



CHEMICAL ENGINEERING NEWSLETTER



**SFEWS: Growing a Sustainable
Food and Energy Future**

CHARLES D. DAVIDSON
SCHOOL OF CHEMICAL ENGINEERING

SUMMER 2020
EXCELLENCE
EXCELLENCE AT SCALE
COST-EFFECTIVE EXCELLENCE AT SCALE

COVID-19 has changed the world so much since our last issue, and Purdue has not escaped the health and economic disruptions of the pandemic. Yet, as an institution of higher learning blessed with talented students and faculty, we have risen to the challenge of forging a path forward. This is especially true of the Davidson School of Chemical Engineering, as chemical engineers can contribute in so many ways to the many facets of this challenge. Discovery and the molecular basis of the disease: chemical engineers use systems biology to target promising host pathways used by the coronavirus' "spike proteins" to help develop "broad spectrum antivirals" that address the extended time scale of this pandemic. The immediate priority of developing effective therapies and vaccines against the current strain: immediate demand in the hundreds of millions to billions presents a nontrivial scale up problem for the bio-pharma industry and an opportunity for Purdue's LyoHUB to advance new lyophilization technologies. The health and economic response to COVID-19: big data and the dynamic nature of the data streams have placed data science and techniques such as machine learning at the forefront and our school has one of the largest collection of such experts in a CHE department. Against this backdrop, Purdue continues to attract record numbers of students to First Year Engineering, and many are attracted to chemical engineering with T2M, or Transition to Major, occurring three times per year or at the end of each term. This past year we had 5 in December, 146 in May, and 17 in August, for a total of 168 students in the sophomore CHE class. The story of excellence at scale continues.



Sangtae "Sang" Kim
Distinguished Professor
Jay and Cynthia Ihlenfeld Head of Chemical Engineering

ChE Undergraduate Class of 2020

ChE Graduating Seniors - 135

Number of Women - 59

Number of Men - 76

Average Starting Salary - \$76,934

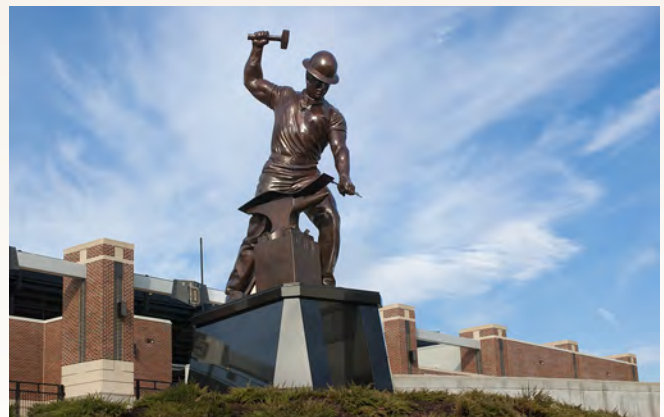
Purdue ChE: Meeting today's challenges to create a better world

During these exceptional times, the Davidson School of Chemical Engineering has upheld its commitment to *maintain a highly capable, motivated, and diverse body of undergraduates, and help them to obtain a strong and relevant education throughout their Purdue experience*, as laid out in the School's strategic plan.

The ChE faculty and staff have shown amazing resolve in their commitment to sustain the highest possible learning environment. With the support of the School's Head, Dr. Sangtae Kim, Chemical Engineering continues to expand the boundaries of learning, while also ensuring our student body and research programs remain on track.

The health and safety of the Boilermaker community is our top priority. While transitioning campus operations to our homes has brought many challenges, it has also fostered inspirational innovation and creativity among the faculty, staff, and students.

In the words of Purdue University President Mitch Daniels, "Boilermakers come together in our most challenging times, which this year has proven to be. No matter the situation, no matter our differences, no matter the tensions of the world, as members of the Purdue community, we work together to find solutions, we work together to build a better world."



Boilermakers are forged in a tradition of excellence and innovation, committed to tackling the next giant leap. (Purdue University photo)

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TELL US WHAT YOU THINK

Write to us at cheschool@ecn.purdue.edu. Share your memories, react to a story, or let us know your thoughts about a particular issue. In doing so, you grant us permission to publish your letter in part or in whole in an upcoming issue. We reserve the right to edit letters for length and clarity.

ADMINISTRATION

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ON THE COVER

Dr. Rakesh Agrawal is Director of Sustainable Food, Energy and Water Systems research at Purdue University, utilizing the concept of “agelectric farming,” in which the sun can simultaneously meet the food and energy needs of a growing world population on the same land. See page 4.

TO MAKE A GIFT TO THE

DAVIDSON SCHOOL OF CHEMICAL ENGINEERING

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***GROWING** A SUSTAINABLE FOOD AND ENERGY FUTURE*

Dr. Rakesh Agrawal leads NSF-funded research and education

By Brian Zink



Corn grows in about an acre field, in tandem with the photovoltaic panels, at the Agronomy Center for Research and Education (ACRE) at Purdue University in West Lafayette, Indiana. (Purdue University photo)

At first glance, there isn't much that connects a tea plantation in India to a farm field in Indiana. But both rely on the sun's immense power to bring crops to life.

It's that power of the sun – and the ability to harness that power both for growing crops and generating energy – that drove Purdue's Rakesh Agrawal to embark upon a journey to make possible the concept of "agelectric farming," in which the sun can simultaneously meet the food and energy needs of a growing world population on the same land.

The sun's energy is abundant: In just one second, the sun blasts out more energy than the human race has used

over our entire history. However, by the time energy-packed photons make the 93-million-mile journey to earth, only a tiny portion is intercepted by earth and the intensity of the incident solar rays is quite dilute, which means many solar panels and vast amounts of land are needed to reap the energy potential.

Agrawal, the Winthrop E. Stone Professor of Chemical Engineering, in 2015 was visiting a tea plantation in south India when he was struck with the realization of how the utilization of land – particularly farmland – potentially hampers the ability of making use of the potential of solar energy.



Construction of the photovoltaic panels at the Agronomy Center for Research and Education (ACRE) at Purdue University in West Lafayette, Indiana. Construction was completed May 2019.

"I realized they are doomed because they had no place to collect energy," he says. "There is just no space." While the United States has abundant land resources the challenge remains, especially considering that almost 54 percent of U.S. land area is designated as agricultural.

"I don't think anyone can argue we are very fortunate in the U.S.," he says. "Despite that, you would still need 4 percent to 6 percent of the U.S. land area to meet the entire energy need we have. What you quickly find out is that if each of the 48 contiguous state decided to meet its entire energy need with solar energy, then roughly half will not be able to achieve this goal. Indiana happens to be one of the states that can't, but the problem isn't that Indiana doesn't have the land, it's that most of the land is for agricultural use."

At end of that 2015 trip, Agrawal spent the late-night flight returning to Purdue from India sketching out potential designs for photovoltaic modules that could be installed on agricultural land to potentially harvest energy while not impacting farmers' crop harvests. Those ideas led to \$3 million in seed funding from the National Science Foundation to create the Sustainable Food, Energy and Water Systems NSF Research Traineeship. That was followed by an additional \$2.5 million from the NSF's Innovations at the Nexus of Food, Energy and Water Systems.

Those funds helped create a robust program to conduct research while also educating and training graduate students. Agrawal partnered with co-director Mitch Tuinstra, Purdue's Wickersham Chair of Excellence in Agricultural Research and a professor of plant breeding and genetics in

the Department of Agronomy. Aavudai Anandhi Swamy is directing the work at partner university Florida A&M.

In May 2019, 28 300-watt panels and 28 100-watt solar panels were constructed on 0.16 acre in a field just north of Purdue's Agronomy Center for Research and Education. The research examined how to manipulate the photovoltaic panels' shadows in a way that wouldn't inhibit the growth of corn plants put in the field under Tuinstra's direction.

Data was collected individually on 1560 plants throughout the growing season for plant height, silking, anthesis dates, and ear height. Now the team is working to analyze the vast amount of data on plant growth and individual corn kernel development to help inform future research and provide guidance on how to manipulate the panels in a way that maximizes both energy production and plant development.

While the goal is energy production, Agrawal says the plants have become a central player in the ongoing work, which, in the future, will likely expand to include other commercial crops.

"The most important thing, which I really didn't appreciate for a long time, is connecting all of this with plant physiology: How does the plant grow? What part of the growing season does it need light? What kind of light does it need? I'm just imagining things. I'm also questioning how I can play with the photovoltaics. These are questions I don't think anyone else in the world has asked yet. All of these dimensions are important."

Agrawal says the current work has used commercially available solar panels because off-the-shelf technology is less expensive and can be more quickly put into practice. However, he also has designs for other systems that might prove to be better options and is also looking at novel photovoltaic materials that would capture certain wavelengths of light to produce energy while allowing other wavelengths to pass through to meet the growth needs of crops.

"Some crops need a lot more light," he says. "Corn is one of those crops that will use every photon it can get, so we need to manipulate the photovoltaics so we don't deprive them."

The research, in addition to its practical value, also offers valuable training for graduate-level students and postdoctoral students. In addition, the Sustainable Food,

Energy and Water Systems initiative has led to the creation of four education modules to teach the holistic approach needed to tackle challenges in food, energy and water systems. Those modules include:

- * Food and Energy Farms: Challenges to Sustainable Production on a Crowded Planet
- * System, Economics and Supply Chain Analysis for Food, Energy and Water Production and Distribution
- * Discovery, Development and Transition in Food, Energy and Water
- * Leadership and Diversity in Science and Technology

The goal of the educational component is to expose students to the sort of interdisciplinary and multidisciplinary thinking required to address a challenge that touches on so many variables.

"I started out four years ago with a very simplistic view," Agrawal says. "The single biggest hurdle is that all of us were trained in the traditional disciplines, and we don't have the knowledge which it takes to bring all of these pieces together. It's important to be able to connect the dots in many different fields."

Purdue's team has brought together a team that includes faculty Agrawal and Michael Harris from chemical

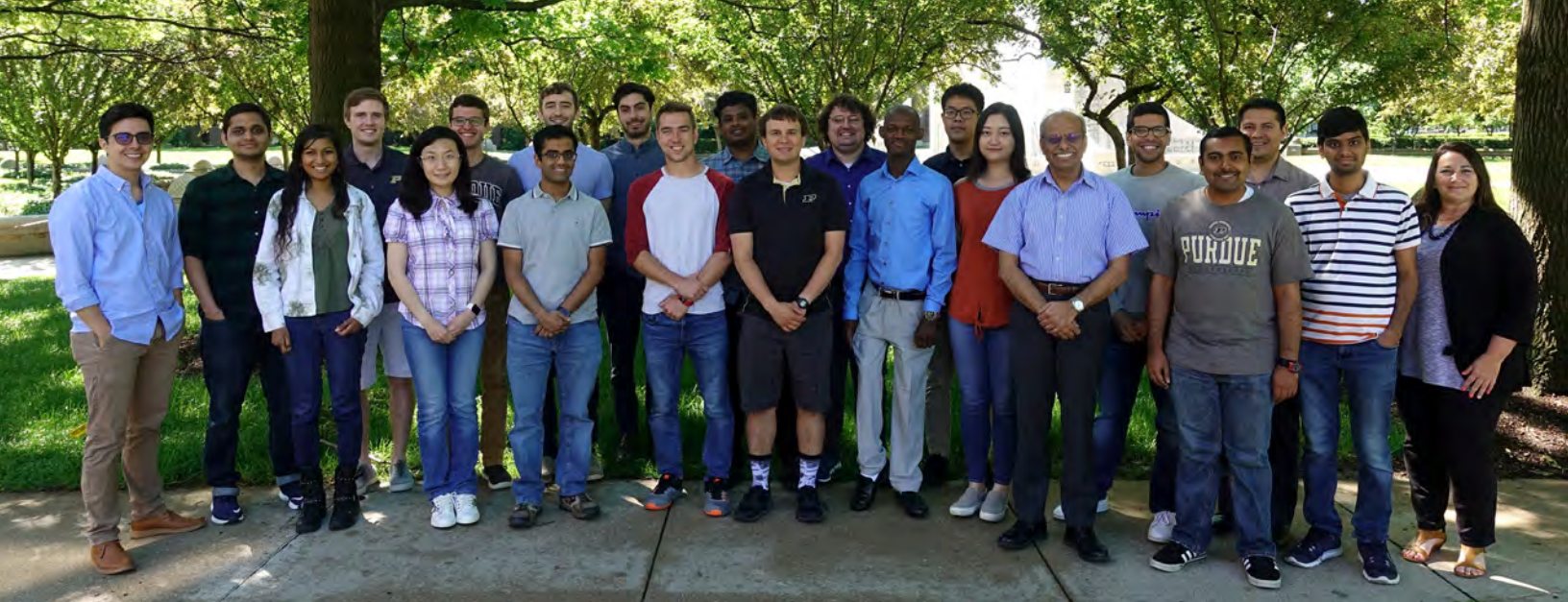
engineering; Tuinstra, Davide Cammarano, and Sylvie Brouder from agronomy; Peter Bremel from electrical and computer engineering; Margaret Gitau from agricultural and biological engineering; Juan Sesmero from agricultural economics; and Nathalie Duval-Coueril from entrepreneurship and innovation. And to make the initial research possible, Agrawal received financial support not only from the NSF but also Purdue's School of Chemical Engineering, the colleges of Engineering and Agriculture, and the Office of the Vice President for Research and Partnerships.

Agrawal notes that Purdue's administration has a forward vision, and was quick to provide the needed financial support for the project construction. That ongoing support from inside and outside the university is what Agrawal says will be needed to meet the goal of meeting future energy needs while ensuring that food and water systems are also strengthened.

While Agrawal doesn't think fossil fuels will run out anytime soon, he does believe that social and economic pressures will make alternative energies, like wind and solar, more viable. And this is from someone who grew up with fossil fuels: Agrawal's father was an oil reservoir engineer, and Agrawal's discipline has deep historical ties to the fossil fuel industry.



Crops growing at the Aglectric Farm at the Agronomy Center for Research and Education (ACRE) at Purdue University in West Lafayette, Indiana. Corn seed was sown in June 2019. (Purdue University photo)



Dr. Rakesh Agrawal, the Winthrop E. Stone Distinguished Professor of Chemical Engineering, with his Spring 2019 research group.

“Chemical engineering grew up on the back of fossils,” he says. “We are not a stagnant discipline. We are going to have to say goodbye to fossil fuels at some point, and where does that leave chemical engineering? We evolve, we use our knowledge set and skills to do things as society’s needs change.”

Solar is a linchpin to provide electricity without decreasing yields of major food crops. That approach would also eliminate competition for land to simultaneously satisfy food, energy and water needs. And because agricultural land is broadly dispersed, it also means energy can be created in areas where it is needed.

“A motto I have is local photons for local needs,” Agrawal says. “If every state, every county, can meet its local energy needs, you don’t have to spend millions or billions on power transport infrastructure. It will change the way we live.”

When it comes to the future of such an integrated approach to solar energy, Agrawal believes Purdue’s work is currently at the forefront. But as research efforts heat up in Europe and China, he knows that window of opportunity won’t be wide open for long.

“Fortunately, no one is working along the same lines that we are, but that is just a matter of time,” Agrawal says. “And what that means is that we at Purdue no longer have the luxury of doing it slowly.”

Agrawal’s bold vision promises a future in which the sun can provide another crop that could be harvested from farmland, which also helps farms be economically viable

and ensures farmland will be there for future generations of farmers and consumers.

“The way I look at it is any farmer converting his or her farmland to non-crop uses is potentially losing the ability to grow crops on that land forever,” he says. “Food is our number one item, and we can never lose sight of that. The future is evolving, but sometimes it’s good to be restless because it pushes you to achieve.”



Rakesh Agrawal addresses the audience at the SFEWS ribbon cutting at Beck Agricultural Center in West Lafayette, Indiana on August 12, 2019. (Purdue University photo)

ABOUT RAKESH AGRAWAL

Dr. Rakesh Agrawal is the Winthrop E. Stone Distinguished Professor in the Davidson School of Chemical Engineering. Learn more about Rakesh Agrawal at: <http://bit.ly/ChE-Rakesh-Agrawal>.

LYOHUB: ADVANCING LYOPHILIZATION TECHNOLOGY

University-Industry Center improves efficiency, science, and technology of freeze-drying

By Jennifer Gray

LyoHUB, a university-industry center at Purdue University, is advancing the science of lyophilization and providing the necessary capabilities in the fight against COVID-19 and other illnesses around the globe.

Lyophilization, also called freeze-drying, is a process that gently removes water from materials to produce a dried product. For pharmaceuticals, lyophilization is often used to stabilize sensitive drugs, lengthening the shelf life while preserving the critical efficacy of the medicine. Lyophilization also presents a technology challenge because the process is time consuming, often misunderstood, and inefficient. Despite this challenge, lyophilization is a critical manufacturing process for the pharmaceutical industry, and around 25 percent of new injectable drugs, vaccines, and biological products are



Elizabeth Topp and Alina Alexeenko, Co-Directors of LyoHUB

formulated in a lyophilized form. With support from the Davidson School of Chemical Engineering, LyoHUB is advancing the science and technology of lyophilization, with the goal of lowering costs and improving the availability of lyophilized products. The need for advancements in this area is magnified as COVID-19 lyophilized treatments, such as Gilead's Remdesivir®, diagnostic reagents and other countermeasures are being developed and evaluated.

"The pharmaceutical industry uses solid forms of drugs to protect them during manufacturing, shipping, and storage. If we tried to remove the water by heating, many drugs would be destroyed," said Elizabeth Topp, a Professor in Purdue's Department of Industrial and Physical Pharmacy

and co-Director of LyoHUB. "Lyophilization removes water at low temperature and low pressure, safely drying sensitive drugs."

LyoHUB was funded at Purdue in 2014 with a National Institute of Standards and Technology (NIST) AMTECH grant program. The program's goal was to develop the Lyophilization Technology Roadmap, a project which was published in 2017 with input from over 100 industry leaders, establishing a university-industry consortium that identified trends and developments in lyophilization. LyoHUB's 24

We are excited that LyoHUB capabilities are being utilized right now to speed up development of novel COVID-19 diagnostics.

industry members, which include the entire value chain in lyophilization— pharmaceutical companies, equipment manufacturers, software companies and more — work together with university researchers to achieve three goals: identify and disseminate Best Practices for lyophilization including equipment performance, testing, validation and formulation; conduct applied research to advance lyophilization processes and technologies; and develop educational and training programs in lyophilization.

Interested parties can now learn about lyophilization and get involved with LyoHUB through a non-credit online course and the LyoLaunchPad program.

In January 2020, LyoHUB released an innovative online, open-access lyophilization short course which allows participants to learn the basics of freeze drying of pharmaceuticals through eight 20-minute educational modules. The modules were developed and recorded by leading lyophilization experts from around the United States.

Course modules include: Introduction to pharmaceutical lyophilization; Overview of the lyophilization process; Production lyophilizers; Quality attributes of lyophilized products; Glass transition temperature; Freezing; Primary and secondary drying; and Graphical design space. An online laboratory exercise in pharmaceutical lyophilization is also included in the course, allowing students inside the LyoHUB demonstration facility to virtually see how

a lyophilization cycle is run. The course was developed through a grant from the National Institute for Innovation in Manufacturing Biopharmaceuticals (NIIMBL), and is available free of charge.

Birk Nanotechnology Center at Purdue is home of the LyoHUB Lyophilization Technology Demonstration Facility, a research lab featuring state-of-the-art lyophilization equipment and analytical tools run by several experienced lyophilization “superusers.” The facility has hosted almost 900 lyophilization runs since it opened in 2016.

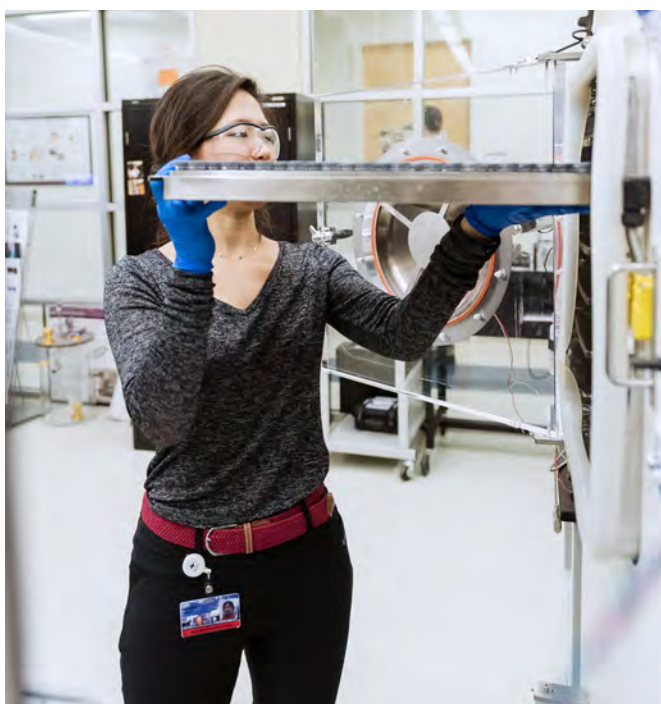
“We are excited that LyoHUB capabilities are being utilized right now to speed up development of novel COVID-19 diagnostics,” said Alina Alexeenko, Professor in Purdue’s School of Aeronautics and Astronautics and the Davidson School of Chemical Engineering, and co-Director of LyoHUB. “We are ready to offer support for other efforts to improve lyophilization for faster manufacturing of COVID-19 reagents, drugs, or vaccines.”

This year, LyoHUB also introduced LyoPRONTO, an Open Source Lyophilization Process Optimization Tool. This user-friendly lyophilization simulation and process optimization tool is freely available under the name LyoPRONTO. It includes freezing, primary drying modeling, and optimization modules, as well as a design space generator (Figure 1). LyoPRONTO can be used to model the



LyoHUB’s “superusers” are students from a variety of disciplines including pharmacy and several engineering fields, who develop freeze drying process & equipment expertise through training and completing projects in the lab. Superusers help Purdue faculty, fellow students and industry members from around the world successfully complete research projects in the LyoHUB demonstration facility.

lyophilization process and create more efficient cycles. The tool is also capable of determining the vial heat transfer parameters and product resistance characteristics, reducing the number of experiments. LyoPRONTO is available on two platforms, Python Source Code and an online version with graphical user interface.



ChE Professional Master’s Program alumna Yirang Park loads a lyophilizer in LyoHUB’s lab in Birk Nanotechnology Center. LyoHUB is a university-industry center at Purdue whose goal is the efficiency, science, and technology of freeze-drying in pharmaceuticals and other areas. (Purdue University/Rebecca McElhoe)

LEARN MORE ABOUT LYOHUB

For more information about LyoHUB, visit the website at www.lyohub.org.

LyoPRONTO is available on two platforms: (Python Source Code): lyoprnto.org and the online version with graphical user interface (GUI): <http://lyoprnto.rcac.purdue.edu/>.

LyoHUB’s new online, open-access lyophilization short course was developed through a grant from the National Institute for Innovation in Manufacturing Biopharmaceuticals (NIIMBL), and is available free of charge at <https://pharmahub.org/courses/lyo101>.

Learn more about the LyoHUB Lyophilization Technology Demonstration Facility, including a description of the facility, along with an equipment listing is available at <https://pharmahub.org/groups/lyo/demofacility>.

LyoHUB offers LyoLaunchPad, a program which allows new users to conduct an approved, non-proprietary, short-term project in the LyoHUB demonstration facility at no charge. Participants are asked to give a short presentation for LyoHUB members at the completion of the project. For more information on LyoLaunchPad, contact Jennifer Gray, LyoHUB Operations Manager, at gray160@purdue.edu.

Papanicolas, Smith, and Thunhorst named 2019 Outstanding Chemical Engineers



Every year since 1988, the Davidson School of Chemical Engineering has recognized alumni who have achieved distinction as leaders while making significant contributions to their fields, thus reflecting the value of a chemical engineering degree. Dr. Sangtae Kim, the Jay and Cynthia Ihlenfeld Head of the Davidson School of Chemical Engineering, is pictured above left with the 2019 OChE recipients: Kristin L. Thunhorst (BSChE '93), Staff Scientist, Safety and Industrial Business Research and Development Laboratory, 3M Company; Mitchel J. Papanicolas, (BSChE '65), President and Owner, Del Ray Glass, Inc.; and Craig A. Smith (BSChE '72), Senior Vice President, Morgan Stanley Wealth Management, retired. The September 5, 2019 OChE events included an afternoon reception, an open forum seminar with a question and answer session, and an evening awards banquet at the Lafayette Country Club. See more photos from the 2019 OChE Awards on page 13.

Stephen Standifird (BSChE '89) named next President of Bradley University

Purdue Chemical Engineering alumnus Dr. Stephen Standifird has been named as the 12th president of Bradley University. Standifird is currently the



dean of Butler University's Andre B. Lacy School of Business in Indianapolis. His new role began June 15.

Standifird also previously worked as the dean of the business school at the University of Evansville, and an associate dean at the University of San Diego.

Standifird earned his Bachelor of Science in Chemical Engineering from Purdue University in 1989. He earned an MBA from Northwestern University, and a doctorate in organization studies from the University of Oregon.

His wife Vivian is CFO at Rehab Medical, Inc. He has two young daughters.

John Klier (MSChE '86, PhD '89) appointed Dean of Engineering at University of Oklahoma



Purdue ChE alumnus Dr. John Klier (MSChE '86, PhD '89) has been appointed as Dean of the Gallogly College of Engineering at the University of Oklahoma. He began his new role at OU on July 1.

Klier joined OU from the University of Massachusetts Amherst, where he served as professor and head of the Department of Chemical Engineering. Before serving on the faculty at UMass Amherst in 2015, Klier worked for more than 25 years in the private sector with Dow Chemical Co.

Klier is a member of several professional organizations, including the National Academy of Engineering and the National Academy of Inventors. Klier was named a 2015 Outstanding Chemical Engineering and is a 2016 Distinguished Engineering Alumni.

AIChE President-elect Deb Grubbe (BSChE '77) shares insights with ChE students



Purdue Chemical Engineering alumna Deborah Grubbe (BSChE '77) was the featured panelist during a question and answer session with ChE students on Friday, May 1, 2020.

The one-hour conversation, titled *AMA: Ask Me Anything*, allowed students to submit a wide range of questions in advance of the session, and Grubbe provided responses during the live event. Because of the COVID-19 social distancing restrictions, the event was held on Zoom, allowing students to join the meeting from their remote locations.

Sponsored by the Purdue AIChE Student Chapter and the Davidson School of Chemical Engineering, the conversation was moderated by ChE graduating senior and Purdue AIChE President Chandani Patel.

Grubbe was born in suburban Chicago and graduated with a Bachelor of Science in Chemical Engineering with Highest Distinction from Purdue University in 1977. She received a Winston Churchill Fellowship to attend Cambridge University in England, where

she received a Certificate of Post-Graduate Study in Chemical Engineering. Grubbe is a registered professional engineer in Delaware and is a Chartered Engineer in the United Kingdom.

Grubbe is Owner and President of Operations and Safety Solutions, LLC, a consultancy that specializes in improving firms' safety and operational performance. Her client list includes firms in the chemical, oil and gas, construction, healthcare, power, and aerospace industries. She is the former Vice President of Group Safety for BP plc, which had its two safest years ever during her tenure.

Grubbe served as a member of the NASA Aerospace Safety Advisory Panel and was a consultant on safety culture to the Columbia Shuttle Accident Investigation Board. For her service, she was awarded the NASA Exceptional Public Service Medal. Grubbe is a 1994 Outstanding Chemical Engineer Award recipient.

She has been active in the Delaware community as former president and board member of the Chesapeake Bay Girl Scout Council. She was the first woman and youngest elected member on the State of Delaware Professional Engineering Registration Board (1985-1989). During her term on the State Board, she was the Chair of the Law Enforcement and Ethics Committee. Grubbe is a registered professional engineer in Delaware and is a Chartered Engineer in the United Kingdom.

In 2002, she received the Purdue Distinguished Engineering Alumni Award, and was named "Engineer of the Year" in the State of Delaware. In May 2010, Grubbe was awarded an Honorary Doctorate in Engineering from Purdue University. In 2013, she was elected to the National Academy of Construction, and in 2018, was named the Delaware Valley Engineer of the Year. A Fellow of both the American Institute of Chemical Engineers (AIChE) and the Institution of Chemical Engineers, Grubbe has been named 2020 President-elect of AIChE, and will succeed Dr. Monty M. Alger as AIChE President in 2021.



Grubbe has worked with AIChE in the following positions: Board of Directors (2005–2007); Chair, 2008 Blue Ribbon Awards Committee; Director, Virtual Local Section; Chair, Institute for Sustainability; Chair, Center for Ethical Practice; Vice Chair, Public Affairs and Information Committee; Chair, Licensing and Professional Development Committee; and member of the Foundation Board, the Career and Education Operating Council (CEOC), and the Center for Chemical Process Safety (CCPS) Advisory Board.

Duncan A. Mellichamp (PhD '64) inducted in 2020 Control Process Automation Hall of Fame



Purdue Chemical Engineering alumnus Dr. Duncan A. Mellichamp (PhD '64) is one of four inductees in the 2020 Control Process Automation Hall of Fame. Dr. Mellichamp, pictured above with Mrs. Suzanne Mellichamp, is an Emeritus Professor of Chemical Engineering at the University of California, Santa Barbara. He is a 2007 Outstanding Chemical Engineer award recipient. He also established the Purdue Chemical Engineering Duncan and Suzanne Mellichamp Lectureship in 2013. Learn more: <https://www.controlglobal.com/articles/2020/2020-control-process-automation-hall-of-fame-duncan-mellichamp/>

NASA Astronaut Dr. Mary Ellen Weber (BSChE '84) visits ChE during Astronaut Reunion

Dr. Weber shares career experiences in ChE 34800, taught by Dr. Enrico Martinez



While on the Purdue West Lafayette campus for the 2019 Astronaut Reunion, Chemical Engineering alumna and NASA astronaut Dr. Mary Ellen Weber (BSChE '84) was the invited speaker in CHE 34800, taught by Dr. Enrico N. Martinez, Professor of Engineering Practice. Dr. Weber shared her career experiences with the students, including her days at Purdue, her national skydiving championships and world record, and her spaceflight experiences on STS-70 Discovery in 1995 and STS-101 Atlantis in 2000.

Dr. Weber grew up in Ohio and earned her BSChE with honors from Purdue in 1984. She went on to earn a doctorate in physical chemistry from the University of California-Berkeley in 1988 and a master of business administration degree from Southern Methodist University in 2002.

Selected by NASA in the 14th group of astronauts in 1992, Dr. Weber held a myriad of positions during her 10-year career. Learn more about ChE alumna Dr. Mary Ellen Weber at https://www.nasa.gov/sites/default/files/atoms/files/weber_mary.pdf



Photos by Heidi Cervantes

MOMENTS IN CHE: 2019 OUTSTANDING CHEMICAL ENGINEER AWARDS

Davidson School of Chemical Engineering presented three distinguished alumni with the 2019 OCHE Award. Mitchel J. Papanicolas (BSChE '65), Craig A. Smith (BSChE '72), and Kristin L. Thunhorst (BSChE '93) were honored at a banquet on Thursday, September 5, 2019.



ChE undergraduate students awarded three Co-Op scholarships

By Heidi Cervantes

ChE undergraduate students were awarded three Co-Op scholarships for 2019-2020. These scholarships are made possible through the generous donation and support of Purdue Chemical Engineering alumnus William Nelson (BSChE '74, MSChE '75) and his wife, Linda. The scholarships were awarded during the Professional Practice Days Career Fair luncheon.

In 2017, William (Bill) and Linda Nelson established the scholarship program to support Purdue Co-Op undergraduate students and encourage participation in the program. Each recipient receives \$1,000, with eight total scholarships awarded annually.

As an undergraduate Co-Op student, Nelson worked five sessions with Mallinckrodt Chemical Company. Since earning his BS and MS degrees in Chemical Engineering at Purdue, Mr. Nelson has had a successful career, with over 40 years of experience in industry. Mr. Nelson is a 2017 Outstanding Chemical Engineer.

2019-2020 recipients of the William & Linda Nelson Scholarship include Chemical Engineering students:

- **Jasmine Hughes** - FLEX Co-Op with Lubrizol – Spring 2020 scholarship
- **Kaya Wiegand** - five-term Co-Op with Lubrizol – Spring 2020 scholarship
- **Jeanette Hill** - three-term Co-Op with Dow Chemical – Spring 2020 scholarship

The students' names will be added to the William & Linda Nelson Scholarship Plaque, which is located outside of the Office of Professional Practice office suite, in the A.A. Potter Engineering Center.



Jasmine Hughes accepts the Spring 2020 scholarship alongside Lubrizol Representatives.

ChE undergraduates named to PPA executive positions

By Makenna Fitzgerald

Four ChE undergraduate students were elected to fill Professional Practice Ambassador (PPA) leadership roles for 2019-2020, including four of the nine executive committee positions. PPA is a student organization composed of co-op students working to enhance the awareness and experience of the cooperative education programs at Purdue University.

ChE undergrads elected to PPA officer positions and their roles are:

- **Katie Dudek, President.** Dudek completed a five-term co-op with Procter & Gamble.
- **Cassidy Ryan, Vice President.** Ryan completed a three-term co-op with Dow Chemical.
- **Austin Taskey, Secretary.** Taskey completed a five-term co-op with Sabic.
- **Matthew Alsop, Treasurer.** Alsop completed a five-term co-op with Dow Chemical.

Additionally, ChE undergraduate student Alex Dobbins was selected to serve on the External Relations team.

Purdue Chemical Engineering undergraduates have a notable presence as Professional Practice Ambassadors. "These students continue the tradition of having many leaders on the PPA leadership team," said Dr. Gabriela Nagy, Davidson School of Chemical Engineering Industrial Education Director. "Including 2019-2020, six of the last seven PPA presidents have been Chemical Engineering students."



Pictured from left: Austin Taskey, Cassidy Ryan, Katie Dudek, and Matthew Alsop

Two recent Chemical Engineering graduates receive Fulbright grants

Two recent Purdue ChE graduates were selected for 2019-20 Fulbright U.S. Student Program research grants, which fully fund a postbaccalaureate year for graduate students and alumni to forge international bonds through research, graduate study, or teaching English abroad.



Brendan Butler

Brendan Butler, from South Bend, Indiana, graduated with a BSChE in May 2019 and is now on his Fulbright scholarship in Italy. He is conducting research in a lab he toured while studying abroad, Politecnico di Milano's Laboratory of Applied Physical Chemistry. Butler is working on a device using a biomaterial-coated microbot to control the release rate and location of drug delivery. His past experience includes interning with Eli Lilly and Co., the City of South Bend, and working on drug technology research at Purdue.

Thomas Carpenter, from Bloomington, Indiana, graduated with a BSChE in December 2018. He is now pursuing fuel cell and renewable energy system research within Norway's context of becoming a renewable energy economy. As an undergraduate, he participated in biofuel and fuel cell research, and previously conducted research in Denmark. In the future, he intends to continue conducting research on renewable energy-integrated fuel cell systems.



Thomas Carpenter



ChE undergrad Natalie Kadlubowski receives Astronaut Scholarship

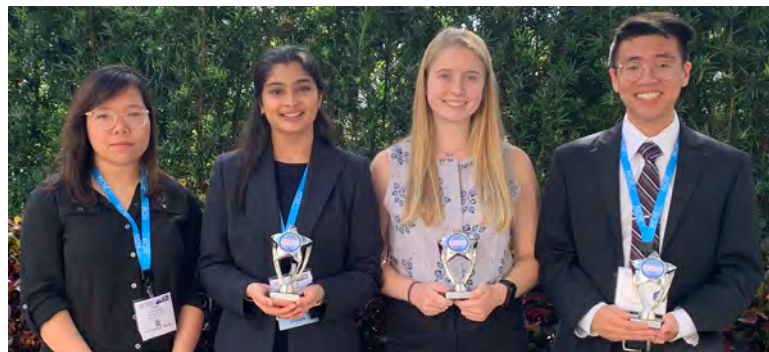
Undergraduate student Natalie Kadlubowski received the Astronaut Scholarship during a Purdue University Honors College event on February 27, 2020. Natalie is a double major in Chemical Engineering and the Department of Chemistry, and is a student in the Purdue Honors College, Purdue Engineering, and Purdue University College of Science. Natalie received the award from Tracy Cernan, in memory of her father, NASA astronaut and Purdue alumnus Gene Cernan, and former NASA astronaut Fred Gregory. [Learn more: bit.ly/2020-astronaut-scholarship](https://bit.ly/2020-astronaut-scholarship)

Undergraduate students compete at 2019 AIChE Annual Meeting

ChE students performed well at the 2019 AIChE Annual Student Conference Undergraduate Poster Competition in Orlando, FL.

Takashi Yokokura (*below right*) received second place in the Materials Engineering and Sciences Division. Yokokura's research poster, *Waste Biomass-derived Anode for Application in Lithium-ion Batteries*, presented a novel anode synthesized from avocado seeds for a lithium-ion battery that either matches or exhibits superior performance when compared to the current commercial graphite anode. Yokokura conducted his research under the supervision of Dr. Vilas Pol, Associate Professor of Chemical Engineering. His laboratory research supervisor was Dr. Jassiel Rodriguez, a postdoctoral fellow.

Four ChE students presented during the poster competition: Thao Nguyen, Vaidehi Apte, Aubrey Quigley, and Yokokura. Attendance at the 2019 AIChE Annual Student Conference was supported by funding from the Davidson School of Chemical Engineering. The Purdue AIChE student chapter was represented by twenty-four student attendees.



2019-2020 GRADUATE STUDENT AWARD WINNERS

Purdue University Awards

Bilsland Fellowship

Recipient: **Brayden Wagoner**

College of Engineering Awards

Magoon Award for Excellence in Teaching

Recipients: **Tony Mathew** and **Brandon Bolton**

Outstanding Service Scholarship

Recipient: **Aiden Coffey**

Outstanding Graduate Student Research Award

Recipient: **Jason Bates**

School of Chemical Engineering Awards

Faculty Lectureship Award

Recipient: **Parul Verma**

Citation Award

Recipients: **Wooram Kang** and **Zhenwei Wu**

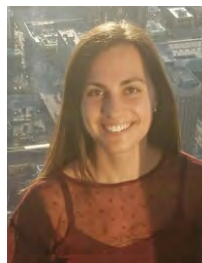
2019 Safety Award

Recipient: **Mihit Parekh**

Marilyn Forney Trailblazer Awards

Grad Recipient: **Laura Wilcox** (left)

Undergrad Recipient: **Jennifer Barrett** (right)



Centennial Fellowship Award

Recipient: **Jack Yungbluth**

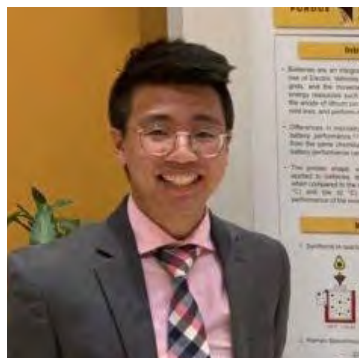


Jack Yungbluth (left) accepts the Centennial Fellowship Award from Dr. John Morgan.

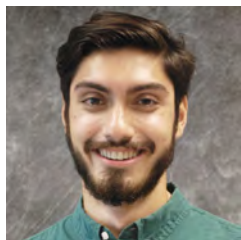
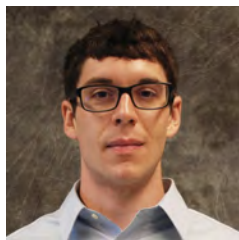
ChE senior, alumna receive 2020 NSF Graduate Research Fellowships

Two 2020 National Science Foundation (NSF) Graduate Research Fellowships were recently awarded to Purdue University Davidson School of Chemical Engineering graduating senior **Takashi Yokokura** (left) and 2018 Chemical Engineering alumna **Ana Carneiro** (right).

Yokokura and Carneiro are part of the largest group of award recipients from the Purdue College of Engineering in several years. Read more: <https://engineering.purdue.edu/ChE/news/2020/che-senior-alumna-receive-nsf-graduate-research-fellowships>



2019 AIChE Annual Meeting graduate student awards



Andrew Radcliffe (*above left*) First Place Presentation, Computing and Systems Technology Division. Radcliffe earned the top prize from 144 submissions in the category for his poster presentation, *Development of an Image Analysis Tool for High-Speed Imaging Data in a Dropwise Additive Manufacturing Process*.

Ryan Ellis (*above right*) First Place Presentation, Electronic and Photonic Materials Graduate Student Awards Session. Ellis earned the top prize for his presentation, *Synthesis and Ligand Engineering of Impurity Free Cu(In,Ga)S₂ Nanoparticles for Slot-Die Coated Photovoltaics*.

Jaeyub Chung (*right*) was awarded the 2019 Doh Wonsuk Memorial Award by the Korea Institute of Chemical Engineers (KICHe) for his stellar contributions to the field of chemical engineering.



Two PhD students awarded Leslie Bottorff Fellowships

Davidson School of Chemical Engineering PhD students Kaustabh Sarkar (*top left*) and Jessica Torres (*bottom left*) received Leslie Bottorff Fellowship. Sarkar was a recipient for his research in delivering localized chemoradiotherapy for head and neck cancers. Sarkar is advised by Professor You-Yeon Won. Torres was a recipient for her research on next-generation surgical adhesives. Torres is advised by Professor Julie Liu.

William Phillip from University of Notre Dame presents 2019 Mellichamp Lecture

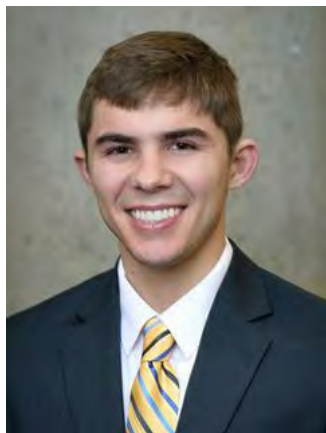
Dr. William Phillip, Associate Professor in the Department of Chemical and Biomolecular Engineering at the University of Notre Dame, presented the 2019 Mellichamp Lecture. Hosted by the Davidson School of Chemical Engineering, Dr. Phillip presented a lecture titled Manufacturing Fit-for-Purpose Membranes from Nanostructured Polymers on Tuesday, October 22 in Forney Hall of Chemical Engineering.



The Duncan and Suzanne Mellichamp Lectureship was established in 2013 to recognize the work of a distinguished young researcher in any area related to the field of chemical engineering. Recipients are selected by the Chemical Engineering faculty in recognition of their contributions to research and education. Learn more about the Davidson School of Chemical Engineering Mellichamp Lecture at <https://engineering.purdue.edu/ChE/aboutus/seminars/mellichamp/index.html>.

Zachary Batts receives inaugural Robert Rose Education Award in Hydrogen and Fuel Cell Technology

By Makenna Fitzgerald



For more than 110 years, the Davidson School of Chemical Engineering has prepared graduates to solve real-world problems, participate in groundbreaking research, and pursue academic and professional success. Thousands of ChE alumni have used their degrees to solve big problems at the nanoscopic level, setting an example of excellence for the students following after them.

Following in their footsteps, Chemical Engineering graduate student Zachary Batts is tackling challenges in renewable energy and sustainable energy technologies. Batts was recently recognized for his persistent pursuit of excellence as the inaugural recipient of the Robert Rose Education Award

in Hydrogen and Fuel Cell Technology. Administered by the American Councils for International Education, the Rose Award aims to support future global leaders in the emerging technology areas of hydrogen and fuel cells.

"As an Indiana native, Purdue was my first choice when considering universities," said Batts, who earned his BSChE in December 2018 and completed his MSChE in December 2019. "I knew that a Chemical Engineering degree would provide a great foundation for a career in renewable energy and sustainable technologies." Batts is focusing on his career goal as an advocate for the safe and economical implementation of renewable energies and sustainable technologies.

As a recipient of the Rose Award, Batts will complete an academic year of residency at Pacific Northwest National Laboratory (PNNL) in Richland, Washington. In January of 2020, he began his fellowship with a three-week orientation seminar in Washington, D.C., conducted by the American Councils for International Education in cooperation with the U.S. Department of Energy.

"During my orientation, I had an amazing opportunity to network and meet a wide variety of individuals involved in the hydrogen and renewable energy industry," stated Batts. A typical day included mornings spent making connections with people at the Fuel Cell Technology Office at the Department of Energy, and afternoons attending meetings with various officials and nongovernmental organizations. He had the opportunity to meet with Indiana Senator Mike Braun, representatives from various organizations, and the hosts of his favorite podcast, *"Everything about Hydrogen."*

Batts describes the work he is doing as more public-facing than initially expected. "A lot of the work I am doing has the ultimate goal of training and educating the public on hydrogen," he explained. "This includes developing materials to educate firefighters and other types of first responders on how to properly handle fuel cell electric vehicles (FCEVs) and other hydrogen-related incidents."

Batts was invited to give a presentation on National Hydrogen and Fuel Cell Day, recognized on October 8. His presentation was titled, *"Celebrate the Legacy of Hydrogen and Fuel Cell Pioneer Robert Rose on H2Day."*

During his off-time, Batts has joined outside organizations such as the PNNL Machine Learning Group and a computer programming start up, Fuse Coworking Space. Batts explained, "Overall, my experience has been very enjoyable and the network I am building is invaluable. I am learning a lot and I am thankful for this opportunity."

"A chemical engineering degree provides a great education for anyone who wants to pursue a career in renewable energy and sustainable technologies."



Senator Mike Braun, right, greets Zach Batts during his tour of the United States Capitol.

Dr. William Clark named Director of ChE Professional Master's Program

By Makenna Fitzgerald



Dr. William Clark, Professor of Engineering Practice in the Davidson School of Chemical Engineering, was named Director of the ChE Professional Master's Program. Dr. Clark started his new role in August 2019, succeeding Dr. Bryan Boudouris, Professor of Chemical Engineering, who held the role since July 2016.

The ChE Professional Master's Program (PMP) was created in 2015 to provide an opportunity for recent graduates and working professionals to expand their undergraduate education with a curriculum that would prepare them for success as technical managers. The PMP is a twelve-month residential program that combines advanced technical and business coursework and culminates in a rigorous summer Capstone Project with industrial partners or ChE faculty.

Dr. Clark will lead the Professional Master's Program team, including Corwin Green, Professional Master's Program Administrator, and Robin Waling, ChE Graduate Office Administrative Assistant.

Dr. Clark received his B.S. in Chemical Engineering from Purdue University in 1982. He earned a Doctor of Medicine from Indiana University in 1986, returning to Purdue to complete his M.S. in Chemical Engineering in 1994. Prior to joining the Davidson School of Chemical Engineering in 2017, he spent more than 20 years in the medical device industry, focusing on dialysis technology. Dr. Clark received the Outstanding Chemical Engineer Award in 2012.

As PMP Director, Dr. Clark brings invaluable experience to the program. Outside of his involvement on Purdue's campus, Dr. Clark is also a researcher for the Center of Dialysis Innovation at the University of Washington, as well as an Affiliate Professor for their Mechanical Engineering department. He is also a Permanent Visiting Scholar of the International Renal Research Institute of Vicenza, Italy.

National Academies names Dr. Sangtae Kim to committee studying future of chemical engineering



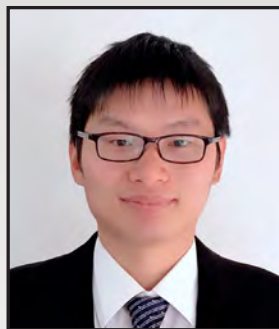
Dr. Kim, the Jay and Cynthia Ihlenfeld Head of Chemical Engineering and Distinguished Professor, has been named to a newly formed National Academies of Sciences, Engineering, and Medicine committee charged with outlining an ambitious vision for chemical engineering research, innovation, and education that will guide the profession for the next 30 years. He will serve for 36 months on the ad hoc committee putting together a comprehensive report, *Chemical Engineering in the 21st Century: Challenges and Opportunities*, that will articulate the status, challenges, and promising opportunities for chemical engineering in the United States.

"I am honored and pleased to be appointed to this committee and to have the opportunity to help formulate the key challenges in education and

research for chemical engineering in the 21st century," said Dr. Kim.

Committee members were selected in Fall 2019, and will take part in report drafting, committee meetings, public webinars, and numerous public events during 2020. The group will conduct report reviews during Spring 2021, with the final report set to be released in Summer 2021 and broadly disseminated in Summer 2022. Chaired by Dr. Eric W. Kaler, Professor of Chemical Engineering and Materials Science and President Emeritus at the University of Minnesota, the committee consists of 17 members who are prominent experts in the field of chemical engineering. The committee began its work during the first meeting on February 27, 2020 in Washington, D.C.

Recent Faculty Awards and Honors



Xiaoping Bao, Assistant Professor of ChE, 2019 LG Chem Global Innovation Award



Stephen Beaudoin, Professor of ChE, Vice Chair, Purdue University Senate



Letian Dou, Assistant Professor of ChE, Web of Science 2019 Highly Cited Researcher; 2020-2021 AIChE Area 8E Programming Chair



Rajamani Gounder, Larry and Virginia Faith Associate Professor of ChE, 2020-2021 AIChE Area 20A Programming Chair



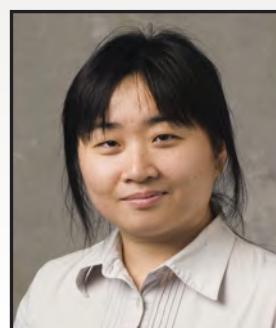
Gintaras V. Reklaitis, Burton and Kathryn Gedge Distinguished Professor of ChE, 2019-2020 College of Engineering Outstanding Faculty Mentor



Fabio Ribeiro, R. Norris and Eleanor Shreve Professor of ChE, 2019 Catalysis Club of Philadelphia Award



Linda Wang, Maxine Spencer Nichols Professor of ChE, PRF Office of Technology Commercialization Innovators Hall of Fame



Chongli Yuan, Associate Professor of ChE, Associate Editor of the Science Advances Editorial Board

“As an institution of higher learning blessed with talented students and faculty, we have risen to the challenge of forging a path forward.

– Dr. Sangtae Kim

Rakesh Agrawal, Stephen Beaudoin recognized for excellence in teaching

Two Davidson School of Chemical Engineering faculty members were recognized for their excellence in teaching undergraduate and graduate students. **Dr. Rakesh Agrawal** (left), the Winthrop E. Stone Distinguished Professor of Chemical Engineering, and **Dr. Stephen Beaudoin** (right), Professor of Chemical Engineering, were honored at the September 24, 2019 graduate seminar.



Bryan Boudouris, Vilas Pol promoted to full professors



Dr. Bryan Boudouris



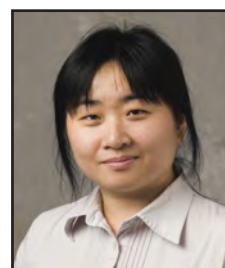
Dr. Vilas Pol

Purdue University Board of Trustees approved promotions for two Davidson School of Chemical Engineering faculty to the rank of Full Professor, effective with the 2020-21 academic year starting August 10.

Dr. Bryan W. Boudouris (*left*) joined Purdue Chemical Engineering in 2011. He received his B.S. from the University of Illinois at Urbana-Champaign in 2004, and his PhD from the University of Minnesota in 2009. He was a postdoctoral fellow at the University of California, Berkeley from 2009-2011. He leads a research group composed of chemical engineering and chemistry undergraduate students, graduate students, and postdoctoral researchers.

Dr. Vilas Pol (*right*) joined Purdue Chemical Engineering in 2014. Dr. Pol received his M.Sc. from Pune University, India in 1996, and his PhD from the University of Bar-Ilan, Israel in 2005. He leads the Vilas Pol Energy Research Group (ViPER).

Read the entire list of promoted faculty at <https://www.purdue.edu/newsroom/releases/2020/Q2/faculty-promotions-at-purdue-approved-by-board.html>.



ChE faculty honored for years of service at Purdue University

Five Davidson School of Chemical Engineering faculty were honored for years of service to Purdue University during the Faculty Service Recognition Luncheon. ChE faculty honored were (*left to right above*): **Rakesh Agrawal** (15 years); **Elias I. Franses** (40 years); **Robert E. Hannemann** (50 years); **Enrico Martinez** (10 years); **Chongli Yuan** (10 years). The event was hosted by the Office of the Provost.

P2SAC leads efforts to improve process safety

Why do major industrial incidents continue to happen?

by Dr. Ray Mentzer



On May 31, 2017, a catastrophic dust explosion at the Didion Milling facility in Cambria, Wisconsin, where corn was processed for ethanol, left five workers dead and 14 more injured.

More recently, a massive explosion and fire rocked the AB Specialty Silicones facility in Waukegan, Illinois on May 3, 2019, killing four workers and causing extensive damage. The incident appeared to be caused by the unanticipated production of flammable hydrogen gas, which combusted and resulted in an explosion felt up to 20 miles away. These incidents, and many more, pose the question: *Why do industrial incidents continue to happen?*

“Last year was particularly bad for workplace incidents, with at least a dozen significant occurrences in just the United States, resulting in seven fatalities and 67 injuries,” says Dr. Ray Mentzer, Professor of Engineering Practice and Executive Director of the Purdue Process Safety and Assurance

Center, or P2SAC. “Globally, there were incidents resulting in over 200 lives lost and untold injuries.”

Dr. Mentzer explains that many people associate such incidents with refineries and chemical plants, but they actually occur in a variety of industries. “As the Didion Milling and AB Specialty Silicones examples illustrate, incidents can often be traced back to the same root causes, as well as design and operational shortcomings.”

P2SAC brings safety to the classroom

Davidson School of Chemical Engineering at Purdue is one of few schools to not only teach a rigorous course in chemical process safety, but also to make it required for all seniors. Industry leaders are pleased to learn of P2SAC’s focus on process safety.

“When I was in school, there was little attention paid to safety,” recalls Dr. Sanjeev Saraf, Senior Process Safety Advisor with BP. “There is the expectation that students would learn process safety on the job. I’m glad to see process safety given the attention it deserves at Purdue, since it is critical to not only saving lives, but a company’s license to operate.”

Dr. Mentzer has taught the chemical process safety course for the last four years, with about 170 students per class. The course combines real-world incidents with equations, math, and logic – relying on the fluid flow, thermodynamics, kinetics, and process control learned in other classes. Video reenactments of significant process safety incidents are shown based on their relation to lectures, such as fires and explosions, toxic releases, and dusts, leading up to hazard and risk analyses.

“Every student team researches a significant incident, preparing a report analyzing the root causes and how the incident might have been prevented,” explains Mentzer. “Many students find this project to be their favorite aspect of the course.”

“*Every student team researches a significant incident, preparing a report analyzing the root causes and how the incident might have been prevented.*”

Role of Purdue Process Safety & Assurance Center – P2SAC

In addition to preparing students in the classroom, P2SAC continues true to its mission. Since its founding in 2014, P2SAC has been at the cutting edge of fundamental science-based research in the prevention of industrial process safety incidents. “Industry’s support of our P2SAC has been fantastic, with corporate sponsors growing to 19 companies from a broad cross-section of industries, including oil and gas, chemicals, pharmaceuticals, manufacturing, and more,” says Dr. Osman Basaran, the Burton and Kathryn Gedge Professor of Chemical Engineering and Academic Director of P2SAC.

P2SAC hosts a conference each semester, which now spans up to three days. Each conference has around 90 participants, including involvement by several departments at Purdue. The most recent event was December 4-5, 2019, which included a series of industry-led tutorials on various aspects of process safety, as well as a poster session featuring more than a dozen research projects.

PhD research funded by P2SAC is chosen by an Executive Committee of company sponsors. With nearly a dozen current projects, ten faculty are engaged on a variety of topics such as dust explosions, gas and fire detector placement, hazardous physical property prediction, battery safety, prevention by catalyst design, and other topics.

P2SAC research also includes industry selected and mentored summer projects as part of the ChE Professional Master’s Program (PMP). “We were delighted to have a team of students develop a methodology for predicting the ignition properties of flammable gas/particulate mixtures, which is a real-world concern of ours,” explains Scott Wright, Global Process Safety Manager of 3M. PMP projects have grown from two in 2017, four projects the following year, to nine the last two years.



An explosion at AB Specialty Silicones facility in Waukegan, Illinois on May 3, 2019 killed four workers and caused extensive damage. The incident appeared to have been caused by the unanticipated production of flammable hydrogen gas, which combusted.

Ayman Allian, Process Safety Manager with Amgen, comments, “In our industry, thermal hazards of pharmaceutical reagents are a significant concern. Last summer, Amgen’s project compared various calculation procedures with experimental data, which we are continuing with another project this summer.” As often happens, the student conducting the research is now employed by the pharmaceutical industry in the eastern U.S.

As more ChE undergraduate students become knowledgeable about process safety in the School, Dr. Mentzer notes there has been an increase in the number of students interested in

conducting research. The projects, which are typically led by Dr. Mentzer, are suggested by industry and engage the students in research for approximately 3-5 hours weekly.

“Some of the P2SAC projects are ‘one semester and done’ in scope, such as the determination of six common shortcomings in process hazards analyses (PHAs) that led to major incidents,” explains Dr. Mentzer. He says that other projects provide suitable background and scope definition to progress to PhD projects, such as in the areas of hazardous property prediction and dusts.

A few have resulted in peer reviewed journal publications. “Risk and reliability of aged natural gas pipelines” involved three students over 16 months and analyzed approximately 3,000 U.S. pipeline failures. Two additional papers were recently submitted for publication, including the work of five students analyzing the root causes that led to catastrophic incidents across 14 industries, including agriculture, chemicals, food, oil and gas, pharmaceuticals, and others.

Companies interested in partnering with P2SAC should contact Professor Osman Basaran, obasaran@purdue.edu, or Dr. Ray Mentzer, rmentzer@purdue.edu, or visit engineering.purdue.edu/P2SAC.

PURDUE FAMILY: PERSISTENT PURSUIT OF THE NEXT GIANT LEAP

Dr. Steven C. Beering, President Emeritus of Purdue University, passed away on April 6, 2020. Under Dr. Beering's leadership (1983-2000), Purdue expanded its international efforts, grew its liberal arts programs, promoted diversity, greened and beautified the West Lafayette campus, added 20 major buildings, and took fundraising to new levels. Dr. Beering also coined the phrase, *Purdue Family*, consisting of alumni, students, faculty, staff and friends.



Reflecting on whom we rely in times of uncertainty, our family is the primary source of support to overcome adversity personally and here at Purdue. The COVID-19 pandemic is changing the way society is conducting business. And, we know that societal changes are consistent with all that is changing at Purdue as well. One constant, however, is the pride and loyalty of Boilermakers stepping up to offer help and ensure we sustain our tradition of educational excellence in chemical engineering.

After completing the highly successful *Ever True* campaign, Purdue adopted a new brand in January of 2020. The *Persistent Pursuit of the Next Giant Leap* is challenging the University and the Davidson School of Chemical Engineering to push the boundaries of learning more than ever before. Because of the support of the *Purdue Family*, we are well-positioned to take advantage of opportunities even during this challenging time.

Whether you have been supporting Chemical Engineering for many years, or you are considering your first gift, know that your generosity makes a considerable impact. We hope all of you and your families are healthy, and we encourage you to connect with us and keep us updated by emailing ChEAlumni@purdue.edu. Also, know that if we can be of assistance, we are here to help. I am truly honored to be a part of such a great *Family*!

Hail Purdue,

Travis Stoutenborough

Chief Development Officer
Davidson School of Chemical Engineering

Chemical Engineering Ambassadors Club Celebrates 25 Years

In February, the founding members of the Chemical Engineering Ambassadors Club gathered to celebrate the organization's 25th anniversary in Naples, Florida as part of the annual President's Council Naples Weekend. The event was held at the Naples Yacht Club.

The ChE Ambassadors Club is an organization designed to engage alumni and friends philanthropically with the Davidson School of Chemical Engineering. To be a ChE Ambassador, donors give a minimum of \$1,000 annually. "The members of the ChE Ambassadors have been some of the most loyal supporters in all of Purdue," said Dr. Sangtae "Sang" Kim. "With approximately 15 founding members, the Ambassadors Club has grown to almost 200 which has provided vital support to our growth and successes over the past 2.5 decades. Because of our alumni ambassadors, we are able to strategically invest in areas giving us sustainable competitive advantages."

Benefits to becoming a member of the ChE Ambassadors Club:

- Invitation to two ChE Ambassadors Club weekends: One on campus for the first home football game of the year and the other is in Naples as part of the annual Presidents Council Naples Weekend
- Annual updates from the Head of the School of ChE on the School's advancements.
- Invitation to the Outstanding Chemical Engineer Alumni Awards
- Annual ChE Ambassadors gift



Purdue For Life Foundation Deepens Ties to Alumni

On March 11, Purdue University President Mitch Daniels announced the creation of the Purdue For Life Foundation, an organization designed to deepen ties to alumni, and to drive and coordinate all alumni-facing activities for the University.

"Our Purdue graduates and friends number in the hundreds of thousands," Daniels said. "Purdue For Life will lead us to new connections and better engagement with this entire alumni universe. In a world of continuous learning and online education and networking, the Purdue experience must become not four years but literally lifelong."

Purdue For Life will encompass the Purdue Alumni Association, the University Development Office, John Purdue Club, and President's Council and is intended to improve alumni engagement and communication by aligning development and stewardship activities across campus and with alumni and friends.

Matt Folk, a 1991 Purdue electrical engineering graduate, will serve as a Purdue vice president for university advancement and alumni engagement and will be the chief executive officer of Purdue For Life, overseeing the combined activities and goals of the aligned units. Folk has recently retired as president

and CEO of Technology Marketing Corp. (a semiconductor sales and marketing company).

"Our goal is to strengthen ties both internally and externally, continuing our efforts to come together as one Purdue," Folk said. "Working alongside the incredibly talented people already in place, we see a future of improved events, improved communication, the addition over time of a lifetime learning component for our Purdue alumni family and much, much more."

"The Purdue Alumni Association Board supports taking steps to continue its mission within the Purdue For Life concept through an integrated engagement and advancement model," said Dan Dawes, chairman of the Board of Directors for the Purdue Alumni Association. "We see Purdue For Life creating a pathway for enhancing lifelong engagement and enabling these three alumni-facing organizations to better serve our alumni. Purdue For Life will provide greater access to personal, professional and intellectual development. As an alumnus of this great university, one can expect to be more aware of what Purdue has to offer them today and through every stage in their life. The idea of a broader and strengthened outreach is well in line with the mission of the Purdue Alumni Association which it has been pursuing for more than 140 years."

CLASS NOTES

1960s

Ralph Dale (MSChE '67) is self-employed in sales and consulting.

James Rust (BSChE '65) is retired as Professor from Georgia Tech.

1970s

FJ Baptista (BSChE '72) is Vice President of Business Development at Meridian Energy Group.

Eric Chance (BSChE '73) is retired from IBM.

Bob Gilewski (BSChE '73) is a project engineer at Steele Technical Services at Dow Chemical.

Jerry Good (BSChE '78) is Director of Program Management at On-Board Engineering.

Stephen Grubbs (BSChE '75) is Vice President of Clinical Affairs at the American Society of Clinical Oncology.

Michael Ladisch (PhD '77) is a Distinguished Professor of Agricultural and Biological Engineering at Purdue University.

Peter Lodal (MSChE '77) is the Principal for D&H Process Safety.

John McShane (BSChE '79) is Managing Partner at Validant Consulting.

Thomas Murphy (BSChE '70) is retired from Abbott Laboratories.

Bob Myers (BSChE '79) is Director of Global Engineering at Pfizer.

Wayne Schulenberg (BSChE '71) is a process engineer at Logical Systems, LLC.

1980s

Doug Everidge (BSChE '89) is President of Everidge Strategic Consulting.

Chuck Froman (BSChE '80) is Wastewater Division Manager at Manatee County Government.

John Klier (PhD '88) became the new Dean of Engineering of the University of Oklahoma, effective July 1, 2020. See p. 10.

Jeff Lievense (PhD '83) was inducted to the National Academy of Engineering in October 2019.

Antonios Mikos (PhD '88, member of NAE and NAM) received an Honorary Doctorate from the University of Thessaloniki in June 2019. Mikos was also elected a member to the Academia Europaea.

Gregory Porter (BSChE '84) is Senior Manager of Strategy and Innovation at Becton Dickinson.

David Rockstraw (BSChE '86) is the Robert Davis Distinguished Professor and Head of Chemical and Materials Engineering at New Mexico State University.

Keith Schimmel (BSChE '84) is Professor of Engineering and Technology at Olivet Nazarene University.

1990s

Kristi Anseth (BS '91) received the L'Oreal Award (Paris) in March 2020 virtually, and was inducted to the American Academy of Arts and Sciences in October 2019.

Thomas Chambers (BSChE '92) is Supply Chain Planning Manager at Avexis.

Robin Church (BSChE '94) is a math teacher at Harrisonburg City Schools.

Brian Douce (BSChE '97) is Business Engineering Management/Business Capital Coordinator at Dow.

Mary am Ende (PhD '93) is the new VP of Product Development of Nalas Engineering in Centerbrook, CT. In November 2019 she received the Industrial Research and Development Award of AIChE.

Andy Felker (BSChE '90) is President/Chief Process Engineer at Process Engineering International, LLC.

Pamela Grant-Taylor (BSChE '92) is an attorney at the Marion County Public Defender Agency.

Kevin Kar (BSChE '95) is Data Analytics Engineering Manager at Gentex Corporation.

Shari Kennett (BS '88) is Vice President, Safety and Quality, Air Liquide.

Caroline Kostak (BSChE '99) is a space suit systems engineer at Engineering Research & Consulting Inc.

Devdatt Kurdikar (PhD '94) is the new CEO of Cardiac Science in Minneapolis, MN.

Anthony Lowman (PhD '97) is the new Provost of Rowan University in New Jersey, effective January 1, 2020.

Surya Mallapragada (PhD '96) was appointed Associate Vice President of Research, Iowa State University.

Steve Matthews (BSChE '94) is Executive Vice President at Noble Biomaterials.

Rob Scott (PhD '98) was inducted to the National Academy of Engineering in October 2019.

Brian Shoener (BSChE '91) is a senior engineer at QK, Inc.

Sriram Subrahmanyam (PhD '96) is Chief Operating Officer at ADESA.

2000s

Abid Ansari (BSChE '01) is Chief Financial Officer at Precision BioSciences.

Nicole Ayers (BSChE '02) is a teacher at St. James Day School.

Petr Bures (PhD '01) is the new Vice President of Global Key Accounts and Sales Operations of Covestro (former Bayer Materials Science) in Pittsburgh.

Matt De Mars (BSChE '06) is a process safety and machinery safety engineer at GSK.

Moiz Diwan (BSChE '09) is Pharmaceutical Development Director at AbbVie Inc.

J.J. Dombek (BSChE '08) is Senior Associate at The Jordan Company.

Patrick Figaro (MSChE '05) is Plant Manager at 3M.

Nathan Klein (BSChE '06) is an estimator at Cem-Base.

Ashley Leidolf (BSChE '06) is Sustainable Packaging Market Manager at Dow.

Matthew McGuirl (BSChE '01) is a pilot plant leader at W.R. Grace.

Brittany Nix (BSChE '09) is an associate consultant engineer at Eli Lilly.

Konstantinos Papanikolaou (BSChE '05) is a senior process engineer at Valdes Engineering Company.

Laura Quock (BSChE '09) is Senior Manager at Gilead Sciences.

2010s

David Acevedo (PhD '17) is a chemist at the U.S. Food and Drug Administration.

Taylor Behre (BSChE '18) is an associate scientist at Merck.

Garrett Bruns (BSChE '18) is a rotational development professional at Pfizer.

Thomas Michel Carpenter (BSChE '18) is Fulbright Scholar at the Fulbright Foundation.

Tej Choksi (PhD '17) is Assistant Professor at Nanyang Technological University.

Robbie Cunningham (BSChE '10) is a senior process engineer at Rogers Corporation.

Jessica Fortner (BSChE '19) is a chemical engineer at GE Aviation.

Amir Gharachorlou (PhD '15) is an analyst at 3M.

Robin Glebes (PhD '19) is Joint Force Structure Analyst in the U.S. Army.

Wenbin Hu (PhD '11) is a principal scientist at Abbvie.

Adam Ingram (BSChE '14) is Operations Supervisor at Chevron Phillips Chemical Co. at the Cedar Bayou Plant.

Ravi Joshi (PhD '19) is an associate engineer at Phillips 66.

Ani Kelkar (PhD '14) is an engagement manager at McKinsey & Company.

Courtney Kelly (BSChE '17) is the New Project Development Buyer at FAREVA.

Samuel Logan (BSChE '18) is a customer relations associate at Microbac Laboratories.

Joseph Magnabosco (BSChE '19) is an R&D engineer at Amcor.

Patrick McGuiggan (BSChE '16) is a production superintendent at ADM.

Dhairya Mehta (PhD '14) is a gas processing researcher at Shell Technology Center Bangalore.

Lilly Myers (BSChE '16) is a senior engineer at Edwards Lifesciences.

Krishna Patel (BSChE '19) is in the Supply Chain Management Development Program at Newell Brands.

Akash Patil (MSChE '18) is a graduate student in Environment and Ecological Engineering at Purdue University.

Nolan Pepka (BSChE '19) is a vintage operations intern/cellar hand at Invivo & Co.

Joel Roche (BSChE '11) is a project engineer at Chr. Hansen Inc.

Aviral Shukla (PhD '10) is Data Science Lead at Bayer.

Jenna Spelde (BSChE '13) is a global capital process lead at General Mills.

Matthew Stewart (BSChE '12) is an associate at McKinsey & Company.

Jessica Torres (PhD '11) is a principal engineer at Intel.

Robert Warburton (PhD '19) is a postdoctoral research associate at Yale University.

Jason Wendholt (BSChE '11) is a maintenance manager at SmithFood Inc.

Gautam Yadav (PhD '13) is the Director of Advanced Battery Research and Development at Urban Electric Power LLC.

Nyah Zarate (PhD '13) is CEO at Continuous Solutions LLC.

Clayton Zink (BSChE '15) is a process improvement researcher at International Paper.

Kevin Zuck (BSChE '17) is an R&D engineer at FritoLay.

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While on the Purdue University campus for the 2019 Astronaut Reunion, Chemical Engineering alumna and NASA astronaut Dr. Mary Ellen Weber (BSCHE '84) was the invited speaker in CHE 34800, taught by Dr. Enrico N. Martinez, Professor of Engineering Practice. See more on page 12.

