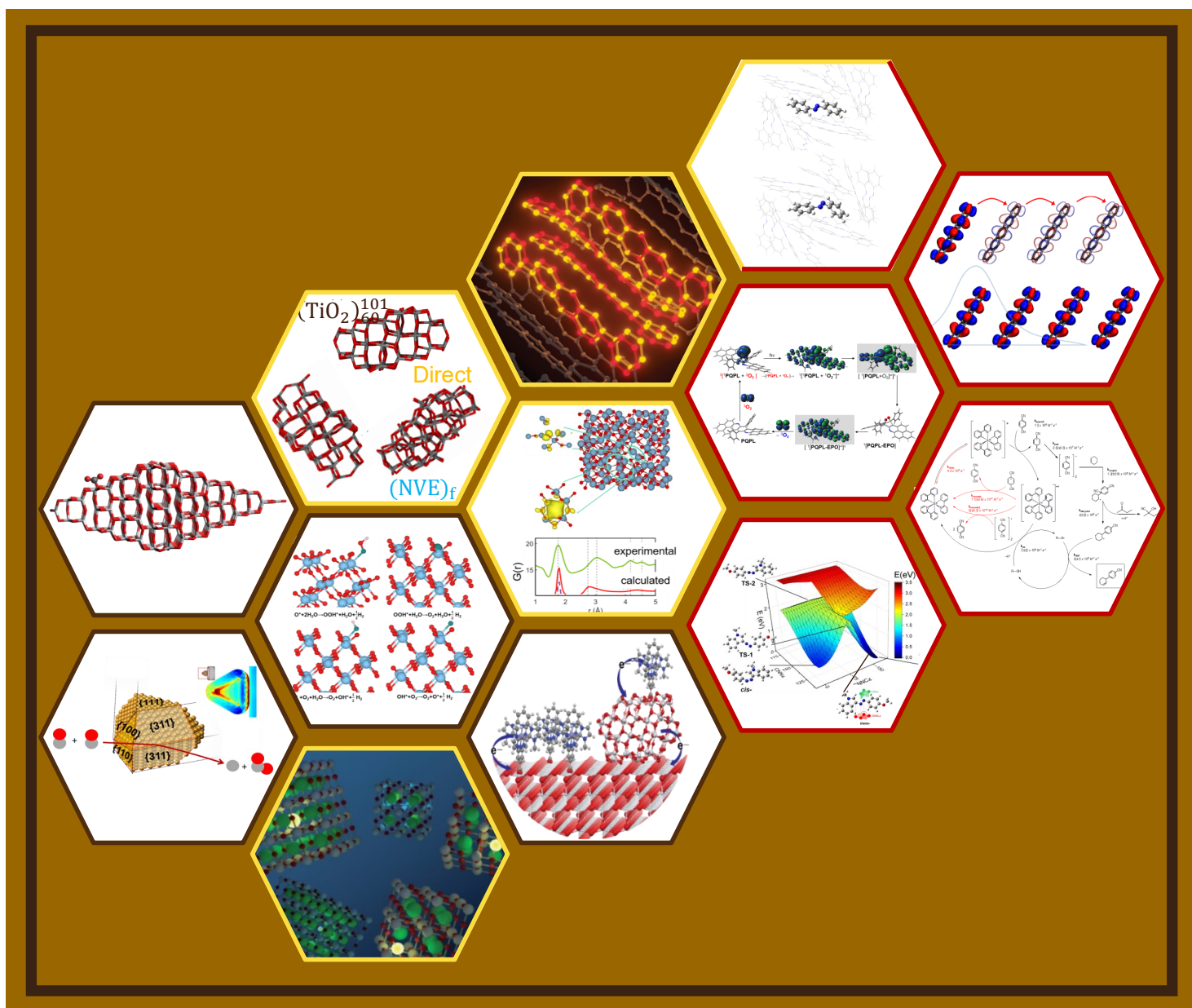


# Mudd IN YOUR EYE

Department of Chemistry • Lehigh University

*“Great importance is given to chemistry as an elementary branch of learning,” — Lehigh Register 1866*



## Welcome Back!

Contributing to the success of the college,  
university, and our students

Greetings from South Bethlehem! The Lehigh Department of Chemistry has had a prosperous and eventful past year. Enrollments in our courses have continued grow over the past few years, as the university has increased the number of overall admissions. During this time, we have also engaged with undergraduate students outside of the classroom and teaching laboratories in a variety of innovative ways: well-attended 5x10 events aimed at enhancing connections between first-year students and Lehigh; an undergraduate poster symposium; and an undergraduate recognition celebration for our chemistry and biochemistry majors. In our graduate program, since moving our fall open house online during the pandemic, we have benefitted from a significant increase in both its attendance (domestic and international) and the number of applications.



In May of 2023, we welcomed Nate Wittenberg to rank of tenured Associate Professor. The faculty and staff recently gathered to congratulate him and to celebrate some of the other departmental accomplishments of the past year. For example, we learned that Assistant Professor Lisa Fredin was chosen as a 2024 Sloan Foundation Research Fellow! (*See Page 3*) These prestigious two-year fellowships recognize “early-career researchers whose creativity, innovation, and research accomplishments make them stand out as the next generation of leaders” (<https://sloan.org/fellowships>). As you’ll see in the newsletter updates, our faculty are continuing to do an outstanding job in both funding and producing impactful research.

And at the end of 2022, Professor Steve Regen closed a chapter in his long and distinguished career and opened a new one as Emeritus Professor. Steve moved to Lehigh in 1985 from Marquette University, and his innovative and productive research program has enhanced the visibility of our department for decades. We appreciate his positive impact and look forward to periodic updates in the years to come.



Department of Chemistry  
Seeley G. Mudd Building  
6 E. Packer Avenue  
Bethlehem, PA 18015  
Phone: (610) 758-3470  
Fax: (610) 758-6536  
<https://chemistry.cas.lehigh.edu>

### Department Chair

Gregory S. Ferguson  
610-758-3462  
[gff03@lehigh.edu](mailto:gff03@lehigh.edu)

### Faculty Coordinator (Newsletter Editor)

Lisa Arechiga  
610-758-3470  
[lia4@lehigh.edu](mailto:lia4@lehigh.edu)

### Academic Coordinator

Kerry Livermore  
610-758-3471  
[kjl212@lehigh.edu](mailto:kjl212@lehigh.edu)

**ON THE COVER:** Ongoing projects in Prof. Fredin's Group. Computational Materials Chemistry ranging from disorder in materials (yellow), interfacial chemistry (brown), and photochemistry (red).

## In This Issue

2 Chair's Update

3 Faculty News

11 New Faculty

12 Alumni News

16 Student News



## Stay in Touch

Lehigh Chemistry alums can be found all across the globe-- using their degrees to address issues that impact the world community.

Your Lehigh Department of Chemistry would like to stay in touch. We love hearing about where your degree has taken you.! Send your stories -- professional or personal -- to [inchem@lehigh.edu](mailto:inchem@lehigh.edu).



## Lehigh Chemist receives 2024 Alfred P. Sloan Research Fellowship

Lisa Fredin joins 126 outstanding early-career researchers honored across seven fields.

Lisa Fredin, an assistant professor of chemistry, has been awarded a prestigious 2024 Sloan Research Fellowship from the Alfred P. Sloan Foundation.

The two-year, \$75,000 fellowships honor exceptional U.S. and Canadian researchers whose creativity, innovation and research accomplishments make them stand out as the next generation of leaders. The awards honor scholars in seven fields: chemistry, computer science, Earth system science, economics, mathematics, neuroscience and physics.



"The Sloan Fellowship is given to the most promising early career scholars in science and the award is clear recognition of the impact and importance of Lisa's work," said Robert Flowers, Herbert J. and Ann L. Siegel Dean of the College of Arts and Sciences. "Since joining Lehigh, Lisa has been a creative scholar, a highly engaged member of the faculty, and an exceptional mentor to our students. We are fortunate to have her as a member of our faculty."

Fredin is among 126 early career researchers chosen this year from 53 institutions. She is a quantum chemist whose research explores the chemistry of surfaces, nanostructures, and disordered systems to better understand the fundamental properties of emerging materials. Fredin builds models of complex materials, which are a mixture of local chemical effects and extended material electronic structures. These computations are at the edge of the current computing power and address important problems in solar energy, molecular switching and sensing, as well as pushing computational science. Fredin's team develops models at the interface of experiment and theory to predict the fundamental electronic properties of materials as they are actually measured by experiments.

Fredin earned her B.S. in chemistry, biochemistry and applied mathematics with a minor in computer science from the University of Texas at Austin. She completed a joint computational-experimental Ph.D. at Northwestern University, synthesizing molecules, measuring material properties, and modeling devices of hybrid organic-inorganic dielectrics.

After a postdoctoral associateship at Lund University in Sweden, where she modeled the photochemistry of transition-metal complexes for light-harvesting, Fredin worked as a National Research Council research associate developing new computational tools that reduce the cost of screening at the National Institute of Standards and Technology in Gaithersburg, Maryland.

Since starting at Lehigh in 2018, her group has published 20 journal articles, building a portfolio that address global energy and climate change problems. Fredin's current portfolio is broad and can be combined to tackle some of the hardest computational problems of the 20th century.

The Sloan Research Fellowship is one of the most highly regarded awards available to young researchers, in part because so many past Fellows have gone on to become distinguished figures in science, including 57 Fellows who have received a Nobel Prize, to date.

"Sloan Research Fellowships are extraordinarily competitive awards involving the nominations of the most inventive and impactful early-career scientists across the U.S. and Canada," said Adam F. Falk, president of the Alfred P. Sloan Foundation. "We look forward to seeing how Fellows take leading roles shaping the research

*Continued on page 5*



Congratulations to Chemistry Department faculty member Nathan Wittenberg, who was awarded tenure and promoted to the rank of associate professor at the end of the 2022-23 academic year. Nate has been a professor in our department since 2016.

Nate Wittenberg's lab specializes in bioanalytical chemistry, using biosensors, microscopy, microfluidics, and surface-patterning techniques to investigate interactions between biomolecules, in particular lipids and proteins. Research topics include the analysis of lipid-protein interactions that govern cell-cell interactions in the nervous system, the implications of lipid oxidation on biomembrane structure and properties, and the development of platforms for the analysis of individual membrane-bound biological particles. He currently has four graduate and four undergraduate students in his group.

Prior to starting at Lehigh, Nate earned his Bachelor's degree in Chemistry at the University of Minnesota and his PhD in Chemistry at Penn State University. He did postdoctoral work at the University of Edinburgh, Scotland, the University of Minnesota, and the Mayo Clinic in Minnesota.

When he's not in the lab or teaching, Nate enjoys fly fishing, running, and hanging out with his family.

---



### Greg Ferguson

Zahed Ghelichkhah graduated with his Ph.D. In August, after publishing his second paper in *Electrochimica Acta*.

"Anion-Catalyzed Active Dissolution Model for the Electrochemical Adsorption of Bisulfate, Sulfate, and Oxygen on Gold in H<sub>2</sub>SO<sub>4</sub> Solution," Z. Ghelichkhah, R. Srinivasan, D.D. Macdonald, G.S. Ferguson, *Electrochimica Acta* **2023**, 439, 141515; <https://doi.org/10.1016/j.electacta.2022.141515>.

And Zahed's third paper has just been accepted for publication. Fatema Amin has also been busy, after returning from a fall-semester internship at Lam Research Corporation. She has written a manuscript describing her work aimed at using self-assembled monolayers on gold to tune the surface chemistry of substrates for the next phase of our study of the key experimental parameters that affect roll-off angles. Kiran Khadka's paper in that area appeared in *Langmuir* early in 2022.



### Oriana Fisher

The Fisher group has had a productive year. We recently received a R35 (MIRA) grant from the NIH to support our research on bacterial transcriptional regulation over the course of the next five years.

During the past year, we welcomed new lab members and said goodbye to others. Postdoctoral fellow Dr. Yuri Silva joined the group in December, and over the summer we hosted two Daniela Dallo from Lycoming College and Samuel Geathers from Cabrini College) through our NSF-funded BOUNDS (Biochemistry Opportunities for Undergraduate Scientists) program. This fall, we also welcomed two new undergraduates: Hailey Price and Christopher Jennings. In May, we said good-bye to four talented undergraduates (David Han, Mu Hu, Emerald Kan, and Dia Zheng) who are all off to exciting new adventures working at EPIC, starting graduate studies at McGill University, working as a research technician at Baylor College of Medicine, and joining the NIH's post-baccalaureate program, respectively.

We have also had opportunities to present our research at several conferences and meetings. Dia and Yuri both

## Oriana Fisher (Cont'd)

presented posters at the annual American Crystallographic Association Meeting in Baltimore, Maryland. Oriana gave a talk and Jess presented a poster (and a 2 minute flash talk) at the Cell Biology of Metals Gordon Research Conference in Mount Snow Vermont. Oriana has also given several other seminars and presentations on the lab's research, including at Barnard College, Franklin & Marshall College, Muhlenberg College, and the National Science Foundation.



### Lisa Fredin

The Fredin Group kept busy this year building new computational methods to study static and dynamic disorder in catalytic, photoresponsive, and conductive materials. With funding from the NSF (CMSD-A), we will be working to build new models of photocatalytic reactivity of nanoparticle surfaces for the next three years. We are investing more into Lehigh Research Computing and have obtained a 10 Million SU allocation from NSF ACCESS to tackle large chemistry material projects at the edge of current computing power.

Three undergraduates and one Masters student graduated from the group in May 2023. The current group consists of two graduate students and four undergraduates. In summer 2023, the 3<sup>rd</sup> year of PURE (Photochemistry Undergraduate Research Experience) provided research opportunities for one undergraduate in the Fredin group. Allen Chen (a physics major) is calculating multidimensional potential energy surfaces of azo-dyes in solution and their photoswitching in the solid state. This year the group adopted a code of conduct and has updated the group website to include our group philosophy of professional development.

Prof. Fredin gave two invited talks at Spring 2023 ACS, and was selected for the poster talk at the Photochemistry GRC. In addition, last year Prof. Fredin gave invited seminars at University of Minnesota, Kutztown University, and Notre Dame University. Fall of 2023, Prof. Fredin is on her tenure tour, sharing the group's work at 20 universities across the US.

**Publications: Graduate<sup>†</sup> and undergraduate<sup>‡</sup> students, and postdocs<sup>⊥</sup> co-authors mentored and advised by Prof. Fredin are marked.**

Repa, G. M.<sup>†</sup>; Fredin, L. A.<sup>\*</sup>, Mn environment in doped SrTiO<sub>3</sub> revealed by first-principles calculation of hyperfine splittings. *Appl. Phys. Lett.*, 2022, 121, 022401. (DOI: [10.1063/5.0096788](https://doi.org/10.1063/5.0096788))

Knepp, Z. J.<sup>†</sup>; Fredin, L. A.<sup>\*</sup>, Real Temperature Model of Dynamic Disorder in Molecular Crystals. *J. Phys. Chem. A*, 2022, 126, 3265-3272. (DOI: [10.1021/acs.jpca.2c02120](https://doi.org/10.1021/acs.jpca.2c02120)) with a supplementary cover (DOI: [10.1021/acs.jpca.2c02120](https://doi.org/10.1021/acs.jpca.2c02120))

Spielvogel, E.H.; Stevenson, B.G.; Stringer, M.J.; Hu, Y.<sup>‡</sup>; Fredin, L.A.<sup>\*</sup>; Sweirk, J. R.<sup>\*</sup> Insights into the Mechanism of an Allylic Arylation Reaction via Photoredox Coupled Hydrogen Atom Transfer. *J. Org. Chem.*, 2021, 87, 223-230. (DOI: [10.1021/acs.joc.1c02235](https://doi.org/10.1021/acs.joc.1c02235))

---

*Continued from page 3*

agenda within their respective fields.”

The Sloan Foundation's mission is “to make the world a better place by advancing the frontiers of knowledge.” Founded in 1934 by industrialist and long-time CEO of General Motors Alfred P. Sloan Jr., the Foundation awards approximately 200 grants per year (excluding the Sloan Research Fellowships) totaling about \$80 million in support of research in science, technology, engineering, mathematics, and economics.

Source: Lehigh University Editorial Services, posted February 22, 2024. Photography by Christa Neu





### Jebrell Glover

The Glover Lab currently has two active grants, one from the NSF entitled “Biophysical Studies of Lipid Droplets and their Associate Proteins” and one from the NIH entitled “Biophysical Studies of Caveolin.” In addition, the Glover Lab welcomed graduate students Sanaz Hashemipour and Khansaa Alshaloug as part of the research team. Dr. Glover is giving invited talks at Rutgers University, John Hopkins University, University of Tennessee Knoxville, and Vanderbilt University. Links to recent publications can be found on the Glover Lab web page:

<https://sites.google.com/lehigh.edu/glover-research-lab-lehigh/publications>



### Kai Landskron

The Landskron group has continued its work on Supercapacitive Swing Adsorption (SSA) as a universal technology for carbon capture and removal. Graduate student Muhammad Bilal substantially improved the electrodes that can now reversibly adsorb about 10 times the amount of CO<sub>2</sub>. Graduate student Jiajie Li worked on a scaling strategy for Supercapacitive Swing Adsorption and demonstrated SSA modules with bipolar electrode stacks. She showed that the energy consumption in the stacks decreases with the number of bipolar electrodes. We sold an option for a license for the technology to Marble, a venture studio focusing on climate tech. It plans to create a start-up that will commercialize the SSA technology. Dr. Landskron gave an invited talk about his SSA research at the 2023 Spring Meeting of the Materials Research Society.

#### References:

Bilal, M., Li, J., Guo, H., & Landskron, K. High-Voltage Supercapacitive Swing Adsorption of Carbon Dioxide. *Small* (2023), 19(24), 2207834.

Bilal, Muhammad, Jiajie Li, and Kai Landskron. "Enhancing Supercapacitive Swing Adsorption of CO<sub>2</sub> with Advanced Activated Carbon Electrodes." *Advanced Sustainable Systems* (2023): 2300250

Li, Jiajie, Muhammad Bilal, and Kai Landskron. "Scaling Supercapacitive Swing Adsorption of CO<sub>2</sub> Using Bipolar Electrode Stacks." (2023), chemrxiv.

In our collaborative effort with the Pimputkar group in the Department for Materials Science and Engineering, graduate student Jacob Dooley determined the solubility of boron nitride in ammonothermal environments. The solubility data will be used in subsequent experiments to grow cubic boron nitride single crystals in ammonothermal autoclaves. The goal of the project is to grow single crystals of unprecedented size at a pressure which is about an order magnitude lower than the state of the art.

#### References:

Dooley, J., Stoddard, N., Landskron, K., & Pimputkar, S. On the solubility of boron nitride in supercritical ammonia-sodium solutions. *Journal of Crystal Growth*, (2023), 621, 127381.



### Damien Thévenin

The Thévenin Lab received an R01 award from the National Health Institutes in collaboration with Profs. Alexey Ladokhin (University of Kansas) and Douglas Tobias (UC Irvine) aimed at elucidating the molecular mechanisms that control the functional switching of proteins from soluble to membrane-associated conformations and develop tools to predict them accurately. Prof. Thévenin gave invited seminars and talks at the University of Kansas, CNRS (Bordeaux, France), Texas Tech University, SUNY Polytechnic Institute (Albany, NY), DiscoverBMB 2023 (Seattle, WA), and Thomas Jefferson University (Philadelphia, PA),

## Damien Thévenin (Cont'd)

the FASEB Protein Phosphatases Science Research Conference (Palm Spring, CA), and the Biophysical Society Conference on Molecular Biophysics of Membranes (Tahoe, CA). The new edition of Protein Tyrosine Phosphatases (Methods in Molecular Biology 2743, ISBN 978-1-0716-3568-1) that Prof. Thévenin edited was published in December 2023.

Finally, the group published the following research articles:

Rizzo S, Sikorski E, Park S, Im W, Vasquez-Montes V, Ladokhin AS, Thévenin D (2023) Promoting the Activity of a Receptor Tyrosine Phosphatase with a Novel pH-responsive Transmembrane Agonist Inhibits Cancer-Associated Phenotypes. *Protein Science*.

Rizzo S, Thévenin D (2023) Identifying Transmembrane Interactions in Receptor Protein Tyrosine Phosphatase Homodimerization and Heterodimerization. *Methods Mol Biol*.

Gerritsen J, Rizzo S, Thévenin D, White F (2023) Mass spectrometry-based analysis of receptor phosphatase effects on signaling networks. *Methods Mol Biol*.

Schwarz M, Rizzo S, Espinoza Paz W, Kresinsky A, Thévenin D, Müller JP (2022) Disrupting PTPRJ Transmembrane-Mediated Oligomerization Counteracts Oncogenic Receptor Tyrosine Kinase FLT3 ITD. *Frontiers in Oncology*, Vol 12.



## David Vicic

David Vicic has been busy leading a Lehigh team that is part of an NSF Engineering Research Center (ERC) proposal, which made it to the final site-visit round. The team is anxiously waiting to hear if the project will be funded. The NSF ERC program supports convergent research, education, and technology translation at U.S. universities that will lead to strong societal impacts. The core institutions for the ERC proposal are Lehigh, Notre Dame, U of Kansas, U of Maryland, U South Dakota, and U of Hawaii.

David gave a research presentation at the Universidad de la República in Montevideo, Uruguay. He also gave invited presentations at the Strong Bond Activation and Transformation Symposium at the 2023 Fall ACS Meeting in San Francisco and at the 23rd International Symposium on Fluorine Chemistry, in Quebec City. The Vicic Lab's published works since the last newsletter include:

“Synthesis and electrochemical properties of tetramethyl ammonium salts of [(PhO)Ni(CF<sub>3</sub>)<sub>3</sub>]<sup>2-</sup> and [(7-azaindole)Ni(CF<sub>3</sub>)<sub>3</sub>]<sup>2-</sup>” Shreiber, S. T., Cramer, R. E.; Vicic, D. A. *Arkivoc* 2023, part IV, 6-13. (Special issue in honor of Yulia Budnikova)

“Trapping of a Late Metal Terminal Sulfido Intermediate with Phenyl Isothiocyanate” Shanahan, J.; Vicic, D. A.; Brennessel, W. W.; Jones, W. D. *Organometallics* 2022, 41, 3448-3453.

“Scrutinizing Formally NiIV Centers through the Lenses of Core Spectroscopy, Molecular Orbital Theory, and Valence Bond Theory” DiMucci, I. M.; Titus, C. J.; Nordlund, D.; Bour, J. R.; Chong, E.; Grigas, D. P.; Hu, C.-H.; Kosobokov, M. D.; Martin, C. D.; Mirica, L. M.; Nebra, N.; Vicic, D. A.; Yorks, L. L.; Yruegas, S.; MacMillan, S. N.; Shearer, J.; Lancaster, K. M. *Chem. Sci.* 2023, 14, 6915-6929.



### Nate Wittenberg

In 2023, Nate was promoted to Associate Professor with tenure. Third year graduate student, Dane Santa, was awarded a prestigious NSF Graduate Research Fellowship. This fellowship will support Dane's Ph.D. research for the next three years. Dane's research is focused on understanding how phospholipid oxidation alters biomembrane structure, as well as how oxidized membrane lipids can trigger immune cell activation. (*See page 16*). In collaboration with Prof. Angela Brown from Lehigh's Department of Chemical & Biomolecular Engineering, Nate was awarded an NIH R15 grant to study how antimicrobial peptides interact with outer membrane vesicles produced by gram negative bacteria.

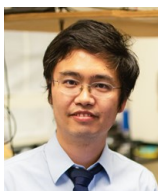
The Wittenberg lab has recently published the following recent papers and preprints:

A.N. Singh, J.B. Nice, A.C. Brown, N.J. Wittenberg. Identifying Size-dependent Toxin Sorting in Bacterial Outer Membrane Vesicles. *bioRxiv* 2023.05.03.539273.

J.L. Cawley, B.A. Berger, A.T. Odudimu, A.N. Singh, D.E. Santa, A.I. McDarby, A.R. Honerkamp-Smith, N.J. Wittenberg. Imaging Giant Vesicle Membrane Domains with a Luminescent Europium Tetracycline Complex. *ACS Omega* 2023, 8, 29314 - 29323.

in Dodecylphosphocholine Micelles. *Proteins* **2022**, 90, 560 - 565.

J.L. Cawley, M.E. Blauch, S.M. Collins, J.B. Nice, Q. Xie, L.R. Jordan, A.C. Brown, N.J. Wittenberg. Nanoarrays of Individual Liposomes and Bacterial Outer Membrane Vesicles by Liftoff Nanocontact Printing. *Small* **2021**, 17, 2103338.



### Xiaoji Xu

In the past year, Dr. Xiaoji Xu's research group continued to be at the forefront of advancements in nanoscale spectroscopy and microscopy.

Much of his work has focused on the development and application of Atomic Force Microscopy (AFM)-based analytical imaging techniques, aiming to push the boundaries of chemical nano-imaging, nanospectroscopy, and multimodal characterization. His innovative contributions include integrating a lock-in-based detection mechanism for pulsed force Kelvin probe force microscopy and peak force infrared microscopy. His group also developed Fourier-Transform AFM-based Photothermal Infrared Spectroscopy with a broadband IR source, marking a step toward advanced time-resolved AFM IR spectroscopy. As an inventor of peak force infrared microscopy, his team summarized its development, principles, and applications in a review article published in *Chemical Society Reviews*. Broadening the scope and contribute to the research community with his tools, one of his collaborative studies explores the potential of trained immunity in pro-metastatic macrophages to control tumor metastasis and results in a publication in *Nature Immunology*. In addition to publications, Dr. Xu and his group members have given seven invited presentations and three presentations at conferences and workshops.

His group published the following research articles between 2022 and 2023.

Amirhossein Zahmatkeshsaredorahi, Devon S. Jakob, Hui Fang, Zahra Fakhraai, and Xiaoji G. Xu "Pulsed Force Kelvin Probe Force Microscopy through Integration of Lock-in Detection" *Nano Letters*, DOI:10.1021/acs.nanolett.3c02452 (2023)

Chuanlin Ding, Rejeena Shrestha, Xiaojuan Zhu, Anne E. Geller, Shouzhen Wu, Matthew R. Woeste, Wenqian Li, Haomin Wang, Fang Yuan, Raobo Xu, Julia H. Chariker, Xiaoling Hu, Hong Li, David Tieri, Huang-Ge Zhang, Eric C. Rouchka, Robert Mitchell, Leah J. Siskind, Xiang Zhang, Xiaoji G. Xu, Kelly M. McMasters, Yan Yu and Jun Yan "Inducing Trained Immunity in Pro-metastatic Macrophages to Control Tumor Metastasis" *Nature Immunology*, 24, 239–254 (2023)

Andrea Dorsa, Qing Xie, Martin Wagner, and Xiaoji G. Xu "Lock-in Amplifier Based Peak Force Infrared Microscopy" *Analyst*, 148, 227, (2023)



## Xiaoji Xu (Cont'd)

Qing Xie, and Xiaoji G. Xu "Fourier-Transform Atomic Force Microscope-Based Photothermal Infrared Spectroscopy with Broadband Source" *Nano Letters*, 22, 22, 9174-9180 (2022) (Figure 1 correction)

Le Wang, Haomin Wang, and Xiaoji G. Xu "Principle and Applications of Peak Force Infrared Microscopy" *Chemical Society Reviews*, 51, 5268 - 5286 (2022)

Qing Xie, Haomin Wang, and Xiaoji G. Xu "Dual-Frequency Peak Force Photothermal Microscopy for Simultaneously Spatial Mapping Chemical Distributions and Energy Dissipation" *The Journal of Physical Chemistry C*, 126, 19, 8393-8399 (2022)

Xiaoji G. Xu "Atomic Force Microscopy-Based Infrared Microscopy for Chemical Nano-Imaging and Spectroscopy." *Atomic Force Microscopy for Energy Research*. CRC Press 213-240. (2022) (book chapter)

Haomin Wang, Qing Xie, and Xiaoji G. Xu "Super-Resolution Mid-Infrared Spectro-Microscopy of Biological Applications through Tapping Mode and Peak Force Tapping Mode Atomic Force Microscope" *Advanced Drug Delivery Reviews*, 180, 14080 (2022) (invited review)



**Liz Young**

The Young Lab graduated its first student this summer. Congratulations Dr. Shea Martin! Prof. Young also gave the Department Ph.D. seminar in the Fall to highlight the great work the group has done over the past several years. The graduate students created a fun "inside joke" shirt to commemorate the events!

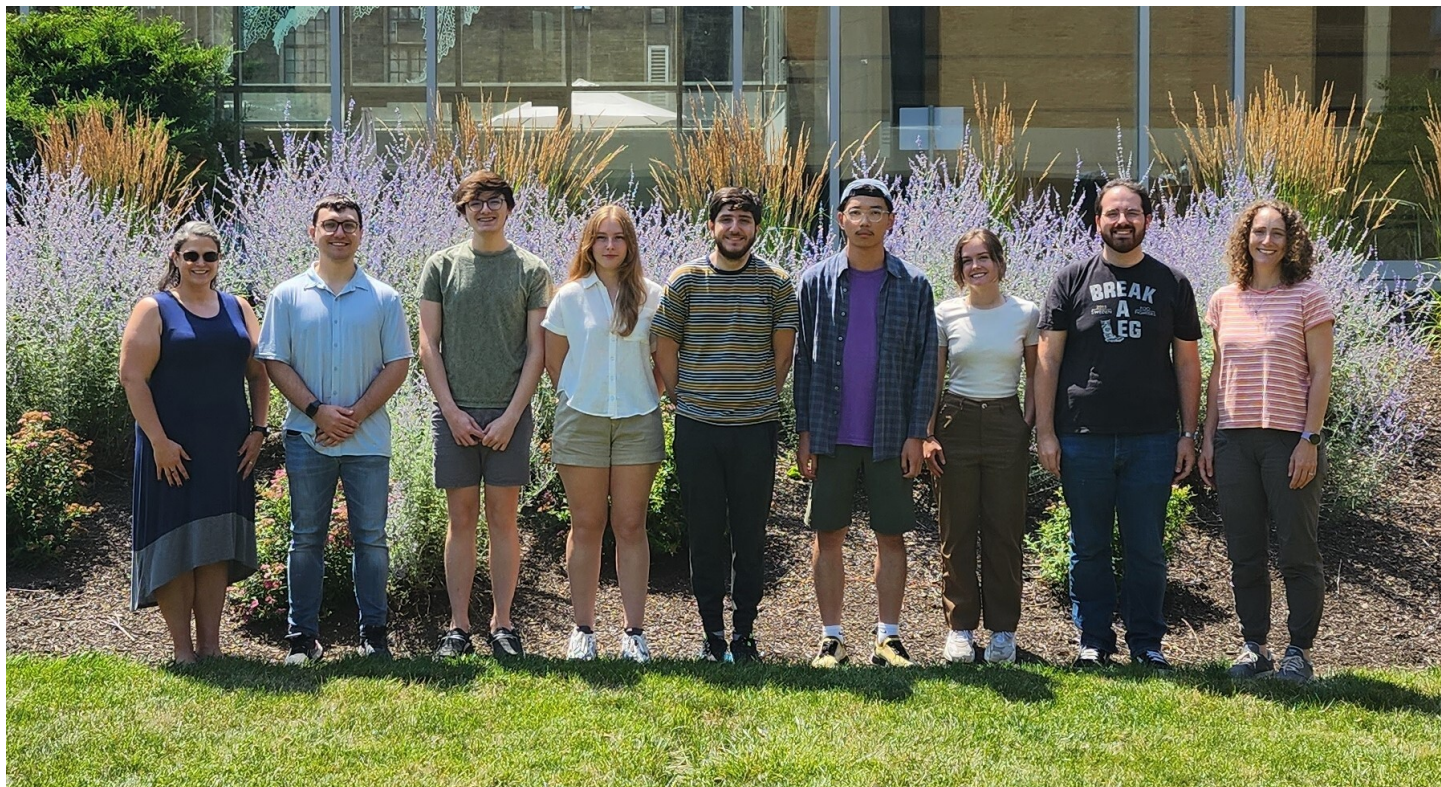
Professor Young was awarded an NSF grant entitled "CAS-SC: Uncovering Mechanistic Details of Photo- Induced Charge Transfer in Thin Films of Photoactive Materials with In situ and Operando Transient Absorption Spectroscopy" to further their work on photo-induced charge transfer in thin film materials. The work started in July 2023.

During 2023 thus far, Professor Young has given seminars at seminars the University of North Carolina – Chapel Hill, North Carolina State University, Duke University, Rochester University, Rensselaer Polytechnic, Worcester Polytechnic and Ursinus College. Professor Young attended the Photochemistry Gordon Research Conference in July to present a poster on "Exploring Ultrafast Dynamics of Substituted trans-Naphthalene Azo Moieties and Using Dynamics to Understand Azo Dye Degradation". She attended the Electrochemical Society meeting in Boston to present work on teaching electrochemistry with interactive lab experiments.





## Liz Young (Cont'd)



Over the summer, Professor Young and Professor Fredin, continued the third year of the PURE program (Photochemistry Undergraduate Research Experience), which combines computation and experimental physical chemistry research. Four Lehigh undergraduate students (Jake Haber, Chem '25; Allen Chen, Physics '25; Zach Groner, Chem '25, Brielle Byerley, Chem '25) continued their research projects during the 2023-2024 academic year.

A few recent publications include:

Martin, S.M.<sup>§</sup>; Knepp, Z.; Thongchai, I.A.<sup>†</sup>; Englehart, K.<sup>†</sup>; Jaffer, A.<sup>†</sup>; Sorto, K.<sup>†</sup>; Fredin, L.A.\*; **Young, E.R.\*** "The doorstep proton: acid-controlled photoisomerization in pyridine-based azo dyes." *New Journal of Chemistry*. **2023**, 47, 11882-11889. (<https://doi.org/10.1039/D2CP04572A>)

Hamburger, R.C.<sup>§</sup>; Huang, T. <sup>‡</sup>; Martin, S.M.<sup>§</sup>; Pointer, C.A.<sup>§</sup>; Fredin, L.A.,\* **Young, E.R.\*** "Ultra-fast Excited-state Dynamics of Substituted *trans*-Naphthalene Azo Moieties." *Physical Chemistry Chemical Physics*. **2023**, 25, 15302 – 15313. (<https://doi.org/10.1039/D2CP04572A>)

Martin, S.M.<sup>§</sup>; Repa, G.; Hamburger, R.C.<sup>§</sup>; Pointer, C.A.<sup>§</sup>; Ward, K.; Pham, T.-N.; Martin, M.I.; Rosenthal, R.;\* Fredin, L.A.,\* **Young, E.R.\*** "Elucidation of Complex Triplet Excited State Dynamics in Pd(II) Biladiene Tetrapyrroles." *Physical Chemistry Chemical Physics*. **2023**, 25, 2179 – 2189. (<https://doi.org/10.1039/D2CP04572A>)



# Welcome New Faculty

## John King and Jon Antilla



**Dr. John King** joined the Department of Chemistry as an associate professor in August 2023. He received his PhD (2013) in physical chemistry from the University of Michigan under the guidance of Dr. Kevin Kubarych. His studies focused on resolving the ultrafast dynamics of hydrogen bonding systems using time-resolved two-dimensional infrared spectroscopy. He then went to the University of Illinois as a postdoc to work on super-resolution microscopy and its application to soft matter systems.

In 2016 John started his independent research career at the Institute for Basic Science in South Korea. During this time, his research group worked on a diverse range of problems ranging from biological phase separation to the interfacial physics involved in hydrodynamic flow. Most of his group's efforts, however, focused on resolving complex conformational dynamics involved in biological catalysis using novel single-molecule spectroscopic techniques.

At Lehigh, the King Group is pursuing fundamental problems that are central to biophysics, including rare fluctuations, allosteric regulation, and conformational flexibility. Furthermore, John teaches core courses in physical chemistry, with a particular interest in thermodynamics



**Jon Antilla** has been serving the department as a Visiting Professor since August 15<sup>th</sup> of 2023. His main duties are teaching sophomore organic chemistry and some advanced organic chemistry lecture courses.

Jon is originally from a small town in Michigan's upper peninsula (called the "U.P.") – a sparsely populated area near Lake Superior and Canada. He attended Northern Michigan University and then the University of Chicago for his Ph.D under William D. Wulff where he worked on one of the first highly selective catalytic asymmetric aziridination reactions. The reaction used boron-based catalysts derived from so called "vaulted bis-phenanthrols" or VAPOL.

He then joined the laboratory of Stephen L. Buchwald at M.I.T. where he worked on the first general copper-catalyzed Ullmann type reactions of N-H heterocycles with aryl halides. The chemistry is used quite extensively.

Jon started his independent career at The University of Mississippi where he started his work on the use of chiral phosphoric acid-catalyzed methodology. The work is in the area called organocatalysis, the use of non-metal catalyzed reaction methods. He had an opportunity to join University of South Florida, and in 10 years became Professor of Chemistry. He helped pioneer the first examples where one can add heteroatom-based nucleophiles to imines to form chiral amins and N,O-acetals in a catalytic asymmetric manner. Jon then took a position in China at The School of Pharmaceutical Sciences and Technology at Tianjin University.

Jon loves teaching and is very happy joining Lehigh, even if it is temporary. Jon thinks it's the best feeling in the world to see students learn and move on to pursue their dreams. Jon and his wife Zoey live simple lives and look after their 2-year old son Ethan, who Jon wants to become an astronaut (maybe that was just Jon's dream though!)



**REMEMBERING Ned D. Heindel**

*by Jim Roberts, Robert Flowers, Greg Ferguson, and Natalie Foster*

**“HOW CAN I HELP?”**

That question defines the personal and professional life of Ned D. Heindel, who died at the age of 85 at his home, the Hexenkopf Baurenhof in Williams Township, on June 27, 2023. Everyone who worked with him on any of his wide-ranging activities knew that his offer of help was sincere, reliable, and without strings attached.

Ned began his career by obtaining a B.S. in chemistry and mathematics from Lebanon Valley College (1959), a Ph.D. in organic chemistry from the University of Delaware (1963), and an NSF postdoctoral fellowship at Princeton University in medicinal chemistry (1964). His teaching career began with successive appointments at the Wilmington Campus of the University of Delaware, Ohio University, Marshall University, and at Lehigh University, where he completed 52 years of teaching, research, and service to the community in 2018, whereupon he transitioned to the position of Distinguished Senior Research Scientist, a rank he held actively until his recent passing. This simple litany of degrees and dates, however, tells little of his story.

**“How can I help?” -- service to science and humanity: from antimalarials to Homeland Security**

Science creates knowledge, and Ned created chemical knowledge through a lifetime of vigorous research, resulting in over 300 journal articles and 20 patents. Upon his arrival at Lehigh in 1966, he began a study of synthetic approaches to antimalarial compounds. In the decade of the 1970s, he moved on in collaboration with physicians and scientists at Hahnemann Medical School (now Drexel University School of Medicine) to study the synthesis of site-specific radiopharmaceutical agents for the diagnostic imaging of tumors, then shifted in the 1980s to radiosensitizers for the eradication of tumors, adding to his collaborations emerging biotechnology firms like Centacor, Inc. In the 1990s, he initiated what would be his longest running collaboration with scientists at the University of Medicine and Dentistry of New Jersey (UMDNJ), Robert Wood Johnson Medical School, in the study of photoactive compounds for the treatment of several proliferative diseases. During this period, his group at Lehigh also accomplished seminal work in the activation of dextran as a carrier for radiotherapeutic agents. Throughout the first two decades of the new century, Ned continued to work with colleagues at UMDNJ on agents targeted against the damage caused by vesicating agents used in warfare that are of high interest to the nation's homeland security efforts. Ned also directed the medicinal chemistry research of Azevan Pharmaceuticals, a start-up firm exploring the development of vasopressin antagonists, including their application for use to diminish aggressive behavior. All these explorations in the field of medicinal chemistry were aimed at helping to solve very human problems: malaria, the diagnosis and treatment of cancer and other proliferative diseases, and even the damage caused by agents of destruction in war.

**“How can I help?”** -- service to students in classroom and laboratory: at home and at a distance

The scope of the work outlined in the previous section must be viewed in the context of Ned's roles of educator and mentor to 40 doctoral students, 168 masters students, and 23 research scientists and postdoctoral associates, but his influence extended into the undergraduate realm as well. Over 40 years ago, Ned received the Briody Award from the University, in large part for leading a team at Lehigh to provide a program of guaranteed admission to medical school. He was pivotal in negotiations with two Philadelphia medical schools to establish the program and to make it work for Lehigh undergraduate students. True to the form which was his signature, his involvement did not end at the negotiating table or at the administrative level: he traditionally taught the special summer organic class for the pre-med students and personally advised most of the students as well.

In the area of delivering opportunities for advanced education to chemists, over 30 years ago Ned spearheaded the effort at Lehigh to launch a continuing education program, first via satellite TV and then by on-line video for asynchronous delivery, to chemists employed in industry. Lehigh's program was the first distance education program in the nation for employees in the chemical and pharmaceutical industry, and at its peak enrolled over 300 students from 51 companies nationwide.

**“How can I help?”** -- service to the profession: from museums to publications

From 1985 through 1996, Ned served as a member of the Board of Directors of the American Chemical Society (ACS), one of the largest science societies in the world, and as the nationally elected President of the Society in 1994. That honor alone merits recognition, but as was typical for Ned, he used the opportunity as a platform for productive work for the profession and its practitioners. While a Director, with three other colleagues, he was a science advisor to the exhibit 'Science in American Life' at the Smithsonian Institution in Washington, D. C. Ned was a most effective liaison between the disparate worlds of the chemist and the museum curator. He provided advice on science content but also was a conduit for the sometimes gnarly and challenging communication between the staff

at the Smithsonian and the ACS. When the sociologists stressed the doom and gloom of the bomb shelter and the evils of fertilizer while the chemists saw only 'better things for better living,' Ned helped find the common ground on which the exhibit was built. At that time, an estimated 6 million people visited the American History Museum at the Smithsonian annually; the exhibit, which ran from 1994 to 2011, was the first in the nation that combined a historical and sociological view of how science and American society shaped each other. Arguably no other public outreach activity of the ACS engaged so many people as this exhibit, and Ned was an all-important interface between the ACS and the Smithsonian and helped the two groups achieve consensus on the content of the final product.

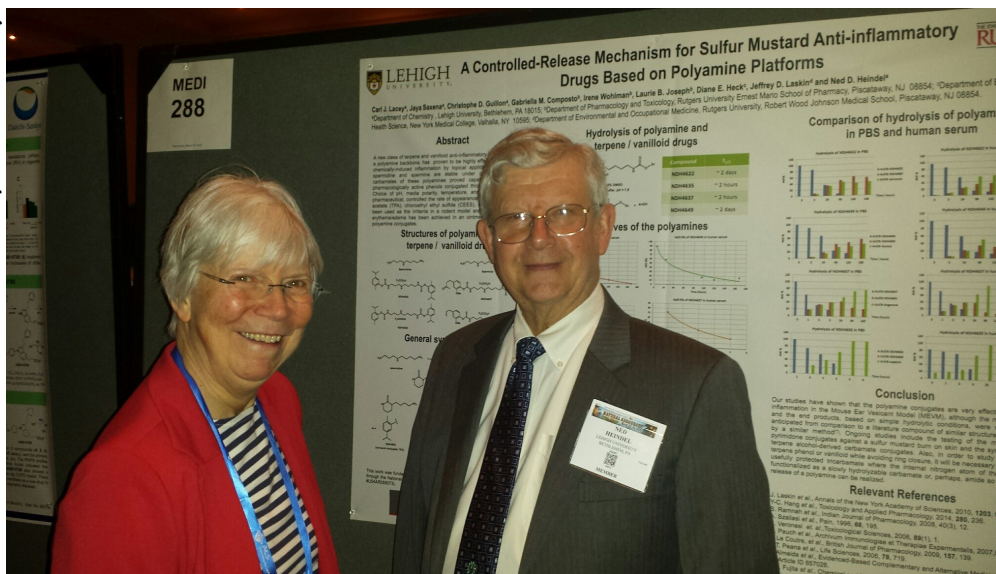
Ned worked throughout his entire career to expand and improve the portfolio of ACS journals and to encourage the Society to broaden its horizons. He was among the first to encourage the Society to co-publish specialized, high-quality journals with other scientific societies. With his help, the Society and its governance recognized that a narrow definition of chemistry could not be sustained, and he guided the initial expansion of



publications into areas of pharmaceutical chemistry, bioconjugate chemistry, and chemical health and safety without compromising the quality, strength, and impact of the Society's flagship journals.

Ned also served on the Board of Trustees of Keystone College (LaPlume, PA) and on the Boards of the Council for Chemical Research, the International Union of Pure and Applied Chemistry – American Division, the Chemical Sciences Roundtable of the National Academy of Sciences, the Pennsylvania Drug Discovery Institute, and CentCom Advertising. He chaired two task forces of the National Academy of Sciences / National Research Council which issued reports, one recommending laboratory safety procedures and safe handling techniques for hazardous materials by small chemical laboratories in developing countries, and a second addressing the setting of prices by publishers of chemical journals.

His avocational interest in history was reflected in his life outside chemistry and Lehigh. He published 16 articles and five books on topics of regional history, among them *Hexenkopf: History, Healing and Hexerei*, and *Iron, Armor, and Adolescents: A History of Redington and the Carter Junior Republic*. A life-long interest in patent medicines resulted in the book *Medicine, Music, and 'Money' Munyon*, the story of James Munroe Munyon, a patent medicine manufacturer and infamous quack whose firm was the first indicted after the passage of the Pure Food and Drug Act in 1906. With his wife, Linda, Ned directed the Williams Township Historical Society and published many articles in its newsletter, *The Pastfinder*. He served on the Boards or Executive Committees of several historical organizations including the Northampton County Historical and



Ned Heindel (right) with Professor Emeritus Natalie Foster at an ACS national meeting.

Genealogical Society, the Science History Institute and its Heritage Council, and the Division of the History of Chemistry of the ACS.

### “How can I help?”

Everyone who knew Ned has stories to tell about how he helped them in times of need, in times of change, and in times when they just needed advice, counsel, or an ear to hear them. He had a seemingly boundless reserve of energy to devote to people and projects. A comment allegedly made about Winston Churchill by Franklin D. Roosevelt is pertinent to describe Ned, too, and only partially in jest. Roosevelt said, “Winston has 100 ideas every day, four of which are good.” But how many of us have even one idea a day – good or not? The truth of the matter is simple: Ned percolated with ideas, information, and a startling drive to produce results, to help people in their daily lives, and to leave the world a better place. A level of productivity, an intensity of commitment to work, and a devotion to the ideal of service as a way of life all characterized every aspect of Ned’s being. He was a generous and kind friend. There is certainly no one else quite like him, and we miss him now and always.





*Ned Heindel (right) with his wife Linda (left), in Germany, overlooking the Rhine river.*

Ned is survived by his wife of 63 years, Linda (Heefner) Heindel (retired Dean of the Comenius College Division of Moravian College [now Moravian University], four cousins and two nephews.



## REMEMBERING Fortunato J. Micale

Fortunato “Nato” Joseph Micale, 91, of Niagara Falls, NY, passed away on May 1, 2024, in Lexington, Kentucky. He was born on August 11, 1932.

Fortunato held a BA from St. Bonaventure University, a BS from Niagara University, a Masters from Purdue University, and a Doctorate from Lehigh University. Nato has numerous patents with Lehigh and was named (along with three other colleagues) inventor of the year by NASA.

Fortunato was described as incredibly intelligent, extremely funny, and most importantly, he was a kind and gentle person. He enjoyed playing golf, photography, telling jokes, and making items neutrally buoyant in his free time.

He is survived by his wife, Dorita “Rita” Micale, his daughters Linda Howley (Greg), Regina Schmutte, and Monica Rapini (Jeff) as well as his grandchildren and siblings.



## Student News



Dane Santa, a third year graduate student, was awarded a prestigious National Science Foundation (NSF) Graduate Research Fellowship, and was featured in a story on Lehigh University's College of Arts and Sciences website this Spring . This fellowship will support Dane's Ph.D. research for the next three years. Dane's research is focused on understanding how phospholipid oxidation alters biomembrane structure, as well as how oxidized membrane lipids can trigger immune cell activation.

The news article, *From the Bottling Line to the Biochemistry Lab*, tells the story of how his job on the packaging team at Samuel Adams Brewery in the Lehigh Valley, led to his interest in science, and down an unconventional path to a Ph.D. program in biochemistry.

*Follow this link to read the article by Emily Halnon. Photography by Christine Kreschollek.*

## 2023 - 2024 Undergraduate Awards

ACS Award	Alex Meyer
ACS Division of Physical Chemistry	Robert Nedoluha
American Institute of Chemists	Gabe Masso
ACS Inorganic Chem. Award	Lorelai Swanek
ACS Organic Chem. Award	Shane Hall
Biochemistry Award	Rosa Medina
Harry M. Ullmann Chem. Prize	Chaihong (Mike) Nah
William H. Chandler Chem. Prize (Senior)	Casey Conboy
William H. Chandler Chem. Prize (Junior)	Dan Wise
William H. Chandler Chem. Prize (Sophomore)	Henry Vietor
ACS Analytical Chem. Award	Jake Haber
Eastern Analytical Symposium Student Research Awards	Tiffany Ye
Royal Society of Chemistry Certificate of Undergraduate Excellence	Ing Thonchai



### 2023 Advanced Degrees

#### PhD - Chemistry:

Zahed Ghelichkhah - *Mechanistic Modelling of Electrochemical Processes on Gold using Electrochemical Impedance Spectroscopy*

Shea Martin - *Combining Experiment and Computation to Solve Complex Problems in Photochemistry*

Teng Xue - *Rational Design of Fluoroalkylated Transition Metal Complexes for Fluoroalkylation Reactions*

#### Master of Science - Chemistry:

Ryann E. Kemmerling  
Samuel Warren Pash  
Amanda Victoria Prascsak

### 2022- 2023 Teaching Assistants of the Year



Andrea Dorsa and Zahed Ghelichkhah TA Award Winners

This award was created to recognize those individuals who, through their dedication, to academic rigor and student success, have distinguished themselves as outstanding teaching assistants.

It documents the high regard with which these two TAs are held by both the teaching faculty and the students they have supported in their learning endeavors throughout the year.

### 2022 - 2023 Graduates Bachelor's Degrees

NAME	MAJOR
Lindsay Mara Adler	Pharmaceutical Chem
Ryan R. Antar	Biochemistry
Isabela Guet-Cruza	Biochemistry
Jueun Han	Biochemistry
Emerald Kan	Biochemistry
Ryan C. Kashatus	Chemistry
Erin Grace Klus	Chemistry
Yuze Li	Pharmaceutical Chem.
Ivonne E. Morban Mora	Biochemistry
Brian Charles Nasielski	Biochemistry
Alexandria Lane Pellett	Biochemistry
Albert Wakim	Biochemistry
Noah Scott Weaver	Biochemistry
Dia Zheng	Biochemistry
Tommy Zheng	Biochemistry

### Welcome New 2023/24 Graduate Students

Vincent Andrews, Indiana University Bloomington  
Jonathan Hixson-Cooper, Moravian University  
Fareed ul Haq Khan, UET Lahore  
Kimberly Maricle, East Stroudsburg University  
Chad Propst, Moravian University  
Korka Fall, Drew University  
Isabelle Herlinger, Salisbury University  
Innocenzo Martellucci, Ithaca College  
Abigail Thompson, Cedar Crest College





Your donations can fund student research and travel, expanding the Lehigh University reputation across the nation and around the globe.

Donations also represent an important part of our continuing efforts to create a “state-of-the-art” environment for teaching and research at Lehigh.

If you are at a point in your life where you can “Pay It Forward” please consider a donation to support those students following in your footsteps.

Donations can be made fast and easy:

- By contacting Lehigh’s Advancement Office at (800) 523-0565



# LEHIGH UNIVERSITY

Department of Chemistry  
Seely G. Mudd Building  
6 E. Packer Avenue  
Bethlehem, PA 18016  
Phone: (610) 758-3470  
Fax: (610) 758-6536

You can email the newsletter editor at [inchem@lehigh.edu](mailto:inchem@lehigh.edu).

Contact information for the faculty and previous newsletters are available on the department website: <https://chemistry.cas.lehigh.edu>