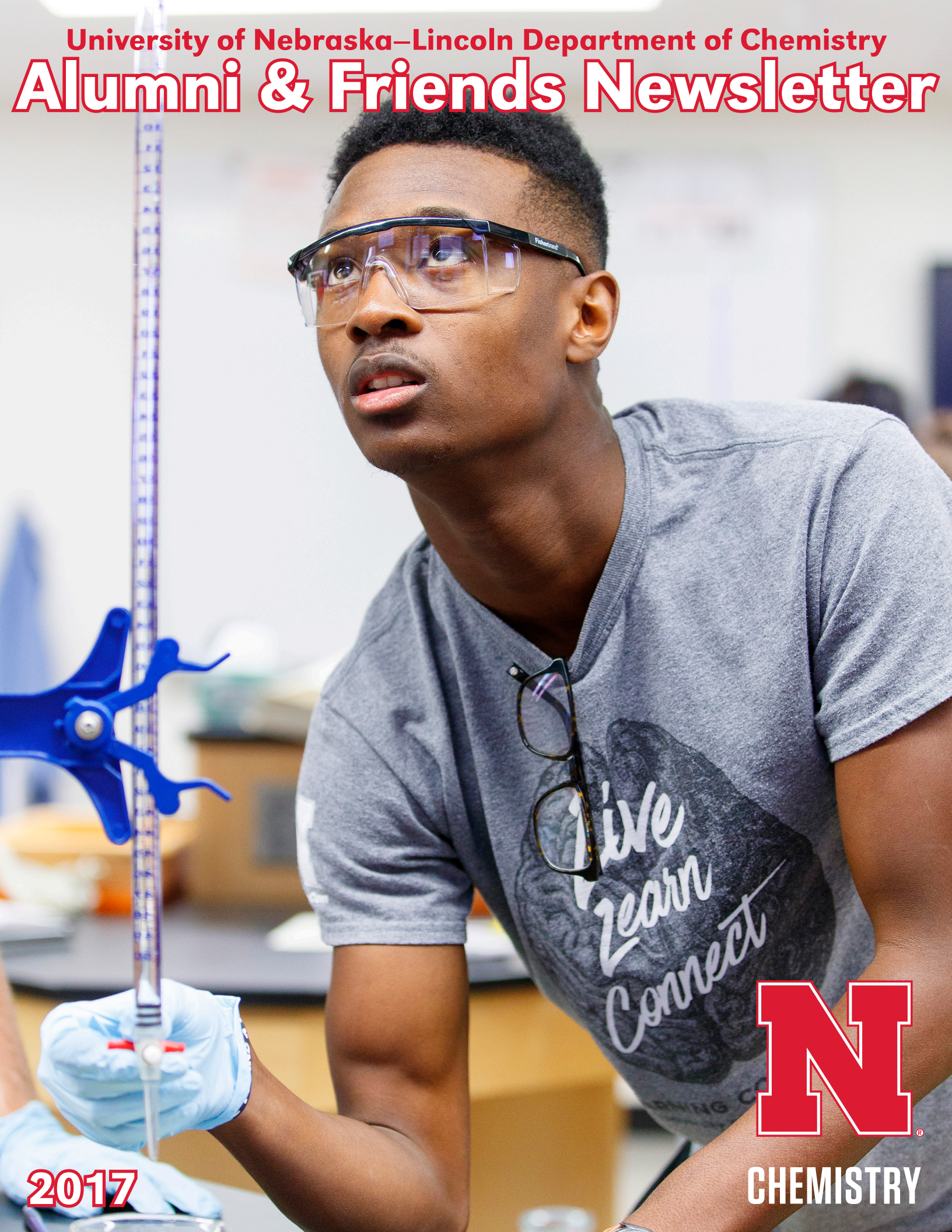


University of Nebraska–Lincoln Department of Chemistry

Alumni & Friends Newsletter



2017



CHEMISTRY

Letter from the Chair



Alumni, Friends, and Colleagues,

I sincerely hope that recent Holidays were pleasant for each of you, and that you were able to enjoy time with loved ones and close friends. 2017 has been a time of self-reflection for our Department. Over the past year we have been highly focused on the process of completing a major Academic Program Review (APR). Our last APR occurred during the Spring semester of 2010. The goal of this process is to document achievements related to our research, teaching, and service missions, while providing an external review team and the upper Administration with descriptions of our needs and plans for continued growth. The faculty really stepped up over the last year in completing the massive self-study, and in actively engaging the review team during their visit to campus in late September. Focal points included the condition of Hamilton Hall and the need to make strategic faculty hires to complement the success we have enjoyed in making junior hires since the last APR.

In the past year our faculty were aggressive and highly successful in pursuit of grant support for their research. The quality of our publication record remains strong, with a large number of articles appearing in top journals and on journal covers. Additionally, we made steady progress in completing necessary improvements to Hamilton Hall. A \$1.4M renovation of 3rd floor east includes new laboratory space (pictured on the back cover) for our Chemistry majors, lounge areas for both graduate and undergraduate students, and an innovative multimedia classroom that is the first of its kind in our building. Through major support from the Nebraska Research Initiative and matching funds from the Department, as well as the College of Arts and Sciences and the Vice Chancellor for Research, Professor Eric Dodds has been successful in acquiring cutting edge instrumentation for the Nebraska Center for Mass Spectrometry. In late November, the Department sited a new 15T FT-ICR in the basement of Hamilton Hall. This mass spectrometer is the highest field instrument commercially available, and it is one of only four at academic institutions in the United States. Renovation of space for major instrumentation acquisitions will be completed early in the new year. You will be hearing more about these capabilities as we plan for a Grand Opening Symposium to be held during the Fall semester of 2018.

Gifts to the Department have had a major impact on our ability to move the Department forward. Thank you. Through prudent management of these gifts by the NU Foundation, we have been able to provide matching money to maintain state-of-the-art instrumentation, to provide startup funds for assistant professors, and to provide unprecedented levels of support for student fellowships and scholarships. Of particular note is the newly established Edward K. and Mariann Chess Fund, which will provide significant fellowship opportunities for graduate students. As many of you will recall, Ed Chess obtained his Ph.D. in our Department with Professor Mike Gross. Additionally, in recent weeks we were excited to learn that the Department will be able to offer an important new award lecture that is supported by one of our faculty colleagues. The Reuben and Loretta Rieke Lectureship will allow us to bring internationally recognized leaders in organometallic chemistry to campus. The format of this new award lecture will be similar to that of the Hamilton Lecture and could begin as early as the Fall of 2018.

As you browse through this year's newsletter, you will see many new faces and that familiar faces will be taking on new roles. Our new staff can be found on pages 44-45. Additionally, please note the story on pages 22-25 that summarizes the career of Professor Craig Eckhardt, who will be "retiring" (is such a word even relevant to Craig?!) after 50 years as a member of our faculty. Finally, note the photo and the short section on page 15 announcing our new colleague, Dr. Alena Moon, who will be joining us in August!

Unfortunately, 2017 was not a year without loss. Gay Gallup, wife of Professor Gordon Gallup, passed away in January. Jean Holtzclaw, wife of Professor Henry Holtzclaw, passed away in April. The untimely loss of Brent Skeahan, one of our longtime custodians, impacted many here in Hamilton Hall, especially the faculty and staff on the 5th floor. Finally, just a few days before the writing of this letter, and just a few days after celebrating his 93rd birthday, Professor John Demuth passed away quietly here in Lincoln with a dear friend at his side. Our heartfelt condolences go out to the families.

Despite inexorable change and all that it brings, important traditions continue. The fall PLU picnic that welcomes new graduate students was a great success, and behind the reliable arm of Professor Steve "Spitball" Morin, the faculty/staff team earned a much-coveted victory over the graduate students in the annual slowpitch softball game. The graduate students,

Letter from the Chair

however, remain steadfast in their theory that the "facstaff" win will never establish itself as customary. Our time-honored custom of PLU Holiday celebrations does continue. This year's event was held at the Nebraska Champions Club, just west of Memorial Stadium, with 143 faculty, staff, students, children, and others in attendance. This event, in conjunction with the Holiday Potluck organized by the purchasing staff (special thanks to Rene Barfoot), provided nice opportunities to enjoy some time together and relax a bit before sliding into the demands of Finals Week.

Looking back on the past year, I recognize that the Department is indeed fortunate. We are fortunate for the progress made through hard work and perseverance, and fortunate for the time spent together in our endeavors here within the walls of Hamilton Hall. Moving forward into the new year, I see renewed enthusiasm and eager anticipation as we prepare to engage new science, meet new colleagues and students, and continue to increase our visibility in the Big 10, and on national and international stages. 2018 promises to be an exciting year.

Wishing you all of the best,



Jody Redepenning
Professor and Interim Chair

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Jason Kautz

Craig Chandler | University Communication

Kautz earns Outstanding Teaching and Instructional Creativity Award

Professor Jason Kautz received an Outstanding Teaching and Instructional Creativity Award. The OTICA recognizes individual faculty system wide who have demonstrated meritorious and sustained records of excellence and creativity in teaching.

The awards recognize faculty from across the University of Nebraska system whose work has had a strong impact on students, university and state.

“The University of Nebraska has an enormous impact on economic vitality and quality of life in our state and around the world. Our faculty, who are some of the best in the country, deserve much of the credit,” said Hank Bounds, NU president. “Nebraskans can be proud of the teaching, research and engagement efforts led by their university. I know I am — and I’m reminded daily of how fortunate I am to work among such talented and dedicated colleagues.”

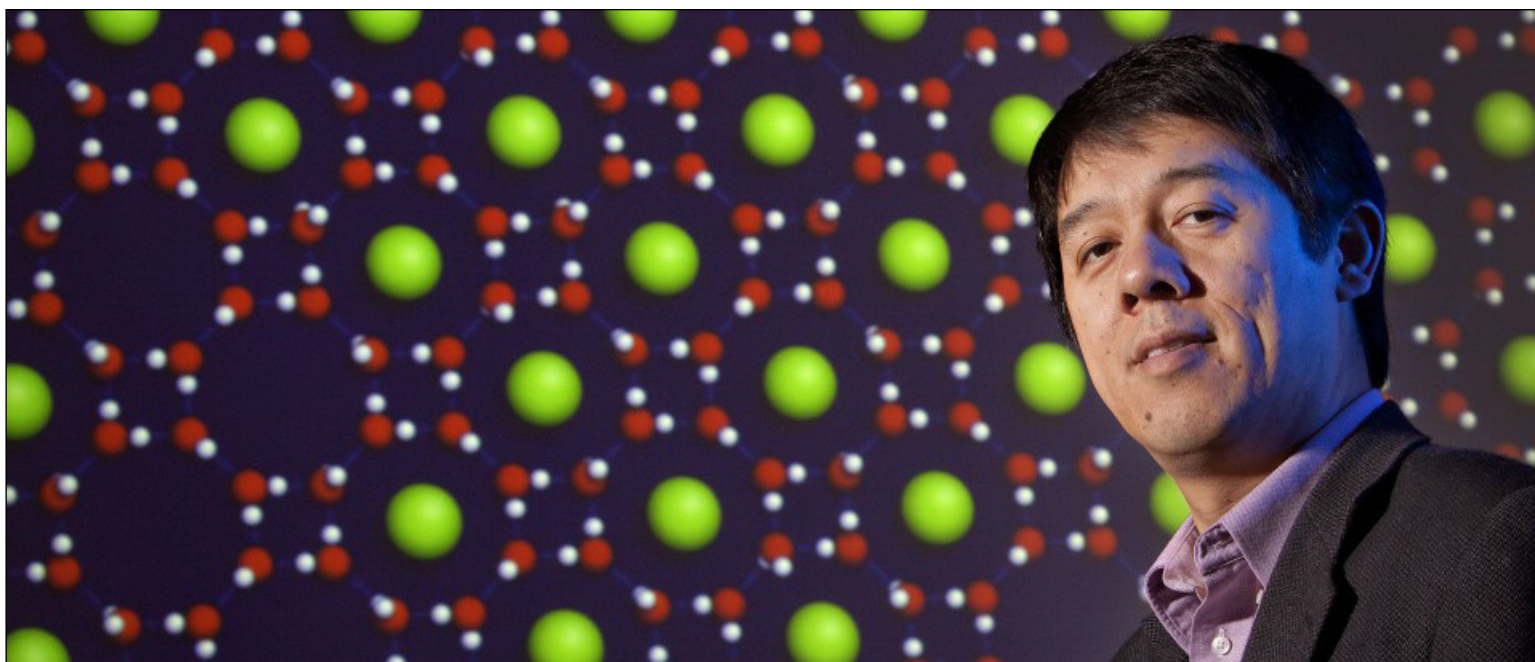
Kautz is a chemistry professor by title, but he teaches with the goal of instilling problem-solving skills in his students that translate to all aspects of life. He joined the university faculty in 2004, and since then he has played a central role in both course and teacher development.

Kautz is the lead coordinator of the university’s freshman chemistry program, which serves more than 2,500 students each academic year. He consistently receives instructor evaluation scores above the departmental average. His teaching effectiveness has manifested itself in three Association of Students of the University of Nebraska Outstanding Educator Awards and the Hazel R. McClymont Distinguished Teaching Fellow Award (2016), among other recognition throughout his career.

Kautz also developed a graduate course in teaching methods of chemistry, which is designed to improve the development of graduate students as teaching assistants and as teachers upon graduation. He is also currently designing and authoring a digital chemistry course-learning program.

Kautz joins James Carr (1996), Paul Kelter (1999), and William McLaughlin (2005) as members of the Department to win an OTICA

Melissa Lee
Central Administration



Xiao Zeng

University Communication

Zeng named winner of Royal Society of Chemistry's Surfaces and Interfaces Award

The Royal Society of Chemistry has named Xiao Cheng Zeng the 2017 recipient of its Surfaces and Interfaces Award.

The annual award honors outstanding and innovative research on the behavior of chemical systems at surfaces or interfaces. Zeng is the first winner from a university outside of Europe.

"I am humbled and very honored to receive the Royal Society of Chemistry's Surfaces and Interfaces Award," he said. "I want to acknowledge all my current and former teammates, including graduate students, postdoctoral fellows and collaborators worldwide. This honor is also a recognition of many scientific accomplishments by my team and collaborators."

Zeng received a medal, certificate and a £2,000 award stipend, or approximately \$2,600 this past fall.

Zeng's research interests are computational chemistry, materials chemistry and nanoscience. He uses supercomputers to carry out virtual experiments that predict the behavior of materials under extreme conditions. Many of his findings are later confirmed in the laboratory.

His team made the groundbreaking discovery that hollow, cage-like structures, or "buckyballs," make up the atomic structure of gold, which could have medial and diagnostic applications. He also uncovered the "Nebraska Ice" phenomenon, the discovery that water contracts rather than expands when frozen at extremes of subnanoscale confinement.

The Royal Society of Chemistry, one of the oldest scientific societies in the world, is Europe's largest organization dedicated to advancing the chemical sciences. It sponsors more than 80 prizes and awards that honor researchers

for the originality, impact and quality of their work, and their ability to engage in collaboration across the chemical sciences.

"It is an honor to celebrate the innovation and expertise of our community through our prizes and awards," said Robert Parker, the society's chief executive. "We know that chemistry can be a powerful force for good, and quality research and communication of that research are more important than ever before."

Fifty previous winners of Royal Society of Chemistry awards have gone on to receive Nobel Prizes for their work, including 2016's Nobel Prize winners Jean-Pierre Sauvage, Fraser Stoddart and Ben Feringa.

Research and Economic
Development

Hage named an American Association for the Advancement of Science Fellow



David Hage

Professor David Hage was named an American Association of the Advancement of Science fellow in November.

Hage is a leading researcher in the design and use of affinity-based separations based on high-performance liquid chromatography. His research group uses biological agents, such as proteins and antibodies, to separate and analyze complex chemical mixtures that range from clinical to environmental samples.

His team developed a new approach for studying drug-protein binding that is fast, reproducible and accurate. Using very small sample sizes, this technique sheds light on the behavior of drugs in individual patients. This approach could lead to customized treatment for people with diabetes and other diseases, opening the door for breakthroughs in personalized medicine.

"We're working on tools for doctors and hospital labs that will help determine what the correct drug or dose is for a given patient," Hage said. "This will help patients avoid going through a trial-and-error process when they're given a new drug-based treatment."

Other applications of Hage's approach for rapid affinity-based measurements could lower the price of drug development, identify markers for diseases or physical states like concussion and enable detection of drugs and other man-made chemicals in the water supply.

Beyond his research, Hage is a dedicated mentor who enjoys watching his students become independent scientists.

"Their contributions have been really essential to me getting the AAAS fellowship, and I couldn't have done it without them," he said.

Tiffany Lee
Research and Economic
Development

Nebraska Chemistry AAAS Fellows

James Van Etten (adjunct)	1993
Reuben Rieke	1996
Xiao Cheng Zeng	2007
David Berkowitz	2015
Andrzej Rajca	2015
Patrick Dussault	2016
Robert Powers	2016
David Hage	2017

Hage wins ISMR Award in Affinity Technology

Professor David Hage, the James Hewitt University Professor of Chemistry, received the 2017 International Society of Molecular Recognition Pierce Award in Affinity Technology. The award was presented during the society's 22nd Affinity Conference, held June 25-29 in Paris, France and was attended by approximately 1,500 scientists from around the world. The biennial award includes a cash prize and an invitation to present a lecture during the conference, which is focused on the science and technology of biomolecular affinity interactions. Founded in 1985, the society fosters communication between researchers concerned with molecular recognition in chemistry, biology, biotechnology and medicine.

Hage's award presentation was titled, "Frontiers in Affinity-Based Separations: New Chromatographic Tools for the Rapid Analysis of Clinical, Pharmaceutical and Environmental Samples."

University Communication

Sinitskii boosts performance of emerging nanomaterial



Alexander Sinitskii

University Communication

In 2011, chemists and engineers met the MXenes: a large family of two-dimensional nanomaterials whose members have already shown real talent for storing energy, purifying water and protecting against electromagnetic interference.

Knowing the family could find employment in those fields for years to come, researchers have since launched the equivalent of a background check into job performance, versatility, stability and quirks.

Scientists from the University of Nebraska-Lincoln and Drexel University recently published findings on an especially promising candidate that includes three titanium atoms and two carbon atoms. Their paper demonstrated that modifying the traditional method of synthesizing the MXene can substantially affect the structure and related properties of its individual, nanoscopic flakes.

The researchers then measured the electrical conductivity of their synthesized flakes, which substantially outperformed those previously reported. By doing so, they also established a threshold for conductivity that engineers could eventually target when incorporating the MXene in lithium-ion batteries, transistors, capacitors and other devices.

“MXenes are synthesized as thin sheets that are then processed for different applications,” said co-author Alexander Sinitskii, associate professor of chemistry at the University of Nebraska-Lincoln. “An important research direction in this field is to develop synthetic approaches to produce MXene

sheets with high structural quality and electrical conductivity.”

MXenes begin their lives in the so-called MAX phase, whose name describes its signature components: the “M,” a transition metal such as titanium or chromium; an element such as aluminum from the “A” group of the periodic table; and the “X,” representing carbon or nitrogen atoms. To synthesize MXenes, chemists have used acidic solutions to etch away the “A” group while leaving the other layers intact – a relatively simple, high-yield technique.

But previous solutions have produced relatively small flakes peppered with nanoscopic pinholes that limit the movement of conductivity-driving electrons while offering plenty of opportunities for oxidation to degrade the material. By tweaking the ratio of solution to MAX phase, the Nebraska-Drexel team managed to synthesize defect-free flakes that were about 25 times larger, significantly more conductive and far less susceptible to degradation than those prepared via other approaches.

“We found that these slight variations in the chemical procedures result in pretty dramatic differences in the qualities of the products we obtain,” said Sinitskii, a member of the Nebraska Center for Materials and Nanoscience. “Our measurements revealed that electrical conductivity of MXene sheets is actually close to that of graphene, the two-dimensional material that holds the present record for conductivity. Information about the intrinsic properties of individual MXene sheets is important for optimizing the performance of energy-storage devices that consist of multiple sheets.”

The team’s paper appeared in the December issue of *Advanced Energy Materials*, which featured the study on its back cover. Sinitskii authored the paper with Alexey Lipatov, research assistant professor of chemistry; Alex Boson, graduate student in chemistry; along with Drexel University’s Yury Gogotsi, Mohamed Alhabeab and Maria Lukatskaya.

The team received support from the National Science Foundation, the NSF-funded Nebraska Materials Research Science and Engineering Center, and the U.S. Department of Energy’s Office of Science.

Scott Schrage
University Communication



Stephen Morin

University Communication

Morin, team show potential of ‘stretchable surfaces’

Building self-propelled, pharmaceutical-ferrying transports on the microscopic scale. Simplifying or even automating forensic processes. Stitching together patchwork nano-materials that expand the versatility of microelectronics.

Stephen Morin envisions a future in which the term “elastic demand” extends well beyond the world of economics. The chemist and his colleagues recently published research demonstrating how the chemistry of stretchable surfaces can affect their interactions with microscopic particles – and enhance or streamline processes usually conducted on rigid foundations.

In one study, Morin’s team investigated the interplay between chemical-coated silicone and microscopic crystals of various shapes. The team found that those shapes – discs vs. rods, for instance – largely determined the proportion of crystals that adhered to the silicone’s surface after stretching and relaxing the material several hundred times.

By coating distinct sections of the silicone with different mol-

ecules before stressing and releasing it, Morin and doctoral student Mark Rose also discovered that they could selectively separate crystals according to their shape. The ability to separate or even remove microscopic particles of various dimensions simply by stretching a material, Morin said, could prove especially useful in forensics.

“You may have a mixture of soil, fibers, shards of glass, or chips of paint or plastic,” said Morin, assistant professor of chemistry. “Trying to find a few (microscopic) chips of paint in a pile of soil isn’t easy.

“Imagine taking that random dispersion of particles, putting them onto this sensitive surface, letting some machine (stretch and relax it) repeatedly, and then, all of a sudden, your paint chips are still stuck to the surface but the soil is gone.”

Yet the same study also found that multiple classes of crystals adhered strongly to the silicone surfaces under a variety of conditions, whether simply exposed to air or submerged

Faculty News

in a solution. That insight informed a subsequent paper that outlined a method for depositing and merging islands of microscopic particles on silicone surfaces. The team began by stamping patterns of polystyrene particles onto the silicone. To do so, the chemists ensured that the stamp's exterior featured an attraction strong enough to pick up the particles but weak enough to release them when contacting the silicone.

After depositing the particles in polygonal groups about the width of a human hair and separated by roughly the same distance, the team treated them with a chemical vapor that effectively welded them into 900-particle islands. Stretching the silicone in one direction or another then brought the edges of those islands into contact, at which point the researchers again introduced the vapor to weld the adjacent islands into substantially larger groups.

Ultimately, Morin's team assembled particles with a diameter 20 times smaller than a hair into structures that were millimeters in length – more than 1,000 times longer than an individual particle.

"I like to think of these rubber surfaces as two-dimensional assemblers," Morin said. "By applying macroscopic stresses to the system, you can elicit microscopic control over (these) building blocks. As a concept, that's really powerful."

The team managed to extract those structures from the silicone while maintaining their structural integrity, a novel feat that Morin said could represent a "powerful contribution and advancement" in micromanufacturing. And the technique's ability to dictate the size, shape and distribution of particle-based islands before maneuvering them into position could offer unprecedented control over the architecture and scale of resulting structures, he said.

That level of precision could even allow users to design and fabricate structures that feature different materials – along with chemical or electromagnetic properties – at strategic sites.

"That's usually not possible using other directed-assembly methods, where you don't have control over the composition of the building blocks," said co-author Vinod Thavarool Puthiyedath, a postdoctoral researcher in chemistry.

"Additive manufacturing, like 3-D printing, is really big right now," Morin said. "Those technologies are not only catching on in the research setting, but also in commercial and manufacturing settings. But those types of methods really struggle

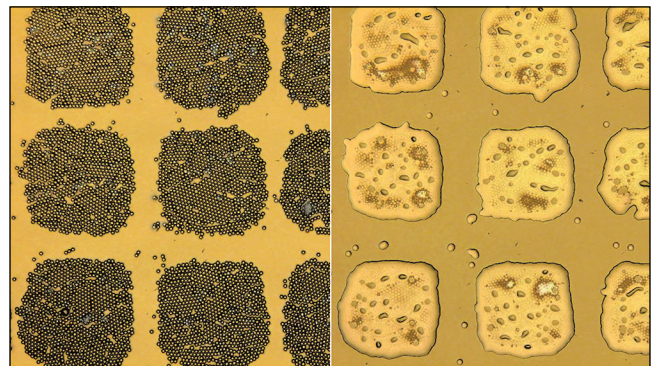
at very small size scales and ... especially when you want to encode very specific functionality to the individual pieces."

Morin, Puthiyedath and their colleagues illustrated this potential by incorporating materials that can catalyze chemical reactions when submerged in certain fluids or solutions. Some of those reactions expel gases that would produce thrust and, if the catalytic material were embedded on only one side of a microstructure, could potentially propel it through a biological system or other liquid environment.

"The ability to drive a specific reaction on a specific region of a surface could have wide-ranging applicability in analytical chemistry and biology," Morin said.

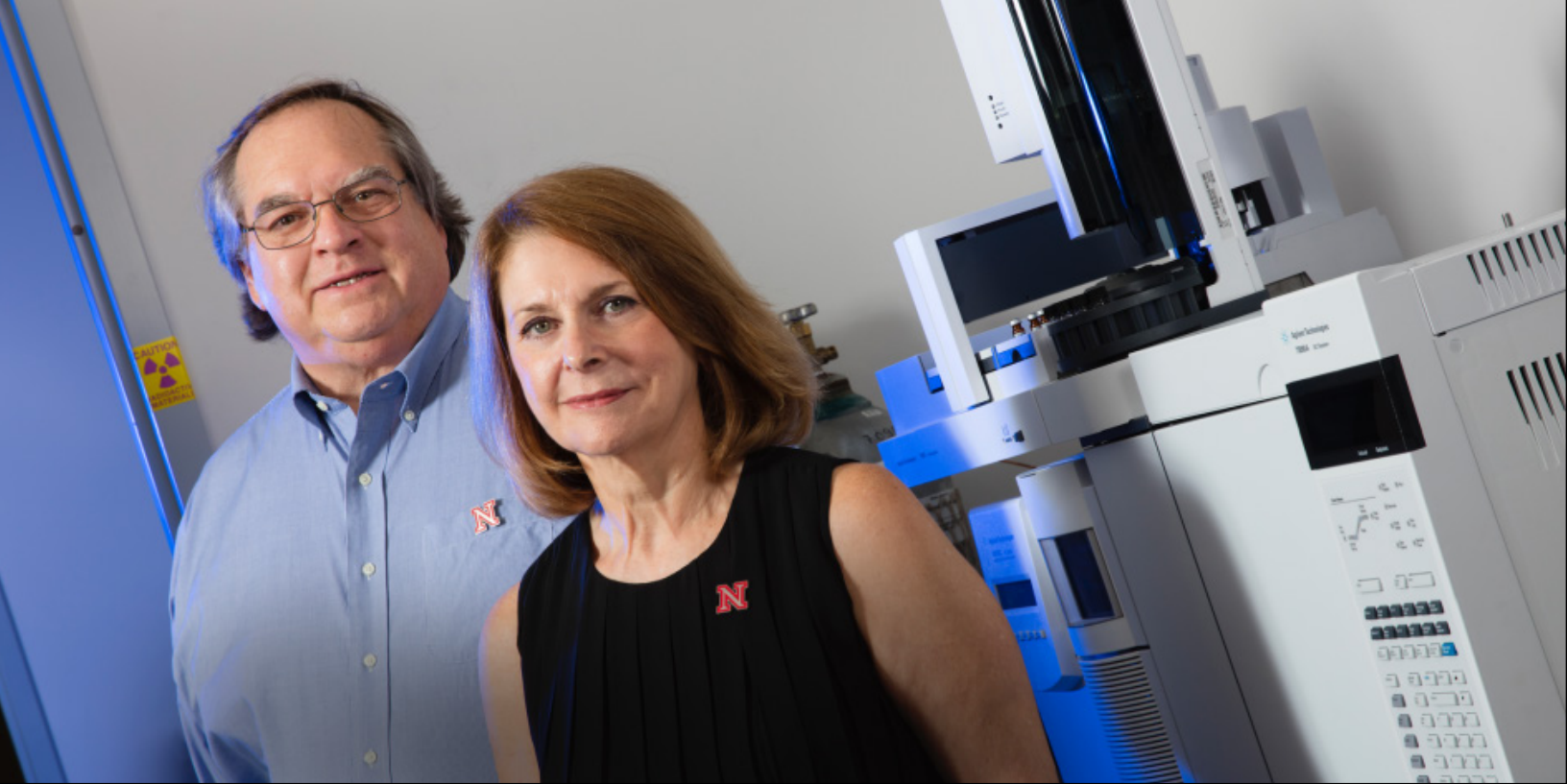
The team also embedded materials that were tagged with fluorescent molecules. Arranging those molecules in unique patterns could enable the corresponding structures to act as microscopic barcodes, Morin said, helping researchers more easily identify them under the microscope or via visual tracking software.

Morin, Rose and Puthiyedath authored their recent studies with doctoral students Jay Taylor and Abhiteja Konda. The researchers published their findings in the journals *Small* and *Chemistry of Materials*, receiving support from the National Science Foundation and the 3M Company.



Microscopic particles of polystyrene reside on an elastic surface before (left) and after being welded together with a chemical vapor treatment.

Scott Schrage
University Communication



James Takacs & Concetta DiRusso

Craig Chandler | University Communication

University earns \$11.3M NIH grant to study biomolecular communication

The University of Nebraska-Lincoln has earned an \$11.3 million grant from the National Institutes of Health to establish a research center focused on investigating cellular level miscommunications that contribute to complex diseases such as cancer, diabetes and chronic liver disease.

A five-year grant from NIH's Center of Biomedical Research Excellence (COBRE) program will support the university's Center for Integrated Biomolecular Communication, or CIBC. The NIH COBRE program funds health-related research and fosters faculty development and research infrastructure.

"This new center at the leading edge of interdisciplinary biomedical research further expands Nebraska's expertise and our critically important collaborations with the University of Nebraska Medical Center," Chancellor Ronnie Green said.

The center will focus on biomolecular communication. As with any successful team effort, the human body's cells must communicate effectively to function properly. Diseases can result from miscommunications within or between cells and tissues due to environmental disturbances, pathogens or other causes.

To better understand how cells communicate and miscommunicate, the center aims to foster interdisciplinary research collaborations by combining new techniques to investigate disease pathways that arise from miscommunication at the molecular level.

Organizers envision the CIBC as a hub for interdisciplinary collaborations among Nebraska's biomedical researchers. The center also will involve faculty at the University of Nebraska Medical Center.

"We want the center to be a mixing chamber of ideas," said center director James Takacs, Charles J. Mach University Professor of Chemistry. "The goal is to bring together outstanding researchers from several disciplines and to use the center to facilitate an integrated approach. An interdisciplinary team working together will bring a unique perspective to complex diseases."

The center will foster a systems approach, combining the research activities of chemists, biochemists, engineers and bioinformaticists. It will connect researchers developing new molecular probes and analytical techniques with those unraveling molecular mechanisms of diseases.

Faculty News

One research collaboration, for example, will model communication pathways between microorganisms in the gut. Another will study the interactions involved in liver disease progression.

“Bringing in a multilevel approach to a problem opens opportunities that will make us more competitive and more effective in research,” Takacs said. “It’s basic research, but this is where the therapies of the future are going to come from.”

The center will augment Nebraska’s strength in biomedical research by building research expertise through mentoring and supporting early career scientists. It also will leverage and enlarge existing facilities in bioinformatics and systems biology.

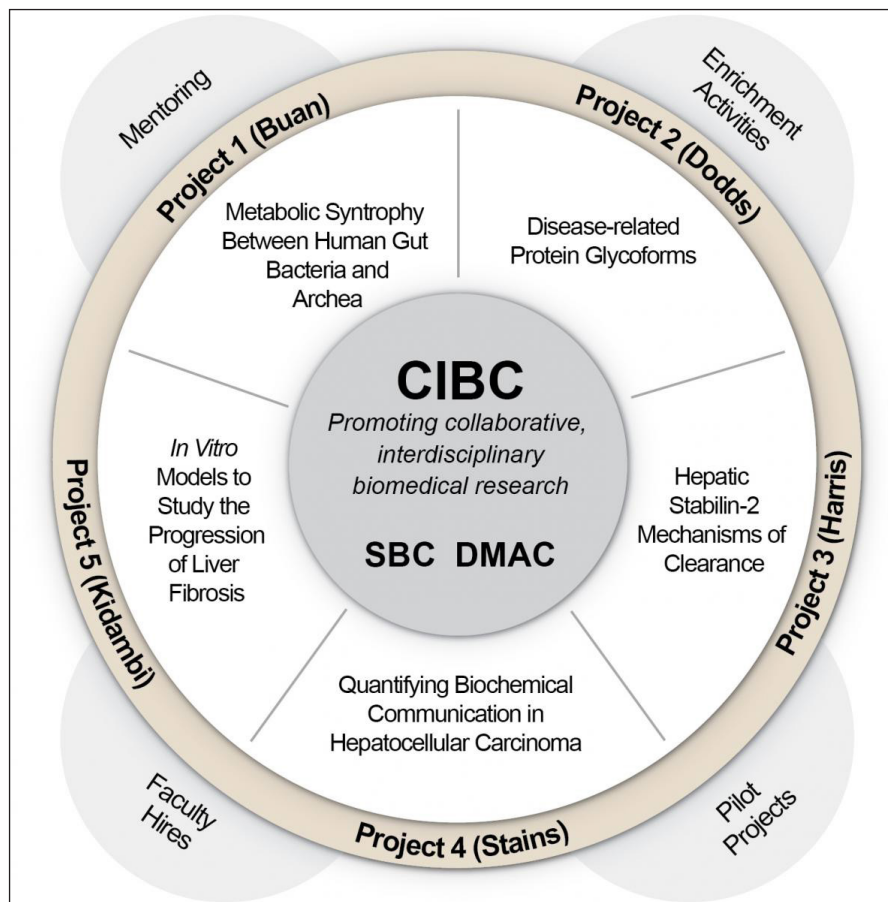
“The university has very successful Centers of Biomedical Research Excellence in virology and redox science,” said co-director Concetta DiRusso, George W. Holmes University Professor of Biochemistry. “Those centers have helped build infrastructure and propelled the careers of young scientists in specific areas of biomedical research. We plan to build on those past successes.”

This center is UNL’s fourth NIH Center for Biomedical Excellence. The Nebraska Center for Virology was established in 2000, the Redox Biology Center was launched in 2002 and the Nebraska Center for the Prevention of Obesity Diseases through Dietary Molecules was created in 2014. COBRE programs are managed by the National Institute for General Medical Sciences.

“Since the university was awarded its first COBRE in 2000 we have continued to grow our biomedical research and advance knowledge of some of society’s most complex health challenges, including HIV and obesity. This center continues this tradition of cutting edge of research,” said Prem Paul, former vice chancellor for research and economic development, who stepped down from his post Monday for health reasons.

Gillian Klucas

Research and Economic
Development



<https://ncibc.unl.edu/about-cibc>

Going to the source: Husker chemists target drivers of disease

It's open to different types, but it's ultimately seeking an exclusive relationship. It knows how to establish a strong bond, but when it does, it tends to develop an unhealthy attachment that can keep a partner from reaching its full potential.

It's an amino acid, and chemists at the University of Nebraska-Lincoln designed it that way to help smother drivers of diseases like Parkinson's and cancer.

David Berkowitz and colleagues have synthesized a new class of amino acid that could inactivate vitamin B6-fueled enzymes – often called PLP enzymes – known for contributing to a range of health issues.

"Inactivating enzymes of any type is a good strategy for making pharmaceutical drugs," said Berkowitz, a Willa Cather Professor of chemistry whose team detailed its feat in the *Journal of the American Chemical Society*.

The researchers did so, Berkowitz said, after an intensive team effort that involved "inventing new chemistry."

Some therapeutic drugs work by temporarily binding to an enzyme – an effective approach that nevertheless requires continuous doses to compensate for the fact that the process is reversible. But others, including the new amino acid created at Nebraska, can irreversibly attach themselves to a target by forming a strong molecular bond that keeps the troublesome enzymes from operating.

To hone the targeting systems of such drugs, chemists usually incorporate a Trojan horse-style chemical group that reacts only when it reaches the target enzyme. All amino acids feature two molecular groups – an amine and a carboxylic acid – that stem from the same central carbon atom, along with a side chain that dictates the amino acid's function and behavior in the body. Berkowitz's team sought to add a so-called (1'-fluoro)vinyl group, which can help trigger an amino acid's enzyme attachment upon reaching its target.

No one had before managed to add a (1'-fluoro) vinyl group to the central carbon atom while also retaining the side chain that directs an amino acid's strike.

"We were able to carry the natural side chain in," Berkowitz



Chris McCune, Matthew Beio, David Berkowitz Craig Chandler | University Communication

said. "So we (can) attach the fluorovinyl group to any amino acid, which is kind of a big deal. Before you could only make the parent, which doesn't have a side chain. There was just no way to do this before.

"There are a whole bunch of PLP enzymes you could imagine targeting, but you would expect great specificity with these compounds. The same reason that they were really, really hard to create makes them really, really specific (to a chosen enzyme). That specificity is good for developing new drugs, but it's also really important for basic science – allowing an investigator to tweak the activity of that particular step in signaling and metabolism to understand better the role of that specific enzyme in human biology. That's truly chemical biology."

The researchers put their design to the test by attaching a (1'-fluoro)vinyl group to an amino acid known as a lysine, then testing the resulting inhibitor candidate on a model PLP enzyme called lysine decarboxylase. Within a matter of minutes, the compound inactivated the target enzyme almost completely. Even after three days of extensive dilution – a process that would have washed away reversible inhibitors – 97 percent of the targeted enzymes remained inactive.

Brain drain

Many PLP enzymes contribute to the production of neurotransmitters – chemical messengers that promote normal brain functioning but also contribute to neurological conditions such as Parkinson's disease and epilepsy. Those with Parkinson's have low levels of the neurotransmitter dopa-

Faculty News

mine, a result of neurons degrading in the brain. Parkinson's patients typically receive a combination treatment of two drugs, one of which locks onto a PLP enzyme to help the other reach afflicted areas of the brain and ultimately boost dopamine levels.

Another enzyme-targeted drug, vigabatrin, can likewise boost levels of the neurotransmitter GABA to suppress the spasms associated with epileptic seizures. Recent research has suggested that targeting PLP enzymes to raise GABA levels might also counteract the pleasure response produced by drugs such as cocaine or heroine, potentially assisting efforts to combat addiction and substance abuse.

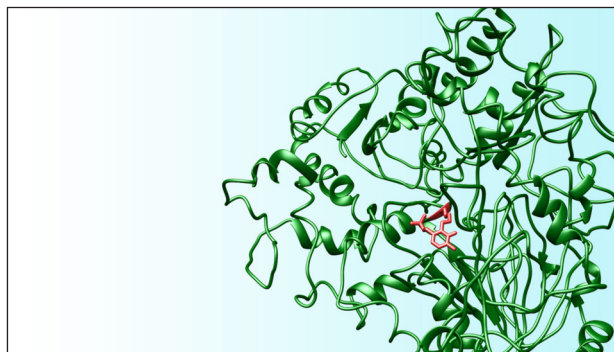
"All of that inspires our work," Berkowitz said. "This is the great thing about being an organic chemist: You get to think about stuff nobody's ever seen before, draw it up on the board, and then go in the lab and actually make it."

"It's very satisfying to be able to hold in your hands something that you drew on a sheet of paper – and then see it actually work."

Berkowitz authored the study with Christopher McCune, a Nebraska doctoral graduate and lecturer at the university; Matthew Beio, doctoral student in chemistry; Jill Sturdivant and Roberto de la Salud-Bea, doctoral graduates of Nebras-

ka now at Aerie Pharmaceuticals and Rhodes College, respectively; and Nebraska graduate Brendan Darnell.

The researchers received support from the National Science Foundation and the American Heart Association.



Rendering of the active site of a PLP enzyme (green = protein backbone; red = bound PLP cofactor) being targeted by a new class of amino acid designed and synthesized by Nebraska chemists.

Matthew Beio / American Chemical Society

Scott Schrage
University Communication

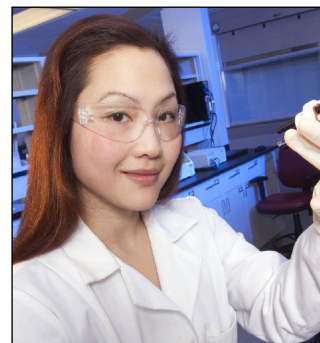
Griep and Lai receive American Chemical Society outreach awards



Mark Griep, associate professor of chemistry, won the 2017 Helen M. Free Award of Public Outreach from the American Chemical Society. The award recognizes outstanding achievements in outreach by a member of the society who improves public recognition and appreciation for the contributions of chemistry. Established in

1995, the award includes a crystal sculpture and a \$1,000 prize.

Rebecca Lai received the Local Section Outreach Volunteer of the Year Award from the American Chemical Society's Committee on Community Activities. The committee wrote: "Prof. Lai presents wonderful outreach activities related to the Harry Potter series. Her presentations are included in the SciPop series, which promotes science in fictional literature. Rebecca's innovative outreach allows students hands-on activities exposing the general public to electrochemical cells, pH changes to hide written codes and the use of common foods to do chemistry."



University Communication

Metal-free nanoparticle could expand MRI use, tumor detection



Andrzej Rajca

What do newborns and people with kidney problems have in common?

What might sound like the set-up to a joke actually has a clinical answer: Both groups can face health risks when injected with metal-containing agents sometimes needed to enhance the color contrast — and diagnostic value — of MRIs.

But a new metal-free nanoparticle developed by the University of Nebraska-Lincoln and MIT could help circumvent these health- and age-related barriers to the powerful diagnostic tool, which physicians use to investigate or confirm a broad range of medical issues.

The team's nanoparticle contains a non-metallic molecule that enhances MRI contrast to help distinguish among bodily tissue, a task typically performed by contrast agents containing gadolinium or other metals.

It also survived long enough to congregate around tumors in mice, suggesting the nanoparticle could help detect cancers as well as its metallic counterparts while eliminating concerns about the long-term accumulation of metal in the body.

Contrast in styles

The molecules residing in the team's nanoparticle belong to a family known as the nitroxides, which are among the most promising alternatives to the metallic agents often injected into patients prior to undergoing MRIs.

Yet antioxidants in the body typically begin breaking down nitroxides within minutes, limiting how long they can enhance the contrast of an MRI. And the team's molecule of interest — a so-called organic radical — has just a single electron, a fact that normally inhibits how much contrast it can produce.

Gadolinium and other metals possess multiple electrons that help them influence how the magnetic waves produced by an MRI interact with water molecules in tissue. This magnetic influence, or relaxivity, ultimately dictates the strength of contrast signals that get converted into the familiar multicolored MRIs.

So Nebraska chemist Andrzej Rajca began collaborating with colleagues at MIT to design a metal-free nanoparticle that would exhibit stability and relaxivity comparable to gadolinium's. Rajca previously designed a nitroxide that, when embedded within relatively small nanoparticles, displayed a relaxivity several times greater than its predecessors.

This time around, MIT researchers incorporated Rajca's nitroxide into a large nanoparticle known as a brush-arm star polymer. The process involved assembling polymers into a spherical structure with a water-attracting core and water-repelling shell, then squeezing multitudes of nitroxide molecules between that core and shell.

The team found that packing so many nitroxides into such tight quarters effectively multiplied their individual relaxivity values, resulting in a nanoparticle with a relaxivity about 40 times higher than a typical nitroxide.

"You don't need much of the (new) contrast agent to see a good image," said Rajca, Charles Bessey Professor of chemistry.

The nanoparticle's polymer shell also helped slow the advance of the disruptive antioxidants enough to prolong the nitroxides' lifespan from roughly two hours to 20. By injecting mice with their agent, the researchers showed that the nanoparticle's longevity and large size allow it to reach tumors and differentiate them from normal tissue. Even in doses larger than those typically needed for MRIs, the team's contrast agent showed no signs of toxicity in human cells or mice.

The team detailed its work in the journal *ACS Central Science*. Rajca authored the study with MIT's Jeremiah Johnson; postdoctoral researcher Hui Zhang and doctoral student Joseph Paletta, both of Nebraska; the late Michael Boska, former professor and vice chair of radiology at the University of Nebraska Medical Center; MIT's Alan Jasanoff, Hung Nguyen, Qixian Chen, Peter Harvey and Yivan Jiang; and M. Francesca Ottaviani from the University of Urbino.

The researchers received support from the National Institute of Biomedical Imaging and Bioengineering, the National Cancer Institute and the National Science Foundation.

Scott Schrage
University Communication

New projects examine collegiate STEM education:

Researchers will study faculty networks, difference between high school and college education

With the assistance of grants from the National Science Foundation, two University of Nebraska-Lincoln researchers are conducting interdisciplinary studies designed to improve collegiate education in science, technology, engineering and mathematics.

Marilyne Stains, associate professor of chemistry, and Brian Couch, assistant professor of biological sciences, will examine STEM education from the perspectives of both students and faculty.

In one study, groups of STEM faculty at Nebraska and the University of Maine will document differences between high school and college-level STEM instruction, along with the reasons that undergraduates may struggle in first-year courses. Fewer than half of first-year undergraduates majoring in STEM fields earn a STEM degree within six years, with many switching majors between their freshman and sophomore years.

The researchers are ultimately aiming to help STEM faculty adapt their instruction to ease students' transition from high



Marilyne Stains

school to college in the hope that fewer undergraduates will abandon STEM majors.

"Our emerging data suggest that the instructional practices used in introductory college STEM courses differ significantly from those used in high school classes, and that incoming college students hold expectations that are often not well-aligned with actual college teaching practices," the researchers wrote.

The other study will gather data on social networks among STEM faculty at Nebraska, the University of South Florida and Boise State University to examine how those networks are influencing the adoption of changes in STEM education already underway at the three institutions. It will also explore the extent to which those changes in teaching practices and culture are actually observed in the universities' STEM classrooms.

"The analysis of these data will provide insight into how ideas around teaching innovation might be shared, especially in research-focused environments," the researchers wrote.

University Communication

Meet our new colleague: Alena Moon



We are proud to announce that in August of 2018 Dr. Alena Moon will be joining the faculty as an Assistant Professor specializing in chemical education research. Alena completed her Ph.D. at Purdue with Professor Marcy Towns, and she is now finishing a postdoctoral fellowship with Professor Ginger Schultz at Michigan. Selected publications co-authored by Alena are found immediately below.

Moon, A.; Stanford, C.; Cole, R.; et al. "Analysis of inquiry materials to explain complexity of chemical reasoning in physical chemistry students' argumentation." *J. Res. Sci. Teach.* 2017, 54, 1322-1346.

Moon, A.; Stanford, C.; Cole, R.; et al. "Decentering: A characteristic of effective student discourse in inquiry-oriented physical chemistry classrooms." *J. Chem. Ed.* 2017, 94, 829-836.

Bain, K.; Moon, A.; Mack, M. R.; et al. "A review of research on the teaching and learning of thermodynamics at the university level." *Chem. Ed. Res. Pract.*, 2014, 15, 320-335.



Alexander Sinitskii

University Communication

New graphene nano-ribbons lend sensors unprecedented sensitivity

Pinning DNA-sized ribbons of carbon to a gas sensor can boost its sensitivity far better than any other known carbon material, says a new study from the University of Nebraska-Lincoln.

The team developed a new form of nano-ribbon made from graphene, a 2-D honeycomb of carbon atoms. When the researchers integrated a film of the nano-ribbons into the circuitry of a gas sensor, it responded about 100 times more sensitively to molecules than did sensors featuring even the best-performing carbon-based materials.

“We previously studied sensors based on other carbon-based materials such as graphene and graphene oxide,” said Alexander Sinitskii, associate professor of chemistry at Nebraska. “In the case of graphene nano-ribbons, we were certain that we would see some sensor response, but we did not expect that it would be that much higher than anything we have seen in the past.”

Reporting their findings in the journal *Nature Communications*, the researchers showed that gas molecules can dramatically alter the electrical resistance of nano-ribbon films. Different gases produced varying resistance signatures, allowing the sensor to distinguish among them.

“With multiple sensors on a chip, we were able to demonstrate that we can differentiate between molecules that have nearly the same chemical nature,” said Sinitskii, a member of the Nebraska Center for Materials and Nanoscience. “For example, we can tell methanol and ethanol apart. So these sensors based on graphene nano-ribbons can be not only sensitive but also selective.”

Sinitskii and his colleagues suspect that the nano-ribbons’ remarkable performance stems partly from an unusual interaction between the ribbons and gas molecules. Unlike its predecessors, the team’s nano-ribbons — which resemble ordered rows of Charlie Brown’s shirt stripes — stand vertically rather

Faculty News

than lying flat on a surface. The team has proposed that gas molecules can nudge these rows apart, effectively lengthening the gaps between nano-ribbons that electrons must jump to conduct electricity.

Enter the (benzene) ring

Graphene, whose 2004 discovery eventually earned a Nobel Prize, boasts unmatched electrical conductivity. But the material's lack of a band gap — which requires electrons to gain energy before jumping from their near orbits around atoms to an outer “conduction band” that drives conductivity — initially prevented researchers from switching off that conductivity. This, in turn, posed challenges to applying graphene in electronics that require adjusting the material's conductivity at will.

One potential solution involved trimming sheets of graphene down to nanoscopic ribbons that computer simulations suggested would possess the elusive band gap. This proved difficult to do with the atomic precision needed to preserve the properties that made graphene appealing in the first place, so researchers began fabricating ribbons from the bottom up by strategically snapping together molecules on certain types of solid surfaces. Though the process worked — and the resulting ribbons did have a band gap — it limited researchers to fabricating just a few ribbons at a time.

In 2014, Sinitskii pioneered an approach that could mass-produce nano-ribbons in a liquid solution, a vital step toward scaling up the technology for electronic applications. But the films made from these nano-ribbons were not conductive enough to perform electrical measurements. The team's newest study adapted the original chemical approach by adding benzene rings — circular molecules with six atoms of both carbon and hydrogen — onto either side of a first-generation nano-ribbon. These rings widened the ribbon, reducing its band gap and enhancing its ability to conduct electricity.

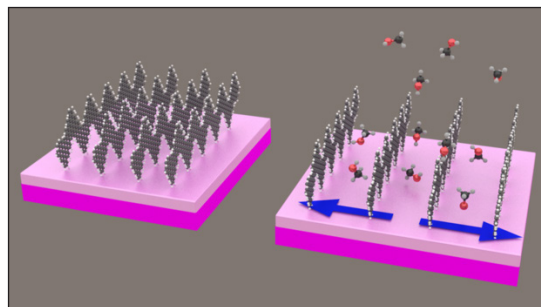
“People do not often think of graphene nano-ribbons as a sensor material,” Sinitskii said. “However, the same (property) that makes the nano-ribbons good for devices such as transistors — the ability to change their conductivity by several orders of magnitude — is also what makes them good for sensors.

“It is possible to design many different kinds of graphene nano-ribbons with very diverse properties. Only a few types have been experimentally demonstrated so far, but there are many interesting theoretical predications about ribbons that

are yet to be synthesized by chemists. So it is very likely that new nano-ribbons with even better sensor characteristics or other exciting properties will be developed in the near future.”

Sinitskii authored the study with Nebraska's Alexey Lipatov, research assistant professor of chemistry; Mohammad Mehdi Pour and Mikhail Shekhirev, doctoral students in chemistry; Rafal Korlacki, research engineer in electrical and computer engineering; the University of Illinois at Urbana-Champaign's Adrian Radocea, Ximeng Liu, Tao Sun, Narayana Aluru and Joseph Lyding; and Victor Sysoev and Andrey Lashkov of Saratov State Technical University.

The researchers received support primarily from the National Science Foundation, the Office of Naval Research and the Nebraska Research Initiative.



This rendering shows gas molecules widening the gaps between rows of the team's graphene nano-ribbons. Nebraska's Alexander Sinitskii and his colleagues have proposed that this phenomenon partly explains how the nano-ribbons grant sensors an unprecedented boost in sensitivity.

Nature Communications / Springer Nature

Scott Schrage
University Communication

Lai finds gold – and other metals

Instead of a pan and a pick ax, prospectors of the future might seek gold with a hand-held biosensor that uses a component of DNA to detect traces of the element in water.

The gold sensor is the latest in a series of metal-detecting biosensors under development by Rebecca Lai, an associate professor of chemistry at the University of Nebraska-Lincoln. Other sensors at various stages of development detect mercury, silver or platinum. Similar technology could be used to find cadmium, lead, arsenic, or other metals and metalloids.

A primary purpose for the sensors would be to detect water contaminants, Lai said. She cited the August 2015 blow-out of a gold mine near Silverton, Colorado, which spilled chemicals into nearby rivers, as well as the problems with lead-tainted water supplies in Flint, Michigan.

Fabricated on paper strips about the size of a litmus strip, Lai's sensors are designed to be inexpensive, portable and reusable. Instead of sending water samples away for time-consuming tests, people might someday use the biosensors to routinely monitor household water supplies for lead, mercury, arsenic or other dangerous contaminants.

But Lai also is among scientists searching for new and better ways to find gold. Not only aesthetically appealing and financially valuable, the precious metal is in growing demand for pharmaceutical and scientific purposes, including anti-cancer agents and drugs fighting tuberculosis and rheumatoid arthritis.

"Geochemical exploration for gold is becoming increasingly important to the mining industry," Lai said. "There is a need for developing sensitive, selective and cost-effective analytical methods capable of identifying and quantifying gold in complex biological and environmental samples."

Scientists have employed several strategies to find gold, such as fluorescence-based sensors, nanomaterials and even a whole cell biosensor that uses transgenic *E. coli*. Lai was a co-author of a 2013 study that explored the use of *E. coli* as a gold biosensor.

DNA, the carrier of genetic information in nearly all living organisms, might seem an unlikely method to detect gold and other metals. Lai's research, however, exploits long-ob-



Rebecca Lai

University Communication

served interactions between metal ions and the four basic building blocks of DNA: adenine, cytosine, guanine and thymine.

Different metal ions have affinities with the different DNA bases. The gold sensor, for example, is based on gold ions' interactions with adenine. A mercury sensor is based upon mercury ions' interaction with thymine. A silver sensor would be based upon silver ions' interaction with cytosine.

NUtech Ventures, the university's affiliate for technology commercialization, is pursuing patent protection and

Faculty News

seeking licensing partners for Lai's metal ion sensors. She applied for a patent for the sensors in 2014.

"Although these interactions have been well-studied, they have not been exploited for use in electrochemical metal ion sensing," Lai and doctoral student Yao Wu said in a recent *Analytical Chemistry* article describing the gold sensor.

Lai and Wu say their article is the first report of how oligoadenines – short adenine chains – can be used in the design and fabrication of this class of electrochemical biosensors, which would be able to measure concentrations of a target metal in a water sample as well as its presence.

The DNA-based sensor detects Au(III), a gold ion that originates from the dissolution of metallic gold. The mercury and silver sensors also detect dissolved mercury and silver ions.

"The detected Au(III) has to come from metallic gold, so if gold is found in a water supply, a gold deposit is somewhere nearby," Lai explained.

The DNA-based biosensors need more refinement before they can be made commercially available, she said. Lai's sensor works by measuring electric current passing

from an electrode to a tracer molecule, methylene blue in this case. In the absence of Au(III), the observed current is high, because the oligoadenine probes are highly flexible and the electron transfer between the electrode and the tracer molecule is efficient.

But upon binding to Au(III) in the sample, the flexibility of the oligoadenine DNA probes is hindered, resulting in a large reduction in the current from the tracer molecule. The extent of the change in current is used to determine the concentration of Au(III) in the sample.

To allow the sensor to be reused multiple times, the Au(III) is later removed from the sensor with an application of another ligand.

Lai's research focus is on electrochemical ion sensors. Her research has been supported with grants from the National Institutes of Health and the National Science Foundation.

Leslie Reed
University Communication

Faculty promotions and awards

Congratulations to our faculty who received promotions and awards from the university and the College of Arts & Sciences over the past two academic terms!

2016

Promoted to Full Professor of Practice

Jason Kautz

Promoted to Associate Professor & Granted Tenure

Eric Dodds

Alexander Sinitskii

Jiantao Guo

Marilyne Stains

College of Arts & Sciences Outstanding Research and Creativity Activity Award

Liangcheng Du

Hazel R. McClymont Distinguished Teaching Fellow Award

Jason Kautz

2017

Promoted to Associate Professor & Granted Tenure

Jian Zhang

College of Arts & Sciences Outstanding Research and Creativity Activity Award

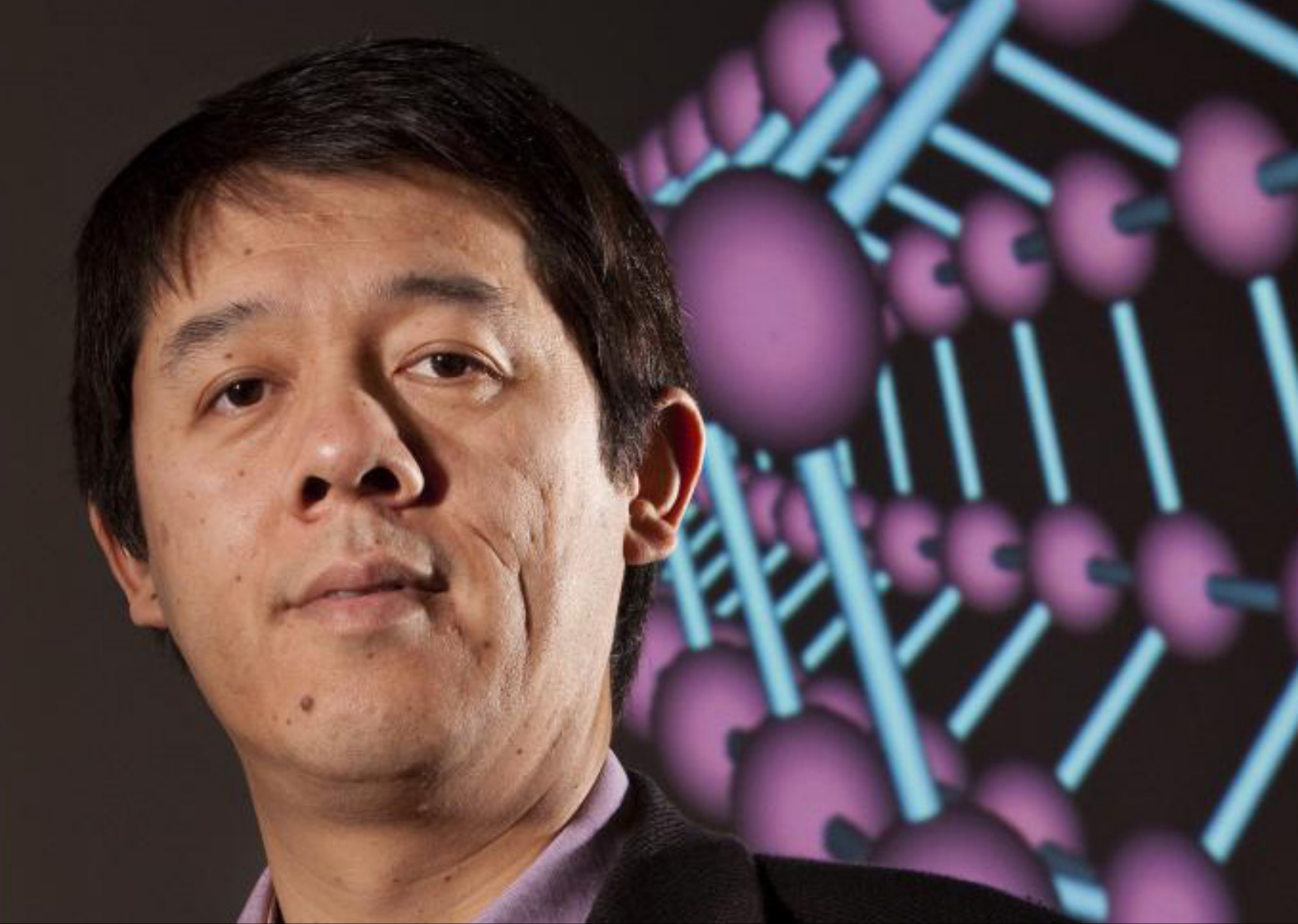
Robert Powers

Hazel R. McClymont Distinguished Teaching Fellow Award

Mark Griep

Outstanding Teaching and Instructional Creativity Award

Jason Kautz



Xiao Zeng

Nice ice, maybe? Zeng finds ice removal can be a breeze

Water-repellent surfaces and coatings could make ice removal a literal breeze by forcing ice to grow up rather than just skate by, says a new study from the University of Nebraska-Lincoln and several Chinese institutions.

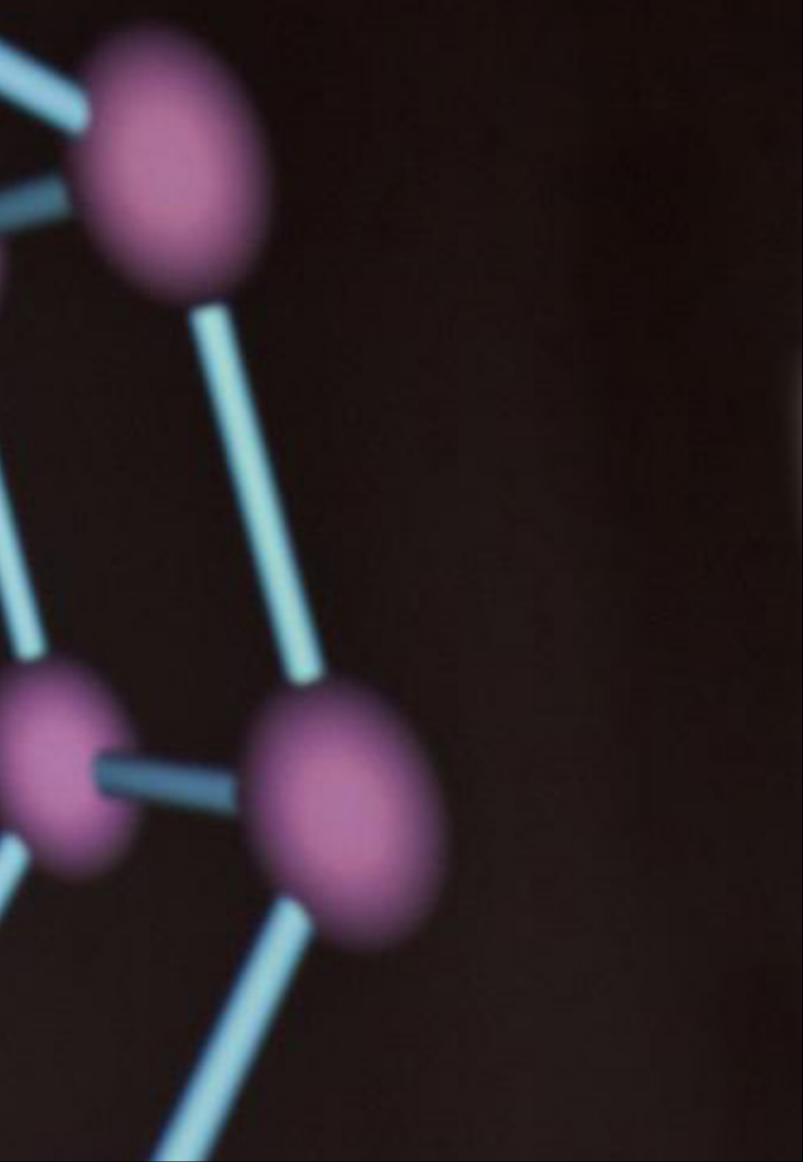
The researchers discovered that ice grows differently on absorbent vs. water-repellent surfaces, demonstrating that a gust of air can blow away ice that forms on the latter. Their findings suggest that applying water-repellent coatings to windshields before winter storms – or engineering surfaces that inherently repel water – could enable a strong breeze to handle the burden of ice removal.

Experiments and simulations showed that a water droplet on a repellent surface will freeze upward into a microscopic six-armed formation that resembles an idealized snowflake, with only a small portion of its base adhering to the surface. This makes sense given that water droplets bead up rather than

spread out over repellent surfaces, said Nebraska co-author Xiao Cheng Zeng.

In contrast, droplets on an absorbent surface crystallized into ice that grew along that surface, making it more difficult to remove. Molecular-level simulations suggested that these droplets almost immediately began forming two stacked layers of hexagonal 2-D ice, a form that Zeng previously discovered and dubbed Nebraska Ice. This ultra-thin ice encourages water molecules to essentially skate across it and colonize other areas of the surface, Zeng said.

“If the water and the surface don’t have much chemistry in the beginning – they don’t like each other – it’s kind of like a divorce or separation,” said Zeng, Chancellor’s University Professor of chemistry. “But if they like each other, they marry and stay together for a long time.”



University Communication

“That’s when the ice grows along the surface. In the winter, if you have that kind of ice on a windshield, you have to use a scraper to get it off.”

Onward or upward

Temperature and pressure mostly dictate how water droplets crystallize in open air, and those variables do factor into ice formation on solid surfaces, Zeng said. But the team’s study suggests that a surface’s contact angle – the angle formed where a water droplet meets a solid surface – determines whether ice will grow along or off the surface. Whereas a hydrophilic surface allows water to spread across it at a small contact angle, a water-repelling hydrophobic surface will force droplets to bead up and form a larger angle.

“Whether water freezes in one way or the other is up to the surface, not the temperature,” Zeng said. “It’s almost entirely dependent on the contact angle.”

On a defect-free surface fabricated in the lab or modeled in

a computer simulation, ice transitions from along-surface to off-surface growth at a contact angle of somewhere between 30 and 40 degrees, the team found. The researchers also discovered that increasing the roughness of a surface by enlarging its nanoscopic pores actually decreased this angular threshold, meaning that rougher surfaces need not be as water-repellent to foster the growth of more-easily removed ice.

Breaking the ice

To compare the two forms of ice growth, the researchers designed a transparent surface split into halves: one hydrophilic, one hydrophobic. They then attached a high-speed camera to a microscope, capturing video of the respective processes both from beneath and from a side profile.

When the researchers subjected both halves to puffs of air, they found that ice abandoned the hydrophobic half but steadfastly held to the hydrophilic side. And ice that advanced across the hydrophilic half abruptly halted when it neared hydrophobic territory.

“People have been studying how water interacts with surfaces for a long, long time,” Zeng said. “But this phenomenon was off the radar until now.”

Zeng authored the study with Nebraska’s Chongqin Zhu, post-doctoral researcher in chemistry; Joseph Francisco, dean of the College of Arts and Sciences; along with colleagues from the Chinese Academy of Sciences, Beijing University of Chemical Technology, and Peking University. The team reported its findings in the journal *Proceedings of the National Academy of Sciences*.

The researchers received support from the U.S. National Science Foundation, National Science Foundation of China and Chinese Academy of Sciences. Zeng and his colleagues conducted their simulations through the University of Nebraska’s Holland Computing Center.

Scott Schrage
University Communication

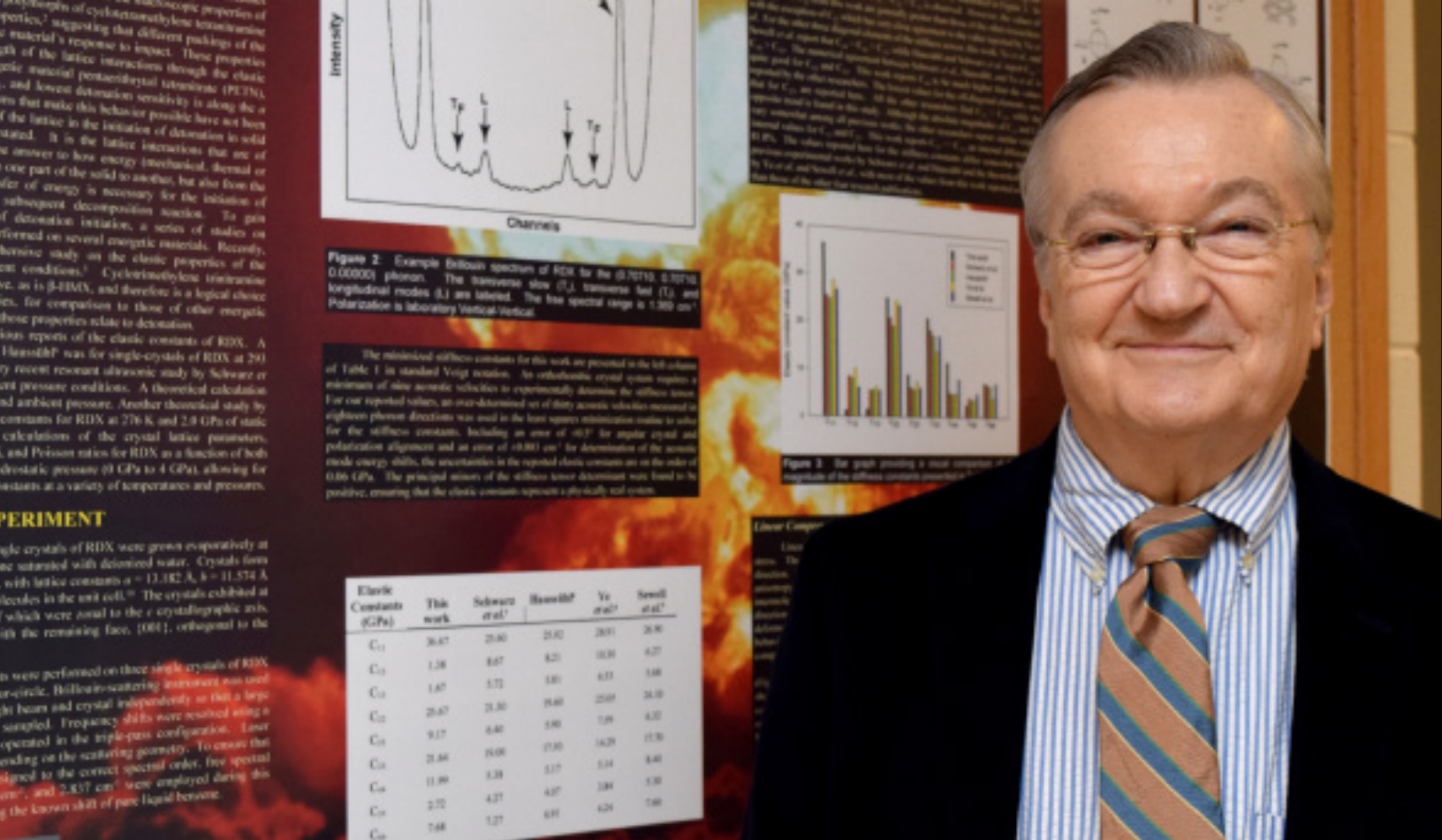


Figure 2: Example Brillouin spectrum of RDX for the (0, 0, 1) plane. The transverse slow (T_2), transverse fast (T_1), and longitudinal modes (L_1) are labeled. The laser spectral range is $\sim 1,300 \text{ cm}^{-1}$. Polarization is laboratory Vertical-Vertical.

The measured elastic constants for this work are presented in the left column of Table 1 in standard Voigt notation. An orthorhombic crystal system requires a minimum of nine acoustic velocities to experimentally determine the stiffness tensor. For our reported values, an over-determined set of thirty acoustic velocities measured in eighteen phonon directions was used to the best upper minimization routine to solve for the stiffness constants, including an error of $\pm 0.7\%$ for single crystal and polarization alignment and an error of $\pm 0.001 \text{ cm}^{-1}$ for determination of the acoustic mode energy shifts. The uncertainties in the reported elastic constants are on the order of 0.06 GPa. The principal values of the stiffness tensor determined were found to be positive, ensuring that the elastic constants represent a physically real system.

Elastic Constants (GPa)	This work	Schwartz et al. ¹	Hansen ²	Ye et al. ³	Swell et al. ⁴
C_{11}	26.67	25.90	23.02	26.91	26.96
C_{22}	1.28	8.67	8.21	10.20	6.27
C_{33}	1.67	5.71	5.81	6.53	3.68
C_{44}	26.67	23.30	19.40	22.67	26.10
C_{55}	9.17	6.40	5.90	7.09	4.32
C_{66}	23.44	19.06	17.00	16.29	17.76
C_{12}	11.99	3.24	5.17	5.14	4.40
C_{13}	2.72	4.27	4.07	3.84	3.30
C_{23}	7.48	3.27	6.91	6.24	7.00

Craig Eckhardt

Peta-Gaye Clachar

Eckhardt retires after 50 years of service to Nebraska Chemistry

Professor Craig Eckhardt’s first lab, tucked away deep within the walls of Avery Hall, was no bigger than his current office. On a good day, it may have measured 300 square feet.

“It wasn’t as bad as Professor Lawrence Parkhurst’s, where they converted the men’s room for him,” Eckhardt said.

It didn’t take long for Eckhardt to move into an office with a better view. He only spent about two years in Avery before moving to the fifth floor of Hamilton Hall – his home for the next 48 years. And after spending half a century exploring the mysteries of chemistry from that lab, he has decided to call it a career at the University of Nebraska – Lincoln. A place that wasn’t even a part of his initial plan.

“I had a postdoc with a world-famous spectroscopist at MIT named John Lord, and I had that all lined up,” Eckhardt said. “I had applied to Nebraska at the persistent urging of my research advisor, but I thought that a postdoc was necessary for an academic post.”

Eckhardt had more or less forgotten about Nebraska while he was wrapping up his dissertation at Yale University, until he received a phone call from Professor Gordon Gallup inviting him out for an interview.

At the time, Eckhardt wasn’t aware that the department had received a multi-million dollar developmental grant from the National Science Foundation, nor was he aware of the new eight-story facility being constructed. When he considered the ability to design his lab and

to purchase all the equipment he would need, the offer seemed too good to be true.

“It pretty much was an offer one could not refuse,” he said.

And the rest is history.

One of Eckhardt’s earliest projects at Nebraska was focused on piezomodulation spectroscopy. He sought to develop this new spectroscopy to examine how the electronic structure of the molecules and the crystals which they comprised were affected by stress and strain placed on the crystals.

Eckhardt became interested in the topic after reading physics literature, where he noticed that the problems of measuring critical points in metals was not

Faculty News

unlike those confronted by molecular spectroscopists dealing with crystals of molecules that had high light absorptivity.

“You could get a crystal of a dye molecule, and you would dissolve it and get, say, a beautiful blue solution. But you would form the crystal, and you would look at the crystal, and it would look like copper metal. Literally look just like copper. So how in the heck did it go from this one thing to the other?,” Eckhardt said.

Crystals of certain molecules, mainly dyes, can become highly absorbent and reflect light like a mirror over an extensive region of two to three electron volts of light energy. Over this range, the crystals lose any kind of structure, sometimes preventing access to a wealth of information about electronic structure.

Physicists confronted this by subjecting metals to stress and strain where they could experimentally identify critical spectroscopic structures associated with so-called Van Hove singularities that are vital to interpreting the theory of the electronic structure of the metal. This paralleled the problem with the highly reflective dye crystals, so Eckhardt adapted a similar approach to molecular crystals to unravel the electronic interactions and structure in these high reflectivity molecular crystals.

“So really what I wound up being interested in was how the molecules talk to each other, electronically,” he said.

It was an interest that provide a foundation for many future projects, and it was this constant questioning of the building blocks of intermolecular forces that drove Eckhardt’s career.

In 1979, Eckhardt was awarded a John Simon Guggenheim Fellowship. The



Jody Redepenning & Craig Eckhardt

Robert Vencil | Nebraska Chemistry

Guggenheim is one of many accolades that fill his resume. He is only one of four Nebraska Chemistry faculty members to ever hold this prestigious fellowship. He has also received a Fulbright Senior Fellowship and several German Academic Exchange Fellowships (DAAD). These fellowships placed him at the heart of intermolecular research at institutions like Cambridge University, Johannes Gutenberg University, the University of Milan (La Statale), Technical University of Wroclaw, and Pohang Technical University. All far from the Black Hills where he was born.

“I’m a southern gentleman,” Eckhardt said with a smirk. “I was born in South Dakota.”

From the Black Hills, he and his family moved around the southern United States as a child during WWII, as his father was a civilian worker for the United States Army. After the war, his family moved to Denver, where he spent his childhood, and where his father worked for the Atomic Energy Commission. It was during this time that Eckhardt started to develop a curiosity toward science.

More specifically, it can be traced back to the kitchen.

“My mother was an excellent and inventive cook. I would watch her concoct these things, and I would watch her put this goo into a pan, put it in the oven, and out you would get a cake,” he said.

This transformation, and many others, seemed almost magical, but his mother could offer no explanation for why it happened.

It was the lack of an explanation that sparked his interest in the transformation of matter.

“There were all kinds of mysteries I knew had to have a reason,” he said. “My dad’s mantra was that there was a rational and nature-based reason for everything, although we may not know it.”

Eckhardt’s curiosity brought him to the University of Colorado Boulder, where he was elected to the university’s Phi Beta Kappa chapter. He graduated magna cum laude in 1962 and then went on to Yale, where he earned his



Craig Eckhardt

Robert Vencil | Nebraska Chemistry

master's degree in 1964 and his Ph.D. in 1967.

Throughout his career, Eckhardt continued to address unresolved questions of chemistry, particularly those that dealt with solid state chemistry.

In particular, he looked at problems associated with a compound called distyrylpyrazine (DSP). The puzzle was that if DSP was in a crystalline state and irradiated with light at wavelengths greater than 400 nanometers, one would get oligomers, or short polymers. When the wavelength was greater than 400 nanometers, high-polymers were produced. However, irradiation of DSP in solution showed no such wavelength dependence. A sufficient explanation could not be found in the scientific literature, so he set out in search of answers.

Eckhardt suspected that it had to do with how the molecules "talked" to each other electronically in the solid state, Exciton Theory. He found that through solid-state electronic and Raman spectroscopy studies, that an excitonic mechanism could explain for the wavelength dependency.

Eckhardt always sought to explore questions that received little attention during his career, and while it was research like that focused on DSP that kept him interested in chemistry, it was his students that made him love it.

Words do no justice for the feelings Eckhardt has for his graduate students, but asked to explain, he tried his best to articulate what their relationships mean to him.

"I enjoyed them more than I did the research," he said. "I truly had a remarkable group of graduate students."

Again, words alone aren't enough.

Many of his students had never heard of the type of research he was conducting before enrolling in Nebraska Chemistry's graduate program, but Eckhardt said they seemed as fascinated as he by the area, and they put their hearts and souls into it. In return, he tried to create an environment where his students, could make mistakes with no repercussions, but would learn from them. He wanted them to take pride in- and ownership of their work.

"It was their baby, so I wasn't going to tell them what to do the next day," Eckhardt said. "I don't believe you teach someone to walk by holding them up all the time."

Over 50 years, Eckhardt advised 25 students to doctorate degrees, and these former students have gone on to have a variety of successful careers, many of which aren't closely related to their Ph.D. work. His students have gone on to become directors of research at large companies and as established faculty members in the scientific community. One even became a professor of epidemiology.

Eckhardt told all his students, "When you walk out the door with a degree, you're my peer. You're going to be a functioning, independent scientist."

Many of Eckhardt's peers also forged relationships with him that went deeper than science

"He is a great colleague, a great mentor, and an outstanding scientist," Interim Chair Professor Jody Redepenning said. "He has also proved to be a dear friend to many of our present and former faculty."

His relationship with his students and fellow faculty was one of understanding and one of respect. But at the root, was a longing for understanding of pertinent problems in solid state chemistry.

The research conducted in Eckhardt's lab tried to answer the questions that, to him, rest at the cutting-edge of chemistry.

Faculty News

“They [his students] all dealt with what I consider to be the real frontier of chemistry now, and that is the codification and quantification of intermolecular forces,” Eckhardt said.

In one way or another, his projects addressed different facets of this question.

“There has not been a systematic, quantitative investigation of intermolecular forces. One has to formulate some very simple models that many find – both boring and unexciting – and analyze the data in detail such that there is reliable predictive power before moving on to the complex,” he said.

And though Eckhardt is stepping away from his life-long investigation, he feels he is leaving a department that is moving in a good direction.

“I came to this department when it was kind of a sleepy, little, good department on the prairie. And now, it’s becoming a powerhouse,” he said.

Moving on from Nebraska Chemistry at a time of great growth isn’t easy, but Eckhardt has some other goals he wants to accomplish. He’s a student of the world and still has a list of places to visit.

High on that list is Antarctica.

The only continent he hasn’t seen.

“It’s the closest I’ll probably ever come to visiting a different planet,” he said.

Closest to a different planet, and a far cry from that makeshift lab in Avery where it all started 50 years ago.

Robert Vencil
Nebraska Chemistry



Former members of Prof. Eckhardt’s group stand with Prof. Eckhardt.

Robert Vencil | Nebraska Chemistry

Select external awards

Jian Zhang, PI — NSF CAREER — \$106,477 (02/22/2017 – 02/28/2021)

“CAREER: Tuning Photoredox Properties of Carbazolic Porous Organic Frameworks for Visible-Light-Mediated Catalysis”

David Berkowitz, PI — NSF — \$20,350 (07/01/2017 – 06/30/2018) “New Approaches to Catalyst Screening and Development (Equipment Supplement)”

Hui Li, PI; Eric Dodds, PI — NIH CIBC Seed Grant — \$44,406 (06/15/2017 – 07/31/2018) “Molecular Dynamics Simulation of Biomolecule Ion Mobility in Gas Phase”

Robert Powers, PI — NSF — \$695,000 (04/01/2017 – 03/31/2020) “ABI Innovation: A Metabolomics Toolkit for NMR and Mass Spectrometry”

Hui Li, PI — Fujitsu Laboratories of America — \$100,000 (03/16/2017 – 06/30/2017) “Conducting Research in Quantum Chemistry”

Stephen Morin, PI — 3M Corporation — \$15,000 (03/27/2017 – 06/30/2017) “Soft Surfaces and Reactors for the Morphological Control and Selective Deposition of Functional Materials

David Berkowitz, PI; Robert Powers, co-PI; Thomas Helikar (University of Nebraska–Lincoln Department of Biochemistry), co-PI — National Strategic Research Institute — \$757,782 (09/28/2017 – 09/27/2018) “Medical Countermeasure Drug Discovery and Development”

Joseph Francisco, PI; Jaeil Bai, co-PI; Barry Cheung, co-PI; Xiao Zeng, co-PI — NSF — \$550,000 (09/01/2017 – 08/31/2020) “Exploration of Low-Dimensional Gas Clathrate Hydrates”

Rebecca Lai, PI — UNO (Prime NASA) — \$5,000 (11/01/2017 – 02/28/2018) “UNO–NASA Space Grant: University of Nebraska–Lincoln Conference for Undergraduate Women in Physical Sciences”

Andrzej Rajca, PI; Suchada Rajca, co-PI — NIH – NIGMS — \$1.74M (08/01/2017 – 06/30/2021) “New Nitroxide Spin Labels for Distance Measurements in Biological Systems”

Marilyne Stains, PI; Brian Couch (University of Nebraska–Lincoln Department of Biological Sciences), co-PI — NSF–DUE — \$524,243 (10/01/2017 – 09/30/2020) “Mapping Change in Higher Education–Social Networks and STEM Reforms”

Marilyne Stains, PI — NSF–DUE — \$72,307 (09/01/2017 – 08/31/2020) “Evaluating the Uptake of Research–Based Instructional Strategies in Undergraduate Chemistry, Mathematics, & Physics”

James Takacs, PI — NIH–NIGMS — \$1.23M (09/15/2017 – 06/30/2021) “Catalytic Asymmetric Hydroboration: Uncapping the Potential with Two-Point Binding Substrates” (renewal)

Jian Zhang, PI — NSF–CBET — \$224,816 (07/01/2017 – 06/30/2020) “Real Time Spectroscopic Studies of Hybrid MOF Photocatalysts for Solar Fuel Production”

Collaborations

Jeremiah Johnson (University of Chicago), PI; Andrzej Rajca, co-PI — University of Chicago (NIH Prime) — \$103,013 (09/01/2016 – 08/31/2017) “Membrane Protein Structural Dynamics Consortium”

Edward Harris (University of Nebraska–Lincoln Department of Biochemistry), PI; Eric Dodds, co-PI — NIH — \$363,175 (03/01/2017 – 02/28/2018) “Liver Mediated Clearance of Low Molecular Weight Heparins”

Joseph Francisco, PI — Purdue University (NSF Prime) — \$227,668 (07/01/2017 – 06/30/2021) “CIF21 DIBBs: El: Creating a Digital Environment for Enabling Data-Driven Science (DEEDS)”

Brian Couch (University of Nebraska–Lincoln Department of Biological Sciences), PI; Marilyne Stains, co-PI — NSF–DUE — \$144,340 (08/01/2017 – 07/31/2019) “Instructional Change in Introductory STEM Courses through Faculty Learning Communities Focused on the Transition from High School to College”

Faculty News

Peter Dowben (University of Nebraska–Lincoln Department of Physics and Astronomy), PI; Christian Binek (University of Nebraska–Lincoln Department of Physics and Astronomy), co-PI; Evgeny Tsymbal (University of Nebraska–Lincoln Department of Physics and Astronomy), co-PI; **Alexander Sinitskii**, co-PI — NSF/SRC — \$2.38M (09/01/2017 – 08/31/2020)

"E2CDA: Type I: Antiferromagnetic Magneto–electric Memory and Logic"

Robert Powers, PI — University of Nebraska Medical Center Collaborative Initiative Seed Grant — \$20,000 (07/01/2017 – 06/30/2018) "Development of a Systems-Level Pangenome Metabolic Model for Analysis of *Staphylococcus Aureus* Physiology"

Department installs new 15T FTICR–MS



In November, the department received a Fourier transform ion cyclotron resonance mass spectrometer (FTICR-MS) equipped with a 15 Tesla (T) superconducting magnet in November. The vendor, Bruker Daltonics, calls this a “Bruker SolariX XR 15T FTMS.”

This is the most powerful commercially available mass spectrometer. Nebraska is only the fourth U.S. academic institution to acquire such an instrument with the highest available magnetic field of 15T (the others are at UCLA, Ohio State, and Vanderbilt).

The new equipment has unique capabilities that will be leveraged to study (1) intact proteins, including their intricate patterns of chemical modifications that dictate biological function (“top-down proteomics”), and (2) metabolites in complex mixtures of thousands of unknown components (“global metabolomics”). The department envisions that the instrument will be an important university-wide and regional resource for molecular life sciences research. Acquisition of the instrument was primarily funded by a Research Equipment Award from the Nebraska Research Initiative.



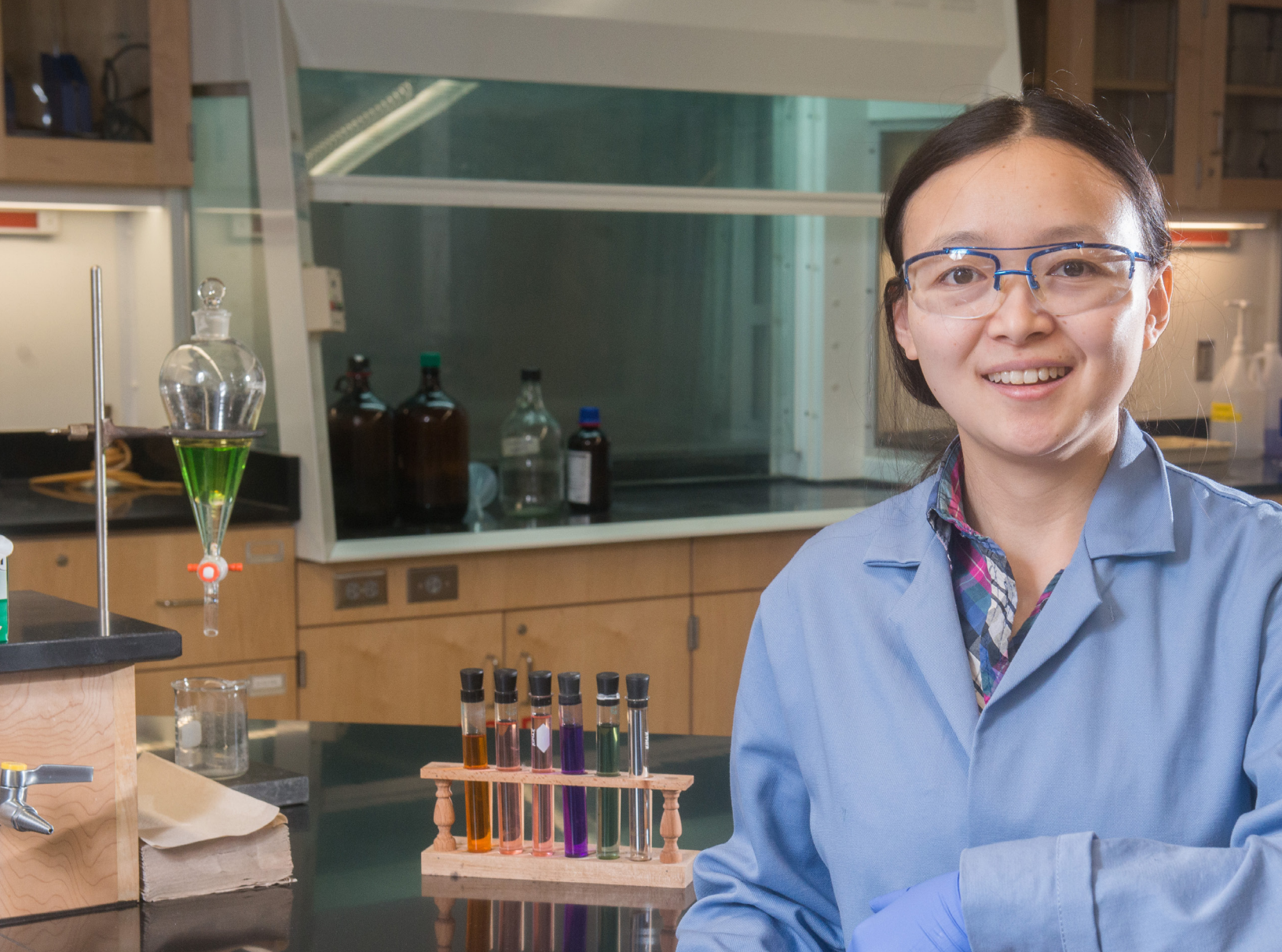
Industrial Ad

Back [L to R]: Todd Eary; Edward Lawson; Edward Che
Jody Redepenning. Front [L to R]: Eugene Cordes, Chair of IA
Mike Grace; James



Advisory Board

ess; Kevin Woller; David Pugmire; Christian Sandstedt;
B; Larry Middendorf; Paul Ries; Cathy Tway; Marijean Eggen;
Lohr; Norton Peet.



Xin Shang

Meet a grad: Xin Shang

Xin Shang, a graduate student in Dr. Jiantao Guo's lab, has been conducting research at the interface of chemistry and biology and is developing new chemical tools to facilitate biological and biomedical investigations.

Shang wants to improve the pharmaceutical drugs used to fight multiple diseases. She wants to make a difference.

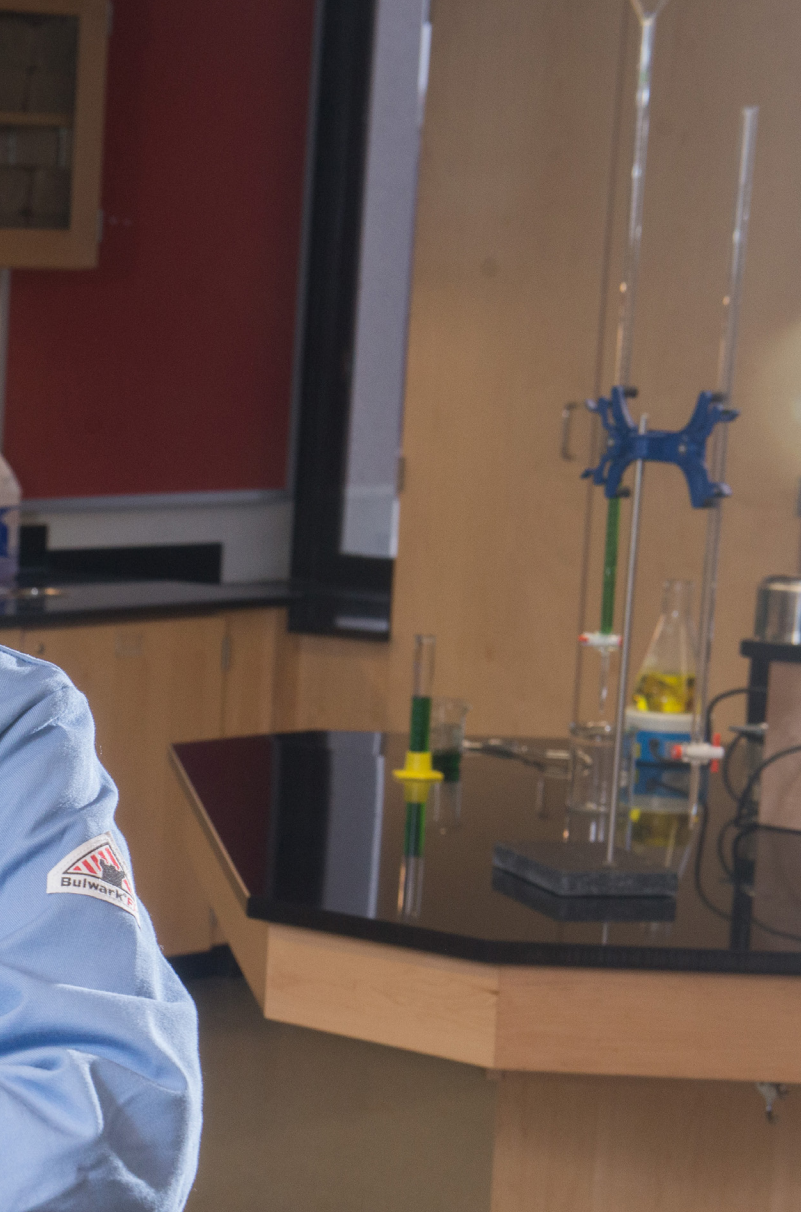
"I'm not sure if I can improve life a lot, but I feel like I can help," Shang said. "I have an opportunity to make a difference."

One of Shang's biggest milestones came in 2016 when she was the lead-author on a publication in *Chemical Science*. Her research focused on the development of fluorogenic pro-

tein labeling based on the inverse electron-demand Diels-Alder reaction between styrene, an unstrained alkene, and a tetrazine. This reaction created a new fluorophore, and once in the biological system, tetrazine reacts with proteins that contain an unnatural amino acid (KStyr). This process allows for protein labeling in live cells, which can potentially be applied to the study of protein folding and function under physiological conditions.

Shang said Nebraska Chemistry's Research First philosophy allowed her get started on her research the minute she arrived.

"The department provides many opportunities for you to start your research," Shang said. "We get support in the lab



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from the first semester until the end.”

She has completed her work on the tetrazine and alkene reaction and is currently working on a tetrazole and alkene reaction.

Shang’s appreciation for the interaction between chemistry and biology has grown through her research, and it’s done so because she can visualize the real-world applications for what she’s discovering. For example, her current research can be applied to Antibody Drug Conjugates, which is a growing area within the drug industry. By developing new methodologies on the introduction of unique chemical handles into proteins, she can help with the drug production and make a difference in the pharmaceutical world.

Shang has also co-authored publications in *RCS Advances* and *Scientific Reports*.

Finding Her Passion

Shang’s freedom to conduct her research at Nebraska has led her to develop a deeper appreciation and interest for chemical biology.

“The Ph.D. program paves a solid road for you to become an independent researcher,” Shang said. “I found my curiosity toward the world at Nebraska.”

Shang’s curiosity goes beyond the field of chemical biology, so she has taken advantage of one of Nebraska’s many interdisciplinary opportunities by attending monthly seminars hosted by the Molecular Mechanisms of Disease (MMoD) program. The interdisciplinary seminars led by Dr. Melanie Simpson of the biochemistry department cover topics related to chemistry, biochemistry, biology, nutrition sciences, and any other discipline associated with the MMoD program.

The seminars have opened Shang’s eyes to how her research can impact other disciplines.

“You learn how different areas interact with each other, so I want to put more energy and passion into chemical biology,” Shang said.

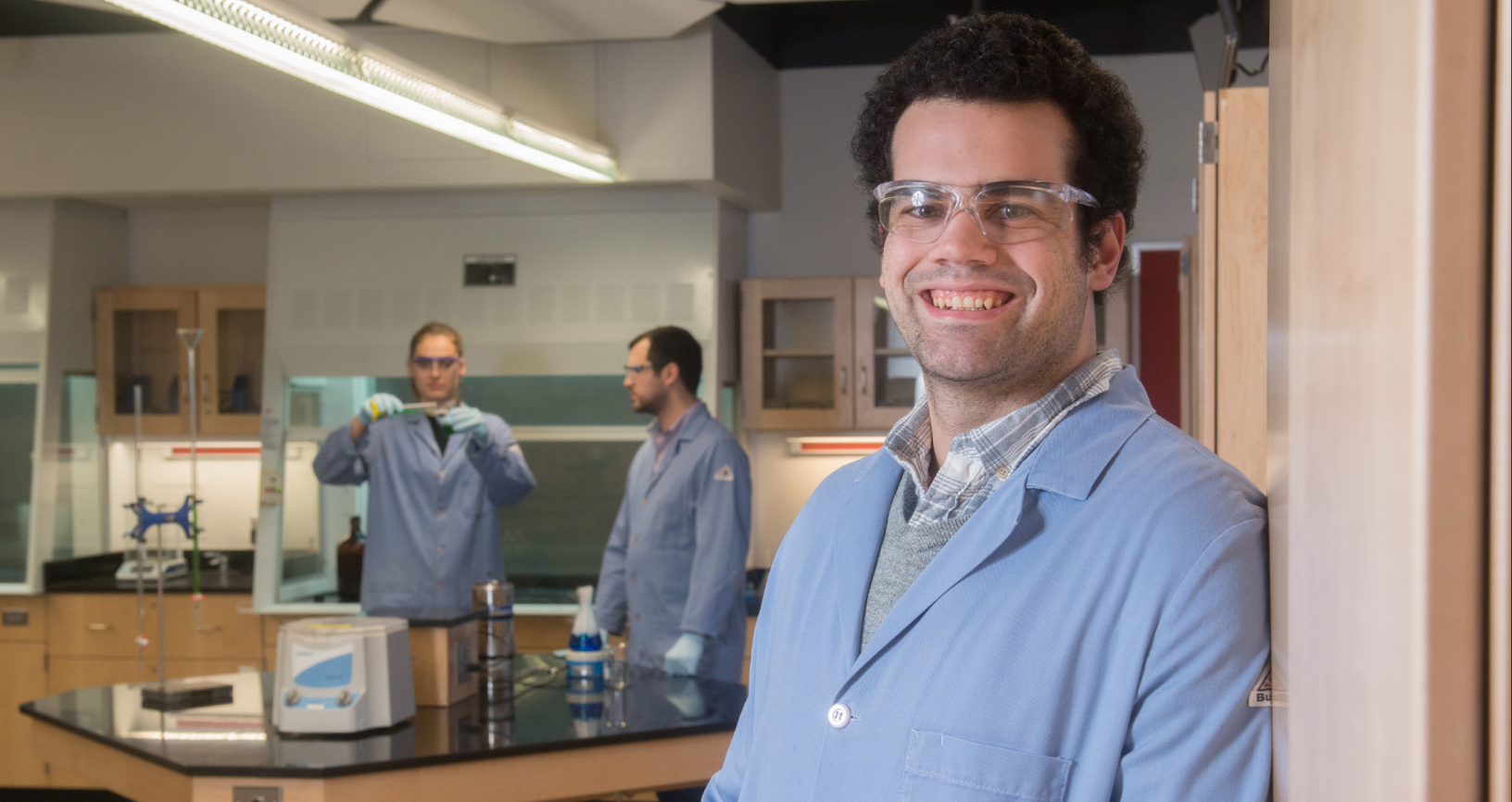
Publications:

Shang, X.; Song, X.; Faller, C.; Lai, R.; Li, H.; Cerny, R.; Niu, W.; Guo, J. “Fluorogenic Protein Labeling Using A Genetically Encoded Unstrained Alkene” *Chem. Sci.* 2016, DOI: 10.1039/C6SC03635J

Song, X., Shang, X.; Ju, T.; Niu, W., Guo, J. “A Photoactivable Src Homology 2 (SH2) Domain” *RCS Advances* 2016, 6, 51120-51124

Wang, N.; Shang, X.; Cerny, R.; Niu, W.; Guo, J. “Systematic Evolution and Study of UAGN Decoding tRNAs in a Genomically Recoded Bacteria.” *Sci. Rep.* 2016, 6, 21898.

Robert Vencil
Nebraska Chemistry



Jay Taylor

Greg Nathan | University Communication

Meet a grad: Jay Taylor

By taking advantage of his time in the lab, Jay Taylor is diving deeper into the world of material sciences. Taylor has been conducting research in Dr. Stephen Morin's lab for three years, but it only took him two before he became the lead-author on a publication.

A Published Chemist

In 2016, Taylor's research looked into how using the chemistry and mechanics of rubber can control the formation of crystalline materials. His results were published in *Advanced Materials*.

"We took advantage of the mechanical properties of a rubber to change the structure of a deposited crystalline film," Taylor said. "The rubber had a dull appearance when it was relaxed and a reflective one when it rubber was stretched."

In the material sciences there is a certain correlation between structure and function. Taylor gave the example of how a paper clip and hammer are both made of steel, but serve different purposes. Same material, different application.

"In nanomaterials, you see this very similar trend where structure controls function," Taylor said. "So, if we can control how

they form, we can control their structures. And if we can control their structure, we can control their properties."

In the relaxed state, the crystalline film was wrinkled, scattering the light in all directions. But when stretched, the wrinkles were pulled out, creating a reflective and smooth surface. The two appearances of the rubber could be switched rapidly and reversibly, illustrating dynamic function.

Taylor said that if he can get materials to form at a certain point, and couple it with a property change, there's a variety of dynamic materials that can be produced.

The results of this study could serve as an easy-to-notice read-out on the stress state of an elastic material, which would allow for a user to easily identify when an elastic material is being over stretched, and prevent the material from breaking.

Being able to jump into his research as a first-year graduate student allowed Taylor to start seeing immediate results.

"Within the first few months in the lab, I already had some proof of concept results," Taylor said.

Taylor was also the co-author on a publication in *Small*. He

and his colleagues demonstrated that they could pattern the surface of a rubber with a variety of chemical groups. These chemical patterns were completely stretchable, and they used them to drive the assembly of liquid droplets, and they showed several applications of this assembly. Taylor helped characterize the surface of the rubber and demonstrated that when stretched, the surface is smooth and completely elastic, which was a limitation in previous studies with any chemical modifications to these rubbers.

As co-author on another publication, this one in *Chemistry of Materials*, Taylor helped demonstrate that by tuning the surface chemistry of the rubber, he and his colleagues could control how crystals placed on the surface adhered. They showed that they could sort a mixture of microscopic crystals on the surface of these rubbers, simply by repeatedly stretching the rubber.

Taylor attributes his success in the lab to the freedom he is afforded while conducting research.

"I had some goals my boss wanted to see happen, but he left a lot of the details and how to run the experiment up to me," Taylor said.

Current Research

Currently, Taylor is working to develop a variety of microfluidic devices and is doing some actuation with the polymers. He is also doing some collaborative work with the electrical and computer engineering department at Nebraska, where he is building nanostructures out of silica and silicon.

"I like the collaboration effort," Taylor said. "It allows me to see another world of science."

The Research First Experience

Many of Taylor's results came within his first few months in the lab as a first-year graduate student.

"Being able to get in the lab and try some things was very valuable," Taylor said. "And it was exciting to me to do so as a first-semester student."

Taylor credits his success to the support he receives from the entire Chemistry Department at Nebraska.

"You feel like you're valued. Your research, someone values it," Taylor said. "Even the instruments specialists are ready and willing to help you."

Personal

Outside of the lab, Taylor is a member of Phi Lamda Upsilon, the chemical graduate student's honor society at Nebraska. In 2016, he was named the PLU Member of the Year for his outstanding volunteer service and willingness to help out when needed.

He also spends time at the Nebraska Innovation Studio. The studio is open to anyone in the Lincoln community who needs the space and tools for projects involving woodworking, ceramics, textiles, and electronics. Taylor enjoys woodworking and circuitry.

Taylor hopes to defend his dissertation in 2019 and move on to a postdoctoral position from there. His goal is to work in academia, but for now, his focus is on the lab.

Robert Vencil
Nebraska Chemistry

Publications

Konda, A.; Taylor, J.M.; Stoller, M.A.; Morin, S.A. "Reconfigurable Microfluidic Systems with Reversible Seals Compatible with 2D and 3D Surfaces of Arbitrary Chemical Composition" *Lab Chip* 2015, 15, 2009-2017.

Bowen, J.J.; Taylor, J.M.; Jurich, C.P.; Morin, S.A. "Stretchable Chemical Patterns for the Assembly and Manipulation of Arrays of Microdroplets with Lensing and Micromixing Functionality" *Adv. Func. Mater.* 2015, 34, 5520-5528.

Taylor, J.M.; Argyropoulos, C.; Morin, S.A. "Soft Surfaces for the Reversible Control of Thin-Film Microstructure and Optical Reflectance" *Adv. Mater.* 2016, 28, 2595-2600.

Rose, M. A.; Taylor, J.M.; Morin, S.A. "Adhesion of Morphologically Distinct Crystals to and Selective Release from Elastomeric Surfaces" *Chem. Mater.* 2016, 28, 8513-8522.

Vinod, T.P.; Taylor, J.M.; Konda, A.; Stephen, S.M. "Stretchable Substrates for the Assembly of Polymeric Microstructures" *Small*, 2016 DOI: 10.1002/smll.201603350.

Meet a grad: Yao Wu

Yao Wu, a former graduate student in Dr. Rebecca Lai's lab, was on the forefront of research in chemical biology during her time in the program. Her research was focused on the design and fabrication of folding- and dynamic-based electrochemical biosensors for the detection of DNA, metal ions, and cancer treatment in drugs. This led her to be the lead-author on eight publications.

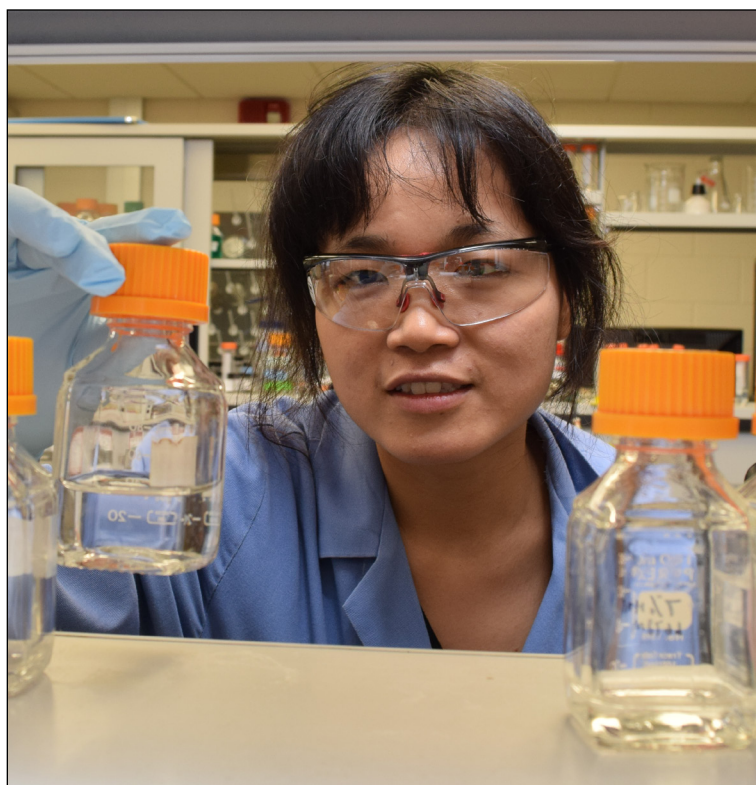
Wu has developed two reagentless and reusable electrochemical DNA sensors for detection of the k-ras gene, and her findings were published in *Analytical Chemistry*. These findings will contribute to studies focused on understanding pancreatic and lung cancer and pathogenesis, and they could have an impact on a wide range of biomedical-relevant nucleic acid sequences, as well as point mutations.

Wu also developed three metal ion sensors for detecting gold, silver, and copper ions. The gold ion sensor can help with mineral exploration and mining, as well as identifying and quantifying gold ion in complex biological and environmental samples. The silver and copper ions could have an impact on environmental monitoring, since the sensors are reagentless, sensitive, specific, and selective enough to be used in realistically complex samples. Wu's findings were published in the *Biotechnology Journal* and *Analytical Chemistry*, respectively.

In another article published in *Analytical Chemistry*, Wu revealed her development of two sensors for detecting anticancer drugs like cisplatin and satraplatin. Recently, cisplatin has been applied in antitumor treatment, but the treatment has been compromised by cellular resistance and toxic side effects after long-term exposure to the drug. Because of these issues, satraplatin has been explored as an option. The sensors Wu developed could have an impact in this area, as it could be used for real-time analysis of drug metabolism in pharmacokinetics studies.

Wu was also working to develop a method to employ electrocatalysis to elucidate the fundamental properties of DNA nucleotides and study the reactions between methylene blue and high oxidation state metal ions. She is also worked to develop electrochemical aptamer-based (E-AB) sensors suitable for surface-enhanced Raman spectroscopy (SERS) analysis.

Thanks to being afforded the opportunity to start conducting research during her first semester, Wu research has led her



Yao Wu

Peta-Gaye Clachar

to be the lead-author on eight publications and co-author on two others. Her work has appeared in *Analytical Chemistry*, *Chemical Communication*, *Current Nanoscience*, and the *Biotechnology Journal*.

"I have accomplished things that I didn't expect that I could do," Wu said. "This would not have happened without Dr. Lai. I would like to sincerely acknowledge my advisor for her guidance and trust during my graduate studies. She encouraged me to look at my career in a holistic manner, which not only helped me grow as an experimentalist and a chemist, but also as an instructor and an independent thinker."

Wu's success at Nebraska has not come as a surprise to Lai.

"She is very responsible and mature in her approach to science and her approach to her work," Lai said. "She is very enjoyable to work with, because she is responsible and very professional about the work."

Wu earned her bachelor's degree in food science and technology from Shanghai Ocean University and obtained her master's in biochemical engineering from Shanghai University. She moved to Nebraska in 2011 to start working on her Ph. D. Wu graduated from Lai's group in Spring 2017.

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Nebraska Chemistry

2017 scholarship and award winners

The department would like to congratulate the 2017 student award and scholarship winners!

Award Winners

George Sturgeon Undergraduate Teaching Award

Daniel Dooling

Graduate Teaching Assistant Honorable Mention

Hamidreza Lotfizadehzhad

Advised by Professor Rebecca Lai

John J. Stezowski Graduate Teaching Assistant Award

Forouzan Aboufazeli

Advised by Professor Eric Dodds

James Looker Graduate Teaching Assistant Award

Veronika Shoba

Advised by Professor James Takacs

James D. Carr Graduate Teaching Assistant Award

Alissa Horn

Advised by Professor Patrick

Dussault

Charles A. Kingsbury Graduate Teaching Assistant Award

Matthew Beio

Advised by Professor David

Berkowitz

Fuerniss Fellowship Award

Xin Shang

Advised by Professor Jiantao Guo

Cromwell Graduate Research Assistant Award

Veronika Shoba

Advised by Professor James Takacs

Graduate Research Assistant Honorable Mention

Abby Gelb

Advised by Professor Eric Dodds

Pill-Soon Song Graduate Research Assistant Award

Yang Hong

Advised by Professor Xiao Zeng

T. Adrian George Graduate Research Assistant Award

Jingzhi Lu

Advised by Professor Jian Zhang

Robert Marianelli Graduate Research Assistant Award

Mikhail Shekhirev

Advised by Professor Alexander

Sinitskii

Scholarship Winners

Marjorie Dewey & Catherine Kelly Scholarship

Malachi Abebe

Dayton Schumacher

Viola C. Jelinek Scholarship in Chemistry

Matthew Ballweg

Lawrence Nguyen

Quynh Tran

Tiffany Truong

Lester C. & Joan M. Krogh Scholarship in Chemistry

Madison Bierman

Meera Choksi

Kaleb Jones

Lauren Lesiak

Britton Lyon

Sean McDermott

Sandoz Foundation Chemistry Scholarship

Nora Breen

Connor Kenney

Elise Le Coz

Madison Schlachter

Colton Webster

Maxine Wertman Fund Scholarship

Camden Bilyeu

Kyle McMillan

Zachary Nelson

Dr. B. Clifford Hendricks Memorial Fund Scholarship

Lauren Poling

Clyde & Elva Weyenberg Scholarship

Daniel Dooling

Jacob Moore

University of Nebraska–Lincoln Chemistry Scholarship

Jeongwon Choi

Jiayuan Cui

Noah Free

Shae Lott

Milton E. Mohr Award

Scholarships

Matthew Ballweg

Lauren Lesiak

Lawrence Nguyen

Tiffany Truong

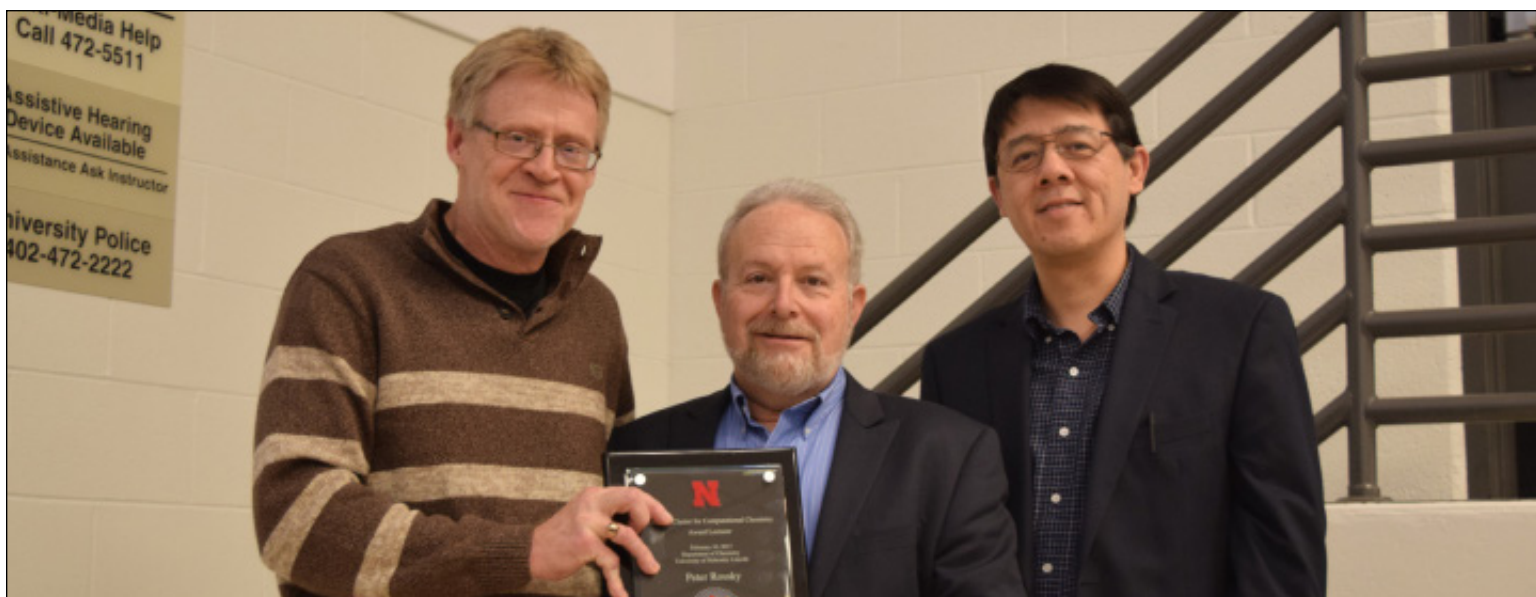
Fellowships

Hamidreza Loftizadehzhad

Seema Pande

Hamilton Graduate Research Award

Suman Chakrabarty



Left to Right: Jody Redepenning, Peter Rossky, Xiao Zeng

Robert Vencil | Nebraska Chemistry

Rossky wins 2017 Nebraska Cluster for Computational Chemistry Award

Professor Peter Rossky of Rice University was awarded the Nebraska Cluster for Computational Chemistry (NC3) Award on February 10, 2017.

Rossky received his undergraduate degree in chemistry *summa cum laude* from Cornell University and his Ph.D. in chemical physics from Harvard. After postgraduate research as an NSF National Needs Postdoctoral Fellow at SUNY, Stony Brook, he joined the faculty at the University of Texas at Austin in the department of chemistry. There he held the Marvin K. Collie-Welch Regents Chair in Chemistry as well as an appointment as professor of chemical engineering. At Austin, he served as the Director of the Institute of Theoretical Chemistry, and then of the Center for Computational Molecular Sciences in the Institute for Computational Engineering and Sciences. He also served as the Director of the Department of Energy-funded Energy Frontier Research Center on Charge Separation and Transfer in Energy Materials.

In 2014, he joined the faculty at Rice University as the Harry C. and Olga K. Wiess Chair in Natural Sciences, professor of chemistry, professor of chemical and biomolecular engineering, and Dean of the Wiess School of Natural Sciences.

His theoretical research program has pursued the elucidation of structure and dynamics associated with chemical processes in the condensed phase, with a focus on liquids, solutions,

and photoactive molecular materials. Rossky has published more than 250 papers in the field. His work has emphasized realistic atomistic descriptions of complex molecular systems studied using classical and quantum statistical physics as well as quantum chemistry. His group has been a pioneer in the development of an understanding of the impact of an aqueous environment on the structure and function of biomolecular systems. His laboratory has also developed a number of new algorithms that underlie our ability to effectively study both the statistical properties and the dynamics of condensed phase molecular quantum systems using computer simulation. His lab currently focuses on the photo-induced dynamics in organic molecular systems, including both synthetic materials and biomolecules.

Honors & Awards

- Member, U.S. National Academy of Sciences
- Member, American Academy of Arts & Sciences
- Fellow, AAAS
- Fellow, American Physical Society
- Fellow, John Simon Guggenheim Foundation
- Dreyfus Foundation Teacher-Scholar
- NSF Presidential Young Investigator
- Fellow, Alfred P. Sloan Foundation
- ACS Hildebrand Award in the Experimental & Theoretical Chemistry of Liquids
- ACS Physical Division Award in Theoretical Chemistry



Left to Right: Eli Riekeberg, Maia Kelly, Abby Gelb, Moriah Locklear, M. Christina White, Alissa Horn, Katherine Schumacher, Channing Thompson

White presents 2017 Phi Lambda Upsilon – Rho Chapter Award Lecture

Dr. M. Christina White of the University of Illinois Urbana-Champaign was awarded the Phi Lambda Upsilon-Rho Chapter Award Lectureship on March 3, 2017.

White, a Grecian native, received her Bachelor of Arts with highest honors in biochemistry at Smith College where she worked with Stuart Rosenfeld. She went on to earn her doctorate degree from Gary Posner at John Hopkins University as an ACS medicinal chemistry fellow. As an NIH postdoctoral fellow, she worked with Eric Jacobsen and now is a professor of chemistry at the University of Illinois Urbana-Champaign. Since joining the University of Illinois in 2005, she has published 42 papers, and several of the publications have been chosen for the editor's choice in science, featured in news of the week in *C&E News*, and reported by UIUC News Bureau.

The White group aims to study and develop selective, catalytic C–H oxidation reactions for broad use in organic synthesis. They have contributed novel palladium/sulfoxide, iron PDP, and manganese phthalocyanine catalysts that are now commercially available (Aldrich, Strem, TCI).

These catalysts are used academically and industrially to functionalize all types of C(sp³)–H bonds, including aliphatics, under preparative conditions with predictable and catalyst-controlled site-selectivities without the requirement for directing groups. The reactions and quantitative models de-

veloped by the White group have led to strategic advances in synthesis, most notably the concept of late-stage C–H functionalization.

Honors & Awards

- Mukaiyama Award
- Fellow, Royal Society of Chemistry
- The Royal Society of Chemistry Merck Award
- Fellow, AAAS
- Cope Scholar Award
- Roche Excellence in Chemistry Award
- Abbott Young Investigator Award
- Camille Dreyfus Teacher-Scholar Award
- Amgen Young Investigator Award
- Pfizer Award for Creativity in Organic Chemistry
- Eli Lilly Grantee Award
- Alfred P. Sloan Research Fellowship
- NSF CAREER Award
- Camille and Henry Dreyfus New Faculty Award
- Fellow of the UIUC Center for Advanced Study
- MS Unrestricted "Freedom to Discover" Grant
- Boehringer Ingelheim Pharmaceuticals New Investigator Award



James Takacs & Amir Hoveyda

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Charles A. Stiefvater Memorial Award presented to Hoveyda

The 2017 Charles A. Stiefvater Memorial Award was presented to Professor Amir H. Hoveyda of Boston College on October 27.

Hoveyda is the Patricia and Joseph T. '49 Vanderslice Millennium Professor of Chemistry at Boston College and a Distinguished Visiting Professor of Chemistry at the Technion–Israel Institute of Technology. Hoveyda received his B.A. from Columbia University and his Ph.D. from Yale University where he carried out graduate studies under the direction of Professor Stuart L. Schreiber. Hoveyda was an American Cancer Society postdoctoral fellow with Professor David A. Evans at Harvard University before joining the faculty at Boston College in 1990. He was quickly promoted to the rank of professor (1994) and subsequently appointed to his present position in 1998.

Hoveyda's scholarly interests are in the development of new approaches and the discovery of catalysts and methods for chemical synthesis, largely through the investigation of reaction mechanisms. He is well known for his important contributions to synthetic chemistry based on the design and development of new catalysts and catalytic reactions. In particular, Hoveyda has made many important contributions to the development of transition metal catalyzed metathesis

methodologies, often in collaboration with Nobel Laureate Richard R. Schrock (MIT). For example, their recent report of novel molybdenum chloride catalysts to effect Z-selective olefin metathesis reactions addresses one of the longstanding synthetic challenges in olefin metathesis. Hoveyda has also made numerous contributions of other modes of chemical synthesis. His research, of late, focuses on asymmetric catalysis and is often directed toward the formation and use of organoboron compounds. Hoveyda's group also applies the strategies and protocols developed in-house to the efficient preparation of complex natural products.

Hoveyda has published close to 250 research papers, more than 35 review articles, and 15 patents. His honors include an NSF National Young Investigator Award (1992), an Alfred P. Sloan Fellowship (1994), Camille Dreyfus Teacher-Scholar Award (1994), ACS Cope Scholar Award (1998), NIH MERIT Award (2005), the 2010 Yamada-Koga Prize, the ACS Award for Creative Work in Organic Synthesis (2014), the Eni Prize for Hydrocarbon Research (2014), and numerous named lectureships. He is the principal co-founder of XiMo, AG and has served on numerous advisory boards. His impact on the field of chemistry is also manifested by his students. Nearly 20 of his former students now hold independent academic positions at major universities in the U.S. and abroad.

Chu-Moyer delivers 2017 Industrial Advisory Board Award Lecture



Margaret Chu-Moyer & Larry Middendorf

Dr. Margaret Chu-Moyer of Amgen Inc. delivered the Industrial Advisory Board Award Lecture on April 7, 2017. Her lecture was titled, “Chemistry in the Age of Biology: Overcoming Challenges in Drug Discovery.”

Chu-Moyer joined Amgen in 2009 and is currently head of Amgen’s Chemistry, Characterization & Technology Group which spans Amgen’s research sites in Cambridge, MA; South San Francisco, CA; and Thousand Oaks, CA and includes medicinal chemistry, separations, structure, biophysics, analytical sciences, materials management, high-throughput screening, research automation, bioassay, and outsourcing.

As part of the therapeutic discovery group that is responsible for delivering clinical candidates across all of Amgen’s various modalities, from monoclonal antibodies to peptides to small molecules, Chu-Moyer’s organization is accountable for advancing the small molecule portfolio across all of Amgen’s therapeutic research areas, namely car-

Robert Vencil | Nebraska Chemistry

diometabolic diseases, inflammation, oncology, and neuroscience.

Most recently, key discoveries have been made in oncology (c-Met inhibitor – AMG 337, p53-MDM2 inhibitor – AMG 232, Mcl-1 inhibitor – AMG 176), diabetes (GKRP inhibitor – AMG-3969), and pain (Nav1.7 inhibitor – AM-2099, GlyRa3 positive allosteric modulator – AM-3607). In this role, Chu-Moyer has also developed cross-functional joint leadership programs with partner groups (Pharmacokinetics & Drug Metabolism, Comparative Biology & Safety Sciences, Process Development) to align strategic and operational intent, resulting in >50% reduction in cycle time in some instances.

Prior to joining Amgen, Chu-Moyer led medicinal chemistry groups at Pfizer Global Research and Development in Groton, CT leading to 13 clinical candidates over a 7-year period in the metabolic disease area. She also led exploratory and hit-to-lead medicinal chemistry groups to deliver seven high

quality project starts and nine new lead series using state-of-the-art lead generation concepts. Additional contributions during that period were in leading multi-functional teams, particularly at the research and informatics interface to facilitate data-driven decision making by optimizing data access, integration, and visualization and to increase the efficiency of sample logistics from compound registration to screening. The latter efforts were honored with a Connecticut Quality Improvement Silver Medal Award in 2006. During this time, Chu-Moyer was also the lead for academic and industry relations and co-lead efforts to increase the pool of women chemists through site visitation programs for undergraduate students, graduate students, and post-doctoral fellows.

Chu-Moyer received a B.S. in chemistry in 1987 from the University of California, Berkeley where she worked with Professor Henry Rapoport. After two years as a laboratory technician at Abbott Laboratories, she pursued a Ph.D. in organic chemistry at Yale University where she worked with Professor Samuel J. Danishefsky and received the Richard Wolfgang Memorial Prize for best thesis in 1994.

Chu-Moyer currently serves on the *Bioorganic & Medicinal Chemistry* and *Bioorganic & Medicinal Chemistry Letters* Editorial Advisory Board and the Boston Children’s Hospital Technology & Innovation Development Office Technology Development Fund Advisory Board. She has previously served on the ACS Medicinal Chemistry Long Range Planning Committee and the Massachusetts Biotechnology Council Board of Directors.

Wells named winner of Streck Award



Peter Wells & Bradford Hunsley

Professor James Wells was awarded the 2017 Streck Award on April 13. Streck's Director of Research & Development, Bradford Hunsley, was on hand for the presentation.

Wells is currently the Harry Wm. And Dianna V. Hind Professor in Pharmaceutical Sciences and serves as the Department Chair of Pharmaceutical Chemistry at the University of California at San Francisco (UCSF). He is also a professor in the UCSF Department of Cellular & Molecular Pharmacology in the School of Medicine, Director of the Small Molecule Discovery Center, and Director of the Antibioime Center at UCSF.

Wells obtained his Ph.D. in biochemistry at Washington State University with Professor Ralph Yount. From there, he went on to conduct post-doctoral work at Stanford University Medical School with Professor George Stark.

Prior to joining the faculty at UCSF, Wells was the founding scientist in Genentech's Protein Engineering Department and co-founder of Sunesis Pharmaceuticals. He has received numerous awards including the Pfizer Award from the ACS for achievements in enzyme chemistry, the Christian B. Anfinsen Award from the Protein Society, the Vincent du Vigneaud Award from the American Peptide Society, the Hans Neurath

Award from the Protein Society, the Perlman Lecture Award from the ACS Biotechnology Division, and the Merch Award from ASBMB. He was inducted into the National Academy of Sciences (1999) and the American Academy of Arts and Sciences (2015).

While at Genentech, Wells' group was among the first to develop gain-of-function engineering of enzymes, proteins, and antibodies by site-directed mutagenesis and phage display. His group also revealed the first cytokine-receptor mechanism for dimerization, discovered hot-spots in protein-protein interfaces using alanine-scanning, and built a new antagonist for human growth hormone used in treating acromegaly today. At Sunesis, Wells developed novel technologies for fragment-based drug discovery, notably the site-directed approach Tethering as applied to cancer targets in clinical development.

Wells' work at UCSF has been focused on understanding and modulating signaling processes in human cells through protein and small molecule design. His lab has developed an N-terminomics technology, a proteomics approach, to characterize the caspase products cleaved during apoptosis revealing nearly 2,000 cellular targets cleaved by caspases. Building upon this work, his lab has engineered enzymes (the SNIPer) to cleave the caspase substrates individually, and another enzyme to label substrates of E3 ligases (the NEDDylator).

Recently, Wells has started the Antibioime Center at UCSF to exploit an automated phage display robot for generation of renewable recombinant antibodies to the proteome. Using this approach, his lab has engineered a motif-specific scaffold for producing synthetic monoclonal antibodies specific to phosphorylation sites in proteins as well as proteins produced on the surface of cancer cells. Wells is also the director of the Small Molecule Discovery Center at UCSF, which offers UCSF researchers access to modern small molecule discovery technologies in order to identify compounds that have the potential to alter disease states.

Hartwig wins Hamilton Award



John Hartwig & James Takacs

Professor John F. Hartwig of the University of California, Berkeley was awarded the 2017 Cliff S. Hamilton Award in Organic Chemistry on October 5.

Hartwig is the Henry Rapoport Professor of Chemistry at the University of California, Berkeley and Senior Faculty Scientist at the Lawrence Berkeley National Laboratory. Hartwig received his B.A. from Princeton University where he carried out research under Professor Maitland Jones Jr., and he received his Ph.D. from the University of California, Berkeley under the direction Professors Robert G. Bergman and Richard A. Andersen. He was an American Cancer Society Postdoctoral Associate with Professor Stephen J. Lippard at the Massachusetts Institute of Technology. He started his independent academic career at Yale University (1992-2006), quickly rising through the ranks to be named Irénée DuPont Professor of Chemistry. After serving on the faculty at the University of Illinois at Urbana-Champaign as Kenneth L. Reinhart Jr. Professor of Chemistry (2006-2011), Hartwig joined UC-Berkeley in his current capacity.

Hartwig's research focuses on the discovery and mechanistic understanding

of new reactions for organic synthesis catalyzed by transition metal complexes. He is well known for contributions to cross-coupling chemistry and for the discovery of practical C–H bond functionalization reactions. While developing these widely used catalytic processes, he has focused on defining the mechanism and fundamental organometallic chemistry that underpins them. His mechanistic research includes definitive studies on reductive eliminations to form carbon-heteroatom bonds, oxidative addition of N–H bonds, and olefin insertions into amides and alkoxides.

The Hartwig group is currently investigating both small-molecule catalysts and artificial metalloenzymes for selective reactions of organic molecules. These reactions include the selective catalytic functionalization of alkanes and arenes, cross-couplings to form aryl and allyl amines and ethers, alpha-aryl, and alpha-allyl carbonyl derivatives, methods for the fluorination and fluoroalkylation of arenes, additions to alkenes, methods to prepare chemicals and polymers from renewable chemical feedstocks, and hydrocarbyl functionalization reaction catalyzed by artificial metalloenzymes that combine the reactivity of transition-metal catalysts with the selectivity and evolutionary potential of enzymes.

Hartwig has authored more than 375 publications, nearly 20 issued or pending patents, and is the author of the highly regarded textbook, *Organotransition Metal Chemistry: From Bonding to Catalysis*. In addition to the awards listed, he has received numerous prestigious awards, including an A.C. Cope Scholar Award (1997), the ACS award in Organometallic Chemistry (2006), the

Herbert C. Brown Award for Creative Research in Synthetic Methods (2013), the Nagoya Gold Medal (2014), and the Janssen Pharmaceutical Prize for Creativity in Organic Synthesis (2014). He was elected to the National Academy of Sciences in 2012 and the American Academy of Arts and Sciences in 2015.

Honors & Awards

- Willard Gibbs Medal
- Organometallics Senior Lectureship
- Sierra Nevada Section of the ACS Distinguished Chemist Award
- Tetrahedron Chair at the Belgium Symposium on Organic Synthesis
- ACS Catalysis Lectureship for the Advancement of Catalytic Science
- GlaxoSmithKline Scholars Award
- Mitsui Chemicals Catalysis Science Award, Japan
- Joseph Chatt Lectureship of the RSC
- International Catalysis Award, International Association of Catalysis Societies
- Mukaiyama Award from the Society of Synthetic Organic Chemistry, Japan
- Paul Rylander Award of the Organic Reactions Catalysis Society
- Raymond and Beverly Sackler Prize in the Physical Sciences
- Tetrahedron Young Investigator Award in Organic Synthesis
- Thieme-IUPAC Prize in Synthetic Organic Chemistry
- Solvias Ligand Prize
- Leo Hendrik Baekeland Award from the North Jersey ACS Division
- Eli Lilly Award Grantee
- Camille Dreyfus Teacher-Scholar Award
- Alfred P. Sloan Research Fellowship
- NSF Young Investigator Award
- Dreyfus Foundation New Faculty Award

Costello awarded Michael L. Gross Award



Left to Right: Jody Redepenning, Catherine Costello, Eric Dodds

Professor Catherine E. Costello of Boston University was awarded the 2017 Michael L. Gross Award in Mass Spectrometry on October 20.

Costello is a William Fairfield Warren Distinguished Professor at Boston University in the departments of biochemistry, biophysics, and chemistry. She earned her B.A. at Emmanuel College (Boston, MA) and her Ph.D. at Georgetown University (Washington DC). She was a postdoctoral fellow with Professor Klaus Biemann at the Massachusetts Institute of Technol-

ogy and served as Associate Director of the MIT Mass Spectrometry Resource for more than 20 years. In 1994, Costello founded the BU School of Medicine Center for Biomedical Mass Spectrometry, an NIH Research Resource, where she continues to act as director. She is also the founder and director of the BU Cardiovascular Proteomics Center. Her research focuses on development and application of MS-based methods to study glycobiology, protein post-translational modifications and protein folding disorders, cardiovascular and infectious diseases, and bioactive lipids.

Costello has authored over 350 scientific papers and has earned several of the most prestigious awards in the field of mass spectrometry. These include the International Mass Spectrometry Foundation Thomson Medal Award (2009), the American Chemical Society Field and Franklin Award for Outstanding Achievement in Mass Spectrometry (2010), and the American Society for Mass Spectrometry Award for a Distinguished Contribution in Mass Spectrometry (2017). She is a fellow of the American Chemical Society (2011), a fellow of the American Association for the Advancement of Science (2016), the current president of the International Mass Spectrometry Foundation (since 2014), and a past president of both the American Society for Mass Spectrometry (2002-2004) and the Human Proteome Organization (2011-2012).

2017 Sommer Award presented to Roberts

Professor Richard W. Roberts of the University of Southern California became the eleventh recipient of the Nolan and Gloria Sommer Award on March 10, 2017.

Roberts is currently a professor and chair of the Mork Family Department of Chemical Engineering and Materials Science in the USC Viterbi School of Engineering. He holds the title of professor of chemistry in the Dornsife College of Letters, Arts, and Sciences; as well as a joint appointment in molecular computational biology and membership in the USC Norris Comprehensive Cancer Center. He is also the director of the USC Center for Peptide and Protein Engineering.

Roberts is a pioneer in methods of molecular recognition of nucleic acids and proteins and invented and patented mRNA display during his work with Nobel Laureate, Professor Jack Szostak.

His awards include the Presidential Early Career Award in Science and Engineering (PECASE), the Beckman Young Investigator Award, and the Alfred P. Sloan Foundation fellowship. He holds a B.S. in chemistry with honors and highest distinction from the University of Kansas and a Ph.D. in biophysical chemistry from Yale University, working with Professor Donald Crothers.

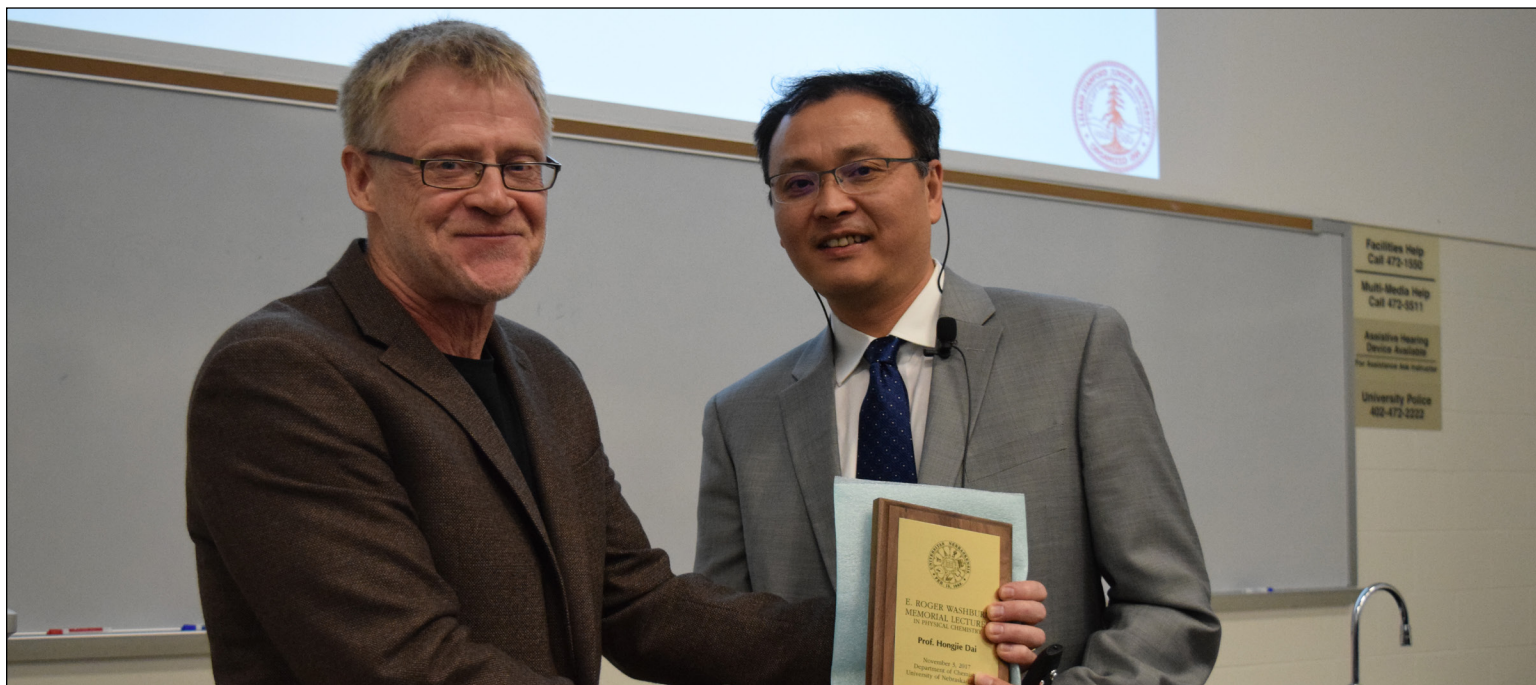


Richard Roberts

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Following his thesis, he performed postdoctoral research with Professor Jack Szostak at Harvard University Medical School/Massachusetts General Hospital, and then he joined the chemistry department at Caltech as an assistant professor.

In 2006, he moved to USC where his lab has worked on designing new peptides and proteins using mRNA display for diagnostic, biological, and therapeutic applications. This method enables the generation of vast libraries of polypeptides containing as many as 10 trillion individual sequences. These libraries are used in selection and directed evolution experiments to find novel ligands against interesting protein, nucleic acid, and small molecule targets.



Jody Redepenning & Hongjie Dai

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Dai delivers Washburn Award Lecture

Professor Hongjie Dai of Stanford University was presented the E. Roger Washburn Memorial Award in Physical Chemistry on November 3.

Dai received a B.S. in physics from Tsinghua University in 1989, a M.S. in applied sciences from Columbia University in 1991, and a Ph.D. in applied physics/physical chemistry from Harvard University in 1994. Dai is the J.G. Jackson and C.J. Wood Professor of Chemistry at Stanford University. He is a member of the National Academy of Sciences and a fellow of the American Academy of Arts and Sciences. Among other awards, Dai has received an APS James McGroddy Prize for New Materials, the ACS Pure Chemistry Award, the MRS Mid-Career Researcher Award, and the NIH Director's Pioneer Award.

Dai has made fundamental contributions to nanosciences, especially to novel carbon-based nanomaterials. Dai developed widely adopted chemical vapor depositions for carbon nanotubes; invented the first electrical nanosensors using nanotube transistors; pushed nanotube transistors to the ballistic limit; pioneered nano-carbon biological applications for novel imaging and therapy; and invented new electrocatalysts and the aluminum-ion battery. Dai has published more than 300 publications with Total Citation of 90,000 (ranked 7th in Chemistry by Thomson Reuters) and H-index of 130.

Honors & Awards

- NIH Director's Pioneer Award (2017)
- Member of the National Academy of Sciences (2016)
- R&D 100 Award for the Development of Ultrafast Aluminum Ion Battery (2016)
- MRS Mid-Career Researcher Award (2016)
- Honorary Chair Professor of the National Taiwan University of Science and Technology (2015)
- Fellow, AAAS (2010)
- Fellow, American Academy of Arts & Sciences (2009)
- The Ramabrahmam and Balamani Guthikonda Award at Columbia University (2009)
- American Physical Society James McGroddy Prize for New Materials (2006)
- Changjian Visiting Professorship, Tsinghua University, China (2005-2008)
- Julius Springer Prize for Applied Physics (2004)
- Camille Dreyfus Teacher-Scholar Award (2002)
- ACS Pure Chemistry Award (2002)
- Alfred P. Sloan Research Fellow (2001)
- Packard Fellowship for Science and Engineering (1999)
- Terman Fellowship, Stanford University (1998)
- Young Microscopist of the Year Award, from Molecular Imaging Co. (1998)
- Camille and Henry Dreyfus Faculty Award (1997)

Aldag and Haverkost win Applause Awards



Jamie Aldag was awarded the November 2016 Applause Award by the college. Her nominators said:

“Jamie ALWAYS has a smile on her face! She has been wonderful to work with and always has a positive attitude! She enjoys getting involved with the department - participating in

spirited fun as well. There has never been a time where I have seen her not smiling and taking a moment to talk with everyone. She is a breath of fresh air to the Chemistry department and is always going above and beyond to do her responsibilities which in turn, helps the department as a whole! I strongly nominate Jamie to receive this award!”

“If there is one phone call I expect every day in the lab, that would be from Jamie Aldag at purchasing department. She always inform us timely about our purchase and she is always patient with any questions we have about purchase, delivery and etc. It is my great pleasure to nominate Jamie for Applause Award. She deserves APPLAUSE for her kind and continuous support to our research!”

“Jamie does a great job helping me in the purchasing department and in the research stockroom. She's a joy to work with and she always has a pleasant and positive attitude every day. I know I can count on her to handle things when I'm away from the office on vacation or absent for the day. I went on vacation for three weeks recently and she ran the research stockroom and purchasing department during my absence and did a fantastic job keeping everything running smoothly. She's very good at organizing and processing purchase order changes, entering goods receipts, checking on back orders and solving issues with vendors and price increases. She also takes care of the students' needs in the stockroom and does the ordering for research labs supplies. She's a very good problem solver and team player and willing to help out where ever needed. She's very eager to learn new things and explore new possibilities. You can count on her to brighten up your day with her warm hello and friendly smile. Jamie is an asset to the chemistry department and she's a fantastic worker who deserves the applause award and recognition for her hard work and dedication!”

“For two years in a row Jamie has manned the purchasing helm while Rene has been gone on vacation. Keeping purchasing moving forward is generally a two person task. However, Jamie steps up each time to ensure that all of the chemistry department's purchasing needs are met. She does this all with a smile on her face and a can do attitude. Jamie is a fascinating person and I always enjoy my conversations with her. Not only does she do a great job with the work load but she also genuinely cares about those who work with her. Jamie is the type of employee who is deserving of an Applause. It is my honor to nominate her.”



Terry Haverkost won his Applause Award in August 2017. His nominators said:

“It is with great pleasure to nominate Terry for the Applause. Terry has been in Chemistry for over a year. In that time, he has been instrumental in the pre-award process for grant submissions.

Terry has provided his expertise as liaison with faculty to prepare their budgets, complete agency form pages, review of scientific narrative, and other facets required in submitting grants. He has also participated in the writing and information gathering for the APR. In and of itself, this exercise requires collecting of information and coordinating with the Chair for its final product. Terry tackles all tasks with a smile. He has a great sense of humor and is ready to tackle new projects (knitting !!!!). Recently, Terry organized a staff activity 'pie in the sky' prior to the solar eclipse, in which brought in pie to share. What a great place to work! Thanks Terry for all that you do for the department and university!”

“Terry has been a great addition to the Chemistry team. Terry is unusually bright and articulate, and he combines this with an outstanding work ethic and dedication to his position. To boot, he carries himself with humility and class. Terry is responsible for both identifying new funding opportunities that might be of interest to faculty or teams, and also for assisting with proposal development, especially for large proposals. Terry has taken it upon himself to learn the specializations of all of the faculty so that he is in a better position to seek out the funding opportunities. The results are apparent; we are all being made aware of RFPs (requests for proposals) that

Staff News

we would have otherwise missed. Whenever we reach out to Terry for help, he responds immediately, juggling parallel tasks almost seamlessly. His work is always precise and very professionally done.

On top of all this, Terry has very quickly integrated himself into the Chemistry Staff team; he is very well liked and the human chemistry is good! Terry is truly one of our most valuable players, please give him an Applause!"

"Terry has quickly become a very reliable partner to the Office of Sponsored Programs (OSP) when it comes to preparing and submitting grant proposals for the Department of Chemistry. His attention to detail and ability to quickly adapt makes him a great resource for OSP and the faculty he works with. Specifically, his work on a recent NSRI proposal was invaluable and the proposal (specifically the budget) would not have been submitted, at least not at the same level of quality, without his efforts. Please give him an Applause!"

Staff recognized for years of service to the university

We would like to thank our wonderful staff for their dedication to the department. In 2016 and 2017, a handful of our staff members were recognized for their years of service to the university. Congratulations! We appreciate everything our staff does!

2016

20 Years of Service

Peg Bergmeyer
Leanna Klempa

15 Years of Service

Rene Barfoot
Evan Meade

10 Years of Service

DeNeice Steinmeyer
Dodie Eveleth

5 Years of Service

Jun Wang

2017

40 Years of Service

Kate Shaner

Welcome to the department!



Rachel Dick
Office Associate
November 2017



Terry Haverkost
Strategic Research Funding Coordinator
May 2016



Zach Nelson
Supply Control Clerk
November 2016



Jessica Periago
Lab Manager
September 2016



Thomas Smith
Assistant Director for Research Instrumentation
August 2016



Robert Vencil
Recruiting & Communications Coordinator
September 2016

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Noteworthy New Funds

Edward K. and Mariann Chess Fund to support graduate fellowships
Reuben D. and Loretta I. Rieke Lectureship in Organometallic Chemistry

I want to support the department!

If you would like more information about specific needs of the department, such as graduate and undergraduate fellowships and scholarships, award lectureships, or research instrumentation, please contact:

Director of Development

Amber Antholz
(402) 458-1182 direct
(402) 432-3216 toll free
aanholz@nufoundation.org

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Name

Degree & year earned

Advisor

Current and past positions

Let us know of any significant events that have occurred in your life and/or career since leaving the university. Please feel free to send any photos!

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Designer, Editor, Writer, and Photographer

Melissa Lee, Tiffany Lee, Leslie Reed and Scott Schrage
Contributing Writers

Craig Chandler, Aaron Lindber, Greg Nathan, and Peta-Gaye Clachar
Contributing Photographers

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Editorial Correspondence

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