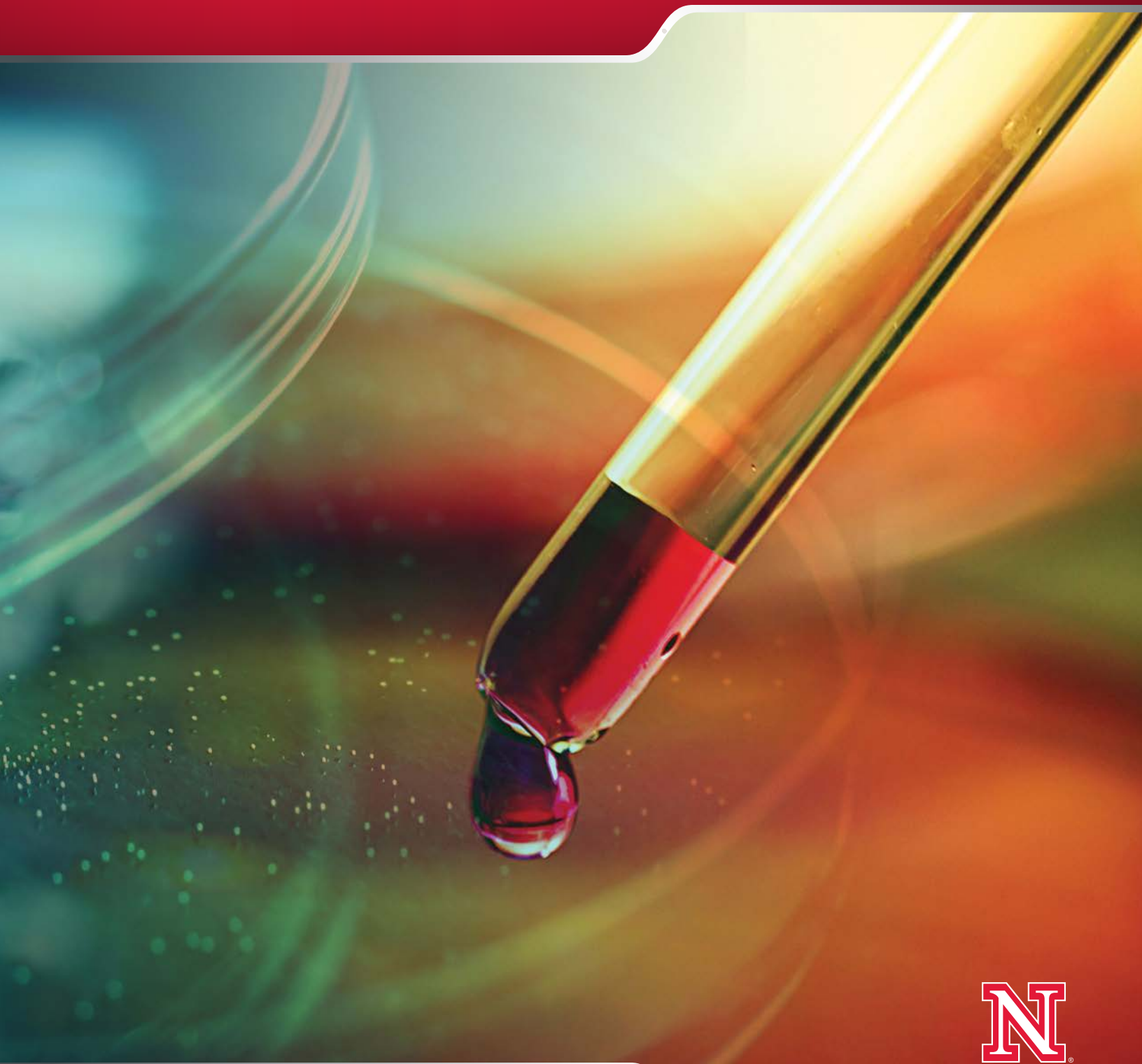


DEPARTMENT OF **CHEMISTRY**

UNIVERSITY OF NEBRASKA-LINCOLN



ALUMNI & FRIENDS NEWSLETTER
Winter 2014

DEPARTMENT OF CHEMISTRY

Story ideas, activities and achievements can be submitted by sending an email to kerry.vondrak@unl.edu. Receipt does not guarantee publication and the editor reserves the right to edit for space, clarity, grammar and style.

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Updates

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

Support the Chemistry 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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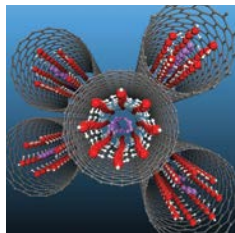
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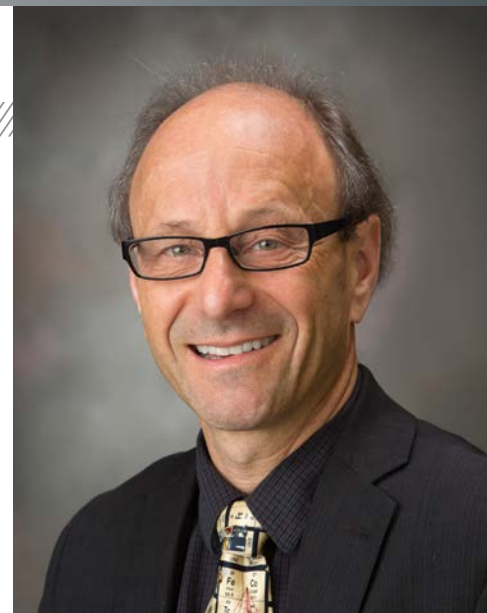
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Letter from the Chair



Fellow Chemists,

Greetings from Lincoln! It is a pleasure to write to you as the Fall 2014 Semester comes to a close. We have had a very eventful semester. For many of us, it started at the Fall ACS Meeting in San Francisco. We had a great turnout with UNL undergrad Chemistry alums ranging from the current Chair of Chemistry at U. Alabama (Kevin Shaughnessy), to the head of the Chemistry/Biology Interface Program at NIH/NIGMS (Miles Fabian), to a successful pediatrician in the Bay area (David Kittams), not to mention a host of current graduate students and alums who are successful in industry and academe. Please circle the dates for the Boston Fall 2015 ACS Meeting (Aug 16-20, 2015) for the Nebraska Chemistry Alumni Reception.

September 19 saw the formal conferring of the Cordes Chair upon Dean Joseph Francisco by Gene Cordes. This event coincided with our inauguration of the NC3—Nebraska Cluster for Computational Chemistry. Mark Ratner, Northwestern University, gave a motivating talk as the inaugural NC3 lecturer. As I write, the stage has been set for the demolition of 4th Floor HaH East for the construction of the NC3 physical space. The facility should be ready for occupation this Spring/Summer. Many of us remember this as the former Chemistry Library space. It will be great to see the new space and see this become a hub of computational chemistry in the United States and internationally!

Marinda Wu, Immediate Past President of the ACS led an entourage from the ACS National Office in Washington to Lincoln, where we all celebrated the declaration of Dr. Rachel Lloyd as an ACS National Historical Chemical Landmark. As you know, Lloyd was both the first American woman to earn a Ph.D. in Chemistry, and the second Chair of the Department of Chemistry at NU, taking the helm back in 1891! Mayor Beutler declared October 1, 2014 Rachel Lloyd Day in Lincoln and Leirion Gaylor Baird from the Lincoln City Council read the official proclamation at the banquet. It was truly a memorable occasion with Chancellor Harvey Perlman opening some of the items from the Avery Hall time capsule that contained the best image of Rachel Lloyd yet uncovered and Professor Mark Griep offered the assembled crowd a personally researched account of Dr. Lloyd's life and career. The next day featured a motivating Women in Science Symposium at the Nebraska Union that would have made Rachel Lloyd proud.

The next month, UNL Chemistry Ph.D., alumnus Dr. Ayman Sahli flew into town from halfway around the world where he was featured as the College of Arts and Sciences Masters Week honoree in the ceremonies on November 19-21, 2014. Ayman is CEO of Julphar Pharma, headquartered in the United Arab Emirates and the largest pharmaceutical/biotech operation in the Middle East. It was a pleasure to see Ayman again!

Then, this past month, we celebrated the 33rd Hamilton Award Lecture, on December 4, 2014. Professor Laura Kiessling, Steenbock Professor at the University of Wisconsin-Madison and an NAS Member, a MacArthur Foundation "Genius" Awardee and Founding Editor, ACS Chemical Biology, delivered a pair of articulate and provocative lectures. This event was extra special this year, as we had the pleasure of welcoming back the Hamilton family, Dr. Cliff Hamilton, Jr. and his wife Yvonne, as well as their children, Debra Hamilton-Schilling and Robert Hamilton and his wife Joan.

And most recently, December 12, we roasted and honored Darrel Kinnan on the occasion of his retirement after 38 years of dedicated (and animated) service as the Laboratory Manager running the Gen Chem Labs...and so much more here in HaH. Darrel will hang up his lab coat and pick up his golf clubs—Darrel, you will be sorely missed—Thanks for all that you have given to this place!

I will close with a big announcement. I have been asked to take on the interim leadership of the Director of the Division of Chemistry at the National Science Foundation to begin February 1, 2015. This is both an honor and a formidable challenge. The budget of Division has hovered around \$230 M in the past several years and it will be my role to be a good steward of those resources and oversee their allocation to fund the best science in the United States. I will be on loan from the University of Nebraska, and I am to return to the Department in the Fall. In the interim, Jody Redepenning, currently Vice Chair of the Department will step up to the plate as Acting Chair, and Liangcheng Du has agreed to serve as Acting Vice Chair. I am thankful to Jody and Liangcheng for their willingness to serve and for their leadership. We are in very good hands, indeed.

In closing, thanks to the Web Oversight Committee we now have a brand new departmental website—check it out at <http://chem.unl.edu/>! Upward and onward, Nebraska Chemistry—GBR!

All the best,

A handwritten signature in black ink, appearing to read "D. Berkowitz".

David B. Berkowitz, Willa Cather Professor & Department Chair

P.S. - Keep a bookmark in your calendars for Spring 2016; our next Nebraska Chemistry Reunion is due to happen then; likely timed with the Spring Game.

Chemistry Collaboration Works Toward Next Generation of High-speed, High-capacity RAM

The improvements in random access memory that have driven many advances of the digital age owe much to the innovative application of physics and chemistry at the atomic scale.

Accordingly, a team led by UNL researchers has employed a Nobel Prize-winning material and common household chemical to enhance the properties of a component primed for the next generation of high-speed, high-capacity RAM.

The team, which published its findings in the Nov. 24 edition of the journal *Nature Communications*, engineered and tested improvements in the performance of a memory structure known as a ferroelectric tunnel junction.

The junction features a ferroelectric layer 100,000 times thinner than a sheet of paper, so thin that electrons can “tunnel” through it. This layer resides between two electrodes that can reverse the direction of its polarization—the alignment of positive and negative charges used to represent “0” and “1” in binary computing—by applying electric voltage to it.

The researchers became the first to design a ferroelectric junction with electrodes made of graphene, a carbon material only one atom thick. While its extreme conductivity makes graphene especially suited for small-scale electronics, the authors’ primary interest lay in how it accommodated nearly any type of molecule—specifically, ammonia—they placed between it and the ferroelectric layer.

“Although graphene is the thinnest material in the universe, it is impermeable to even the smallest atoms and molecules, such as helium and hydrogen,” said Alexander Sinitskii, an assistant professor of chemistry and one of the co-authors of the study. “This property makes graphene a perfect cover material that can be used to encapsulate any molecules, such as ammonia, on a surface of a ferroelectric substrate,” he said.

A junction’s polarity determines its resistance to tunneling current, with one direction allowing current to flow and the other strongly reducing it. The researchers found that their graphene-ammonia combination increased the disparity between these “on” and “off” conditions, a prized outcome that improves the reliability of RAM devices and allows them to read data without having to rewrite it.

“This is one of the most important differences between previous technology that has already been commercialized and this emergent ferroelectric technology,” said Alexei Gruverman, a Charles Bessey Professor of physics who co-authored the study.

Ferroelectric materials naturally boast the quality of “non-volatility,” meaning they maintain their polarization—and can hence retain stored information—even in the absence of an external power source. However, the infinitesimal space between the positive and negative charges in a tunnel junction makes maintaining this polarization especially difficult, Gruverman said.

“In all memory devices, there is a gradual relaxation, or decrease, of this polarization,” he said. “The thinner the ferroelectric layer is, the more difficult it is to keep these polarization charges separate, as there is a stronger driving force in the material that tries to get rid of it.”

Gruverman said the team’s graphene-ammonia combination also shows promise for addressing this prevalent issue, significantly improving the stability of the junction’s polarization during the study.

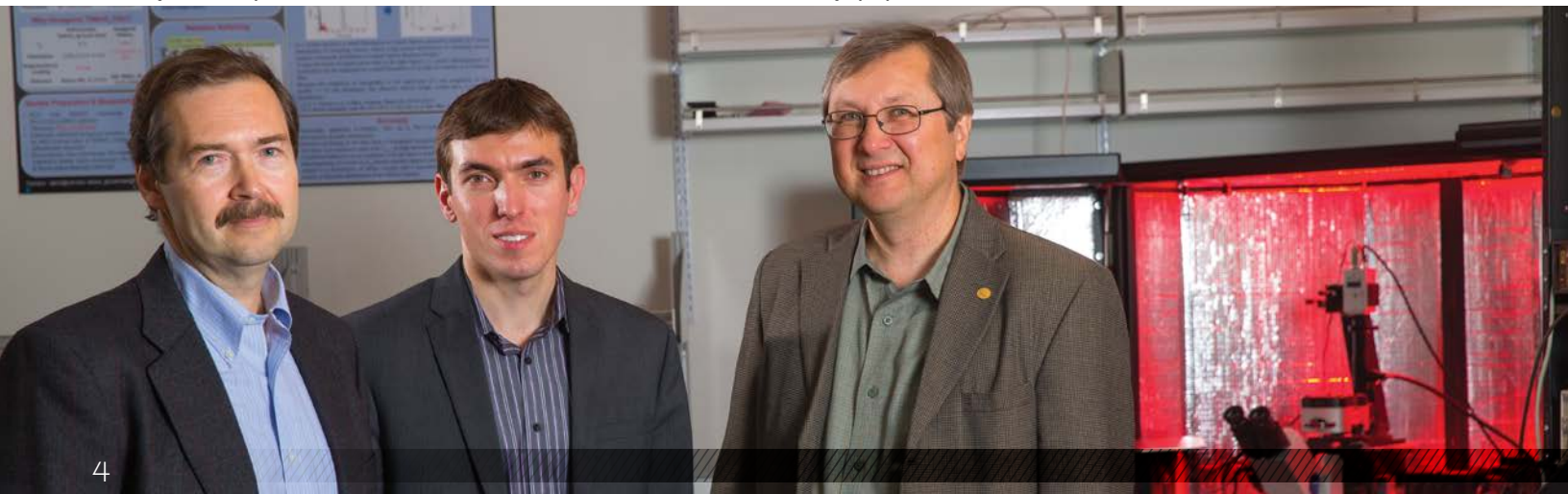
UNL co-authors included Alexei Gruverman, physics; Haidong Lu and Dong Jik Kim, postdoctoral researchers in physics and astronomy; Alexey Lipatov, a postdoctoral researcher in chemistry; Evgeny Tsymbal, George Holmes University Professor of physics and astronomy; and Alexander Sinitskii, assistant professor of chemistry. The study was also authored by researchers from the University of Wisconsin-Madison and the Moscow-based Kurnakov Institute for General and Inorganic Chemistry.

The team’s research was conducted with the assistance of UNL’s Materials Research Science and Engineering Center—part of a nationwide network of MRSECs sponsored by the National Science Foundation—and also received support from the U.S. Department of Energy.

Nature Communications is the Nature Publishing Group’s multidisciplinary online journal of research in all areas of the biological, physical and chemical sciences.

— Scott Schrage, UNL University Communications

Left to right, University of Nebraska-Lincoln scientists Alexei Gruverman, Alexander Sinitskii and Evgeny Tsymbal



Hage Investigates Factors Affecting Potency of Diabetes Meds

Among the greatest challenges of treating diabetes? Many proteins that agree to taxi pharmaceutical drugs through the bloodstream are already carrying unruly back-seat drivers in the form of glucose.

David Hage, the James Hewett University Professor of Chemistry, is developing approaches to analyze how the bonding of proteins and glucose, or glycation, alters the effectiveness of diabetes medications taken by millions who contend with the disease on a daily basis.

With support from a grant recently renewed by the National Institutes of Health, Hage and his colleagues are exploring applications of a technique known as high-performance affinity chromatography. The researchers have refined a process that involves placing a sample of the blood's most common protein—human serum albumin, or HSA—in a porous column. By passing a drug-containing liquid solution through this column, the researchers essentially create an intersection where pharmaceuticals can interact with the HSA protein.

The time it takes a specific drug to pass through the column helps the team determine whether and how strongly it binds to HSA, thereby offering insights into how glucose modifies this drug-protein interaction.

"We're basically mimicking a biological system; we've created a synthetic model of the human bloodstream that allows us to focus on this drug-protein interaction," Hage said. "Our hypothesis was that the modification of this protein (by glucose) affects its ability to bind with these drugs that are used to treat Type 2 diabetes. There were hints that this might be happening, but no one had really done any detailed studies on it until we started this project."

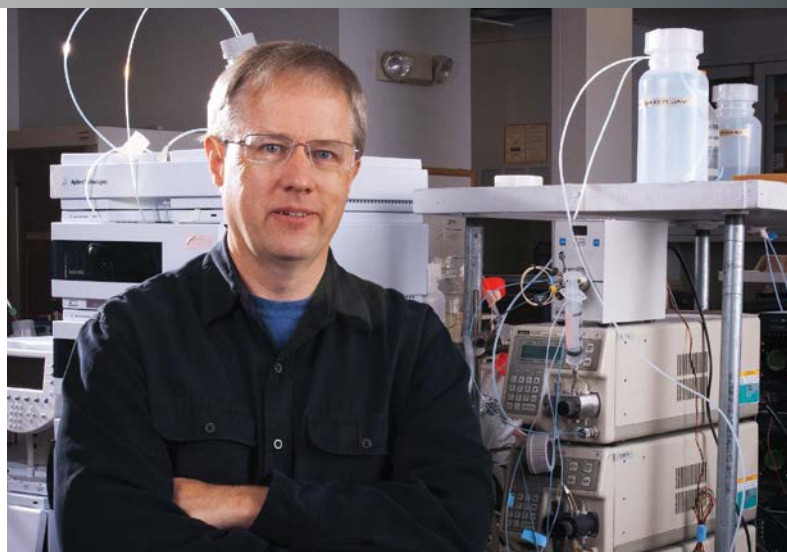
By comparing normal proteins with those modified by glucose, Hage's team has found evidence that glycation can significantly impede binding between HSA and drugs used to suppress diabetes-related complications.

Hage said his team has also developed procedures by which to detect and identify differences in the binding process. Their efforts have specifically helped examine HSA's many potential binding sites, which can exhibit distinct sensitivities to glucose. Accordingly, the researchers are now examining how glucose-driven modifications at different locations on this protein can moderate the behavior of various drugs.

"We have an idea that this binding is having an effect, but now we can also get an idea of why it's changing," Hage said. "Sometimes one of the sites will seem to be more affected by these modifications than another, so certain drugs are going to have bigger effects than others, depending on where they're binding."

Because diabetes also leads to increased circulation of fatty acids in the bloodstream, Hage's team is comparing how their effects compare—and potentially combine—with those of glucose.

"We can do studies with the protein that's just been modified through glycation without the fatty acids present, and we can do it with the fatty acids present," Hage said. "We've seen that there are changes: Sometimes they counterbalance each other, so the net result is not much of a change, and sometimes they enhance each



Dr. David Hage

other, so there's an even bigger change. It depends on the drug, the glycation and the fatty acids. So it's not simple, which explains why people have been confused about it in the past."

The researchers' efforts to analyze the interactions occurring within diabetics further extend to the types and number of pharmaceuticals a person may be taking, Hage said. Those with diabetes often take multiple drugs to address its effects, he said, making this a major focus of future study.

"You have to start thinking about not only how the binding of any particular drug to this protein will be affected, but how the binding of the second drug is being affected by the first, and vice versa," he said. Hage said the team will also attempt to account for additional factors that influence diabetes treatment, including differences in glucose levels between and within diabetics.

"We already know that there's often a period of trial and error to get the dosage right," Hage said. "At least part of that adjustment might be due to the fact that their glucose levels are changing, so we'll be looking at samples from various patients that have the same level of glucose control to see how the drug binding changes from one patient to the next."

The group also plans to examine samples obtained from the same person at different points in their treatment to determine how drug-binding changes in accordance with glucose control.

Though the team's chromatographic approach isn't yet ready for widespread adoption in conventional clinics, Hage said it could eventually contribute to the personalized treatment of a disease that affects more than 150 million people worldwide.

"At some point, it could be practical to use it in a clinical setting as a screening method for doctors to select drugs for individual patients," Hage said. "Getting to the point where it's automated, or at least fairly routine, would allow it to be done."

The research is funded by the National Institute of Diabetes and Digestive and Kidney Diseases, part of the National Institutes of Health, under grant number R01DK069629.

— Scott Schrage, UNL University Communications

Zeng, Bai, Francisco Collaboration Featured in Chemistry Journal



Joseph Francisco's collaboration with UNL's Xiao Cheng Zeng, Ameritas University Professor of chemistry, and Jaeil Bai, research assistant professor of chemistry, demonstrated the potential of hydrogen gas hydrates to exist within the confines of single-walled carbon nanotubes. The research, which began in October when Francisco was William E. Moore Distinguished Professor of Earth and Atmospheric Sciences and Chemistry at Purdue University, was highlighted in the *Journal of the American Chemical Society* Spotlights, a feature developed to make the journal's research more accessible to the broader community.

Francisco became dean of the UNL College of Arts and Sciences on July 1.

Far beneath the Earth's surface, fossil fuels are believed to be stored as gas hydrates, which are composed of gas molecules encapsulated within clathrates (cage-like structures made of hydrogen-bonded water molecules). Given their natural ability to grab onto gas molecules, gas hydrates have captured the attention of researchers interested in developing new approaches to carbon sequestration and hydrogen storage, among other applications. Although hydrogen molecules were long believed to be too small to stabilize the host lattice of ice clathrates, hydrogen gas has been demonstrated to form gas hydrates when subject to high pressures, a development that sparked a wave of efforts to develop gas hydrates as a new medium for hydrogen storage.

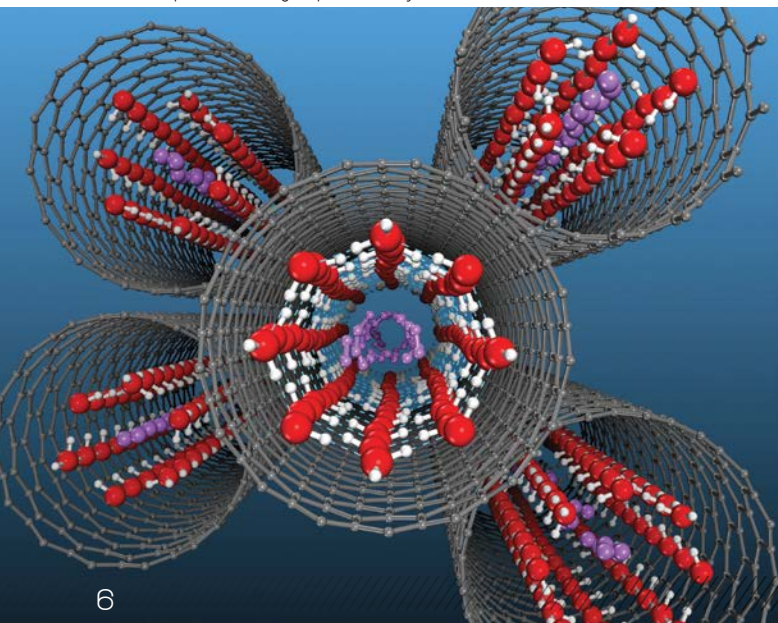
The team used molecular dynamics simulations to predict that the hydrogen hydrates, stable at near-ambient temperatures, spontaneously form a molecular wire within a one-dimensional nanochannel, and exhibit structures dependent on the width of their single-walled carbon nanotube containers. If confirmed in the laboratory, these structures may lead to the development of large-scale hydrogen storage media.

"I had been following this guy's (Zeng's) work for 10 years, so when he called and invited me to come over, I was delighted," Francisco said. "He had done some really fundamental work in this area and we had been playing around in that area. I saw an opportunity for us to do something that hadn't been done before. There's no guarantee that these ideas will work out, but we had the right young man (Bai) to take a look at the problem. He worked very hard on it and yielded some really fruitful results.

"What excited me the most was the potential to have a big impact. If experiments verify this work, it could really be a game-changer."

— Tom Simons, UNL University Communications

The cover of the July 30 issue of the *Journal of the American Chemical Society* with an artist's depiction of the group's discovery



Research by UNL's (from left) Xiao Cheng Zeng, Jaeil Bai and Joseph Francisco may lead to the development of large-scale hydrogen storage media.

A collaboration with UNL researchers that began months before Joseph Francisco was appointed dean of the College of Arts and Sciences was featured on the cover of the July 30 edition of the *Journal of the American Chemical Society*.

Faculty Grant Awards, Publications and Accomplishments

Grant Awards:

The Department of Chemistry would like to congratulate the following faculty members for being awarded these very competitive federal and nationally prestigious grants. We wish you the best of luck on these ambitious endeavors.

Funding Agency: National Institutes of Health (NIH)-NIDDK

Title: Chromatographic Studies of Functional Proteomics

PI: Dr. David Hage

Dr. Hage's team has recently shown that high-performance affinity chromatography (HPAC) can be an effective and powerful method for examining drug interactions with glycosylated HSA, as is produced during diabetes. In this project, his team will create and employ HPAC assays and columns that contain or examine glycosylated HSA and explore the use of HPAC as a tool for personalized medicine and in examining interactions in heterogeneous protein populations or complex biological systems. With their expertise in protein-based chromatography, they hope to gain a greater understanding of how protein function may be altered in diabetics.

Funding Agency: National Science Foundation (NSF)

Title: Nitrogen-Centered Radicals

PI: Dr. Andrzej Rajca

In this project, funded by the Chemical Structure, Dynamics & Mechanism B (CSDM B) Program of the NSF Chemistry Division, Dr. Rajca will investigate structure and property relationships of organic molecules and macromolecules that are relevant to the development of novel magnetic and optical technology. The goal of this research is to synthesize and study high-spin nitrogen-centered radicals (aminyls) and chiral helical radical cations. The aminyls with strong through-bond ferromagnetic coupling and with persistence at room temperature are important to the development of lightweight, soft organic magnets. In addition, such organic radicals could benefit the development of metal-free paramagnetic contrast agents for magnetic resonance imaging (MRI, <http://dx.doi.org/10.1021/ja3079829>), agents for paramagnetic relaxation enhancement nuclear magnetic resonance (NMR) spectroscopy, as well as materials for spintronics. The helical radical cations, which possess an unpaired electron confined to a helix, could facilitate the discovery of new organic magneto-optic materials and devices.

Furthermore, the collaborative project with Prof. J. A. Johnson of the Massachusetts Institute of Technology entitled "Synthesis of Densely Functionalized PEG-Branch-Nitroxide Structures as Organic MRI Contrast Agents" has recently received funding from the NIH (R21, J. A. Johnson, PI, A. Rajca, co-PI).

The Powers Group (*see awards below*) will use the power of metabolomic analysis to learn more about the etiology of pancreatic cancer and *S. aureus*-based kidney disease.

Dr. Robert Powers and his collaborators were recently awarded two NIH grants, both of which harness the power of NMR to carry out meaningful proteomics analysis. Both grants are collaborative with lead PIs at the University of Nebraska Medical Center (UNMC).

Funding Agency: NIH

Title: Staphylococcal Biofilm and Disease

PI: Dr. Kenneth Bayles, UNMC, Co-PI: Dr. Robert Powers

The NIH has awarded PI Kenneth Bayles (UNMC) and co-project leaders Paul Fey and Robert Powers a grant for a project entitled "Staphylococcal Biofilm and Disease (Arginine and Proline Metabolism in *Staphylococcus aureus*)." This collaboration will use metabolomics analysis to learn more about the details of biofilm-based infections in the kidney that owe their origins to *S. aureus*.

The major goals of this project are to investigate the transcriptional regulation of arginine biosynthesis via glutamate and proline, interrogate function of urease in the establishment and maturation of a *S. aureus* renal abscess, and determine if arginine biosynthesis via proline is required for establishment and maturation of chronic and biofilm-mediated infections.

Funding Agency: NIH

Title: Targeting MUC1-induced Tumor-stromal Metabolic Cross Talk in Pancreatic Cancer

PI: Dr. Pankaj Singh, UNMC, Co-PI: Dr. Robert Powers

This project is an NIH funded collaboration with Pankaj Singh, (PI, UNMC) in the area of pancreatic cancer. The project's goal is to determine the molecular basis of MUC1-mediated metabolic alterations that facilitate invasiveness and metastasis in pancreatic cancer.

MUC1 is a glycoprotein of importance in both tumor drug delivery and signaling. Read more about it here: <http://en.wikipedia.org/wiki/MUC1>. The Singh-Powers team hypothesizes that signaling through MUC1 stabilizes HIF1 and facilitates metabolic cross-talk between epithelial and stromal components in pancreatic adenocarcinoma; thus facilitating tumor progression and metastasis. They propose that blocking MUC1-mediated metabolic cross-talk between epithelial and stromal components will reduce tumor progression and metastasis in pancreatic cancer.

Funding Agency: NSF**Title:** Defect Chemistry of Metal Oxides for Catalytic Reactive Oxygen Species Generation**PI:** Dr. Chin Li Cheung, Co-PI: Dr. Wai-Ning Mei, University of Nebraska at Omaha

Reactive oxygen species (ROS) are powerful oxidants which can be produced in both biological systems and natural environments. Due to their high oxidizing power, ROS are major contributors to serious diseases such as cancer, cardiovascular disease, brain dysfunction, inflammation, and aging. The family of biologically relevant ROS typically includes singlet oxygen, superoxide anion radical, hydroxyl radical and hydrogen peroxide. With this award, the NSF Chemical Catalysis Program is funding Drs. Chin Li (Barry) Cheung of the University of Nebraska–Lincoln and Wai-Ning Mei of the University of Nebraska at Omaha for research to investigate how metal oxides catalyze the decomposition of the hydrogen peroxide to generate the ROS species and their annihilation. They will apply an experimental-modeling effort to resolve the roles of different types of oxygen vacancy defects and size of metal oxide nanoparticles, particularly nanoceria, in the ROS generation and annihilation reaction mechanisms. The studies of ROS, their production and reactivity are expected to have diverse implications and applications in fields ranging from polymer science to cancer therapy.

Funding Agency: NSF**Title:** SusChEM: Novel 1,2-Propanediol Biosynthesis from Renewable Feedstocks through Enzyme Discovery**PI:** Dr. Wei Niu

The chemical industry needs a paradigm shift in order to address the sustainable development challenge posed by the dwindling raw materials and the ever more polluted environment. Biocatalytic syntheses, in forms of enzymatic conversion or microbial whole-cell fermentation, are increasingly explored as the alternate platform of chemical production. Due to the fact that most of the current industrial chemicals are considered man-made, research efforts are needed to discover unknown enzymatic activities and natural pathways, or to engineer new catalytic activities and assemble artificial biosynthetic routes to enable the biosyntheses of industrial chemicals from renewable feedstocks. This research aims at harnessing metabolic engineering to create a Green Chemistry route for the synthesis of valuable chemical building blocks.

Funding Agency: NSF**Title:** Enforced Stacking of Shape-Persistent Macrocycles: A Molecular Approach for Tuning the Structures and Functions of Nanotubular Assemblies**PI:** Dr. Bing Gong, Co-PI: Dr. Xiao Cheng Zeng

In this project funded by the Macromolecular, Supramolecular and Nanochemistry Program of the Chemistry Division, Bing Gong of the State University of New York at Buffalo and Xiao Cheng Zeng of the University of Nebraska–Lincoln will develop a general strategy for the controlled synthesis and assembly of shape-persistent macrocyclic molecules into functional organic nanotubes containing sub-nanometer pores. Because the interior and exterior of the macrocycles may be functionalized independently, both the diameters and inner

surfaces of the nanopores may be modified in a controlled manner. The nanopores, eventually, will be incorporated into membranes and allow for the selective transport of water across the membrane. The broader impacts involve cross-disciplinary training of graduate and undergraduate students, incorporating research into teaching, outreach to students at primarily undergraduate institutions, and the potential long-term impacts of water purification technology. This as the latest chapter in a longstanding, successful collaboration between Zeng and Gong in developing novel materials with predictable properties.

Funding Agency: NSF**Title:** Effect of Composition and Particle Size in Oxidation Catalysis by Metal Oxide Solid Solution Nanoparticles**PI:** Dr. Marjorie Langell (continuing her research through the IR/D program for NSF Program Officers), Substitute PI: Dr. Patrick Dussault

This cutting-edge research will use sophisticated spectroscopy to fingerprint the surfaces of heterogeneous catalysts. In this project, novel group of bimetallic oxides, $\text{Cu}_x\text{Pd}_{1-x}\text{O}$, $\text{Zn}_x\text{Pd}_{1-x}\text{O}$, $\text{Cu}_x\text{Ce}_{1-x}\text{O}_2$, $\text{Zn}_x\text{Ce}_{1-x}\text{O}_2$ and $\text{Cu}_x\text{Zn}_{1-x}\text{O}$, are proposed for study as heterogeneous oxidation catalysts with the objective of developing new catalytic materials and in investigating the inter-relationship between metals in mixed-metal oxides and metals supported on oxides in catalytic processes.

Funding Agency: NSF**Title:** Nebraska—Framing the Chemistry Curriculum**PI:** Dr. Mark Griep

This project is part of the newly funded Broadening Participation in STEM (Science, Technology, Engineering, and Mathematics) program. It started in the summer of 2013 when the science faculty and deans at Nebraska Indian Community College (NICC; www.thenicc.edu) and Little Priest Tribal College (LPTC; www.lptc.edu) and UNL's Dr. Griep met over a period of six weeks to develop a program to connect college science instruction to community topics. Their project was one of five selected out of more than 100 applications for funding. Here's more information on the project: (http://chemweb.unl.edu/griep/?page_id=207).

Publications:

Dr. Marilyn Stains and her co-workers were featured in *Science Magazine* for their research regarding the promotion of evidence-based teaching. http://www.sciencemag.org/content/345/6196/twil_full#compilation-1-4-article-title-1.

Additionally, the *Journal of College Science Teaching* also published their work with a paper entitled "Published freshman laboratory exercises as indicators of awareness and adoption of instructional practices grounded in discipline-based education research," *Journal of College Science Teaching*, 43(6), 89-99. DeChenne, S. E., Carew, J., and Stains, M. (2014). <http://digital.nsta.org/publication/?i=212734&p=91>

The article highlights limited faculty awareness of experimentally tested practices emanating from DBER-studies that appears to relate to the nature of the published literature in the field. The focus is on inquiry-based laboratory instruction—take a look.

Dr. Xiao Zeng and Dr. Joseph Francisco have been featured on the cover of *JACS* for a potentially far-reaching piece of collaborative work. The article is entitled, "Spontaneous Formation of One-Dimensional Hydrogen Gas Hydrate in Carbon Nanotubes" *J. Am. Chem. Soc.* 2014, 136, 10661-10668. DOI: 10.1021/ja5041539. Spotlights: <http://pubs.acs.org/doi/abs/10.1021/ja507437b>

Experimentalists will now be looking to verify that hydrogen gas does indeed form stable clathrate-like structures when confined to SWTs. If so, this could serve as non-traditional, but potentially effective, H₂-storage mechanism. This collaboration was also featured in UNL Today. <http://news.unl.edu/newsrooms/unltoday/article/francisco-zeng-bai-collaboration-featured-in-chemistry-journal/>

Dr. Andrzej Rajca's research group has just come out with a couple key papers on nitroxide radicals and nitrogen-centered radicals. The paper entitled "Synthesis of Unnatural Amino Acids Functionalized with Sterically Shielded Pyrroline Nitroxides" has just appeared in *Organic Letters* and describes the synthesis of a new family of spin-labeled unnatural amino acid building blocks for genetic spin labeling of proteins. (<http://pubs.acs.org/doi/abs/10.1021/ol502449r>). Another paper entitled, "Synthesis of Aza-m-Xylylene Diradicals with Large Singlet-Triplet Energy Gap and Statistical Analyses of their EPR Spectra" that has just been published in the *Journal of the American Chemical Society*, <http://pubs.acs.org/doi/abs/10.1021/ja508119d> describes the generation of a new type aza-meta-xylylene diradical with a large singlet-triplet energy gap and persistence at room temperature. Included in this study is the development of a new, statistical EPR analysis method for estimating singlet-triplet gaps in samples that are not homogeneous. This is expected to find wide use in the field. These studies are part of a longstanding program in unpaired electron chemistry, in which the Rajca group combines theory and experiment to develop molecules with multiple unpaired spins with great potential for both materials (e.g. <http://www.sciencemag.org/content/294/5546/1503.full?ikey=X/mEBJRewp3JE&keytype=ref&siteid=sci> or for DOI: <http://www.sciencemag.org/content/294/5546/1503>) and biomedical (contrast agents for medical imaging) applications (e.g., <http://dx.doi.org/10.1021/ja3079829>). Rajca wrote perhaps the seminal review on the former area in *Chem Reviews*, and that paper has been cited well over 600 times (<http://pubs.acs.org/doi/abs/10.1021/cr00028a002>).

Dr. David B. Berkowitz and his team were featured in a *Nature Chemistry* review in their Sept. 22, 2014, issue for their work with *in situ* enzymatic screening. The review was entitled, "Contemporary screening approaches to reaction discovery and development," by Frank Glorius (Universität Münster). <http://www.nature.com/nchem/journal/v6/n10/full/nchem.2062.html>.

This timely review talks about the importance of the ISES (In Situ Enzymatic Screening) method for catalyst screening and reaction development in synthetic chemistry. ISES has been developed in the Berkowitz group with sustained support from the National Science Foundation. The method allows one to compare reaction rates, substrate scopes and enantioselectivities of candidate catalysts/ligands, in real time, in a parallel screening format. The review compares the ISES method with other state-of-the-art catalyst

screening methods from MacMillan (Princeton), Hartwig (Berkeley), Liu (Harvard), Porco and Beeler (BU), Pfaltz (Max Planck Institute-Muelheim/U. Basel, D/CH), Kozmin and Mrksich (U. Chicago/Northwestern), Taran (Gif-sur-Yvette, FR) and Bickelhaupt and Reek (Amsterdam/Utrecht, NL).

The ISES method has borne fruit in both chiral ligand development and in reaction discovery. In the former area, ISES has identified useful salen ligands based upon terpenoid or carbohydrate-derived diamines. In the latter realm, ISES has led to the discovery of the first asymmetric allylic amination chemistry with Ni(0), as well as interesting formal halorhodiation/carbocyclization and thiocyanopalladation/carbocyclization transformations that are currently under study in the group.

The research from Dr. Robert Powers' group was selected for the cover of the October issue of *Proteins: Structure, Function, and Bioinformatics*. <http://onlinelibrary.wiley.com/doi/10.1002/prot.v82.10/issuetoc>.

The abstract details how families of distantly related proteins typically have very low sequence identity, which hinders evolutionary analysis and functional annotation. Slowly evolving features of proteins, such as an active site, are therefore valuable for annotating putative and distantly related proteins. To date, a complete evolutionary analysis of the functional relationship of an entire enzyme family based on active-site structural similarities has not yet been undertaken. Pyridoxal-5-phosphate (PLP) dependent enzymes are primordial enzymes that diversified in the last universal ancestor. Using the comparison of protein active site structures (CPASS) software and database, we show that the active site structures of PLP-dependent enzymes can be used to infer evolutionary relationships based on functional similarity. The enzymes successfully clustered together based on substrate specificity, function, and three-dimensional-fold. This study demonstrates the value of using active site structures for functional evolutionary analysis and the effectiveness of CPASS. <http://onlinelibrary.wiley.com/doi/10.1002/prot.24624/abstract>

Accomplishments:

Please help us congratulate Dr. David Hage. He has been given the accolade of the 2015 Eastern Analytical Symposium Award for Outstanding Achievements in Separation Science. This honor will be presented at the 2015 EAS national meeting November 2015 at a symposium held in Dr. David Hage's honor. Congratulations again!

Kiessling and Marshall Give Memorable Colloquium Presentations

This year we've had a very memorable colloquia season with some outstanding lecturers including such alumni as B. Ray Stults now with the National Renewable Energy Laboratory and Dr. David H. Russell with Texas A&M University.

Additionally, we had two special named lecture awardees this fall. Alan G. Marshall was named as the 2014-2015 Michael L. Gross awardee. He is the Robert O. Lawton Distinguished Professor of Chemistry and Biochemistry at Florida State University, and Director of the Ion Cyclotron Resonance Program at the National High Magnetic Field Laboratory. He is most widely known as co-inventor of Fourier transform ion cyclotron resonance mass spectrometry (FT-ICR MS). Since that time, his group has led the development and application of this technology for ultra-high resolution and ultra-high mass measurement accuracy. Current focus areas of his research program include the development of FT-ICR MS instrumentation; application to environmental and petrochemical analysis, including petroleomics; and characterization of primary and higher-order structure in biological macromolecules and their complexes.

Marshall is an author of more than 580 refereed scientific papers, collectively garnering over 26,000 citations and an *h*-index of 79. He has also published one textbook (*Biophysical Chemistry*); edited two books (*Fourier, Hadamard, and Hilbert Transforms in Chemistry and Asphaltenes, Heavy Oils, and Petroleomics*); and authored one monograph (*Fourier Transforms in NMR, Optical, and Mass Spectrometry: A User's Handbook*). He has given over 650 invited lectures.

Among numerous awards and recognitions, Marshall is a Fellow of the American Association for the Advancement of Science, a Member and Fellow of the American Academy of Arts and Sciences, and an Inaugural Fellow of the American Chemical Society. He is also a recipient of the International Mass Spectrometry Foundation Thomson Medal Award, the American Chemical Society Field and Franklin Award for Outstanding Achievement in Mass Spectrometry, and the American Society for Mass Spectrometry Award for a Distinguished Contribution in Mass Spectrometry.

Being such a decorated lecturer, we asked Marshall what this newest award meant to him. "It means a lot to me since I personally know Dr. Gross," commented Marshall.

Another time-honored tradition in our department has been the Hamilton Award Lecture observing its 33rd annual presentation. Professor Laura L. Kiessling was the 2014-2015 Cliff S. Hamilton awardee.

Kiessling is the Steenbock Professor of Chemistry and the Laurens Anderson Professor of Biochemistry at the University of Wisconsin-Madison. Professor Kiessling also currently serves as the Director of the Keck Center of Chemical Genomics and the Program Director of National Institutes of Health Chemistry-Biology Interface Training Program at UW-Madison. Kiessling received her undergraduate training in chemistry at MIT working in the laboratory of Professor William Roush. She then earned a PhD (1989) from Yale University, where she worked in the laboratory of Professor Stuart L. Schreiber on the synthesis of anti-tumor natural products. Subsequently,

Kiessling conducted postdoctoral research in the laboratory of Professor Peter B. Dervan at the California Institute of Technology, where she explored the recognition of duplex DNA through triple helix formation. She began her independent academic career at UW-Madison in 1991. Kiessling currently serves as member of the editorial board for *The Journal of the American Chemical Society* and *Annual Reviews of Biochemistry*. In 2005, she became the founding editor-in-chief of *ACS Chemical Biology*.

Kiessling's multidisciplinary research group combines tools from organic synthesis, polymer chemistry, structural biology, microbiology and molecular and cell biology to investigate the chemistry and biology of carbohydrates. She has published over 110 peer-reviewed journal articles, six book chapters and more than ten patents. Her research interests include protein-carbohydrate interactions, the role of carbohydrates in signal transduction and carbohydrate polymer biosynthesis. Her work has been recognized with numerous awards including the Beckman Young Investigator Award, Dreyfus Teacher-Scholar Award, Alfred P. Sloan Foundation Fellowship, Arthur C. Cope Scholar Award, MacArthur Foundation Fellowship, Tetrahedron Young Investigator Award in Bioorganic or Medicinal Chemistry, Guggenheim Fellowship and Alfred Bader Award in Bioinorganic or Bioorganic Chemistry. Kiessling is also a member of the National Academy of Sciences, the American Academy of Arts and Sciences and the American Academy of Microbiology.

"Laura Kiessling is an excellent scientist and a pioneer at the interface of organic chemistry and glycobiology," said David Berkowitz. "She is also a real leader in the chemical biology community."

Laura Kiessling presenting at the Hamilton lecture.



Cordes Chair Established at NC3 Inaugural Lecture

Computational Chemistry at Nebraska received a big boost this past July with the hiring of recent ACS President and National Academy of Sciences member Joseph Francisco as the Cordes Chair of Chemistry and Dean of the College of Arts and Sciences. This hire nucleated the formation of the Nebraska Cluster for Computational Chemistry (NC3). For more information check out: youtu.be/11qw2wQFNrS.

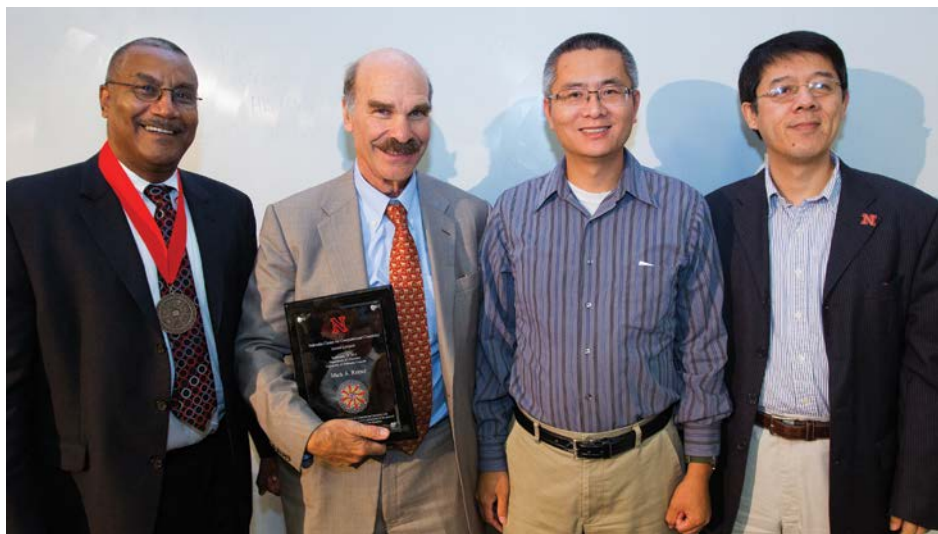
The department marked the occasion this September with the Inaugural NC3 Award Lecture and ceremony. The lecture was preceded by inaugural presentations given by David Berkowitz, chemistry chair and Prem Paul, vice chancellor of research and economic development. The establishment of the Elmer H. and Ruby M. Cordes Chair in Chemistry was conferred to honoree Eugene Cordes by Amber Antholtz, assistant vice president, University of Nebraska Foundation. Cordes then presented Joseph Francisco with the honor of the first Cordes Chair in Chemistry.

“Once in a while the stars and the heavens get aligned properly and great things happen and that great thing was Joe Francisco coming to the University of Nebraska–Lincoln as Dean and as the Cordes Professor,” commented Cordes in regards to the new Cordes Chair.

Dean Francisco humbly accepted this new honor with his trademark enthusiasm. “I just want to let everybody know, I am delighted to be here, and I also want to let you know we have a lot of hard work ahead.”

The ceremony was concluded with Professor Xiao Cheng Zeng, senior NC3 member, presenting Professor Mark A. Ratner with the award lecture plaque. His lecture was entitled, “Molecular Mesoscopies: Transport in Molecular Junctions.”

On behalf of the entire department, we would like to congratulate all three honorees, Eugene Cordes, Joseph Francisco and Mark A. Ratner for their amazing contributions!



At top (L-R): Eugene Cordes awarding Joseph Francisco with the Cordes Chair.
At bottom (L-R): Dean Joseph Francisco, Mark A. Ratner, Hui Li and Xiao Cheng Zeng.

“Once in a while the stars and the heavens get aligned properly and great things happen and that great thing was Joe Francisco coming to the University of Nebraska–Lincoln as Dean and as the Cordes Professor.”

– Eugene Cordes

Time Capsule Yields Rare Manuscript on Pioneering Female Chemist

For Mark Griep and the UNL community, Rachel Lloyd was an enigma.



In this May 12, 2014, file photo, Mark Griep, associate professor of chemistry, shows the Avery Hall cornerstone time capsule to a group of students from York Middle School.

It was in a passing conversation in 1997 that Griep, associate professor of chemistry, learned that Lloyd had been possibly the first American woman to hold a

doctorate in chemistry and that she had taught at Nebraska for seven years, even serving as acting chair of the department from 1892 to 1893. Griep, who enjoys researching family and community history, was intrigued with Lloyd's story and wondered why there seemed to be no official photo held by the department or the university.

"I do family history and I love local history and relating my ancestors' lives to their communities and what caused them to do what," he said. "So I got interested in her story and the early story of our department. (Her story) is part of what makes Nebraska special, that there has always been this mentality of 'anything is possible.'"

Griep pieced together information about Lloyd's academic and family history, her groundbreaking research into Nebraska sugar beets and her years at the university, from 1887 to 1894. But many things still remained a mystery. He couldn't find any information on why she pursued chemistry nor could he explain why she retired after only seven years.

He came across a 1901 article from the Philadelphia Times two years ago, advertising the publication of Lloyd's biography by her brother-in-law, Clement. Griep searched the country for the manuscript, but came up empty-handed.

"I had been very frustrated because I wasn't able to find a copy of this book," he said.

He then sought the help of Keith Lindblom at the American Chemical Society.

"We checked everywhere she had worked or lived," Griep said. "Nobody had it. I think one issue was that it was privately published. Since it was privately published, it wasn't sent to the Library of Congress."

Griep also didn't have a good photo of Lloyd; the only photo he'd been able to find was in an old university yearbook. This bothered him—portraits of former chairs of the department are on display in

Hamilton Hall. That mystery was solved by a 1916 article in the Red Cloud Chief, describing a time capsule included in the date stone of Avery Hall. The article explicitly said a photo of Lloyd had been included.

Griep gained permission to dig out the time capsule and did so in May. The contents were revealed at the Dr. Rachel Lloyd

National Historic Chemical Landmark Banquet held in October and followed by the Dr. Rachel Lloyd Memorial Conference on Women in Science the following day. Much to Griep's surprise, the manuscript he'd been searching for was also included. Despite nearly 100 years encased with chemicals, photos, old newspapers and other materials, the white book was in excellent shape.



Griep was ecstatic over the find and worked with staff from the UNL Libraries and the Center for Digital Research in the Humanities. Mary Ellen Ducey, an archivist, and Andy Jewell, associate professor of digital projects, University Libraries, took the manuscript and digitized it. It is now available to everyone at <http://unlhistory.unl.edu/legacy/rachelloyd/rachelloyd.html>.

"It was exciting to do because Mark was very enthusiastic and excited about the project and his enthusiasm was tangible," Ducey said. "From our point of view, it was nice that we could work in collaboration with him on this. His purpose was to make it accessible to more people so they could see it and that's what we do here as well."

And Griep finally found the answers he'd been looking for—which only made Lloyd more impressive to him. Out of this respect he had for Lloyd, he worked to establish her as a National Historical Chemical Landmark by the American Chemical Society.

"She and her husband were religious and were focused on missions and what they could do for the greater good," Griep said. "Her husband died after only five years of marriage and she eventually decided to teach."

"She became a science teacher at a girls' school in Philadelphia. She immediately started focusing on chemistry, Clement Lloyd explained, because her husband had been a chemist and she believed she could best honor his memory by making it her mission to teach chemistry to girls. As a result, it was the first girls' school to do laboratory experiments in chemistry."

Griep also made sure her efforts are recognized on campus and had her portrait hung among the chairs in Hamilton Hall. He hopes the photo will provoke students to learn more about her accomplishments and contributions to chemistry and Nebraska.

"She was a pioneer her whole life," he said.

— Deann Gayman, UNL University Communications

Two Students Given the Citation for Excellence in Teaching Chemistry Award

This year, the Department of Chemistry created a new accolade called the *Citation for Excellence in Teaching Chemistry Award* to recognize its teaching assistants (TA) and their amazing contributions toward the department's educational goals. The undergraduate and graduate TA awardees were selected by the Resource Center administrators and faculty based on student reviews and their performance in the Resource Center and labs.

This year the honor goes to graduate student Seth Blackwell and undergraduate student Jake Luther.

"I was incredibly honored when I found out that I had received this citation for teaching," commented Luther. "So far, I have thoroughly enjoyed teaching in the lab and plan on doing so as long as I can. It is great to be recognized for hard work, and I will continue to do the best job I can as a teaching assistant and to grow and develop as an instructor," stated Luther regarding his award.

Blackwell echoed those sentiments, "I am very honored to receive this award, and I am grateful for the opportunities I have had as a teaching assistant for the chemistry department. I look forward to more opportunities to teach, as it will continue to build my experience in preparation for a career in academia," commented Blackwell regarding his award.

Luther and Blackwell say they definitely see the value of being a TA and how it has prepared them to accomplish many of their goals.

"The work that I am doing for the chemistry department here at UNL is teaching me a great deal about professionalism," commented Luther. "The general chemistry professors are all extremely accomplished professionals and are excellent role models for how to interact with other employees in the department, as well as students. I can apply the methods that I learn from them to interact with my own students in the lab. Also, this professionalism will be crucial for presenting myself when applying to and interviewing at different medical schools, as well as when I begin to interact with medical professionals if I were to be admitted to a medical school."

Additionally, Blackwell feels right at home teaching undergraduate students and sees it as a great fit for his career path trajectory.

Seth Blackwell and fellow students in the new resource center.



Students watch while grad assistant, Jake Luther, performs a demonstration in one of the Hamilton Hall undergraduate chemistry labs.

"I thoroughly value the opportunity to guide and educate students... The UNL Department of Chemistry has been invaluable to my development in teaching and researching. I have learned an incredible amount through the experience, and it continues to increase," commented Blackwell.

These two students have definitely proven themselves as an admirable asset to the team and have gone above and beyond in their duties and commitment to our students.

"Their passion for the educational enterprise and the welfare of our students, their dedication to their job, and their ability to communicate with students so that they recognize the importance of their own engagement and investment in our courses are invaluable to the mission of our program," said Dr. Jason Kautz, coordinator of general chemistry. "And that is what makes them remarkable TA's and deserving of this award."

"Their passion for the educational enterprise and the welfare of our students, their dedication to their job, and their ability to communicate with students so that they recognize the importance of their own engagement and investment in our courses are invaluable to the mission of our program."

— Dr. Jason Kautz

Ovation Award

The College of Arts and Sciences' Ovation Award for August was awarded to Lisa Morton, a student worker in the chemistry department! This award was designed to recognize those student workers who have gone above and beyond with their positions. Lisa Morton is also the daughter of Dr. Martha Morton, our director of research instrumentation.

Ovation Award:



Lisa Morton

"Lisa is always so cheerful and loves to jump in and have fun with everyone! She is always hard at work but makes time to say hello and just see how everyone is doing. She's very dependable and always full of positive energy! It's great to have her here!"

"Lisa is the embodiment of what an Ovation Award recipient should be. She comes to work when she is scheduled, does what needs to be done (often

without instruction or supervision) and is more than pleasant to those around her. Lisa will look for things to do when assigned tasks are completed. She accepts doing work that is, at best, boring (like labeling sample vials, filing forms or counting pages of handouts) but is necessary to the functioning of the chemistry department. She delivers materials from Receiving and handles the attached paper work. She aids students and others in placing orders and resolving problems and mistakes. Recently she has been handling many of the duties of the purchasing department (often alone) while her boss was on break. Beyond her duties to the department, Lisa

enjoys decorating for parties or just to brighten the area. Her smile is infecting (in a good way) and her energy is impressive. She deserves an Ovation!"

"We have been very fortunate to have incredible student workers here in the chemistry department. Many of them have stayed for a very long time and done great things for us. Lisa is one of those student workers who will be remembered long after she has left the department as one of the really, really outstanding student workers. Lisa comes in every day with a smile on her face, a bounce in her step and an overall truly unique and positive attitude. She doesn't hesitate to take on the looming tasks nor those that really aren't that much fun. Everyone needs to experience a student worker like Lisa to realize the enormous benefit someone like her provides. This was never more evident than in the past two weeks. Our primary purchasing person was gone for more than two weeks. Lisa stepped in and kept the show running the whole time. There wasn't even a blip on the radar screen. The status quo was kept up, and then some! WOW!!! We truly are lucky and extremely thankful. As such, it is my honor to nominate Lisa for the Ovation Award. She exemplifies all that a student worker should be and then some. Thank you Lisa!"

Poster Session Exhibits Great Student Potential

The Department of Chemistry enjoyed another great poster session this year with science presented by 50 researchers from visiting high school students, undergraduate/REU students, graduate students and postdocs.

"The science presented was top notch and well-presented and the atmosphere was truly dynamic," commented Dr. David Berkowitz.

This year the festivities were held on the second floor of Hamilton Hall. It is always a pleasure to see students all a buzz with anticipation and excitement talking to all the judges and audience members who happened to walk by. The enthusiasm was infectious.

"There was an abundance of highly meritorious work presented and so I know there will be a large number of high-quality publications coming out of the department again in AY 2014/15," remarked Berkowitz.

After much deliberation, the graduate committee finalized the official results from the judges and the winners were:

Postdoc Category

- Kostiantyn Marichev – 1st Place
- Erika L. Pfaunmiller – 2nd Place

Senior Graduate Student Category

- Kaushik Panigrahi – 1st Place tie
- Rob Swyka – 1st Place tie
- Jia (Emma) Zhao – 2nd Place
- Xiwei Zheng – Honorable Mention

Beginning Graduate Category

- Jon R. Beck – 1st Place
- Forouzan Aboufazeli – 2nd Place tie
- Abhiteja Konda – 2nd Place tie
- Veronika Shoba – 2nd Place tie
- John J. Bowen – Honorable Mention tie
- Jessica Periago – Honorable Mention tie

Undergrad Category

- William Lambert – 1st Place
- Yao Liu – 2nd Place tie
- Elli Kaufmann – 2nd Place tie
- Jesbaniris Bas – Honorable Mention

REU Category (Travel Awards)

- Elizabeth Scott
- Laura M. Szczesniak
- Gloricelly M. Roman
- Meryl Vannoy
- Marissa Brooks

High School Category

- Marytza Abebe – 1st Place tie
- Malachi Abebe – 1st Place tie
- Christopher P. Jurich – 2nd Place tie
- Tiffany Truong – 2nd Place tie
- Katharen Hedges – Honorable Mention

Congratulations to all the winners and thank you to all the presenters for doing a great job!

Two Longtime Staff Retire this Year



Darrell Kinnan



Mike Cook

The UNL chemistry department had two longtime staff members retire this year: Darrel Kinnan, undergraduate chemistry lab manager with 38 years with UNL and Mike Cook, chemistry purchasing office manager with 29 years of service.

Kinnan retires from the chemistry department this January. He started at the University in 1976 in the second floor stock room and was promoted to his current position as undergraduate chemistry lab manager in 1984.

Kinnan is also a UNL alumnus of 1976. He went back to school after serving as a Green Beret medic with the Army from 1968 to 1971.

After being with the UNL chemistry department for several decades, Kinnan has definitely left his mark. Some of his proudest moments include being awarded two Applause awards by the College of Arts and Sciences and one Board of Regents Kudos award in recognition of his outstanding performance and commitment to his profession.

One accomplishment Darrel wasn't sure he would be around to see before he retired was the completion of the 2nd floor undergraduate labs and resource center renovations which Darrel played an integral role in their development and completion.

"Being a part of trying to make the chemistry undergraduate classes a positive learning experience for teaching assistants and students has always been important to me," Kinnan commented.

Without question, Kinnan has seen many changes in the department over the years including serving with 10 department chairs: Gerhard Meisels, Rueben Rieke, Henry Holtzclaw, Craig Eckhardt, Pill Soon Song, Lawrence Parkhurst, Patrick Dussault, James Takacs, David Berkowitz and lastly Jody Redepenning for one working day in 2015. Plus, he has worked with four general chemistry program coordinators: Dr. David Brooks, Dr. James Carr, Dr. Bill McLaughlin and Dr. Jason Kautz.

Kinnan was always at the very forefront of departmental outreach efforts preparing and presenting for events like the Big Red Road Show and Chemistry Day. Not too many students will soon forget Kinnan's elephant toothpaste demonstration or his annual green oozing pumpkin demo in his larger than life Igor costume all while dancing to the "Monster Mash."

Kinnan will surely be remembered for his academic contributions to the department but for so many he will also be cherished for his sense of community. During his tenure with the department, he won countless chili cook-offs for the hottest chili and played Santa Claus for the Phi Lambda Upsilon Rho Chapter's annual holiday party numerous times (sorry we let that one out of the bag).

Cook retired from the chemistry department this past April after 29 years. He started at the University in 1985 in the Dental College as a stockroom clerk, then he moved to the Scientific Store in 1987 ordering stock. Because of the chemistry department's high purchasing volume, he was transferred to the department in 1989 as a buyer strictly for chemistry. Cook was eventually promoted to the manager of the Chemistry Purchasing Office.

Cook is well respected by his colleagues in the chemistry department. During his tenure with the department, he earned the College of Arts and Sciences' Applause Award and the Board of Regents Kudos Award.

However, Cook was known as much for his purchasing knowledge in the department as his skills for organizing and participating in department events such as holiday potlucks, chili cook-offs and department picnics.

Please join us in wishing these two great employees a wonderful retirement.



UNL Chemistry Department Alumnus Welcomed Back for Alumni Masters Week



2014 marks the 50th annual Alumni Masters Week, a program sponsored by the Nebraska Alumni Association, Scarlet Guard (the alumni association's student group) and the UNL Chancellor's Office.

Every fall, outstanding alumni return to campus to share their experiences and knowledge with students. The students are encouraged to take part in lectures, presentations and events with the Alumni Masters, who will speak about ways to apply formal education to working situations and career goals.

The selection of the Alumni Masters is competitive. Candidates are alumni who have shown great promise, success and leadership in their fields. That's why our department was ecstatic to have 1994 Ph.D. alumnus Ayman Sahli, who is now CEO of Gulf Pharmaceutical Industries (Julphar) in the United Arab Emirates, return for a visit. He was one of Dr. Patrick Dussault's first graduate students.

Sahli says he remembers being impressed with Dr. Dussault's research presentation during his interview and knew at that moment UNL was a good fit for his academic needs. Sahli modestly recalls being a student of average skill but he credits Dr. Dussault and the program with molding him into a great student and scientist.

"For someone who came not knowing very much but left with so much is a great reflection on your (UNL's) educational program," commented Sahli. Sahli attributes many of his career opportunities to the skills he acquired as a graduate student.

"My experience with UNL's chemistry department was helpful in securing my first job," commented Sahli, which happened to be as a process chemist with Zeneca Agrochemicals (now called Syngenta) in Mobile, Alabama, after his postdoc position at the University of Delaware.

Dr. Ayman Sahli



In 2000, Sahli joined Wyeth now part of Pfizer. Wyeth manufactured over-the-counter (OTC) drugs such as Robitussin, Advil (ibuprofen) as well as prescription drugs Premarin and Effexor.

"I got the job with Wyeth because of my multi-disciplinary functionality and exposure to manufacturing and chemical engineering concepts."

In 2004, he joined Hikma, a leading multinational pharmaceutical company founded in Jordan which offers both branded and generic pharmaceuticals with an outreach spanning from the Middle East to the U.S.A.

He was appointed deputy general manager of the Jordan Unit, a post he held until 2008 when he joined Gulf Pharmaceutical Industries (Julphar) as chief executive officer. Sahli extended the company geographically, expanding as far as Latin America, Africa and Asia. The inauguration of the first overseas manufacturing facility in Addis Ababa, Ethiopia in 2013 was a significant step in improving healthcare quality and affordability in under-developed regions of Africa. Since then, Julphar has acquired a local plant in Bangladesh, along with plans underway in strategic locations such as the Kingdom of Saudi Arabia and Algeria. Under Sahli's leadership, Julphar's product portfolio has grown, covering more than ten therapeutic areas and more than 3,350 registered products. In 2012, 'Julphar Diabetes' was launched, marking Julphar as the only company in the region to venture into recombinant-DNA insulin production and addressing a significant health burden of the local region.

'Alumnus Welcomed Back' continued on page 18

"Due process was my guardian. My advice is to take it easy and not to overshoot during your first year. Your first year is about making those small risks and mistakes and learning from them. In your second year there will be more opportunity for growth."

— Dr. Ayman Sahli



Dr. Alireza Ebrahim

“The high quality of education that I received at UNL as well as the guidance and encouragement of my professors, especially those in my supervisory/dissertation committee, provided me with a solid foundation for my professional career as a chemist.”

– Dr. Alireza Ebrahim

Homecoming Brings Alums Back for Tour of Department and Memory Lane

Here in the chemistry department we love to have alumni come back and visit for homecoming (or any other time of year for that matter.) We had several alums catch the game and also take a tour of the department. This year, we had the fortune of catching up with Dr. Alireza Ebrahim who studied under Dr. Edward Rack from 1984-88 earning both his M.S. and Ph.D. degrees from UNL. Subsequently, he also earned several executive certificates in Technology Management and Innovation Organization from California Institute of Technology and University of California-Berkeley, respectively.

Ebrahim’s interest in radio-chemical techniques and nuclear chemistry led him to UNL.

“Looking back, I think coming to UNL was one of the best decisions that I made as a student. Also, the quality of education and cost of living had a lot to do with my decision.”

As a graduate student, Ebrahim’s research focused on the application of chromatographic techniques and neutron activation analysis for determination of trace metals such as selenium and vanadium in biological fluids and tissues. Additionally, he studied the mechanisms of high-energy reactions and coulombic explosions caused by neutron bombardment of halogens.

“Since my area of research was neutron activation analysis, I spent a significant amount of time at the nuclear reactor facility at the Veterans Affairs Medical Center in Omaha, Neb.,” commented Ebrahim.

He explains only a few educational institutions in the U.S. offered research in the field of neutron activation analysis so commuting to

Omaha was an essential part of his program of study and one that provided him the opportunity to interact with his advisor and peers. They talked about a broad spectrum of topics including science and technology, current news and world politics and everything in between during those commutes. For Ebrahim, it was a great bonding experience and a chance to become acquainted with one another in an environment other than the lab.

However getting used to the commutes and the rhythm of graduate school took some adjustment at first.

“There was not enough time in a day to do what I needed to do, especially during my first year as a graduate student,” Ebrahim commented. “Between time demanded for course work, research, teaching and family, there was very little time available for myself. Balancing time and priorities were very challenging and frustrating.”

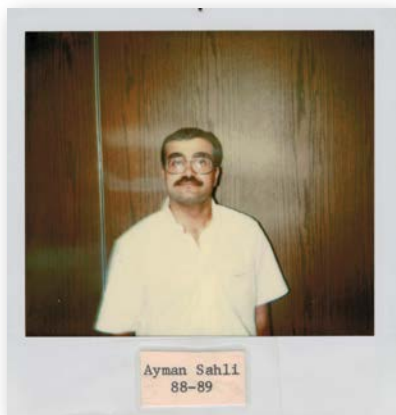
Honing time management skills and understanding that being a graduate student is a world apart from undergraduate school, seems to be a common hurdle that most graduate students face. Although most successful students always seem to find a way of navigating the waters in a way that works for them.

“I recognized and accepted that learning is an endless journey. I also learned to improve my time management skills by budgeting my time efficiently and balancing my life on and off campus. Reading smarter, not harder was another tactic that I used to give myself more bandwidth to do other things. This approach helped a lot especially

‘Homecoming Brings Alums Back’ continued on page 18

UNL Chemistry Department Alumnus Welcomed Back for Alumni Masters Week,

continued from page 16



After such an amazing career, Sahli was honored to be asked to come back as an Alumni Master to speak with our students.

"I've really enjoyed my time back here with UNL. Everyone has been so wonderful," Sahli said.

Sahli confessed he was a little worried at first about coming back to the United States.

"It has been an emotional journey. It has been over 20 years since I have been in Nebraska," Sahli stated. "I was a little fearful on how I would be received since I'm not still doing the research anymore. What should I talk about? What will they think?" However, once he arrived all those fears melted away.

With all of Sahli's experience, he has a lot of advice to offer the next generation of scientists. He shared with us and some UNL students some of his career philosophies.

Sahli stressed how his moral compass has helped guide him through his life and believes having a transparent and ethical approach to work is what will save employees from the big mistakes. However, he acknowledges mistakes are inevitable.

"Careers are not made up of any unforgiveable mistakes. With my career I have received a lot of forgiveness," Sahli said humbly. "Due process was my guardian. My advice is to take it easy and not to overshoot during your first year. Your first year is about making those small risks and mistakes and learning from them. In your second year there will be more opportunity for growth."

Dr. Dussault and his students with Dr. Ayman Sahli during Masters Week



Homecoming Brings Alums Back for Tour of Department and Memory Lane,

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when screening scientific articles (reading the abstract of an article instead of the entire paper)."

Ebrahim credits his mentor and graduate school peers with helping him overcome many of those graduate school obstacles and guide him along the way.

"Dr. Edward Rack, my research advisor, was very committed to growing and developing his students academically and professionally," Ebrahim explains. "I remember when the first paper I co-authored was published. That was the first time that I felt like a scientist."

Ebrahim also attributes his successful career to his educational background.

"The high quality of education that I received at UNL as well as the guidance and encouragement of my professors, especially those in my supervisory/dissertation committee, provided me with a solid foundation for my professional career as a chemist."

Today Dr. Ebrahim is the director of R&D at Bio-Rad Laboratories. He is responsible for directing R&D activities, which includes discovery, product development and post-launch technical support, for in vitro diagnostics medical devices used in clinical laboratories to test patient samples for various analytes and biomarkers.

Prior to Bio-Rad he also worked at Johnson & Johnson as a senior scientist with Advanced Sterilization Products and as a scientist with Streck Laboratories, Inc.

Thank you Dr. Alireza Ebrahim. We are so glad you dropped by for a visit with the department and took time to talk with us.

If you would also like to stop by Hamilton Hall and catch up, we would love to hear from you.

Chemistry Faculty Remembrance Fund

The UNL Chemistry Faculty Remembrance Fund was created to establish an endowed fund for those wanting to honor professors who impacted their lives.


Each year, an award will be made in honor of a former faculty member to a deserving undergraduate or graduate student with the spendable income generated by this fund.

If you would like to give to this fund, the Chemistry Excellence Fund, or establish a fund in someone's memory or honor, please call **1-800-432-3216** or visit <https://nufoundation.org/-/unl-college-of-arts-sciences-chemistry-faculty-remembrance-fund-01116790> for more information.

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in Join the University of Nebraska–Lincoln Chemistry Alumni group on LinkedIn and reconnect with professors, colleagues, classmates, and friends! The Department of Chemistry Alumni group will help you expand and strengthen your professional networks while keeping you posted on all of the happenings in the department.

Chemistry Alumni Website:

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Offering:

Class Listings:

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Career Networking Services provide links to job listings, help with chemistry job searches, and provide opportunities to use Chemistry Facebook Group and LinkedIn for social and professional networking. Update your contact information by sending to alumni@huskeralum.org.

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Learn how to support the UNL Department of Chemistry through a variety of ways.

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>.



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: kerry.vondrak@unl.edu

Name: _____

Degree: _____

Year Earned: _____

UNL Advisor: _____

Email: _____

Current and past career positions: _____

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!



Update Contact Information:

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

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