DEPARTMENT OF CHEMISTRY

UNIVERSITY OF NEBRASKA-LINCOLN

NC3 EAST WING INAUGURATION

Creating an environment that stimulates ideas

ALSO . . .

NSF CAREER award aids Sinitskii's nanoribbon research

F. Fleming Crim receives Jack Merski Memorial Award

ALUMNI & FRIENDS **NEWS**LETTER

Winter 2015

DEPARTMENT OF
CHEMISTRY
UNIVERSITY OF NEBRASKA-LINCOLN

For alumni and friends of the University of Nebraska–Lincoln's Department of Chemistry.

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Updates
Alumni members, you can update your contact information by visiting **http://chem.unl.edu/alumni-info-update**.

Support the Department

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

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Letter from the Chair

Fellow Nebraska Chemists,

It is a pleasure to write to you as we may have passed the tipping point here in Lincoln on Winter 2015/2016 – they are predicting weather in the 60's for the upcoming weekend. I hope that conjures up fond memories for all of you of beautiful, sunny winter days here in Lincoln, occasionally with spring-like temperatures, thanks to a dominant high pressure from the South.

Alumni have been a huge part of the equation around Hamilton Hall this Academic Year. The UNL Chemistry Industrial Advisory Board has recently welcomed nine new members, all UNL Chemistry Ph.D.s and all quite successful in the private and government laboratory sectors. The new IAB members are:

- Todd Eary (Exec. Director-Process Chem.-Avista Pharma; Ph.D. – Dussault)
- MariJean Eggen (Research Advisor/Group Leader-Eli Lilly; Ph.D. - Berkowitz)
- Edward C. Lawson (Senior Principal Scientist-Janssen; Ph.D. – Takacs)
- David L. Pugmire (Acting Group Leader-Los Alamos; Ph.D.-Langell)
- Peggy Ruhn (Bioanalytical Principal Investigator-Celerion; Ph.D.-Hage)
- Christian A. Sandstedt (VP, Optics R&D-Calhoun Vision; Ph.D.-Eckhardt)
- Weijun Shen (Principal Investigator-Calibr; Ph.D.- Berkowitz)
- John R. Swart (President/CEO -Exemplar Genetics; Ph.D. – Griep)
- Kevin R. Woller (Senior Scientist III/Group Leader-Abbvie; Ph.D.-Dussault)

All of these new members joined the following standing members for a highly energized IAB meeting this Fall semester on **December 11, 2015:** Gene Cordes (Chair, IAB), Ed Chess, Jim Lohr, Norton Peet, Paul Ries, Leonard Saari, Larry Middendorf, and Fred Wagner. The level of talent and experience in the room was impressive and palpable. The Nebraska Chemistry community is a powerful one.

The meeting was coupled with the official unveiling of the beautiful new space for the Nebraska Cluster for Computational Chemistry (NC3). This space was the former Chemistry Library space on 4th Floor East Wing. I hope that you all are able to return to the Department for the Spring Reunion (*vide infra*) to see this spectacular new research wing. The space is home to the research groups of Dean of the College of Arts and Sciences **Joseph Francisco**, Elmer H. and Ruby M. Cordes Chair of Chemistry; **Xiao Cheng Zeng**, Ameritas Professor of Chemistry; and **Hui Li**, Associate Professor of Chemistry; as well as **Jaeil Bai**, Research Assistant Professor of Chemistry.

This past Fall, the Department played host to two outstanding named lecturers. Namely, on **October 29 & 30, 2015**, **Professor David MacMillan**, of Princeton University, was in the house to deliver the **34th Cliff S. Hamilton Award Lecture**. MacMillan spoke of the power of chemistry to make new pharmaceuticals that truly save lives, and to do so with ever greater efficiency as catalytic chemistry continues to be developed. The 'revolution' in methodology development about which he spoke focused upon the burgeoning new area of photoredox catalysis to which he has so significantly contributed. We were honored to have Clif S. Hamilton, Jr. and Yvonne Hamilton, and Dr. Debra Hamilton among our presence for all of the festivities at the

Hamilton Lecture itself. We are so proud of the heritage that Cliff S. Hamilton built and believe that he would be proud today to see the strength in organic chemistry and chemical biology that remains so prominent in the Department.

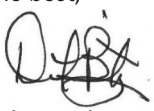
On **December 4, 2015**, we celebrated ***Experimental Physical Chemistry*** with the conferring of the **Merski Award** to **F. Fleming Crim**, Willard and Hilldale Professor of Chemistry at the University of Wisconsin, and also currently Head of the Mathematics and Physical Sciences (MPS) Directorate at the National Science Foundation. Dr. Crim was introduced by Professor Craig Eckhardt who recalled a young Crim coming through the Department as an Assistant Professor candidate as he launched his academic career. Crim gave an eloquent presentation on the selective excitation of specific vibrational modes in both the gas and liquid phases to probe and control chemical reactivity.

It has personally been great to be back in Lincoln full time, after my stint in Washington as NSF Chemistry Division Director. I want to especially thank **Jody Redepenning** who did an excellent job in leading the Department in my stead while I served at NSF-CHE in 2015. Jody and I are now back at the helm together, and working very closely with Business Manager **Dodie Eveleth** and Financial Manager **Kate Shaner** as an administrative team to conduct the daily business of this fine department. **Jim Takacs, Pat Dussault, Rebecca Lai** and **Eric Dodds** have all spearheaded large team grants that are currently pending at federal agencies, and for their tireless efforts to organize and galvanize these large teams to put forward excellent proposals, we are all grateful. There has also been change, with **Steve DiMagno** leaving the Department this spring to move to U. of Illinois-Chicago where his wife Susan Poser has already assumed the position of Provost. It has been a great run with Steve as a dedicated and very creative colleague and we wish him great success on his new endeavors.

That said, there is tremendous energy in the Department with the UNL Chemistry junior faculty pushing the research boundaries back, and doing so in key priority areas of the Department and the University. On the ***Chemical Education*** side, **Marilyne Stains** is tearing it up, bringing evidence-based teaching methods to the attention of STEM faculty across the University and the Nation, and examining how these are most effectively implemented in the classroom. On the ***Chemical Biology/Bioanalytical Chemistry*** side, **Jiantao Guo** is taking unnatural amino acid mutagenesis (UAAM) to new levels with efforts to both expand the genetic code with quadruplet codons and to establish a UAAM-controlled live-attenuated HIV for vaccine development. **Eric Dodds** is developing fundamentally new MS-based methods for glycoscience, including the ability to distinguish isomeric carbohydrates, utilizing the clever combination of metalation, ion mobility-MS and electron transfer dissociation. **Cliff Stains** is carving out a niche for himself and his group in ***Supramolecular Chemical Biology***, including tailored molecular systems for reporting on specific kinase and phosphatase activities, for detecting protein aggregation and for building new signaling pathways. On the ***Materials Chemistry*** side, **Alex Sinitskii** is developing bottom-up syntheses of graphene nanoribbons, nitrogen-doped graphene sheets and transition metal chalcogenides as emerging, but underexplored, low dimensional inorganic materials. **Steve Morin** is exploring the construction of hybrid soft/hard materials and developing mechano-switchable systems.

The entire Department came together for the annual PLU-sponsored welcoming picnic in Waverly in the Fall (the grad student team defeated the faculty/staff team in softball yet again!), the PLU holiday party in December (the Lai & Morin groups win for most creative gifts!) and for the extensive Chemistry Day activities in Hamilton Hall. There are great opportunities to interact with your fellow Nebraska chemistry alumni at the events listed below, and you are always welcome back here in HaH! I hope that you will have an opportunity to visit the Department – please let us know when you will be in the neighborhood!

All the best,



David B. Berkowitz, Willa Cather Professor & Department Chair

P.S. Please circle two key dates for Alumni reunions:

***April 22-23, 2016 - UNL Chemistry Alumni Reunion –Lincoln, NE. Pill-Soon Song**, Professor Emeritus and former Dow Chemistry Professor of Chemistry and Department Chair will be the guest of honor, and many of his alumni will be in the house to celebrate Pill's return to Lincoln.*

***August 21-25, 2016 - Nebraska Chemistry Alumni Reception** to be held in conjunction with the **Fall 2016 ACS Meeting** in **Philadelphia** – this is growing into a great tradition. Stay tuned for more details.*

2016 Chemistry Alumni

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Save the Date | April 22-23, 2016

Join us as we celebrate
"100 Years of Doctoral Research in Chemistry,"
in honor of George Borrowman, whose 1916 Ph.D. thesis
was titled, "The Clays of Nebraska."

Come back to campus, meet up with former professors
and classmates, and take part in all of the exciting
activities we have planned!

Former faculty member Dr. Pill-Soon Song
will be our special guest.

YEARS
of Doctoral Research in Chemistry

INSIDE

FACULTYNEWS

Berkowitz and Rajca named AAAS Fellows

Professor David Berkowitz, Willa Cather Professor of Chemistry and Department Chair, and Professor Andrzej Rajca, Charles Bessey Professor of Chemistry, were named fellows of the American Association for the Advancement of Science (AAAS).

Prof. Berkowitz was recognized for his contribution to chemical biology and synthetic chemistry and Prof. Rajca for his contribution to organic materials, especially for developing high-spin organic molecules.

Berkowitz's research focuses on the interface between protein biochemistry and organic chemistry. His contributions have led to innovative tools that aid researchers in synthetic chemistry and chemical biology, with implications for therapeutic drug development.

His research involves designing molecules that bind to specific macromolecules or can be incorporated into protein structure to alter function. One designer molecule became an invaluable tool in unraveling phosphorylation mechanisms important in tumor suppression and melatonin production.

Conversely, Berkowitz's research also uses enzymes as tools to facilitate discoveries of new reactions and catalysts. His research team invented the *In Situ* Enzymatic Screening approach, which exploits enzymes to obtain real-time information about organic reactions. This technique has led to finding useful new chemical transformations and catalysts.

"It's a tremendous honor," Berkowitz said of his AAAS fellowship. "We do this as a team. It's recognition that our work has impact beyond the state of Nebraska and beyond the field of chemistry, and that's very gratifying."

Chemist Andrzej Rajca's research focuses on organic magnetic materials. His work has contributed significantly toward improving biomedical imaging and creating tools to better understand proteins and related diseases.

MRIs often rely on injecting patients with potentially harmful *metal-based* contrast agents to produce sharper images. Rajca's research team has developed a safer *organic* alternative proven successful in mice trials.

Rajca's team also helped develop new nanoparticles that can simultaneously perform both MRI and fluorescent imaging. The material could help scientists track specific metabolites *in vivo,* monitor a tumor, or determine whether drugs have successfully reached their targets. The work is collaborative with the Massachusetts Institute of Technology.

In other research, Rajca's team has developed spin labels that work at room temperature. The labels, organic probes bearing unpaired electrons, will facilitate the study of protein structure and function. Such tools have the potential to advance knowledge of and therapies for protein-related diseases.

Gillian Klucas
Research and Economic Development

Professors Berkowitz and Rajca join AAA Fellows Professor Xiao Cheng Zeng (2007), Ameritas University Professor of Chemistry; Professor Joseph Francisco (2001), Dean of College of Arts and Sciences and Elmer H. and Ruby M. Cordes Chair in Chemistry; and Professor Reuben Rieke (1996); Emeritus Professor of Chemistry, giving the Department of Chemistry a total of five of the forty one AAAS fellows from the state of Nebraska. Congratulations!

Alexander Sinitskii

NSF CAREER Award aids Sinitskii's nanoribbon research

Graphene has garnered much attention for its potential to improve electronics, solar cells and other devices. Assistant Professor Alexander Sinitskii is using his breakthrough graphene production technique to put the promising nanomaterial to the test.

Sinitskii has earned a five-year, $538,477 Faculty Early Career Development Program Award from the National Science Foundation to investigate graphene's properties. These prestigious grants, known as CAREER Awards, support pre-tenure faculty who exemplify the role of teacher-scholars through outstanding research, excellent education and the integration of education and research.

Sinitskii is capitalizing on a technique he developed to create atomically precise graphene nanoribbons, ultra-narrow bands of one-atom thick sheets of carbon. He and his team build the ribbons from the bottom up, using organic chemistry techniques to couple smaller molecules together.

That level of precision allows Sinitskii to create nanoribbons with different widths and edges, such as adding nitrogen or hydrogen atoms. Now he's investigating how these differing characteristics influence the nanoribbons' properties.

Scientists have studied graphene nanoribbons theoretically for many years. These studies predicted that physical properties of nanoribbons strongly depend on their structural parameters.

Craig Chandler | University Communications

"But until recently there were no synthetic techniques to make those materials and test the predictions. Now we have an opportunity to study graphene nanoribbons experimentally and confirm their predicted properties," said Sinitskii, a member of both UNL's Nebraska Center for Materials and Nanoscience and its NSF-funded Materials Research Science and Engineering Center.

Understanding changes in nanoribbon properties will help Sinitskii and others design materials with the best performance for diverse applications.

For example, graphene is touted for its conductivity. But is such a good conductor that it is hard to control for use in electronics. Sinitskii's nanoribbons are able to harness graphene's conductivity for use as a semiconductor in electronics. He will experiment with various nanoribbon characteristics to test and optimize its semiconductive potential.

Graphene nanoribbons also have photovoltaic properties. Creating a variety of nanoribbons capable of absorbing photons from a wide range of sunlight wavelengths could improve solar cell efficiency, he said.

Fuel cells may benefit from graphene nanoribbons as well. Fuel cells generate electricity from the energy in fuel through a chemical reaction. The nanoribbons can act as a catalyst to speed up certain reactions, improving fuel cell efficiency. Preliminary evidence suggests adding nitrogen atoms to the edges of the nanoribbons improve their catalytic properties.

Sinitskii plans to develop prototype devices incorporating graphene nanoribbons. "We will synthesize different varieties of graphene nanoribbons and test them for applications in electronics, photovoltaics and catalysis," he said.

With the CAREER Award, Sinitskii also will develop new nanoscience courses and conduct outreach activities to promote graduate, undergraduate and high school student education in materials chemistry and nanofabrication.

Gillian Klucas
Research and Economic Development

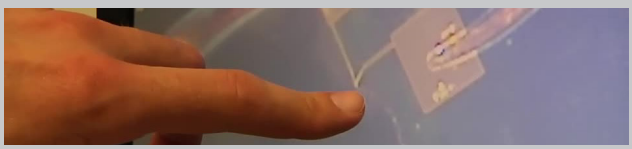
Vo, T. H.; Shekhirev, M.; Kunkel, D. A.; Morton, M. D.; Berglund, E.; Kong, L. M.; Wilson, P. M.; Dowben, P. A.; Enders, A.; Sinitskii, A. Large-Scale Solution Synthesis of Narrow Graphene Nanoribbons. *Nat. Commun.* **2014**, *5*, pp 3189. DOI: 10.1038/ncomms4189

Vo, T. H.; Shekhirev, M.; Kunkel, D. A.; Orange, F.; Guinel, M. J. F.; Enders, A.; Sinitskii, A. Bottom-up Solution Synthesis of Narrow Nitrogen-Doped Graphene Nanoribbons. *Chem. Commun.* **2014**, *50*, pp 4172-4174. DOI: 10.1039/C4CC00885E

Vo, T. H.; Perera, U. G. E.; Shekhirev, M.; Mehdi Pour, M.; Kunkel, D. A.; Lu, H.; Gruverman, A.; Sutter, E.; Cotlet, M.; Nykypanchuk, D.; Zahl, P.; Enders, A.; Sinitskii, A.; Sutter, P. Nitrogen-Doping Induced Self-Assembly of Graphene Nanoribbon-Based Two-Dimensional and Three-Dimensional Metamaterials. *Nano Lett.* **2015**, *15*, pp 5770-5777. DOI: 10.1021/acs.nanolett.5b01723

Putting graphene to the test

Graphene has the potential to improve electronics, solar cells and other devices. Learn how Assistant Professor Alexander Sinitskii is testing this promising nanomaterial with a $538.5K National Science Foundation CAREER Award. https://youtu.be/11AxpzITWAA



About the award

Funding Agency: NSF
Title: CAREER: Narrow Graphene Nanoribbons with Tunable Electronic Properties
Award Amount: $538.5 K
PI: Alexander Sinitskii

Chemists measure aggregation of disease-related proteins

Predators looking to snack on deep-sea shrimp sometimes encounter a surprise: clouds of blinding blue light that their prey spew as a distraction before bolting for new hiding spots in the jet-black depths.

A new study from Assistant Professor Cliff Stains and his colleagues has shown how the enzyme that sparks these bioluminescent fireworks can be used to monitor human diseases that include Alzheimer's, Parkinson's and Type 2 diabetes.

The new screening technique uses self-assembling fragments of the enzyme to measure a potentially toxic process known as protein aggregation in living cells. Using its new system, the team hopes to see the light: The less aggregation occurring within a cell, the brighter the system glows blue.

As workhorses of the cell, proteins naturally fold into specific three-dimensional forms that dictate their functions. However, these proteins sometimes misfold – the biological equivalent of an origami crane mutating into a bulldog – which leads them to clump together, or aggregate. Previous research has linked the protein aggregation process with multiple diseases.

Stains and his colleagues demonstrated that their technique can quickly test compounds that might prevent this aggregation and potentially combat the diseases associated with it. The technique could potentially screen tens of thousands of compounds in a single day, Stains said.

"The idea is that we're going to generate genetically encodable libraries of a few hundred thousand compounds," said Stains. "Then we're going to screen these compounds against aggregating proteins to see if we can find any that decrease the aggregation potential.

Peta-Gaye Clachar

Assistant Professor Cliff Stains (right) engages with his colleagues as they explore science. From L-R is: JR Beck, Xinqi Zhou, Garrett Casey, Emma Zhao, Travis Nelson, Tiffany Truong, Camden Bilyeu, and Maia Kelly.

"We can visualize tens of thousands of cells on a plate and just look for the most luminescent one. This will allow us to screen really large compound libraries pretty rapidly."

Unlike many of its predecessors, the team's approach can accomplish this within living mammalian cells – an important advancement that offers a better sense of how drug-like compounds might behave in a biological setting, Stains said.

The team's technique involves splitting a bioluminescent enzyme into two pieces, significantly reducing its luminescence. Given the opportunity, however, these enzyme fragments will spontaneously snap back together and shine just as brightly as before.

Knowing that protein aggregation interrupts this reassembly, the researchers attached one enzyme half to an aggregation-prone protein. When that aggregation occurs, the lights remain dimmed; when it doesn't, the blue luminescence returns.

The result: A hyper-efficient, intuitive readout system that allows them to identify molecules that reduce the aggregation potential of a protein. The system also serves as a convenient platform for addressing important questions about the protein aggregation process, according to Stains. The team has already begun triggering random mutations in proteins of interest and identifying those that lead to aggregation.

"What residues in a protein are really essential for aggregation? What is the mechanism (that drives) aggregation? We can ask those kinds of fundamental science questions with our new technique," Stains said.

The team's study appeared in the journal *ACS Chemical Biology*. Stains co-authored the paper with doctoral students Jia "Emma" Zhao and Travis Nelson, who is a fellow of UNL's Molecular Mechanisms of Disease Program. Undergraduate students Quyen Vu and Tiffany Truong also contributed to the research through UNL's UCARE Program, and the UNL Distinguished Life Sciences Scholar Program, respectively.

Scott Schrage
University Communications

Zhao, J.; Nelson, T.J.; Vu, Q.; Truong, T.; Stains, C.I. Self-Assembling NanoLuc Luciferase Fragments as Probes for Protein Aggregation in Living Cells. *ACS Chem. Biol.* **2016**, *11*, 132-13. DOI: 10.1021/acschembio.5b00758

Study models new atomic structures of gold particles

They may deal in gold, atomic staples and electron volts rather than cement, support beams and kilowatt-hours, but chemists have drafted new nanoscale blueprints for low-energy structures capable of housing pharmaceuticals and oxygen atoms.

Led by Xiao Cheng Zeng and former visiting Professor Yi Gao, new research has revealed four atomic arrangements of a gold nanoparticle cluster. The arrangements exhibit much lower potential energy and greater stability than a standard-setting configuration reported last year by a Nobel Prize-winning team from Stanford University.

The modeling of these arrangements could inform the cluster's use as a transporter of pharmaceutical drugs and as a catalyst for removing pollutants from vehicular emissions or other industrial byproducts, Zeng said.

Zeng and his colleagues unveiled the arrangements for a molecule featuring 68 gold atoms and 32 pairs of bonded sulfur-hydrogen atoms. Sixteen of the gold atoms form the molecule's core; the remainder bond with the sulfur and hydrogen to form a protective coating that stems from the core.

Differences in atomic arrangements can alter molecular energy and stability, with less potential energy making for a more stable molecule. The team calculates that one of the arrangements may represent the most stable possible structure in a molecule with its composition.

"Our group has helped lead the front on nano-gold research over the past 10 years," said Zeng, the Ameritas University Professor of Chemistry. "We've now found new coating structures of much lower energy, meaning they are closer to the reality than (previous) analyses. So the deciphering of this coating structure is major progress."

The researchers reported their findings in the April 24 edition of *Science Advances*, an online journal from the *American Association for the Advancement of Science*.

Xiao Cheng Zeng

Craig Chandler | University Communications

The structure of the molecule's gold core was previously detailed by the Stanford team. Building on this, Zeng and his colleagues used a computational framework dubbed "divide-and-protect" to configure potential arrangements of the remaining gold atoms and sulfur-hydrogen pairs surrounding the core.

The researchers already knew that the atomic coating features staple-shaped linkages of various lengths. They also knew the potential atomic composition of each short, medium and long staple – such as the fact that a short staple consists of two sulfur atoms bonded with one gold.

By combining this information with their knowledge of how many atoms reside outside the core, the team reduced the number of potential arrangements from millions to mere hundreds.

"We divided 32 into the short, middle and long (permutations)," said Zeng, who helped develop the divide-and-protect approach in 2008. "We lined up all those possible arrangements, and then we computed their energies to find the most stable ones.

"Without those rules, it's like finding a needle in the Platte River. With them, it's like finding a needle in the fountain outside the Nebraska Union. It's still hard, but it's much more manageable. You have a more narrow range."

The researchers resorted to the computational approach because of the difficulty of capturing the structure via X-ray crystallography or single-particle transmission electron microscopy, two of the most common imaging methods at the atomic scale.

Knowing the nanoparticle's most stable configurations, Zeng said, could allow biomedical engineers to identify appropriate binding sites for drugs used to treat cancer and other diseases. The findings could also optimize the use of gold nanoparticles in catalyzing the oxidation process that transforms dangerous carbon monoxide emissions into the less noxious carbon dioxide, he said.

Zeng and Gao co-authored the study with Wen Wu Xu, who works with Gao at the Shanghai Institute of Applied Physics. The team, which received support from the U.S. Army Research Laboratory and UNL's Nebraska Center for Energy Sciences Research, performed most of its computational analyses through the Holland Computing Center.

Scott Schrage
University Communications

Xu, W. W.; Gao, Y.; Zeng, X. C. Unraveling Structures of Protection Ligands on Gold Nanoparticle $Au_{68}(SH)_{32}$. *Sci. Adv.* **2015**, *1*, e1400211. DOI: 10.1126/sciadv.1400211

Patrick Dussault, Charles Bessey Professor of Chemistry (center), looks at a thin layer chromotography (TLC) plate with his students in the lab. From left to right: Schuyler Chamb

NSF grant to support new paradigm for ether synthesis

Patrick Dussault, Charles Bessey Professor of Chemistry, has earned a National Science Foundation grant to explore new methods for synthesizing organic ethers broadly construed.

Organic ethers have been widely used as surgical anesthetics and fuel additives. They also serve as structural components of pharmaceutical drugs, polymers and other synthetic materials.

Dussault aims to update the ether cookbook by expanding the slim chapter on organic peroxides, utilizing these as reagents for ether synthesis in an "umpolung" approach.

Conventional ether synthesis has relied on reactions between nucleophilic oxygen atoms – those inclined to share their electrons – and electrophilic carbon atoms that accept them. The flipped or "umpolong" approach entails reacting carbanions with the electrophilic oxygen atoms found in the organic peroxides.

"We want to completely reverse the normal polarity order in which people make ethers," said Dussault. "What we're trying to do is ... add a valuable new synthetic tool by showing that you can take advantage of this.

"It's always nice to have a different tool, because different tools work for different purposes. There are classes of molecules where the traditional way doesn't work very well. Interestingly, our way often seems to work remarkably well for those."

Peta-Gaye Clachar

ers, Abigail Jameson, Moriah Locklear, Alissa Horn, and Anna Diepenbrock.

The new synthesis approach seeks to capitalize on the unusual nature of peroxides, which feature two oxygen atoms whose mutual bond makes them uncharacteristically unstable and hungry for the electrons offered by carbon atoms.

"We're trying to tame the reactivity of peroxides and apply it to a fairly important kind of bond formation in chemistry," Dussault said. "Bond formation, to chemists – and to people who make drugs and fertilizers and whatever else – is kind of akin to structural elements for engineers. If you want to build a certain (structure), you have to be able to form certain bonds." Though chemists have known about the flipped polarity of the peroxide-carbanion reaction for some time, they have generally considered it an impractical curiosity, Dussault said. He and colleague Keith Kuwata, a Theoretical Chemist from Macalester College, are aiming to gain a better grasp of peroxide reactivity and the mechanisms that control ether bond formation.

Preliminary results support their hope that the peroxide-to-ether conversion can be developed into a reliable and high-yielding reaction, he said.

The researchers are also looking to hone their control over reactions of non-symmetric peroxide molecules, which feature different atomic groups on either end. Historically, chemists have successfully introduced carbanions on only the less crowded end of such molecules. However, Dussault and Kuwata have found that peroxides bearing certain groups will react as expected no matter how crowded one end happens to get.

"That's pretty valuable, because the construction of a molecule may require you to know that you can selectively deliver one or the other oxygen (atom) of a peroxide," Dussault said. "We think we can achieve that type of complete control.

"But we don't completely understand this. We're collaborating because we're not quite sure why it's all working the way it is."

Dussault will also use the NSF funding to create a website for researchers interested in working with or learning more about peroxides, some of which can be dangerously unstable.

This reputation for instability has led fellow researchers to regularly contact Dussault about best practices for safely handling peroxides, he said. It's inspired him to develop a digital warehouse of guidelines, tips and answers to common questions.

"What we're trying to do is simply ... start grouping the safety literature that we think is relevant," said Dussault, who has worked with peroxides for more than 20 years. "We're trying to put down a middle ground and say, 'Here's what we do in our group. Here are the things that we would be comfortable doing and the things we would not be comfortable with.' We're going to be putting up information and updating it very regularly."

Scott Schrage
University Communications

Kyasa, S-K.; Meier, R. N.; Pardini, R. A.; Truttman, T. K.; Kuwata, K. T.; Dussault, P. H. Synthesis of Ethers via Reaction of Carbanions and Monoperoxyacetals. *J. Org. Chem.* **2015**, *80,* pp 12100. DOI: 10.1021/acs.joc.5b02043

Kyasa, S. K.; Dussault, P. H. Synthesis of S,S,O-Orthoesters and Difluoroalkyl Ethers via Reaction of Peroxide Electrophiles with Lithiated 1,3-Dithianes. *Org. Lett.* **2014**, *80*, pp 5235–5237. DOI:10.1021/ol502726p

Willand-Charnley, R. W.; Puffer, B. W.; Dussault, P. H. Intramolecular Reaction of Carbanions and Peroxides: an Umpoled Approach to Cyclic Ethers. *J. Amer. Chem. Soc.* **2014**, *136,* pp 5821-3. DOI: 10.1021/ja5026276

About the award

Funding Agency: NSF
Title: A New Paradigm for Ether Synthesis
Award Amount: $390K
PI: Patrick Dussault
Co-PI: Keith Kuwata (Macalester College)

Hage and Zheng receive international accolades for bioanalytical chemistry

On Nov. 17, David Hage, Charles Bessey Professor & James Hewett University Professor of Chemistry, stepped before a large group of his peers to accept recognition for a research career that has spanned more than 25 years.

The next day, nearly 4,000 miles and an ocean away, his postdoctoral advisee received kudos for a promising start to her own.

Hage accepted the 2015 Award for Outstanding Achievements in Separation Science at the Eastern Analytical Symposium in Somerset, New Jersey. The award honored Hage's efforts to advance techniques that include high-performance affinity chromatography, which uses biological agents such as antibodies and proteins to analyze and separate chemical compounds.

His work has helped isolate drugs, hormones and other compounds from complex samples at extremely fast rates. This has allowed Hage's research group to characterize the behavior of pharmaceutical drugs in individual patients, including the extent to which drugs bind with proteins in those contending with diabetes and other diseases.

That research group includes Xiwei "Emmi" Zheng, who earned her doctorate under Hage's guidance earlier this year and has since worked as a postdoctoral fellow in his lab. Zheng spent Nov. 18-20 at the European Bioanalytical Forum's annual symposium in Barcelona, Spain, where she received the 2015 Young Investigator Award from the peer-reviewed journal *Bioanalysis*.

Zheng earned the award over finalists from the University of California-Irvine Medical School, the Missouri University of Science and Technology, and the University of Washington.

"It was a surprise to me," Zheng said.

Peta-Gaye Clachar

Xiwei "Emmi" Zheng (left) and David Hage in the lab. Dr. Hage and Emmi make a great team!

"I even double-checked the notification email to make sure that I was reading it correctly. All of the other finalists had very strong backgrounds. I feel so fortunate to have received the honor."

Hage, who nominated Zheng for the award, was less surprised by the outcome.

"Emmi is a hard-working young scientist who has been extremely productive in her research," said Hage. "I knew she was quite deserving of this award and was glad to see that her peers in the research community ... had also reached this decision."

Zheng's research has likewise focused on describing interactions between pharmaceutical drugs and blood-based proteins, which largely determine how the body absorbs and metabolizes the drugs.

While at UNL, Zheng has developed a novel technique that substantially reduces the amount of time and sample volumes needed to examine these interactions. The new approach simultaneously measures several drug-protein dynamics that previously required separate techniques to analyze, allowing researchers to determine the bloodstream's ratio of protein-bound and unbound drugs. The latter form represents the portion that can be absorbed by the body, making this information critical to the development of effective and even individualized drugs.

Zheng credited Hage's combination of patience, flexibility and creativity with helping her achieve so much so early in her career.

"Dr. Hage has a strong professional background and has always come up with great ideas that give me a good direction to start my research," Zheng said. "He is also open to new ideas for experiments from his students.

"I am very grateful to be his student and to have been able to work under his guidance."

Scott Schrage
University Communications

Researchers explain why nanotubes prefer potassium to sodium

It's a counterintuitive finding that has puzzled researchers: Why do bigger atoms sometimes fare better at passing through the smallest of channels?

Researchers have co-authored a new study that helps reveal the chemistry behind the mystery, offering answers that may inform efforts to purify water and transport pharmaceutical drugs.

The study modeled the behavior of water-carried potassium and sodium ions – positively or negatively charged atoms – in artificial channels similar to those that regulate the passage of ions throughout cells in the body.

Biochemists have largely explained the workings of natural ion channels, which help balance the highly charged cocktail of potassium, sodium and other electrolytes that keep the heart pumping and nerves firing.

As reported in the journal *Proceedings of the National Academy of Sciences*, Xiao Cheng Zeng and Joseph Francisco led a study of two synthetic counterparts that could be used to filter or detect nanoparticles.

The team found that the smaller sodium ions accumulate more stable, robust "hydration shells" – essentially coats of water molecules – than do the larger potassium ions. Whereas potassium ions take on a single, short-lived shell, sodium ions attract two shells of molecules that forge longer-lasting bonds.

This extra baggage means that sodium ions require more energy to move from large volumes of water to the gateway of an ion channel. Even if they reach it, Zeng said, their shells can slow or even impede their migration when the water molecules begin binding even more tightly in the nanoscopically small tunnels.

In contrast, the size of the larger potassium ions can actually work in their favor, Zeng said. Because these ions occupy more of the channel, they tend to shuck off some of their looser water molecules as they enter, he said.

Having worked for years in a football-crazed state, Zeng compared the potassium ion to an offensive lineman and the sodium to a running back. The former tends to receive attention from fewer, less intense followers, while the latter often gets swarmed by autograph-seeking fanatics, he said.

"So when the running back moves through the tunnel, he has to work through a lot of surrounding fans who won't let go very easily," said Zeng, the Ameritas University Professor of Chemistry. "It's harder for him to move, or maybe he doesn't have as much strength to move the fans. On the other hand, the lineman is bigger; when he goes into the tunnel, some of the fans have to move aside to make room."

Zeng and Francisco, the Dean of UNL's College of Arts and Sciences, examined this ion selectivity in numerous carbon nanotubes and a synthetic organic nanopore that was co-developed by Zeng in 2012. The carbon nanotubes boast a smooth interior but are difficult to fabricate in a uniform size; the organic nanopore features a jagged interior of dangling molecules but can be produced with extreme precision.

After modeling various scenarios through the Holland Computing Center, the authors pinpointed a carbon nanotube configuration that is about 20 times better than the organic nanopore at selecting potassium while blocking sodium. The team designated it "likely one of the best" artificial nanochannels for this purpose.

According to Zeng, these nanochannels could eventually become viable candidates for the desalination of saltwater, an ever-appealing option as the world's population continues to rise and its sources of freshwater diminish. They might also assist the removal of contaminants in drinking water, he said.

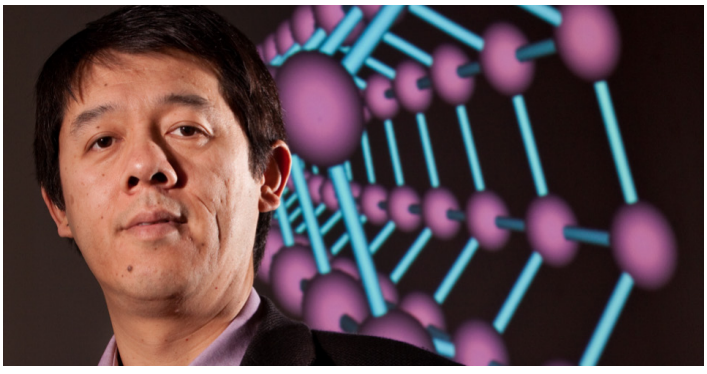
The channels could further lead to more precise transportation of pharmaceutical drugs, Zeng said, particularly as researchers explore how to design channels that filter or select species beyond potassium and sodium.

"Filtering a greater variety of ions is certainly one goal for us," said Zeng. "We're collaborating with other institutions to functionalize the inner surfaces of these pores and study the effects of different surface designs on selective ion transport."

Zeng and Francisco co-authored the study with Hui Li, a former UNL Postdoctoral Researcher now at the Chinese Academy of Sciences. The team received support from the National Science Foundation and the National Science Foundation of China.

Scott Schrage
University Communications

Li, H., Francisco, J. S.; Zeng, X. C. Unraveling the Mechanism of Selective ion Transport in Hydrophobic ubnanometer Channels. *Proc. Natl. Acad. Sci. U.S.A.* **2015**, *112*, pp 10851-10856. DOI: 10.1073/pnas.1513718112



Xiao Cheng Zeng

Stephen Morin

Researchers build, morph chemical patterns on stretchable surfaces

With just a slight stretch of the imagination – and some elastic material – researchers have shown how to create microscopic chemical patterns whose flexibility could extend from the physical to the functional.

In a new study, the authors detail a method for synthesizing hundreds of chemically based shapes in any conceivable pattern on silicone rubber films. The study also outlines multiple potential applications for the technique, which could prove useful in areas ranging from chemistry and circuitry to optics and textiles.

The team's technique involves oxidizing the material's surface before attaching amines, ammonia-derived molecules that react with many of the signature atomic groups found in commercially available chemicals.

After "drawing" a honeycomb pattern with the amines, the researchers deposited tiny liquid droplets of a chemical compound onto the silicone and watched as they dutifully filled the hexagonal rows outlined by the pattern.

By stretching the silicone film either before or after depositing the liquid, the researchers also demonstrated the ability to morph the size, shape and density of the chemical pattern and its individual droplets. The team found that the pattern quickly reverted to its original form when the material was relaxed to its natural state.

"Anyone who has written a message on a rubber band is familiar with what happens when you stretch it," said Stephen Morin, Assistant Professor and the study's lead author. "In a sense, what we have done here is analogous – but instead of ink from a marker, we have written our message by selectively attaching molecules to form patterns."

The use of an elastic material affords far more literal and figurative versatility when compared with the more labor-intensive techniques for modifying patterns on rigid surfaces, Morin said.

"While looking through the (research) literature, we were very surprised to see that there was very little to none that actually coupled the mechanical properties of rubber with its surface-chemical properties," he said. "We are excited by the

Craig Chandler | University Communications

possibilities. The manipulation of these tiny droplets presents a number of opportunities that haven't been shown before."

Having such rapidly reversible control over the chemistry of a surface could point researchers and engineers toward new ways of controlling material properties, behaviors and applications.

The ability to easily morph patterns, for example, might reduce the number of masks needed to filter the light exposures that define circuit layouts in computational components. With more research, it could even allow engineers to fabricate designs at scales smaller than they can easily achieve using current methods, Morin said.

"We can use a single mask as a template for our chemical pattern, but by changing the stress in the material relative to the pattern of the mask, we can access different families of patterns," Morin said. "When you define a pattern (while stretching the film) and then release the material, the features have to get smaller. So you actually can get higher feature density … more simply than by fabricating an entirely new mask."

Morin said the technique could also be used to organize arrays of liquid micro-lenses. Micro-lens arrays can improve the efficiency of optical detectors to produce high-quality digital images favored in professional photography and medicine.

"Because we can contort the shape of the droplet, we can also easily change the focal length and other properties of the lenses," Morin said.

The team further showed that it could make droplets evaporate 10 times faster than usual by continuously stretching and relaxing its underlying material. The researchers believe this motion speeds evaporation partly by driving a rapid exchange of molecules between the droplet's interior and its surface.

This molecular-mixing capacity could make the technique an appealing alternative to a laboratory staple known as the micro-plate, a rigid surface dimpled with small wells that act as miniature test tubes. Chemists often use these plates to mix compounds whose reactions can help characterize the makeup of a chemical or pinpoint markers of disease, among many other uses.

Morin said chemists could potentially employ the droplets as even smaller wells that accelerate reactions and reduce the amount of compound needed for each sample.

"It's hard to assemble a precise array of really small droplets; there are actually robots that are designed to do this," he said. "But this is a way of assembling something (similar) by simply stretching and releasing a rubber band."

The study's results also suggested that stretching and relaxing such chemically patterned materials could change other properties – including the attraction or repellence to water – that further hint at the technique's wide-ranging potential.

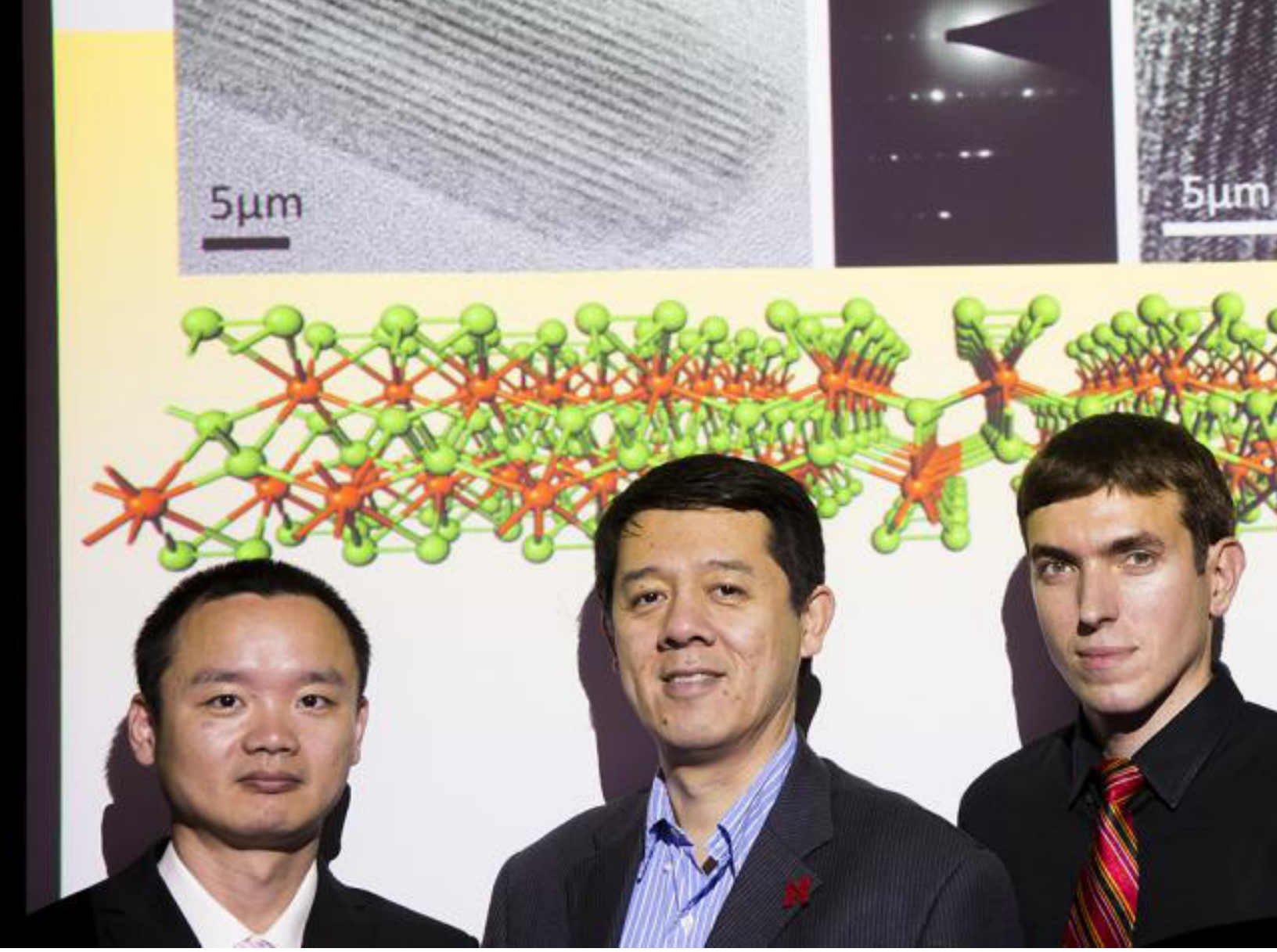
"It's going to be interesting to see how the mechanics of soft materials can be coupled with the chemistry on their surfaces to control different types of processes," Morin said. "If nothing else, this illustrates that something as simple as a rubber band that you played with in elementary school can actually do some pretty interesting things."

The team's study appeared in the journal *Advanced Functional Materials*. Morin authored the study with John Bowen and Jay Taylor, graduate students in Chemistry, and Christopher Jurich, a 2015 graduate of Lincoln East High School.

The team received funding from the National Science Foundation, UNL's Nebraska Center for Materials and Nanoscience, and the University of Nebraska Foundation.

Scott Schrage
University Communications

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. Funct. Mater.* **2015**, *25*, pp 5520-5528. DOI: 10.1002/adfm.201502174



From L-R: Jun Dai, Postdoctoral Researcher; Xiao Cheng Zeng, Ameritas University Professor of Chemistry; Alexander Sinitskii, Assistant Professor of Chemistry; and Alexey Lipato

New 2-D material's properties show promise

One completed a series of theoretical calculations to predict its properties with the help of a massive computing center. The other grew it in bulk before waxing its atom-thin whiskers with the assistance of adhesive tape.

Together, Xiao Cheng Zeng and Alexander Sinitskii have demonstrated that a compound called titanium trisulfide could surge toward the fore of two-dimensional materials that are gaining popularity among designers of microelectronics.

The rise of 2-D materials – sheets no more than a few atoms thick – began with the 2004 demonstration of graphene, which remains the strongest and thinnest material known.

Zeng and Sinitskii have published two recent studies showing that titanium trisulfide compares favorably not only with graphene, but also phosphorene and molybdenum disulfide – fellow 2-D materials that have shown great promise for electronic applications.

"There was no interest in the properties of few-layer titanium trisulfide until now," said Zeng, the Ameritas University Professor of Chemistry. "We were among the first to look at them, and we've been very excited by what we've seen."

Zeng's theoretical study revealed that 2-D titanium trisulfide has the potential to transport electrons faster than phosphorene and molybdenum disulfide. This "electron mobility" helps dictate the speed of transistors, the devices that control electric current and amplify electrical power in technology ranging from cellphones to spacecraft.

Craig Chandler | University Communications

v, Postdoctoral Researcher.

Transistors also form the core of semiconductors, which rapidly switch between a current-conducting "on" state and current-insulating "off" state to represent the 1s and 0s of digital computing.

Graphene boasts unparalleled conductivity, but crucially lacks the quality that can turn it off: a band gap, which describes the energy necessary for electrons to jump from their near orbits around atoms to an outer "conduction band" that promotes conductivity.

Zeng and Sinitskii found that titanium trisulfide has a moderate band gap that approximates the one found in semiconductor favorite silicon, making it ideal for the on/off switching prized in such devices. The material also yields a large disparity between "on" and "off" conditions, which helps distinguish between resulting 1s and 0s.

The material's band gap also allows it to absorb elementary particles of light known as photons from most of the sun's emission spectrum. Because of this, titanium trisulfide could also prove useful in solar-cell designs, Sinitskii said.

Sinitskii, an Assistant Professor of Chemistry, followed up on Zeng's theoretical calculations by combining titanium and sulfur to form a block of titanium trisulfide. He then used adhesive tape to rip off microscopic whiskers of the compound in the same way that the pioneers of graphene did with graphite more than a decade ago.

Sinitskii turned those whiskers into transistors and directed the performance tests that confirmed his colleague's work.

"As a theoretician, I always want to predict something," Zeng said. "The dream for us is that somebody makes it in the laboratory.

"I couldn't help but tell Alex. He's one of the leading experts in the world when it comes to making two-dimensional materials, and he did it just a couple of months after (I asked him)."

Sinitskii said the 2-D predecessors of titanium trisulfide should help accelerate his team's efforts to study and improve it.

"When people started working with devices based on graphene, the first two-dimensional material, everything was new," he said. "Researchers studied how different parameters affect device performance. When they started working on other 2-D materials, the knowledge generated from graphene research was very useful.

"In our case, we're actually in quite a good position, because we can learn a lot from those earlier studies and apply prior knowledge to making better transistors from titanium trisulfide."

Zeng's recent study, published in the journal *Angewandte Chemie International Edition,* was co-authored with Postdoctoral Researcher Jun Dai. The researchers performed their calculations through UNL's Holland Computing Center.

The Sinitskii-led study appeared in the journal *Nanoscale*. He shared authorship with Postdoctoral Researcher Alexey Lipatov and graduate students Peter Wilson, Mikhail Shekhirev, Jacob Teeter and Ross Netusil.

Both research teams received support from UNL's Materials Research Science and Engineering Center, part of a nationwide network of MRSECs sponsored by the National Science Foundation. They conducted their work in conjunction with the Nebraska Center for Materials and Nanoscience.

Scott Schrage
University Communications

Dai, J.; Zeng, X. C. Titanium Trisulfide Monolayer: Theoretical Prediction of a New Direct-Gap Semiconductor with High and Anisotropic Carrier Mobility. *Angew. Chem. Int. Ed.* **2015**, *54*, pp 7572-7576. DOI: 10.1002/anie.201502107

Lipatov, A.; Wilson, P. M.; Shekhirev, M.; Teeter, J. D.; Netusil, R.; Sinitskii, A. Few-Layer Titanium Trisulfide (TiS_3) Field-Effect Transistors. *Nanoscale.* **2015**, *7*, pp 12291-12296. DOI: 10.1039/C5NR01895A

Team spotlights molecular discoveries at intersection of chemistry, biology

Chemist Louis Pasteur once remarked that chance favors the prepared mind – a notion epitomized by University of Nebraska-Lincoln researchers who recently published fortuitous and potentially groundbreaking findings.

The study, published in the *Journal of the American Chemical Society*, highlighted how discoveries in the sub-disciplines of bio-catalytic and organic chemistry can yield a sophisticated molecule with useful biological properties. The findings could one day lead to a range of medical and biological applications, including improved blood pressure medications.

Led by David Berkowitz, a Willa Cather Professor of Chemistry, the team revealed the surprising versatility of a bacterial enzyme while also unveiling an unexpected molecular rearrangement involving the organized shuffling of bonds.

The authors found that the enzyme, which originates from the bacterium *Clostridium acetobutylicum*, easily bonded and consistently reacted with two very different classes of molecules, or substrates.

The enzyme binds the two compound classes very selectively, Berkowitz said. In each case, it produced only one of two mirror images but unexpectedly exhibited opposite chirality – that is, a left- vs. right-handed orientation.

"That's fascinating, and it means that there's something really interesting about this (enzyme)," said Berkowitz. "We refer to it as 'active site plasticity.' We've modeled it – we have a hypothesis about how the substrates bind and are transformed by the enzyme – but this is based on a computer's simulation of what's going on. We really want to understand that better, so that's a future research direction."

The team also demonstrated a generalizable method for rearranging the enzymatic products to form new carbon-sulfur bonds while preserving the handedness initially set by the enzyme.

Berkowitz and his colleagues initiated the rearrangements partly through fluorination. This introduction of fluorines accelerated the rearrangement's half-time from 20 hours to roughly three minutes – among the fastest rates ever recorded.

The researchers further determined that the fluorination yielded an unusually favorable "entropy of activation," meaning that the rearrangement costs less energy and requires a less orderly transition than typically expected.

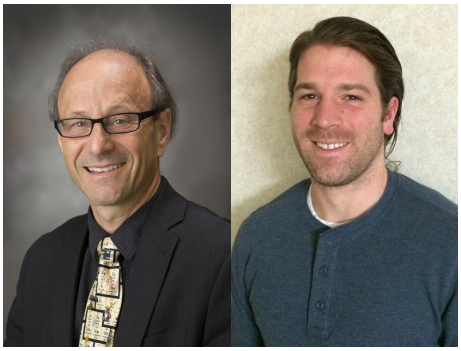
"The special features that favor this rearrangement entropically also constitute an important future direction of our research," Berkowitz said.

The team's multi-stage method ultimately produced several compounds in the phosphonate family. The compounds featured in the study could disrupt the functioning of an enzyme shown to play a role in increasing blood pressure.

"That's a particular enzyme for which drugs have really not yet been developed," Berkowitz said. "It's sort of an emerging target for hypertension, and we built a platform that could be used to create a library of good compound candidates for inhibiting it."

The study's molecular rearrangement actually came to the fore while co-author and recent doctoral graduate Kaushik Panigrahi was attempting to study a different one.

"The standard for this type of reaction is that you need to heat the molecules significantly," Berkowitz said. "That's how Kaushik discovered this; he was trying to make one compound, and it actually rearranged before he could even take a spectrum analysis. He said, 'What's



David Berkowitz (left) and Greg Applegate

going on here?' And the two of us figured out that he had discovered something really special."

Panigrahi and fellow doctoral student Greg Applegate recognized the opportunity to couple the molecular rearrangement with the bacterial enzyme, which Applegate was investigating as a "reporting enzyme" for a trademark method that Berkowitz's group uses to track organic reactions in real time.

Two seemingly unrelated strands of research thus became entangled in what Berkowitz called a "hybrid method using tools of biology and organic chemistry in concert."

"Sometimes the best science isn't exactly what you planned to do," he said. "Ultimately, what this study shows is that chemistry is an experimental science. Theory is great, but experiment can drive theory as much as theory drives experimentation."

The study, which the journal featured as a "Spotlight" (DOI: 10.1021/jacs.5b02757) in its March 25 edition, was co-authored by Guillaume Malik, Postdoctoral Researcher in chemistry. The research was funded by the National Science Foundation.

Scott Schrage
University Communications

Panigrahi, K.; Applegate, G.; Malik, G.; Berkowitz, D. Combining a *Clostridial* Enzyme Exhibiting Unusual Active Site Plasticity with a Remarkably Facile Sigmatropic Rearrangement: Rapid, Stereocontrolled Entry into Densely Functionalized Fluorinated Phosphonates for Chemical Biology. *J. Am. Chem. Soc.* **2015**, *137*, pp 3600–3609. DOI: 10.1021/jacs.5b00022

FACULTYNEWS

Faculty grant awards

Congratulations to the following faculty members for being awarded competitive national and federal grants. These prestigious grants will enable the graduate students, postdoctoral associates, and faculty in these research teams to push back the frontiers of science.

Major External Awards

Patrick Dussault, PI; Rebecca Lai, David Hage, +17 other UNL, co-PIs – National Science Foundation (NSF) Experimental Program to Stimulate Competitive Research (EPSCoR) Track II – $12.2M (11/01/2010 - 09/30/2016) "Building Infrastructure in Nanohybrid Materials and Algal Biology Research"

Jiantao Guo, PI; Wei Niu (Chemical Engineering) and Qingsheng Li (SBS), co-PIs – National Institutes of Health (NIH) – $1.9M (05/01/2014 - 04/30/2018) "Improve the Safety of an Efficacious Live-Attenuated HIV-1 Vaccine Through Unnatural Amino Acid-Mediated Suppression of Blank Codon"

Andrzej Rajca, PI; Suchada Rajca, co-PI – NIH – $1.2M (08/07/2015 - 07/31/2019) "Synthesis of Metal-Free Magnetic Resonance Imaging Contrast Agents"

Stephen DiMagno, PI – NIH – $1.2M (07/01/2012 - 05/31/2016) "Synthesis of Radiofluorinated PET Imaging Agents"

David Hage, PI – NIH – $1.1M (07/15/2014 - 06/30/2018) "Chromatographic Studies of Functional Proteomics"

James Takacs, PI – NIH – $900K (05/01/2012 - 04/30/2016) "Catalytic Asymmetric Hydroboration: Uncapping the Potential with Two-Point Binding"

Liangcheng Du, PI; Patrick Dussault, co-PI – NIH – $839K (06/15/2012 - 05/31/2016) "Discovering New Anti-Infective Agents from *Lysobacter*"

David Hage, PI – NIH – $809K (09/15/2011 - 08/31/2016) "Chromatographic Automation of Immunoassays"

Mark Griep, PI; Brigid Quinn (Little Priest Tribal College) and Don Torgerson (Nebraska Indian Community College), co-PIs – NSF - Office of Integrative Activities (OIA) – $749K (10/01/2013 - 09/30/2018) "Framing the Chemistry Curriculum"

David Berkowitz, PI – NSF - Division of Chemical, Bioengineering, Environmental and Transport Systems (CBET) – $573K (09/01/2015 - 08/31/2018) "New Approaches to Catalyst Screening and Development"

Alexander Sinitskii, PI – NSF - Division of Chemistry (CHE) – $538K (05/01/2015 - 04/30/2020) "CAREER: Narrow Graphene Nanoribbons with Tunable Electronic Properties"

Jian Zhang, PI – NSF - Division of Materials Research (DMR) – $527K (03/01/2016 - 02/28/2021) "CAREER: Tuning Photoredox Properties of Carbazolic Porous Organic Frameworks for Visible-Light-Mediated Catalysis"

Marjorie Langell, PI (Patrick Dussault - Substitute PI) – NSF-CHE – $485K (06/01/2014 - 05/31/2017) "Effect of Composition and Particle Size in Oxidation Catalysis by Metal Oxide Solid Solution Nanoparticles"

Andrzej Rajca, PI – NSF-CHE – $463K (08/01/2014 - 07/31/2017) "Nitrogen-Centered Radicals"

Rebecca Lai, PI – NSF-CHE – $455K (07/01/2010 - 06/30/2016) "CAREER: Ligand-induced Folding in Peptides for Biosensing Applications"

Alexander Sinitskii, PI; Alexei Gruverman (Physics & Astronomy), co-PI – NSF - Division of Electrical, Communications and Cyber Systems (ECCS) – $409K (06/01/15 - 05/31/2018) "Polarization-Mediated Modulation of Electronic Properties of Hybrid Ferroelectric-Based Heterostructures"

Chin Li Cheung, PI; Wai-Ning Mei (University of Nebraska at Omaha), co-PI – NSF-CHE – $406K (08/01/2014 - 07/31/2017) "Defect Chemistry of Metal Oxides for Catalytic Reactive Oxygen Species Generation"

David Hage, PI; Tino Hofmann (Electrical & Computer Engineering), co-PI – NSF-CHE – $402K (09/01/2013 - 08/31/2016) "Instrumentation Development: Label-Free and Rapid 3D-Nanostructure Ultrathin-layer Birefringence Imaging Chromatography"

Patrick Dussault, PI; Keith Kuwata (Macalester College), co-PI – NSF-CHE – $390K (09/01/2015 - 08/31/2018) "A New Paradigm for Ether Synthesis"

Eric Dodds, PI – NSF-CHE – $317K (09/01/2015 - 08/31/2018) "Gas-Phase Structural Analysis of Metal Cationized Carbohydrates"

Faculty grant awards

Jiantao Guo, PI; Wei Niu (Chemical Engineering), co-PI – NSF-CBET – $307K (07/15/2013 - 06/30/2016) "Mechanistic Study of Cellulosome Through Reprogramming Its Assembly"

Mark Griep, PI – NSF-CHE – $270K (06/15/2015 - 05/31/2018) "REU Site: Research Experiences for Undergraduates in Chemical Assembly at the University of Nebraska"

Joseph Francisco, PI – NSF-CHE – $269K (09/01/2014 - 08/31/2016) "Radical Chemistry on Cloud and Aerosol Surfaces"

Collaborative research involving UNL Chemistry faculty

Lance Perez (Associate Vice Chancellor for Academic Affairs/Electrical & Computer Engineering), PI; Ruth Heaton (Teaching, Learning & Teacher Education), Kevin Lee (Physics & Astronomy), Marilyne Stains, Leilani Arthurs (Earth & Atmospheric Sciences), co-PIs – NSF - Division of Undergraduate Education (DUE) – $1.9M (04/01/2014 - 03/31/2017) "WIDER: Adopting Research-Eased Instructional Strategies for Enhancing STEM Education"

Nitin P. Padture (Brown University), PI; Jinsong Huang (MME), Xiao Cheng Zeng, and Hia Hong (Physics & Astronomy), co-PIs – Brown University (NSF-OIA), Nebraska's EPSCoR – $654K UNL portion (08/01/15 - 07/31/2017) "RII Track-2 FEC: Low-Cost, Efficient Next-Generation Solar Cells for the Coming Clean Energy Revolution"

Eduardo Perozo (University of Chicago), PI; Andrzej Rajca, Leilani Arthurs (Earth & Atmospheric Sciences), co-PIs – University of Chicago (NIH) – $550K UNL portion (09/24/2015 - 08/31/2020) "Membrane Protein Structural Dynamics Consortium"

Concetta DiRusso (Biochemistry), PI; Ronald Cerny and Jiri Adamec (Biochemistry), co-PIs – NSF-CBET – $550K (06/01/2014 - 05/31/2017) "Activators to Maximize Algal Oil Production"

Regis Moreau (Department of Nutrition and Health Sciences, PI; David Hage, co-PI – Department of Agriculture - National Institute of Food and Agriculture – $480K (10/15/2015 - 10/14/2019) "Bioactivity of Curcumin and Gut Inflammation"

Bruce Dvorak (Civil Engineering), PI; Rebecca Lai, co-PI – University of Massachusetts (Environmental Protection Agency) – $338K (07/01/2014 - 06/30/2017) "Water Innovation Network for Sustainable Small Systems (WINSSS)"

Wei Niu (Chemical Engineering), PI; Jiantao Guo, co-PI – NSF-CBET – $317K (08/01/2014 - 07/31/2017) "SusChEM: Novel 1, 2-Propanediol Biosynthesis From Renewable Feedstocks Through Enzyme Discovery"

Pankaj Singh (UNMC), PI; Robert Powers, co-PI – University of Nebraska Medical Center (NIH) – $238K (09/25/2012 - 07/31/2016) "Targeting MUC1-Induced Tumor-Stromal Metabolic Cross-Talk in Pancreatic Cancer"

Paul Fey (UNMC), PI; Robert Powers, co-PI – University of Nebraska Medical Center (NIH) – $222K UNL portion (07/01/2014 - 06/30/2016) "Staphylococcal Biofilm and Disease"

Melanie Simpson (Biochemistry), PI; Jiantao Guo, Joseph Barycki and Jonathan Markham (Biochemistry), co-PI – NIH – $182K UNL portion (05/19/2015 - 04/30/2017) "Defining Abberrant Steroid Elimination in Castration Resistant Prostrate Cancer"

Jeremiah A. Johnson (MIT), PI; Andrzej Rajca, co-PI – Massachusetts Institute of Technology (NIH) – $97K UNL portion (07/201/2014 - 06/30/2016) "Synthesis of Densely Functionalized PEG-Branch-Nitroxide Structures as Organic MRI Contrast Agents"

Bing Gong (State University of New York), PI; Xiao Cheng Zeng, co-PI – State University of New York-Buffalo (NSF-CHE) – $81K UNL portion (07/01/2013 - 06/30/2016) "Enforced Stacking of Shape-Persistent Macrocycles: A Molecular Approach for Tuning the Structures and Functions of Nanotubular Assemblies"

Pankaj Singh (UNMC), PI; Robert Powers, Leilani Arthurs (Earth & Atmospheric Sciences), co-PI – University of Nebraska Medical Center (Department of Defense) – $60K UNL portion (09/15/2013 - 09/14/2016) "Targeting MUC1-Mediated Tumor-Stromal Metabolic Interactions in Triple-Negative Breast Cancer"

Bing Gong (State University of New York), PI; Xiao Cheng Zeng, co-PI – State University of New York-Buffalo (NSF-CBET) – $50K UNL portion (06/15/2015 - 05/31/2018) "Nanoporous Membranes Based on Uniform Sub-Nanometer Pores"

FACULTYNEWS

Faculty grant awards

Other notable external awards

Gerard Harbison, **PI – American Chemical Society Petroleum Research Fund (ACS/PRF) – $110K** (02/01/2016 - 08/31/2018) "Gas-Phase NMR and Computations on Hydrocarbons in Volatile Fractions of Crude Oil"

Jian Zhang, **PI – ACS/PRF – $100K** (09/01/2014 - 08/31/2016) "New Strategies for the Synthesis of Covalent Organic Frameworks"

Rebecca Lai, **PI – Camille & Henry Dreyfus Foundation – $25K** (12/01/2014 - 06/30/2016) "SciPop Talks! Chemistry"

Stephen Morin, **PI – 3-M Corporation – $15K** (06/01/2015 - 05/31/2016) "Soft Surfaces and Reactors for the Morphological Control and Selective Deposition of Functional Materials"

"The beauty of Chemistry, first of all, is that simple ideas explain complex phenomena. And secondly, that we can build models that are quantitatively predictive. And we can use a few organizing principles, like the conservation of energy and the conservation of momentum, to describe phenomena like, why salt melts ice in the road, why the sky is blue, and why water expands when it freezes. We chemists are attracted to this simplicity."

F. Fleming Crim
John E. Willard and Hilldale Professor, University of Wisconsin-Madison &
2015 Jack Merski Memorial awardee

Peta-Gaye Clachar

Computational chemistry space opens in Hamilton Hall

More than 100 attendees joined us for the Dec. 10 unveiling of a newly refurbished Hamilton Hall space dedicated to advancing research in an ever-important cornerstone of modern chemistry.

As the new home to the Nebraska Cluster for Computational Chemistry (NC3), the fourth-floor space of Hamilton's east wing will accommodate the NC3's three inaugural faculty: Joseph Francisco, Dean of the College of Arts and Sciences; Xiao Cheng Zeng, Ameritas University Professor of Chemistry; and Hui Li, Associate Professor of Chemistry.

Spurred in part by Francisco's 2014 move from Purdue University to UNL, the space will also serve as a collaborative hub for students, postdoctoral researchers and visiting scholars.

"It's about creating an environment that stimulates ideas," said Francisco, the Elmer H. and Ruby M. Cordes Chair of Chemistry. "It's really exciting to encourage students to explore their creativity.

"We have the capacity, the brain-power, the enthusiasm and the commitment from students to push the envelope and solve challenging global problems that need scientific solutions."

David Berkowitz, Chair of the Department, pointed to the successful research partnership between Zeng and Francisco as the impetus for launching the NC3.

"It gives us an idea of the sort of things that can happen when the scientists, grad students and postdocs who will sit in this physical space can collaborate, exchange ideas and perform computations together," Berkowitz said. "This group ... will continue to push experimentalists to find structures they have not already seen or that may be lying under the earth."

Peta-Gaye Clachar

The Department of Chemistry inaugurates NC3 at a ribbon-cutting ceremony held Dec. 10. From L-R: Hui Li, Xiao Cheng Zeng, Joseph Francisco, Eugene Cordes, Lance Pérez, and David Berkowitz.

The department also revealed a small mural that graces a prominent wall in the new space and visually encapsulates the work to be conducted there. It depicts a configuration of water-housed hydrogen molecules passing through a carbon nanotube – an enclosure one billion times thinner than a human hair – as predicted by a signature computational study from Zeng, Francisco and colleagues.

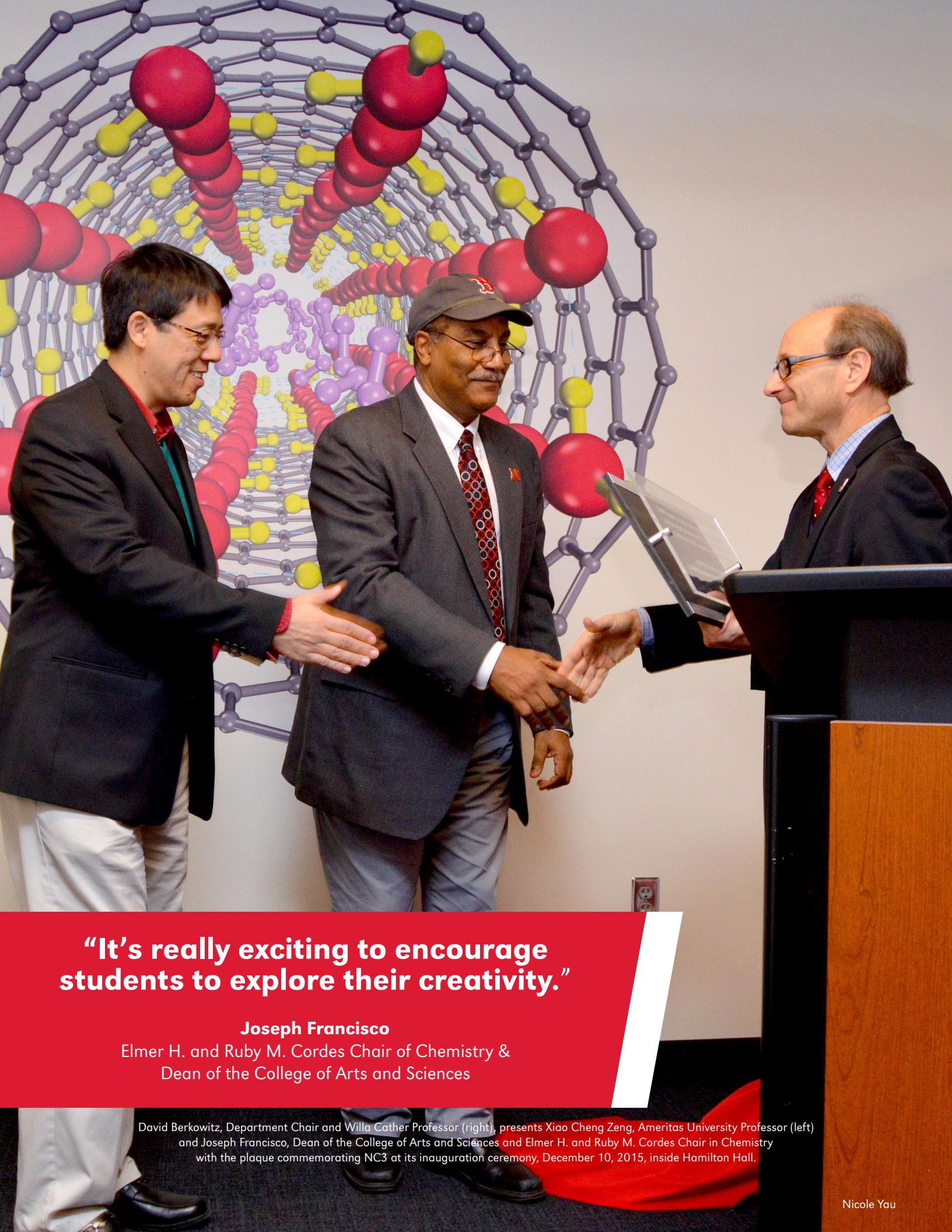
Zeng and Francisco's initial collaborations, which began when Francisco was at Purdue, sprang from a mutual interest in the molecular-level properties and dynamics of water.

"At the time, we were interested in hydrogen storage and posed the question, 'Could we use water to store hydrogen?' So, we started exploring water cages to try to understand what was the optimal kind of orientation and configuration that would allow hydrogen to be trapped for a very short time," Francisco said.

That question has expanded to many others, Zeng said, including the ways that atmospheric chemistry may shape the accumulation and spread of air pollution. Their ongoing and future research will rely on algorithms and simulations of intermolecular interactions developed by Li.

The NC3 researchers will also continue working with engineering and physics faculty to explore designs for nanomaterials that boast optical, electrical, magnetic and mechanical properties critical to the development of new technologies.

Scott Schrage, University Communications &
Peta-Gaye Clachar, UNL Chemistry



“It’s really exciting to encourage students to explore their creativity.”

Joseph Francisco
Elmer H. and Ruby M. Cordes Chair of Chemistry &
Dean of the College of Arts and Sciences

David Berkowitz, Department Chair and Willa Cather Professor (right), presents Xiao Cheng Zeng, Ameritas University Professor (left) and Joseph Francisco, Dean of the College of Arts and Sciences and Elmer H. and Ruby M. Cordes Chair in Chemistry with the plaque commemorating NC3 at its inauguration ceremony, December 10, 2015, inside Hamilton Hall.

Nicole Yau

INDUSTRIAL AD

From L-R (front row): Peggy Ruhn (Ph.D. Hage), Weijun Shen (Ph.D. Berkowitz), James
Marijean Eggen (Ph.D. Berkowitz), Paul Ries (Ph.D. Eckhardt), and Larry Middendorf. L-R (Back ro
Norton Peet (Ph.D. Looker), Leonard Saari, Kevin Woller (Ph.D. Dussault), David Pug

Peta-Gaye Clachar

VISORY BOARD

Lohr, Fred Wagner, David Berkowitz (Department Chair), Eugene Cordes (IAB Chair),
ow): John Swart (Ph.D. Griep), Edward Chess (Ph.D. Gross), Christian Sandstedt (Ph.D. Eckhardt),
mire (Ph.D. Langell), Edward Lawson (Ph.D. Takacs), and Todd Eary (Ph.D. Dussault).

F. Fleming Crim receives the Jack Merski Memorial Award

On December 4, 2015, the Department of Chemistry presented the Jack Merski Memorial Award to F. Fleming Crim, John E. Willard Professor and Hilldale Professor of Chemistry at the University of Wisconsin. Crim also serves as Assistant Director for the Mathematical and Physical Sciences Directorate at the National Science Foundation.

Crim addressed a full house of UNL Chemistry audience about "Using Vibrations to Probe and Control Chemical Reactions in Gases and Liquids." This distinguished award was presented to Crim for his pioneering work investigating the role that vibrational energy plays in chemical reactions.

Crim demonstrated that reactions can be controlled using vibrational excitation to cleave bonds selectively. To achieve this, the researchers excited molecules into "prepared" vibrational states and then used time-resolved laser spectroscopy to follow the migration of vibrational energy within these "prepared" molecules.

Born in Waco, Texas, Crim earned a bachelor's degree in Chemistry, in 1969, at Southwestern University, in Georgetown, Texas. Five years later he received a Ph.D. in Physical Chemistry from Cornell University, where George A. Fisk was his advisor. In 1977, he joined the University of Wisconsin-Madison Chemistry Department.

Crim is a member of the National Academy of Sciences and has chaired the Physical Chemistry Division of the American Chemical Society and the Committee on Professional Training. At NAS, he was Co-chair of the Chemical Sciences Roundtable, the Board on Chemical Sciences and Technology, and Chair of the Chemistry Section. Crim has published more than 150 papers and has supervised more than 45 Ph.D. students and 20 postdoctoral associates.

F. Fleming Crim, Professor at the University of Wisconsin, is the proud recipient of the 2015 Jack Merski Memorial Award.

Peta-Gaye Clachar

David Berkowitz, Chair of the Department of Chemistry (third left), presents the Jack Merski Memorial Award to F. Fleming Crim, Professor at University of Wisconsin, for his contributions to Physical Chemistry. From L-R: Xiao Cheng Zeng, Ameritas University Professor; Craig Eckhardt; F. Fleming Crim's wife Scarlett Presley; and Elmer H. and Ruby M. Cordes Chair in Chemistry Joseph Francisco, Dean of the College of Arts and Sciences.

Some of Crim's awards and recognitions include:

- Earle K. Plyler Prize for Molecular Spectroscopy, American Physical Society
- The Irving Langmuir Award in Chemical Physics, American Chemical Society
- The Centenary Silver Medal, The Royal Society of Chemistry
- Hilldale Award in Physical Sciences, University of Wisconsin-Madison
- Fellow, American Chemical Society
- Member, National Academy of Sciences
- Fellow, American Academy of Arts and Sciences
- Fellow, American Association for the Advancement of Science
- Fellow, Japan Society for the Promotion of Science
- Max Planck Research Award (with Juergen Troe)
- Upjohn Teaching Award, Department of Chemistry, University of Wisconsin
- Chancellor's Award for Excellence in Teaching, University of Wisconsin-Madison
- Fellow, American Physical Society
- Alexander von Humboldt Senior U.S. Scientist Award
- Camille and Henry Dreyfus Teacher-Scholar
- Fellow, Alfred P. Sloan Research Foundation

Crim was selected for the Merski Award based on his intense interest in science and his dedication to excellence and its practice. Peter Wolynes received the first Jack Merski Memorial Award and Ahmed H. Zewail, a Nobel laureate, received the second award. This award honors Merski's contribution to physical chemistry and is awarded to a chemist whose work is closely aligned with Merski's research.

Peta-Gaye Clachar
UNL Chemistry

Peta-Gaye Clachar

Special guests and family members of the late Dr. Cliff S. Hamilton help keep a legacy prominent by coming to present the 2015 Hamilton Award to David MacMillan (center) and to honor the occasion, October 29, 2015. From L-R is Joseph Francisco, Dean of College of Arts & Sciences; Dr. Debra Y. Hamilton, granddaughter of Dr. Cliff S. Hamilton; James Takacs, Hamilton Award Committee Chair; Yvonne, wife of Dr. Clif S. Hamilton Jr. (second right); and David Berkowitz, Chair of the Department of Chemistry.

David MacMillan (Future Man) is 2015 Hamilton awardee

The University of Nebraska—Lincoln Department of Chemistry presented David W. C. MacMillan with the 2015-2016 Cliff S. Hamilton Award for his outstanding contributions to synthetic organic chemistry, especially transformative innovations in organocatalysis and photoredox catalysis leading to novel bond-forming events under mild conditions.

MacMillan, the James S. McDonnell Distinguished University Professor at Princeton University, delivered the award lecture in Love Library on October 29. The public lecture, titled "The Design of New Chemistry Using Light" described aspects of MacMillan's research program focused on the investigation of chemical reactions and novel synthetic strategies relevant to both academic and industrial chemists.

Born in Bellshill, Scotland, MacMillan earned his undergraduate degree in Chemistry at the University of Glasgow, in Scotland, and completed his doctorate at the University of California, Irvine under the direction of Professor Larry E. Overman. After completing a postdoctoral research fellowship with Professor David A. Evans at Harvard University, MacMillan began his independent academic career at the University of California, Berkeley, in 1998, as an Assistant Professor. In 2000, MacMillan became an Associate Professor at the California Institute of Technology then Director of Merck Center for Catalysis at Princeton University, in 2006.

MacMillan is also a Scientific Consultant with Merck (worldwide), Amgen (worldwide), Abbvie Research Laboratories, Johnson & Johnson Pharmaceuticals, and Gilead Research Laboratories. He also serves on the scientific advisory boards of Lexicon Pharmaceuticals, Firmenich (Switzerland), and the Research Strategy Review Committee board at Merck Research Laboratories. He has been elected as Fellow of the Royal Society and Fellow of the American Academy of Arts and Sciences.

Selected Honors and Awards

- 2015 Ernst Schering Prize for Outstanding Basic Research in the Field of Chemistry
- 2014 NJ ACS Award for Creativity in Molecular Design and Synthesis
- 2014 Harrison Howe ACS Award in Chemistry
- 2012 Elected to the Fellowship of the Royal Society (FRS)
- 2012 Elected to the American Academy of Arts and Sciences
- 2011 ACS Prize for Creative Work in Organic Synthesis (Sponsored by Aldrich)
- 2011 Mitsui Award in Catalysis (Mitsui Chemicals, Japan)
- 2011 Fellow American Association for the Advancement of Science
- 2011 UC Irvine Distinguished Alumni Award
- 2007 Mukaiyama Prize (Japanese Society of Organic Chemists)
- 2007 ISHC Award in Heterocyclic Chemistry
- 2007 Arthur C Cope Scholar ACS Award
- 2006 Thieme-IUPAC Prize in Synthetic Organic Chemistry
- 2005 Elias J. Corey American Chemical Society Award
- 2005 Tetrahedron Worldwide Young Investigator Award (Inaugural award)
- 2005 Corday-Morgan Medal, Royal Society of Chemistry, UK
- 2001 Woodward Scholar Lectureship, Harvard University

Visit our media hub to watch an interview in which Dr. David MacMillan discusses the inspiration behind his research, and his first visit to Nebraska. http://mediahub.unl.edu/media/4670

Peta-Gaye Clachar
UNL Chemistry

Peta-Gaye Clachar

James Takacs (left) presents the 2015 Outstanding Chemistry Teacher of the Year Award to Daryl D. Jahn (middle), from Millard North High School, in Omaha, Nebraska, as David Berkowitz, Chair of the Department of Chemistry, looks on at the 15th Annual Chemistry Day at UNL Hamilton Hall.

Chemistry Day helps students explore science interests

On October 3, 2015, Chemistry Day got off to a blast when Jason Kautz, Associate Professor of Practice, introduced high school seniors to the power of the reaction of hydrogen balloons with atmospheric oxygen. The impact of the exothermic and environmentally friendly reaction provided for a rousing introduction to the day's activities.

More than 120 high school juniors, seniors, parents, and teachers from Nebraska, Kansas, and Missouri, gathered in Hamilton Hall that Saturday morning to engage in a day mixed with demonstrations, lectures, quiz bowl contests and hands-on activities including an introduction to non-Newtonian fluids.

This year's theme was "Chemistry Colors Our World: Exploring the Chemistry of Dyes, Pigments and Light" and professors demonstrated to the groups how fun chemistry can be.

Students participated in a traffic light demonstration, which illustrates the redox chemistry of indigo. Liquid chemicals changed colors when agitated. Among other planned demos was the making of phosphoric acid from red phosphorous.

The day featured an array of activities including hands-on t-shirt chromatography and guided tours of research labs. Alumni were also on hand to speak to students and answer their questions. All told, the visitors came away with an enlightened view of Chemistry and the many career paths for Chemistry majors.

At the end of Chemistry Day, five students were presented $1500 scholarships as prospective UNL Chemistry majors. The scholarships were awarded to Benjamin Hynes, David Liescheski, Logan Baumberger, Nina Bui, and Scott Alder, and become effective upon enrolling as a Chemistry major at UNL for the 2016 - 17 academic school year. Another highlight was the presentation of the 2015 Outstanding Teacher Award to Daryl D. Jahn, the Chemistry Teacher at Millard North High School.

The event was a resounding success that sustained the Department's enthusiasm for this thoroughly enjoyable annual event.

Watch the Chemistry Day feature on KLKN TV at:
http://www.klkntv.com/story/30164822/chemistry-day-promotes-love-of-science

Peta-Gaye Clachar
UNL Chemistry

2015 poster session winners

It was another great summer poster session on August 12, 2015, with enthusiastic students who are excited about research. Postdoctoral fellows, seniors and beginning graduate students, UNL undergraduate researchers, and Research Experience for Undergraduates (REU) students participated in the department's annual poster session.

The annual poster session recognizes summer research accomplishments and provides undergraduate students and those who participated in the Nebraska Summer Research Program (SRP) a chance to showcase their summer research or creative activity, and to communicate their results to others in the form of a poster session.

Our SRP offers outstanding undergraduates the chance to work in research labs and to preview graduate school. Students work under faculty mentorship and as part of a research team that may include graduate students, post-docs, research scientists, and other summer scholars. Some compete in the poster session and are awarded prizes. The winners of the 2015 poster session are:

Beginning graduate students
1st Place: Michael Stoller
2nd Place: Katherine Schumacher
Honorable Mention: Elliott Rodriguez

Senior graduate students
1st Place (tie): Lukasz Gauza & Xiang Zhang
2nd Place: Lei Li
Honorable Mention: Xinqi Zhou

Postdoctoral fellows
1st Place: Xiwei Zheng
2nd Place: Jun Dai
Honorable Mention: Trisha Vickrey

High school students
1st Place (tie): Elizabeth Otto & Akshat Saraf
2nd Place: Yousif Ibrahim
Honorable Mention: Trang Hoang

Undergraduate students
1st Place: Molly Undersander
2nd Place: Riley Giesler
Honorable Mention: Quyen Vu

REU travel awards
Brenna Rossi
Joel Monroy
Yamil M. Rodriguez
Julian Kosacki

Congratulations to the award winners and to the many others who participated!

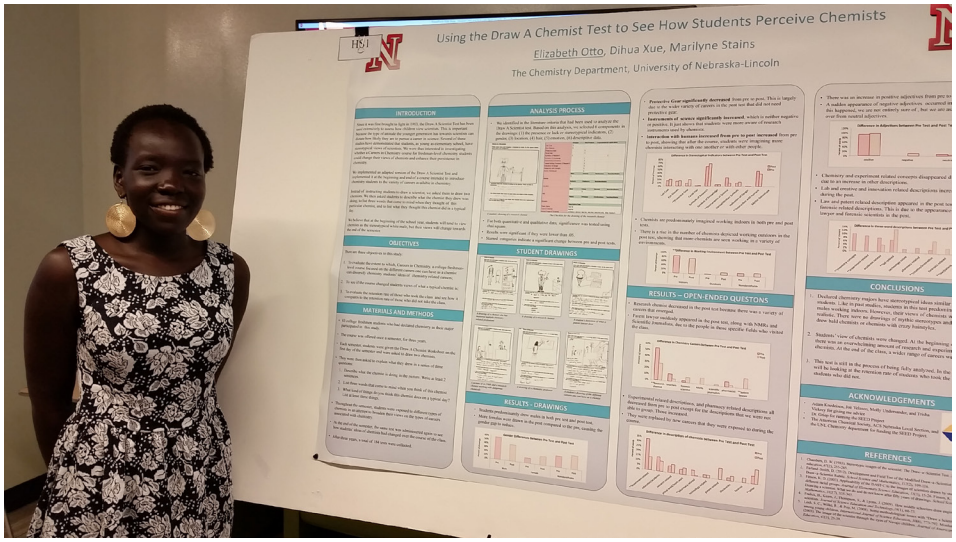
Milton E. Mohr Award winners

The Department of Chemistry is pleased to announce this year's Milton E. Mohr awardees.

Chemistry graduate students Lei Li, advised by Prof. Xiao Cheng Zeng, and Jacob Johnson, advised by Prof. Jian Zhang were this year's fellowship winners.

Chemistry undergraduate students Brett Begley, Schuyler Chambers, Ryan Geisert and Kathryn Miller were this year's scholarship winners.

Congratulations on a job well done!



Photos courtesy of Marilyne Stains

Elizabeth Otto, one of the 1st place winners in the high school students' category, with her poster. Her project was entitled "Impact of the Careers in Chemistry Course on Students' Views of Chemists." She was advised by Dr. Marilyne Stains.

Citation for Excellence in Teaching Chemistry

Each semester four students are handpicked to receive the Citation for Excellence in Teaching Chemistry Award. The award is recognition of the recipients' dedication, passion for the educational enterprise and interest in the welfare of our students. The citation recognizes excellence in both undergraduate and graduate teaching assistants. TAs must exhibit exemplary teaching, as evidenced through student evaluations, active participation in small group meetings, creativity in the design of pedagogically valuable teaching strategies, accurate and efficient grading, and compliance with all safety standards. This year, we would like to congratulate Doron Attanasio, Channing Thompson, Ryan Geisert, Schuyler Chambers, Brett Begley and Jessica Periago for receiving this award.

Doron Attanasio

Doron Attanasio received the Spring 2015 Citation for Excellence in Teaching Chemistry Award because of his ability to connect with undergraduate students.

"Working in the Chemistry Department at UNL has done a great job of preparing me for my future career as a dentist. The daily interactions I have with students both in the lab and in the Chemistry Resource Center have taught me how to be an effective communicator, which will be very useful when interacting with my future patients."

The Resource Center staff and faculty were as excited to give the award as Doron was to receive it.

"Doron is a great teaching assistant, and he's wonderful with our students," Jason Kautz, Associate Professor of Practice and Coordinator of General Chemistry said. "Doron takes admirable pride in his job and is a role model for all our undergraduate students."

Doron added, "I am very honored to have received this teaching award from the Chemistry Department. Teaching a Chemistry lab has been one of the most rewarding experiences I have ever been a part of at UNL. I am very grateful for the opportunity to be a Teaching Assistant for General Chemistry, and I look forward to continue working in the department for another semester."

It is no surprise that Doron has had a long history of recognition. Today, the former biology major has transitioned to his first year at the University of Nebraska Medical Center College of Dentistry. He anticipates becoming a General Dentist, in Lincoln, after he graduates, in 2019.

Additional Accomplishments:

- Accepted into University of Nebraska Medical Center College of Dentistry
- UNL Dean's List – Spring 2012, Fall 2012, Fall 2013
- Nebraska All-State Musician (high school)
- 2-time Class C All-State Musician (high school)
- Class C All-State Top Musician Scholarship Winner (high school)
- 3-time All-Conference Musician Selection (high school)
- 2-time Top Instrumentalist Selection (high school)

Greg Nathan | University Communications

Greg Nathan | University Communications

Channing Thompson

Channing Thompson was awarded the Spring 2015 Citation for Excellence in Teaching Chemistry Award. Her passion to teach and her openness to learn from the students as she teaches are among her special qualities as a TA.

"I feel honored to receive this award, especially since last semester was my first experience as a TA. I had a wonderful group of students and they taught me more than I think I ended up teaching them," Channing said. "I wish them the best in their future endeavors. It gives me the motivation to keep working hard and doing my best."

Being a Teaching Assistant has expanded Channing's horizons and exposed her to opportunities she hadn't considered before.

"Working as a Teaching Assistant has opened my eyes to the possibility of pursuing a career in education after graduation. Plus, working with research has given me the opportunity to advance my analytical skills in the laboratory and also work alongside some amazing collaborators, my colleagues," she added.

The faculty and staff in the Resource Center have been extremely impressed with her professionalism.

"Channing is a pure joy to have here in the Resource Center and the students absolutely love her," Kautz said.

Channing graduated with a B.S. in Chemistry from South Dakota School of Mines and Technology, in Rapid City, SD. in 2010. She joined the Lai lab in August 2014 and in now in her second year of grad school. The focus of her research is on peptide-based electrochemical biosensors. Her dream is to one day become a Professor at a predominantly undergraduate university.

Ryan Geisert

Ryan Geisert received a Citation for Excellence in Teaching Chemistry Award not only because of his student evaluation results, but also for his willingness to go that extra mile to engage his students.

"Ryan is a very driven person and it is always exciting to see Teaching Assistants who take that drive and apply it to their work and get excited about the results," Kautz said. "When Ryan is faced with a problem, he treats it like a challenge, and he won't give up until it's solved."

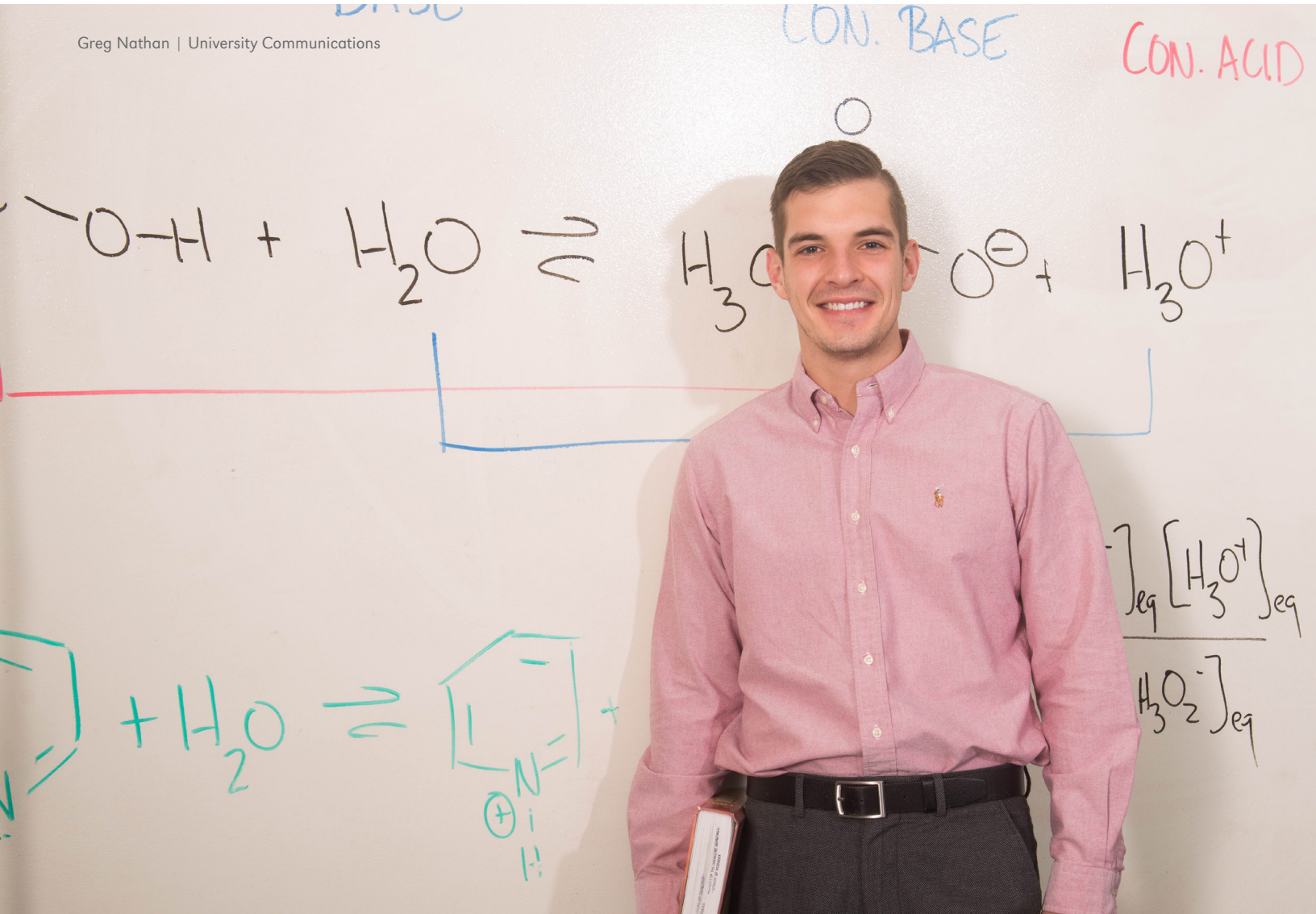
"It makes me feel humbled, more than anything else," Ryan said. "It's true that I feel an overwhelming sense of pride and accomplishment for receiving the award. I'm proud of my work as a TA, but when I look at the way that I've taught, I realize that I'm far from perfect. I want to live up to whatever those around me see, and so I feel more driven than ever to work hard at growing in my position."

Today, Ryan is a senior, pursuing a Bachelor of Arts degree in Chemistry. His aspirations involve a career in medicine and his experience as a Teaching Assistant just may well help him become a patient favorite in regards to bedside manner.

"The field of medicine and teaching have stark differences, but also striking similarities, the most important being involvement with people," Ryan said. "Learning how to take on the role of a Teacher has helped me begin to understand the complex relationship that teaching entails, similar to that of a Doctor. Building credibility without arrogance, maintaining authority while empathizing, and learning to effectively utilize time are all valuable traits I'm trying to develop while teaching, I hope to carry these same traits throughout my career."

Additional Accomplishments:

- Inductee of the Nebraska Innocents Society
- College of Arts and Sciences Dean's List—2012-2013
- UNL Honors Program—2012-2014
- UNL David Distinguished Scholarship—2013-Present
- UNL Lester C and Joan M Krogh Scholarship—2014-Present
- Order of Omega Honors Society—2014-Present
- Chair's Undergraduate Teaching Assistant Awardee 2014-2015
- Milton Mohr Scholarship 2015-Present
- Ralph F. Nielsen Scholarship 2015-Present



Greg Nathan | University Communications

Greg Nathan | University Communications

Schuyler Chambers

Schuyler Chambers' teaching style was quickly recognized by the department faculty as an invaluable resource and was honored with a Citation for Excellence in Teaching Chemistry Award.

"Once in a while you get a Teaching Assistant who's just a natural born teacher," Kautz commented about Schuyler's teaching ability. "She's a joy to watch in the lab and is very deserving of the award."

"To me this award is an honor because it shows that as an interested and motivated teacher, I can encourage the growth of curiosity within students and create an active classroom environment," Schuyler said. "My teaching style centers on my inherent love of the subject. However, it also takes a student's willingness to learn in order to create a good classroom discussion. There is give-and-take between teachers and students, and this balance of intrigue and understanding is something I hope to continue to foster in my classes as both a student and a teacher."

Being a Teaching Assistant has really nurtured Schuyler's love of teaching and her desire to connect with students. Schuyler has really embraced the adage "what you teach, you learn."

"As an incoming freshman undergraduate, I would have never thought that in just a few years I would be a TA for a General Chemistry course and an independent researcher, while simultaneously being enrolled in classes, which consistently push my knowledge and curiosity in the classroom. When so many opportunities are available within the department, it becomes easy to push your boundaries of understanding and to fuel personal curiosity and innovation," She added.

Schuyler is currently a senior and a researcher in organic chemistry in Prof. Patrick Dussault's group. Her plans are to complete her Ph.D. and become a College Professor.

Additional Accomplishments:

- Undergraduate Creative Activity and Research (UCARE) at UNL Recipient
- Milton E. Mohr Scholarship
- George Beadle Scholarship
- Ralph F. Nielsen Scholarship
- UNL Dean's List for 5 Semesters

Brett Begley

Brett Begley is one of the recipients of the Fall 2015 Citation for Excellence in Teaching Chemistry Award. From Omaha, Nebraska, Brett is currently an Undergraduate Recitation Teaching Assistant for General Chemistry I (CHEM 109). In previous semesters, he has worked as a Recitation TA in General Chemistry II (CHEM 110) and Fundamentals of Chemistry I (CHEM 113). Brett is working towards a Bachelor of Arts degree in Chemistry with minors in Biochemistry and Mathematics. He also works as a Research Assistant in the lab of Professor David Berkowitz, Chair of the Department of Chemistry.

Brett's motivation for being an excellent teacher is derived from his parents. "Teaching has always been an interest of mine simply because that's what my parents do. The opportunity to teach UNL students and help them through Chemistry is extremely rewarding," Brett said.

While he is honored by the recognition, Brett recognizes the abundance of talent in the Department of Chemistry as a whole. He said, "There are so many talented Teaching Assistants in the Chemistry program—both graduates and undergraduates—I'm happy to be a member of such a strong team."

In addition to balancing a busy schedule of classes and teaching, Brett works with Professor Kautz on multiple extracurricular projects. Brett and Kautz have recently co-authored a new Chemistry 110 Workbook, which is now being used at UNL since January 2016.

"UNL and the Department of Chemistry have given me more opportunities than I could possibly imagine," Brett said. He feels privileged to play so many active roles in Chemistry.

According to Kautz, "Brett is an assiduous student; he asks questions that are thoughtful, intelligent, and deep. Frankly, he motivates me."

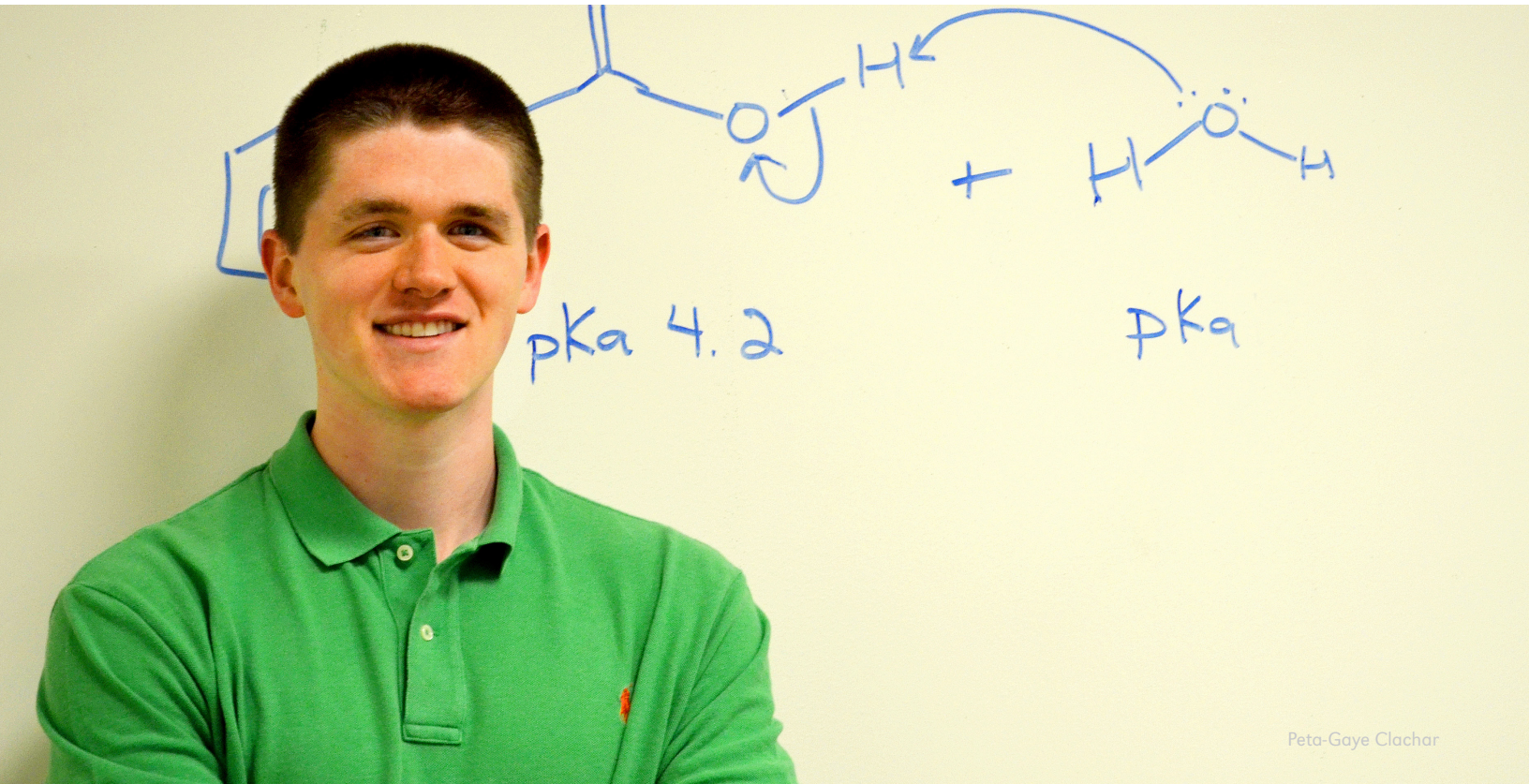
According to Brett, "In order to be a successful student, you have to be self-motivating. One of the most important lessons you discover in college is that learning is a private affair—no one can do it for you," he said.

Brett maintains a 4.0 GPA and anticipates a Spring 2017 graduation, whereupon he plans to attend medical school. His aim is that one day he will be able to incorporate patient care with teaching and research.

Additional Accomplishments:

- Citation for Excellence in Teaching Chemistry
- Distinguished Life Sciences Scholar Research Fellowship
- Ed F. and Clara M. Degering Trust Fund Scholarship
- Frank M. Hallgren Scholarship
- Milton E. Mohr Scholarship
- Ralph F. Nielsen Scholarship
- Jayne Wade Anderson Scholarship
- Dean's List
- 4.0 High Scholar
- Robert Morrison Scholar
- Chancellor's Scholarship
- National Merit Scholarship
- Mustang Booster Club Scholarship
- Student of the Week Scholarship
- Honors Program Textbook Scholarship

Peta-Gaye Clachar
UNL Chemistry



Peta-Gaye Clachar

Peta-Gaye Clachar

Jessica Periago

Jessica Periago is a Graduate Teaching Assistant Mentor and one of the Fall 2015 recipients of the Citation for Excellence in Teaching Chemistry Award. Periago received the award for her dedication to the 33 General Chemistry Teaching Assistants with whom she meets on a weekly basis.

Born in Toulon, France, Jessica graduated with a high school diploma, in 2006, from the National Institute of Sport and Physical Education, located just outside Paris, France— a school that fosters athletes who excel at sports while studying. Her love for basketball took her to competitions in Africa, Italy, Spain, Czech Republic, along with several trips to the United States. In 2007, she earned a scholarship at the Division I level to play women's basketball at the University of Nebraska-Lincoln. At UNL, Jessica excelled both on and off the court, and has garnered a number of achievements.

After graduating in 2012 with a Bachelor of Science in Biochemistry, Jessica enrolled in the Chemistry graduate program and has worked as a TA for several semesters. Her teaching style is no ordinary one, but is one that she adapts to each student according to his or her needs. Jessica takes on a high-energy approach to her duties and a team-building mentality. "She is invested in not just the program and her job, but genuinely wants to help us," Tessa Andrews, a first-year graduate student TA, said.

Jessica ensures that her TAs understand what they are teaching. She wants them to be dedicated so that they too can be organized and deliver a world-class teaching experience to their students. "I put my heart and soul into teaching," Jessica said, "I want students to have a valuable experience."

Although this award was unexpected, she feels humbled. "It felt good to be recognized for working hard. I am honored."

Kautz said Periago is responsible, independent, and fosters a sense of unity in the classroom, which is one reason he chose her to be a TA mentor. "We wanted her to bring that same sense of togetherness and team-spirit to our group—she has definitely done that," Kautz said. Periago delivers a consistent message to our TAs, he said, one that positively reflects the Department of Chemistry's goals.

Her fascination with how the human body functions led Jessica to pursue an advanced degree in Chemistry. "I love learning how stuff works, especially in the body," Periago said.

With the help of her Academic Advisor, Mark Griep, Associate Professor, Jessica plans to defend her Ph.D. in 2018 and begin a career in the pharmaceutical industry.

Additional Accomplishments:

- Earned scholarship at the Division I level to compete for the UNL basketball team
- Participated in three European Championship with the youth French national team (2004- 2006)
    - 2005 bronze medalist
- First-team Academic All Big 12, 2010 and 2011
- Eight-time honoree, Big 12 Commissioners Academic Honor Roll
- Student-Athlete Academic Recognition Banquet, 2009, 2010, 2011, and 2012
- Appointed Team Game Captain, Nebraska Basketball, 2010 – 2011
- Volunteer Mentor, Belmont Elementary School, 2007 – 2011
- Volunteer, Husker Connect Mentoring program, 2009 – 2012

Peta-Gaye Clachar
UNL Chemistry

Peta-Gaye Clachar

Jacob Teeter

Jacob Teeter is one of four Fall 2015 recipients of the Citation for Excellence in Teaching Chemistry Award. He received this award for his patience and dedication to students' overall learning and his endless efforts to keep them engage in General Chemistry 1 (Chem. 109) and General Chemistry 2 (Chem. 110) labs.

"Jacob embodies the standards expected for a recipient of the Citation for Excellence in Teaching Chemistry. His dedication to his students is clear as well as the respect he has earned from his peers. I am proud to have Jacob as part of our teaching team," Kautz said.

Born in Jackson, Mississippi, Jacob spent most of his childhood years in Fort Smith, Arkansas. He received the Arkansas Government Scholarship to attend Lyon College where he earned a Bachelor of Science degree in Chemistry and Mathematics, in 2014.

As an undergraduate, Jacob worked in the research lab of Professor Stuart Hutton, Associate Professor of Physics, where he explored the ferroelectric properties in derivatives of Rochelle salt. In addition to his research endeavors, Jacob also served as the historian for the Lyon College American Chemical Society student affiliates and as the Secretary for Zeta Beta Tau Fraternity.

Jacob has been a Chemistry Lab TA for two years. His teaching style reflects how he was once taught by a Chemistry Professor at Lyon College, which was to tailor each lesson to fit the individual's need.

"I try to teach how I wanted to be taught when I was taking these classes," Jacob said. "I think I learn the best when concepts are first presented in the simplest possible form and then build via example from that.

"I usually try to engage students in some extra dimension in the lab and try to make sure they understand what they are doing. My hope is that, if they understand what they are doing and what's happening behind the scenes...they might be more interested."

In addition to being a TA, Jacob has an interest in exploring material sciences and so you will find him in the physics lab of Associate Professor Axel Enders or working alongside his advisor Assistant Professor Alexander Sinitskii. In summer 2015, Jacob co-authored a paper, "Few Layer Titanium Tri-sulfide Field-effect Transistors," published by the *Royal Society of Chemistry Nanoscale*.

Jacob, in his spare time, takes time to read, plays online games, and builds computers.

He is now in his second year as a grad student and eventually intends to pursue a career in industry or in a government lab.

Additional Accomplishments:

- Citation for Excellence in Teaching Chemistry (Fall 2015)
- Chemistry Chair Fellowship, (2014)
- Member of the Order of the Tartan chapter of Mortar Board, service-oriented senior honor society (Spring 2013)
- Member of Chi Beta Phi, science honor society (Fall 2012)
- Member of Alpha Lambda Delta, freshman honor society (Spring 2011)
- Dean's List: Fall 2010, Spring 2013, Spring 2014

Peta-Gaye Clachar
UNL Chemistry

Lipatov, A.; Wilson, P. M.; Shekhirev, M.; Teeter, J. D.; Netusil, R.; Sinitskii, A. Few-Layer Titanium Trisulfide (TiS_3) Field-Effect Transistors. *Nanoscale.* **2015**, *7*, pp 12291-12296. DOI: 10.1039/C5NR01895A

Elizabeth Zurfluh

Elizabeth Zurfluh is one of two undergraduates who received the Fall 2015 Citation for Excellence in Teaching Award. Her resilience and passion to help students excel are two reasons she earned this award. Elizabeth goes the extra mile to help students push themselves.

"I felt really flattered and it was really nice to hear that they had recognized me as someone who was doing well at being a TA," Elizabeth said.

Born and raised in Lincoln, Nebraska, this senior undergrad is pursuing a Biochemistry and English double major while juggling her teaching responsibilities. She said she loves teaching because it widens her scope and it opens her up to new experiences.

"Teaching provided me with new skills. "I try to relay concepts in a simple way but leave some things open to have them ask questions," Elizabeth said. "I like to keep it kind of light-hearted and focus on the interesting things we can do in Chemistry ... and point that out."

"Elizabeth is fully engaged in our teaching program: She is a former lab TA, current Recitation TA, and Student Assistant in the Chemistry Resource Center. Always cheerful and hardworking, it is a pleasure to have Elizabeth on our team," Kautz said.

"You just have to make sure that you are being the TA that you would want," Elizabeth added. "You have to continually engage them."

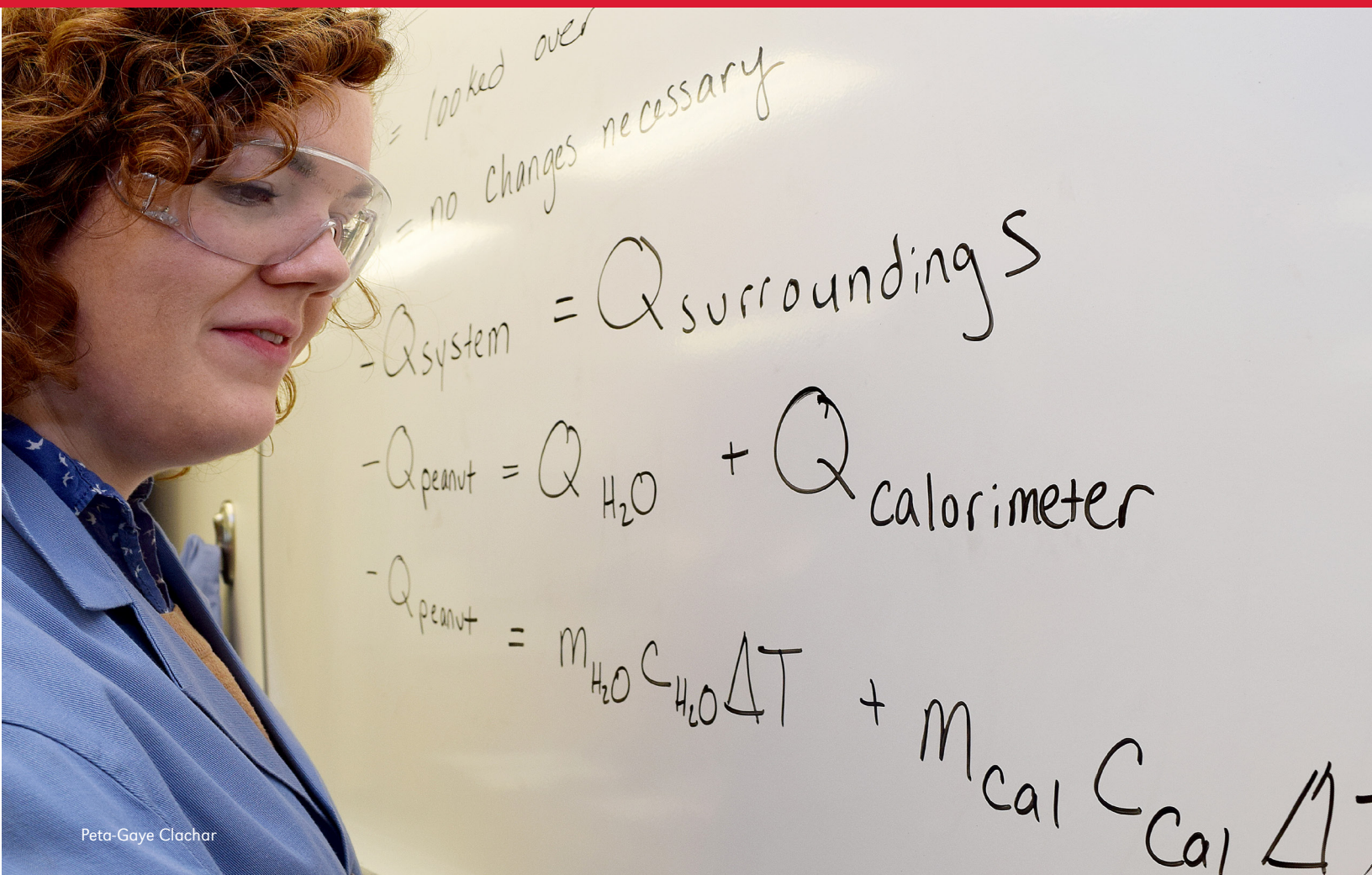
Elizabeth anticipates graduating, August 2016, and is considering going to medical school. One of her long-term goals is to pursue a career in the field of Chemistry or biomedical research.

Additional Accomplishments:

- Volunteer Lab Assistant Spring 2014
- TA for Introduction to Communications Studies (Comm. 109)

Peta-Gaye Clachar
UNL Chemistry

"I like to make myself very open and approachable ... and try to look at it from their point of view."–Elizabeth Zurfluh



Peta-Gaye Clachar

STUDENTNEWS

Congratulations to all of our B.A. /B.S. /M.S. /Ph.D. graduates!

December 2014
Minkyo Kim – B.A.
Rebecca Jarratt – B.A.
Emily Spencer – B.A.
Laura Goodenberger – B.A.
Alex Boson – B.S.
Nhu Dinh – B.S.
Rui Lai – M.S. (Hui Li)
Holly Ochidi – M.S. (Hui Li)
Xiang Fei – Ph.D. (David Berkowitz)
Arnon Olankitwanit – Ph.D. (Andrzej Rajca)
Kaushik Panigrahi – Ph.D. (David Berkowitz)
Matthew Sobansky – Ph.D. (David Hage)
Rachel Willand-Charnley – Ph.D. (Patrick Dussault)

May 2015
Whitney Duarte – B.A.
Samantha Medema – B.A.
Lauren Largen – B.A.
Molly Miller – B.A.
Scott Ingham – B.A.
Lindsay Heimann – B.A.
Cameron Gilinsky – B.A.
Brian Colburn – B.A.
Quynh Nguyen – B.A.
Kelsey Thorpe – B.A.
John Henthorn – B.A.
Maria Podariu – B.S.
Michael Kellar – B.S.
Mitchell Milanuk – B.S.
Tyler Reeson – B.S.
David Brunken-Deibert – B.S.
William Lambert – B.S.
Matthew Kottwitz – B.S.
Venkata Kolli – M.S. (Eric Dodds)
Scott Raber – M.S. (Jiantao Guo)
Xinqi Zhou – M.S. (Cliff Stains)
Katie McCauley (Glaspy) – M.S. (Stephen DiMagno)
Haotong Chen – Ph.D. (Liangcheng Du)
Zane Gernhart – Ph.D. (Barry Cheung)
Shiva Kumar Kyasa – Ph.D. (Patrick Dussault)
Ryan Matsuda – Ph.D. (David Hage)
Timothy Vo – Ph.D. (Alexander Sinitskii)
Anita Zaitouna – Ph.D. (Rebecca Lai)
Xiwei Zheng – Ph.D. (David Hage)

August 2015
Daewoo Park – B.S.
Yao Liu – B.S.
Gilbert Mbah – M.S. (Alexander Sinitskii)
Yali Wang – Ph.D. (Gerard Harbison)
Yunyun Zhou – Ph.D. (Barry Cheung)

December 2015
David Michael Fox – B.A.
Ashley Nicole Siebler – B.A.
Quyen Mai To Vu – B.S.
Shaina Gu Ives – M.S. (Jiantao Guo)
Jordan Veness – M.S. (Stephen DiMagno)
Bi Xu – M.S. (Cliff Stains)
Teklab Gebregiworgis – Ph.D. (Robert Powers)
John Vargas – Ph.D. (David Hage)
Peter Wilson – Ph.D. (Alexander Sinitskii)
Bradley Worley – Ph.D. (Robert Powers)

College of Arts & Sciences dean's list

Congratulations to all on this great achievement!

Fall 2014
Brett Begley
Daniel Dooling
Whitney Duarte
Drew Dudley
Kate Durst
Jake Edelman
Alexandra Fiedler
Jonathan Freese
Riley Giesler
Tressa Golystein
Lindsay Heimann
Elizabeth Hoffman
Scott Ingham
Rebecca Jarratt
Matthew Kottwitz
Megan Lee
Christopher Lubbers
Jordan Mason
Samantha Medema
Philip Melchert
Mitchell Milanuk
Hannah Milenkovich
Kathryn Miller
Molly Miller
Ashton Neylon
Lawrence Nguyen
Maria Podariu
Jeff Post
Kevin Real
Andrew Schacht
Aubrey Schmidt
Olivia Thiel
Olivia Thomas
Megan Vandergriend

Spring 2015
Malachi Abebe
Brett Begley
Camden Bilyeu
Alleah Bouley
Lukas Brenden
David Brunken-Deibert
Schuyler Chambers
Drew Dudley
Kate Durst
Alexandra Fiedler
Jonathan Freese
Ryan Geisert
Elizabeth Hoffman
Tyler Koupal
Megan Lee
Samantha Lonergan
Austin Lowe
Christopher Lubbers
Philip Melchert
Mitchell Milanuk
Hannah Milenkovich
Kathryn Miller
Molly Miller
Lawrence Nguyen
Kaitlyn Papke
Breanna Petersen
Maria Podariu
Jeff Post
Kevin Real
Tyler Reeson
Olivia Thomas
Sydney Townsend
Tiffany Truong
Megan Vandergriend

STUDENTNEWS

2015 scholarship and award winners

The Department of Chemistry is pleased to announce our 2015 student awards and scholarship winners.

2015 award winners

Chair's Undergraduate Teaching Assistant Awardee
- Ryan Geisert

Chair's Undergraduate Research Assistant Awardee
- William Lambert

Chair's Undergraduate Research Assistant Awardee
- Kaitlyn Rosploch

Robert S. Marianelli Undergraduate Research Assistant Awardee
- Maria Podariu

John J. Stezowski Graduate Teaching Assistant Awardee
- Katherine Schumacher
  Advised By Professor Eric Dodds

James Carr Graduate Teaching Assistant Awardee
- Yunyun Zhou
  Advised By Professor Barry Cheung

Fuerniss Fellowship Awardee
- Shiva Kumar Kyasa
  Advised By Professor Patrick H. Dussault

Cromwell Graduate Research Assistant Awardee
- Gregory A. Applegate
  Advised By Professor David B. Berkowitz

Graduate Research Assistant Awardee, Honorable Mention
- Alexey Lipatov
  Advised By Professor Alexander Sinitskii

Graduate Research Assistant Awardee, Honorable Mention
- Brad Worley
  Advised By Professor Robert Powers

Gordon A. Gallup Graduate Research Assistant Awardee
- Lei Li
  Advised By Professor Xiao Cheng Zeng

T. Adrian George Graduate Research Assistant Awardee*
- Jacob A. Johnson
  Advised By Professor Jian Zhang

Korean Alumni Graduate Research Assistant Awardee
- Xiwei Zheng
  Advised By Professor David S. Hage

2015 scholarship winners

ACS Hach Excellence in Chemistry Education
- Kathryn Miller

Marjorie Dewey & Catherine Kelly SS/FSC
- Malachi Abebe
- Pierce Bower
- Ashton Neylon

Ed Hirsch Scholarship
- Melanie Farmer

Viola C. Jelinek Scholarship in Chemistry
- Tressa Gloystein
- Megan Lee
- Megan Vandergriend

Lester C & Joan M Krogh Scholarship & Fellowship in Chemistry
- Kate Durst
- Alexandra Fiedler
- Tyler Koupal
- Samantha Lonergan
- Hannah Milenkovich

Ralph F. Nielsen Scholarship
- Brett Begley
- Alleah Bouley
- Schuyler Chambers
- David Fox
- Ryan Geisert
- Brenna Petersen
- Kevin Real

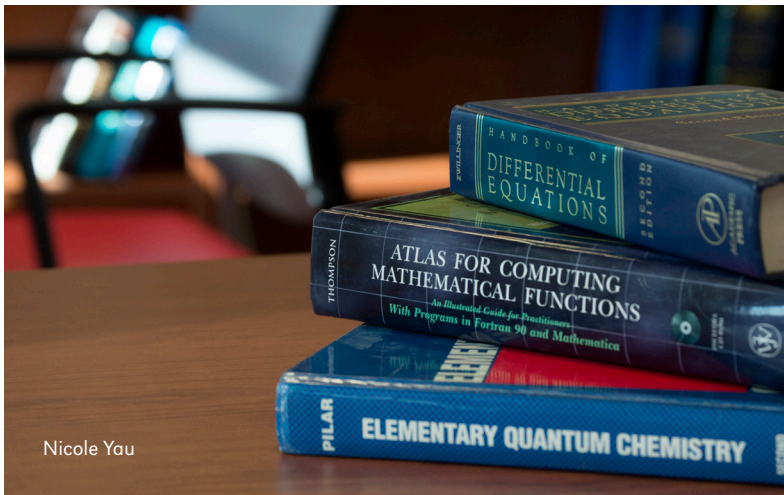
Ida Elizabeth Frey Samuelson Scholarship
- Lawrence Nguyen

UNL Department of Chemistry Scholarship
- Daniel Dooling
- Jake Edelman
- Jonathan Freese
- Philip Melchert
- Sydney Townsend
- Tiffany Truong

Maxine Wertman Fund Scholarship
- Lukas Brenden
- Drew Dudley
- Jeff Post

Clyde & Elva Weyenberg Scholarship
- Olivia Thomas

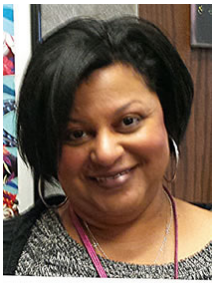
Ervin F. Wilson Chemistry Scholarship
- Elizabeth Hoffman



Nicole Yau

Ovation and Applause honorees

The College of Arts and Sciences has several programs to honor outstanding staff and college student workers who perform their jobs extraordinarily well. The Ovation program honors college student workers and the Applause program recognizes staff employees. This year, we were honored with three awardees: JaMel Ways, Leanna Klempa, and Kaylee Wheeler. JaMel and Leanna received Applause Awards and later, this Fall, were honored with Super Applause Awards.



JaMel Ways

JaMel Ways, Assistant to the Chair, was honored January 2015 with the Applause Award. Here is what her nominators had to say:

"As the Assistant to the Chair, JaMel is the face of the Department for all who call upon Chemistry both within the university and around the country. She takes pride in representing Chemistry professionally to all. JaMel also is a real leader in organizing major events in which the Department takes a lead. She does this with a great degree of independence and has a real flair for creativity. It is not surprising that she now also leads the CAS Staff Council; her sense of team pride is ever present, as is the smile on her face."

"JaMel definitely deserves the Applause Award. Not only does she run the chair's office in a friendly and efficient manner, she takes time to bring staff together with her 'staff board. 'This is usually a monthly inquiry into 'fun facts' about the staff that she collects and then posts for us to see. It's always fun to see how others have responded to the topics she sends out and she is the current president of the staff council. She always has a smile on her face, a great sense of humor, and something nice to say. She's ready to help with any project that may arise and is just a joy to be around!"

"If ever a department needed a breath of fresh air, it was Chemistry. We didn't get just a breath of fresh air with JaMel; we got a full blown tornado. JaMel is happy, vibrant, and it is a pleasure to work with her day to day. She always has her nose to the grindstone, but makes it appear effortless to those around her. She tells people how she loves her job and that is evident in her positive attitude. I think JaMel emulates the type of employee we should honor with an Applause Award. She is energetic, vivacious, and dedicated to the University. It is my pleasure to nominate her for the Applause Award!"

"As a former Chair of the Department of Chemistry, I wholeheartedly support the nomination of JaMel Ways for Applause. During my term, I found that two days in the chair's office were rarely the same, but JaMel was always the same. She has a can-do unflappable spirit that rules the day no matter how crazy things get ... and they did get crazy from time to time. I could always count on the fact that JaMel would show the patience of a saint, the determination of a bulldog, and a calm demeanor that projected, "it's all in a day's work and we'll get it done." An Applause Award is richly deserved for the countless contributions she makes to the Department!"

"JaMel Ways works hard at increasing the morale of our Department by creating fun activities for all staff to enjoy. You always see JaMel with a smile and she is always so encouraging of others. When you need cheering up you can always count on her. I truly enjoy working with her. The Department wouldn't be the same without her!"

Leanna Klempa

Leanna Klempa, Staff Secretary, was honored this August with the Applause Award. Her nominators described her as a tenacious employee who is jolly and also an expert in what she does. Here are their thoughts of Leanna:

"The word that comes to mind when I think of Leanna is "wow." Although she is with us only half of each day, she casts a full-time shadow in terms of her work in the front office. She is the smooth hand behind room reservations, door access, helping faculty and staff with projects, and making arrangements for special events both large and small (student appreciation days, larger orientation events for entering classes, and others). Along with her coworker in the front office, Leanna tends to be the person who gives a visitor or student the first impression of the Department of Chemistry; that impression is that we are efficient and pleasant. Please award her an Applause!"

"Leanna is a hard worker and always makes sure everything goes smoothly! She plans many events with caterers and she's got it down to a fine art. She is always available to help out in any way that she can, and does it with a smile! Since I've known her, she's shown her willingness to go above and beyond to make our Department events great! In addition to her hard work, she also makes us laugh with her stories about her kids, family, friends, and a ton of other topics that one can only hear about during break time! Thanks for always having a smile to give every day Leanna! You are appreciated!!"

"Leanna is AMAZING! She's a whiz with room reservations. She monitors all building and elevator access for Chemistry (120+ just counting grad students!). She works with the catering for all receptions and events. That's just the tip of the iceberg. Leanna is always calm, patient, and efficient no matter how crazy things may be around her. On top of all this, she's REALLY NICE! Leanna is well deserving of an Applause Award."

"Leanna is the perfect person to nominate for an Applause Award. Leanna is a tried and true UNL employee. She goes out of her way to ensure that her job responsibilities are accomplished and she never complains. (Even when she has had to call the copy guy five days in a row!) She will keep calling until the job is done and the job is done right. Leanna is one of the most reliable and dependable people I know. Anytime you need to her to do anything she always makes sure that things are done the right way. On a personal note, Leanna always has a smile on her face and obviously enjoys the company of those around her. It is my honor to nominate someone like Leanna for the Applause Award!"

Kaylee Wheeler

Drum roll please... and the Ovation Award goes to Kaylee Wheeler! Her nominators found her vivacious spirit to be enlightening. Here are some of the amazing things the people who worked closely with Kaylee had to say:

"Kaylee works in our business office running errands, monitoring mailing lists, shredding documents, putting flyers together for Chemistry Day, and just about anything else you might ask her to do. She is always efficient, cheerful, and friendly. Kaylee deserves the Ovation Award for all her hard work!"

"Kaylee has been a very dedicated student worker for the Department of Chemistry. She is on time, reliable, tackles any project that is sent her way, and always has a smile. No matter how challenging or how time consuming a project, she will see it through to completion. She does well working on projects for many different people. Kaylee is definitely a keeper. She is well organized and a joy to be around. I strongly nominate her for an Ovation Award."

"Kaylee has been a student worker in our area for the past year. She has such an incredibly kind spirit and is always willing to help with whatever is needed. Kaylee really exemplifies what everyone looks for in student worker qualities. She is hard-working, diligent, dependable, funny, and a gentle soul. I am more than happy to nominate Kaylee for an OVATION Award as she is very deserving!"

"Kaylee is very deserving of the Ovation Award; she quietly goes about her duties in the most efficient way possible. I have asked her to do some fairly "nasty" jobs such as cleaning liquefied spinach leaves out of the refrigerator and she cleaned it up immediately and without a complaint. Unfortunately, some of our jobs are very mundane and repetitive and she tackles them all. We even needed an "extra" for a training video and she gladly assisted. Our department is much better off having Kaylee working with us. Please give her an Ovation!"

Congratulations you three!

The Dean's office of the College of Arts & Sciences later honored Leanna and JaMel with Super Applause Awards for their valiant efforts in being consistently outstanding in their jobs and always going the extra mile.

"Applause Awards already recognized those who excel in performance across the college; "Super Applause" Awards are the "crème-de-la crème" of the Applause awardees."

—David Berkowitz, Department Chair

Stara and Clachar join the Department

The Department of Chemistry is pleased to introduce two new members of staff to our team. Michelle Stara, Lab Manager, and Peta-Gaye Clachar, Recruiting and Communications Coordinator.

From Bruno, Nebraska, Michelle Stara brings to the Department a wealth of STEM-related experiences and more than 24 years in the pharmaceutical industry. Her background as a scientist working in research laboratories and management in academic settings put Stara at an advantage as a versatile Lab Manager in the Department of Chemistry.

Michelle Stara

Outside of being the overseer of the chemistry labs, Stara prepares lab quizzes and practicals, creates seating charts for exams, and participates in the group process of grading of over 1100 exams. She ensures proper running of the undergraduate teaching labs, which includes maintaining lab equipment, reagents, and materials; purchasing new equipment; and keeping state-of-the-art equipment functional and up-to-date.

"I'm most passionate about the challenge of bringing the lab standards up to peer university levels so that we can compete with schools like Michigan State, Ohio State, Penn State, and all the Big Ten schools," Stara said.

Stara comes to the Chemistry Department from the UNL Biological Production Development Facility (BPDF) in the Department of Chemical Engineering. She worked as a Scientist developing studies and growing genetically modified *E. coli* and yeast to produce target proteins for clinical trials to treat various diseases.

For 19 years, Stara worked at Pfizer, moving up quickly through the ranks from Manufacturing Associate, to Associate Microbiologist, and then Senior Associate Scientist.

Some of her core skills include designing research studies, applying business principles, project management, and lab bench development of assays.

"I have had the opportunity to work through the process from proposal writing and justification, to project management in terms of time and monetary budgeting, to the drafting of experiments, interim reports, and final executive summaries and full project reports," Stara said.

This "Jill of all trades" enjoys having dynamic careers in the STEM field. Stara is a UNL alumna with a Bachelor of Arts degree in Psychology and a minor in Biological Sciences. She also has an MBA from the University of Phoenix and Ph.D. in Organizational Management (in business) from Capella University. In her pursuit of knowledge, Stara continues to further her education. She hopes to pursue a master's degree in Microbiology and another in Internet Education to teach online distance-education programs utilizing technology to teach (physical) labs to non-traditional students in a virtual classroom.

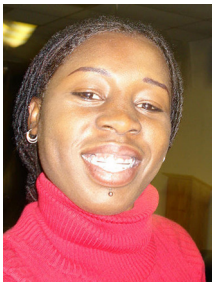
Her love of technology is a driving force in her day-to-day routine as Lab Manager. She uses technology as a tool to help organize the labs more efficiently. Stara is implementing a tracking system to monitor equipment and supplies to ensure there is adequate stock required for teaching lab experiments.

"I really like tech stuff...being able to barcode and track equipment and supplies is the way I want to have these labs running," Stara said. "We have to be able to show students that we have the technology to do our jobs and that they too are getting a quality lab learning experience."

Outside of the labs, the avid animal lover spends her time doing activities with her three daughters, Caitlin, 17; Bailey, 13; and Megan, 7; who enjoy watching the American drama series "The Walking Dead."

Stara said her life goals include establishing new and innovative methods to deliver science based lab courses, and to eventually, one day, write a book.

She brings the warmth of the Caribbean



Peta-Gaye Clachar

Peta-Gaye Clachar, our newest Recruiting and Communications Coordinator, joins us from Fargo, North Dakota. Born in Kingston, Jamaica, Peta-Gaye came to the United States on an academic scholarship. Her thirst for a different cultural experience to broaden her communications abilities brought her from the Caribbean to Fargo, North Dakota, to pursue a degree at North Dakota State University. In 2014, she received a Bachelor of Fine Arts degree in Visual Arts and a Bachelor of Science degree in Journalism. She also has a diploma in Photography.

Her experience behind the camera goes beyond her academic pursuit. With over decade of experience as a Photographer under her belt, Peta-Gaye's photography expertise can be seen all over the World Wide Web. She worked at one of Jamaica's largest and leading newspapers, *The Gleaner,* as a Photojournalist. Her news media experience extended to six years when she worked briefly as a Multimedia Journalist for NBC and CBS.

Another one of her loves is fine arts, where she loves to dabble her creativity on canvas. Peta-Gaye is a passionate painter and has showcased her work in exhibitions in North Dakota and in Nebraska. In 2014, her artworks were exhibited among some of the world's most famous painters: Salvador Dali, Andy Warhol, and Jasper Johns. Some of her paintings are part of the NDSU Memorial Union art collection.

As the Recruiting and Communications Coordinator, Peta-Gaye is responsible for recruiting graduate students, visual communications and graphics, written communications, alumni, social media, and creating and adding web content and updates.

"This is my opportunity to shine and I will strive to be the best Recruiting and Communications Coordinator this department will ever have," Peta-Gaye said. "I am excited to add to the diversity in the department, and to learn every day, broaden my skills, and also, to put my own spin on things, with collective inputs and support.

"I believe this is a great opportunity for me to combine my visual and written communications skills and effectively get the messages across our target audience – both internally and externally."

Her array of skills, artistic talents, her people-person personality, and her positive attitude make Peta-Gaye a pleasant treat to have in the Department of Chemistry.

"I'm so happy to be part of such an intimate family. I feel at home here in Lincoln and I truly feel like a Husker," she said.

Peta-Gaye Clachar
UNL Chemistry

"A Mother's Blessing" oil on canvas, (4 panels) 80" X 80", 2013

Beth Donovan Greg Nathan | University Communications

Farewell but not goodbye

For years our Department has had some great employees come in and out and have gone on to start new and exciting opportunities and careers. Recently, we had to say farewell to an outstanding employee, Beth Donovan, who worked hard to make her mark in the Chemistry Department.

Beth Donovan was the Assistant Director of Instrumentation. She has been with the Department for nearly two years and maintained the Undergraduate Instrument Center (UIC) where she trained undergrad students to use analytical equipment for their research. Beth's primary goal was to improve the undergraduate lab experience by developing and implementing changes to existing experiments.

"Beth Donovan was an excellent addition to the UNL Chemistry team," David Berkowitz, Department Chair said. "Her enthusiasm for doing experimental chemistry was contagious and made many a student's journey through the UIC to collect data a memorable and enjoyable one."

She left the Department in November to take up another position in the mountainous state of Salt Lake City, Utah.

Beth, we will miss your smile! Best wishes in your endeavors!

Peta-Gaye Clachar
UNL Chemistry

Participants of the ACS Division of Organic Chemistry Graduate Research Symposium in Austin, Texas. Photos courtesy of the ACS Division of Organic Chemistry

Chemistry grad student participates in special ACS symposium

Graduate student Gia Hoang got the opportunity to present a poster on his research at the ACS Division of Organic Chemistry Graduate Research Symposium (GRS).

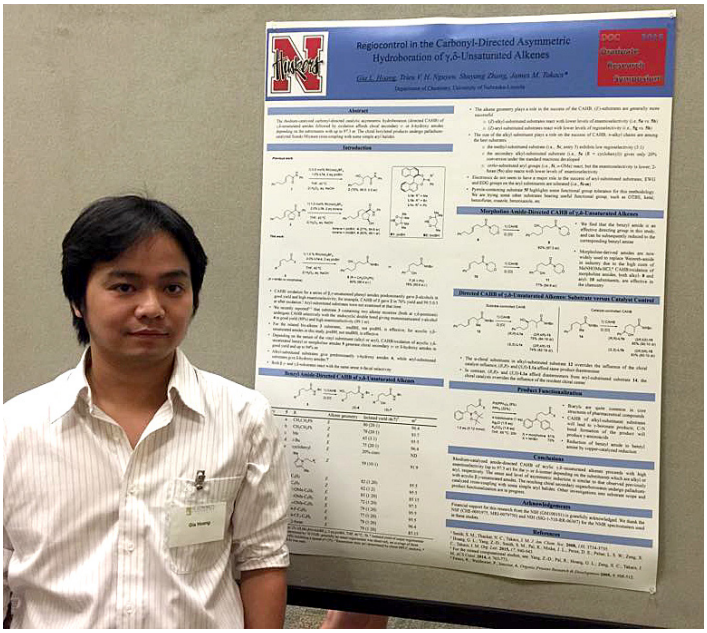
The GRS, held at St. Edwards University in Austin, Texas, July 23-26, 2015, allowed Hoang to present "Regiocontrol in the Carbonyl-Directed Asymmetric Hydroboration of γ,δ -Unsaturated Alkenes." The symposium was a vehicle for Hoang to present his research in front of 50-75 graduate students. One to three people from any research group from various institutions from all over the country attended.

"GRS gave me the privilege to share our results and an opportunity to interact with front runners from academia, industry, various funding agencies, and publishers at a single venue," Hoang said.

Summary of Hoang's research:

"Chiral organoboronates are useful intermediates for a lot of stereospecfic transformations. We recently described carbonyl-directed catalytic asymmetric hydroborations (directed CAHBs) of β,γ–unsaturated alkenes as well as functionalizations of their forming organoboronate products. This study, CAHB of γ,δ -unsaturated alkenes, provides the parallel method but will further broaden the range of core structures that can subsequently be accessed. Depending on the substituents (aliphatic vs. aromatic), CAHB reactions are achieved in highly γ- or δ-selective, respectively, both in excellent enantioselectivity (89-94% ee) with the same sense of ϖ-facial selecvitity. Moreover, kinetic resolutions using chiral and racemic α- and β-substituted substrates are also studied. The organoborane products are functionalized via C-C and C-N bond formations resulting in a number of pharmaceutical compounds."

The GRS within the Division of Organic Chemistry is specifically designed for 4th year graduate students. The Symposia is limited to 50-75 graduate students with no more than these restrictions make the acceptance rate very competitive. In addition, a potential nominee has to submit a résumé along with a 3-4 page summary of their research. For accepted participants, the GRS sponsors provided room, board, and a limited number of travel bursaries (up to $400).



Hoang presenting his poster at the GRS

"It was a once in a lifetime chance for me to learn different perspectives for post-graduate schools and careers," Hoang said.

Hoang works along with his mentor Dr. James Takacs, the Charles Mach University Professor, and is doing great things. He is currently working on the rhodium-catalyzed asymmetric hydroboration project. Hoang, who anticipates graduating in December 2016, has already written three papers.

Hoang, G. L.; Yang, Z-D.; Smith, S. M.; Pal, R.; Miska, J. L.; Perez, D. E.; Pelter, L. S. W.; Zeng, X. C.; Takacs, J. M. Enantioselective Desymmetrization via Carbonyl-Directed Catalytic Asymmetric Hydroboration and Suzuki-Miyaura Cross-Coupling. *Org. Lett.* **2015**, *17*, pp 940-943. DOI: 10.1021/ol503764d

Yang, Z-D.; Pal, R.; Hoang, G. L.; Zeng, X. C.; Takacs, J. M. Mechanistic Insights into Carbonyl-Directed Rhodium-Catalyzed Hydroboration: ab Initio Study of a Cyclic γ, δ- Unsaturated Amide. *ACS Catal.* **2014**, *4*, pp 763-773. DOI: 10.1021/cs401023j

Smith, S. M.; Hoang, G. L.; Pal, R.; Khaled, M. O. B.; Pelter, L. S. W.; Zeng, X. C.; Takacs, J. M. γ-Selective Directed Catalytic Asymmetric Hydroboration of 1,1-Disubstituted Alkenes. *Chem. Commun.* **2012**, *48*, pp 12180-12182. DOI: 10.1039/c2cc36199j

Peta-Gaye Clachar
UNL Chemistry

STAYCONNECTED

Reconnect...

Facebook, Twitter, and LinkedIn

The UNL Department of Chemistry is on Facebook! Become a fan of the *University of Nebraska–Lincoln Department of Chemistry*.

Follow the UNL Department of Chemistry on Twitter! Keep up-to-date on Department awards, events and research by following *@UNLChemistry*.

Expand and strengthen your professional networks while keeping up on Department happenings by joining the *University of Nebraska–Lincoln Chemistry Alumni* group.

Chemistry alumni website

http://chem.unl.edu/alumni-friends

Connect to job opportunities with Husker hire link

Husker Hire Link is UNL's free online service that connects UNL students and alumni with employers. The site allows students and alumni to post and send resumes; search jobs, internships, and employers; request on-campus interviews; and stay updated on career opportunities. Last year, more than 2,200 employers from across the country in a wide variety of career areas used Husker Hire Link to post more than 8,000 jobs and internships.

For more information, visit the Husker Hire Link at http://www.unl.edu/careers/hhl

Update contact information

Alumni members, you can update your contact information by visiting http://chem.unl.edu/alumni-info-update

Where are they now?

Attention alumni! We want to know where you are and what you're doing!

Please take a moment to answer the following questions and return your responses by mail to:

University of Nebraska–Lincoln
Department of Chemistry
515A Hamilton Hall
Lincoln, NE 68588-0304

Or, email your responses to:
pclachar2@unl.edu

Name: _____
Degree: _____
_____
Year Earned: _____
UNL Advisor: _____
Email: _____
Current and past career positions: _____
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Please let us know of any significant events in your life and/or career since leaving the University of Nebraska–Lincoln. Also, please feel free to send any photos and/or recollections of your time here at UNL!

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