

UNIVERSITY of WASHINGTON

CHEM LETTER

SUMMER 2020 / VOLUME XXXVIII NO.1

LETTER FROM THE CHAIR

Dear Friend of Chemistry,

I hope that you and your family are healthy and safe. These are challenging times for us all, and the UW and the Department of Chemistry. At the end of week nine of winter quarter, we abruptly changed over to remote instruction. After organizing online final exams, our faculty and staff then had one week to prepare for online instruction in the spring quarter while our campus modified operations and locked buildings. I am pleased to report that our faculty, staff, and TAs have responded very well to these challenges. No classes have been cancelled; even lab courses are being offered remotely.

We are cautiously resuming limited in-person research on campus. Our faculty, graduate students and postdoctoral scholars have been working remotely through April and May. All are anxious to get back in their labs. While most labs were shut down, we did have several groups with COVID-19 related research who continued to work. Daniel Chiu and coworkers are developing sensitive analytical techniques which may help in virus testing; the group of Ashleigh Theberge is working on microfluidic methods for the rapid analysis of viral RNA; Gabriele Varani and colleagues are using NMR spectroscopy to rapidly screen RNA binding molecules as possible drug candidates for a virus treatment.

Our faculty continue to win accolades for their research and teaching. Professor Xiaosong Li received the UW Distinguished Teaching Award. Professor Charlie Campbell received the ACS award for Exceptional Achievements in Catalysis. The ACS award in Electrochemistry was bestowed on Professor Bo Zhang.



MIKE HEINEKEY BECAME EMERITUS PROFESSOR OF CHEMISTRY ON JULY 1, AND WE ARE CONFIDENT THAT HE WILL ENJOY THE COMPARABLY LOWER ADMINISTRATIVE BURDEN OF RETIREMENT.

WE WELCOME PROFESSOR **MUNIRA KHALIL** TO THE CHAIR'S OFFICE AS THE 15TH CHAIR OF UW CHEMISTRY.



Graduate students Casey Bisted (Khalil group) and Madeleine Breshears (Ginger group) received graduate research fellowships from the National Science Foundation. Rachel Huchmala (McCoy group) and Leo Porter-Zasada (Xiao group) received honorable mentions. Graduate students Samantha Phan and Kseniya Shin were named to the Husky 100, along with undergraduates

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PROMOTIONS



CHEMISTRY FACULTY CLIMBING THE RANKS: the part you play in this autumn's promotions

We are pleased to announce the following promotions, effective September 16, 2020:

- 1 Lecturer Lawrence Goldman – promoted to senior lecturer
- 2 Assistant Professor Alshakim Nelson – promoted to associate professor with tenure
- 3 Assistant Professor Joshua Vaughan – promoted to associate professor with tenure
- 4 Associate Professor Brandi Cossairt – promoted to professor
- 5 Associate Professor Gojko Lalic – promoted to professor

Thank you for your support of our faculty! Private support of the Department of Chemistry makes all the difference when we recruit junior faculty to the University of Washington. Aspiring academics have a big choice ahead of them: at which institution would I be happy for the duration of my career? Often, faculty start their careers at the institutions from where they retire. Because of you, our faculty have the confidence and security that we, as a public university, can provide them with the facilities and programs necessary to build robust research groups and carry out their work for decades to come.



THANK YOU

You further support the work of our faculty with your gifts to departmental scholarships and student fellowship funds. The following were awarded in the past year alone:

- Chemistry Graduate Alumni Award, John Andrew Ritchhart, Cossairt group
- Howard J. Ringold Endowed Fellowship, Micaela Homer, Cossairt group
- Rex J. and Ruth C. Robinson Scholarship in Chemistry, Shenwei Wu, Cossairt group
- George H. Hitchings Endowed Scholarship, Anton Taraskin, Lalic group
- Lewis R. and Joan M. Honnen Endowed Fellowship in Chemistry, Evan Long, Lalic group
- Amy Scott and Stephen C. Alley Endowed Fellowship in Chemistry, Austin Shaff, Lalic group
- Mary K. Simeon and Goldie Simeon Read Chemistry Research Award, Brianne King, Lalic group
- Lewis R. and Joan M. Honnen Endowed Fellowship in Chemistry, Christopher Fellin, Nelson group
- Earl W. Davie Endowed Scholarship in Chemistry or Biochemistry, Ethan Vo, Vaughan group
- Rex J. and Ruth C. Robinson Scholarship in Chemistry, Zachariah Fincher, Vaughan group

Your contributions to these funds provide a wide range of support to the students and their research groups, including books, computers, conference travel, moving expenses, stipends, and unrestricted funds which provide much needed flexibility in conducting creative research. Thank you!

Get to know about the research activities you support by visiting these faculty members' research group pages linked to the Department of Chemistry website:

Al Nelson's group:

- Synthesis & Self-Assembly, Additive Manufacturing, Interface with Life Sciences
- On Twitter @NelsonLabUW

Josh Vaughan's group on the development and application of chemical tools for biological imaging

Brandi Cossairt:

- Synthetic inorganic chemistry group focused on building up inorganic nanostructures for targeted applications in light emission, energy harvesting, and catalysis
- On Twitter @brandicossairt

Gojko Lalic's group on the development of practical transition-metal catalyzed transformations that address problems encountered in organic synthesis

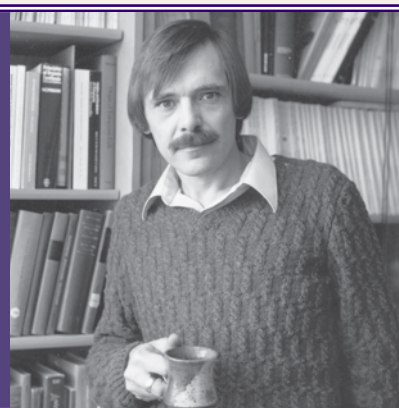
Larry Goldman's work with the Chemistry Education Research Group will be available on the Department's new website going live in September 2020.

Thank you for the discoveries and advances you make possible.

IN MEMORIAM

NIELS H. ANDERSEN PROFESSOR EMERITUS

OCTOBER 9, 1943—DECEMBER 20, 2019



Niels H. Andersen left the world peacefully on December 20, 2019 after a two-year battle with lymphoma. He retained his sharp wit, kindness, and a cheerful, uncomplaining demeanor throughout.

Niels retired from the University of Washington on June 1, 2018 after fifty years of service on the faculty of the Department of Chemistry (without ever taking a sick day!). He was born in Copenhagen, Denmark and immigrated to Minnesota as a child. He obtained a B.A. from the University of Minnesota at age 20 and his Ph.D. in synthetic chemistry from Northwestern University at age 24. Niels conducted postdoctoral work at Harvard University with Nobel Laureate E.J. Corey Niels and joined the faculty of the University of Washington in 1968 as its youngest ever faculty hire.

For fifty years, Niels maintained a research group that published 200 peer-reviewed papers, with later work focused on designing new drugs and proteins. He taught organic chemistry to thousands of undergraduates and was a supportive and beloved mentor to many Ph.D. students who held a special place in his heart.

Niels and his wife Susan Howell traveled the world and made a lot of beautiful music together in 32 years of marriage. Their passion for dulcimer and ukulele led them to innumerable “music camps” and publishing music books and videos.

Niels was frequently seen wearing Hawaiian shirts and Birkenstock sandals. He loved the outdoors, ran several miles almost every morning, and climbed Mount Baker at age 73.

Niels is survived by his beloved wife Susan, children, grandchildren, and his seemingly indestructible 30+-year-old Eastern box turtle Fred.

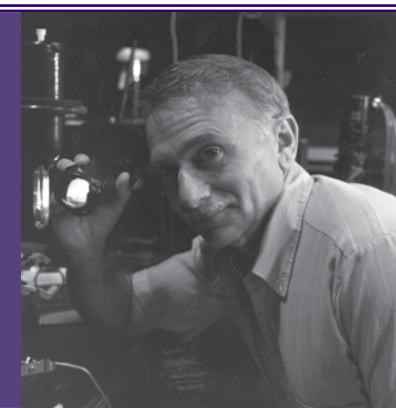
Adapted from the obituary written by Professor Andersen's family.

Photo above by University Photography; photo at left courtesy of Susan Howell.



MARTIN GOUTERMAN PROFESSOR EMERITUS

DECEMBER 26, 1931—FEBRUARY 22, 2020



Martin Gouterman, a beloved professor, mentor, colleague, friend, father, and activist, died on February 22, 2020.

Martin was born in Philadelphia where his parents raised him and his cousin as brothers. Martin graduated from Philadelphia's Central High School in 1949 and earned a bachelor's degree and the Ph.D. in physics from the University of Chicago. In 1958, he started his career as a professor at Harvard University.

In 1966, Martin came to the University of Washington as a professor of chemistry and was named professor emeritus in 1999. Martin mentored more than 30 Ph.D. students, including Nobel Laureate Roald Hoffman; 10 master's students; and was deeply involved with undergraduates, in his research group and in his role as associate chair for undergraduate education. He was beloved for his rare combination of scientific creativity, integrity, personal warmth, and modesty; a former student referred to him as a “professor's professor.”

Martin's extensive research with porphyrin molecules yielded more than 150 widely cited papers. He explained on a quantum mechanical level why grass is green and blood is red. To explain the absorption spectra of porphyrins, he developed the Gouterman Four-Orbital Model. Funded by NASA, he helped invent a pressure-sensitive paint used by Boeing to improve airplane wing design and overall performance. After his retirement, an international symposium was held in his honor in Rome in 2006.

Beginning in the 1960s, Martin worked as an activist with various communities. He worked to end the Vietnam War. He worked with the Kadima Reconstructionist Community and the International

Jewish Peace Union for an end to the 1967 Israeli occupation of the West Bank and Gaza and a just Israeli-Palestinian peace. He was an activist within the gay community and helped found the Dorian Society to promote understanding and tolerance of gay people.

Martin was a music enthusiast who studied piano performance before changing his major to physics. He loved classical and jazz and frequently visited clubs to hear local jazz musicians such as Melody Jones and Ruby Bishop.

In 1983, Martin helped a lesbian couple conceive a son who he met six years later. Martin was a dedicated and loving father and grandfather and was devoted to his large family, which included dozens of cousins. Family members remember him for his brilliance, kindness, and humor.

Adapted from the obituary published in The Seattle Times from March 13-14, 2020.

Photos courtesy of the Department of Chemistry.



THEBERGE Awarded PACKARD FELLOWSHIP

RESEARCH PROBES CHEMICAL SIGNALS CELLS USE TO COMMUNICATE

Story by James Urton, *UW News*

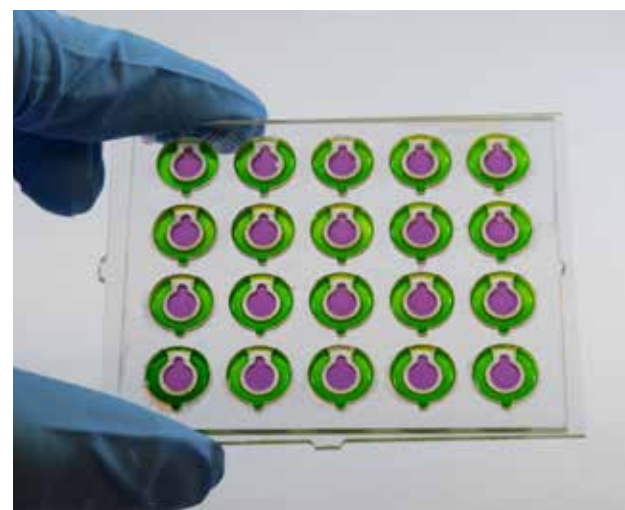
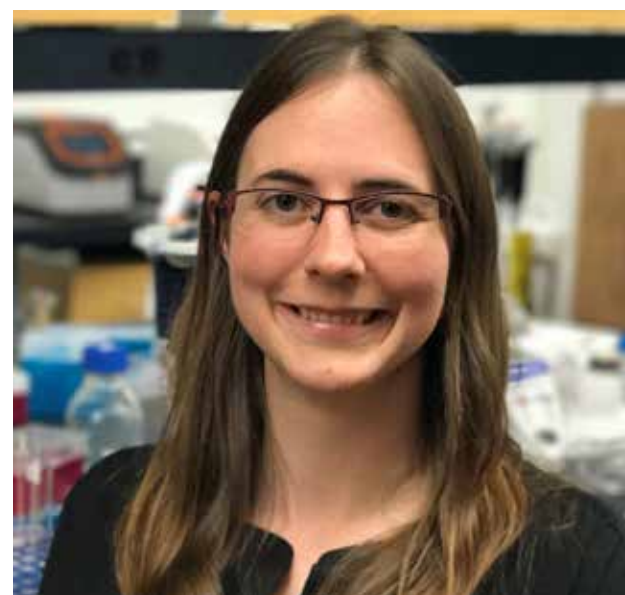
Assistant Professor Ashleigh Theberge was named a 2019 Packard Fellow for Science and Engineering for her research on cell signaling. Every year since 1988, the David and Lucile Packard Foundation has awarded Packard Fellowships in Science and Engineering to early-career scientists to pursue the types of innovative projects that often fall outside the purview of traditional sources of funding, such as research grants from government agencies. As one of 22 fellows for 2019, Theberge will receive \$875,000 over five years.

Theberge's research probes the chemical signals that cells use to communicate with one another. The organization of our bodies, with different types of cells taking on discrete functions, depends on this biochemical language.

"We're alive because our cells can exchange chemical messages in appropriate ways," said Theberge, who is also an affiliate assistant professor of urology at the UW. "All cells — human cells, microbes — utilize chemical signals to deliver information and influence the properties of other cells."

Theberge focuses on the chemical messages released by cells, which diffuse out into the environment — be it a body or a colony of microbes — and are picked up by other groups of cells. To measure these signals and characterize their effects, scientists need precision: experimental systems that will let researchers set up a population of cells, identify the types and precise amounts of chemicals the cells release, how they diffuse through the environment, which chemical messages are picked up by other groups of cells and their effects.

Theberge and her collaborators — which include Erwin Berthier, a UW affiliate assistant professor of chemistry and co-founder of the medical device company Tasso, Inc. — develop and manufacture laboratory tools to make these precise measurements possible. These include microscale plastic and gel-based dividers, which can partition commonly used cell culture plates on the surface of a slide into more complex arrangements of compartments. These allow researchers to grow different populations of cells in close proximity and sample the types of chemical signals that pass between them.



MICROFLUIDIC COCULTURE DEVICE FOR THE STUDY OF CELL SIGNALING.
PHOTO BY TIANZI ZHANG.

"While we pursue our own biological hypotheses, we're also focused on exporting the technologies we've developed to other laboratories," said Theberge. "We really want these tools to be available and used widely."

Depending on the arrangement of compartments, signals can diffuse horizontally between cell populations separated by short walls, through vertical stacks of cells or other arrangements. Theberge and her team design their cell culture devices with the physics of fluidics in mind. They precisely control the position of liquids in their devices via capillary forces — the passive forces that allow fluids to flow.

Theberge has also put these tools to work. She has started more than 20 collaborations since joining the UW faculty in 2016. The tools she and her group have developed are being used to identify cellular signals involved in testis development and male infertility, communication between epithelial and endothelial cells in kidneys and the immune system signals involved in inflammation. Some of these experiments study chemical signals present in tissue samples from patients, including a collaboration with the University of Washington Male Fertility Laboratory.

Her group has also been working on molecular methods to accurately quantify the amount of different types of chemicals that are received by individual cells.

"That will give us information not just on the type of signal reaching a cell, but how signal strength and origin can affect cell communication," said Theberge.

Theberge earned a bachelor's degree in chemistry from Williams College and a doctoral degree in chemistry from the University of Cambridge. Prior to joining the UW faculty, she was a postdoctoral researcher at the University of Wisconsin–Madison. According to the UW Office of Research, Theberge is the 11th faculty member to earn a Packard Fellowship, and the fourth overall from the Department of Chemistry, after Brandi Cossairt, Munira Khalil, and former UW faculty member Younan Xia.

CODY SCHLENKER AMONG LEADERS in applied energy materials

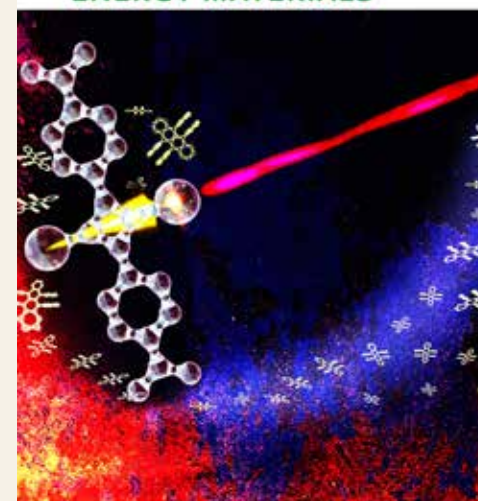
Work from the group of Assistant Professor Cody Schlenker was featured on the front cover of the Young Investigators issue of *ACS Applied Energy Materials* in January 2020. This special Forum Issue showcases research from emerging leaders in applied energy materials.

The following paragraph is an excerpt from the editorial by Gerald J. Meyer, "Young Investigators Advance Energy Applications." This article is made available under the ACS Free to Read License, which permits copying and redistribution of the article for non-commercial scholarly purposes.

The start of a new decade provides an opportunity to consider futuristic sources of energy. Increased industrialization with a world population that is rapidly approaching eight billion people places high demands on existing energy resources. This special Forum Issue of *ACS Applied Energy Materials* features exciting contributions from young investigators who seek to address this demand through the realization of novel materials that hold considerable promise for specific energy applications. These contributions are highlighted below with more detailed accounts available in this issue...

ACS Appl. Energy Mater. **2020**, 3 (1), 1, Publication Date: January 27, 2020, DOI: 10.1021/acsaem.0c00022

ACS APPLIED
ENERGY MATERIALS



Heavy-Atom-Free Red-to-Yellow Photon Upconversion in a Thiosquaraine Composite

Sarah R. Pristash, Kathryn L. Corp, Emily J. Rabe, and Cody W. Schlenker
ACS Appl. Energy Mater. **2020** 3 (1), 19-28
DOI: 10.1021/acsaem.9b01808

Photon upconversion through triplet-triplet annihilation is of interest for diverse applications, notably as a potential means of exceeding the Shockley-Queisser limits in solar cells. In this Young Investigators Forum article, Pristash, Corp, Rabe, and Schlenker present a heavy-atom-free triplet sensitizer based on a thionated squaraine. Using this all-organic sensitizer, they demonstrate red-to-yellow photon upconversion through triplet sensitization of rubrene. The upconversion system is photostable and can operate under filtered broadband solar illumination. This system exhibits upconversion both in solution and in a polymer film. Thionated squaraines provide an exciting new platform for developing heavy-atom-free upconversion systems.

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LETTER FROM THE CHAIR *continued from page 1*

Georges Motchoffo, Irika Sinha and Hugo Ferreira Pontes. Karen Zhang was awarded the Goldwater Scholarship. I invite you to visit our website <http://depts.washington.edu/chem/> to read more about the awards.

Our faculty and students have a wide range of scientific interests, but we maintain a sense of collegiality and community here. Our alumni and friends are a part of it as well, and you have been extremely generous with your support. Our students greatly appreciate the fellowships and scholarships you provide, as well as networking opportunities, and your interest in our research and educational work. Thank you for your support.

This is my last letter to our Chemistry community. As of July 1, my term as chair ended and I am retiring from the University of Washington. My successor, the 15th chair of UW Chemistry, is Professor Munira Khalil. I know that Munira is looking forward to introducing herself to you and I am sure that she would be pleased to hear from you. I invite you to welcome her to the chair's office by sending a note to her at mkhalil@uw.edu.

Sincerely,

D. Michael Heinekey

Professor Emeritus

PUBLISHED BY

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