College of Engineering
UNIVERSITY OF WISCONSIN–MADISON

SPRING 2025 NEWSLETTER

DEPARTMENT OF

CHEMICAL AND BIOLOGICAL ENGINEERING

Greetings! Spring is known as a season of renewal and growth and has brought many exciting events to the department that we hope are harbingers of great success in the coming years.

Spring started early for the Dudley research group with a new project, its first federally supported one, to create plant-based "living refineries" that convert carbon dioxide into aromatic compounds. The novel approach could provide a sustainable source for building blocks that make up important industrial products like plastics, resins, fuel and semiconductor materials.

A new course is germinating in our instructional laboratories! After last year's successful pilot fermentation lab, this spring we offered an official fermentation course to 12 exceptional seniors. This time around, students cultivated firsthand knowledge of the brewing process with additional guidance from brewmasters at Lake Louie Brewing of Verona, Wisconsin. In teams of two, students designed recipes for an extra special bitter, brewed their recipes in the lab and a midterm exam panel evaluated them. As a surprise to the students, the winning recipe was brewed at five-barrel scale at the Lake Louie brewery in Oconomowoc, Wisconsin, while the students watched. In the future, we hope to continue collaborating with Lake Louie and perhaps see student-developed beers enter the local market.

This semester, we interviewed 12 candidates for faculty positions we are hiring under the Wisconsin Research, Innovation and Scholarly Excellence (RISE) Initiative. RISE aims to address significant, complex challenges facing Wisconsin and the world with strategic faculty hiring in areas including artificial intelligence, sustainability and the health span. Soon we hope to introduce new experts who will reinforce and broaden CBE efforts in these areas.

We also hope to continue renovating our facilities, building new support for graduate students, and enabling our young faculty to develop into academic stars. Support from our alumni and friends ensures our department will continue to grow and educate the best chemical engineers in the world. We thank you for your confidence in CBE!

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!

Your support has the power to shape the future. At a time when the value of universities and research investment is under scrutiny, your generosity is more important than ever.

Your investment energizes research and helps graduate students deepen their understanding of real-world challenges. Your support also enables them to mentor undergraduates and inspire the next generation of innovators.

Join us in making a difference!

Contact: Mike Holland
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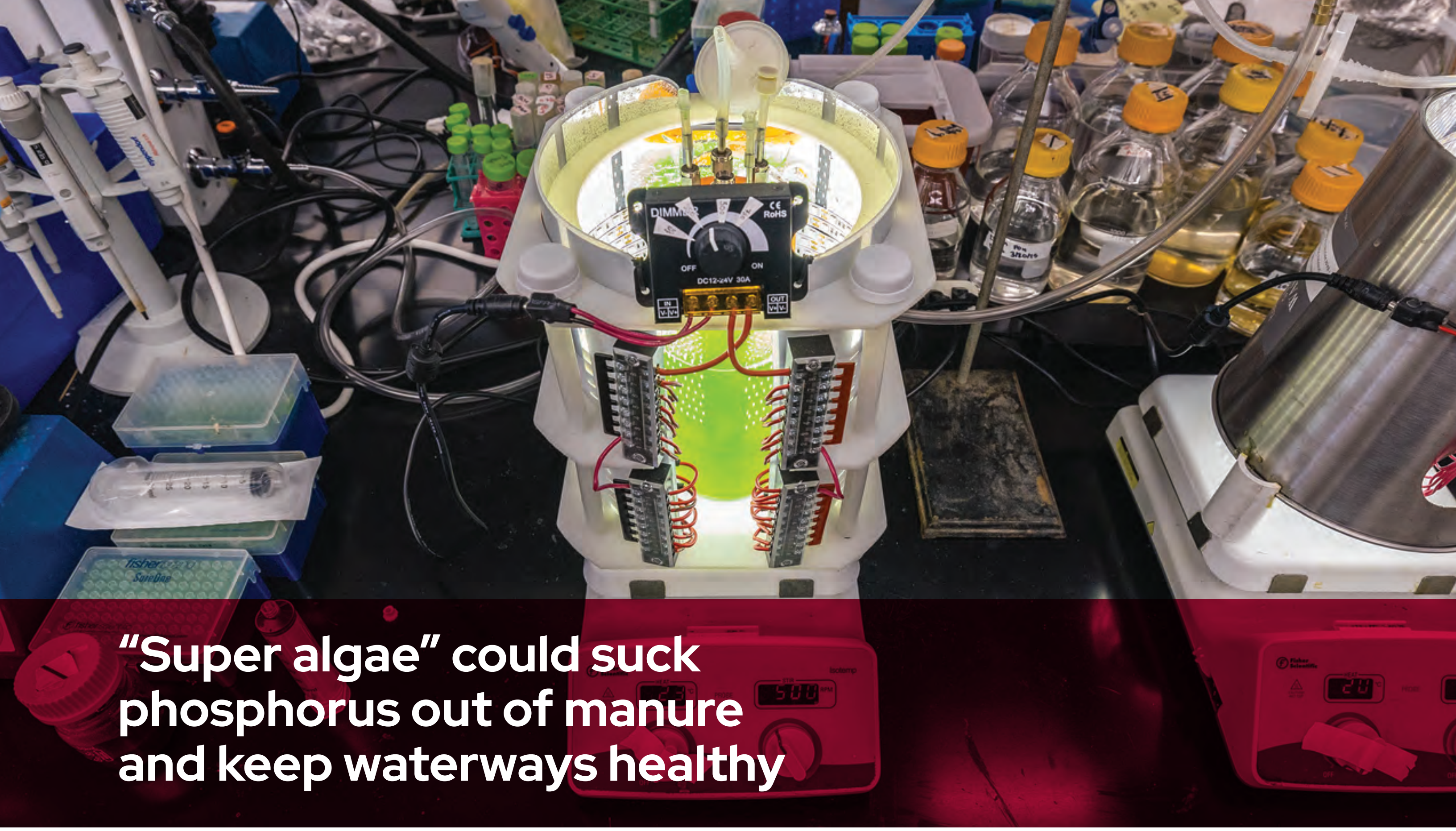
On the cover: Working out of the Bluemke Family Bioengineering Laboratory, new Assistant Professor Mai Ngo and her students aim to advance regenerative medicine—in particular, leveraging cell-to-cell signaling to fine-tune engineered tissue. Submitted photo.



“Super algae” could suck phosphorus out of manure and keep waterways healthy

A team led by CBE postdoctoral scholar Ted Chavkin has developed a new strain of cyanobacteria, also known as blue-green algae, which takes 8.5 times the phosphorus out of manure compared to its wild counterpart.

These supercharged bacteria are at the heart of a new manure-treatment system, which prevents phosphorus from dairy farms from polluting waterways.

“Farmers are in a place where they can’t operate more sustainably because of profit margins, and the state can’t force them to because it would be either too expensive or would harm the farm industry,” says Chavkin, whose research is part of a National Science Foundation-funded project led by Baldovin-DaPra Professor Victor Zavala in collaboration with Karen and William Monfre Professor and Vilas Distinguished Achievement Professor Brian Pfleger. “It’s the perfect situation for new technology to try to fix the problem.”

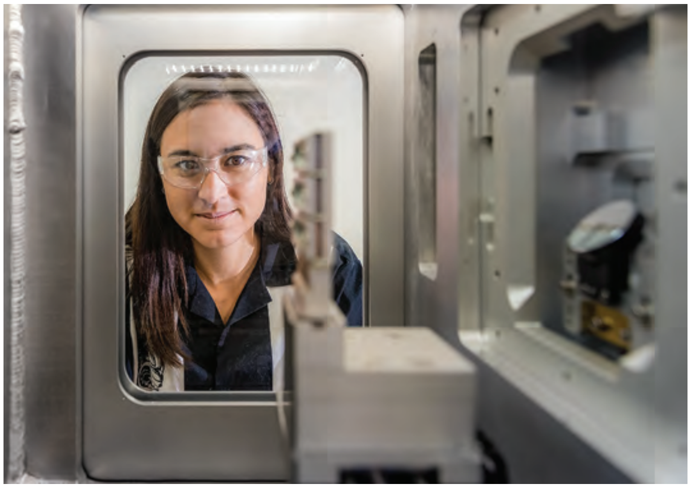
Phosphorus pollution is an issue around the world; the nutrient, which is mined from phosphate deposits, is critical to crop growth and is a big element in synthetic fertilizers as well as manure, which is often spread on farm fields. The problem is that overapplication of manure causes phosphorus to build up in the soil over time. When the nutrient is washed into streams, rivers and lakes, it can lead to powerful toxic blue-green algae blooms that are harmful to humans and animals and impact tourism and property values.

Led by postdoctoral scholar Ted Chavkin, engineers pioneered a cost- and resource-effective method for extracting and reusing nutrients from manure. Photos: Joel Hallberg

To keep the phosphorus in manure out of the water, the team has developed a nutrient capture system that allows its algae to gobble up all the phosphorus it wants in a controlled bioreactor. Then, the phosphorus-rich algae is dried, crushed into powder and used in a new biofertilizer.

In his research, Chavkin found that increasing expression of a specific gene caused the algae to take up 850% more phosphorus. This tweak drastically increases the efficiency of the manure-processing system. It now takes just a fraction of the cyanobacteria previously needed to slurp the phosphorus out of a batch of manure, reducing overall costs and water usage.

Putting the system into practice will require the team to work with farmers to showcase the benefits of algae-based biofertilizer. But the team is optimistic that prototype systems will soon be munching away on manure at a farm near you.



Whitney Loo is engineering the heart of next-gen batteries

The U.S. Department of Energy selected Conway Assistant Professor Whitney Loo for a prestigious 2024 Early Career Research Program award.

Loo's project is aimed at engineering a new type of electrolyte for use in batteries, which could lead to safer, cheaper and more energy-dense battery chemistries.

Batteries are made of two electrical terminals—one called a cathode and a second called an anode—and an ion-rich electrolyte in between. The chemical reactions among these elements determine how stable, efficient and durable a battery is.

To improve a battery, researchers must find better anode and cathode materials and more innovative electrolytes. That's where Loo's research comes in. An expert in developing new polymers—materials with long chains of molecules like plastics, rubber and proteins—she is designing materials called "single-ion conducting polymer-blend electrolytes." These new materials combine one polymer that contains ions and one that can transport ions.

"We're blending two different polymer-containing components to try to maximize two important properties that are typically not found in a single material," says Loo. "Practically, that correlates to things like fast-charging and high-current-density applications."

In other words, better batteries. Loo's new electrolyte, which she describes as slightly goopy, could enable next generation lithium-metal batteries by creating a stable interface with lithium metal. That stability reduces the threat of battery fires or explosions. It also cuts down on a phenomenon called dendrite growth, which can lower battery performance or lead to failures.

As part of her research, Loo also plans to swap lithium for different ions, like potassium, magnesium and sodium, to see how they change the electrolyte's structure and ion transport capabilities. This is an important step in moving beyond lithium to safer, cheaper, more sustainable rechargeable batteries.

Thatcher Root is helping turn plants into plastics

Kreuz-Bascom Professor Thatcher Root is part of a research team that has developed a new process that could help make plant-based plastics and other alternatives to fossil fuels more economically viable.

Root, along with chemistry professor Shannon Stahl and researchers with the Great Lakes Bioenergy Research Center, used oxygen to break down a tough form of plant fiber called lignin into chemicals that resemble the building blocks of many plastics and textiles currently made from petroleum.

Lignin, a polymer that binds together sugars and provides structure to plants, is the world's most abundant natural source of aromatics, an important class of organic compounds. But industries like paper mills and biorefineries typically burn lignin for heat because it is difficult to break down into useful components.

Using a new reactor design, the team is able to process lignin and remove the aromatic products before they begin to degrade. In tests, the reactor produced impressive yields of aromatics within minutes from both hardwood and softwood lignin as well as the messier kraft lignin produced by pulp and paper mills.

Once the lignin polymer is chopped up, the aromatic molecules can be fed to genetically engineered microbes that convert them into valuable chemical products. One appealing target is muconic acid, a chemical that can be easily turned into adipic acid, one of the primary ingredients used to make plastics and textiles.

One of the advantages to using an oxidation process is the resulting molecules dissolve better in water, making it easy to feed them to the microbes. The team is now working to scale up the process, first to the 1-kilogram and then the 10-kilogram scale.

Dillon Hofsommer adjusts a membrane flow bioreactor in his lab at the Wisconsin Energy Institute. Scientists with the Great Lakes Bioenergy Research Center use the reactor to extract valuable aromatic chemicals from lignin, a part of plant cells often treated as waste. Photo: Chelsea Mamott/Wisconsin Energy Institute

Machine learning speeds up solvent testing

Plant fibers contain valuable chemicals that can be used to make biofuels, plastics, medicines, and other products, but separating and purifying them is challenging, especially without using toxic solvents.

In a collaboration between the Great Lakes Bioenergy Research Center and Wisconsin Energy Institute, Hunt-Hougen Associate Professor Reid Van Lehn and 2024 PhD graduate Amy Qin, now a researcher at Dow Chemical, used machine learning to streamline the process of finding the best solvents for the job, balancing selectivity, efficiency, and environmental impact.


Reid Van Lehn


Amy Qin

The team used Bayesian experimental design, a framework that uses statistical models to guess what a design space looks like based on existing knowledge and to decide which areas of the space to explore next. By balancing exploration of unknown areas and exploitation of promising ones, the framework can be used to improve predictive models.

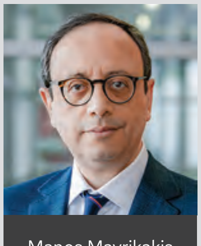
That means instead of testing thousands of mixtures, researchers can instead focus on dozens of the most promising candidates. “We think of this as a flexible technique that could be applied in multiple different contexts,” Van Lehn says. “And this is really just a proof of concept.”

In this project, the team searched for a blend of green solvents that could replace toxic chlorinated solvents used to break down lignin, a bioproduct that is used to make plant-based plastics, fibers, pharmaceuticals, and other products. The team identified eight candidates, including water, alcohols, and ethers, but with nearly infinite possible combinations, traditional trial and error methods weren’t practical.

Instead, they designed a computer model to predict a certain property — in this case a measure of a substance’s preference between two solvents. The team first used a physics-based model known as COSMO-RS to generate “fantasy samples” most likely to improve performance. They then used a liquid-handling robot that can test 40 solvent samples at a time. The data from these experiments was then fed back into the machine learning model, significantly improving its predictions.

The researchers are now working to apply the framework to other reaction conditions, such as temperature and pressure, and to consider practical parameters like cost and whether a solvent can be easily recovered for reuse.

Atomic-scale understanding of a new electrocatalyst could lead to more affordable and efficient fuel cells


Manos Mavrikakis

In a paper in the journal *Nature Materials*, Manos Mavrikakis, the Ernest Micek Distinguished Chair, James A. Dumesic Professor, and Vilas Distinguished Achievement Professor, detailed the atomic-level reactions of a class of new materials that could greatly reduce the cost of fuel cells, an emerging energy source that can efficiently turn a variety of fuels into electricity.

In fuel cells and other energy storage devices, a process called an oxygen reduction reaction takes place at the cathode. This reaction is key to completing a circuit and producing electricity, but the reaction is slow, presenting a bottleneck in the efficiency of electrochemical energy systems.

Researchers have found that using platinum as a catalyst can greatly improve the oxygen reduction reaction speed. However, platinum is one of the most expensive metals in the world. That’s why researchers are searching for non-precious metal catalysts that can do the job equally well.

A class of materials called transition metal nitrides are promising low-cost alternative catalysts; however, a lack of fundamental understanding of the catalytic reaction mechanism that takes place on the surface of metal nitrides has limited researchers’ ability to design catalysts from these materials

Through a combination of electrochemical experimentation and computational modeling, led by Mavrikakis and postdoctoral researcher Lang Xu, a multi-university research team found that during oxygen reduction reactions on manganese nitride, a thin oxide shell develops that is 300% more catalytically active than the rest of the nitride.

This atomic-level insight of the process provides a new understanding of how these materials function, and could lead to better, much more affordable transition metal nitride-based electrocatalysts and fuel cells.

From pirouettes to pipettes: Senior's journey to a ChE degree

Senior Bianca Navari grew up in Hyattsville, Maryland, and started ballet as an 11-year-old. Her natural talent led Navari to Moscow when she was 16 to study at the Bolshoi Ballet Academy. After that, she joined the Russian Ballet Theater as a professional dancer. Now, in her post-ballet life, she is pursuing a second act as a chemical engineering student at UW-Madison.

How did you go from professional ballet to studying chemical engineering?

Even when I was at the peak in my career as a ballet dancer, I always knew I'd return to school for a higher education. A career in ballet is physically demanding and limited in time, with most dancers retiring around the age of 35. While many in my field transition into teaching ballet, I found myself drawn to exploring new challenges and opportunities beyond dance. This led me to seek out a university education where I could satisfy my intellectual curiosity and build a foundation for a new career path. I did the math and knew I had to start college by the time I was 24.

What drew you to chemical engineering?

Although I entered university undecided, I found myself enjoying my chemistry, physics and math courses. They are all precise—just like ballet. The CBE curriculum stood out to me because it combines all three of these subjects and is in itself rigorous and demanding.

What was the transition from ballet to university like?

My move back to the U.S. was quite difficult. I had become an adult in Russia. After living there for eight years, my identity was tightly bound to Slavic culture and ballet. It was painful to move away knowing I might never see my Russian friends again. The academic environment was so foreign and, at first, very difficult. I thought I was going to fail out of school after my first chemistry exam (I didn't). By my second semester, I found myself feeling at home in Madison and enjoying the change in my life's trajectory. It was finally exciting.

How do you feel your time in the ballet has prepared you for university?

Ballet taught me so much. It gave me my work ethic and determination. The discipline required for ballet taught me the value of preparation and punctuality, both of which are essential in academic life. Additionally, working through injuries helped me learn patience with myself, allowing me to approach challenges with a balanced perspective.

What have been the highlights of your chemical engineering education so far?

Chemical engineering is a challenging field. Our professors and TAs play a crucial role in helping us bridge the gap between the simplified concepts we start with and the complex, science-driven world we aim to understand. However, it's ultimately up to us as students to make sense of it all, and this journey wouldn't be possible without the support of the friends I've made within my engineering cohort. It's the moments of learning, collaboration and discovery that will ultimately mold me into an engineer worthy of a UW-Madison diploma.

What are your career plans?

After graduating, I plan to enter the pharmaceutical industry. Over the past two summers, I had the opportunity to work for a small pharmaceutical company in Madison, where I discovered a deep sense of fulfillment in the work I was doing. Beyond the technical challenges, what I found most rewarding was contributing to a company whose mission aligned closely with my personal values.

Undergrads create lens into future technology

Srini Ramu, a junior in CBE, and Nathaniel Richmond, a junior in neurobiology, have been friends since meeting during a chemistry class their first semester at UW-Madison. But when Richmond began working with multiple advanced imaging systems at the UW-Madison Optical Imaging Core, located in the Wisconsin Institute for Medical Research, the pair discovered a mutual passion: microscopy.

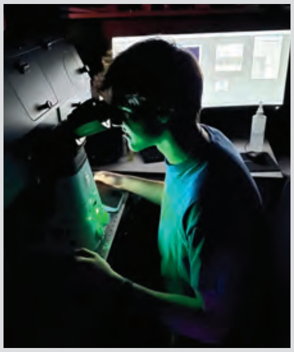
That's why, in spring 2024, they created Lens Into Future Technologies (LIFT), a student organization that introduces and trains undergraduates on the sophisticated microscopy systems available at UW-Madison.

While the different microscopes at the optical imaging core were available to all students, staff and faculty, they were usually reserved for graduate students, postdocs and faculty. Richmond and Ramu wanted to give undergraduates unique access and training on the advanced and typically inaccessible technology. Since Richmond worked at the optical imaging core, helping people learn and use the imaging systems, they had a chance to do just that.

Richmond and Ramu hope students realize the potential of this technology and carry it into their future careers. They also hope that by building students' microscopy skills, LIFT can empower them to join and excel in research labs across campus.

"LIFT is a great opportunity to expand your knowledge, confidence and curiosity for microscopy. It's such a useful skill applicable in various fields of research, and the instruments are incredible," says Emilia Nicometo, a chemistry major and a member of LIFT.

While they're excited by the traction they've gained with undergraduate students, Richmond and Ramu also want to reach high school students. They hope that by exposing them to advanced and typically inaccessible technology, they can inspire a new generation and show them the different possibilities with research and microscopy. "We all value knowledge and strive to attain it. For me, giving knowledge is a gift that has a greater sense of satisfaction than using it. I want to give experiences and direction that develops others," says Ramu.



Nathaniel Richmond using the imaging equipment. Submitted photo.

Expo and exposés with Isabelle Egizio

CBE senior Isabelle Egizio is working on more than just experiments. Egizio is heavily involved in Engineering EXPO and the *Wisconsin Engineer* magazine, which have been a critical part of her engineering education.

What made you decide to join the Engineering Expo leadership team?

When researching UW-Madison during high school to see if I would be interested in attending, I learned about the Engineering EXPO event that was held every spring. I was and continue to be passionate about creating new opportunities to teach members of the community about recent STEM advancements in order to help inspire the next generation of engineers. Learning about this unique outreach event encouraged me to ultimately attend UW-Madison and was even the main topic of my "Why UW-Madison" admissions essay! When I attended E-Bash my freshman year, I knew that I had to join the Engineering EXPO leadership team and help continue the mission of the organization.

Why did you join *Wisconsin Engineer*?

During my freshman year of college, I also became interested in honing the technical writing skills I developed in high school. I wanted to challenge myself to pursue an opportunity outside the standard skillset of an engineer by joining the magazine as a writer. Three years later, I am thankful for the opportunities to be head of the writing department and editor-in-chief of the magazine, my current position.

What opportunities do extracurriculars like these offer?

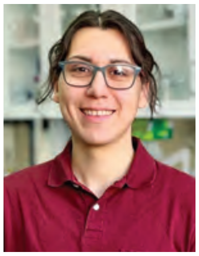
Students who are part of organizations like EXPO and WEM are able to make connections with faculty, staff, alumni, industry and other students on campus. Leading an event like Engineering EXPO entails extensive networking with companies for sponsorships and working closely with college staff to coordinate the event. These connections have helped students like me secure internships in the field.

What is your favorite part of being involved in these student orgs?

Every year when I walk around EXPO on the days of the event, I am constantly reminded of why I wanted to pursue engineering. Experiencing the wonder that the children have for different exhibits like the science behind making ice cream or building their own LED light inspires me to continue studying engineering despite the accompanying challenges!

GERS offers graduate students a community away from home

The College of Engineering's Graduate Engineering Research Scholars (GERS) is celebrating its 25th anniversary in the 2024-25 academic year. The program recognizes excellence in research to enhance the experiences and opportunities of graduate students in the College of Engineering. Meet two outstanding GERS students working in CBE.



Elvis Umaña works in the labs of Conway Assistant Professor Matt Gebbie and Baldovin-DaPra Professor Victor Zavala. Umaña uses data science and machine learning to accelerate the discovery of non-flammable electrolytes and sustainable electrochemical energy storage technology such as sustainable batteries.

What led you to UW-Madison?

I chose CBE because of the department's supportive and collaborative culture. UW-Madison provides a great amount of student support, and this propagates through their faculty. At UW-Madison, I value that I work with faculty and students in collaboration rather than in competition.

How did you get interested in your research area?

I learned about sustainable energy in high school and the potential for renewable energy sources to improve energy accessibility and quality of life in remote and polluted areas. Second, I became interested in applying data science to environmental problems as I learned the abilities of machine learning to identify patterns and trends in data quicker than humans alone can. I am motivated by the hope of data science to accelerate global environmental sustainability and alleviate the impacts of global climate change.

What do you like best about being part of the GERS community?

GERS provides a dependable space for me to build confidence and comfort in my work. Support from GERS community members helps to remind me to focus on the joys in learning rather than the struggles in answering scientific challenges. Especially, as a first-generation college student, the GERS community provides comfort, understanding and perspective that is not as common in my family.

What are your plans after graduation?

I hope to become a professor at a public university. The mentors I've met through my education have changed my perspective on what is achievable and helped me realize my career goals. I hope to continue researching environmental sustainability, and to also use my knowledge and experiences to inspire and enable as many students as I can to pursue their dreams through education.

Carlos Huang-Zhu, originally from Puerto Rico, works in Hunt-Hougen Associate Professor Reid Van Lehn's research group. His research focuses on using molecular simulations to study nano-bio interactions. Specifically, he designs nanoparticles coated with chemical molecules that could be used in new types of targeted drug delivery. He hopes to work in industry before returning to Puerto Rico to transition into academia.

What led you to UW-Madison?

The main reason for choosing CBE was the welcoming and supportive community: I felt that the grad students within the department emanated happiness and seemed to enjoy both their personal and academic aspects as PhD students.

How did you get interested in your research area?

I've been interested in nanomaterials ever since I was in high school, where I had the amazing opportunity of participating in Program SEED from the American Chemical Society. I've always been a tech-nerd, so after seeing my advisor Reid Van Lehn's research presentation and how he uses computers to simulate and characterize biological and chemical processes, I knew that it was what I wanted to do for my PhD research.

What do you enjoy most about your research?

Without a doubt, being able to actually see what's happening at a molecular scale. Oftentimes, with experimental research, you can only hypothesize why you observe results. With my research, I can provide those explanations with quantitative metrics and visual support through simulation snapshots and videos.

What do you like best about being part of the GERS community?

The GERS group is a great support because it has always provided us a safe and open space to share both our frustrations when something is not going well and the excitement from our triumphs. I love that we meet monthly to have lunch and just catch up. It helps me take my mind off some of the research and gives me something to look forward to that's academic, but not necessarily research-oriented.

Food for thought

CBE alums Brandon Dunbar (BSChE '17) and Luca Martino (BSChE '03), are co-workers at Jackson's of Muskego, Wisconsin, a company best known for its sweet potato and kettle chips. Both attest to how CBE taught them skills needed for their careers and lessons that they carry into every aspect of their lives.

For Martino, vice president of operations at Jackson's, the journey included some tough love. "I was partying too much and struggling in CBE 250," he admits. "The professor pulled me aside and said, 'Luca, I think you can do great things in chemical engineering, but you're going to have to change your approach in your life if you want to.' They suggested I drop the class, and that walk home for me was one of the hardest moments of my life. It was my first real failure, but it taught me the value of perseverance."

Martino went on to work in operations at Cargill, Ocean Spray, DSM and UAS Labs before joining Jackson's. He also founded a startup that produces LED lights for aquarium coral.

Dunbar started in operations at Jackson's but soon found his niche in supply chain management. The chemical engineering mindset helped him make a smooth transition. "It's not just about engineering. The CBE program teaches you how to think critically and tackle challenges, whether in life or in your career," he says. "It's about seeing the big picture, identifying weak points, and improving them. That foundation is what has helped me transition into roles outside traditional engineering."

Both say their time in CBE is a critical part of their success. "Chemical engineering gave us the tools to do the impossible," says Martino. "And that's a skill that never goes out of style."

Alumni Brandon Dunbar and Luca Martino have applied their education in many ways—most recently making sure a Wisconsin food manufacturer can continue producing great chips. Submitted photo.

Engineering a lifetime of love

CBE has a reputation for producing some of the most skilled and innovative engineers in the world. But for alumni Matt and Beth Koenings, the department also offered something equally life-changing: a lifelong partnership built on mutual respect, teamwork and a shared passion for problem-solving.

The pair were randomly teamed up as lab partners in September 1979, during their junior year in the rigorous transport phenomena lab. From the very beginning, their dynamic as a team was evident. They often studied together, comparing answers and analyzing their approaches.

That partnership quickly grew into something more; both hockey fans, they began going a Badger men's hockey games at the Dane County Coliseum on Friday nights to mark the end of their intense school weeks. "We learned to study together and balance our academic and social activities," the couple says.

Those lessons in balance would later serve them well in managing dual careers and raising three children. The pair married in June 1981. They used the first summer lab session ever held at University College London as the kickoff to their honeymoon. They were the first married couple in UCL's chemical engineering department, and staff questioned whether they could work effectively in the same environment. But their adaptability and professionalism proved otherwise. By the program's end, the faculty celebrated their success with a tongue-in-cheek gift: engraved handcuffs commemorating their achievement of completing summer lab ... "still married."

Matt and Beth credit UW-Madison and CBE with preparing them not only for successful careers but also for a strong, supportive marriage. "If you can work closely together and excel in a challenging curriculum like chemical engineering," they say, "you'll learn how to support each other through life's challenges."

Celebrating our legacy: The department history wall

CBE's rich history now has a permanent place to shine, thanks to the generous gift of Franz and Karen Altpeter.

The Altpeters joined us for the grand opening of the John C. Kuetemeyer Instructional Laboratories, where we celebrated the unveiling of the history wall. Located in the heart of the Jensen Family Student Lounge—a popular gathering place—the wall highlights the department's renowned past, inspiring future generations to leave their own mark.

An influential 1964 chemical engineering graduate, Franz built his career in the Midwest, starting at General Mills in Minneapolis. He also earned an MBA from the University of Chicago before joining Procter & Gamble in Green Bay. In 2003, he retired as part-owner and CEO of Intek Plastics.

The Altpeter family has a legacy in the department's history. Franz and his brother, Philip (BS '69), have been dedicated supporters of student excellence, sponsoring the Roger J. Altpeter awards. Named in honor of their father, the award recognizes Roger's remarkable contributions to CBE—where he served as a faculty member from 1937 to 1977. Roger earned his BS, MS and PhD from the department, exemplifying a lifelong commitment to chemical engineering.

Your continued support makes a lasting impact on our department. If you are interested in supporting our efforts, please contact Mike Holland at mike.holland@supportuw.org or (608) 440-1178.

Why we do research

Professor Emeritus Jim Dumesic recently authored an essay outlining the multiple benefits university research brings to students, industry and society.

"At a time when the role and value of higher education are being questioned," he writes, "it is imperative to reflect on the important and broad benefits research brings to our communities and the impact it can make on pressing societal concerns. University research supports a core educational mission, expands our scientific knowledge, promotes interdisciplinary collaboration, and generates economic value."

Scan this code to read more:

After seven years in CBE, department administrator Michael Morris has retired. Dedicated and good-natured, Morris has impacted the department in many ways: improving operations, developing top staff, redesigning office space, preparing for major renovations, and tackling financial challenges. As an encyclopedia of university knowledge, Morris has also been a phenomenal resource for the department's chairs. When asked what he enjoyed most in the department, Morris points to his colleagues. "Working with such incredibly gifted, professional, and caring staff and faculty has made me enjoy coming to work each and every day," he says.

In retirement, Mike is looking forward to spending more time at home, getting some laps in at the pool, reading a good book and volunteering in his community. The department is thankful for his work and dedication throughout the years. His pleasant smile and sincere interest in improving life around CBE will be greatly missed.

Faculty News


Assistant Professor **Quentin Dudley** and Baldovin-DaPra Professor **Victor Zavala** are part of a team selected by the U.S. Department of Energy's Advanced Research Projects Agency-Energy for a $2.8 million grant as part of its Vision OPEN 2024 program. The goal of the research is to develop plant-based "living refineries" technology that use sunlight energy and convert atmospheric carbon dioxide directly into aromatic compounds, which serve as essential building blocks for many of society's most important industrial products, including plastics, fuels, resins and semiconductor materials.

Conway Assistant Professor **Matthew Gebbie** received a grant from the Defense University Research Instrumentation Program to acquire an electrochemical atomic force microscope. The specialized microscope will allow his lab to investigate changes on an electrode's surface during chemical reactions. "Having the opportunity to bring electrochemical atomic force microscopy into our lab is going to transform the types of questions we can ask and insights we can pursue," says Gebbie.

Howard Curler Distinguished Professor **Eric Shusta** received the 2024 Biotechnology Progress Award for Excellence in Biological Engineering Publication from AIChE. The award celebrates excellence and foundational contributions to biological engineering. It cites Shusta's seminal publications dealing with cell-based modeling of the blood-brain barrier to better understand this biological interface and design antibody therapeutics to overcome it to treat brain disease.

Hunt-Hougen Associate Professor **Reid Van Lehn** has received a Vilas Faculty Early-Career Investigator Award from UW-Madison. The award recognizes research and teaching excellence in faculty who are relatively early in their careers and provides flexible research funding for three years.

Student News

PhD student **Lisa Je**, who works with Hunt-Hougen Associate Professor Reid Van Lehn and Baldovin-DaPra Professor Victor Zavala, was inducted by the Graduate School into the university's chapter of the Edward Alexander Bouchet Graduate Honor Society. The Bouchet Society celebrates the legacy of Dr. Edward Alexander Bouchet, the first African American to earn a PhD in the United States. The society aims to foster supportive environments and serve as leaders and advocates for students traditionally underrepresented in academia.

Three graduate students have earned prestigious NSF Graduate Research Fellowships, which support outstanding graduate students in STEM fields, providing three years of funding. **Nicole Babineau** of the Dudley research group and **Kyra Keena** and **Bridget Price** of the Pfleger research group received the awards in fall 2024. **Abigail Cordiner** of the Palecek group and **Sam Johnstone** of the Gebbie group are also continuing GRF scholars.

Two exceptional fourth-year graduate students, **Evangelos Smith** and **Deepak Sonawat**, are the winners of the spring 2025 Bird Stewart Lightfoot Wisconsin Distinguished Graduate Fellowship, which provides graduate students with critical financial support. Smith is a member of the Mavrikakis research group and first-place winner for his oral presentation in the 2025 Young Scientist Symposium hosted by the Catalysis Club of Chicago. Sonawat is in the Krishna Sustainable Catalysis Lab, where he focuses on developing more sustainable methods for chemical production.

Junior **Caleb Youngwerth**, an undergraduate researcher with the CBE Research Forward team, recently earned the student poster award at the American Physical Society's Eastern Great Lakes Section Conference.

Congratulations to our fall 2024 Ragatz Teaching Assistant awardees selected by undergraduate students who received mentorship and teaching: **Sarah Noga** (first place), **Matthew Edgar** (second place), **Stephanie Brown** (third place) and **Saam Farzam** (fourth place).

The fall 2024 PPG Graduate Student Seminar highlighted the exceptional work of two graduate researchers, **David Cole** and **Hrishikesh Tupkar.** Cole, a fifth-year PhD candidate in Victor Zavala's group, applies graph theory to optimization and data science, with his seminar focusing on graph-based modeling for chemical engineering applications. Tupkar works in Matthew Gebbie's group exploring electrochemical properties of ionic liquid electrolytes, with his seminar focusing on understanding interfacial structure to enhance electrochemical capacitance.

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Meet the college's next dean

Devesh Ranjan, a mechanical engineer and a leader at one of the country's largest and highest-ranked engineering programs, will be the college's 10^{th} dean. He will begin on June 16.

Ranjan, the Eugene C. Gwaltney Jr. School Chair and Professor of Mechanical Engineering at the Georgia Institute of Technology, remembers the promise he felt when he first arrived at UW-Madison in 2003 to begin graduate school in the college he will now lead.

"I've been blessed from that day onward," Ranjan says. "The thing I say about UW-Madison is if you dream about doing something here, it will happen. It will happen because of the opportunity and the support here for you at UW-Madison."

After earning a doctorate at UW–Madison in 2007 in the lab of Professor Riccardo Bonazza, Ranjan was a Director's Postdoctoral Fellow at Los Alamos National Laboratory before joining the faculty at Texas A&M University in 2009. He moved to Georgia Tech in 2014, where his own work has focused on the dynamics of fluids at very high speeds—air across the surface of supersonic jets, the plume of a volcanic eruption, shock waves that fragment kidney stones—and designing next-generation power cycles optimized for solar energy sources or incorporating the efficiency of supercritical carbon dioxide as in heat pumps.

Read more about incoming Dean Ranjan.