The University of Iowa

DEPARTMENT OF CHEMISTRY

2020-2021 NEWSLETTER

IOWA

Department of Chemistry

MESSAGE FROM THE CHAIR

Despite the enormous challenges presented by the global outbreak of the COVID-19 pandemic during the last year, our students, faculty, and staff endured tremendously, and we look forward to the upcoming 2021-2022 academic year. Our focus has remained on the education and safety of our students, as we strive to work with the College of Liberal Arts and Sciences (CLAS) and the University to provide world-class instruction and experience in chemistry during this unprecedented situation. During this time, we have also continued to look forward to your support and guidance in allowing us to continue to grow as a department. The articles and stories in our current newsletter attest to our progress.

Specifically, we welcomed the arrival of two new faculty members in 2020-2021. Aditi Bhattacherjee and Korey Carter joined the Department in Spring 2021. Aditi joined us following a Marie-Curie Postdoctoral Fellow position at the Fundamental Research on Matter Institute for Atomic and Molecular Physics in the Netherlands, Europe. Aditi's research focuses on molecular photochemistry, spectroscopy, and ultrafast dynamics as applied to molecules in the gas and solution phases. Korey joined us following a postdoctoral fellow position at the Lawrence Berkeley National Laboratory in Berkeley, California. Korey's research focuses on understanding fundamental bonding interactions in lanthanide and actinide materials, with efforts to develop applications in radiochemical separations, nuclear medicine, and correlated materials. We are thrilled to have both Aditi and Korey on the faculty and look forward with excitement to their contributions.

The Department and our faculty continued to undergo advancement. Scott Daly was recently promoted to Associate Professor and Ned Bowden was promoted to Full Professor. Mona Maalouf was promoted to Associate Professor of Instruction. Scott was also recognized as a CLAS Dean's Scholar, which is a faculty development award that recognizes faculty candidates for promotion who excel in both teaching and scholarship or creative work. Our Department also introduced a new faculty development award, the Research Scholar program, to recognize research achievement at the Associate Professor level. Betsy Stone was the first recipient of a Department of Chemistry Research Scholar award. As part of the award, Betsy conducted research on atmospheric pollen fragments, which can carry allergens and impact human health. These promotions and developments continue to speak volumes of the leadership roles that our chemistry faculty provide within and outside the University of Iowa.

Our faculty and staff were also recipients of prestigious national and UI achievements and recognitions. Dave Wiemer received the 2020 American Chemical Society (ACS) Midwest Award. The Midwest Award is conferred annually on one scientist who has made meritorious contributions to the advancement of pure or applied chemistry, chemical education, and the profession of chemistry. Dave joins four other faculty members (Stanley Wawzonek (1976); Donald Burton (1990); Vasu Nair (2001); Vicki Grassian (2014)) that have received the award. James Shepherd received a highly competitive Department of Energy Early Career Research Program award, being one of 76 faculty members across the US to be selected. Four of our faculty and one staff member received awards within the UI. Betsy Stone received a Distinguished Mentor Award that recognizes work of mentors within the Iowa Center for Research by Undergraduates. Ed Gillan was recognized with an Innovation in Laboratory Safety Award that celebrates exceptional and ground-breaking innovations that advance safety in academic research laboratories. Amy Strathman was recipient of the Hubbard-Walder Award for Excellence in Teaching, which is presented to faculty who have participated in a variety of teaching and have contributed to curriculum and/or program development. Renée Cole won a 2021 Collegiate Teaching Award. The award is given each year to faculty who demonstrate outstanding performance in the classroom, laboratory, or studio and are recognized by their peers. Trent Tappan was the recipient of a Mary Louise Kelley Award, which is given annually to recognize staff members of CLAS who performed exceptional service or contributed ideas that improved the work of the Department or the College. Many of our undergraduate and graduate students also received important awards and recognitions. Congratulations to everyone!

Len MacGillivray

Department Chair (DEO), Department of Chemistry
Collegiate Fellow, College of Liberal Arts and Sciences

The Department also received a grant on "Enhancing Chemical Sciences at Iowa: Modernizing Undergraduate Instruction and Graduate Student Training" from the Carver Charitable Trust during the past year. The grant supports a three-year effort to improve the undergraduate curriculum to enable content and context to be more relevant. By doing so, the activities are expected to better prepare our students and meet the needs of regional and national employers. The work is being conducted by faculty and graduate students during the summer months. An article by Johna Leddy describes efforts within the grant.

The past year also involved the founding of our Departmental Diversity, Equity, and Inclusion (DEI) Committee. Tori Forbes served as the chair of the committee. The committee made tremendous progress, which involved a Departmental response to racism in science and the formation of a student-led DEI Graduate Cohort. An article by graduate student Hoang Dang describes work of the DEI Committee during the past year.

I would like to thank again all of those who have supported and continue to provide support for our Department though chemistry-directed contributions to the UI Center for Advancement. Now is an excellent time to contribute to the Department as we look forward to the 2021-22 academic year. Your support can make an immediate and indelible impact. Funds provided either directly to the Department or as income from endowments enable us to reward our undergraduate students through scholarships that recognize strong performance and help with ever-rising college expenses. Funds can also enable us to support our graduate students, including awards for research and teaching excellence, summer fellowships, travel costs to attend scientific conferences, funding for safety initiatives, community outreach efforts, and other activities that foster career development and growth as scientists. With approximately 120 graduate students in the program, there continue to be many such needs! We are constantly working to develop events that promote networking and camaraderie among our undergraduate and graduate students. Many types of ancillary but important expenses are not covered by research grants or UI budgets, and having funds available that permit us to meet some of these needs helps a great deal. All of these sources of support are essential to the vitality of our Department.

Our Chemistry Department continues to prove itself as a place for innovation, collaboration, and a destination for teaching, research, and service. Please let us know if you would like to stop by when in Iowa City, and we would be happy to give you a tour of our facilities and update you on the latest progress. Our interactive periodic table in the main entrance to CB and the "Brain Rock" sculpture right next to CB are campus highlights. Please continue to take care of your well-being during the upcoming year. We hope to connect and see you soon.

NEW FACULTY

Welcome
Aditi Bhattacherjee

Assistant Professor,
Physical & Computational Chemistry

Prof. Bhattacherjee obtained her Ph.D. in Chemical Sciences at Tata Institute of Fundamental Research, India. For her doctoral dissertation on weak hydrogen-bonding interactions in molecular complexes, she won the Best Thesis Award (2015) in the Department of Chemical Sciences, TIFR. Her post-doctoral research in UC Berkeley blazed a new trail in femtosecond, time-resolved dynamics in small organic molecules such as hydrocarbon and heterocyclic rings, against which theoretical methods for core-level spectroscopy can now be tested. She has expertise in photocatalytic reactions in solutions and phase transitions in novel deep eutectic solvents. She has held a Marie Curie Fellowship (2018), was a finalist for Panofsky Fellowship (2020), and shared nominations for USERN Prize (2020) and Falling Walls (2020) in Physical Sciences. Alongside research, her passions are in developing education, research, and mentoring programs for students in inclusive and equitable workspaces.

Research Interests:

Excited electronic states in molecules and materials are important because these states have energies comparable to activation barriers associated with most chemical reactions. However, even today, such chemistries remain underutilized because of experimental difficulties in resolving atom- or site-specific excited state dynamics. The challenges are substantial – for one, excited electronic states are often delocalized over multiple atoms making site-specific changes amenable to only theoretical methods; two, the changes proceed on extremely fast time scales that require femtosecond time resolution; and last but not the least, 'coherent artifacts' in most ultrafast spectroscopies fuzz out the 'time-zero', rendering the critical Franck-Condon region intractable. Research in the Bhattacherjee Lab aims to develop ultrafast core-level spectroscopy to utilize the full potential of excited-state photochemical reactions for applications in energy and catalysis.

Department of Chemistry welcomes Dr. Korey Carter

Assistant Professor, Radiochemistry

The Department of Chemistry is pleased to announce that Dr. Korey Carter will be joining the faculty as an Assistant Professor beginning January 2021. Dr. Carter graduated with a BS in Physics from Michigan State University in 2011 and received a PhD in Chemistry from The George Washington University in 2017, where he worked in the lab of Christopher Cahill studying halogen bonding in f-block hybrid materials. Since 2017, Dr. Carter has worked as a postdoctoral fellow in the group of Rebecca Abergel at Lawrence Berkeley National Laboratory, investigating fundamental bonding interactions in f- and d-block coordination complexes with specific applications in radiochemical separations, nuclear medicine, metal-ion decorporation, and nuclear waste stewardship. Research in the Carter group will take advantage of the rich coordination chemistry of the f-block to address fundamental challenges in quantum information science, nuclear medicine, and separations chemistry.

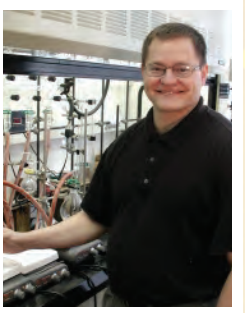
Korey grew up in a suburb outside of Kansas City. He received his Bachelor of Science degree in Physics from Michigan State University where he also worked as an undergraduate researcher in the solid-state chemistry lab of Prof. Viktor Poltavets and on an environmental stewardship special projects team evaluating electronic textbook adoption and implementation in university classrooms. In 2012, Korey started chemistry graduate school at The George Washington University in Washington, DC in the lab of Prof. Christopher Cahill. His thesis work focused on supramolecular assembly in f-element hybrid materials, with a particular focus on halogen bonding and correlating covalent and non-covalent interactions to spectroscopic properties. After obtaining his PhD in 2017, Korey moved to Berkeley, CA to work in the BioActinide Chemistry group led by Prof. Rebecca Abergel at Lawrence Berkeley National Laboratory. At LBNL, his work focused on investigating fundamental bonding interactions in f- and d-block coordination complexes with bioinspired chelators. This led to the first characterization of an einsteinium coordination complex as well as the extensive development of materials for specific applications in radiochemical separations, nuclear medicine, metal-ion decorporation, and nuclear waste stewardship. Korey moved to the University of Iowa in January of 2021 and launched the Carter Radiochemistry group, which aims to capitalize on the rich coordination chemistry of the f-block to address fundamental challenges in quantum information science, therapeutic and diagnostic nuclear medicine, and radiochemical separations. Outside the lab and classroom, Korey enjoys running, watching Arsenal matches, listening to Prince music, and growing his wine and whiskey collections.

PROMOTIONS

Bowden Promoted to Professor

September 10, 2020

Ned B. Bowden was recently promoted to the rank of Professor. He is a proud product of the Midwest; he was born in Wisconsin and raised in Minnesota. After spending a couple of years in the Netherlands where he completed high school at a high school on an American Air Force base, he moved to California to attend the California Institute of Technology where he worked with Professor Bob Grubbs. He was one of the first people in the world to work with the Grubbs catalysts while an undergraduate. He graduated with his B.S. in chemistry in 1994 and then moved across the country to Harvard University for graduate school in chemistry where he worked with Professor George Whitesides. He learned much about how to do, present, and think about science from Professor Whitesides and his research group. After completing his Ph.D. in 1999, he moved to Stanford University where he worked in Professor Bob Waymouth's laboratory to synthesize polymers. In 2002 he moved to the University of Iowa where he started his independent career. He has worked in a variety of areas including polymer synthesis, small molecule synthesis, membrane separations, organic monolayers on Si(111), and agriculture-based chemicals. He works in areas where his expertise in synthesis can be used to tackle problems that no one else is studying. He has been a part of three start-up companies and plans to launch more.



Daly Promoted to Associate Professor

September 15, 2020

Prof. Scott Daly was promoted to the rank of Associate Professor in July 2020. Dr. Daly joined the faculty at the University of Iowa in 2014. With funding from both the Department of Energy and the National Science Foundation, Dr. Daly and his research group are investigating new metal complexes to address problems associated with energy-intensive small molecule transformations and nuclear waste. The Daly Group also has an active presence on Twitter, bringing knowledge to a broader audience, and sharing the exciting advancements of the sciences.

In addition to teaching, research and publishing, Daly also leads the Chemistry Platoon. The Chemistry Platoon "is aimed at bringing together student Veterans at the University of Iowa so they can work together to improve their fundamental understanding of Chemistry." Daly, an Army veteran, is able to provide support to the veteran community at the University of Iowa, forming a group to study chemistry and share in common life experiences.

Maalouf Promoted to Associate Professor of Instruction

September 9, 2020

Prof. Mona Maalouf was recently promoted to Associate Professor of Instruction. Mona received her Maitrise degree in Chemistry from the Lebanese University in Beirut, Lebanon, in 1990. She came to the University of Iowa as a Fulbright scholar in 2000. She subsequently joined the Ph.D. program in the Chemistry Department at Iowa and earned her Ph.D. degree while working in Dr. David Wiemer's laboratory on the synthesis of organophosphorus compounds as potential substrates or inhibitors for different enzymes in the mevalonate pathway. Mona joined the teaching faculty at the University of Iowa from 2007-2012 during which she taught freshman chemistry and organic chemistry courses. From 2012 -2014, she was a visiting professor at the Lebanese American University, and American University of Science and Technology. In the fall of 2016, Mona returned to the University of Iowa as a Lecturer in the Department of Chemistry and is currently teaching the laboratory component of the freshman chemistry course. Prior to that she was a visiting Assistant Professor at Denison University, in Granville, Ohio.

Fei Wu named Young Researcher, Institute of Radiochemistry and Nuclear Environment at Lanzhou University

November 23, 2020

Fei Wu, a recent graduate of the University of Iowa Department of Chemistry and the Margulis Group, was named Young Researcher, Institute of Radiochemistry and Nuclear Environment at Lanzhou University.

Chemistry Alumni Spotlight: Nelson & Payne

July 15, 2020

Two individuals with ties to the Department of Chemistry and the Forbes Group were spotlighted in a recent article by the Graduate College:

Andrew Nelson and Mo Payne are both employed by Sandia National Laboratories in Albequrque, New Mexico, working in Chemical and Biological Security, alongside other Hawkeye Alumi.

Andrew Nelson

Mo Payne

Read the full article here:
https://www.grad.uiowa.edu/news/2020-06-08/sandia-labs-brings-hawkeyes-together-in-national-defense

Department of Chemistry Alumna Minteer receives $20 Million NSF Grant

March 4, 2021

Prof. Shelley Minteer, University of Iowa alumna, and current Dale and Susan Poulter Endowed Chair of Biological Chemistry and Associate Chair of Chemistry at the University of Utah, has received a $20 Million grant from the NSF in her role as Director for The Center for Synthetic Organic Electrochemistry (CSOE). One of the primary goals of the CSOE is to improve the safety and sustainability in the chemical manuafacturing process. She was recently featured in the University of Utah's "Discover" newsletter, the full article is linked below.

Dr. Minteer holds the Dale and Susan Poulter Chair in Biological Chemistry, as well as the position of Director of the U's Center for Synthetic Organic Electrotherapy. She is a former member of the Leddy Group at the University of Iowa Department of Chemistry.

Minteer has also been named editor in chief of ACS Au journals, and 9 ACS open access journals.

https://science.utah.edu/news/discover-2020 (page 8)

DEPARTMENT HIGHLIGHTS

Mason Group featured on Nature Nano Cover

December 23, 2020

Blake Hudson, 3rd-year graduate student in Prof. Sara E. Mason's research group, said it was a nice surprise to hear that his work on modeling metal dissolution had caught the attention of plant nutrition researchers, but having his project with them featured on the cover of December 2020's Nature Nanotechnology was even nicer. Hudson is a researcher in the NSF Center for Sustainable Nanotechnology, and his modeling is usually applied in the area of battery development, where stray metal ions are undesirable. In this case, though, well-timed metal dissolution was just what was needed. Mason's colleagues at the Connecticut Agricultural Experimental Station (CAES) and University of Wisconsin-Madison were building on research that showed copper treatments to be promising in reversing soybean sudden death syndrome, a root-rot fungal disease responsible for $3 billion in crop losses annually in the United States alone. In such treatments, copper nanomaterials are sprayed on plant leaves, and the copper ions they release migrate to the roots, where they help the plant fight the disease nutritionally. The question was whether nanomaterials might be tuned to make copper ions optimally available to the plants. Under consideration were CuO nanoparticles and two copper nanosheets: $Cu_3(PO_4)_2$ and CuO. Experimentally, the nanosheets kept better contact with leaves than the irregularly-shaped nanoparticles did. Both nanosheets released copper well, but the $Cu_3(PO_4)_2$ sheets released copper in a burst: 60 times faster, in water, than the other nanomaterials, with even faster bursts in media more like plant-cell environments.

Hudson's modeling work, which takes into account the effect of ion accumulation in solution from surface dissolution, explains the dramatic bursts by demonstrating how the configuration of the $Cu_3(PO_4)_2$ lattice is relatively thermodynamically favorable to copper release. Aiding him were the calculations of the group's postdoc, Dr. Ali Abbaspour Tamijani, which allowed investigation of the various media's effects. Experimentally, the gradual-release CuO nanosheets gave the highest root Cu concentration, yielding the best disease defense in plants, and underscoring the Connecticut researchers' contention that nanomaterials can be tuned rationally to provide optimal plant nutrition.

You can read the entire paper here https://www.nature.com/nnano/volumes/15/issues/12.

Mason Group receives NSF Center for Sustainable Nanotechnology Grant Renewal

October 2, 2020

With a $20 million grant renewal, the Mason group is celebrating the success of the NSF Center for Sustainable Nanotechnology (CSN), a multi-institution project that began at the University of Wisconsin-Madison in 2012 and now partners with eleven other laboratories and universities across the country, including the University of Iowa. The Mason group, which uses theory and computational models to understand how technologically important nanomaterials change when they're released into the environment, has been part of the project since 2015. Mason's CSN projects have supported several UI Chemistry graduate students and postdocs, whose results have been published in journals such as Environmental Science: Nano, JACS, and Nature Nanotechnology.

The group's next five years' work with CSN probes the physical basis of an agriculturally promising discovery: copper oxide and copper phosphate nanoparticles have cured fungal infection in soybeans. Some copper compounds performed better than others, and the reasons may lie in the varying coordination environment of the copper as the compounds dissolve in the soil's complex aqueous environment. Using electronic structure theory and thermodynamics modeling, the Mason group will explore how the fungicidal compounds dissolve in simulated complex aqueous environments: ones that include growth media for bacteria, for instance, or are already rich in ions.

Chemistry graduate students Diamond T. Jones and Blake G. Hudson are current CSN participants and will continue with their work. Additional positions supported by this renewal are now available.

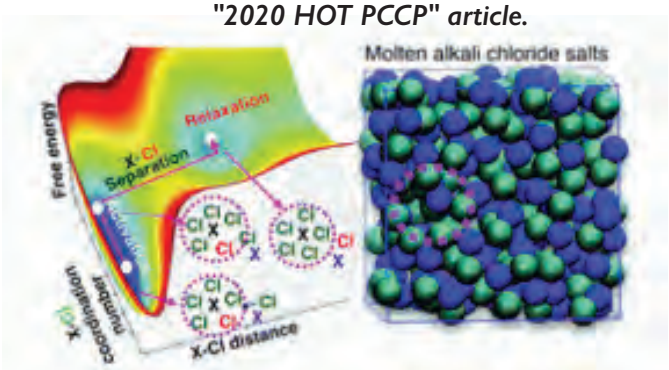
Wade Elmer, Center for Sustainable Nanotechnology (CSN) affiliate and vice director of plant pathology and ecology with the Connecticut Agricultural Experiment Station, observes soybeans used is part of an ongoing experiment where CSN materials are being used to suppress disease. The University of Iowa is part of the CSN, a multi-institutional venture that obtained renewed funding from the U.S. National Science Foundation. Photo by Jason White.

You can learn more about the Mason group and its CSN projects in this Iowa Now story and in this brief introductory video: https://uicapture.hosted.panopto.com/Panopto/Pages/Viewer.aspx?id=3462bb46-f95c-4c34-b38a-ac3f0151a480

Margulis Group Article featured in the 2020 HOT PCCP List

November 23, 2020

Members of the Margulis Group, including Fei Wu, Shobha Sharma, and Claudio Margulis, are co-authors of a "2020 HOT PCCP" article.



Abstract

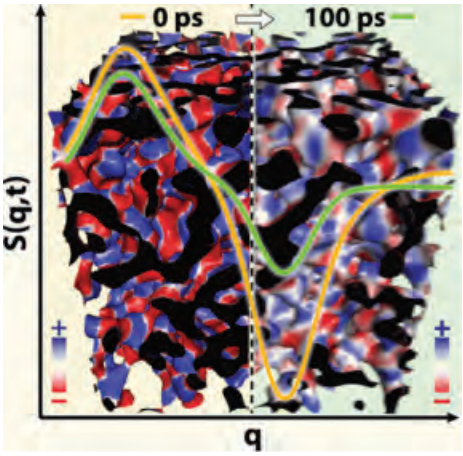
Molten salts are of great interest as alternative solvents, electrolytes, and heat transfer fluids in many emerging technologies. The macroscopic properties of molten salts are ultimately controlled by their structure and ion dynamics at the microscopic level and it is therefore vital to develop an understanding of these at the atomistic scale. Herein, we present high-energy X-ray scattering experiments combined with classical and ab initio molecular dynamics simulations to elucidate structural and dynamical correlations across the family of alkali-chlorides. Computed structure functions and transport properties are in reasonably good agreement with experiments providing confidence in our analysis of microscopic properties based on simulations. For these systems, we also survey different rate theory models of anion exchange dynamics in order to gain a more sophisticated understanding of the short-time correlations that are likely to influence transport properties such as conductivity. The anion exchange process occurs on the picoseconds time scale at 1100 K and the rate increases in the order KCl < NaCl < LiCl, which is in stark contrast to the ion pair dissociation trend in aqueous solutions. Consistent with the trend we observe for conductivity, the cationic size/mass, as well as other factors specific to each type of rate theory, appear to play important roles in the anion exchange rate trend.

Read the full article in Physical Chemistry Chemical Physics here: https://pubs.rsc.org/en/content/articlelanding/2020/CP/D0CP03672B#!divAb...

Margulis paper selected as ACS Editor's Choice

March 11, 2020

A paper from the Margulis Research Group, A Pictorial View of Viscosity in Ionic Liquids and the Link to Nanostructural Heterogeneity, has been selected as an ACS Editor's Choice, and is also highlighted as one of the most read papers of the month.



Abstract

Prototypical ionic liquids (ILs) are characterized by three structural motifs associated with (1) vicinal interactions, (2) the formation of positive–negative charge-alternating chains or networks, and (3) the alternation of these networks with apolar domains. In recent articles, we highlighted that the friction and mobility in these systems are nowhere close to being spatially homogeneous. This results in what one could call mechanical heterogeneity, where charge networks are intrinsically stiff and charge-depleted regions are softer, flexible, and mobile. This Letter attempts to provide a clear and visual connection between friction—associated with the dynamics of the structural motifs (in particular, the charge network)—and recent theoretical work by Yamaguchi linking the time-dependent viscosity of ILs to the decay of the charge alternation peak in the dynamic structure function. We propose that charge blurring associated with the loss of memory of where positive and negative charges are within networks is the key mechanism associated with viscosity in ILs. An IL will have low viscosity if a characteristic charge-blurring decorrelation time is low. With this in mind, engineering new low-viscosity ILs is reduced to understanding how to minimize this quantity.

Stone Group Members author NSF paper: "Spring rains: A surprising source of pollen"

June 12, 2020

Congratulations to Professor Betsy Stone, along with graduate students Chamari Mampage and Dagen Hughes, and undergraduate student, Lily Jones, from the Department of Chemistry. Together they have authored a paper on the effects of rain on tree pollen.

Check out these links for the full article:

NSF Radio story: https://nsf.gov/news/mmg/mmg_disp.jsp?med_id=186446&from=

NSF Video story: https://players.brightcove.net/pages/v1/index.html?accountId=6792561330001&playerId=default&videoId=6163128144001&autoplay=true

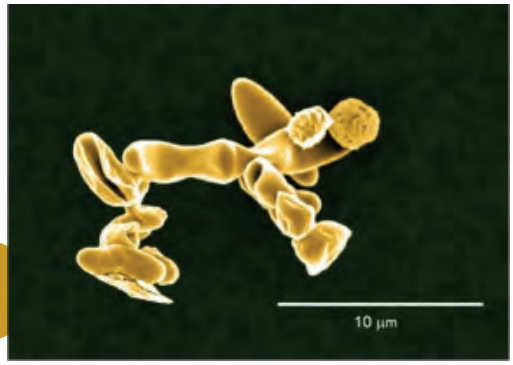
Other posted content on NSF channels: https://www.nsf.gov/discoveries/disc_summ.jsp?cntn_id=300665&WT.mc_id=USNSF_1

Chamari Mampage of the Stone Research Group.

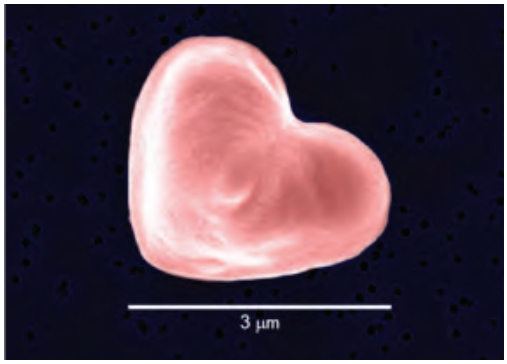
Chamari Mampage Earns Top Honors in Fine Particle Art Competition

November 30, 2020

Chamari Mampage, a doctoral student of the Stone Research Group in the Department of Chemistry, earned the top prize in the Fine Particle Art Competition at the 38th Annual American Association of Aerosol Research (AAAR) Conference in October 2020. The prize-winning work, entitled Particulate Puppy, is a scanning electron micrograph of biological spores and dust particles. Mampage also earned third prize for her work entitled Love is in the Air. The particles featured in her micrographs were collected in Iowa City as part of a research study on atmospheric sub-pollen particles under extreme weather conditions. All images were collected at the University of Iowa Central Microscopy Research Facility. Mampage shares this recognition with her collaborators Prof. Elizabeth A. Stone, Dagen Hughes, and Lillian Jones.



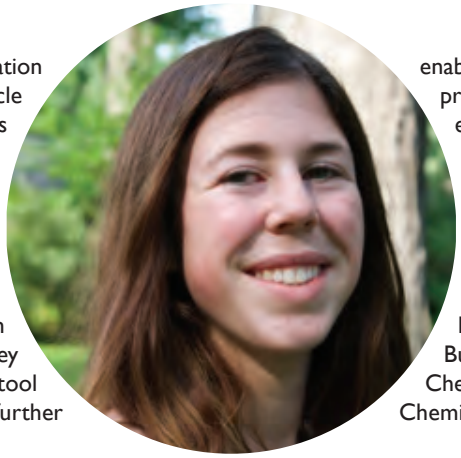
Particulate Puppy (First place) A scanning electron micrograph of biological spores and dust particles arranged in the shape of a puppy in samples collected by a cascade impactor in Iowa City, Iowa on a rainy day in spring 2019.



Love is in the Air (Third place) A scanning electron micrograph of a heart shaped particle collected by a cascade impactor in Iowa City on a rainy day in spring 2019.

Milani Breaks New Ground in Atmospheric Chemistry

November 30, 2020



Undergraduate researcher, Alissia Milani, in collaboration with Prof. Elizabeth A. Stone, studies the sources of particle air pollution with the long-term goal of reducing its negative impacts on respiratory health. Personal care products, like shampoos, skin cream, hair spray, and other cosmetic products contain volatile organic compounds that can evaporate, undergo chemical reactions, and form particles. Milani demonstrated for the first time the presence of a particle-phase compound derived from personal care products in ambient air. Her findings are significant because they provide the atmospheric chemistry community a new tool to track particles derived from this source, which will further enable assessments of the impacts of personal care products on air quality. A notable feature of her work is explaining to other researchers how to detect this compound, so that it can be measured by others around the world.

In December 2020, Milani completed her Bachelor's degree in Chemistry with highest distinction and university honors. She is a fellow of the Iowa Center for Research by Undergraduates (ICRU), an ICRU ambassador, and the recipient of the Donald J. Burton and Margaret A. Burton Scholarship, Senior Chemistry Alumni Award, and ACS Division of Analytical Chemistry Award.

See her article published in Atmospheric Environment with co-authors Dr. Ibrahim Al-Naiema (Ph.D. 2018) and Prof. Stone here: https://doi.org/10.1016/j.atmosenv.2020.118078

FACULTY/STAFF HIGHLIGHTS

Professor Daly named Dean's Scholar

March 23, 2020

Prof. Scott Daly has been named a Dean's Scholar for 2020-2022.

Scott was born in Joliet, IL and grew up in a small community north of Ocala, FL. After graduating high school, he enlisted in the United States Army as an M1 tank crewman at the age of 17 and was honorably discharged after three years of active duty service in the 1st Cavalry Division in Ft. Hood, TX. He then moved to the Chicago suburbs and went on to receive his B.S. degree in chemistry from North Central College in Naperville, IL. During his time at North Central, Scott performed research with Dr. E. Philip Horwitz at Eichrom Technologies LLC to improve the chromatographic extraction of actinides from soil and water. In 2006, he entered the PhD chemistry program at the University of Illinois at Urbana-Champaign and performed research under the guidance of Professor Gregory S. Girolami. Scott's research focused on the synthesis and characterization of new chelating borohydride ligands and their use in the preparation of volatile transition metal, lanthanide, and actinide complexes for chemical vapor deposition applications. After receiving his PhD in spring 2010, he began working as a Seaborg Postdoctoral Fellow with Drs. Stosh A. Kozimor and David L. Clark at Los Alamos National Lab in Los Alamos, NM. His research there focused on sulfur K-edge X-ray absorption spectroscopy (XAS) studies to understand structure-function correlations in dithiophosphinates used for minor actinide extraction processes. In 2012, Scott accepted a faculty position George Washington University in Washington, DC. In 2014, he moved his research group to the University of Iowa where he is currently an Assistant Professor of Chemistry.

The Daly Group is currently funded by the National Science Foundation to investigate metal complexes containing reactive ligands and by the Department of Energy to develop solvent-free separation methods for metals found in nuclear waste.

Prof. Stone honored with Distinguished Mentor Award

May 18, 2020

The University of Iowa has recognized Prof. Betsy Stone with a Distinguished Mentor Award. The award was created "to recognize the work that mentors put in to make their student's experiences successful, the Iowa Center for Undergraduates (ICRU) created the Distinguished Mentor Award (DMA)."

The annual Discovery & Innovation awards program recognizes faculty, staff, postdoctoral scholars/fellows, graduate students, undergraduate students and mentors who have demonstrated outstanding accomplishments to research in their field. The program also recognizes individuals and start-ups awarded patents, options, or licenses with the support of the University of Iowa Research Foundation to help protect and commercialize their intellectual property.

> "When I first met her, I was at the crossroad of college paths, trying to figure out my major. I had already met with four other professors and felt even more confused than ever. In that 30-minute meeting with Dr. Stone, I had not only decided that I want to study chemistry, but also that I wanted to be a part of her research lab."
>
> —Tianyi Li, Environmental Science student

Prof. Gillan honored with Innovation in Laboratory Safety Award

May 18, 2020

The University of Iowa has recognized Prof. Ed Gillan with an Innovation in Laboratory Safety Award. "The Innovation in Laboratory Safety Award celebrates exceptional and ground-breaking innovations that advance safety in academic research laboratories."

The annual Discovery & Innovation awards program recognizes faculty, staff, postdoctoral scholars/fellows, graduate students, undergraduate students and mentors who have demonstrated outstanding accomplishments to research in their field. The program also recognizes individuals and start-ups awarded patents, options, or licenses with the support of the University of Iowa Research Foundation to help protect and commercialize their intellectual property.

> "Students and staff must be carefully and thoroughly trained in safety protocols and a strong and ingrained culture of safety and respect for potential hazards is essential. Professor Gillan has been *the* major force in addressing these issues in our department for many years, and has been highly effective and successful in doing so."
>
> — James B. Gloer,
> Roy J. Carver/Ralph L. Shriner Professor of Chemistry

Shepherd awarded Early Career award from the US Department of Energy

June 24, 2020

Prof. James Shepherd, assistant in the Department of Chemistry, was recognized with an award from the United States Department of Energy's Early Career Research Program. Shepherd is one of 76 scientists from across the nation selected for the award by the DOE's Office of Science.

The funding will help Shepherd to advance the field of finite-temperature electronic structure theory.

"Although we can observe how temperature changes bulk material properties, our understanding about how the quantum-mechanical properties of electrons change with temperature can be imprecise," Shepherd says. "The simulations required to examine these interactions more accurately are beyond the current capability of modern supercomputers. Over the next five years, we will be able to develop new algorithms to simulate the properties of electrons over a range of temperatures with a complete treatment of quantum-mechanical effects."

The Early Career Research Program, now in its eleventh year, is designed to bolster the nation's scientific workforce by providing support to exceptional researchers during crucial early career years, when many scientists do their most formative work.

Click here for the full write up by Richard C. Lewis: https://now.uiowa.edu/2020/06/university-iowa-chemist-selected-early-career-award-us-department-energy

Prof. Wiemer awarded 2020 ACS Midwest Award

July 21, 2020

Prof. Dave Wiemer has been awarded the 2020 ACS Midwest Award. This award publicly recognizes outstanding achievements in chemistry in the Midwest region. It is conferred annually on a scientist who has made meritorious contributions to the advancement of pure or applied chemistry, chemical education, and the profession of chemistry.

An award ceremony will be planned at the Midwest Regional ACS Meeting in Springfield, Missouri in October, where there will be a Midwest Award Symposium and a Midwest Award Lecture.

Follow this link for more information: http://www.stlacs.org/midwest-award/

Strathman named recipient of the Hubbard-Walder Award for Excellence in Teaching

April 30, 2021

"Four University of Iowa faculty members—Gail Bishop, Ray Fagenbaum, Cinda Coggins-Mosher, and Amy Strathman—were named winners of the inaugural Hubbard-Walder Award for Excellence in Teaching. The new award is presented to UI faculty who have participated in a variety of university teaching (undergraduate, graduate or professional, classroom, one-on-one) and have contributed to curriculum and/or program development. Each recipient has a minimum six years of teaching experience at Iowa and will receive a $1,000 honorarium.

"Strathman is associate professor of instruction in the Department of Chemistry. Strathman's role as associate professor of instruction was a new position for the department when she was named to the role in 2017 as she began to lead the Instructional Track Faculty (ITF). Strathman has become the teaching leader of the ITF and a mainstay in the department. ITF plays a critical role in teaching introductory courses General Chemistry I/II and Principles of Chemistry I/II. These courses are complex, have high student enrollment and large teams of teaching assistants, and are continually evolving. Strathman's work has defined what is expected from the ITF track, as others have begun taking cues from her in developing approaches to teaching on a day-to-day and yearly basis. Strathman also helped pioneer a curriculum redesign of Principles of Chemistry I/II. This project involved integrating a new "chemical thinking" aspect. The project was in development since 2018 and was implemented during the COVID-19 pandemic under Strathman's leadership. Her leadership has set the example of ITF and tenure-track faculty that will last for many years."

Quoted text from Jack Rossi, written for IowaNow. Read the full article including profiles of the three other recipients here: https://now.uiowa.edu/2021/04/4-faculty-named-inaugural-hubbard-walder-honorees?utm_source=IANowFaculty&utm_medium=hubbard_ward_awards&utm_campaign=IANowFaculty-4-29-2021

Professor Renée Cole has won the 2021 Collegiate Teaching Award

Professor Renée Cole of the University of Iowa Department of Chemistry has won the 2021 Collegiate Teaching Award, the College of Liberal Arts and Sciences announced. Cole, who was named CLAS Collegiate Scholar in 2018, is not only an excellent teacher and mentor, but she also focuses her research on teaching.

An expert in the area of chemical education, as well as STEM education more broadly, she is interested in issues related to how students learn chemistry and how that guides the design of instructional materials and teaching strategies. She is also interested in how to effectively translate discipline-based research to the practice of teaching, thus increasing the impact of this research and improving undergraduate STEM education.

To read the full announcement, see this link: https://clas.uiowa.edu/news/ren-e-cole-professor-chemistry-named-2021-collegiate-teaching-award-recipient

Trent Tappan awarded the 2021 Mary Louise Kelley Award

Trent Tappan, Chemistry Center Manager, has been named winner of the Mary Louise Kelley Staff Excellence award. The Mary Louise Kelley Staff Excellence Awards are given annually to recognize staff members of the College of Liberal Arts and Sciences who performed exceptional service or contributed ideas that improved the work of the department or the College.

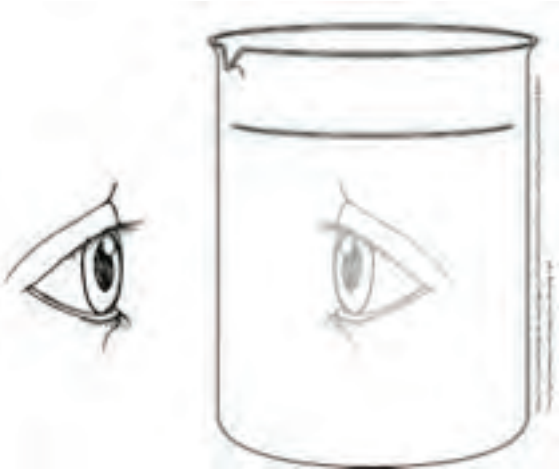
The criteria by which nominees are evaluated include the nominee's exceptional service to their department or to the College, ideas the nominee proposed that improved the work of the department or the College; and contributions that extend beyond those normally expected or required by the job description.

Nominations are evaluated with respect to the award criteria by members of the College of Liberal Arts and Sciences Staff Recognition Committee and the Dean. Recipients of this award are invited to a reception with the Deans, featured on the CLAS website, and honored at the annual College of Liberal Arts and Sciences Staff Recognition Reception, which is held each spring.

See the Beaker!

What is New in Analytical Chemistry I

by Johna Leddy



Analytical Chemistry I covers the two ***E***s: equilibria and electrochemistry. When former students check in, they don't tell me the year that they took Analytical I, they tell me the exam topics.

The entire class is predicated on the protocol of (a) write the reactions; (b) conserve mass; (c) conserve charge; and (d) equilibrium constants are products over reactants, even in the Nernst equation*. *See the beaker!*

In the beginning, good algebra skills were important in mastery of the ***E***s. But students' skills evolve and now students' skills are more attuned to finding data with lightning speed and working with spreadsheets, and so, the mode of delivery for the ***E***s has evolved.

Analytical I Exam Topics

- **Coffee**
- **Bombardier Beetles**
- **Autumnal Leaf Color**
- **Taste Buds**
- **Gout**
- **Indigo Dyes for Blue Jeans**
- **Capsaicin**
- **Hippopotamus' Sunscreen**
- **Twin Murders**
- **Odor of Ginko Trees**
- **Nixtamalization**
- **Bathtub rings**
- **Cardiff Giant and Gypsum Transferrins**
- **pH in a Cow's Digestive Tract**
- **Forensics**
- **Dead Goldfish**
- **Paper Making**
- **Squid Ink**
- **Dental Amalgams**
- **Kevlar Vests**
- **Alton Brown's Pickle Recipe**
- **Texas City NH4NO3 Explosion**

In summer 2020, the Carver Foundation generously supported a grant to the Department of Chemistry to develop more effective means of instruction. One of the projects was to transpose Analytical I from algebra intensive to spreadsheet intensive.

The class develops systematic treatment of equilibrium (aka cosmic general rules) and spreadsheet templates for acid base chemistry with fractional concentrations and titrations, equilibrium redox processes with titrations and potential axes, dynamic electrochemistry of voltammetry with simulation of Nernstian voltammograms *(ducks)*, and activity effects.

*Just in case you forgot, for O + ne ⇌ R, the Nernst equation is
$E = E0' - (0.059\,V / n)\ log([R] / [O])$.

There are still two exams, but the exams are now open book, open computer, open internet,... and implement the spreadsheet tools the students built. Like research in real space, the exams use the tools available to all researchers. The only exceptions are no talking to others and no Chegg during the exam. Questions can, as always, be asked of the instructors.

And, there is no final. Instead, the students design projects of their own choosing that employ the spreadsheet tools and systematic treatment of equilibrium to dissect their system of interest. A written report that uses the spreadsheet tools is submitted. And what an interesting array of projects were submitted.

- **Milk vs dark chocolate**
- **Citric acid production**
- **Carbon storage**
- **Forensics of metabolic processes**
- **Art conservation: metals and ceramics**
- **Marsh test**
- **Phenols**
- **Carbolic soap**
- **Phloroglucinol determination**
- **Ramen: It's Saved My Bank Account; Can It Save My Grade?**
- **Hemoglobin**
- **Dissolving bone**
- **Water to electricity**
- **Chemistry of Saturn's moons**
- **Chemistry through quarantine**
- **Gingerol antioxidant**
- **Lidocaine**
- **Compounds in citrus fruits**
- **Sunscreens and corals**
- **CO^2 binding to metal complexes**
- **Rust**
- **Catfish finds lunch**
- **Coca Cola**
- **Nordihydroguaiaretic acid (NDGA)**
- **Recycling $LiCoO^2$ in Li batteries**
- **Mountain Dew**
- **Bread making**
- **HF and Ca in the body**
- **Monster energy drinks**
- **Electrochemical drug detection**

Plus, there were several murder mysteries, forensics cases, and in class finals for next year.

The projects were impressive and ranged across myriad topics. The spreadsheet tools were ably deployed, after some initial recalibrations and taming of Zoom, the conversion from algebra to spreadsheets went well. Thinking triumphed.

The objective of the grant from the Carver Foundation is to focus on creative thinking and problem solving, rather than formulaic resolution of standard problems. The tools developed under the grant enable the students to address their own novel questions. The students now have better tools to see into the beaker.

Acknowledgments

- Thank you to the Carver Foundation for supporting this project.
- Thank you to all the students who have taken Analytical I over the years. I learned a lot.
- A special thanks to the Fall 2020 Analytical I class for their tenacity, patience, and sense of adventure. You made the experiment work.
- And if you encountered any ***E*** systems that would make good exam I and II problems, send them forward (johna-leddy@uiowa.edu).

DEI COMMITTEE

The 2020-2021 academic year was a significant year of growth in Diversity, Equity, and Inclusion (DEI). National media coverage of racial injustice prompted many conversations in academic institutions about how academia presents many barriers for people with marginalized identities, especially those of African American descent. Following weeks of massive protests against racial injustice, academic departments across the country were compelled to join in. On June 10, 2020, some members of the University of Iowa Department of Chemistry participated in #ShutDownSTEM https://www.shutdownstem.com/, a movement based from social media wherein participants voluntarily refrain from normal research activities and instead engage in learning and discourse about anti-Black racism. Some research groups at UI Chemistry, for example, adapted their virtual group meeting activities to allow for discussion of systemic racism between graduate students and professors – many occurring for the first time in the department.

This moment helped catalyze creation of the DEI Committee, which Associate Professor Tori Forbes would eventually become the chair of. The first formal committee was comprised of 3 faculty members, 2 staff members, and 3 graduate students in Chemistry, all members of which would meet monthly to identify and address issues of DEI. One of the very first tasks to be undertaken was the creation of a departmental response to racism in science. Led by Assistant Professor Florence Williams in the Fall 2020 semester, the DEI Committee developed, fully ratified, and publicly published a statement describing racism in academic institutions and how we must continue to work to achieve justice and equity for marginalized people. The committee continues to target DEI issues including constructing a formal assessment of inequities in comprehensive exams and developing of an anti-racism workshop to be led by graduate students (for the past year's list of action items, please visit: https://chem.uiowa.edu/-diversity/i-want-get-involved). They also hope to further expand the current committee structure to include representation from undergraduate students and visiting professors.

Simultaneous to the founding of Chemistry's first official DEI Committee was the formation of a graduate-student organization called the DEI Graduate Cohort. After some monthly virtual meetings, students in the cohort worked to cultivate better environments for knowledge and growth in DEI. A tremendous achievement was the execution of a two-week virtual DEI symposium, wherein fellow Chemistry Ph.D. candidates Safia Jilani (of Georgetown University) and Jacky Deng (of the University of Ottawa) were invited to speak to UI Chemistry about advocacy and equity. Another was a DEI Identity Awareness Week, a week of virtual safe spaces meant for learning, supporting, and networking among Chemistry students and faculty; each day was led by a main faculty or staff facilitator in categories such as LGBTQ+, women in STEM, mental health & disabilities, and internationality. These events, organized by Chemistry Ph.D. candidates Hoang Dang and Jessica DeYoung, were well-attended and were praised by faculty members and graduate students alike, and will likely set a strong precedent for more spaces that aim for equity and inclusion.

By Hoang Dang
Graduate Student 2019-2020

While protests condemning systemic injustice across the nation have mostly halted for now, the efforts toward a more diverse, equitable, and inclusive Chemistry department remain as important as ever. This past year's founding of the department's first DEI Committee and a student-led DEI Graduate Cohort show the power of what peer organizing can accomplish. With certainty, the UI Department of Chemistry welcomes this new, broadened commitment to DEI for the 2021-2022 academic year.

To learn more about the structures, goals, and other information about current DEI efforts at UI Chemistry, please visit https://chem.uiowa.edu/diversity.

AWARDS & RECOGNITION

2021

GRADUATE

University

Ballard and Seashore Fellowship

- **Spring 2021 -** Kyle Spielvogel, Dagen Hughes
- **Fall 2021 -** Kevin Robben, Diamond Jones

Graduate College Post-Comprehensive Research Award

- **Spring 2021 -** Chamari Mampage, Hayley Petras, Hoang Dang
- **Fall 2021 -** Kevin Hunter, Christopher Hartwick

CLAS Dissertation Writing Fellowship - Daniel Parr

Graduate College Summer Fellowship - Kasun Dadallagei, Jessica DeYoung, James Earl, Austin Gessell, Christian Haas, Whitney Harmon, Christopher Hartwick, Lucas Howell, Chathuri Kaluarachchi, Zhuoheng Li, Nicholas Luedtke, Anushree Poddar, Grant Shivers, Soe Tun

Council on Teaching Outstanding Teaching Award - Christian Haas, Hayley Petras, Grant Shivers

Graduate Diversity Fellowship

- **Spring 2021 -** Lucas Howell
- **Fall 2021 -** Nicole States, Ramin Ordikhani Seyedlar, Whitney Harmon

Graduate College COVID-Delay Fellowships

- **Summer 2021 -** Hansol Lee
- **Fall 2021 -** Jay Bell, James Grace

Department

A. Lynn Anderson Award for Research Excellence
Kyle Spielvogel, Katherine Lazenby

UNDERGRADUATE

- **Donald J. Burton and Margaret A. Burton Scholarship**
  Nicholas Dahlen
- **E. David Cater Scholarship**
  Jennifer Lane-Murcia
- **Russell K. Simms Scholarship**
  Tyler Sullivan, Emerson Tran Lam
- **Kenneth Sando Scholarship Award**
  Ryan Van Daele

Chemistry Alumni Awards

- **Senior Chemistry Alumni Award -** Emily Carroll
- **Junior Chemistry Alumni Award -** Darrell Smith
- **Sophomore Chemistry Alumni Award -** Madelyn Daley
- **CRC Freshman Chemistry Award -** Dillon Geng
- **ACS Organic Award -** Darrell Smith
- **ACS Division of Inorganic Chemistry Award -** Haley Lightfoot
- **Analytical Chemistry Award -** Ryan Van Daele
- **ACS Division of Physical Chemistry Award -** Laura Weiler
- **Merck Index Award -** Ana Rodriguez
- **American Institute of Chemists Award -** Emily Carroll

2020

GRADUATE

Outside

NSF Graduate Research Fellowship Program Competition (Honorable Mention) - Hayley Petras

Paul R. Sharp Award for Outstanding Oral Presentation in Inorganic Chemistry, 2019 Midwest ACS Award -
Gonzalo Campillo-Alvarado

Institute of Advanced Science and Technology in Nayoga Japan -
Javier Luna

University

Ballard and Seashore Fellowship

- **Spring 2020 -** Nicholas Lentini, Elias Hasenecz, Md. Robiul Islam
- **Fall 2020 -** Hansol Lee, Javier Luna, Mahboubeh Varmazyad

Graduate College Post-Comprehensive Research Award

- **Spring 2020 -** Chathuri Kaluarachchi, Lauren Lambach, Tina Mihm, Evan Schroeder
- **Fall 2020 -** Jessica DeYoung, Dmytro Kravchuk, Changan Li, Arjun Paudel

CLAS Dissertation Writing Fellowship - Jennifer Bjorklund

Graduate College Summer Fellowship - Janaka Abeysinghe, Kasun Dadallagei, Jalen Dickson, James Earl, Grant Forsythe, Christian Haas, Rayford Harrison, Lucas Howell, Chathuri Kaluarachchi, Sajeewani Kumarage, Lauren Lambach, Changan Li, Kathryn Mauger-Sonnek, Ramin Ordikhani Seyedlar, Arjun Paudel, Kevin Robben, Soe Tun

Council on Teaching Outstanding Teaching Award -
Lucas Howell, Nicholas Luedtke, Soe Tun

Graduate Diversity Fellowship

- **Fall 2020 -** Johnathan Culpepper, Alexis Ellis, Alisa Fairweather, Nyema Harmon, Diamond Jones

Department

A. Lynn Anderson Award for Research Excellence -
Hansol Lee, Gonzalo Campillo-Alvarado

Departmental Teaching Award

- **Team Award: Organic Lab for Non-Majors TAs under the instruction of Mona Maalouf -**
  Manshu Li, Reid Hein, Leah Scharlott, James Earl, Dillon Krotz, Madeline Parker, Changan Li, Scott Gryzbowski, Mahboubeh Varmazyad, Stephen Cullen (Head TA)

Excellence in Teaching Laboratory Safety Awards -
Nimesh Pasan Ranasin Ranasinghe Arachchige (Principles of Chemistry II), Scott Grzybowski (Organic Chemistry Laboratory), Manshu Li (Organic Chemistry Laboratory), Joshua Zgrabik (Principles of Chemistry I)

UNDERGRADUATE

- **Donald J. Burton and Margaret A. Burton Scholarship -**
  Emily Carroll
- **E. David Cater Scholarship -** Ryan Benson
- **Russell K. Simms Scholarship -** Elizabeth Keene, Lillian Jones

Chemistry Alumni Awards

- **Senior Chemistry Alumni Award -** Alissia Milani
- **Junior Chemistry Alumni Award -** Hannah Sunderman
- **CRC Freshman Chemistry Award -** Maddie Rhomberg
- **ACS Organic Award -** Elizabeth Keene
- **ACS Division of Inorganic Chemistry Award -** Francesca Eckstrom
- **Analytical Chemistry Award -** Alissia Milani
- **ACS Division of Physical Chemistry Award -** Rachel Harder
- **Merck Index Award -** Ryan Van Daele

Jennifer Bjorklund receives CLAS Dissertation Writing Fellowship

March 20, 2020

Jennifer Bjorklund is one of just 12 CLAS graduate students to receive a CLAS Dissertation Writing Fellowships. CLAS Dissertation Writing Fellowship provide recipients with a fellowship of $13,750 to support work on the final stages of their dissertations. Jennifer is a member of the Mason Research Group.

Three Chemistry Graduate Students named 2020 Outstanding Teaching Assistant Award recipients

April 30, 2020

Congratulations to Lucas Howell, of the Friestad Group, Nicholas Luedtke, of the Cheatum Group, and Soe Tun, of the Pigge Group. They have been recognized for their efforts as teaching assistants in Chemistry and Biochemistry.

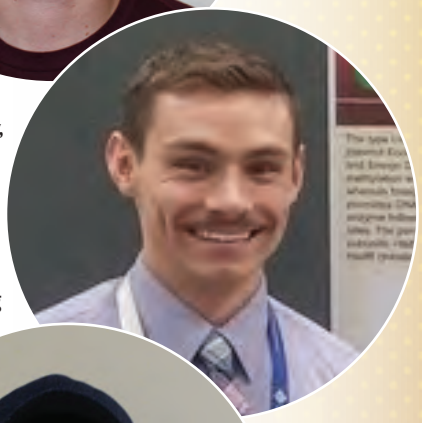
The University of Iowa Council on Teaching named 30 teaching assistants as recipients of the 2020 Outstanding Teaching Assistant Award. These awards have been given annually since 1988 to a select group of graduate teaching assistants who have effectively promoted learning and creativity both inside and outside the classroom while demonstrating enthusiasm and dedication to student success.

"Recognizing and rewarding teaching excellence is so important, and I could not be prouder to recognize these outstanding teaching assistants," said Montserrat Fuentes, executive vice president and provost. "While I am very disappointed that our current situation prevents me from thanking them in person, I want each of them to know how grateful I am for their commitment and generosity toward their students, for their hard work, and for showing such true Hawkeye spirit. They lift up our community and deserve our praise."

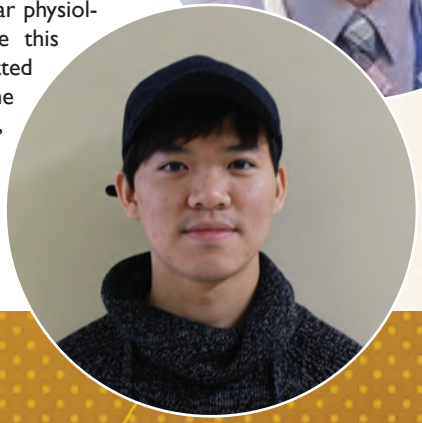
This year's recipients are teaching assistants who taught for at least one semester during the spring, summer, or fall of 2019. Nominations for the awards were sought from undergraduate students, faculty, colleagues, departmental executive officers, and deans. Each awardee receives a certificate as well as $1,000.

"The importance of good teachers cannot be understated," said Thomas Schmidt, chair of the Council on Teaching and professor of molecular physiology and biophysics. "Like this institution, I am committed to giving our students the best education possible, and so I am proud to recognize these dedicated and talented teaching assistants who show us what our best can be."

Lucas Howell of the Friestad Group



Nicholas Luedtke of the Cheatum Group



Soe Tun of the Pigge Group