

ALUMNI NEWSLETTER

CU DENVER CHEMISTRY DEPARTMENT | Fall 2021

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A WORD FROM THE CHAIR

BY SCOTT REED

This past summer, I took on the responsibility of being the Chair of the Department of Chemistry. The department has been under the leadership of Professor Haobin Wang since 2014 and we are all thankful for his many years of service. Professor Wang will return to his role as a faculty member and looks forward to dedicating more time to his research. I am especially grateful that Professor Wang stayed on as chair right as the pandemic made many things very challenging. It is worth noting some of the advances to the department that occurred during Professor Wang's time as Chair. The department added a Biochemistry major, expanded a 4+1 program, and added three disciplinary tracks to the MS program. Furthermore, the department is at the highest level of research in its history in terms of publications and research grants.

Despite the many challenges that the pandemic brought with it, the department continues to prosper. For many months labs were fully closed to research students and teaching labs were greatly restricted in student capacity. Through the tremendous efforts of Vanessa Fishback, Cilla Burrows, Nicole Shoup, Catherine Rathbun, and Pamela Nagafuji we were able to keep in-person Chemistry labs active throughout the pandemic. This ensured that students still had the hands-on experiences that are critical to learning Chemistry. This also minimized disruption to the process of re-populating research labs with properly trained students as restrictions have eased in recent months.

A Word From the Chair (cont.)



While the department succeeded in pivoting toward working remotely without a large decrease in activity one critical area did suffer greatly. Training new students to become research scientists, the most important thing that we do, became nearly impossible for a time. Restrictions prevented bringing in new students for one-on-one training and this meant many labs were down to bare bones. Coming back from that downturn has been challenging. Prof. Jung-Jae Lee received a grant from the College this past summer to help the department recover from this downturn by creating a bootcamp for training new students in research methods. The graduates from this program have been very successful in finding positions in research labs. We are exploring ways to

continue running summer bootcamps for new research students in future years.

More support is needed to bring student research back to full capacity. Through donations of internal funds from the College, the Department, and from the personal accounts of 8 faculty members it was possible to put together a \$30,000 fund to bring new students into research. This as-yet unnamed scholarship fund has been set up as a one-time endeavor, but we would love to expand it to future years. Please consider donating to support the return of students to the lab and our efforts to bring more new students into research that otherwise would not have that opportunity.

https://giving.cu.edu/fund-search?field_campuses=All&field_fund_interests=All&field_fund_type=All&fund_search_term=0321058



Research has also prospered despite the many obstacles the pandemic presented. Of particular note, Associate Professor Xiaojun Ren was awarded an NIH R01 grant. This is the first time a faculty member in Chemistry has received this prestigious award. The grant provides \$840,000 to cover research in Dr. Ren's lab for 5 years. Such a large grant is a recognition of the importance of Dr. Ren's work in the field of epigenetics. This brings the department to a total of 7 NIH grants. Considering that 10 years ago not a single NIH grant had been awarded to the department, this is a truly outstanding rate of growth in funded research activity.

Among the many other grants received by faculty in the department another recent one is particularly noteworthy. Associate Professor of Chemistry, Marino Resendiz, was awarded a Henry Dreyfus Teacher-Scholar Award for 2021. These awards, from the Camille and Henry Dreyfus Foundation, support the research and teaching careers of talented young faculty in the chemical sciences at undergraduate institutions. The program provides discretionary funding to faculty at an early stage in their careers and the award is based on

accomplishment in scholarly research with undergraduates as well as a compelling commitment to teaching. Professor Resendiz received this award for his grant, "Structure-Function Relationships of Chemically Modified RNA: The Quest to Retain Students in Chemistry." Professor Resendiz joins Professors Lin and Knight as the third faculty member in the Department of Chemistry to receive a Henry Dreyfus Teacher-Scholar Award. This is a testament to the high standards of research, teaching, and student mentoring in the department.

Faculty and students continue to publish their research at a high rate and in top-notch journals. One noteworthy publication came from Associate Professor Xiaojun Ren's research lab and included multiple students and faculty from the department. The paper, "Nuclear condensates of the Polycomb protein chromobox 2 (CBX2) assemble through phase separation," was published in *The Journal of Biological Chemistry* (JBC), the flagship journal of the American Society for Biochemistry and Molecular Biology. JBC recently collected the 46 most significant research papers published during their history and Dr. Ren's paper was included in this collection. Many other papers on that list were seminal works by scientists that went on to receive Nobel prizes for the work described in their JBC papers including Profs. Kornberg, Tsien, and Sancar.

Another critical recent change to the University is the recognition of its role in serving minority students. Being named a Hispanic Serving Institution (HSI) and an emerging Asian American and Native American Pacific Islander-Serving Institution (AANAPISI) elevates the visibility of the University and opens doors to new funding programs. Most importantly it is a recognition of the important role that a diverse group of students plays in the mission of the University. The Department has a strong track record of including students from underrepresented groups in research and recently had a number of faculty participate in the Inclusive Pedagogy Academy, a semester long professional development opportunity that focuses on how instructors can reduce barriers to success for students in their classes. In recognition of her efforts to incorporate inclusive pedagogy into her teaching practice, Clinical Track Associate Professor, Marta Maroń has been invited to participate in the leadership track of the Student Experience Project and to act as a liaison to other member of the department looking to improve their courses.

Last year we welcomed a new member to the faculty, Assistant Professor Woonghee Lee who adds to our growing strength in computational research (more information below). In the past year we have also seen notable retirements from the department. Clinical Track Associate Professor Margaret (Peggy) Bruehl retired at the beginning of 2021. Among many other courses, Professor Bruehl developed and taught the Honors General Chemistry Lab and Lecture, contributing to the unique experiences we provide to students at the University.

Finally, as described below, the longest serving member of the department, Professor Robert Damrauer has retired. His impact on the institution is unparalleled and his absence will be felt by all of us. Look to our website for news of an event in Spring 2022 to celebrate Prof Damrauer's many contributions to the Department and the University.

Scott Reed



Chemistry Professors and Student Collaborate to Innovate Information Literacy Education

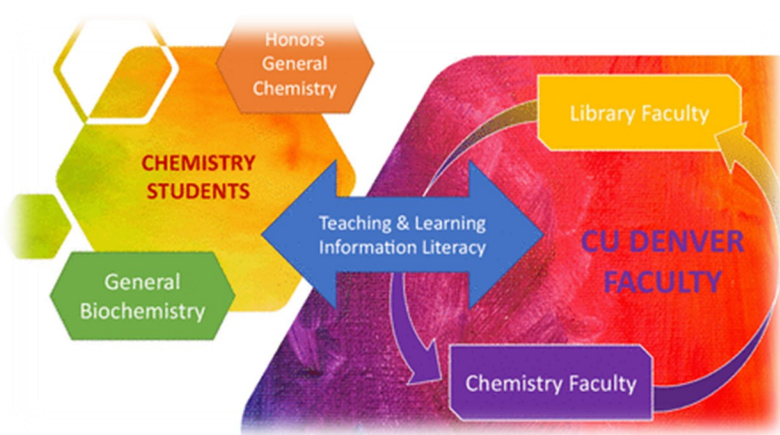
CU Denver Chemistry Professors Margaret Bruehl and Jefferson Knight, in collaboration with student Skylar Budd (BS Biochemistry 2020) and librarian Denise Pan, have recently published two papers in the prestigious *Journal of Chemical Education* that detail their innovations in information literacy education. Information literacy can be defined as the ability to find, understand, and use information from various sources. In the sciences, the crucial information sources are research articles.

Finding, reading, and critically assessing research articles are important career skills for scientists and medical professionals, and the amount of information available in the scientific literature is expanding at an ever-increasing pace. Therefore, it is important for university science courses to teach the information literacy skills that students need to be successful. Dr. Bruehl's and Dr. Knight's contributions to teaching these skills are highlighted in these two recent articles.

The first paper, titled "A Paired Set of Biochemistry Writing Assignments Combining Core Threshold Concepts, Information Literacy, and Real-World Applications," describes assignments that Dr. Knight developed for his General Biochemistry I and II courses over the past 12 years. Other faculty in the department have also adapted these assignments for their General Biochemistry courses. Alumni who took these classes may remember the projects, in which students work in groups to read and assimilate information from the scientific literature in order to prepare a mini-review article and oral presentation on a cell signaling pathway, genetic metabolic disorder, or biotechnology application of their choosing. The peer reviewers of this article especially appreciated the viewpoint of the student coauthor Skylar Budd, who had completed the cell signaling project in Dr. Knight's class.

The second paper, titled "Tracking Information Literacy in Science Students: A Longitudinal Case Study of Skill Retention from General Chemistry to Biochemistry," tested the hypothesis that students would do better on Dr. Knight's assignments if they had had prior training in information literacy – specifically, training that Dr. Bruehl provided in her Honors General Chemistry Lab courses. The results showed that Dr. Bruehl's former students did perform slightly better on Dr. Knight's assignments, but only in the first semester. By the second semester, the performance evened out, indicating that one semester of prior information literacy training (in Honors Gen Chem or Biochem 1) is enough to get everyone up to the same level.

The articles are currently available on the ACS Publications website and will become publicly accessible one year after the publication date. Until then, they can be freely accessed through the Auraria Library, by using your ACS member benefits, or by contacting Dr. Knight directly. <https://doi.org/10.1021/acs.jchemed.1c00115> and <https://doi.org/10.1021/acs.jchemed.1c00114>



Welcoming New Faculty Professor Woonghee Lee

Prof. Woonghee Lee joined the department in August of 2020, moving from the National Magnetic Resonance Facility at Madison (NRMFAM), at the University of Wisconsin-Madison. He graduated from Yonsei University (one of SKY universities in South Korea) with B.S. and M.S degrees in Biochemistry. He received a PhD in Biochemistry from the University of Wisconsin for research on biomolecular NMR spectroscopy and human rhinovirus C with Professor John Markley. He then accepted a staff scientist position at NRMFAM after working two years as a postdoctoral fellow under the NIH P41 center grant.

His research accomplishments are well-acknowledged in his field- multidimensional NMR for biomolecular research. He has been the major developer of vital NMR software packages, which are globally popular. Using his experience as a professional geographical information system (GIS) programmer, he has set a standard in a full automation and visualization system complete with the creation of algorithms, visual tools and dashboards, databases, web services, YouTube video tutorials, and more.

His group at CU Denver (<https://poky.clas.ucdenver.edu/wlee-group>) focuses on two broad areas: computational development on the POKY suite and its extensions with Dr. Mehdi Rahimi, a postdoc researcher in the Lee group, and structural biochemistry on infectious diseases using POKY with Dr. Estefania Lopez, a prospective postdoc researcher. POKY is the modern automated/integrated software suite for multidimensional NMR and 3D structure calculation with artificial intelligence and machine learning (AI/ML) technologies (<https://poky.clas.ucdenver.edu>). Using POKY, the Lee group characterizes structures and functions of viral proteins (e.g. rhinovirus and coronavirus) and their relationship.

Outside the lab, he enjoys hiking. During weekends, he explores trails with his wife Jenna near his Broomfield home. He also enjoys playing tennis. He was a captain of the Yonsei University tennis team (1999-2000) and competes locally in the NTRP 4.5 division.

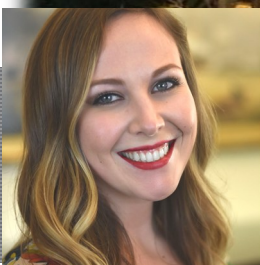
2020-2021 Department Awards Recipients



**ROBERT DAMRAUER
SCHOLARSHIP**
Jae-Hwan Lim



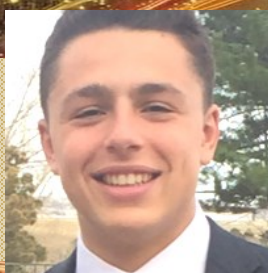
**ROBERT DAMRAUER
SCHOLARSHIP**
Filipa Monteiro



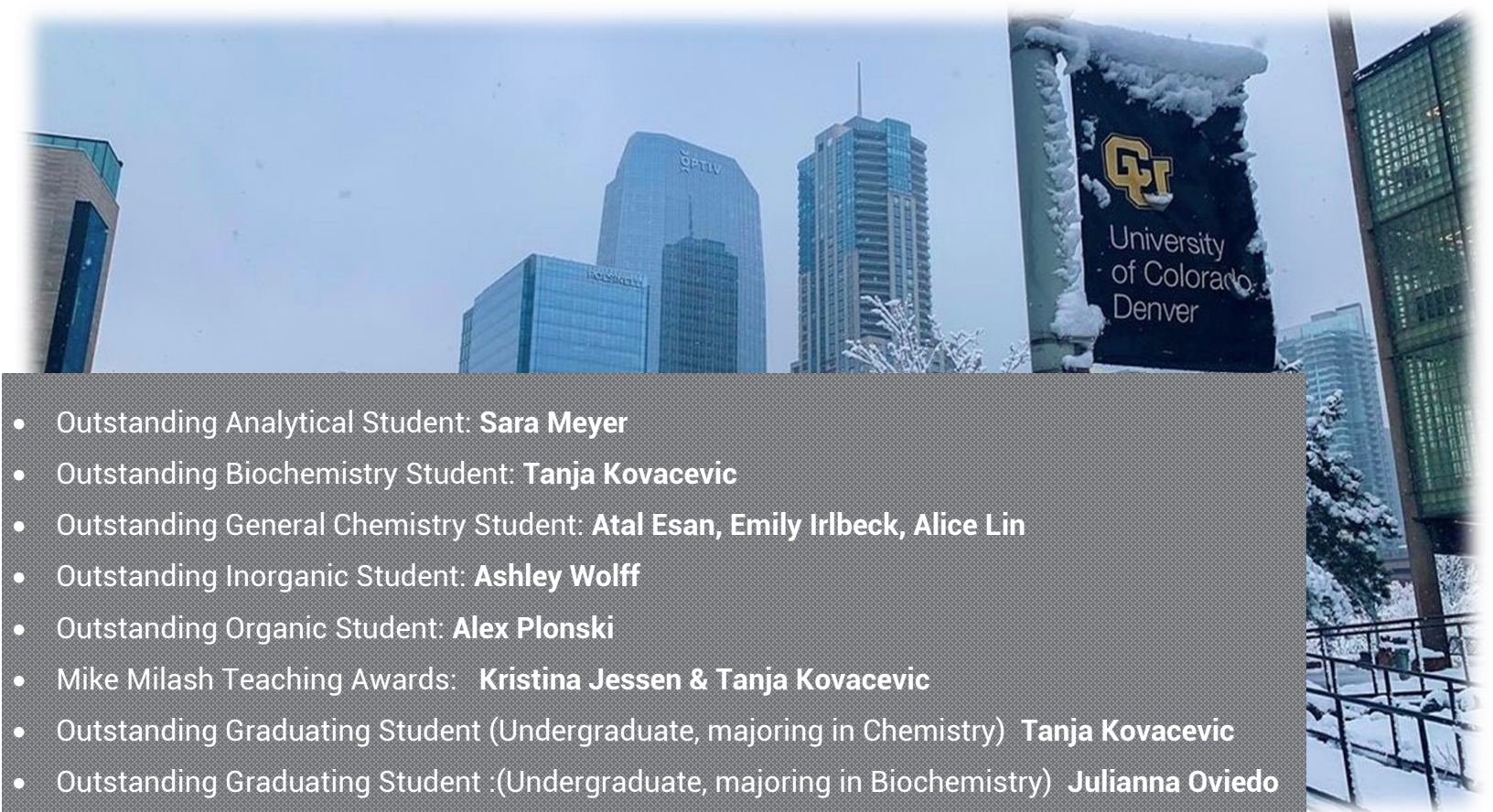
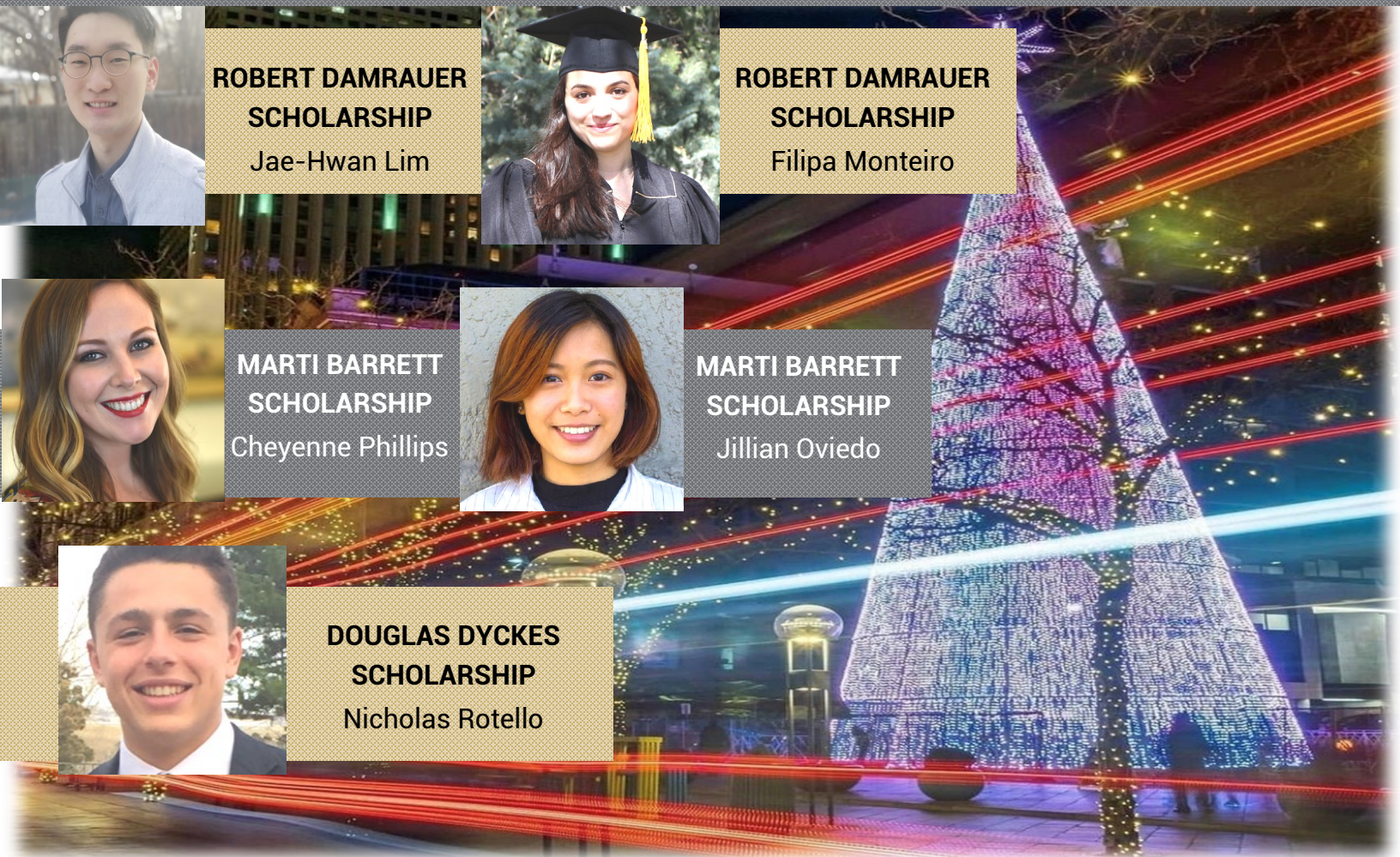
**MARTI BARRETT
SCHOLARSHIP**
Cheyenne Phillips



**MARTI BARRETT
SCHOLARSHIP**
Jillian Oviedo



**DOUGLAS DYCKES
SCHOLARSHIP**
Nicholas Rotello



- Outstanding Analytical Student: **Sara Meyer**
- Outstanding Biochemistry Student: **Tanja Kovacevic**
- Outstanding General Chemistry Student: **Atal Esan, Emily Irlbeck, Alice Lin**
- Outstanding Inorganic Student: **Ashley Wolff**
- Outstanding Organic Student: **Alex Plonski**
- Mike Milash Teaching Awards: **Kristina Jessen & Tanja Kovacevic**
- Outstanding Graduating Student (Undergraduate, majoring in Chemistry) **Tanja Kovacevic**
- Outstanding Graduating Student :(Undergraduate, majoring in Biochemistry) **Julianna Oviedo**
- Outstanding Graduate Student: **Selina Vong**



Margaret Bruehl Retires; Named Associate Professor Emerita

After 12+ years of teaching at CU Denver, Dr. Margaret “Peggy” Bruehl retired from the Chemistry department in February 2021. Dr. Bruehl earned her B.S. in Chemistry from DePaul University and her Ph.D. in Theoretical Physical Chemistry from Northwestern University. She joined the CU Denver

Chemistry department in 2008 and reached the rank of Clinical Teaching Track (CTT) Associate Professor in 2015. Dr. Bruehl taught Environmental Chemistry, General Chemistry, Honors General Chemistry, Foundations of General Chemistry, Consumer Chemistry, and a University Honors and Leadership course called Scientific Thinking. She helped to develop the Honors General Chemistry sequence and the General Chemistry Aptitude Test (GCAT) for incoming General Chemistry students, and she was among the first faculty on campus to include Learning Assistants in her courses. Dr. Bruehl innovated the inclusion of information literacy instruction in her courses and those of others. This work led to the publication of several scholarly articles in professional journals including the *Journal of Chemical Education* and the *Journal of Academic Librarianship*. Finally, Dr. Bruehl won the CU Denver campus-wide Award for Excellence in Teaching in 2017.

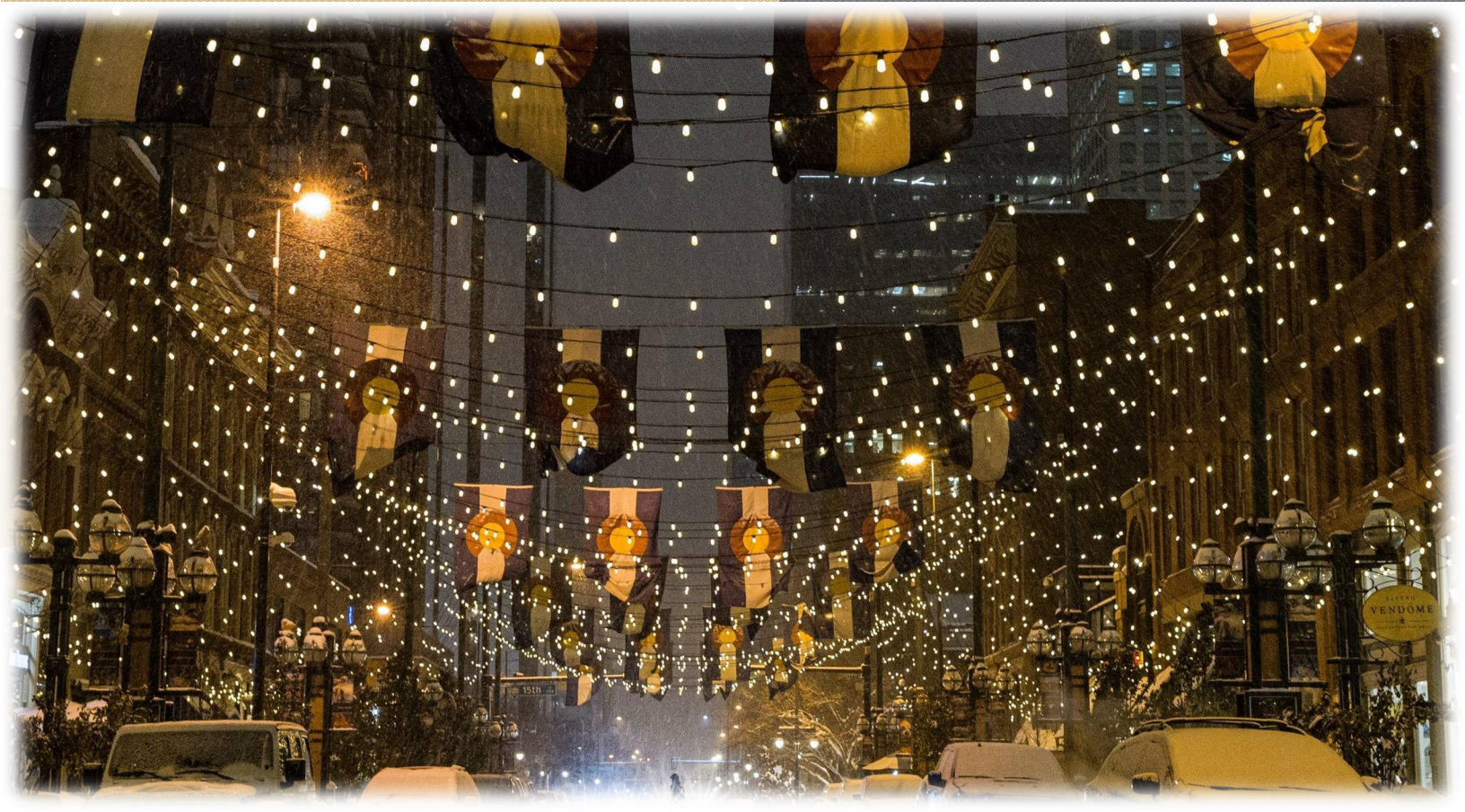
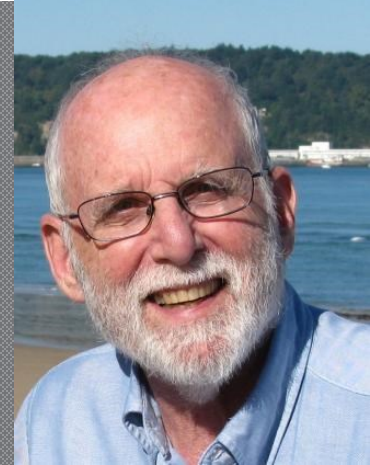
Following her retirement, Dr. Bruehl was named Associate Professor CTT Emerita. The Emerita/Emeritus designation is not given lightly but may be awarded to retiring faculty who have served the university with distinction and wish to retain an academic appointment in retirement. The department congratulates Dr. Bruehl on this recognition and is extremely grateful for her many years of excellent teaching, service, and research.

Robert Damrauer Retires

After an illustrious career of over 50 years, Professor Robert (Bob) Damrauer announced his retirement from the University of Colorado Denver. Dr. Damrauer joined the Chemistry Department at CU Denver in 1968 before either the University or the Department actually existed. CU Denver in those early days was an extension of the Boulder campus and Dr. Damrauer helped the “Denver Center” grow into the premier public urban research university it is today.

Dr. Damrauer’s love of chemistry—both teaching and research—was fostered by his uncle, a chemist, father-figure, and mentor as he grew up. He earned his B.S. degree from the University of Michigan and his Ph.D. from the Massachusetts Institute of Technology. Starting in an austere laboratory with no equipment, he established a vibrant research program at CU Denver, collaborating with colleagues at the Boulder campus and mentoring numerous undergraduate and graduate students as well as post-doctorate fellows. His experimental work began with the study of organo-silicon compounds, extended this study into experimenting with similar compounds in the gas phase, and ultimately morphed into explorations in the ever-expanding area of computational chemistry.

Professor Damrauer is passionate about teaching. His thoughtful approach to teaching, engaging students in learning, and fostering burgeoning researchers made him a popular professor and an invaluable colleague. Among his many significant honors and awards in teaching and research, he has also made a significant contribution to the University in the area of faculty development. He worked at the Department, College and University levels of Promotion and Tenure and headed the Office of Research Services. He founded the YUMPS (Young Upwardly Mobile Professors) as a way to mentor new faculty, help them navigate the complex path to tenure and promotion, and be an advocate for their professional advancement.



Recent Chemistry Faculty Publications

- Joani Mato, Adam W. Duster, **Emilie B. Guidez**, and **Hai Lin** Adaptive-Partitioning Multilayer Dynamics Simulations: 1. On-the-Fly Switch between Two Quantum Levels of Theory *Journal of Chemical Theory and Computation* 2021 17, 5456-5465.
- Aml A. Alnaas, Abena Watson-Siriboe, Sherleen Tran, Mikias Negussie, Jack A. Henderson, J. Ryan Osterberg, Nara L. Chon, Beckston M. Harrott, Julianna Oviedo, Tatyana Lyakhova, Cole Michel, Nichole Reisdorph, Richard Reisdorph, Colin T. Shearn, **Hai Lin**, **Jefferson D. Knight**, Multivalent lipid targeting by the calcium-independent C2A domain of synaptotagmin-like protein 4/granuphilin, *Journal of Biological Chemistry* 2021 296, 100159.
- Liliya Vugmeyster**, Dan Fai Au, Matthew C Smith, Dmitry Ostrovsky Comparative Hydrophobic Core Dynamics between Wild-type Amyloid- β Fibrils, Glutamate-3 Truncation, and Serine-8 Phosphorylation *ChemPhysChem*, 2022 23, e202100709.
- Peng Xu, Tosaporn Sattasathuchana, **Emilie Guidez**, Simon P. Webb, Kilinoelani Montgomery, Hussna Yasini, Iara F. M. Pedreira, and Mark S. Gordon. Computation of host-guest binding free energies with a new quantum mechanics based mining minima algorithm *Journal of Chemical Physics* 2021 154, 104122.
- Parker J. Nichols, Isaac Falconer, Aaron Griffin, Colin Mant, Robert Hodges, Christopher J. McKnight, Beat Vögeli, **Liliya Vugmeyster** Deuteration of nonexchangeable protons on proteins affects their thermal stability, side-chain dynamics, and hydrophobicity *Protein Science* 2020 29, 1641-1654.
- Liliya Vugmeyster**, Dan Fai Au, Dmitry Ostrovsky, Dillon Ray Lee Rickertsen, and **Scott M. Reed** Dynamics of Serine-8 Side-Chain in Amyloid- β Fibrils and Fluorenylmethoxycarbonyl Serine Amino Acid, Investigated by Solid-State Deuteron NMR *The Journal of Physical Chemistry B* 2020 124, 4723-4731.
- Austin Skinner, Chou-Hsun Yang, Kazuki Hincks, **Haobin Wang**, **Marino J. E. Resendiz** Experimental and theoretical rationalization for the base pairing abilities of inosine, guanosine, adenosine, and their corresponding 8-oxo-7,8-dihydropurine, and 8-bromopurine analogues within A-form duplexes of RNA *Biopolymers*, 2020, 111, e23410.
- Glennon, M. M., Skinner, A., Krutsinger, M., & **Resendiz, M. J.** Translesion synthesis by AMV, HIV, and MMLV reverse transcriptases using RNA templates containing inosine, guanosine, and their 8-oxo-7, 8-dihydropurine derivatives. *PLoS one*, 2020 15, e0235102.
- Nara L. Chon, Adam W. Duster, Baris Aydinoglu, **Hai Lin**, Anion pathways in CLCF fluoride/proton antiporters, *Chemical Physics Letters* 2021 762, 138123.
- Woonghee Lee**, Mehdi Rahimi, Yeongjoon Lee, and Abigail Chiu POKY: a software suite for multidimensional NMR and 3D structure calculation of biomolecules *Bioinformatics* 2021 37, 3041-3042.
- Quantum Mechanical Modeling of the Interactions between Noble Metal (Ag and Au) Nanoclusters and Water with the Effective Fragment Potential Method Anh L. Tran and **Emilie B. Guidez** *ACS Omega* 2020 5, 7446-7455.
- Yi Zhang, Kyle Brown, Yucong Yu, Ziad Ibrahim, Mohamad Zandian, Hongwen Xuan, Steven Ingersoll, Thomas Lee, Christopher C. Ebmeier, Jiuyang Liu, Daniel Panne, Xiaobing Shi, **Xiaojun Ren** and Tatiana G. Kutateladze. Nuclear condensates of p300 formed through the structured catalytic core can act as a storage pool of p300 with reduced HAT activity. *Nature Communications*, 2021 12, 1-15.
- Kyle Brown, Haralambo Andrianakos, Steven Ingersoll, **Xiaojun Ren** Single-molecule imaging of epigenetic complexes in living cells: insights from studies on Polycomb group proteins *Nucleic Acids Research* 2021 49, 6621-6637.
- Samantha Kent, Kyle Brown, Chou-hsun Yang, Njood Alsaihati, Christina Tian, **Haobin Wang**, **Xiaojun Ren**, Phase-Separated Transcriptional Condensates Accelerate Target-Search Process Revealed by Live-Cell Single-Molecule Imaging, *Cell Reports* 2020 33, 108248.
- David G. Schwark, Dr. Margaret A. Schmitt, Wil Biddle, Prof. **John D. Fisk** The Influence of Competing tRNA Abundance on Translation: Quantifying the Efficiency of Sense Codon Reassignment at Rarely Used Codons *Chembiochem* 2020 21, 2274-2286.
- Khang X. Nguyen, Phuc H. Pham, Thao T. Nguyen, Chou-Hsun Yang, Hoai T. B. Pham, Tung T. Nguyen, **Haobin Wang**, and Nam T. S. Phan Trisulfur-Radical-Anion-Triggered C(sp²)-H Amination of Electron-Deficient Alkenes *Organic Letters* 2020 22, 9751-9756.
- Tanja Kovacevic, Austin Skinner, **John D. Fisk**, **Vanessa Fishback**, and **Scott M. Reed** A Semester-Long, Organic Chemistry Laboratory Structured around Unknown Analysis and Resynthesis as a Bridge to Guided-Inquiry *Journal of Chemical Education* 2020 97, 1633-1636.

DEPARTMENT OF CHEMISTRY FACULTY

PRISCILLA BURROW
DAVID ENGELKE
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JOHN FISK
EMILIE GUIDEZ
KYOUNG NAN KIM
DORIS KIMBROUGH

JEFF KNIGHT
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SCOTT REED, CHAIR
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