas Associates Competition award earlier in 2026.

"The Sloan Research Fellows are among the most promising early-career researchers in the U.S. and Canada, already driving meaningful progress in their respective disciplines," says Stacie Bloom, president and chief executive officer of the Alfred P. Sloan Foundation. "We look forward to seeing how these exceptional scholars continue to unlock new scientific advancements, redefine their fields, and foster the wellbeing and knowledge of all."

There are 126 fellows from 44 institutions in the 2026 cohort, chosen from more than 1,000 nominees. Winners receive $75,000, which can be used to advance their research. UW-Madison has had 115 Sloan Research Fellows since the program began in 1955.

Marcel Schreier and PhD student Zach Oliver work on a reactor designed to improve organic electrosynthesis, one of many fields Schreier investigates. Photo: Joel Hallberg

Whitney Loo Siddarth Krishna

Whitney Loo and Siddarth Krishna lead advanced materials projects

Conway Assistant Professor Whitney Loo and Duane H. and Dorothy M. Bluemke Assistant Professor Siddarth Krishna are part of projects selected for the National Science Foundation Designing Materials to Revolutionize and Engineer our Future (DMREF) program.

Loo is principal investigator on a four-year project with colleagues at the University of Illinois and Air Force Research Lab. The team will develop photoresists compatible with new extreme ultraviolet (EUV)-based lithography methods used in the production of computer chips.

EUV lithography, the latest technology used by U.S.-based manufacturers, has the potential to enable more powerful chips by packing higher volumes of small electronic components onto a single chip.

Finding photoresists that can work with this process and pattern these extremely tiny features is essential to the success of this technology. Loo and her colleagues will investigate the local molecular structure of polymer-based photoresists to understand how patterning works on the nanoscale level and how this translates to manufacturing outcomes. They will then use elements of chemistry, processing, characterization and computation to design new polymer-based photoresists that can enable this cutting-edge lithography.

Krishna serves as lead principal investigator on a project which also includes Ernest Micek Distinguished Chair, James A. Dumesic Professor, and Vilas Distinguished Achievement Professor Manos Mavrikakis and Paul A. Elfers Professor Jeff Greeley.

Currently, researchers don't fully understand the nanoscale dynamics of how catalysts change during reactions. In this project, the team will use advanced computer modeling accelerated by artificial intelligence and machine learning along with experimental tools to study how catalyst structures evolve during reactions. They will use these tools to look at the production of ammonia fertilizer, which uses huge amounts of the world's energy to produce, and try to find new energy-efficient catalysts for the process. They will also study the possibility of using earth-abundant catalysts to "crack" or break the bonds in ammonia to make hydrogen, a potential alternative energy carrier.

The goal of DMREF is to get new materials to market faster and cheaper than what it possible through traditional research methods. The translation of fundamental research toward manufacturing and application is facilitated through valuable partnerships with a variety of federal research programs and international partners.

Photo: Althea Dotzour / UW–Madison

Jeeva Premkumar took the plunge coming to Wisconsin

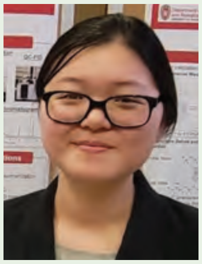
Jeeva Premkumar likes to say he took a formative leap—into an icy Lake Mendota—after he got to campus, but the student speaker for Winter 2025 Commencement was not necessarily new to taking big steps.

Born in the Democratic Republic of the Congo, Premkumar moved to Kenya for boarding school at age 10 and then to India to finish high school. He moved to Madison in search of a challenge that wasn't just academic. "I've always loved the sciences. And I've loved problem solving," he says. "I wanted a program where research wasn't just something you watched from a distance; it was something you participated in. I saw an opportunity at UW-Madison where I could work on impactful science from day one, and that sort of sealed the decision for me."

So, he set off to yet another continent, for a major in chemical engineering and for a new community in an entirely unfamiliar climate. Enter: the lake (literally). Granted, it's not really a UW-Madison-endorsed method of self-exploration for new students, but friends managed to talk Premkumar into taking the plunge. Premkumar was already struggling to get used to the Wisconsin cold, but the experience was far from a disaster. It was even a little fun. "It sounds absurd, but I feel like a lot changed around that moment," he says. "It helped me realize the importance of having the confidence to step out of my comfort zone, to reach for opportunities. That's the message I want to share at commencement."

As a student, Premkumar received an American Heart Association research fellowship, which supported his work using stem cells to study the structure and function of heart tissue in the lab of UW-Madison cardiologist Timothy Kamp. He also held internships with Moderna, contributing to research on new drug-delivery methods, and with Lactalis Heritage Dairy in Wisconsin, where he worked on utility plant upgrade projects.

His proudest leap was also a step toward home. Premkumar won a Wisconsin Idea Fellowship in 2025 from the Morgridge Center for Public Service. Alongside nonprofit Let Africa Live, he has used the funding to expand educational access to children affected by civil war in the eastern provinces of the Democratic Republic of Congo."That was something personal to me," he says. "But that's part of being a Badger. UW-Madison offers opportunities like this to apply what you've learned in school, to have an impact on an international scale. I'm thankful for that."



Grace Zhang wins Sophomore Research Fellowship

As a recipient of the 2024-2025 Sophomore Research Fellowship for her work as a member of the Krishna Sustainable Catalysis Research Group, Grace Zhang is advancing work on cutting-edge hydrogen storage technologies. One of the university's most competitive undergraduate research honors, the award provides $3,000 to the student recipient and $500 to the faculty project advisor to work in collaboration on research projects. With it, Zhang hopes to address real-world environmental challenges.

UW-Madison's strong emphasis on research and interdisciplinary learning is what drew her to Madison. She knew she wanted hands-on experience with environmental issues, and chemical engineering presented the perfect blend of theory and application. "I was interested in a career focused on sustainability, and the problem-solving aspect of engineering really appealed to me," she says.

The CBE department's research in areas like materials, energy, and catalysis only deepened her interest. Curious to explore research as a potential career, Zhang joined the Krishna lab. "I wanted to see if research was something I would enjoy long-term, and the sustainability angle was a perfect fit for my interests," she says.

Her research project focuses on the development of efficient catalysts for hydrogen storage. Hydrogen, as a clean energy source, holds great potential for addressing the intermittent nature of renewable energy sources like solar and wind. However, the challenge lies in efficiently storing and releasing hydrogen for long-term use. Zhang's work focuses on liquid carrier molecules, which can reversibly store hydrogen through chemical bonds. "Hydrogen can be produced from renewable energy, but effective storage is key to making it a viable long-term energy solution," she explains.

Her research investigates bimetallic catalysts—catalysts made from two different metals—to improve the dehydrogenation process, which is the critical step of releasing hydrogen from the liquid carriers. The ultimate goal is to design catalysts that increase energy-storage efficiency, making hydrogen a more practical solution for renewable energy storage.

With her fellowship support, Zhang is excited to continue her research in hydrogen storage and seeing how her project can evolve. She's also keen to explore further how chemical engineering can contribute to solving larger-scale environmental challenges.

Contributing to a project with real-world applications has also given her a deeper sense of purpose in her studies. "The skills I've gained here, especially writing proposals and learning to communicate complex ideas, have been invaluable," she says.

Madeline Bingenheimer blends music and engineering

When not studying or in class, CBE sophomore Madeline Bingenheimer plays the violin as part of the All-University Philharmonic Orchestra. The Waukesha native says concern for the environment is what drew her to chemical engineering, which she is pursuing with a focus on energy efficiency through a Certificate in Energy Sustainability. "I hope to learn how to make energy systems more efficient and shift toward renewable resources over fossil fuels," she says.

After graduation, she hopes to work abroad in critical areas like biofuels, nuclear energy, or hydrogen fuel research. Bingenheimer notes that the relevance of her curriculum has been a highlight, particularly CBE 250: *Process Synthesis*. She describes the course as the "first class that truly simulates what real-world chemical engineering looks like," finding excitement in seeing the challenges and opportunities that lie ahead.

Amidst her demanding schedule, she is an active member of the All-University Philharmonic Orchestra and last year, she was a part of the of the University Symphony Orchestra. For her, being part of a university orchestra brings a welcome variety to her college career and helps to keep her passion for music alive. "Being part of a large ensemble is incredibly rewarding and has made my time at UW-Madison even more fulfilling," she says.

More than just a hobby, the act of performance is a collective effort that she finds profoundly meaningful. "Each member brings a unique background, but when we come together, it's incredible what we can accomplish by performance day," she says. "Performing at the Hamel Music Center is so inspiring! I feel honored to share the stage with such talented musicians."

Submitted photo

This dual commitment to engineering and music has provided her with invaluable preparation for her future career. She credits the collaborative nature of the orchestra with helping her hone essential soft skills. A recent opportunity to travel to Europe as part of an orchestra further strengthened her skills and reinforced the global perspective she hopes to maintain. Managing the rigorous demands of engineering is challenging enough, but Bingenheimer must also manage orchestra rehearsals, performances and other commitments, which has forged a strong sense of discipline and time management. She views music as a strategic tool for managing academic pressure and a welcome break from her intensive STEM coursework. "Even though it takes concentration and hard work, it's rewarding in a different way," she says. "Juggling rehearsals and coursework can be challenging, especially during midterms, but it's taught me discipline, time management, and how to stay intrinsically motivated."

Jacob Damro wins Hilldale Research Fellowship

CBE senior Jacob Damro's natural aptitude for problem-solving, science and math led him to pursue a chemical engineering degree so he could learn a broad and versatile skill set applicable to multiple industries.

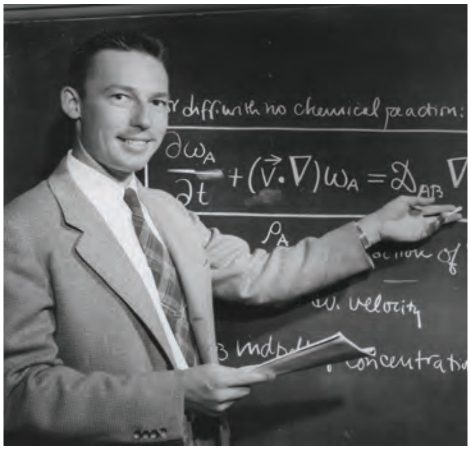
His research project, funded by a Hilldale Undergraduate/Faculty Research Fellowship and guided by Richard H. Soit Assistant Professor Mai Ngo, focuses on a critical global health challenge: brain cancer metastasis. He aims to create a "tissue-on-chip" model of brain microvasculature and study how tumor cells exit blood vessels and invade brain tissue, a process known as extravasation. This model could help scientists identify therapeutic targets to treat or prevent brain metastasis, offering hope for a disease with a poor prognosis.

The potential applications of this research extend far beyond brain cancer. "With some small tweaks," Damro notes, "our tissue-on-chip model can help us study other aspects of brain cancer metastasis as well as other neurodegenerative disorders such as Alzheimer's, Parkinson's, and multiple sclerosis."

This experience has not only deepened his scientific understanding but has also added a new dimension to his undergraduate journey. "Balancing my coursework with academic research as well as the meetings, conferences and fellowship applications has added a lot of value to my experience because of the variety I had in my weekly tasks," he says.

While his research is impressive, Damro's life is far from all work and no play. He loves learning from and interacting with faculty, and he particularly enjoyed his time in summer lab. "My partner Nathan Holland and I got to perform a variety of experiments including brewing beer and making beef jerky and protein-based biofilms," he shares. "Our hard work paid off when we won an award for best team at the end of the lab!"

He's also the vice president of the campus International Society of Pharmaceutical Engineering (ISPE), which helps students connect with the pharmaceutical industry. He's also a student assistant within CBE, where he helps beginning students navigate the tougher parts of their courses.



Reflections on CBE from Bob Bird

What makes UW-Madison's CBE department so special? Legendary Professor Bob Bird, who passed away in 2020, had some thoughts. His words, even now, offer a warm and deeply personal perspective on a department that shaped the chemical engineering field and nurtured countless minds.

Bird treasured Madison's natural areas and beauty. He was equally impressed by UW-Madison's culture: the friendly and collaborative relationships between professors and students, both undergraduate and graduate. This creates an environment where the joy of learning and the fun of exploring truly thrive. Additionally, it's just as important to facilitate collaboration across different departments, a quality that has profoundly shaped CBE and its contributions to various fields.

Bird's own career perfectly shows this spirit of exploration beyond traditional boundaries. Even with his PhD in chemistry, he was hired by Professor Olaf A. Hougen to teach chemical engineering.

As a faculty member, Bird actively worked with colleagues in engineering mechanics on research, which led to the creation of the Rheology Research Center. This was a truly interdisciplinary effort, bringing together people from mechanical engineering, chemistry and chemical engineering. Perhaps even more surprisingly, Bird collaborated with a professor in the German department to write a textbook about Dutch literature. Later, he teamed up with Ed Daub on several books, translating technical Japanese.

This kind of wandering outside one's usual field is not always allowed in academic settings, but was encouraged at UW-Madison.

This supportive culture also extended to the creation of what would become a cornerstone in chemical engineering: the *Transport Phenomena* textbook. In 1957, when Bird, along with Warren Stewart and Edwin "Ed" Lightfoot, began working on the first edition of this groundbreaking textbook, they received the full support and encouragement of their department. Bird points out how remarkable it was that he and Lightfoot had only joined the department in 1953, and Stewart in 1955. They were still early in their academic career, yet these three "youngsters" were empowered to make a major change in the curriculum with the department's full approval. "This level of trust and freedom would be rare in many other departments," recalls Bird.

The department was also a trailblazer in integrating the biosciences into chemical engineering, notably when Hougen hired Ed Lightfoot for that purpose, tasking him with developing a biochemical research and education program. Bird also states the department was among the first to offer courses in kinetics and process control, further solidifying its reputation for innovation.

Beyond its own advancements, CBE has been a launchpad for leaders who went on to establish and shape other prominent chemical engineering departments across the country, including the University of Minnesota and the University of Delaware, among others.

Bob Bird's reflections paint a vivid picture of a department that has not only shaped the field of chemical engineering but also provided a unique and supportive academic home for its faculty and students. Thinking back on his long and rewarding time at UW-Madison, Professor Bird expressed deep satisfaction before he passed. His hope for the future was that the department continues to uphold its traditions of innovation, collaboration, interdisciplinary thinking, and a supportive environment that truly fosters the joy of learning.

Abraham Lenhoff elected to the National Academy of Engineering

Alumnus Abraham Lenhoff (PhDChE '84), was elected to the National Academy of Engineering (NAE). Lenhoff is the Allan P. Colburn Professor of Chemical Engineering at the University of Delaware. He is one of 130 U.S.-based and 28 international members elected to the academy's 2026 class.

NAE members are among the world's most accomplished engineers and are chosen for their significant contributions to engineering research, practice or education.

The academy recognized Lenhoff for his research addressing protein-protein, protein-surface and colloidal interactions leading to major advances in protein purification technologies.

Lenhoff's research seeks to analyze, control and exploit molecular interactions involving proteins and colloidal particles including theoretical and experimental work dealing with both the fundamentals—transport, kinetic and thermodynamic phenomena—and their interaction in the process environment.

Lenhoff's PhD mentor was Edwin Lightfoot, the legendary UW-Madison researcher who pioneered the field of transport phenomena in biological systems, a legacy Lenhoff carries on.

FACULTY NEWS

Conway Assistant Professor Whitney Loo received a 2025 UW-Madison Vilas Faculty Early Career Investigator Award. The award recognizes research and teaching excellence and provides flexible research funding for three years.

CBE recognized Associate Professor Reid Van Lehn with the John T. and Magdalen L. Sobota Professorship. Established in 1991 by Magdalen L. Sobota in memory of her husband, John Sobota, a 1932 chemical engineering graduate, the professorship has elevated the work and impact of many exceptional faculty members over several decades.

Richard H. Soit Assistant Professor Marcel Schreier is one of 24 UW-Madison faculty winners of the 2026-27 Vilas Associates Competition. The award recognizes new and ongoing research of the highest quality and significance and is available to tenure-track assistant professors

STUDENT NEWS

Senior Morris Yen won the overall first place award in the Undergraduate Student Poster Competition in Computing, Simulation and Process Control at the American Institute for Chemical Engineers conference in November 2025. Senior Jacob Damro won third place in the Food, Pharma and Biotech Student Poster Competition.

ALUMNI NEWS

Alumnus Arturo Jiménez, (PhDChE '82), a longtime professor of chemical engineering at the Instituto Tecnológico de Celaya, received an honorary doctorate from the University of Guanajuato in December 2025. His work on the design of energy-efficient distillation systems has led to significant energy savings. During his 40-year career, he has mentored more than 80 graduate students.

Pfleger elected to AIMBE

The American Institute for Medical and Biological Engineering (AIMBE) elected Karen and William Monfre Professor Brian Pfleger to its 2026 College of Fellows.

Election to AIMBE honors individuals who have made outstanding or pioneering contributions to engineering and medicine research, practice, education and related fields and technologies. This election places Pfleger in the top-2% of engineers in these fields; to be part of this elite group, which includes Nobel Prize laureates and fellows of the National Academy of Engineering, researchers must demonstrate a commitment to embracing innovation in the service of improving the healthcare and safety of society.

The institute acknowledged Pfleger for his pioneering contributions to the metabolic engineering of microorganisms for sustainable chemical production and outstanding leadership to the biotechnology community.

Pfleger's research focuses on synthetic biology. Using a variety of tools and metabolic engineering techniques, he and his team pursue projects that include producing value-added fuels and platform chemicals from organisms like *E. coli*, yeast and cyanobacteria. They also work on microbes than can enhance agricultural sustainability and remediate nutrient pollution, among other projects aimed at solving societal problems through synthetic biology.

Over his career, Pfleger has received many awards, including a National Science Foundation CAREER Award, DOE Early Career Award, Air Force Young Investigator Program Award, the Bessel Research Award from the Alexander von Humboldt Foundation, and many accolades from UW-Madison and the College of Engineering.

Pfleger was among 175 new AIMBE fellows inducted at a ceremony during the Institute's annual meeting held in April 2026.

Zavala elected NAI senior member

Baldovin-DaPra Professor Victor Zavala was named a senior member of the National Academy of Inventors (NAI). Zavala is one 230 inventors from 82 NAI member institutions around the world selected to the 2026 class of senior members.

NAI senior members are active faculty, scientists and administrators with success in patents, licensing and commercialization and have produced technologies that have brought or aspire to bring real impact on the welfare of society. They are rising stars who foster a spirit of innovation within their communities and institutions while educating and mentoring the next generation of inventors. Senior members are nominated by NAI member institutions to recognize their outstanding innovators and foster a culture of innovation and invention on their campuses.

Zavala's work focuses on computational mathematics, including the development of theory, algorithms and software to tackle problems that arise in diverse scientific and industrial applications. He and his students develop new techniques and tools to model systems and facilitate the analysis and solution of complex optimization problems.

His work has applications in far-ranging fields, including data science and machine learning, sustainability, energy systems, process control and more. He and his students have undertaken dozens of projects, including analyzing manure and nutrient control in agriculture, optimizing space biomanufacturing and even analyzing undergraduate education.

"This year's Senior Member Class is a truly impressive cohort. These innovators come from a variety of fields and disciplines, translating their technologies into tangible impact," says Paul R. Sanberg, NAI president. "I commend them on their incredible pursuits and I'm honored to welcome them to the Academy."

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CBE welcomes kid scientists to E-Hall

In December 2025, 240 excited young innovators filled the commons of Engineering Hall; working in teams, the fourth- through eighth-graders built and programmed autonomous LEGO robots before completing various missions on a themed game field, to earn points. These aspiring Badger engineers were participants in a Wisconsin FIRST LEGO League (FLL) regional tournament hosted by two Madison-area high school robotics teams and the Madison nonprofit BadgerBots.

FLL uses hands-on challenges to engage kids in STEM through designing, building and coding LEGO robots and solving real-world challenges as a team—and in the process, building their skills in critical thinking, coding and design. At the Madison regional tournament, in addition to the robot design, judges also evaluated teams on an innovation project and on core values, which include teamwork, inclusion and gracious professionalism, as well as collaboration and respect. For the innovation project, teams spent up to three months researching a real problem related to the season's theme, which was archaeology and human history. At the competition, they presented their innovative solutions followed by questions and feedback from the judges.

CBE helped to host the event, with distinguished teaching faculty member Andrew Greenberg providing outreach activities aided by Professor Victor Zavala and 14 CBE students. Richard L. Antoine Professor George Huber and Kumuda Ranjan, wife of Grainger Dean of the College of Engineering Devesh Ranjan, both served as team coaches.

"These hands-on experiences not only teach problem-solving and teamwork—which are critical skills for engineers—but they also help young students see themselves as future engineers and innovators," says Ranjan. "By engaging them now, we're building a strong pipeline of talent that will shape the technologies and solutions our world needs."