# EEEEUESite

Iowa State University Chemical and Biological Engineering • Issue No. 33, Fall 2022

# IOWA STATE UNIVERSITY.

Department of Chemical and Biological Engineering

"CHEMICAL ENGINEERS CAN

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# **Chair's Letter**

Dear Alumni and Friends,

Warm greetings from the Department of Chemical and Biological Engineering at Iowa State University. We hope that you enjoy this 2022 edition of ActiveSite, our annual departmental newsletter. This issue highlights many of the notable achievements and activities of our faculty, staff, students and alumni over the past year. In these pages, you will find a collection of stories and pictures featuring research accomplishments and projects, student activities, faculty and student awards, alumni news and images from around the department.

In other news, I wanted to share that our department will be going through a leadership change at the end of this academic year. I am currently in my 10th year as department chair, and it will also be my last. I will be stepping down and returning to a more traditional faculty role in the summer of 2023. It has been my absolute pleasure and honor to serve as chair and I look forward to welcoming our next leader and being part of our future accomplishments.

Let me close by once again thanking all of you for your continued support of our program and people. Your friendship and generosity play such an important role in helping us in our continued efforts to educate the next generation of highly talented engineers. Your support helps in so many ways, including recruiting and retaining the very best students, staff and faculty, supporting state-of-the-art facilities for teaching and research, providing financial assistance to students through scholarships and fellowships and supporting all sorts of new initiatives to promote our mission of world-leading research and education in chemical engineering.

Please send me any comments, updates or suggestions you have for future issues of ActiveSite (hillier@iastate.edu). Let me also take this opportunity to invite you back to campus. I would be delighted to host you and give you a tour of our amazing facilities.

Warmest Regards and Go Cyclones!

Andrew C. Hillier Professor and Reginald R. Baxter Endowed Department Chair

# CBE By The Numbers 2021-22



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for B.S. Degrees

# Transforming immunotherapy treatment with nanostars and imaging-guided techniques

Immunotherapy is a Nobel Prizewinning treatment that uses our own immune system to fight cancer. Given the treatment's potential to prolong and improve the quality of life, it is highly sought after by cancer patients and their loved ones. However, only twenty to twenty-five percent of patients respond well to immunotherapy treatments.

# Heading off the "wait and see" method with treatment

Currently, medical experts lack the diagnostic tools to predict if patients will respond well to treatment. Furthermore, medical experts cannot easily or noninvasively monitor the effectiveness of ongoing immunotherapy treatments. **Rizia Bardhan**, associate professor of chemical and biological engineering, is using nanomaterials and imaging-guided techniques to address these challenges.

Cancer patients currently rely on a wait-and-see approach to determine if they are responding to immunotherapy treatments. After weeks, if not months, of expensive therapy, biopsies are taken and analyzed to determine if patients respond to treatment. Unfortunately, as Bardhan explains, "by that time, it may be too late for some patients that are not responding."

# A new approach

Bardhan is designing immunoactive gold nanostars, tiny particles about 500 times smaller than the width of a human hair, to mark tumor cells expressing specific immune biomarkers and immune cells called cytotoxic T lymphocytes. Bardhan then uses two medical imaging techniques, Positron Emission Tomography (PET) and Raman spectroscopy, to detect the marked tumor and immune cells non-invasively and in real-time.

In mice with breast cancer, Bardhan has shown that this approach has the potential to predict which will respond to immunotherapies before treatment. After treatment starts, this new approach can also be used to evaluate whether it is boosting the immune system and decreasing tumors.

"Patients should not have to wait months to find out if they will and are responding to treatment," says Bardhan. Her work is leading to a future where this is possible.

# **RESEARCH NEWS**



# Probiotic-Mediated Cancer Therapy

**Rizia Bardhan** received a 2022 Margaret B. Barry Cancer Research Program award to develop new strains of the probiotic Escherichia coli Nissle that are specifically engineered to display simplified versions of antibodies on the surface of bacterial cells to target breast and colorectal cancer tumors.

Once the bioengineered probiotic bacteria have identified specific tumors, they will release tumor-destroying molecules to reduce or eliminate the tumor as part of a strategy the team refers to as probiotic-mediated cancer therapy (PMCT). The approach also has the potential to be used for early tumor detection and visualization, with the long-term goal of reducing negative side effects of traditional cancer treatments and improving outcomes for patients with inoperable cancers.

Bardhan is collaborating with Iowa State professor of veterinary microbiology **Gregory Phillips** and others in the Nanovaccine Institute on the project, which is funded by the Iowa State University Office of the Vice President for Research.

# Three projects, nearly \$5 million in funding from NIH MIRA for ESI program



Over the past two years, three Department of Chemical and Biological Engineering faculty members have received National Institute of Health research funding totaling nearly \$5 million from the highly competitive Maximizing Investigators' Research Award (MIRA) for Early Stage Investigators (ESI) program.

**Thomas Mansell** (top), associate professor and Karen and Denis Vaughn Faculty Fellow, **Nigel Reuel** (left), associate professor and Jack R. and Carol A. Johnson Faculty Fellow, and **Zengyi Shao** (bottom), associate professor and Vernon Guse Faculty Fellow, have each been awarded these prestigious awards.

The Mansell Group, which will receive \$1.45 million from the grant, plans to use the funding to pursue the development of live biotherapeutics. The Reuel Group will use the \$1.78 million they will receive over five years to create an automated tool to discover and design new protein therapeutics for various diseases. The Shao Group plans to use the \$1.75 million in funding to study mitochondrial DNA-associated diseases and develop yeast disease models.

# **RESEARCH NEWS**

# Understanding the logic of cell decision-making

**Ian Schneider**, associate professor of chemical and biological engineering, has been awarded nearly a million dollars in funding from the National Institute of Health (NIH) Research Project Grant Program (R01) for a project called "Cell Migration Control through Modulation of Multiple Directional Cues."

"It's really exciting and validating to receive funding for this work, which I have been interested in and wanted to explore in more detail for a long time," says Schneider.

"For this research project, we're trying to figure out the logic of cell decision making," says Schneider. In particular, the Schneider group wants to understand how multiple cues inform the decisions cells make about cellular migration.

The innovative work Schneider's group is doing to understand the logic of cell decision-making could enable scientists to construct medical treatments that direct cells to targeted areas and instruct them to grow new tissue, release medicine, attack cancer cells, heal wounds and more.

# Engineering vaccines for the most vulnerable

According to the Centers for Disease Control and Prevention (CDC), in the 2018-2019 flu season, there were 29 million flu illnesses, 1.4 million flu-related hospitalizations, and 28,000 flu deaths. Tragically, individuals over 65 years of age accounted for nearly 75 percent of these deaths and 57 percent of hospitalizations.

Fortunately, Anson Marston Distinguished Professor in Engineering and Vlasta Klima Balloun Faculty Chair **Balaji Narasimhan** (right) along with Anson Marston Distinguished Professor in Engineering and Carol Vohs Johnson Chair **Surya Mallapragada** (left) and Barbara E. Forker Professor in Kinesiology **Marian Kohut** are developing a vaccine that will better protect the most vulnerable from the flu.

# The issue with one size fits all

The increased risks that the flu poses to older adults are partly due to changes in aging immune systems. And these changes are why it is so important for older individuals to get vaccinated.

Yet, as Narasimhan explains, "Most vaccines

are developed for young immune systems; they are not developed specifically for aged immune systems. And this is a major shortcoming."

"The aged immune system is very different compared to a young immune system and has some deficiencies," says Mallapragada.

The current "one size fits all" strategy of giving older individuals a much higher dose of the flu vaccine does not adequately address the deficiencies of an aging immune system.

Kohut explains, "Giving older adults a higher dose produces a higher antibody response in the short term, but the quality of that response might not be as good as in younger adults. And sometimes, the response drops off quickly. So it's not a great fix."

# A targeted approach

"Our research aims to develop a much more targeted approach that addresses the deficiencies of aged immune systems," says Mallapragada.

The goal of their research is to identify the effect of vaccine biomaterials and adjuvants on dendritic cell metabolism and subsequent effects on antibody and T cell memory to develop a nanovaccine to overcome age-related immune impairments.

NANOVACCINE INSTITUTE "Essentially, we're marrying two nanotechnologies, one that uses nanoscale micelles to elicit a robust and rapid immune response, and one that uses nanoparticles to maintain that immune response for a long period of time," says Narasimhan. Such an approach is essential since, with traditional vaccines, immunity wanes faster in aged immune systems.

The optimal combination of these two technologies will also limit the inflammation response. As Kohut explains, this is important because "in aged immune systems, inflammation might be linked to impaired vaccine response."

"Our results so far have been promising, and since we are tailoring the biomaterial chemistries to affect the immune response, our research will be able to be applied to various other vaccines as well," says Mallapragada.

Narasimhan, Mallapragada, and Kohut's research is being funded by the National Institute of Allergy and Infectious Diseases (NIAID), which is part of the National Institute of Health. The NIAID supports research that seeks to better understand, treat, and ultimately prevent infectious, immunologic, and allergic diseases.

# Leading the ChaRGE:

The far-reaching effects of the CHaRGE program are illustrated in this graphic.

ISU Chemical and Biological Engineering

# **Chemical manufacturing in the age of Industry 5.0**

Researchers at Iowa State University have received funding from the National Science Foundation's (NSF) Emerging Frontiers in Research and Innovation (EFRI) program for Distributed Chemical Manufacturing (DCheM).

Jean-Philippe Tessonnier (pictured left) associate professor and Richard C. Seagrave Professor of chemical and biological engineering, is leading the EFRI-funded project entitled Chemicals from Renewables Through Green Electrochemistry (ChaRGE).

He is accompanied by CBE faculty members: Professor and Mary Jane Skogen Hagenson & Randy L. Hagenson Professor **Eric Cochran**, professor and Herbert L. Stiles Faculty Fellow **Wenzhen Li**, assistant professor **Luke Roling**, and **Sarah Ryan**, C.G. "Turk" and Joyce A. Therkildsen Department Chair of Industrial and Manufacturing Systems Engineering.

As Tessonnier explains, "One of the

goals of ChaRGE is to bring chemical manufacturing into the age of Industry 5.0."

# The ChaRGE for Industry 5.0

Industry 5.0 strives to create an industrial era of mass customization that is sustainable, affordable, human-centric and resilient.

The investigators working on the ChaRGE project are using the principles of Industry 5.0 to develop a new distributed approach to chemical manufacturing. The new approach will streamline fermentation and electrochemistry in modular reactor systems to produce high-value chemicals from biomass using sustainable wind and solar energy.

"Instead of having a big plant in one geographic location, our approach relies on a lot of small units all over the Midwest using sustainable energy to produce chemicals on-demand from things like corn," says Tessonnier. The Industry 5.0 approach to chemical manufacturing that the ChaRGE project will develop is ideal for Iowa and the greater Midwest.

"Iowa farmers could profit from having their corn stover turned into chemicals, and the process could be done sustainably using wind energy," he says.

# **Delight in the spotlight**

The EFRI program seeks out and funds projects founded on transformative ideas that have the potential to fundamentally change engineering knowledge and address national needs in the long term.

Tessonnier is proud that ChaRGE is one of the seven EFRI DCheM projects that received funding in 2021.

"We competed with research projects produced by teams at some of the top chemical engineering departments in the nation. So, we are delighted that our project was selected and that it puts Iowa State in the spotlight," says Tessonnier.

# Change in the air...

# Soybean-based material takes on problem of recycling wind turbine blades

The business of wind-generated electricity has been a shining light of the green energy revolution. Wind turbines dot many areas of the American landscape. But so do piles of discarded wind turbine blades.

Conventionally-constructed wind turbine blades can't be recycled and few landfills accept them. As more and larger wind turbines are put into service, the accumulation of used blades has created an unwelcome sight and runs counter to the philosophy of a greener future through wind energy.

# A better blade

Professor and Mary Jane Skogen Hagenson and Randy L. Hagenson Professor **Eric Cochran** (pictured left) is part of a research team addressing this concern – through the use of soybean-based polymers that can be used to create reengineered wind turbine blades that are tougher, longer-lasting, and most importantly, easily recyclable.

Cochran and **Xainglan Bai**, associate professor of mechanical engineering, are leading the research, titled "Low-cost Biobased Composite Materials for Ultra-durable and Recyclable Wind Turbine Blades," which is being supported by a nearly half-million dollar three-year grant from the Iowa Energy Center.

Traditional techniques used for creating wind turbine blades involve an epoxy-resin coating placed on a type of material known as a fiber-reinforced thermoset matrix composite. It creates a strong material, but also one that cannot be reformed and does not break down when disposed of. Using bio-based components promises to be the next-generation method for constructing wind turbine blades.

Resins created by a thermoplastic process have greater durability and the ability to be reformed, including into material that can be recycled and repurposed.

# **RAFT to the rescue**

Cochran and Bai's research is making mechanical properties of blade-coating material even better through soybean-based polymers added to thermoplastic material to contribute to the process. The research uses a technique called RAFT (Reversible addition-fragmentation chaintransfer polymerization), a versatile and economical way to create materials that Cochran and Bai use to transform multifunctional components such as soybean oil into rubber materials. The process creates chemical sites that react so that the extruded product contains microscopic pockets of soybased material that toughens it and makes it more recyclable. This creates a matrix that can be used to create material that could replace the epoxy resin with a whole new type of blade construction.

"These wind turbine blades can be repurposed instead of being discarded on or in the ground," Cochran explains. "And, ideally, they could be repurposed into new wind turbine blades. Sort of the ultimate example of recycling."

Marketing the product to business will be a step taken in the near future. Iowa State chemical engineering post-doctoral researcher **Baker Kuehl** and graduate student **Thamer Rawah** are also contributing to the project.

# **RESEARCH NEWS**

# Fermentation scale-up research to jump the lab-to-production gap



**Esther Oreoluwa Jokodola**, a CBE graduate student in Zengyi Shao's group, is on the research team working on bioreactor fermentation.

A group of Iowa State researchers, led by Department of Chemical and Biological Engineering faculty, is collaborating with Cargill and Genomatica to scale-up fermentation processes. The project starts by perfecting fermentation techniques in the small laboratory scale.

"What makes simulation and scale-up of bioreactors difficult is the fact that microorganisms, which function as small chemical factories, are heavily influenced by both the microenvironment that they are in, and also the microenvironment's trajectory, or history," says professor **Dennis Vigil**, a CBE faculty member on the project team. "As the bioreactor size increases, the heterogeneity of microenvironments increases, which makes prediction of the overall performance of the bioreactor more difficult. This is the problem we are trying to address by first understanding how microorganisms perform in a uniform homogeneous environment."

**Rodney Fox**, Hershel B. Whitney Professor, Global Initiatives, is the principal investigator, joined by Vigil. Both specialize in multiphase reactor design and analysis. CBE's **Zengyi Shao**, associate professor and Vernon Guse Faculty Fellow, leverages her expertise in the manipulation of microbes that drive the fermentation process, while **Ted Heindel**, Bergles Professor in Thermal Science and a University Professor of mechanical engineering, and **Alberto Passalacqua**, associate professor of mechanical engineering, bring expertise in measurement and computational fluid dynamics.

Cargill and Genomatica will then team up to move the process to large-scale production of a new generation bio-based intermediate chemical product used by many industries. It will be produced in a new facility at Cargill's Eddyville, Iowa, operation.

A portion of \$2.5 million funding for the project is from BioMADE, a manufacturing innovation institute supported by the Department of Defense that works to advance research directed at the manufacturing of bio-based products. Iowa State is a governing member of BioMADE.

# **Recent Faculty Publications**

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# **Rodney Fox**

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# **Kurt Hebert**

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# **Andrew Hillier**

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## **Thomas Mansell**

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## **Matthew Panthani**

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# **Nigel Reuel**

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## Luke Roling

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# Zengyi Shao

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## **Jean-Philippe Tessonnier**

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# **GRADUATE STUDENT NEWS**

# Abigail Koep awarded prestigious research fellowship from NSF

Chemical engineering Ph.D. student Abigail Koep was awarded a prestigious National Science Foundation Graduate Research Fellowship. She was one of only three Iowa State students to receive the fellowship this year.

The fellowship will support Koep's education and research with associate professor **Ian Schneider** on drug delivery vehicles using DNA origami, which is "folding a long DNA sequence into whatever kind of shape you want." Discoveries in this area could help create targeted, non-invasive drug delivery systems for cancer medications.

Koep received her B.S. in chemical engineering from Iowa State in 2020 before entering the chemical and biological engineering Ph.D. program.

# Four graduate students honored in exemplary 2022 Perfect Pitch competition

Graduate student research presentations were once again on a three-minute clock (and limited to only one slide!) in this year's Perfect Pitch competition.

The students vied to be among the top finishers in judging by selected individuals in attendance. Judging was based on questions like "How does your approach uniquely solve the problem?" and "What is the potential impact of your research if it is successful?" with a goal of preparing grad students to have a quick, high-impact research elevator speech.

First place – **Efrain Rodriguez-Ocasio**, "Bioconversion of Thermally Oxo-Degraded Plastics."

Second place – **Bradley Ryan**, "Nanostructured Silicon for Next-Generation Optoelectronic Devices"

Third place – **Andrew Kohler**, "Creating Sustainable Value from Farm Waste."

**Deon Ploessl**, "Developing a Mitochondrial DNA Editing Toolkit."



# Meg Lashier: Inspiring the next generation of women engineers

**Margaret "Meg" Lashier** is passionate about setting an example for other young women considering a career in chemical engineering.

"The ratio of men to women can be intimidating, and it can feel at times that you have to be the best to be taken seriously. However, the more women that choose STEM as their field of study, the better it will get," Lashier says. "I know that I, alongside all the other women in my field, are working hard to set an example for younger women considering a career in science."

Lashier says Iowa State has presented her with great resources, such as Women in Science and Engineering (WiSE) programming that helped her with a smooth transition from high school to college.

And, Lashier says, she has had only great experiences with her professors, in-class learning, involvement on student teams, and multiple work experiences. "After going on an internship and a co-op, I feel like the classes here really have helped prepare me for the world outside of school," Lashier said. "I am utilizing the problem-solving skills that I acquired from my engineering classes all the time."

Lashier has also been involved in various student organizations and clubs including, PrISUm Solar Car club at ISU. The club's mission is to change the future of transportation and to educate future generations.

"On team PrISUm, I have served as a member of the composites team, which involved very hands-on work, as outreach director. where my job involved spreading our message to the community, and most recently project director, where I was the leader of the team," Lashier says. "This project is one of the most rewarding

things I've ever been a part of, and I know that I have developed crucial leadership, teamwork, and technical skills that have helped me grow as an engineer and a person."



# **UNDERGRADUATE STUDENT NEWS**

# Chem-E-Car winning streak rolls on at lowa State-hosted AIChE conference



Iowa State's student chapter of the American Institute of Chemical Engineers (AIChE) hosted the group's Mid-America Student Regional Conference April 8-9, 2022 – rolling out the red carpet for students from 12 other schools and taking some top honors of its own.

The AIChE student group organized competitions, technical presentations, an awards banquet, and more, marking the first time Iowa State has hosted an in-person version of the event since 2010.

The Chem-E-Car competition, a popular activity at AIChE student conferences where student teams build and race small vehicles powered and stopped by chemical processes, saw an Iowa State team take first place for the third consecutive year and it marked the seventh straight year the ISU chapter will



compete at nationals. A banquet capped off the conference activities and featured a speech and question and answer session from CBE alumnus **Mark Lashier**, president and chief executive officer of Philips 66.

# Expanded BioMaP undergrad research program hosts 18 students

Students from Iowa State University and around the nation took part in a summer of hands-on research work with the department's 2022 BioMaP Summer Research Experience for Undergraduates (BioMAP REU), a program led by CBE faculty members **Monica Lamm** and **Ian Schneider**.

With funding from the National Science Foundation, the BioMAP REU provides mentored research for selected students who are pursuing bachleor's degrees in chemical engineering or a related curriculum. Each student is paired with a CBE faculty member to work on a research project.



# **UNDERGRADUATE STUDENT NEWS**

# Successful Oviedo, Spain summer lab with financial support from Whitney Global Initiatives program

Eleven Iowa State chemical engineering students embarked on the 2022 Oviedo, Spain, summer lab experience – with scholarship support provided through a gift from the estate of Hershel B. Whitney, a 1949 graduate of the chemical engineering department.

The Hershel B. Whitney Global Initiatives Program, established in 2018 and named in honor of the late Whitney, provides scholarships that defray many of the costs associated with the program and has opened the door to more significant student involvement.

The intensive five-week summer program is conducted in collaboration with faculty and facilities at the University of Oviedo. It serves up the equivalent of two different chemical engineering lab courses with a series of hands-on engineering experiments performed in teams, along with regular written reports and an oral presentation. The program is shared between students from Iowa State and the University of Wisconsin–Madison.

Research work is interspersed with field activities, including industry visits to chemical engineering-related manufacturing facilities in Spain, sightseeing and social activities. This year's foray included a trip to a Real Oviedo soccer match.

The group was accompanied by CBE teaching professor **Stephanie Loveland**.







# **ALUMNI NEWS**

# Alumna Lori Ryerkerk, Celanese CEO, joins CBE Hall of Fame



The Department of Chemical and Biological Engineering Hall of Fame gained new member **Lori Ryerkerk** in October 2021.

Ryerkerk, who received a B.S. in chemical engineering from Iowa State in 1983, is president, chief executive officer and chairman of the board of Celanese Corporation, a Fortune 500 global technology and specialty materials company. She was inducted into the CBE Hall of Fame by Reginald R. Baxter Endowed Department Chair Andrew C. Hillier during the annual department Honors and Awards Banquet that celebrated student scholarships, fellowships and other achievements.

Earlier in 2021 Ryerkerk was awarded the Iowa State University College of Engineering Anson Marston Medal, the highest honor awarded by the college to alumni that recognizes outstanding achievement in advancing engineering science, technology, or policy having national and international impact in academics, industry, public services, government or other venues.

Celanese is an international corporation involved in areas that include chemistry, cellulose derivatives, polymers, food ingredients, engineered materials and more and operates a wide variety of brands. Prior to joining Celanese, Ryerkerk was the executive vice president of global manufacturing at Shell Downstream Inc., where she led a team of 30,000 employees and contractors at refineries and chemical sites worldwide. She has also held senior leadership positions at Hess Corporation and spent 24 years with ExxonMobil, improving operational performance in assignments across the U.S. to Europe and Asia.

A plaque in Ryerkerk's honor has been placed on the department's Hall of Fame wall in Sweeney Hall.

# Full circle: Alum Kevin Lucke returns to Ames as president of Chevron Renewable Energy Group

**Kevin Lucke** graduated from Iowa State University with a bachelor's degree in chemical engineering in 1981. In 2022, he finds himself back in Ames, Iowa as president of the newly formed Chevron Renewable Energy Group.

Chevron has acquired Ames-based Renewable Energy Group, Inc. (REG) to create what it says will "fuel the expansion of our renewable fuels business and provide lower carbon solutions for the transportation sector." The \$3.15 billion purchase will create Chevron's renewable fuel headquarters based in Ames.

For Lucke, it's a continuation of working for the employer he started with right after leaving Iowa State, and he credits his time in the chemical engineering program as helping him to succeed: "My Iowa State chemical engineering degree opened the door for me to work at Chevron when I graduated," he says. "Once the door was opened, the skills I learned in the ISU program in engineering, analytical problem solving and working effectively as a team, helped get me started in my first two roles for Chevron as a design engineer and then lead designs engineer in their El Segundo, California refinery."

Lucke is a native of Harlan, Iowa. He has spent many years working in the downstream and chemicals areas of Chevron. For the last 10 years, he has lived in Harlan and commuted to Chevron jobs he has held in both California and Texas.

The REG acquisition places new emphasis on Chevron's goal of being a world leader in renewable fuels. Lucke says the prospect of an expanded workforce to help make that happen could bode well for Iowa State chemical and biological engineering graduates: "We will be looking to expand in the future and that will take the help of many talented people. Some future ISU chemical engineering graduates might be able to look to a company based right across town to find job opportunities."



# **ALUMNI NEWS**

# Baxter, Sullivan, Wiggers: Remembering three influential alums

The Department of Chemical and Biological Engineering remembers and honors the legacy of three influential alumni and supporters of Iowa State University.



**Reginald R. "Barney" Baxter** received an M.S. in chemical engineering from Iowa State University in 1949 and went on to enjoy a varied and highly successful career that included engineering positions at American Oil Company and Standard Oil of New Jersey, CEO of CF Industries and president/owner of ASHTA Chemicals. He was also CEO of Nimbus Medical, a medical device company, and founded his own consulting firm and an investment and acquisition capital and services business. In retirement, Barney picked up oil painting and wrote a memoir entitled "A Bountiful Harvest."

He was among the charter members of CBE's Hall of Fame. He and his wife, "Jamie," founded the Reginald R. and Jameson A. Baxter Foundation, which provided an endowed department chair position in Reginald's name, which is currently held by department chair Andrew Hillier. The Baxters also supported renovations to Sweeney Hall and funded a chemical engineering graduate fellowship in their name. **Joseph (Joe) Sullivan** earned a B.S. in chemical engineering from Iowa State in 1962 followed by a Ph.D. from the University of Minnesota. He spent 25 years at Ciba-Geigy Corporation, rising to the rank of corporation vice president, and was a member of the board of directors, responsible for industrial divisions.

After retiring from Ciba-Geigy he taught chemical engineering at Virginia Tech and then worked as a lab instructor at the University of Minnesota's chemical engineering department. He also served as a tutor at Minneapolis Community & Technical College.

Joe and his wife Marcia established the Sullivan Scholarship in Chemical and Biological Engineering in 2016 to support Iowa State chemical engineering undergraduates with financial needs. Harold Wiggers earned a B.S. in chemical engineering from Iowa State in 1953. He spent his entire career with Exxon (later ExxonMobil) where he specialized in the installation and expansion of Exxon oil refineries around the world. As a result, Harold and his family lived in 11 different countries. After retiring from ExxonMobil in 1986 he worked as a consultant until 1993.

Wiggers was a major contributor to the Department of Chemical and Biological Engineering Excellence Fund and also established the Wiggers Student Success Fund, an endowment created to enhance the CBE student experience and provide opportunities for building many skills, including undergraduate research experiences, study abroad, scholarships, industry visits and other activities.

# **AROUND THE DEPARTMENT**

# **New Faculty Members**



# **Ratul Chowdhury**

Postdoc: Harvard Medical School Ph.D.: Penn State University Research Focus: Designing protein sequences that can bind to and thus recover hard-to-purify rare earth metals from electronic waste, tweaking natural enzymes for new functions while maintaining high activity, creating channel protein-based separation devices



Molly Kozminsky Postdoc: University of California, Berkeley and University of Michigan Ph.D.: University of Michigan Research focus: State-of-the-art nanotechnology to investigate disease and to harness the power of micro- and nanotechnology to change the way cancer is studied, diagnosed and monitored



Jing Wang Postdoc: University of Michigan Ph.D.: Peking University, China Research focus: Nanotechnology and quantitative bioimaging, protein engineering and peptide drug development, targeted or image-guided drug/gene/vaccine/cell delivery for immunotherapy, and biomaterial-directed immune modulation for cancers and inflammatory diseases

# CBE Honors & Awards 2021-2022 FACULTY ALU

**Rodney Fox** Fullbright-Tocqueville Distinguished Chair

**Wenzhen Li** Promoted to professor

**Stephanie Loveland** Outstanding Service Award, ISU Learning Communities

**Surya Mallapragada** Selected for Women Impacting ISU 2022 calendar, Catt Center for Women and Politics

Thomas Mansell Promoted to associate professor

# Nigel Reuel

Skroot Laboratory, first place, John Pappajohn Iowa Entrepreneurial Venture Competition

Jacqueline Shanks College of Engineering Inclusive Excellence Award

# Matthew Panthani

College of Engineering Mid-Career Achievement in Research Award

# **STAFF**

Matthew Brown Exceptional Advising During COVID Award

**Nicole Prentice** Early Achievement in Learning Community Coordination Award

# Kathleen Ross

Professional and Scientific Council Outstanding New Professional Award

Mackenzie Schwartz Early Achievement in Learning Community Coordination Award

# **ALUMNI**

**Lori Ryerkerk**, B.S. '83 Inducted into CBE Hall of Fame

Mark Lashier, B.S. '85, Ph.D. '89 College of Engineering Anson Marston Medal

**Christopher Ellison**, B.S. '00 College of Engineering Professional Achievement Citation in Engineering

Jack Johnson, B.S. Computer Engineering '81, and the late Carol Johnson, B.S. '81 Campanile Award, Iowa State University Foundation

# UNDERGRADUATE STUDENTS

# **Bryce Stubbings**

Lawrence E. Burkhart Outstanding Senior Award, Fall 2021

**Anna Buccholz** CBE senior marshal nominee, Fall 2021

# Luke Geis

Lawrence E. Burkhart Outstanding Senior Award, Spring 2022

**Jedidiah Chukwusom** CBE senior marshal nominee, Spring 2022

# **POST DOCTORAL**

# **Susheel Nethi**

Iowa State University Postdoctoral Excellence Award for Teaching and Mentoring Students

# **Jungkuk Lee**

Iowa State University Postdoctoral Research Excellence Award

# **AROUND THE DEPARTMENT**



CBE freshmen get their first chance at hands-on lab activities in the Fall 2022 semester. New equipment was made possible by a gift from department alumnus Gary Griswold and his wife Mickie. Department alumnus and Phillips 66 President/Chief Executive Officer Mark Lashier was the banquet keynote speaker at the Iowa State-hosted AIChE Mid-American Student Regional Conference.



Local TV news reporter Roger Riley (far right) featured CBE students in a report on making chocolate in a class taught by professor of practice John Kaiser.



CBE undergrad Aline Milach Teixeira displays her research poster at the Iowa State-hosted AIChE Mid-America Student Regional Conference.



CBE's contingent in the AIChE Annual Student Conference enjoy the event, held in Boston in 2021.



CBE undergrads dig into the goodies at Donut Day, the traditional department welcome back event at the start of spring semester.

# **AROUND THE DEPARTMENT**

Department supporter Ed McCracken (BS EE '66) congratulates Jared Greiner at the CBE Awards Banquet. Greiner was the recipient of a scholarship made possible by Ed and his wife Ana.

IOWA STATE UNIVERSITY





Winter 2021 (above) and Spring 2022 (below) CBE graduates on hand at the pre-commencement reception smile for the camera.



The addition of graphics to hallway walls, teaching laboratories, entrances and more gave Sweeney Hall some splashes of dynamic color and chemical engineering promotion in 2022.

Professor Eric Cochran (center) was named Mary Jane Skogen Hagenson and Randy L. Hagenson Professor in late 2021. He's shown at the medallion ceremony with the Hagensons, ISU President Wendy Wintersteen (far right) and James L. and Katherine S. Melsa Dean of Engineering W. Samuel Easterling (far left).

> An accomplished resear CBE faculty member Surva Mallapragada was included in the 2022 Women Impacting ISU calendar produced by the university Catt Center for Women and Politics.

> > ALL THE WORLD'S PROBLEM

Surya Mallapragada

Associate Vice President for Research

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# SCHOLARSHIPS AND FELLOWSHIPS

**3M Endowed Scholarship in Engineering** Hannah Nguyen

A. Douglas and Helen F. Steffenson Memorial Endowed Scholarship Isabel Furness Jonathan Greene

Alpha Chi Sigma Chemical Engineering Scholarship Sophia Vaughan

Ana and Ed McCracken Engineering Scholarship Jared Greiner

Barbara L. Feroe Scholarship Laura Stowater

### BASF STEM Scholarship

Julia Barajas Nicolas Gonzalez Jefu Kashindi Morgan Meaney

### Beisner Scholar Award in the Department of Chemical Engineering

Kyle Harrison Aubrey Jorgensen Matthew Laws Lauren Stauffer

**BASF STEM Scholarship** William Tidona

**Bob Kaiser Memorial Scholarship** Cassandra Volpe

Building a World of Difference Renewable Energy and Sustainable Water Scholarship in Engineering Ryan Ungs Burton H. Friar Scholarship in Chemical Engineering Fund Megan Wolfe

# Chemical Engineering Scholarship Fund

Joran Brensdal Laura Brown **Emilv Cline** Mackenzie Donald Jessica Fuertes-De Arcos Michael Galvin Jack Girton Kaelie Hainlin Jessica Hammel Kyle Harrison Grace Hartzler Nicholas Hoffman Kaitlyn Holtz Holly Jacobs Elena Knops Alexis Lambros Matthew Laws **Rachel Leholm** Nicole Lorang Ashlev Marker Natalie McAninch Anna McCaslin Morgan Meanev Aline Milach Teixeira Madison Mohar Logan Morris Samuel Musselman David Nelson Katelvn Nelson **Tyler Nelson** Huy Nguyen Addisen Popp Kaitlvn Quinn **Jack Raffaelle** Rvan Rasmussen Payton Ricks **Taylor Schlagel Brodrick Sevart** Megan Sherman Aislin Sim

### Chemical Engineering Scholarship Fund (cont.)

Nathan Smith Lauren Stauffer Laura Stowater Ee Jie Tai Phuong Tran John Traxler Sophia Vaughan Mariella Vitelli Cassandra Volpe Carter Wachholtz Sydney Williams Ava Zaugg

### Conrad N. Muzzy Scholarship Fund Elena Knops

Dean and Sharon Vance Scholarships Vanessa Hupp Joseph Jonasson

Dr. Owen A. Heng Chemical and Biological Engineering Scholarship Taylor Schlagel

**Dr. Peter Reilly** 

Memorial Scholarship Anna Meerschaert

Dr. Thomas D. Wheelock Scholarship Mary Thatcher

Edward W. and Joyce C. Backhaus Scholarship in Chemical and Biological Engineering

Jordan Boban Maria Brown Brandon Deahl Robert Downs Jessica Fuertes-De Arcos Isabel Furness James Gninefou Shane Kelsey Edward W. and Joyce C. Backhaus Scholarship in Chemical and Biological Engineering (cont.)

Luke Koeneman Katelyn Nelson Josef Schmitz Charles Walter

### Edwin John Hull Endowed Scholarship

Tyler Nelson Ryan Rasmussen Carter Wachholtz Charles Walter

# Engineering Incoming Freshman MeritScholarship

Grace Malin Margaret Nedved

### Engineering Student Program Support -Incoming Freshman Applied Merit

Vaughn Blad Andrew Bliss Madison Chng Lucas Edders Elijah Erickson Sophie Faga Tyler Gardner James Gninefou **Kiana Gubbins** Aubrey Jorgensen Eagan Kirk Joseph Knepper Michael Labno **Blake Popinga** Hannah Serdarevic **Michael Stogdill** Kyle Tsujimoto **Casey Zielinsk** 

### Engineering Student Program Support -Incoming International Merit

Jaitra Ajgaonkar Ronnit Nandu Ana Soares

**Erwin and DeLoris** Whitney Scholarship in Chemical Engineering Violet Lapke

Eugene Devere Travis Scholarship Alexis Lambros Nicole Lorang David Nelson

Fred and Cassandra Dotzler Scholarship Violet Lapke

George L. Dawson Jr. Chemical Engineering Scholarship Matthew Baker

**Gerald and Barbara Montgomery Scholarship in Chemical and Biological Engineering** Victoria Kyveryga Mya O'Connell

# Griffen Family Scholarship

Anna McCaslin

**Gudron Cummings Student Support Fund** Aadhi Subbiah

H. Stuart Kuyper Engineering Excellence Endowment Fund Eric Bernhagen

Hans Buehler Scholarship Fund Jessica Fuertes-De Arcos Hans Buehler Scholarship Fund (cont.) Nathan Smith

Harry Oakley Price Scholarship Fund Hannah Gebur

ICL Specialty Products Inc. Engineering Scholarships Caleb Ragner Dejuan Roberson

Johnson-Engel Scholarship Endowment in Engineering Lauren Friederichs Luke Koeneman

Kenneth and Mary Heilman Scholarship in Chemical Engineering Maria Brown

Kenneth Jolls Undergraduate Scholarship in Chemical and Biological Engineering Khloe Dao Hannah Nguyen

Kenneth L. Garrett Scholarship in Chemical and Biological Engineering Jack Bonde Addisen Popp

**Langerhans Chemical Engineering Scholarship** Kaelie Hainlin

Lawrence E. and Janice B. Burkhart Memorial Scholarship Fund Jack Raffaelle

# SCHOLARSHIPS AND FELLOWSHIPS

### Leadership through Engineering Academic Diversity Learning Community (LEAD LC) Scholarship Madison Chng

Maxine Downer Rebeca Guimaraes de Oliveira Majeste Kyei-Amponsah

Linda Mittman Demmon and Wesley Demmon Scholarship in Engineering Elena Knops

# Lois and Manley Hoppe Endowed Scholarship

Brandon Deahl Grace Hartzler Shane Kelsey Sydney Williams

Lyle J. and Marcia L. Higgins Engineering Scholarship Fund Tyler Jenczmionka

## Manley R. Hoppe Scholarship

Laura Brown Nicholas Hoffman Kaitlyn Holtz Megan Sherman

Mary Jane Skogen Hagenson and Randy L. Hagenson Scholarship in Chemical and Biological Engineering Shawn Husgen Christopher Schnitzler

Mike and Jean Steffenson Scholarship Lauren Burton Jonathan Greene Shawn Husgen Zoe Ostrowski Christopher Schnitzler Neil and Vivian Lashier Memorial Scholarship Emily Cline Natalie McAninch

# Nicholas L. Reding/ Monsanto Scholarship in Engineering

Matthew Baker Jack Bonde Michael Galvin Jack Girton Kaelie Hainlin Rachel Leholm Morgan Meaney Madison Mohar Katelyn Nelson Kaitlyn Quinn Aislin Sim Ee Jie Tai Ava Zaugg

P. Fred Petersen Scholarship in Engineering Ee Jie Tai Mariella Vitelli

Patricia Werner Merten Memorial Scholarship Fund Tyler DeBlieck

### Professor Eugene H. Wissler Scholarship Brandon Deahl

Fernando Zuniga-Lara

Ralph Luebbers Scholarship in Chemical Engineering Lauren Stauffer

Ralph S. Millhone Endowed Presidential Scholarship Anna McCaslin **Robert A. and Jacklyn R. Lane Engineering Scholarship** Josef Schmitz

Robert and Ardith Wilkens Engineering Scholarship Joran Brensdal Michael Galvin Jack Girton

**Robert O. and Marie E. Dierks Scholarship in Chemical Engineering** Elena Leon Christopher Schnitzler

Roderick Seward, Flossie Ratcliffe and Helen M. Galloway Foundation Expendable Scholarship Delaney Eaheart Nathan Harding

**Sadeghbeigi Chemical Engineering Scholarship** Kyle Kelly

Sarah A. Rajala and James V. Aanstoos Endowed Scholarship Anna Do

Stuart M. Totty Scholarship Isabel Furness

### Sullivan Scholarship in Chemical and Biological Engineering

Christopher Haack Emily Cline Fernando Zuniga-Lara Jefu Kashindi Megan Wolfe

# Tau Beta Pi Scholars Program

Madison Mohar Kaitlyn Quinn Mariella Vitellii

The Robert Alan and Lori Ann (Lundquist) Pollet Scholarship in Engineering Delaney Eaheart

Thomas D. and Edra S. Wheelock Endowed Scholarship Ashley Marker Payton Ricks John Traxler

Thor and Karen Hanson Scholarship Aline Milach Teixeira

Wayne and Gladys Mittman Scholarship Mackenzie Donald

# GRADUATE FELLOWSHIPS

### M. A. Larson Fellowship in Chemical Engineering

Jonas Adjasoo Bibek Acharya Zisun Ahmed Vandhana Kandavelkumar

Chemical Engineering Fellowship Fund Liam Herbst

James Katzer Energy Fellowship Md Mosaddek Hossen

Lanny A. Robbins Endowed Graduate Fellowship Sujin Kang Reginald R. and Jameson A. Baxter Graduate Fellowship Vivek Garg

George W. Parrott Centennial Graduate Fellowship Mahmudul Khan

Judson M. Harper Graduate Scholarship in Chemical & Biological Engineering Devanshi Mistry

Loren and Donna Luppes Graduate Fellowship in Chemical Engineering Shiva Karimidehkordi

Sweeney Family Memorial Scholarship Award Sujin Kang

Frederick Martinson Chemical Engineering Scholarship Fund Abdulhakim Tofik

Gerald T. and Barbara J. Montgomery Graduate Fellowship in Chemical & Biological Engineering Soheyl Mirzababaei

Peter J. Reilly Graduate Scholarship Ryan Godin

## **CBE Excellence**

Ryan Godin Sujin Kang Shiva Karimidehkordi Mahmudul Khan Devanshi Mistry

# NATIONAL MERIT SCHOLARSHIP Sophie Faga Joseph Jonasson Victoria Kyveryga Mya O'Connell Michael Stogdill

Michael Stogdi Mary Thatcher hip in ical

Karimidehkordi nudul Khan nshi Mistry

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