



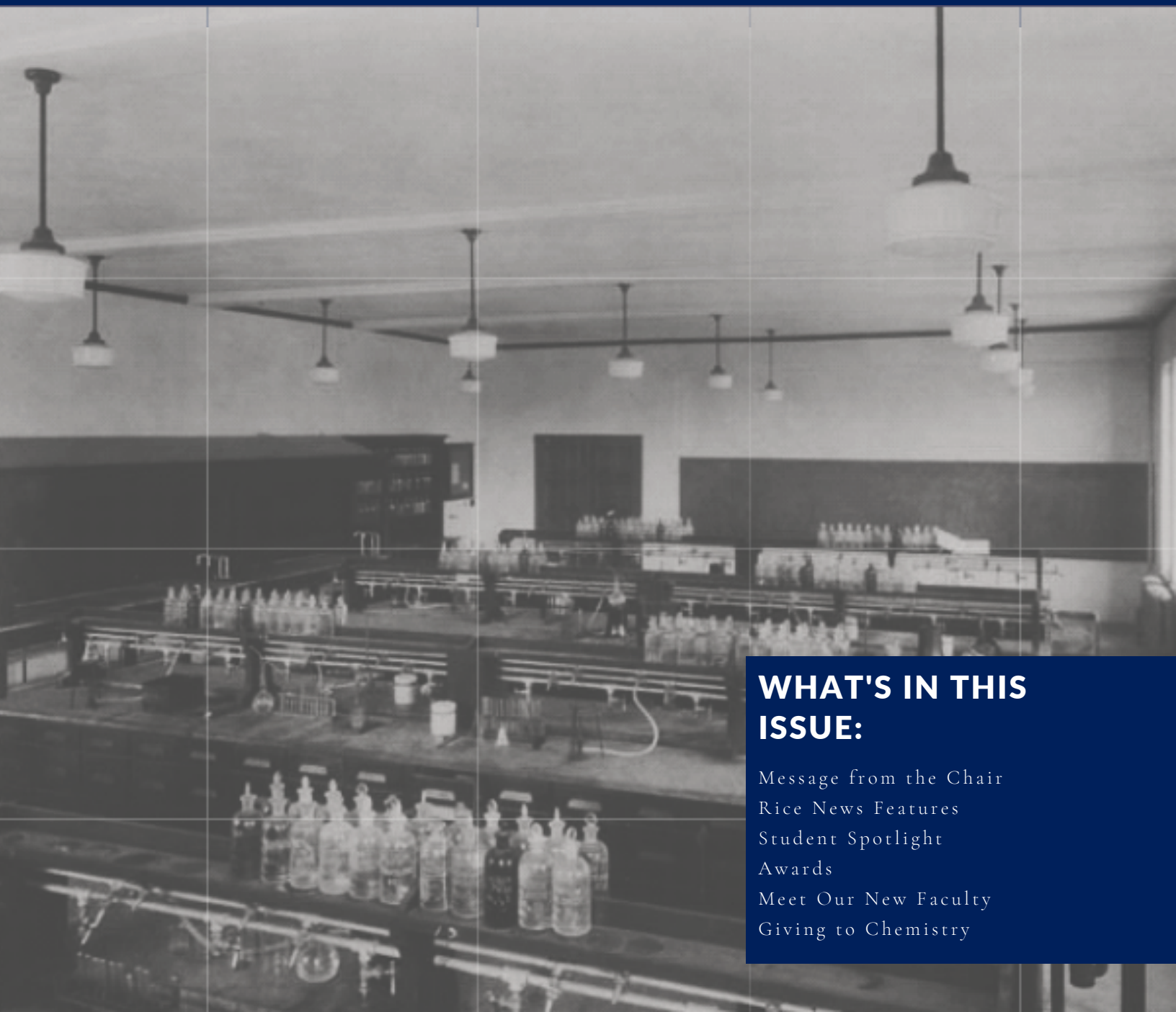
RICE NATURAL SCIENCES

Chemistry

# CHEM NEWSLETTER

SPRING 2023

WHERE INNOVATION MEETS COLLABORATION  
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## Message from the Chair

The Department of Chemistry at Rice University successfully continues various research and educational activities. Please enjoy our CHEM Newsletter, which appears every 6-12 months, highlighting some outstanding recent accomplishments by faculty, postdocs and students as well as some exciting news from the department.

We are very happy to report that our research faculty have received multiple awards. Assistant Professors Anna-Karin Gustavsson and Julian West each received Welch Research Grants (2021-2024), assistant professor Matt Jones has been awarded a very prestigious NSF CAREER (starting from July 2022), assistant professor Sam Yruegas has been awarded a \$2 million CPRIT Grant (2022), assistant professor Julian West has also been named a Cottrell Scholar by the Research Corporation for Science Advancement (2023), and associate professor Hans Renata has been awarded a \$4 million CPRIT Grant (2022).

Furthermore, we are very happy that Dr. James Shee will join our department as an assistant professor in July 2023. Shee comes to Rice after completing postdoctoral research at the University of California, Berkeley.

I am also very excited to report that our national rankings for several Chemistry subfields significantly improved. Theoretical Chemistry is now No. 11 (was No. 12 last year); Experimental Physical Chemistry is now No. 17 (previously unranked), and Organic Chemistry is now No. 22 (previously unranked). We hope that our rankings will go even higher this coming year!

We look forward to having more exciting news and research accomplishments from people at the Department of Chemistry!

# Rice News Features

*Our faculty, students and researchers are doing outstanding work in the classroom and in the lab. Catch a glimpse of a few of their stories featured on Rice News this cycle.*

## Rice lab uncovers dynamics behind protein crucial in breast cancer

Watching a puppet show can teach you something about how estrogen works in the body, according to Rice University scientists whose research could open the door to new strategies for regulating the hormone — which could help prevent breast cancer and other diseases.

Just as a puppeteer manipulates strings, an estrogen receptor, once it binds to a hormone molecule, manipulates its structure to access a specific DNA site, where it will either enhance or inhibit gene expression. Estrogen receptors play a crucial role in breast cancer, making them therapeutic targets for tumor growth inhibition. A study published this week in the Proceedings of the National Academy of Sciences explains the link between the particular structure of estrogen receptor alpha proteins and how these receptors function at the molecular level.

“This molecule has two regions or domains that normally are not touching each other,” said Rice theoretical physicist Peter Wolynes, the study’s corresponding author. “Instead, they’re separated by two stringlike structures. The puzzle was, how do these two domains communicate with each other? How is the information that a hormone is bound conveyed to the domain that binds DNA?” Using software called AWSEM that his research group developed to predict the structure and dynamics of proteins, Wolynes and his team of Rice graduate students found estrogen receptor hormone regulation is controlled by a previously unknown strategy of molecular communication.



Full Article: <https://news.rice.edu/news/2023/rice-lab-uncovers-dynamics-behind-protein-crucial-breast-cancer>

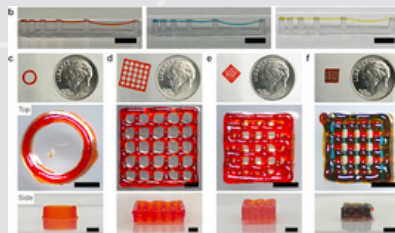
## Peptide 3D-printing inks could advance regenerative medicine

How do you build complex structures for housing cells using a material as soft as Jell-O? Rice University scientists have the answer, and it represents a potential leap forward for regenerative medicine and medical research in general.

Researchers in the lab of Rice’s Jeffrey Hartgerink have figured out how to 3D-print the well-defined structures using a self-assembling peptide ink. “Eventually, the goal is to print structures with cells and grow mature tissue in a petri dish. These tissues can then be transplanted to treat injuries, or used to learn about how an illness works and to test drug candidates,” said Adam Farsheed, a Rice bioengineering graduate student and lead author of the study, which appeared in *Advanced Materials*.

“There are 20 naturally occurring amino acids that make up proteins in the human body,” Farsheed said. “Amino acids can be linked together into larger chains, like Lego blocks. When amino acid chains are longer than 50 amino acids, they are called proteins, but when these chains are shorter than 50 amino acids they are called peptides. In this work, we used peptides as our base material in our 3D-printing inks.” Developed by Hartgerink and collaborators, these “multidomain peptides” are designed to be hydrophobic on one side and hydrophilic on the other. When placed in water, “one of the molecules will flip itself on top of another, creating what we call a hydrophobic sandwich,” Farsheed said.

These sandwiches stack onto one another and form long fibers, which then form a hydrogel, a water-based material with a gelatinous texture that can be useful for a wide range of applications such as tissue engineering, soft robotics and wastewater treatment.



Full Article: <https://news.rice.edu/news/2023/peptide-3d-printing-inks-could-advance-regenerative-medicine>

# RCSA Welcomes 2023 Class of Cottrell Scholars

*CONGRATULATIONS TO ASSISTANT PROFESSOR JULIAN WEST AND DR. LYDIA KISLEY '15, ON THEIR SELECTION AS 2023 COTTRELL SCHOLARS!*

Research Corporation for Science Advancement, America's first foundation dedicated wholly to science, has named 26 early career scholars in chemistry, physics, and astronomy as recipients of its 2023 Cottrell Scholar Awards. Each awardee receives \$100,000.

“The future of science depends on innovation, diversity, and commitment to student success,” said RCSA President & CEO Daniel Linzer. “These new awardees have been selected as much for their research and teaching excellence as for their potential to become change-makers at their institutions, in science, and society at large.”

Cottrell Scholars are chosen through a rigorous peer-review process of applications from public and private research universities and primarily undergraduate institutions across the United States and Canada. Their award proposals incorporate both research and science education.

“It’s always an honor to welcome a new class to the Cottrell Scholar family,” said RCSA Senior Program Director Silvia Ronco. “We look forward to seeing the fresh ideas and energy these outstanding researchers, teachers, and mentors bring to the community, and the impact they will have for decades to come.”

As their careers advance, Cottrell Scholars become eligible to compete for several additional levels of funding through the Cottrell Plus Awards. Scholars meet each July at the annual Cottrell Scholar Conference to network, exchange ideas, and develop collaborative projects with potential national impact. This year’s event is scheduled for July 19-21 in Tucson, Arizona.

Full Article: <https://rescorp.org/news/2023/02/rcsa-welcomes-2023-class-of-cottrell-scholars>

## Naomi Halas named University Professor

Rice University has promoted Naomi Halas to University Professor, the institution’s highest academic rank. She becomes only the 10th person and second woman to earn the title in Rice’s 111-year history.

An engineer, chemist, physicist and pioneer in the field of nanophotonics, Halas is the only member of Rice’s faculty elected to both the National Academy of Sciences and the National Academy of Engineering for research done entirely at Rice. She joined the university in 1989 following her time at AT&T Bell Laboratories, and leads one of Rice’s largest interdisciplinary institutes, the Smalley-Curl Institute, and one of its largest research groups. Halas held joint appointments in five departments prior to being named University Professor, an at-large appointment that allows her to teach in any academic department.

“I have worked with Naomi for several years and can’t think of anyone more deserving of the title University Professor,” said Rice President Reginald DesRoches. “Naomi is the epitome of a scholar. She is an accomplished researcher, innovator, teacher and mentor. More importantly, she is a fervent seeker of transformational knowledge, which is evident in her many accomplishments throughout her career at Rice.”

Full Article: [news.rice.edu/news/2023/naomi-halas-named-university-professor](https://news.rice.edu/news/2023/naomi-halas-named-university-professor)



# Student Spotlight

## Meet Rice's Graduate Ambassador Carly Graverson

Meet Carly Graverson. Graverson is a third year Ph.D. Candidate in the Department of Chemistry at Rice University. Graverson is from Wisconsin and is a Rice Graduate Ambassador.

Ambassadors are students who represent the university and help prospective students gain knowledge of student life as a graduate student at Rice.

Graverson chose Rice as a graduate school because of her enjoyment of conducting research and the campus community. Her research focuses on understanding the role of ligands in nanoparticle synthesis. She focuses on understanding how charged species pass through non-charged bilayers to grow gold nanoparticles. She investigates how changes in the molecular structure of the bilayer affect the speed and directionality of nanoparticle growth.

When she is not conducting research, she serves in various leadership roles within the Rice community. She is a part of Chemistry GSA, Grad STRIVE, GPS Fellowship Coach, and FACETS on campus.

Graverson advises prospective students to have backup plans just in case their first option doesn't go as planned.

Graverson also tells students to go into a department with the mindset of doing general research and not for a specific advisor.

"Make sure the department you are applying to has at least three groups you will be interested in working with," said Graverson. "You can never be sure about what is going to happen."

Graverson advises admitted students to talk to the professors in the department to understand if the mentorship style and work dynamics are a good fit for you.

"It feels like you are being interviewed, but you are actually interviewing them too," said Graverson.

Outside of academics, Graverson enjoys coffee at Coffeehouse on Rice's campus and eating at Aga's, Lankford's Grocery, and the Hobbit Cafe.

Graverson played division two basketball as a forward when they were in undergrad. Her favorite basketball team is the Milwaukee Bucks, and her middle name was inspired by an NFL player on the Greenbay Packers team in the '90s.

Graduate ambassadors can be contacted via email at [gradambassadors@rice.edu](mailto:gradambassadors@rice.edu). Carly Graverson can be contacted directly by email at [cfg2@rice.edu](mailto:cfg2@rice.edu).

Article published by Rice News, January 26: [graduate.rice.edu/news/current-news/meet-rices-graduate-ambassador-carly-graverson](https://graduate.rice.edu/news/current-news/meet-rices-graduate-ambassador-carly-graverson)



## Awards

Saxton Fisher (Jones Group) was the recipient of the Graduate Teaching Award for Student Support

Naomi Halas and Peter Nordlander won the prestigious Eni Energy Transition Award, 2023

Jeff Hartgerink was a recipient of the 2023 Outstanding Doctoral Advisor Award

Matt Jones won a 2022 Young Scientist Award from iCANX, a Chinese organization

Christy Landes was awarded the ACS-GHS Joe W. Hightower Award, 2022

Christy Landes was elected as a 2022 ACS Fellow

Seiichi Matsuda was the recipient of the 2022 Debra W. Stewart Award for Outstanding Leadership in Graduate Education

Utana Umezaki, a graduate student working with Angel Marti, was named as Rice's inaugural 2023 Quad Fellow

Julian West received The University of British Columbia 2022 Chemistry Alumni Award of Distinction

## Meet Our New Faculty

Sam Yruegas is a native Texan hailing from Laredo, TX. Yruegas joined the faculty at Rice University as an assistant professor in Chemistry in the summer of 2022 as a CPRIT Scholar and Norman-Hackerman Welch Young Investigator Chair. Yruegas began her chemistry career at Texas A&M University where she conducted undergraduate research in Oleg V. Ozerov's group as a Regents' Scholar studying the solubility of carborane salts of pincer complexes in weakly coordinating solvents. Dr. Yruegas received her B.A. in Chemistry in 2014. She received her Ph.D. in Chemistry from Baylor University in 2019. Her work in the laboratory of Caleb D. Martin was focused on the development of methodologies targeting the synthesis of highly unusual and unstable bonding motifs centralized around boron. As a postdoctoral researcher in Paul J. Chirik's group at Princeton University, her work concentrated on developing earth abundant metal-catalyzed processes with nickel, cobalt, and iron to upgrade hindered olefin streams into desirable products with homogeneous and heterogeneous catalysts. Yruegas' work has been recognized with several awards, including, the League of Legends Distinguished Alumni Award from J. B. Alexander High School in '19, the element erbium (Er) on the IUPAC Periodic Table of Younger Chemists in '19, the American Chemical Society, Division of Inorganic Chemistry Young Investigator Award in 2020, and the CPRIT Recruitment of First-Time Tenure-Track Faculty Members Award in 2022. She enjoys baking and hanging out with her dogs outside of the lab.

### Samantha Yruegas



### Hans Renata



Hans Renata was born in Surabaya, Indonesia. After completing his high school education in Singapore, he moved to the US and received his B.A. degree from Columbia University in 2008, conducting research under the tutelage of Tristan H. Lambert. He earned his Ph.D. from The Scripps Research Institute in 2013 under the guidance of Phil S. Baran. In his graduate thesis, Renata completed the synthesis of a polyhydroxylated cardiac glycoside, ouabagenin, and developed a range of corticosteroid analogues bearing hydroxylation at the C19 position. In 2013, he began his postdoctoral studies in the laboratory of Professor Frances H. Arnold at the California Institute of Technology. Renata joined the faculty at The Scripps Research Institute Florida in the summer of 2016 and was promoted to the rank of associate professor with tenure in 2022. Renata joined the faculty at Rice University in July 2022. Outside of the lab, he enjoys drinking good beer, while trying to stay up to date with new music and his favorite soccer teams.

Raúl Hernández Sánchez was born in Chihuahua, Mexico. He joined the faculty at Rice in 2022 and is the Norman Hackerman Welch Young Investigator Junior Chair. Prior to joining Rice, Hernández Sánchez was an assistant professor at the University of Pittsburgh from 2018-2022. During his undergraduate years, Hernández Sánchez worked intermittently as a research assistant in the laboratory of Sossina Haile at the California Institute of Technology in the summers of 2007-09 and spring of 2008. Later, he explored the formation of ionic membranes under the guidance of Beate Klösgen at the Southern University of Denmark in the spring of 2009. He received a B.Sc. in chemistry at ITESM Campus Monterrey in 2010, defending a thesis on the synthesis of drug-loaded dendrimers under the direction of Jesús Angel Valencia. He then moved to Cambridge, Massachusetts to pursue a Ph.D. in chemistry at Harvard under the mentorship of Ted Betley. After completing his thesis on the coordination chemistry and electronic structure of iron clusters, he moved to Columbia University as a Columbia Nano Initiative Postdoctoral Fellow to work under the supervision of Colin Nuckolls. Outside of the lab, Hernández Sánchez enjoys eating spicy food and spending time at the beach.

### Raúl Hernández Sánchez





RICE NATURAL SCIENCES

## Department of Chemistry

### GIVING TO CHEMISTRY

The global impact of Rice University is expanded and sustained by the accomplishments and support of our alumni and friends. The continued generosity of our donors is paramount to the mission and goals of Rice Chemistry. Graduate student education and research are top priorities in the Department of Chemistry. Graduate fellowships attract and sustain a strong body of doctoral students, an important component of our research programs and accomplishments. Endowments for graduate student fellowships provide an opportunity to complement and improve our chemistry graduate program, thereby contributing to educating and training the next generation of scientists to improve our healthcare, protect our environment, develop new and clean energy sources, and create the novel materials of the future—for all intents and purposes, for a better world.

Giving to Chemistry means supporting our academic efforts. Gifts to the General Support Fund have significant student impact by providing student stipends or other education needs of our students. Additional awards and endowed funds in the Chemistry Department are also established to support various aspects of teaching, learning, and research. To learn more about our funds, please visit our website: <https://chemistry.rice.edu/give-chemistry> Your gift will tremendously help our research program in advancing science and in training new generations of educated specialists. If you would like to know more about how you can support the Department of Chemistry please contact the Wiess School of Natural Sciences Director of Development Jackie Macha at [jackie.macha@rice.edu](mailto:jackie.macha@rice.edu) or 713-348-4268. We are grateful for your support. Thank you!

**The Department of Chemistry thanks you very much for your continued support!**

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Let us know what you've been up to since leaving Rice by filling out our alumni form:

[bit.ly/2Mezkwb](https://bit.ly/2Mezkwb)