CHEMICAL ENGINEERING
NEWSLETTER

Can Li

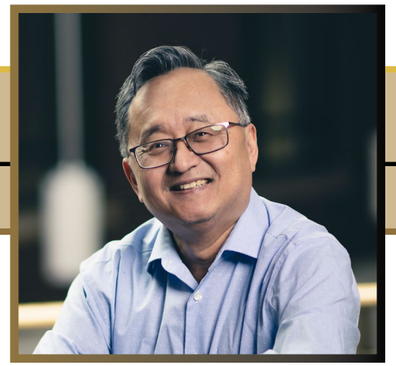
Assistant Professor of Chemical Engineering

Awarded Air Liquide Scientific Prize for his Data Sharing for Decarbonation Proposal

PURDUE UNIVERSITY | Davidson School of Chemical Engineering

SPRING 2024

MESSAGE
FROM THE HEAD



It is with great excitement and pride that I share the remarkable achievements and giant leaps taken by our school since the previous issue of the newsletter. The year 2023 saw the school's continued march of "excellence at scale" and was filled with groundbreaking research, prestigious awards and exciting new initiatives. We welcomed three new additions to our faculty: Michel Boudart Distinguished Professor Enrique Iglesia, Associate Professor Kelly Schultz, and Assistant Professor Tayler Hebner (to join August 2024).

I am thrilled to announce that our youngest faculty continue to achieve remarkable firsts for the school. Assistant Professor Can Li has been awarded the prestigious Air Liquide Scientific Challenge award for his "Data sharing for decarbonization" research proposal and Assistant Professor David Bernal was an invited speaker at the Arab-American Frontiers of Science, Engineering and Medicine Symposium of the National Academies—an invitation usually reserved for faculty in their second decade of their career (i.e., not their first year!).

I am delighted to share that four Research Area Endowments have been named, further solidifying our commitment to fostering groundbreaking research and providing invaluable support to our faculty and students at the most critical, early stages of research. We have also been busy preparing for a successful launch of the Professional Master's Program (Pharmaceutical Concentration) at Purdue Indianapolis in fall 2024, expanding our reach to our state's major urban area and creating new opportunities for our students in this sector.

As we celebrate these achievements, we also look ahead with great anticipation for the future of Purdue Chemical Engineering. I extend my sincere gratitude for your ongoing commitment to Purdue. Your contributions, whether through mentorship, collaboration, or support, are integral to our shared success.

Sangtae Kim
Jay and Cynthia Ihlenfeld Head of Chemical Engineering

Spring 2023 Chemical Engineering Undergrads

SPRING ENROLLMENT 504

168 IN RESIDENTS

297 NON-RESIDENTS

39 INTERNATIONAL STUDENTS

342 STUDENTS WITH 3.2 GPA OR HIGHER

281 MALE

223 WOMEN

Chemical Engineering Class of May 2023

73 MEN

58 WOMEN

131 TOTAL NUMBER OF GRADUATES

24 CO-OP STUDENTS

$81, 558 AVERAGE SALARY

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Administration
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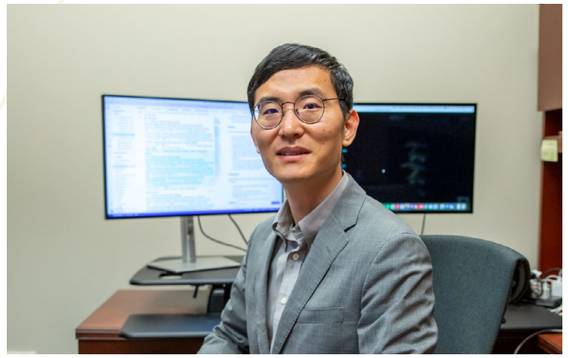
Can Li

Awarded scientific prize and research contract with Air Liquide for data sharing for decarbonation proposal



Can Li, Assistant Professor in the Davidson School of Chemical Engineering, has been recognized as one of three laureates of the Air Liquide Scientific Challenge Edition Three.

This award facilitates collaborative efforts among stakeholders, aimed at reducing carbon emissions and optimizing shared resources. Li has won a three-year collaborative research contract and an additional $600,000 in funding to support the transformation of his proposal into a market-ready technology. This award also includes sponsorship for two Purdue doctoral students and travel to domestic conferences, such as the annual American Institute of Chemical Engineers (AIChE) meeting, where Li will present his research findings on secure data sharing.

Li, only one year into his career at Purdue, is eager to use this opportunity to expand his promising research and make a lasting impact on sustainable energy systems.

"It's very early in my career to get research funding to work on these ideas, so I am very excited about this prize," said Li. "In academia, we are always solving challenging problems by developing algorithms or theory, so we are excited to see it's real impact."

According to Li, complex networks of interconnected industrial ecosystems play a vital role in society; however, their operations require significant energy consumption to fulfill demand. Consequently, carbon dioxide (CO_2) from natural gas, coal or other energy producers, is emitted in the process. If stakeholders collaborate to enhance resources and energy utilization, they can achieve substantially greater reductions in carbon emissions compared to operating in silos. While corporations such as chemical plants may be willing to share certain information, they are generally reluctant to disclose these types of operational specifics due to confidentiality concerns.

In his two-page Scientific Challenge proposal, Li detailed, "Data Sharing for Decarbonation," a pioneering theory and algorithm designed to establish a central system similar to a brain. This algorithm is capable of managing, processing and analyzing confidential data to solve questions about optimal energy and resource use within an industrial ecosystem, while safeguarding the confidentiality of each stakeholder.

"We have created a very sophisticated way of making information private, so stakeholders only need to share some unrelated information to achieve the same goal. If industries use this algorithm, they can reduce their carbon emission by a large amount."

Once market ready, various stakeholders within an industrial ecosystem, regardless of their individual objectives, could harmonize data sharing and collaboration to foster sustainable, intelligent ecosystems.

Can Li's recognition by Air Liquide underscores the importance of interdisciplinary collaboration and innovation in addressing the complex challenges of decarbonizing industrial ecosystems.

Li's collaboration with Air Liquide, one of Purdue University's Center for Innovative and Strategic Transformation of Alkane Resources' (CISTAR) founding industrial consortium members, will *"no doubt transform the approach to sustainability in the industrial sector,"* said Fabio Ribeiro, Director of CISTAR.

Learn More:
https://bit.ly/3v0swdr

Xiaoping Bao's

CAR-Engineered Cells for Cancer Therapy

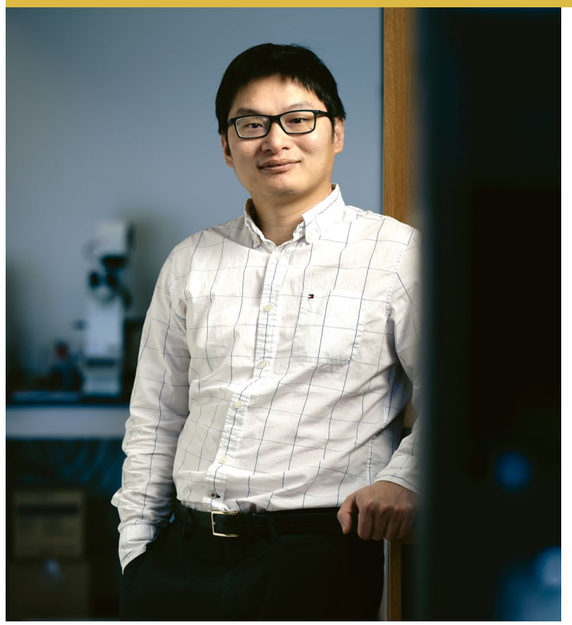
Glioblastoma (GBM) is one of the most aggressive and lethal types of cancers, creating solid tumors in the brain or spinal cord. While effective therapeutics have been developed to treat various types of cancer, their effectiveness in treating GBM has been hindered due to blood-brain and blood-brain-tumor barriers.

Xiaoping Bao, the William K. Luckow Assistant Professor of Chemical Engineering, is revolutionizing the biomedical industry with his achievements in chimeric antigen receptor (CAR) engineered cells for cancer therapy.

Published in *Nature Communications*, Xiaoping Bao's latest discovery focuses on a life-saving discovery treatment for those suffering from GBM by using CAR-neutrophil cells to non-invasively deliver and release tumor responsive drugs at the site of the tumor, without inducing additional inflammation. According to Bao, this CAR-neutrophil drug delivery system is a safe, potent and versatile option for treating GBM and provides much promise for practical treatment of other devastating brain diseases, such as Alzheimer's disease.

In addition to his latest publication, Bao's CAR-cell research was published in five other scientific journals in 2023. For instance, detailed in *Bioactive Materials*, "Engineered human pluripotent stem cell-derived natural killer cells with PD-L1 responsive immunological memory for enhanced immunotherapeutic efficacy," Bao and a team of researchers used human pluripotent stem cells (hPSCs) with optimized CARs to develop an engineering platform strategy for manufacturing CAR-NK cells for targeted immunotherapy. In *Nature Reviews Bioengineering's* "A pluripotent road to immunoengineering," the Bao Lab outlines the use hPSCs as an off-the-shelf, cheaper and scalable solution to the variability, time commitment and cost of engineering of their counterpart primary CAR-T cells.

"With support from our School, Purdue University and Federal Agencies, we have engineered various CAR-immune cells from hPSCs for targeted cancer therapy," said Bao. "In collaboration with Purdue Animal Hospital, we're also launching an animal clinical trial on pet dogs

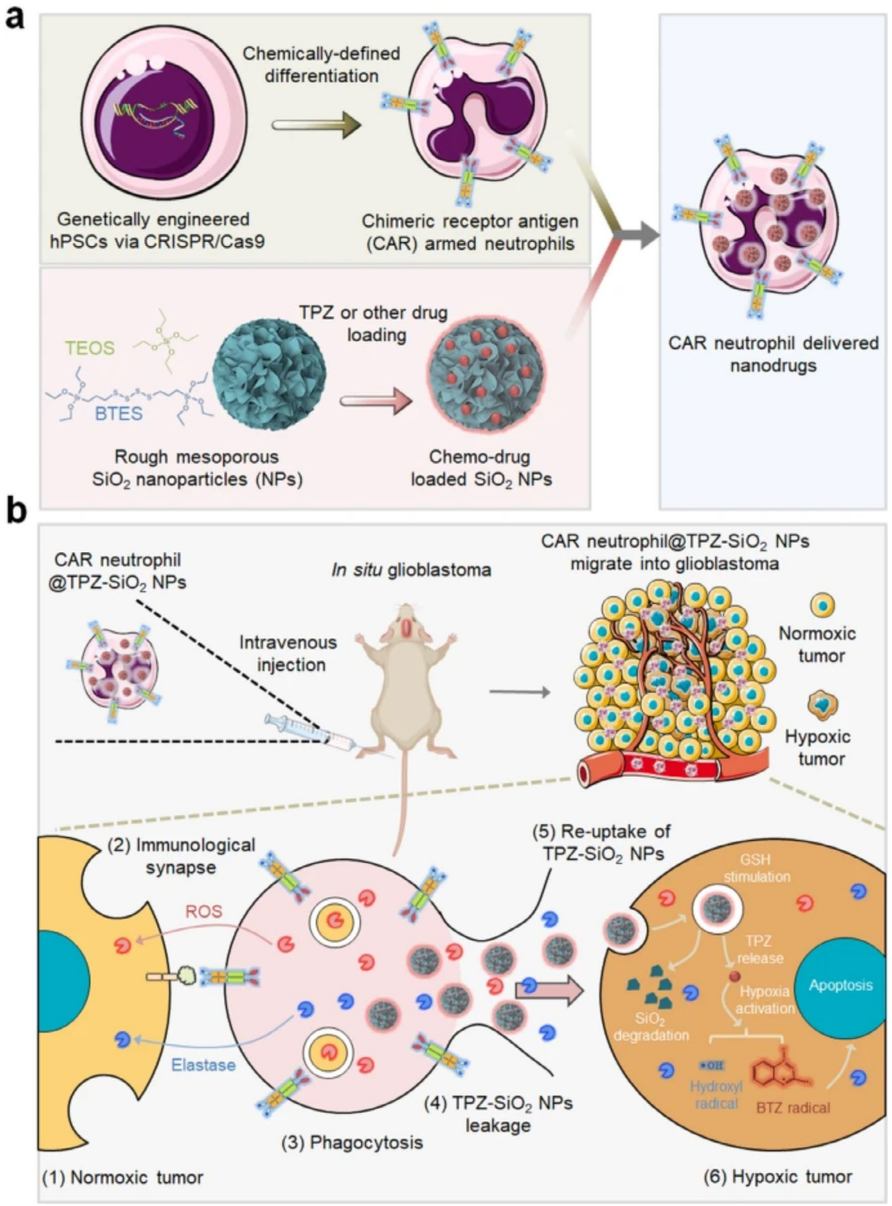


with spontaneous glioma, which is the second most common brain tumors in dogs and the hardest to treat."

Bao holds two patents, one for liquid crystal biosensors with ultrahigh sensitivity and selectivity and another for the generation of aorta-gonad-mesonephros-like hematopoietic cells from human pluripotent stem cells under a defined condition.

Xiaoping Bao has been honored with various awards throughout his career, including being named the 2023 William K. Luckow Assistant Professor of Chemical Engineering. He also received the Cellular and Molecular Bioengineering (CMBE) Rising Star Award and the Advanced Biomanufacturing (ABioM) Junior Investigator Research Award for Junior Faculty from the Biomedial Engineering Society (BMES).

"I am honored and humbled to receive these awards/recognitions in 2023, made possible by the smart and dedicated researchers in my and our collaborators' labs. I am also excited about the impact of stem cell immunoengineering on future cancer therapy and translating our discoveries into animal/human clinics."



Schematic of enhanced anti-glioblastoma efficacy using combinatory immunotherapy of CAR-neutrophils and tumor microenvironment responsive nanodrugs. (a) Human pluripotent stem cells were engineered with CARs and differentiated into CAR-neutrophils that are loaded with rough silica nanoparticles (SiO2 NPs) containing hypoxia-targeting tirapazamine (TPZ) or other drugs, as a dual immunochemotherapy. (b) Systemically administered CAR-neutrophil@R-SiO2-TPZ NPs first attack external normoxic tumor cells by forming immunological synapses and kill tumor cells via phagocytosis. After apoptosis, CAR-neutrophils can then release R-SiO2-TPZ NPs, which are uptaken by tumor cells. Afterwards, nano-prodrugs respond to the hypoxic tumor microenvironment and effectively kill tumor cells. TEOS tetraethyl orthosilicate, BTES bis[3-(triethoxysilyl) propyl] tetrasulfide, TPZ tirapazamine, BTZ benzotriazinyl.

A Milestone in Machine Learning

Savoie research team builds largest dataset of reaction mechanisms in existence

Theoreticians have worked in tandem with experimentalists since the dawn of the scientific age. The advent of machine learning facilitated computational work on a larger scale and a faster timetable. While data about the properties of specific molecules has been available for years, predications of how those molecules would react in different environments and under various conditions remained elusive.

After developing the automated computational method YARP — Yet Another Reaction Program — two years ago, a research team led by **Brett Savoie**, the Charles Davidson Associate Professor of Chemical Engineering, applied YARP's technology to build the largest dataset of reaction mechanisms in existence. The research was published in the journal *Scientific Data* in March.

"We didn't develop YARP with the intention of creating a reaction dataset, but we recognized the opportunity to address a huge gap in the field because of our work in machine learning," Savoie says.

"We knew we could leverage our technology to develop a valuable resource for the scientific community."

Graduate student Qiyuan Zhao worked with Savoie to develop YARP, a new approach to predicting research outcomes from scratch. YARP treats chemicals like graphs, which allows chemical reactions to be described in a way that computers can interpret and automate. To build the dataset, the research team attempted about 700,000 virtual reactions using YARP and from those attempts, observed 175,000 interesting reactions. YARP's hit rate is four times that of other existing computational methods.

"We've spent two years developing YARP, which is now in its third version," Savoie says. *"We've been constantly improving the algorithms it uses to find these transition states. At this point, YARP is both the fastest and most accurate transition state finding algorithm that exists to our knowledge."*

The reaction dataset enables researchers to predict how a material's properties would react in different environments. Changes in moisture, temperature and acidity can affect the stability of molecules and can cause them to break down leading to instability of materials. Accurately predicting how materials will break down can determine whether a new material will remain viable in the field.

"Material stability is a bottleneck in the production of virtually anything that is synthesized," Savoie says. *"Using computational methods to predict susceptibilities earlier in the process is more cost-effective and time efficient than experimenting with traditional iterations in a lab. This dataset will have far-reaching applications across multiple industries."*

The team is currently in the process of expanding the dataset with the goal of eventually covering all of reaction space, which could mean simulating billions of reactions using YARP. The university's unrivaled computational resources enable the team to run extensive simulations on a relatively short timescale. While the initial dataset was publicly released, future versions may be licensed.

"Purdue gifted the scientific community with an extremely important asset by publicly releasing this dataset," Savoie says.

"We've generated a milestone for our field and reinforced the university's reputation as a preeminent institution for algorithm engineering and machine learning, but we see a lot more opportunity to build on this success with future versions. Our ambition is to eventually characterize all classes of reactions so that any researcher wanting to understand or optimize a reaction will be able to find it in our dataset.

"The past century has shown how synthesized materials can dramatically increase our quality of life. Because of its immediate relevance to predicting stability, we expect this dataset to accelerate the creation of better materials with functionalities that haven't yet been realized. I'm incredibly optimistic about the semiconductors of tomorrow, the medicines of tomorrow. The future is as bright as it has ever been with respect to what chemical engineering can do for us. The caveat is that the things we make can also be destructive. So as the barrier to the design and synthesis of new molecules and materials is reduced, we must be careful as we deploy these technologies."

Mapping Glucose Pyrolysis

The computational methods being developed by the Savoie group are also finding other applications. In a recent project, Savoie's team used YARP to characterize a record-sized reaction network for glucose pyrolysis — how one specific system degrades under heat. Converting biomass waste into valuable chemical components can be challenging because glucose undergoes a myriad of reactions as it is heated. The traditional methods of engineering reactors to transition from glucose to a subset of high-value products is difficult. The reaction network produced by the research team is the first to map the reactions from glucose to optimized products.

"Once you have that reaction network, you can start to rationally improve the yields of these products," Savoie says. *"We've developed the first method of its kind to map those pathways. It's a landmark achievement in terms of the size of the network we've generated, the number of steps involved and using simulations to spontaneously discover the reaction mechanisms that produce these valuable chemical products from glucose."*

The research was published in the *Proceedings of the National Academy of Science*.

Managing Complexity

Purdue-developed technology optimizes manufacturing of complex molecules for medicine

The top 20 global pharmaceutical companies spent an estimated $139 billion on R&D in 2022. The medicine that emerges must be manufactured. Making that manufacturing efficient is the work of **Joseph Pekny**, Professor of Chemical Engineering, and CEO of Advanced Process Combinatorics Inc. — the software company he co-founded in 1993 — based in Purdue Research Park.

Using technology inspired by the deliberate innovation approach to research at Purdue in close partnership with industry, APCI specializes in the application of mathematical programming-based optimization to the process industries. Pekny likens it to deconstructing chicken soup.

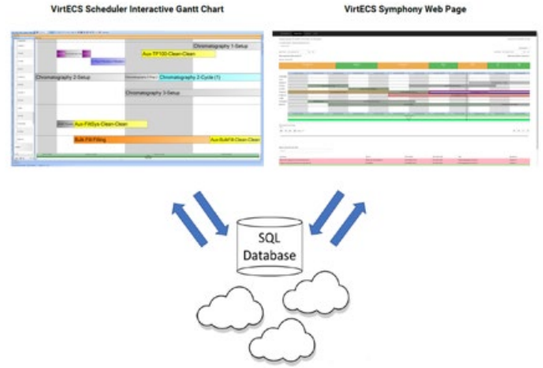
"All biologics medicines are made by cell culture," Pekny says. "Scientists genetically engineer them and feed them and as they grow, they get transferred to a larger vessel where they are fed some more. The process continues until they've grown enough of the target molecule, which then needs to be extracted. Just like chicken soup, you've got big parts and small parts all mixed together and you're looking for something very specific that you want to separate out."

VirtECS, the software developed by APCI, speeds up the procedure immensely by managing the complexity of the manufacturing process. VirtECS computational models identify ideal methods to choreograph these complex operations to increase efficiency of production. The result? Optimizing from the many possible ways to extract the "chicken soup" that leads to life-saving and life-enhancing medicines worth $5 million to $50 million a batch.

"We view our mission as one of great importance," Pekny says. "By reducing the manufacturing time it takes to move medicines to market, companies can produce more product annually which means more people will benefit from these life-sustaining drugs."

When Pekny embarked on his Purdue career as an assistant professor in 1990, his work in algorithms wasn't necessarily viewed as mainline chemical engineering. Because Purdue has one of the largest chemical engineering programs in the country, Pekny felt supported in his research endeavors.

Purdue Technology Center –
Headquarters of Advanced Process Combinatorics, Inc. (APCI)



VirtECS/Symphony Lets Users Form a Manufacturing Social Media to Solve Evolving Challenges

Resources

	Name	Availability	DisplayName
*	Add new row here...		
⊞ ▶	WFI	28000	
⊞	CIP	1	
⊞	Upstream Labor	10	
⊞	Capping Labor	10	
⊞	Downstream Labor	10	

Trial Number	Upstream Labor Availability	Downstream Labor Availability	Capping Labor Availability	MakespanDays
1	6	10	4	36.5
2	5	10	4	36.5
3	4	10	4	36.5
4	6	8	4	36.5
5	5	8	4	36.5
6	4	8	4	21.76041667
7	6	10	3	21.76041667
8	5	10	3	21.76041667
9	4	10	3	21.76041667
10	6	8	3	21.76041667
11	5	8	3	21.76041667
12	4	8	3	21.76041667

VirtECS Makes Its Powerful Proprietary Mathematics Accessible for Use In Spreadsheets for Easy Use in as Many Trials As Needed

"There was a seat for me at the table because it's a big table," he says. "Over the years, algorithm engineering has evolved to become mainline engineering. But Purdue is a place where you can work for a long time with a revolutionary idea and have the time to bring it to practice."

In the early 90s, most pharmaceutical companies were primarily making small molecules such as aspirin, penicillin and other antibiotics. At the time, older alumni in the industry encouraged Pekny to pursue deliberate innovation and focus on complex molecules, such as proteins and enzymes, that would be the harbinger of the life science and genetic sequencing booms in the late 90s and early 2000s. Some of those alumni became APCI's first clients and are still with the company today.

Over the past few years, a class of biologics — used to treat a ride range of conditions from autoimmune disorders to cancer — have become prevalent throughout the industry. Pekny's dual roles in academia and industry enables APCI to harness the cutting-edge knowledge from both worlds to continually improve and evolve the company's technology.

"Collaborating with alumni in dozens of industries all over the world enables us to combine an academic perspective with an industrial perspective in a very balanced way," Pekny says. *"Very few companies can do that. An academic perspective brings a sense of awareness and powerful new ideas based on a literature review of what others are achieving through their research. This allows us to bring the very best of what the world has to offer in terms of ideas and quickly apply them to practice, just as the deliberate innovation approach advises."*

When Pekny and his co-founder, Donald Miller, dreamt up the idea for APCI over dinner in October 1993, they knew there was a need for the technology they proposed. Fast forward 30 years and with the evolution of computers and abundance of available data, the world has finally caught up with their groundbreaking idea.

"It's been quite an adventure," Pekny says. *"This work has really taken a lifetime. The Purdue ecosystem has always fostered a long-term perspective. We've been very fortunate to see steady progress over a long time and make a tremendous impact on people's lives."*

Celebrating Four New Research Area Endowments

The Davidson School of Chemical Engineering has initiated its Research Area Endowments to advance pioneering research across various disciplines within chemical engineering.

Of the initial set of ten endowments, four have been successfully established.

- Dr. Norman and Dr. Jane Li Chemical Engineering Separations Research Area
- Dr. Doraiswami and Mrs. Geetha Ramkrishna Mathematical Modeling Research Area
- Robert T. Henson Soft Materials Research Area
- Product and Process Systems Research Area

Dr. Norman & Dr. Jane Li
Chemical Engineering
Separations Research Area
Dedicated April 14, 2023

Dr. Doraiswami and Mrs. Geetha Ramkrishna
Mathematical Modeling Research Area
Dedicated April 26, 2023

Research Area Endowment Celebration

On November 5th, 2023, the School celebrated the establishment of its four Research Area Endowments at the 2023 AIChE Conference.

The Center for Innovative and Strategic Transformation of Alkane Resources (CISTAR)

Purdue University Led Engineering Research Center

The Center for Innovative and Strategic Transformation of Alkane Resources (CISTAR), headquartered at Purdue University, stands as a flagship Engineering Research Center (ERC) funded by the National Science Foundation. Established in 2017, CISTAR is now in its seventh year of operation and is the only ERC currently led by Purdue. Partner Universities include the University of New Mexico, Northwestern University, University of Notre Dame and the University of Texas at Austin.

The center's vision is to "convert light hydrocarbons into lower carbon footprint chemicals and transportation fuels, by exploring decarbonization of manufacturing processes, modular design and electrification based on renewable energy sources." CISTAR's mission extends beyond research; the center brings together industry, academia and government to cultivate engineering discovery and education in research areas critical to our nation's strength. The CISTAR infrastructure integrates four pillars: research, engineering workforce development, industry and innovation, and diversity and culture of inclusion, with industry partners being paramount to center success.

CENTER HIGHLIGHTS:

Patents: CISTAR has submitted 25 patent applications across the five partner universities. Of the total, Purdue researchers have filed 14, and five are granted patents.

Research and Development: CISTAR's research is organized into Thrust areas which include catalysis, separations, life-cycle analysis, environmental impact and systems-level decarbonization. These R&D efforts combine into systems focused on the conversion of natural gas to aromatics, processes that require ethylene en route to the desired products, and chemicals and fuels derived from propylene intermediates. Leading technology highlights include: (i) **process designs** for alternative light olefin production via electric cracking reactors, (ii) **separations systems** for selective H2- and C2H2-tolerant olefin-paraffin separation membranes and fabrication of iptycene-based microporous polymers for gas separations and (iii) **catalysis systems** for methane dehydroaromatization, selective and tunable olefin oligomerization, conversion of ethane and propane to aromatics and gasoline, as well as oligomerization of olefins to diesel or jet fuel.

Degrees Granted: Over the life of the center, CISTAR has granted 15 Master's degrees, 40 Bachelor's degrees and 56 Doctoral degrees. Post-graduation, 44% of all CISTAR graduates to date have been hired by companies in industry. Nearly half of these hires are by CISTAR industry consortium companies.

Publications: CISTAR researchers have 270 publications in trade and peer-reviewed technical journals, 7,518 citations and an h-index of 43 to date.

K-12 Outreach and Recruiting: CISTAR faculty and staff have built partnerships within their local communities and across the nation with K-12 partner schools, programs and outreach efforts. Incorporating virtual outreach in conjunction with in-person activities has helped to extend CISTAR's efforts to even more pre-college students and teachers. Over the lifetime of the center, CISTAR has impacted 54,190 K-12 students and teachers with outreach events.

Industrial Membership: With over 30 industry companies joining the center, CISTAR has a very robust program offering privileged access to a wide array of opportunities. This encompasses knowhow, research, intellectual property, mentoring, advising, internships, recruitment and technology development.

Purdue ChE CISTAR Graduate Fellows, Justin Rosa Rojas (left) and Ricem Diaz Arroyo (right) at an outreach event.

Innovation Ecosystem: ERCs are encouraged to include a broader exposure to innovation in the context of technology development. CISTAR's Innovation Academy offers a certificate in innovation from a semester-long course focused on the Business Model Canvas as a tool for guiding ideas toward the market.

International Collaborations: With an additional NSF Center-to-Center (C2C) Award, CISTAR has partnered with international organizations in Brazil to develop cutting-edge solutions to significantly reduce the carbon footprint of energy technologies. The Brazilian research centers include the Center for Innovation on New Energies (CINE) and the Research Centre for Greenhouse Gas Innovation (RCGI). The three centers are working towards their common goal to create efficient, low-carbon energy solutions in key research areas like electrochemical conversion of methane, development of in-operando synchrotron characterization tools and computational materials science to develop innovative solutions. Researchers and students from the three centers have visited each other's institutions and facilities over the last year. Faculty and students have been able to grow their intercultural skills through shared educational opportunities such as brown bag seminars, webinars and workshops. The summer graduate certificate program, Growing Intercultural Global Energy Leaders (GIGEL), was created by CISTAR's Diversity and Culture of Inclusion Director, Denise Driscoll, in collaboration with a Senior Intercultural Learning Specialist at Purdue, Dr. Dan Jones, to address the diversity and culture of inclusion goals outlined in the C2C grant.

CISTAR team members from the five partner universities gathered at Purdue University in April 2023 for the center's Year 6 Annual Meeting.

After being well mentored at Purdue University in the CISTAR labs, the REM students are also better equipped to mentor kids at the NSBE SEEK camps.

ENGINEERING WORKFORCE DEVELOPMENT AND DIVERSITY AND CULTURE OF INCLUSION HIGHLIGHT:
CISTAR and NSBE's Research Experience and Mentoring Program

Together the two organizations are working towards developing an inclusive next generation of leaders in STEM. The National Science Foundation Engineering Research Center for Innovative and Strategic Transformation of Alkane Resources, CISTAR, in partnership with the National Society of Black Engineers (NSBE), has offered a Research Experience and Mentoring (REM) Program since 2019 as part of their Engineering Workforce Development and Diversity and Culture of Inclusion programs. This unique summer program allows undergraduate students to engage in cutting-edge energy research under the guidance of mentors in CISTAR labs at Purdue University for the first six weeks, then transition to being a mentor for third to fifth graders at a NSBE Summer Engineering Experience for Kids (SEEK) camp for the final four weeks.

NSBE SEEK campers mentored by CISTAR REM students.

Maeve Drummond Oakes, CISTAR's Engineering Workforce Development Director, explains, *"This collaboration empowers students to acquire hands-on lab experience and enhance their professional skills, all while learning more about the spectrum of energy sources and understanding their pivotal role in mitigating the global carbon footprint."*

Continue Reading:
https://bit.ly/2024CISTARUpdate

P2SAC
Celebrates 10th Anniversary

Established 2014, **Purdue's Process Safety & Assurance Center** (P2SAC) began with a handful of company representatives and members of the Davidson School of Chemical Engineering's (ChE) Industrial Advisory Council. A decade later, P2SAC now hosts biannual conferences on Purdue's campus, with over a hundred registrants, 23 sponsor companies and a growing number of interested companies in attendance.

P2SAC serves as a nexus for advancing chemical process safety education and research. The focus is on specific industry safety sectors such as oil and gas, chemical, pharmaceutical and technological industries. P2SAC collaborates with industry partners via research, specialized courses and consultation to help contribute to improving safety standards worldwide.

"Having been there since the beginning of P2SAC a decade ago, it is amazing how the Center has grown with a diverse mix of companies all recognizing the importance of process safety to their operations," commented Prasad Goteti of Honeywell.

Throughout the years, the P2SAC's commitment to process safety related research projects has grown to approximately 25 projects annually, and has led to beneficial collaborations with graduate, Professional Master's Program (PMP) and undergraduate students.

Ray Mentzer, the Executive Director of P2SAC notes that recent incidents like the 2023 East Palestine, Ohio train derailment and the 2017 Didion Milling facility explosion in Cambria, Wisconsin, affected thousands of residents and further underscore the critical importance of P2SAC's work in process safety.

"We're proud to be one of the few chemical engineering departments to teach and require a rigorous senior level course in process safety, where incidents such as these are analyzed so students understand the design, maintenance, and operational expectations and implications, commented Dr. Sangtae Kim, the Jay and Cynthia Ihlenfeld Head of Chemical Engineering. With P2SAC, students get hands-on experience through diverse research projects, with over 1,500 students completing the process safety class and 150 participating in research initiatives."

Derek Brown, Principal Engineer with Amgen – Spring 2023 P2SAC Conference

P2SAC's projects span various sectors, including pharmaceuticals, oil & gas, chemicals, manufacturing and consulting. Sponsors exclusively fund Ph.D. research projects focused on battery safety, gas detectors, erosion, flow assurance and machine learning.


Spring 2023 P2SAC Conference Attendees


Tekin Kunt, Process Safety and Reliability Group Director – Spring 2023 P2SAC Conference


Sai Sathanapally, Senior Research Associate of Process Safety at Gilead – Spring 2023 P2SAC Conference


Spring 2023 P2SAC Conference Attendees

SOME NOTEWORTHY PROJECTS INCLUDE:

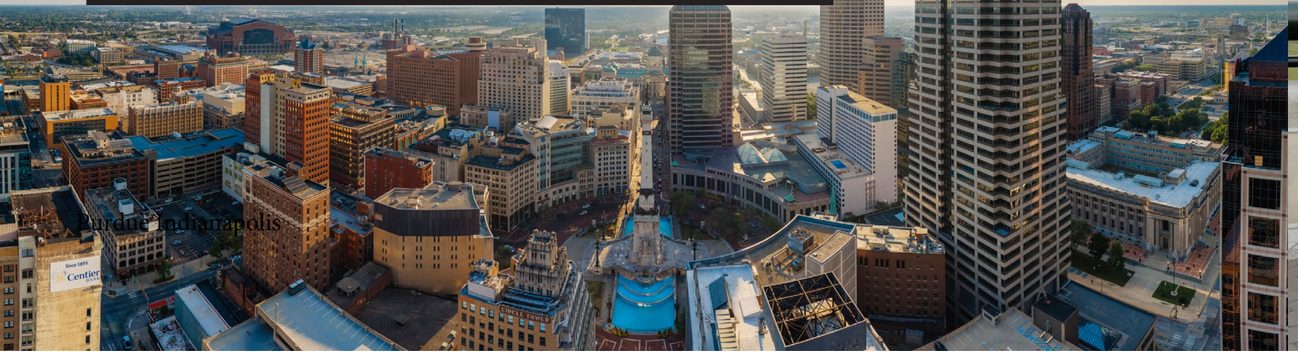
- Reactivity in Pharmaceutical Molecules: A collaborative effort involving eight companies and students in Professor Savoie's research group model molecular structures using industry-standard CHETAH software and Purdue's machine learning-based TCIT software, showcasing successful collaboration among pharmaceutical competitors.
- Hydrogen Production and Transportation Hazards: To address the potential hazards of hydrogen as an alternative fuel source, Undergraduates analyzed incidents involving hydrogen pipelines while PMP students conducted hazard assessments of three primary production technologies: SOEC (Solid Oxide Electrolysis Cell), Alkane Electrolysis Electrolyzer and Proton Exchange Membrane.
- AI Tools in Process Safety: Interested in the applicability of Artificial Intelligence tools, two undergraduates, Professors Can Li and David Bernal, and P2SAC sponsors PSRG and ACC (American Chemical Council) researched ChatGPT's ability to perform process safety analyses revealed promising potential despite existing limitations. This study was summarized in a student presentation at the December P2SAC conference.

P2SAC is dedicated to the advancement of process safety education and research, with ongoing projects and future exploration. For more information, visit engineering.purdue.edu/P2SAC or contact Professors Osman Basaran (obasaran@purdue.edu) or Ray Mentzer (rmentzer@purdue.edu).

Continue Reading:
https://bit.ly/P2SAC10Year

PURDUE UNIVERSITY IN INDIANAPOLIS

THE NEXT GIANT LEAP



The Pharmaceutical Engineering Concentration of the Professional Master's Program (PMP) at the Purdue University Davidson School of Chemical Engineering is one of the newest graduate programs offered at Purdue University Indianapolis. This program stands out as a significant career advancement opportunity, not only for students aspiring to enter the pharmaceutical industry but also current pharmaceutical professionals interested in upskilling their capabilities. Moreover, the program serves an important role on a local, regional and national level by helping to enhance the workforce capabilities of a critical industry.

The Pharmaceutical Engineering PMP concentration addresses the evolving challenges in pharmaceutical production, with a specific focus on the manufacturing of pharmaceutical compounds and the advancement of innovative healthcare engineering strategies. Emphasizing the combination of business acumen and technical knowledge, this concentration demonstrates Purdue's dedication to creating well-rounded professionals capable of thriving in dynamic and competitive settings.

The program also places a special focus on bridging the gap between industry and academia by connecting students to world-class educators and researchers alike. In their classroom experience, students learn from Purdue faculty with expertise covering the spectrum of drug discovery, development and manufacturing. Also, under the guidance of engaged professionals actively working in the pharmaceutical industry, students are able to gain real world insights, ensuring that graduates are adequately equipped to make meaningful contributions to the field.

Purdue University's new fully-integrated extension of the flagship West Lafayette campus is strategically positioned in the heart of Indianapolis to provide students with more opportunities for growth and success. As part of this commitment, Purdue University brings the academic rigor and accessible excellence the Davidson School of Chemical Engineering and the College of Engineering are known, to central Indiana.

The new urban campus' close proximity to top businesses and leading pharmaceutical companies not only benefits students, but also contributes to the economic growth of the region. Graduates of the program are positioned to become important contributors to the pharmaceutical sector, driving innovation and economic prosperity.

Purdue University in Indianapolis offers more than a degree; it offers an immersive experience that combines academic quality with practical applications. The PMP's pharmaceutical engineering concentration is a testament to Purdue's commitment to shaping the future of pharmaceutical engineering and nurturing the next generation of industry leaders, one giant leap at a time.

Learn more:
https://bit.ly/ChEPMPIndy

Sydney Hummel

Undergraduate Feature

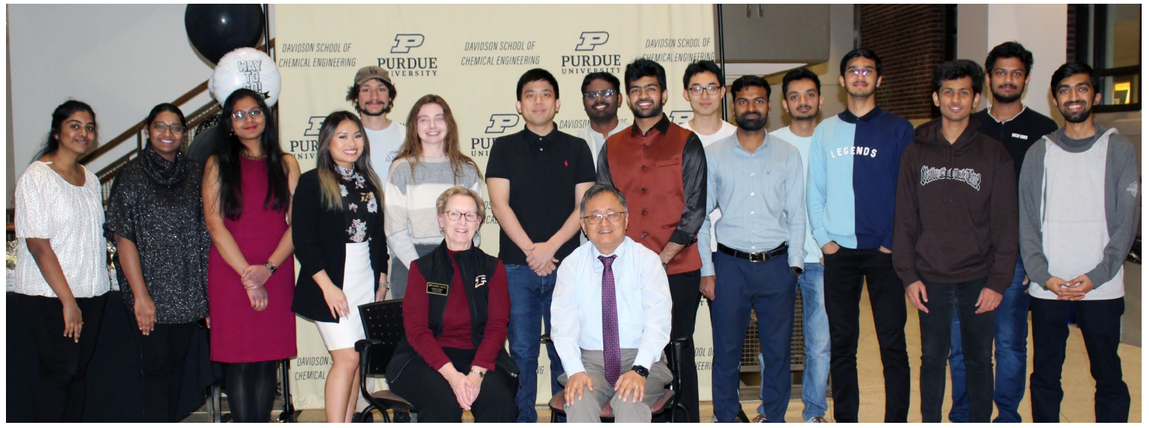
Sydney Hummel, a senior pursuing a degree in chemical engineering with an anticipated graduation in May 2024, currently serves as an undergraduate research assistant within the Xiaoping Bao Lab. Her focus lies in investigating engineered human stem cells for potential applications in cancer therapy. Sydney has been distinguished as both an Astronaut Scholar and a Churchill Scholar for the 2023-2024 academic year.

Sydney described the Astronaut Scholarship as instrumental in funding her senior year tuition and supporting her future research endeavors. This scholarship is awarded to outstanding junior and senior STEM students, with candidates nominated by Purdue University faculty members. Established in 1984 by the Astronaut Scholarship Foundation (ASF) in tribute to the Mercury 7 Astronauts, this award offers recipients financial support alongside networking and mentorship opportunities with esteemed astronauts, alumni and industry leaders, culminating in attendance at the ASF's Innovators Week & Gala.

In parallel, Sydney's designation as a Churchill Scholar underscores her academic prowess and leadership within the fields of science and engineering. The Churchill Scholarship affords her the opportunity to pursue one year of master's study at Churchill College, Cambridge, covering full tuition and travel expenses, with the potential to apply for a supplementary $4,000 research grant.

This program aims to foster transatlantic collaboration in advancing science and technology, with only a select few students from Purdue, including Sydney, named as Churchill Scholars. Sydney collaborated closely with Purdue's National and International Scholarships Office (NISO) during the application process, expressing particular enthusiasm for the prospect of studying abroad and broadening her academic horizons.

Sydney attributes her achievements to the supportive community at Purdue, notably highlighting the Davidson School of Chemical Engineering as a pivotal source of impactful research opportunities. Praised by Associate Professor Bao for her unwavering eagerness to learn and adept time-management skills, Sydney exemplifies excellence within the Purdue academic landscape, positioning herself as a dedicated and accomplished scholar poised for continued success in her academic and professional pursuits.



We celebrated our December 2023 graduates at a reception in the Forney Hall Atrium.

Professional Masters Program

Feature

The Professional Master's Program (PMP) experienced a successful year in 2023 with an increase in enrollments and a record number of student internships.

In 2023, we welcomed 33 new students to the program, while 26 graduated with indispensable skills to advance to their professional careers.

The PMP LinkedIn page and website underwent significant improvements that now feature articles on current and past students. These student features have gained interest from prospective applicants and provided a wide network outside of Purdue for these students. In addition, a video focusing on the PMP program was produced with several of our current students, providing segments that feature their reasons for pursuing this Masters degree program.

Follow our Professional MS Program on LinkedIn at:
https://bit.ly/ChEPMPLinkedIN

Vistit our web page at:
https://bit.ly/ChEPMP

Student and graduate features at:
https://bit.ly/PMPBlogs

PMP Video feature:
https://bit.ly/ChEPMPVideo

Graduate

Feature

Postdoctoral Researcher, **Hansol Wee**, has been awarded the 2023-2024 Faculty Lectureship Award.

Following the completion of his bachelor's and master's degree from Sogang University in 2014 and 2016, respectively, Hansol Wee embarked on a PhD research journey, delving into fluid dynamics at Purdue University. He earned his PhD in Chemical Engineering in 2023, and currently serves as a postdoctoral researcher under the supervision of Professor Osman Basaran.

Professor Basaran has played a pivotal role in nurturing Wee's growth as a researcher. Wee attests, *"Professor Basaran believes in the importance of training and nurturing students."* He emphasizes the correlation between the quality of research and the resulting scholarly publications, stating, *"I believe that good papers naturally follow when you focus on the quality of your research."* Wee underscores the significance of self-study alongside research efforts, noting Professor Basaran's encouragement and support for students dedicating time to expand their knowledge. Reflecting on his learning experiences, Wee expresses, *"Learning something new is incredibly fun, and it's twice as enjoyable when I'm with him."*

Upon completing his PhD, Wee recognized the opportunity for further growth under Professor Basaran's mentorship and decided to pursue a postdoctoral research position with him in the Davidson School of Chemical Engineering. Currently, Wee is engaged in studying the theoretical and simulation-based exploration of liquid jets and droplets, a field with significant academic implications and diverse industrial applications.

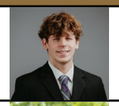
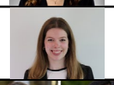
Wee's enthusiasm for his postdoctoral research is palpable as he remarks, *"As I immerse myself in post-doctoral work at the forefront of semiconductor chip manufacturing technology, the excitement is palpable, fueled by the prospect of contributing to substantial advancements in future computer technologies."* He underscores the integral role of their research group's distinctive approach, which seamlessly integrates theory and simulation techniques to attain a comprehensive understanding of free surface flows. Wee extends an invitation to individuals passionate about mathematics, physics or computer coding to participate actively in their research endeavors, emphasizing their potential to significantly contribute to ongoing advancements in the field.

Hansol Wee has been selected as the Faculty Lectureship Award Recipient for 2023-2024. This award recognizes scholarly research and publication by a Purdue Chemical Engineering graduate student. The winner of the award will receive a certificate, a $500 monetary award, and invitation to give a thirty-minute lecture to the faculty and graduate student body on their research.

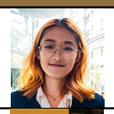
Professor Basaran commented, *"I am delighted that the exceptional quality of Hansol's PhD research has been recognized by the Davidson School of Chemical Engineering. I am very much looking forward to Hansol's presentation at the upcoming Faculty Lecture. I feel truly fortunate that Hansol chose to stay at Purdue for his postdoc before embarking on what I fully expect will be a stellar career."*

2023-2024 Student Awards

Undergraduate Awards

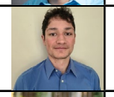
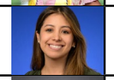
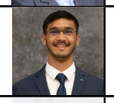
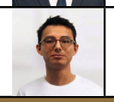
	**Jeremy Sapp** 2023 AIChE Annual Student Conference First Year Recognition Award
	**Casey Gooden** 2023 AIChE Annual Student Conference Donald F. Othmer Second Year Student Excellence Award 2023 AIChE Annual Student Conference, the Donald F. & Mildred Topp Othmer Scholarship Award
	**Purdue AIChE Student Chapter** 2023 AIChE Annual Student Conference, 2022 - 2023 Outstanding Student Chapter Award
	**Sydney Hummel** 2023-2024 Astronaut Scholar 2023-2024 Churchill Scholar
	**Maddy Hoffman** Omega Chi Epsilon 2023 Outstanding Senior
	**Ariana Scott, Rithika Athreya** 2023-2024 Dean's Leadership Scholars
	**Rithika Athreya** 2023 Purdue Engineering Fellow

Graduate Awards

	**Yufei Zhao** TRAvel for CollaborativE Research (TRACER) Grant
	**Hansol Wee** Faculty Lectureship Award

Learn About Each Award:
https://bit.ly/2023ChEStudentAwards

Professional Master's Program Awards

	**Lakshmi Sai Jinca** Outstanding Academic Achievement Spring 2023
	**Aman Bhargava** Outstanding Academic Achievement Summer 2023
	**Spencer Goldrich** Outstanding Academic Achievement Fall 2023
	**Marilyn Padua** Outstanding Academic Achievement Fall 2023
	**Anelis Susana Chiluisa Calvache** Outstanding Service Award Summer 2023
	**Mounika Anne** Excellence in Professional MS Research Award (Academic Capstone) Summer 2023
	**Ketan Paramesh Phadnis** Excellence in Professional MS Research Award (Industrial Project Capstone) Fall 2023
	**Jose Gutierrez** Excellence in Professional MS Research Award (Industrial Project Capstone) Summer 2023

New Faculty

David Bernal Neira

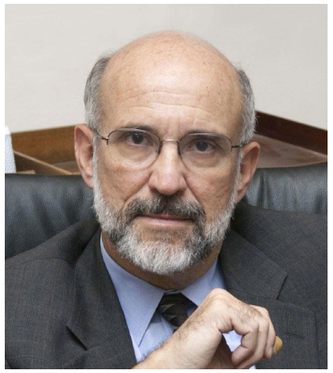
Assistant Professor

Education:

2021-2023 NRC Postdoctoral Fellow, NASA QuAIL and USRA
2021 PhD, Carnegie Mellon University
2016 M.Sc., Universidad de Los Andes
B.A.Sc., Universidad de Los Andes
2014 B.A.Sc., Universidad de Los Andes

Research Interest:

Optimization software and theory, Quantum Computing as solution methods to problems in combinatorial optimization and chemistry, Chemical and Process Systems Engineering.



Enrique Iglesia

Michel Boudart Distinguished Professor of Chemical Engineering

Education:

1979-1982, PhD, Stanford University
1977-1979, M.S., Stanford University
1973-1977, B.S., Princeton University

Research Interests:

Synthesis and structural and functional assessments of solids as catalysts for the production and use of energy carriers and chemicals with minimal environmental footprints.

Kelly Schultz

Associate Professor

Education:

2011 National Science Foundation Graduate Research Fellow
2011 PhD, NSF Graduate Research Fellow, University of Delaware
2006 B.S., Northeastern University

Research Interests:

Emerging gel materials developed for applications from consumer products to materials that can enhance and restart wound healing.

Tayler Hebner

Assistant Professor

Education:

2023 Postdoctoral Scholar, University of Oregon,
Knight Campus for Accelerating Scientific Impact
2019-2022 PhD, Graduate Research Fellow, University of Colorado Boulder
2015-2019 B.S., University of Minnesota Duluth

Research Interests:

Stimuli-responsive polymeric materials, covalent adaptable networks, soft robotics, biomaterials, tissue engineering.

New Professorships

Rajamani Gounder

NAMED PROFESSORSHIPS

R. Norris and Eleanor Shreve Professor of Chemical Engineering

Rajamani Gounder is a distinguished researcher of chemical engineering who has made significant contributions to the chemistry and engineering of catalytic systems. His work focuses on the fundamental science of catalysis and its practical applications to develop sustainable routes to synthesize chemicals and fuels and to mitigate their deleterious impacts on the environment.

Fabio Ribeiro

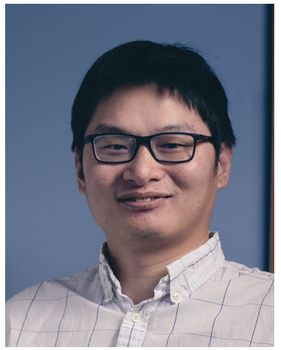
William Nicholas and Elizabeth Holstein Delgass Distinguished Professor of Chemical Engineering

Fabio Ribeiro is the Director of the National Science Foundation Engineering Research Center on the Innovative and Strategic Transformation of Alkane Resources (CISTAR) at the Davidson School of Chemical Engineering, Purdue University. CISTAR is a successful five-university and 32 industry partner collaboration that allies with industry to develop technological innovations and build a diverse and innovative workforce to responsibly realize U.S. shale gas potential in reducing carbon footprints. Ribeiro's current research interests are centered on the kinetics of heterogeneous catalytic reactions and catalyst characterization under reaction conditions.

Bryan Boudouris

R. Norris and Eleanor Shreve Professor of Chemical Engineering

Bryan Boudouris is a professor of chemical engineering with a courtesy appointment in chemistry. He has played an instrumental role in the field of polymeric and energetic materials development by creating a research ecosystem that combines breakthroughs in foundational molecular principles with a focus on translational impact. With an interdisciplinary research approach, Boudouris combines the physical sciences, health sciences and engineering with social, behavioral and economic sciences to guide and evaluate technological innovations. His active research program focuses on the science and engineering of polymers and soft materials.

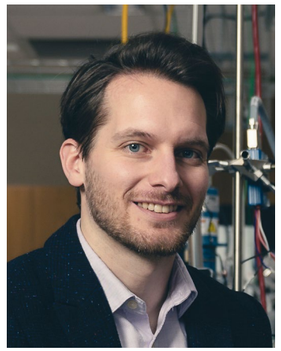


Xiaoping Bao

NAMED APPOINTMENTS

William K. Luckow Assistant Professor of Chemical Engineering

Xiaoping Bao is a global leader in stem cell differentiation and cell-based therapeutics for cancer and neurogenerative diseases. He studies the development of novel cell- and gene-based therapies for incurable human diseases—work that has earned him many recognitions. Bao's lab uses in vitro human models to study cardiovascular development and pathologies, providing novel insights into cell- and gene-based therapies.



Brian Tackett

Robert D. and Sally C. Weist Assistant Professor of Chemical Engineering

Brian Tackett is one of the Purdue's top experimentalists in electrocatalysis and an essential piece in the university's mission to become a global leader in decarbonization research. Tackett and his research team study and design electrocatalysts to help facilitate the recycling of carbon dioxide and other waste materials to decarbonize the economy.

Henson Distinguished Visiting Scholar

Kim Underhill

Robert T. Henson (BSChE '36), and his spouse, Adeline Henson, exemplified remarkable generosity as supporters of the Davidson School of Chemical Engineering. Their contributions culminated in the dedication of the Robert T. Henson Atrium in Forney Hall and the establishment of three esteemed designations: the Henson Scholarships, the Robert T. Henson Endowment for Soft Materials and the Henson Distinguished Visiting Scholar program.

The Henson Distinguished Visiting Scholar designation is conferred upon esteemed professionals whose outstanding career achievements serve as a source of inspiration to Purdue University Chemical Engineering students.

In 2023, **Kim Underhill**, a 2018 Distinguished Engineering Alumni awardee, earned this distinction following an esteemed career spanning 32 years. As a graduate of the School of Chemical Engineering in 1987, Underhill has held various leadership positions at Kimberly-Clark, including Group President of Kimberly-Clark North America and Global President of Kimberly-Clark Professional. Throughout her tenure, she has been instrumental in driving innovation, overseeing billion-dollar projects and spearheading customer-centric business strategies. Currently retired, Underhill serves on the boards of Foot Locker Inc., the Menasha Corporation, Glanbia PLC and Theda Care Regional Medical Center, in addition to her volunteer work with United Way.

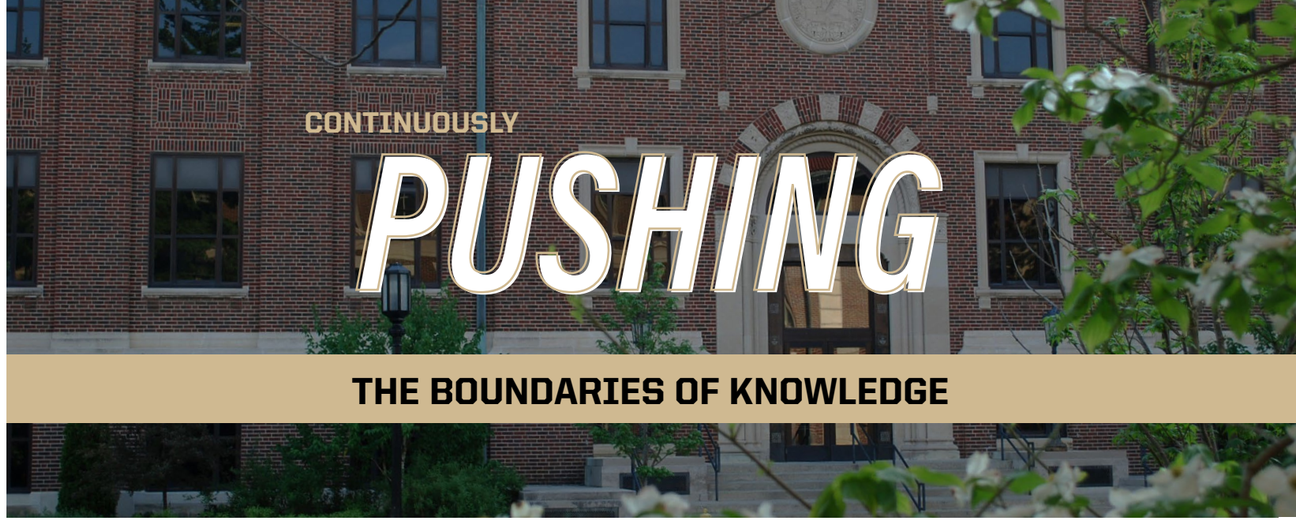
Underhill's philanthropic endeavors extend to her alma mater, motivating her to assume the role of the 2023-2024 Henson Distinguished Visiting Scholar. Embracing this opportunity as a means to reconnect with Purdue's campus and address the evolving needs of students, Underhill participates in a flexible program that allows for multiple week-long visits to campus. In addition, she hosts virtual events in the time between her campus visits.

"This program is an opportunity to integrate my interests as well as the needs of the students," shared Underhill, adding the gratitude she has for being able to make an impact. "It has been great to give back. It has been nearly 40 years since I walked on campus for the first time. Purdue has been instrumental to my success, and I am grateful to give back."

Central to Underhill's engagement with undergraduate students is her commitment to career coaching. Leveraging her extensive industry experience, she aims to enhance the educational experience of chemical engineering students at Purdue by imparting knowledge of business dynamics, industry insights and life choices. She hopes to empower students one at a time, providing them with a sounding board for navigating their academic and professional decisions with confidence. Underhill cherishes the relationships she has cultivated with students, recognizing the significance of these connections in shaping their futures

"I have had a chance to get to know many students during my time this last year," said Underhill. "Several have reached out separately, and I expect that we will keep a great relationship as they make decisions to start their year."

As the third Henson Distinguished Visiting Scholar, Underhill offers invaluable advice to aspiring engineers, urging them to identify their passions and pursue them diligently, while making strategic investments of their time and energy.



Julie Liu

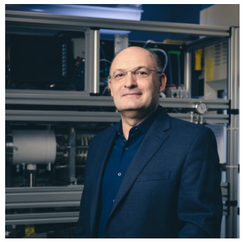
- Associate Professor of Chemical Engineering

"As co-director of the Purdue Engineering Initiative in Engineering Medicine, I am excited by the Purdue ecosystem that fosters development of technologies to improve human health. My trainees interface with collaborators from different Schools (Biomedical Engineering, Mechanical Engineering), Colleges (Science, Veterinary Medicine), and Universities (Georgia Tech, Indiana University School of Medicine) to advance our work in cartilage tissue engineering, surgical glues and drug delivery."

Jeffrey Greeley

- Charles and Nancy Davidson Professor of Chemical Engineering

"I am extremely proud of the work that the graduate students in my group have done, and I am excited about the impact that group of alumni are having in industry, academia and the national laboratory system. My most recent graduate student began a professorship at the University of Rochester this past fall."



Zoltan Nagy

- Arvind Varma Professor of Chemical Engineering

"Students from my group have taken leading positions at government agencies and major chemical and pharmaceutical industries. They lead activities in emerging technologies, digitalization and smart manufacturing. I am very proud of what we have achieved together, but I am even prouder of what they are able to accomplish in their careers."

Cornelius Masuku

- Associate Professor of Chemical Engineering

"I am excited to mentor students who are participating in curbing carbon dioxide emissions from manufacturing processes while maintaining the quality of life through process and innovation."

2023 & 2024

EARLY CAREER RESEARCH

FACULTY EXCELLENCE AWARDS

Purdue Chemical Engineering wins its second consecutive Early Career Research Award during the College of Engineering's Faculty Excellence Awards

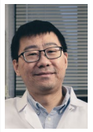
Letian Dou, Charles Davidson Associate Professor of Chemical Engineering, won the 2023 Faculty Excellence Award for Early Career Research for his organic semiconductor-incorporated perovskite (OSiP) and demonstrated solution phase synthesis work that began in 2019. His research produced innovative results concerning crystal growth, epitaxial heterostructures and high-performance solar cell applications of OSiP materials. The Letian Dou Group have since made a breakthrough in the OSiP materials development for optoelectronics and photonics applications, setting a record-high external quantum efficiency for perovskite LEDs. Additionally, the Dou group discovered new mechanisms in OSiP materials to enhance light emission and amplification, creating the opportunity for low-cost lasers.

Brett Savoie, Charles Davidson Associate Professor of Chemical Engineering, has won the 2024 Faculty Excellence Award for Early Career Research for his cutting-edge gains in addressing challenges in leveraging machine learning to accelerate chemical engineering discoveries. His work focuses on developing standardized processes for machine learning, specifically utilizing formulae, technical schematics, tabular data and simulations to seamlessly integrate chemical engineering and machine learning. One of the most notable implementations of the Brett Savoie Group's findings have been the design and characterization of semiconducting and conducting materials. These design and characterization components create the opportunity to store and generate energy more effectively.

"Previous winners of the Early Career Research Award comprise an intimidating list, and I am absolutely thrilled to share their company," said Savoie. *"If I could summarize one thing that I hope our group's research makes clear is that there are tremendous opportunities to invent and develop machine learning approaches that are by and for engineers."*

2023 & 2024

FACULTY AWARDS

	Rakesh Agrawal	- XXX Interamerican Congress of Chemical Engineering / WCCE11-11th World Congress of Chemical Engineering - Distinguished James Y. Oldshue Lecture Speaker
	Xiaoping Bao	- Biomedical Engineering Society - CMBE Rising Star Junior Faculty Award 2023 - Biomedical Engineering Society - ABioM Junior Investigator Research Award 2023 - 49th Northeast Bioengineering Conference - New Innovator Award 2023 - Purdue University Office of Research - Seed for Success Acorn Award 2023
	David Bernal Neira	- 9th Arab-American Frontiers Symposium - Speaker 2023
	David Corti	- Purdue University Davidson School of Chemical Engineering - Norris Shreve Prize for Outstanding Undergraduate Teaching 2023
	Letian Dou	- Journal of Physical Chemistry - Early Career and Emerging Researchers 2023 - Purdue University College of Engineering - Faculty Excellence Award for Early Career Research 2023 - Alexander von Humboldt Foundation - Humboldt Research Fellowship 2024
	Rajamani Gounder	- Royal Society of Chemistry - Fellow 2023 - International Symposia on Chemical Reaction Engineering, Inc. (ISCRE)- Rutherford Aris Award 2023 - Purdue University Office of the Provost - R. Norris and Eleanor Shreve Endowed Full Professorship 2023
	Enrique Iglesia	- Royal Society of Chemistry - Faraday Lectureship Prize 2023
	Can Li	- Air Liquide - Scientific Challenge Edition 3 Awardee

	Julie Liu	- AIChE - Women in Chemical Engineering Mentorship Excellence Award 2023
	Enrico Martinez	- Purdue University College of Engineering - Most Impactful Faculty Inventors 2023
	Cornelius Masuku	- University of Johannesburg, South Africa - Invited Webinar Speaker 2023 - Pan-American Advanced Studies Institute in Buenos Aires, Argentina - Invited Speaker 2023 - Energy Systems Initiative at Carnegie Mellon University, US - Invited Speaker 2023
	John Morgan	- AIChE - Food, Pharmaceutical and Bioengineering Division 15A Plenary Award 2023
	Vilas G. Pol	- Chemical Sciences Maharashtra Academy of Science (MASc) - Foreign Fellow - Purdue University College of Engineering - Most Impactful Faculty Inventors 2023
	Fabio Ribeiro	- Catalysis Science and Technology Division (CATL) of the American Chemical Society (ACS) - Catalysis Award
	Nien-hwa (Linda) Wang	- Department of Energy (DoE)- Wind Turbine Material Recycle Phase I 55Prize 2024
	You-Yeon Won	- Purdue College of Engineering - Most Impactful Faculty Inventors 2023

PURDUE UNIVERSITY | Davidson School of Chemical Engineering

2023 OUTSTANDING CHEMICAL ENGINEER AWARDS

Carrie L. (Byrnes) Anderson

BSChE 1991

Chief Financial Officer | Campbell Soup Company

For an impressive career in corporate finance reflecting a broad base of global experience in multiple industrial end markets.

Michael A. Klobuchar

BSChE 1998

Executive Vice President and Chief Strategy Officer | Merck & Co. Inc.

For an unrelenting commitment to applying leading-edge science to save and improve lives worldwide.

Kyle P. Kostroski

BSChE 2004, PhD 2008

Vice President, Engineering, Prioritization and Planning | BP

For his development of forward-thinking strategies to transform the energy industry's efforts to address the need for secure, affordable and lower carbon resources.

Amy L. Roth

BSChE 1992

Vice President, Environment Health and Safety | Terra-Gen, LLC.

For her commitment to sustainability and reducing the carbon footprint by providing clean, reliable and affordable energy to communities across the United States.

OUTSTANDING CHEMICAL ENGINEERS PLAQUE
FORNEY HALL, WEST ENTRANCE

PLAQUE HONORING THE OUTSTANDING CHEMICAL ENGINEERS

The Outstanding Chemical Engineer Award is the highest award given to chemical engineering alumni on behalf of the Davidson School of Chemical Engineering, as selected through a faculty vote. The award plaque was created in 1993 and represents the central and continuing role of chemical engineers in the design and operation of all aspects of chemical manufacturing.

2023 DISTINGUISHED Engineering Alumni

David Li

(BSChE '95)

Board Member, Past President & CEO of Cabot Microelectronics Corporation

Outstanding Chemical Engineer Award, 2017

PURDUE UNIVERSITY | Davidson School of Chemical Engineering

ChE News

Henry Lim

October 24, 1935 - February 12, 2021

It is with deep sorrow and a heavy heart that we share the news of the passing of Henry Lim, a dedicated supporter and cherished member of our Purdue Chemical Engineering family.

Lim dedicated 20 years to scholarship and teaching as a professor of Chemical Engineering at Purdue University, earning recognition for his research, publications, and pedagogy. During his tenure at Purdue, Lim made significant contributions to both undergraduate and graduate programs, earning the R.N. Shreve Prize three times in 1973, 1975, and 1977. Lim also taught at UC Irvine for 22 years.

Henry, alongside his wife Sun Boo (Sunny), actively fostered opportunities for immigrants, both Korean and non-Korean, in the United States. His legacy of excellence, innovation, and compassion will endure in the hearts and minds of all who had the privilege of knowing him.

Alan Fox

April 1st, 1934 – November 14, 2023

Alan Fox (BSChE 1995), a man of remarkable achievement and unwavering generosity, passed away peacefully on November 14, 2023. His life was a testament to dedication, ingenuity, and the profound impact one individual can have on the world around them.

After embarking on a successful career designing refineries in Chicago, Fox returned to South Whitley to lead Fox Products Corporation, the business founded by his parents. Under his guidance, Fox Products flourished, becoming a global leader in woodwind instrument manufacturing. Alan's accomplishments led to him being honored with an Outstanding Chemical Engineer Award from Purdue in 1992.

Beyond his professional endeavors, Alan was a pillar of his community, generously supporting Purdue University's Davidson School of Chemical Engineering. Alan's kindness, wisdom, and unwavering commitment to making the world a better place will continue to inspire us all.

Vern Weekman, Jr.

June 28, 1931 - January 14, 2024

It is with great sorrow that we share the news of the passing of Vern Weekman Jr. (BSChE 1953, Ph.D. 1963), a beloved supporter and advocate for Purdue Chemical Engineering. Vern's unwavering commitment and passion for advancing the field have left an indelible mark on our community.

Weekman had a distinguished career in the energy industry, and a crucial role at Mobil Oil, Corp., where he contributed significantly to the company's international leadership in catalytic petroleum processing. He held many positions throughout his career, including manager of process research and development; president of Mobil Solar Energy Corp.; and director of Mobil Oil's Central Research Laboratory. Additionally, Weekman served as an industrial lecturer in the Chemical Engineering Dept. at Princeton University and received an honorary PhD from Purdue in 2007.

Vern Weekman played a significant role in advancing the field of chemical engineering. His enduring impact and influence will continue to persist into the future.

Celebrating the Life and Legacy of Marilyn Forney

The Davidson School of Chemical Engineering is saddened to report the passing of our dear friend, Marilyn Forney (BSChE '47) of December 29, 2023. Marilyn and her late husband, Robert (Bob) Forney (BSChE ' 47, PhD ChE '50 HDR '81), were ardent supporters of the School and provided a $10M lead gift to build the addition to our building, which is now named in their honor.

Marilyn Glenn Forney, a pioneering philanthropist and chemical engineer, graduated as the only woman in Purdue University's chemical engineering class of 1947. After marrying her classmate Bob Forney in 1948, Marilyn's career spanned roles as a development engineer and technical writer. Her activism began in 1956 in Greenville, NC, where she advocated for school integration. Settling in Wilmington, DE in 1962, Marilyn dedicated herself to various causes, including prison reform, mental health advocacy and affordable housing. She raised $74 million and built more than 1000 units of housing for low-income seniors.

As active members of the Purdue Alumni Community, Marilyn and Bob co-chaired Purdue's Class of '47 Scholarship Fund. Additionally, each year the School recognizes one graduate student and one undergraduate student whose impact has helped pave the way for women in the field of engineering through the Marilyn Forney Trailblazer Award. In honor of their contributions to the Purdue community, Marilyn and Bob were honored with the naming rights for Forney Hall of Engineering, the home of Purdue's School of Chemical Engineering.

Marilyn and Bob Forney's generosity was the catalyst that inspired so many others to give back to the School. Purdue Chemical Engineering is forever indebted to them for their friendship, generosity and leadership.

The Forney legacy is one that will always be an integral part of our School's history. As we acknowledge Marilyn's passing, may we also reflect with admiration on the tremendous impact she and Bob have had on our program.

Phillip Wankat

Receives President's Council Distinguished Pinnacle Award

On November 10th, 2023, Phillip Wankat, the Clifton L. Lovell Distinguished Professor Emeritus of Chemical Engineering and Professor Emeritus of Engineering Education, was honored with one of Purdue University's highest accolades: the President's Council Distinguished Pinnacle Award. This recognition was bestowed in acknowledgment of Wankat's philanthropic contributions to innovation, discovery and education at Purdue University.

After earning a Bachelor's degree from Purdue University (ChE '66) and a Ph.D. from Princeton University (ChE '70), Phillip Wankat returned to Purdue to advance his research in chemical engineering separation processes and to educate the next generation of engineers. Motivated by a commitment to enhance engineering pedagogy, Wankat continued his academic pursuits at Purdue by earning a Master's degree in education (MSEd '82). Today, Wankat is celebrated for the design of several successful engineering education courses, textbooks and teaching methodologies that have significantly influenced engineering education.

Wankat's scholarly contributions extend beyond the chemical engineering and engineering education disciplines. Wankat has held various roles within the College of Engineering, including the Head of the Department of Freshman Engineering and the Director of Undergraduate Degree Programs in the School of Engineering Education. Additionally, his philanthropy has significantly bolstered programs such as the Purdue for (Education) Counseling Psychology Program, the Minority Engineering Program, WBAA radio and Convocations. Wankat has also donated over $105,000 in travel endowments to more than 325 graduate students.

Wankat has been recognized with many awards, including the Purdue's 1979 Potter Award for best teacher in the College of Engineering, the 2016 Morrill Award, Purdue University's highest faculty award and the 2022 American Society for Engineering Education (ASEE) Lifetime Achievement Award, for 50 years of service to engineering education and Purdue.

Phillip Wankat's enduring legacy at Purdue University stands as a testament to his multifaceted contributions, which have profoundly enriched both the institution's academic endeavors and its broader community.

Your unwavering support and generosity have played a pivotal role in advancing our mission and facilitating transformative opportunities for our students, faculty and community. Characterized by notable growth of our faculty, undergraduate and graduate enrollment, facilities and research initiatives, the Davidson School of Chemical Engineering is transforming the chemical engineering industry with strength and vitality.

Our goals are bold, but the possibilities are limitless.

Join us in transforming the future as we look towards our next giant leaps!

Give to the Davision School of Chemical Engineering:
https://bit.ly/GivetoChE

Class Notes
Alumni

1940s
Paul Oreffice (1949): Paul Oreffice, aged 96, is reportedly doing well.

1950s
Walter Heckelmann (1951): Walter Heckelmann spends his time exercising, playing bridge, attending bible studies and fellowship dinners, meeting people and getting acquainted.
Max Downham (1958): Max Downham continues to serve as the Executive Director of the International College of Surgeons, managing various responsibilities, including overseeing the International Museum of Surgical Science. He has also traveled extensively for World Health Organization meetings over the past year.
Leonard Fabiano (1958): Leonard Fabiano has been inducted as a Fellow to AIChE and serves as an Adjunct Professor at the University of Pennsylvania.
John Mayne (1958): John Mayne is now retired and resides in beautiful Santa Barbara, CA.

1960s
Thomas Huseby (1960): Thomas Huseby retired from Bell Labs and Lucent in 1997 and has since been invoålved with the Applied Innovation Board of Directors. He currently resides in Sarasota, FL.
James Julian (1963): James Julian, retired from his career as a Chemical Engineer, is enjoying his golden years and has 11 great grandchildren.
David Boles (1966): David Boles completed the design and fabrication of a land speed streamliner. This project took about 15 years to complete, involving welding, metal shaping, wiring and composite work. The streamliner was successfully run in a one-mile event in Blytheville, AK, reaching a speed of 162 mph.
Mike Medlock (1967): Mike Medlock retired from National Starch & Chemical Corp after 32 years.
John Rak (1968): John Rak served with Arco Products Company from 1968 to 1999, holding various positions including Director of Marketing and Legislative Affairs. Afterward, he served as Associate Director of Archdiocesan Youth Employment Services Los Angeles from 2002 to 2007 and as Director of Advancement for Ventura County Catholic Charities from 2007 to 2014. He retired in 2014 and currently resides in Westfield, IN.
Ronald Kahney (1962): Ronald Kahney retired on January 1, 2000. He now in Kirkwood, MO.

1970s
Martin Ferman (1970): Martin Ferman plans to retire spring 2024 after eight years of part-time consulting on three research projects at Ford.
Jerry Spillane (1971): Jerry Spillane is enjoying retirement.
Larry Bowler (1971): Larry Bowler is retired from GE/SABIC but is currently working part-time for Baker Engineering and Risk as a Principal Consultant specializing in Process Safety and Risk Management.
Frank Hearl (1974): Frank Hearl retired at the end of December 2022 after a long career at the National Institute for Occupational Safety and Health (NIOSH) within the CDC.
Cliff Kowall (1974): Cliff Kowall is actively engaged in research with a team from the University of Pittsburgh and Oregon State University. He recently published a paper in the *Chemical Engineering Journal* and is involved in various activities related to the American Institute of Chemical Engineering (AIChE) and the DOE/AIChE RAPID Manufacturing Institute.
James (Jim) Simnick (1974 BSChE, 1979 PhD ChemE): Jim Simnick retired from BP after 41 years and now runs Simnick Consulting LLC. He remains active in the ASTM standards organization. *CONTINUED*

1980s
Richard D'Ardenne (1980): Richard D'Ardenne assumed the role of Director of Engineering at ION Clean Energy in Boulder, CO, effective January 1, 2023, overseeing the engineering scope of ION's carbon capture technology offerings.
David Grubbs (1980): David Grubbs has been serving as a staff cardiologist at the Wilmington Delaware Veterans Hospital since July 2020.
Francis Stack (1980): Francis Stack retired in April 2022 after dedicating 37 years to Forest City Technologies, Inc.
Jenny McComb (1980): Jenny McComb retired from Texas Instruments and relocated to the Chicago area.
Andy Steinhubl (1980): The Center convened a group of leading energy company sponsors, and they successfully submitted a proposal for a Hydrogen Hub in Greater Houston, one of seven hubs designated by the DOE across the country.
Barry Curtis (1981): Barry Curtis concluded his role within the UC Davis Office of Research, then spent five months living in Germany in 2022 as part of his wife's Humboldt Fellowship. He later started a new role within the UC Davis Graduate School of Management. *CONTINUED*

1990s
Jorge Olivares (1990): Jorge Olivares announced his retirement from Eli Lilly and Company after 34 years of service.
Timothy Lebrecht (1991): Timothy Lebrecht's responsibilities expanded to include the transition to hydrogen for clean energy processes.
Shawn Batey (1992): Shawn Batey started a new position at Sigma Engineers and Constructors in Baton Rouge in April 2021.
Eric Brooks (1992): Eric Brooks completed an HVAC and process chiller design and installation project to support new product expansion at a major food processor.
Patrick Welborn (1992): Patrick Welborn retired at the end of December 2021 after 31 years at Dow Corning / Dow.
Jeff Kerkay (1993): Jeff Kerkay was named Vice President - Investments, Treasury and Real Estate for Henry Ford Health in Detroit, MI in June 2023.
Loy-Sek Tay (1993): Loy-Sek Tay focuses on Climate Neutral and Net Positive Nature Sustainability. *CONTINUED*

2000s
Nick Adler (2000): Nick Adler assumed the role of Vice President of Value Streams for Wabash and is responsible for a $2.5B+ operating plan and increasing value for customers throughout all Wabash business segments.
Valerie Ghai (2000): Valerie Ghai works as a cleaning validation engineer at Thermofisher Scientific, focusing on pharmaceutical manufacturing.
Angela Kofoed (2002): Angela Kofoed was promoted to PPM in July 2022 with a focus on quality and optimization in a newly expanding business line.
Alvaro Timotheo (2000): Alvaro Timotheo transitioned to the role of Chief Commercial Officer for CPM, overseeing the company's commercial team in four key segments globally.
Nicole Ayers (2002): Nicole Ayers coaches VEX Robotics and Esports at Martha and Josh Morriss Mathematics and Engineering Elementary School.
Jonathan Gortat (2002): Jonathan Gortat started a new position as Director of Licensing and Strategic Alliances for Stanford University in April 2023.
Susan Gleissner (2003): Susan Gleissner launched Unearth Coaching & Consulting in 2021, alongside her current career with Hennepin County in Minneapolis. *CONTINUED*

2010s
Robbie Cunningham (2010): Robbie Cunningham assumed a new position as a Senior Process Development Engineer, leaving his previous Senior Process Engineer position.
Matt Foust (2010): Matt Foust led a procurement project for Shell, resulting in the award of three contracts totaling $125M/year in total, spending for their Deepwater Gulf of Mexico portfolio.
Lauren Quig (2010): Lauren Quig teaches environmental organic chemistry as an adjunct at Portland State and works on a high-resolution site characterization remedial investigation of PFAS at a large air force base.
Joe Williams (2012): Joe Williams has been promoted to Plant Manager at Glanbia Nutritionals, following previous roles as Operations Manager and Engineering Manager.
Paul Brooks (2013): Paul Brooks has taken on a new position as a Sr. Process Engineer in the pharmaceutical manufacturing industry. His projects include overseeing processes for new market APIs and serving as the lead engineer on an incoming commercial product capital project.
Rebekah Hanewinkel (2013): Rebekah Hanewinkel supported the process controls and start-up of proprietary FCDh technology with Dow, a pioneering project in on-purpose propylene production from 2020 to 2024. She found the project highly rewarding and looks forward to further sustainable innovations.
Taylar Sykes (Marshall) (2013): Taylar Sykes started a new role in May 2022 in Glendale, AZ, for Nestle. She is involved in building a new greenfield Beverage factory to produce Coffee Mate, Starbucks and Natural Bliss coffee enhancer products. This is set to open in July 2024. *CONTINUED*

2020s
Evan Jones (2020): Evan Jones has been working on the "Rodeo Renewed" project at the Phillips 66 Rodeo Refinery, which aims to convert an oil refinery into a renewable diesel/jet production facility.
Zachary Piontek (2020): Zachary Piontek took a new job with Celanese in 2022 and led the installation of a new organic fluid vaporizer project in 2023.
Austin Taskey (2020): Austin Taskey changed jobs to Venture Global LNG in October 2023, where he is currently working on the pipeline into the Plaquemines LNG facility.
Brianne Kelly (2021): Brianne Kelly tried her hand at Product Owning and led analytics on multiple projects.
Andrew Reader (2021): Andrew Reader was hired at Evonik Tippecanoe Laboratories in August 2022, where he supports the production of large-scale intermediate and API drug molecules. *CONTINUED*

See Full Class Note List:
https://bit.ly/2024ClassNotes

PURDUE UNIVERSITY

Davidson School of
Chemical Engineering

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Purdue AIChE Named Chapter of the Year Award for 8 Consecutive Years

Over 90% of graduating students from the Davidson School of Chemical Engineering become professional members of AIChE, through efforts of Purdue AIChE.