

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





Welcome Spring!

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

Happy Spring greetings from the Lehigh Department of Chemistry! The past year has been eventful and successful for us, in both our classrooms and our research laboratories. Our professors and instructional staff are among the highest rated in the College, and our faculty research groups have excelled

with impactful scholarship. At the broader institutional level, President Helble and Provost Urban have assembled the Lehigh community in a strategic planning process, and Dean Flowers has led the design of a new liberal arts curriculum for the College of Arts and Sciences. Our department is integral to the success of the college and university, and we have interfaced with the various committees associated with these initiatives to help them succeed.

At the beginning of 2022, Dr. Hannah Cronk was promoted to Professor of Practice and now holds the title Teaching Assistant Professor. Dr. Andy Ho also has a new title, Teaching Associate Professor. Congratulations to them both! We also said farewell to our Faculty Coordinator, Mary Roberson, who accepted a new position closer to family in Ohio. Many of you got to know Mary as the editor and key contact person for *Mudd in Your Eye*, and we wish her the very best in her new Midwestern adventure. It took some time with the tight labor market, but I am delighted to introduce you to our current Faculty Coordinator, Lisa Arechiga.

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.



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ON THE COVER: From Dr. Nate Wittenberg's research: Supported lipid bilayer patches displaying phase separation. The orange areas are the liquid disordered phase, while the green areas are the liquid ordered phase, marked by fluorescent antibody binding to GD1a ganglioside.



2 Chair's Update 3 Faculty News 12 Liz Young New Staff 13 Alumni News 18 Past Traditions Student News

In This Issue

Stay in Touch

Lehigh Chemistry alums can be found all across the globe-using their degrees to address universal 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 lia4@lehigh.edu.





Greg Ferguson

We were delighted to welcome Fatema Amin to the research group this year. She is using selfassembled monolayers 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 Langmuir early in 2022. Zahed Ghelichkhah continues to be a powerhouse in the research lab

appeared in Langmuir early in 2022. Zahed Ghelichkhah continues to be a powerhouse in the research lab, publishing his second paper in the Electrochimica Acta and submitting his third manuscript.

We also bid farewell to Tarannuma Ferdous Manny, who has joined her new spouse at Florida State University – we wish the new couple well!

"Anion-Catalyzed Active Dissolution Model for the Electrochemical Adsorption of Bisulfate, Sulfate, and Oxygen on Gold in H2SO4 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.

"Does the Roll-off Angle Depend on Work of Adhesion?" K. Khadka and G.S. Ferguson, Langmuir 2022, 38, 4820–4825; https://doi.org/10.1021/acs.langmuir.1c03425.



Oriana Fisher

The Fisher lab has been hard at work investigating the molecular basis by which bacteria respond to changes in their environments. We received funding to specifically support our research on bacterial copper acquisition through a LEAPS-MPS grant from the NSF. During the past year, we welcomed

several new lab members: Chemistry graduate student Jess Mickno and undergraduates Dia Zheng (Biochemistry, '23), Emerald Kan (Biochemistry, '23), David Han (Biochemistry, '23), and Mu Hu (Biology, '23). We also bid farewell to the lab's first undergraduate student, Jing Guo, who graduated with Honors in Biochemistry last Spring and recently started a position as a research technician at the Dana Farber Cancer Institute at Harvard Medical School. Before she graduated, Jing and Oriana wrote a review article about cupredoxin domains, a protein fold that is used by many copper-binding proteins for a wide range of biological functions that was recently published in The Journal of Biological Inorganic Chemistry.

Members of the group have also shared our research at a number of venues, both virtual and in-person. Dia, David, and Emerald all participated in the summer STEM-SI program and gave poster presentations about their research. Dia also gave a virtual talk at the ISCC this past April. During the past year, Oriana has also given several talks and presentations, including a poster presentation at the ASBMB annual meeting in Philadelphia, a seminar at Moravian University, a talk at the ACS Mid-Atlantic Region Meeting in New Jersey, and a talk at the 12th International Copper Meeting in Italy.



Lisa Fredin

The Fredin Group kept busy this year working on large scale computational problems at the intersection of photochemistry and material disorder. In particular, projects looking at inherent disorder (packing defects or molecular vibration) and induced disorder (dopants) have allowed the

group to solve important problems in light-driven faceted and reconstructed nanoparticle catalysis, vibrational effects on conduction in organic materials, and the photoexicited state dynamics of organic molecules. Two undergraduates and one Masters student graduated from the group and are moving on to dental school, graduate school in chemistry, and a job in chemical industry. Graduate student, Zach Knepp passed his general exam and post-doc Dr. Anum Shahid Malik joined the group in January. The current group consists of three graduate students, one post-doc, and seven undergraduates.

The 2nd year of PURE (Photochemistry Undergraduate Research Experience), which combines computation and



Lisa Fredin (Cont'd)

experimental physical chemistry research, in an innovative experience for Lehigh undergraduates started in summer 2022. Four Lehigh undergraduate students (majoring in chemistry and physics) competed an immersive summer research experience. Building off the skills they learned during the summer, each student has worked during the 2022-2023 academic year in order to complete their research projects on novel indole azo-dye photophysics.

At the Fall 2022 National ACS meeting in Chicago, Prof. Fredin organized and chaired an **in-person** version of the Photochemistry Spotlight! Prof. Fredin gave an invited virtual talk for the Theory and Simulation of Electronic and Optical Processes in Molecules and Materials. In addition, with more conferences being back in person, Prof. Fredin gave invited talks at MARM, American Conference on Theoretical Chemistry (ACTC), Fall 2022 ACS, and NERM. In the fall Prof. Fredin gave invited seminars at U Penn, University of Rochester, University of Delaware, and Binghamton University.

Publications:

Repa, G. M.[†]; Fredin, L. A.^{*}, Mn environment in doped SrTiO₃ revealed by first-principles calculation of hyperfine splittings. *Appl. Phys. Lett.*, 2022, *121*, 022401. (*DOI: 10.1063/5.0096788*)

Knepp, Z. J.[†]; Fredin, L. A.*, Real Temperature Model of Dynamic Disorder in Molecular Crystals. J. Phys. Chem. A, 2022, 126, 3265-3272. (DOI: 10.1021/acs.jpca.2c02120) with a supplementary cover (DOI: jpcafh/126/20)

Spielvogel, E.H.; Stevenson, B.G.; Stringer, M.J.; Hu, Y.[‡]; Fredin, L.A.*; Sweirk, J. R.* 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)



Jebrell Glover

The Glover Lab received an NSF award entitled "Biophysical Studies of Lipid Droplets and their Associate Proteins." This was a collaborative proposal with co-PIs Nathan Wittenberg and Wonpil Im who are both in the Chemistry Department. The Glover Lab continues to make progress on the

NIH R15 award entitled "Biophysical Studies of Caveolin" which was awarded in 2021. In addition, they welcomed graduate student Jesika DeDonato as part of the research team. Dr. Glover also gave invited talks at Gettysburg College and ACS NERM 2022. Links to recent publications can be found on the Glover Lab web page: https://sites.google.com/lehigh.edu/glover-research-lab-lehigh/publications



Wonpil Im

During the previous academic year, Dr. Im conducted the following professional endeavors:

Grant:

NSF CHE (Co-Investigator: 2022-2025; PI: Jebrell K. Glover) CAS-Biophysical Studies of Lipid Droplets and their Associate Proteins

Papers:

Y. Yin, F. Zhang, S. Feng, K.J. Butay, M.J. Borgnia, W. Im, S-Y. Lee, Activation Mechanism of the Mouse Cold -sensing TRPM8 Channel by Cooling Agonist and PIP2. Science in press (2022). https://doi.org/10.1126/science.add1



Wonpil Im (Cont'd)

D. Suh, S. Feng, H. Lee, H. Zhang, S-J. Park, S. Kim, J. Lee, S. Choi, and W. Im, CHARMM-GUI Enhanced Sampler for Various Collective Variables and Enhanced Sampling Methods. Protein Sci. in press (2022). https://doi.org/10.1002/pro.4446

K.W. Wang, J. Lee, H. Zhang, D. Suh, and W. Im, CHARMM-GUI Implicit Solvent Modeler for Various Generalized Born Models in Different Simulation Programs. J. Phys. Chem. B. in press (2022). https://doi.org/10.1021/acs.jpcb.2c05294

Y. Tian, K. Shin, A.E. Aleshin, W. Im, and F.M. Marassi, Calcium-induced Environmental Adaptability of the Blood Protein Vitronectin. Biophys. J. in press (2022). https://doi.org/10.1016/j.bpj.2022.08.044

N.J. Wright, J.G. Fedor, H. Zhang, P. Jeong, Y. Suo, J. Yoo, J. Hong, W. Im, S-Y. Lee, Methotrexate Recognition by the Human Reduced Folate Carrier SLC19A1. Nature in press (2022) https://doi.org/10.1038/ s41586-022-05168-0

T. Das, X. Yang, H. Lee, E.H. Garst, E. Valencia, K. Chandran, W. Im, H.C. Hang, S-palmitoylation and Sterol Interactions Mediate Antiviral Specificity of IFITMs. ACS Chem. Biol. 17:2109–2120 (2022)

H. Guterres, S-J. Park, H. Zhang, T.V. Perone, J. Kim, and W. Im, CHARMM-GUI High-Throughput Simulator for Efficient Evaluation of Protein-Ligand Interactions with Different Force Fields. Protein Sci. 31:e4413 (2022).

H-K. Choi, H. Kang, C. Lee, H.G. Kim, B.P. Phillips, S. Park, C. Tumescheit, S.A. Kim, H. Lee, S-H. Roh, H. Hong, M. Steinegger, W. Im, E.A. Miller, H-J. Choi, and T-Y. Yoon, Evolutionary Balance Between Foldability and Functionality of a Glucose Transporter. Nat. Chem. Biol. 18:713-723 (2022).

J. Rizo, L. Sari, Y. Qi, W. Im, and M.M. Lin, All-atom Molecular Dynamics Simulations of Synaptotagmin-SNARE-Complexin Complexes Bridging a Vesicle and a Flat Lipid Bilayer. eLife 11:e76356 (2022).

S. Feng, S. Gee, L. Kong, and W. Im, Molecular Condensate in a Membrane: A Tugging Game Between Hydrophobicity and Polarity with Its Biological Significance. Langmuir 19:5955-5962 (2022).

L. Ghani, S. Kim, H. Wang, H.S. Lee, J.S. Mortensen, S. Katsube, Y. Du, A. Sadaf, W Ahmed, B. Byrne, L. Guan, C.J. Loland, B.K. Kobilka, W. Im, and P.S. Chae, Foldable Detergents for Membrane Protein Study: Importance of Detergent Core Flexibility in Protein Stabilization. Chem. Eur. J. 28:e2022001 (2022).

I.D. Pogozheva, G.A. Armstrong, L. Kong, T.J. Hartnagel, C.A. Carpino, S.E. Gee, D.M. Picarello, A.S. Rubin, J. Lee, S. Park, A.L. Lomize, and W. Im, Comparative Molecular Dynamics Simulation Studies of Realistic Eukaryotic, Prokaryotic, and Archaeal Membranes. J. Chem. Inf. Model. 62:1036-1051 (2022).

C. Park, J. Kim, S-B. Ko, Y.K. Choi, H. Jeong, H. Woo, H. Kang, I. Bang, S.A. Kim, T-Y. Yoon, C. Seok, W. Im, and H-J. Choi, Structural Basis of Neuropeptide Y Signaling Through Y1 Receptor. Nat. Commun. 13:853 (2022).

Y.K. Choi, N.R. Kern, S. Kim, K. Kanhaiya, S.H. Jeon, Y. Afshar, S. Jo, B.R. Brooks, J. Lee, E.B. Tadmor, H. Heinz, and W. Im, CHARMM-GUI Nanomaterial Modeler for Modeling and Simulation of Nanomaterial Systems. J. Chem. Theory Comput. 18:479-493 (2022).

A. Kognole, J. Lee, S-J. Park, S. Jo, P. Chatterjee, J. Lemkul, J. Huang, A.D. MacKerell, Jr., and W. Im, CHARMM-GUI Drude Prepper for Molecular Dynamics Simulation Using the Classical Drude Polarizable Force Field. J. Comput. Chem. 43:359-375 (2022).



Wonpil Im (Continued)

S. Kim, Y. Liu, Z. Lei, J. Dicker, Y. Cao, X.F. Zhang, and W. Im, Differential Interactions Between Human ACE2 and Spike RBD of SARS-CoV-2 Variants of Concern. J. Chem. Theory Comput. 17:7972-7979 (2021).

A. Pisapati, W. Cao, K.R. Anderson, G. Jones, K. Hoffman, P. Whiteaker, W. Im, X.F. Zhang, and J.M. Miwa, Biophysical Characterization of Lynx-Nicotinic Receptor Interactions Using Atomic Force Microscopy. FASEB Bioadv. 3:1034-1042 (2021).

H. Guterres, S-J. Park, Y. Cao, and W. Im, CHARMM-GUI Ligand Designer for Template-based Ab Initio Ligand Design in a Binding Site. J. Chem. Inf. Model. 61:5336-5342 (2021).

N. Ferraro, S. Kim, W. Im, and M.M. Pires, Systematic Assessment of Accessibility to the Surface of Staphylococcus aureus. ACS Chem. Biol. 16:2527-2536 (2021).

S. Park, W. Im, and R.W. Pastor, Developing Initial Conditions for Simulations of Asymmetric Membranes: A Practical Recommendation. Biophys. J. 120:5041-5059 (2021).

S. Park, Y.K. Choi, S. Kim, J. Lee, and W. Im, CHARMM-GUI Membrane Builder for Lipid Nanoparticles with



Kai Landskron

During the past year, graduate student Jiajie Li continued her research studying the influence of carbon dioxide partial pressure on supercapacitive swing adsorption for carbon capture. She is also in the process of building and testing of scaled supercapacitive swing adsorption modules with

bipolar electrodes. Graduate student Muhammad Bilal continued to work on improved electrode materials for supercapacitive swing adsorption, and improved the gravimetric sorption capacity by a factor of ten. Graduate student Jacob Dooley continued to construct his lab for ammonothermal cubic boron nitride crystal growth (collaboration with Prof. Siddha Pimputkar in Materials Science). He also developed a hot-press approach to ammonothermal crystal growth.



Steve Regen

To help bring closure to his 50 year career as a University Professor, Steve Regen published a summary of some of his past efforts aimed at (i) understanding cholesterol's condensing effect (Regen, S. L. Cholesterol's condensing effect: unpacking a century-old mystery. J. Am. Chem.

Soc. Au, **2022**, 2, 84-91) and (ii) creating hyperthin membranes for gas separations (Regen, S. L. Creating hyperthin membranes for gas separations. Langmuir, **2022**, 38, 4490-4493.) Professor Regen also recently published what may prove to be his "crowning achievement" in the gas separation area with the introduction of a surface crosslinking strategy that can produce membranes having high permeability and high permeation selectivity. This strategy has already yielded membranes having practical potential for the separation of CO_2 from N₂ in flue gas, which is the major source of anthropogenic CO_2 and the major source of climate change (Shaligram, S.; Regen, S. L. Increased CO_2/N_2 selectivity of PTMSP by surface crosslinking, Chemical Communications., **2022**, 58, 3557-3560).



Damien Thévenin

The Thévenin Lab received two Exploratory/Developmental Research R21 Grant Awards from the National Cancer Institutes related to its work on the development of tumor-selective approaches: (1) "Chemical Remodeling of Cell Surface to Enhance the Accumulation of Therapeutic Bacteria to



Damien Thévenin (Cont'd)

Tumors" and (2) "Off-the-shelf CAR-T Therapy via Tumor-Selective Immuno-engagers". In addition, the lab received as a collaborator with the Honerkamp-Smith Lab (Department of Physics) an NIH R01 award aimed at elucidating how proteins at the surface of cell membranes respond to fluid flow and how they trigger intracellular signaling in endothelial cells. The lab also welcomed two talented new graduate students: Leah Knepper and Walter Espinoza Paz.

Prof. Thévenin gave invited talks at the EMBO Workshop (Reversible phosphorylation, signal integration, and drug discovery) and Biophysical Society Meeting (Molecular Biophysics of Membranes) on the group's work on receptor protein tyrosine phosphatases. Prof. Thévenin is also now an Editor for the Journal of Membrane Biology, and is editing the new edition of the book on Protein Tyrosine Phosphatases, to be published in the well -established lab protocol series Methods in Molecular Biology.

Finally, the group published the following research articles:

Vasquez-Montes, V.; Tyagi, V.; Sikorski, E.; Kyrychenko, A.; Freites, J. A.; Thévenin, D.; Tobias, D. J.; Ladokhin, A. S. Ca2+ -dependent Interactions between Lipids and the Tumor-targeting Peptide PHLIP. Protein Science 2022, 31 (9). https://doi.org/10.1002/pro.4385.

Vasquez-Montes, V.; Goldberg, A. F. X.; Thévenin, D.; Ladokhin, A. S. Ca2+ and Mg2+ Influence the Thermodynamics of Peptide-Membrane Interactions. Journal of Molecular Biology 2022, 167826. https://doi.org/10.1016/j.jmb.2022.167826.

Sikorski, E. L.; Wehr, J.; Ferraro, N. J.; Rizzo, S. M.; Pires, M. M.; Thévenin, D. Selective Display of a Chemoattractant Agonist on Cancer Cells Activates the Formyl Peptide Receptor 1 on Immune Cells**. ChemBioChem 2022, 23 (8). https://doi.org/10.1002/cbic.202100521.



David Vicic

Since the last newsletter, the Vicic Group received an NSF grant to develop nickel-catalyzed methods to prepare high-value organofluorine molecules. David gave invited lectures at University of Cincinnati, University of Shanghai (virtual), Mississippi State University, the 2022 ACS Northeast Regional Meeting in Rochester NY, the 20th European Symposium on Fluorine

Chemistry in Berlin (where David also served as a poster judge), and the 26th Annual Green Chemistry & amp; Engineering Conference in Reston VA. David also gave a poster presentation at the 2022 Organometallic Chemistry Gordon Research Conference at Salve Regina University.

David Vicic has served as the Chair of the ACS Winter Fluorine Conference (WFC) that was held in Clearwater, FL in January 2023. The WFC is the flagship meeting of the ACS Division of Fluorine Chemistry and attracts top academic and industrial scientists from around the world.

The published scientific contributions from the group include:

"Synthesis, Characterization, and Solution Behavior of Solvated Perfluoroethyl and n-Perfluoropropyl Cobalt (III) Complexes" Xue, T.; Shreiber, S. T.; Cramer, R. E.; Vicic, D. A. J. Fluorine Chem. **2022**, 261-262, 110030.

"Transformation of brucine into trifluoromethyl neobrucine using the homoleptic nickel catalyst [Ni(CF 3) 4] 2 - " Shreiber, S. T.; Puchall, G. I.; Vicic, D. A. Tetrahedron Lett. 2022, 97, 153795.

"Synthesis, Structure, and Electrochemical Properties of [LNi(R f)(C 4 F 8)] - and [LNi(R f) 3] - Complexes"



David Vicic (Cont'd)

Shreiber, S. T.; Amin, F.; Schäfer, S. A.; Cramer, R. E.; Klein, A.; Vicic, D. A. Dalton Trans. 2022, 51, 5515-5523. This work was selected for Dalton Transactions' Spotlight Collection on Fluorinated Ligands and their Effects on Physical Properties and Chemical Reactivity.

"Access to Perfluorometallacyclopentane Complexes of Cobalt through the [(MeCN) 4 Co(C 4 F 8)][PF 6] Precursor" Xue, T.; Cramer, R. E.; Vicic, D. A. Organometallics 2021, 40, 3585-3590.

Submitted works include:

"Synthesis and electrochemical properties of tetramethyl ammonium salts of [(PhO)Ni(CF 3) 3] 2- and [(7-azaindole)Ni(CF 3) 3] 2- "Shreiber, S. T., Cramer, R. E.; Vicic, D. A. **2022**, submitted.

"Trapping of a Late Metal Terminal Sulfido Intermediate with Phenyl Isothiocyanate" Shanahan, J.; Vicic, D. A.; Jones, W. D. **2022**, submitted.

"Scrutinizing Formally Ni IV 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.; Kosobokov, M. D.; Martin, C. D.; Nebra, N.; Vicic, D. A.; Yruegas, S.; MacMillan, S. N.; Shearer, J.; Lancaster, K. M. **2022**, submitted.



Nate Wittenberg

In 2022, the Wittenberg lab produced its first two Ph.D. graduates: Dr. Jennie Cawley and Dr. Ashley Baxter. Ashley defended her dissertation, "Bioanalytical Techniques to Investigate the Consequences of Photosensitized Lipid Oxidation on Lipid Bilayer Formation and Structure" in April, while Jennie's defense was in July. Jennie's dissertation was titled, "Analysis of

Biomolecular Interactions and New Imaging Approaches for Identifying Membrane Heterogeneities." Jennie has moved on to an industry position with Johnson & Johnson in New Jersey, and Ashley is a Lecturer at the University of Maryland in the Department of Chemistry & Biochemistry.

In collaboration with Profs. Jebrell Glover and Wonpil Im from the Lehigh Chemistry Department, the Wittenberg lab was awarded an NSF grant for a project titled, "Biophysical Studies of Lipid Droplets and their Associate Proteins." This grant will fund our collaborative research on the structure and function of the protein oleosin, especially with regard to how it stabilizes lipid droplets found in plant cells. Additionally, we are investigating ways that synthetic lipid droplets can be used in water remediation.

In the last year, Nate gave invited seminars at a number of universities, including Brigham Young University, the University of Washington, Florida State University, and Virginia Commonwealth University.

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

J.L. Cawley, A.I. McDarby, A.R. Honerkamp-Smith, N.J. Wittenberg. A Luminescent Complex of Europium and Tetracycline Labels Liquid Disordered Membrane Domains and Causes GM1 Redistribution. *bioRxiv* **2022**.07.01.498133.

G. Ongwae, M. Chordia, J.L. Cawley, B.E. Dalesandro, N.J. Wittenberg, M.M. Pires. Targeting of Pseudomonas aeruginosa Cell Surface via GP12, an Escherichia coli Specific Bacteriophage Protein. *Scientific Reports* **2022**, 12, 721.

J.A. Julien, S.G, Mutchek, N.J. Wittenberg, K.J. Glover. Biophysical Characterization of Full-Length Oleosin



Nate Wittenberg (Cont'd)

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

Dr. Xu's lab has published the following papers:

C. Ding, R. Shrestha, X. Zhu, A. E. Geller, S. Wu, M. R. Woeste, W. Li, H. Wang, F. Yuan, R. Xu, J. H. Chariker, X. Hu, H. Li, D. Tieri, H.-G. Zhang, E. C. Rouchka, R. Mitchell, L. J. Siskind, X. Zhang, X. G.

Xu, K. M. McMasters, Y. Yu and J. Yan "Inducing Trained Immunity in Pro-metastatic Macrophages to Control Tumor Metastasis" Nature Immunology in press 2023

A. Dorsa, Q. Xie, M. Wagner, and X. G. Xu "Lock-in Amplifier Based Peak Force Infrared Microscopy" Analyst 148, 227 2023

Q. Xie, H. Wang, and X. G. Xu "Fourier-Transform Atomic Force Microscope-Based Photothermal Infrared Spectroscopy with Broadband Source" Nano Letters 22, 22, 9174-9180 2022

L. Wang, H. Wang, and X. G. Xu "Principle and Applications of Peak Force Infrared Microscopy" Chemical Society Reviews 51, 5268-5286 2022

Q. Xie, H. Wang, and X. 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

Q. Xie, J. Wiemann, Y. Yu and X. G. Xu "Dual-Color Peak Force Infrared Microscopy" Analytical Chemistry 94, 2, 1425-1431 2022

H. Wang, Q. Xie, and X. 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

J. M. González-Fialkowski, L. Wang, Y.J. Li and X. G. Xu "Nano-Chemical and Mechanical Mapping of Fine and Ultrafine Indoor Aerosols with Peak Force Infrared Microscopy" Analytical Chemistry 93, 50, 16845 2021

Y. Li, J. Ding, C. Liang, X. Zhang, J. Zhang, D. S. Jakob, B. Wang, X. Li, H. Zhang, L. Li, Y. Yang, G. Zhang, X. Zhang, W. Du, X. Liu, Y. Zhang, Y. Zhang, X. G. Xu, X. Qiu, and H. Zhou, "Nanoscale Heterogeneous Distribution of Surface Energy at Interlayers in Organic Bulk-heterojunction Solar Cells" Joule, 5, 12, 3154 2021

Xiaoji Xu was invited to give the following presentation talks:

Bruker Virtual Workshop on NanoIR Spectroscopy and Imaging: Recent Developments and Applications, Sept. 1, 2021 (online)

FACSS SciX 2021 Conference, Providence, RI, USA. Sept. 26 to Oct. 1, 2021 (online)

Material Research Society 2021 MRS Fall Meeting and Exhibit, Boston, MA, Dec. 6 2021 (online)



Xiaoji Xu (Cont'd)

PIERS: PhotonIcs and Electromagnetics Research Symposium 2021, Hangzhou, Zhejiang, China, Apr. 22, 2022 (online)

Keynote presentation, The 82th Physical Electronics Conference, Loyola University Chicago, IL, Jun. 7-9, 2022

American Chemical Society Fall Meeting, Chicago, IL, USA, Aug. 23, 2022

Department of Chemistry, University of New Haven, New Haven, CT, Sept. 9, 2022

FACSS SciX 2022 Conference, Northern Kentucky, KT, USA, Oct. 2, 2022

Department of Chemistry, University of Arkansas, Nov. 4, 2022 (online)



Liz Young

The Young Lab welcomed two new graduate students to the group since our last update. Welcome to Domenica Fertal and Christian Guzman who both joined the group late in the fall of 2021. Shea Martin received the Lehigh University Horner Fellowship for the 2022-2023 year to fund his project on Re(I)-carbonyl complexes for photo-induced proton-coupled electron transfer. In February, Shea gave a

presentation in the graduate student seminar series detailing the results of his thesis projects entitled "Combining Experiment and Computation to Solve Complex Problems in Photochemistry."

During 2022, Professor Young gave seminars the University of Houston, Villanova University and Muhlenberg College. She was invited speaker at the Philadelphia Inorganic Colloquium in the Fall of 2022. In November, Professor Young gave two international talks in Germany, visiting the Friedrich-Alexander-Universität Erlangen-Nürnberg and the Ludwig-Maximilians-Universität in Munich. And, in May, Professor Young traveled to Mexico to the 3rd Frontiers in Photochemistry Conference to deliver a talk on "Ultra-fast Excited-State Dynamics of Accessing triplet Excited States in Porphyrinoids". Professor Young attended the Electron Donor-Acceptor Interactions Gordon Research Conference in August to present a poster on "Photo-induced Charge Transfer Dynamics in thin-films of Sb 2 S 3."

In 2022, the Young lab hosted Prof. Jared Paul (from Villanova) and his undergraduate research students Olivia Kachurak ('24); Tyler Caron ('24); Hailey Bierling ('25) to carry out transient absorption measurements on Ru(II)-complexes. Visiting scholar Dr. Ryan Crisp (from the University of Erlangen, Germany) visited for 5 weeks to use our ultrafast laser system.

Over the summer, Professor Young and Professor Fredin, continued the second 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; Rachel Joh, Chem '25; Gabe Masso, Chem '24) are continuing their research projects during the 2022-2023 academic year. See https://wordpress.lehigh.edu/younglablehigh/pure/ for more details.

Professor Young was awarded an American Chemical Society Petroleum Research Fund grant entitled "Controlling Excited-State Dynamics and Reactivity of Naphthalene-Based Azo Dyes" and began work on this project in May 2022. On the teaching and mentoring front, Professor Young was awared the 2022 Lehigh Early Career Award for Distinguished Teaching, Lehigh University. She also completed the CIMER Mentor Training run by the Deputy Provost for Faculty Affairs and the Deputy Provost for Graduate Education and participated in the Inclusive Excellence in Teaching Workshop run by the CITL at Lehigh CITL. Professor young continues to serve on the Leadership team of the Chemistry Women Mentorship Network (ChemWMN) (http://brandicossairt.wixsite.com/ chemwmn), which has the goal to create a national network of women in academic chemistry to provide support, encouragement and mentorship for young women considering careers in academia.



Liz Young (Cont'd)



Over the summer of 2022, Professor Young and Professor Fredin, continued the second 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; Rachel Joh, Chem '25; Gabe Masso, Chem '24) are continuing their research projects during the 2022-2023 academic year.

See https://wordpress.lehigh.edu/younglablehigh/pure/ for more details.

Pictured here, L to R, Lisa Fredin, Gabe Masso, Jake Haber, Christian Guzman (Grad mentor), Zach Knepp (Grad mentor) Domenica Fertal (Grad mentor), Rachel Joh, Allen Chen, Elizabeth Young

Research Highlight! The Young Lab has published two recent articles on a Pd(II)-biladiene moiety that we are developing as a photosensitizer drug for photodynamic therapy.

Photodynamic therapy (PDT) is a way to treat cancer using light. PDT relies on photosensitizer (PS) drugs that are activated to kill cancer cells when light is shined on them, thereby making the treatment spatially specific within the body. The key aspect to advance this therapy is the development of PS drugs with the necessary properties.

Effective photosensitizers should ideally exhibit these four key characteristics: (1) absorb light in the therapeutic window, (2) have prolonged excited-state triplet lifetimes for the treatment to be effective, (3) efficiently generate reactive oxygen species (singlet oxygen), and (4) have high specificity for targeting cancer cells.



In collaboration with the Rosenthal group at the University of Delaware, the Young lab has developed and investigated a series of porphyrinoid complexes that can be used as PS drugs for PDT. Our lab has carried out the time-resolved spectroscopy to quantify the excited-state evolution of three specific Pd(II) biladine complexes. In doing so, we discovered excitation-wavelength dependent photophysics that is uncommon in most chromophores. In collaboration with the Fredin group at Lehigh, we rationalized that excitation into higher-energy metal-mixed-charge-transfer excited states with high spin–orbit coupling to higher-energy metal-mixed-charge-transfer triplet states leads to the additional excitation deactivation pathway. The results of our team's work demonstrate that Pd(II) biladienes support a unique triplet photochemistry that may be exploited for development of new photochemical schemes and applications. Our results are reported in the following two publications:



Liz Young (Cont'd)

Martin, S.M.[§]; Repa, G.; Hamburger,R.C.[§]; Pointer, C.A.[§]; 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)

Cai, Q.; Rice, A.T.; Pointer, C.A.[§]; Martin, M.I.; Davies, B.; Yu, A.; Ward, K.; Hertler, P.R.; Warndorf, M.C.; Yap, G.P.A.; **Young, E.R.**; Rosenthal, J.* "Synthesis, Electrochemistry and Photophysics of Pd(II) Biladiene Complexes Bearing Varied Substituents at the sp³-Hybridized 10-Position." *Inorg. Chem.* **2021**, *60*, 15797–15807. (https://doi.org/10.1021/acs.inorgchem.1c02458)

A Textbook Case of Teaching



Chemistry faculty member Liz Young was chosen to be a face of physical chemistry for the new Atkins *Physical Chemistry* textbook (12th edition). They have a new section called People and Perspectives and she was interviewed for that section. They produced a 12 minute video of the interview, which can be found at this link: <u>https://drive.google.com/file/d/1g8pvASkPERM8YEk_XftuLiP0sgBkJiD1/view?usp=sharing</u>. Her segment starts at video marker 0:56.

During the interview, Prof. Young gives her perspective on the question "What advice would you give to someone studying physical chemistry with regards to their future career?" In her response she says,

"One thing about physical chemistry and chemistry in general is that it's not just about knowing the thing, the answer to the problem you're working on, it's understanding why something is the way it is... The why is the most important thing that we can ask ourselves in physical chemistry and one of the most important answers that we work towards as physical chemists -- to understand the chemistry of our project or of our reaction or of our material."



Lisa Arechiga joined the Chemistry Department as the Faculty Coordinator last August. She began full time employment at Lehigh University in August of 2013 as the Graduate Coordinator in the Materials Science and Engineering Department, and also supported the Polymer Science and Engineering on campus and Distance Education programs. Prior to that, she worked part-time as a moderator for courses offered by Lehigh's Office of Distance Education. She holds a B.A. in Communications and a Master's of Science in Instructional Design and Development, and came with years of corporate experience in training, documentation, newspapers, marketing, and in public education. Lisa enjoys walking, swimming, music, travel, and spending time with her family and friends.



John Texter (MS Chem 1973, PhD 1976) reports that he was elected as Fellow of the Royal Society of Chemistry in December.

Josephine Tan (BS Chem, 1989) writes, "Extremely grateful to retire from the food processing industry after 33 years and also grateful to those who have made a positive impact in my realm. I'm very excited for the second half of reinvigorating and repurposing my life. I'd like to leave you with this thought by an unknown but wise author, "You make a living for what you get; you make a life for what you give."

Immediately after completing her Lehigh chem degree Josie was hired as a quality control chemist by the Lehigh Valley Kraft cheese plant and rapidly took on ever-increasing quality management posts in China (Hong King, Beijing and Guangzhou) and then in Canada (Toronto). She retired from Kraft-Heinz as Head of Food Safety and Quality for Canada.



Peter DeMatteo (BS Chem E 2002, MS Chem 2004) writes that he has successfully completed a certificate in Project Management while employed as a Principal Scientist at Adesis Inc. in New Castle, Delaware. Since completing his PhD in Organic Chemistry from the University of Delaware in 2011, Peter has been employed at several contract synthesis laboratories in Delaware and Pennsylvania. He writes, "At Adesis we're currently synthesizing anything and everything our clients desire. I can deliver a series of small molecules or large amounts of any single compound in high purity and within targeted timelines."

Dennis M. Todd (PhD 1978) has joined the faculty of Manhattan College (Bronx Campus) as an Adjunct Professor. Dennis is bringing his decades of experience in analytical and clinical

chemistry to the teaching of Manhattan College's General Chem course. The rest of Dennis's very busy days is spent as Chief Science Officer for Cellula LLC, a biopharmaceutical start-up company.

Sherry Rohn Clancy (BS 1994 MS Chem 1995) has completed a postgraduate certificate program in Biotechnology and Biomanufacturing at Montgomery County Community College. After Lehigh, Sherry was employed as a Technical Service Chemist for Occidental Chemical Co. at their Pottstown site. Subsequently she taught chemistry to dental hygiene, radiological technology, and med tech students at MCCC while serving as Financial Administrator for St. James Lutheran Church in Pottstown.

James Devery (PhD 2013) was recently promoted to Associate Professor rank and granted tenure at Loyola University, Chicago, IL. Jim was also elected Chair of the Loyola Faculty Council.

Uli Hacksell (LU Research Scientist, 1983-85) has been recently elected Chairman of the Board of the Swedish pharmaceutical company Medivir. Medivir's research is in chemotherapeutics for difficult to treat malignancies including liver, pancreas, and brain. After Lehigh, Uli joined the faculty of his alma mater Uppsala University, rose through the ranks to become Professor and Chemistry Department Chair and then in 2000 joined Arcadia Pharmaceuticals (San Diego, California). He retired as Arcadia's CEO in 2015 to return to Sweden as Board Chair at Medivir.

Jane Knapp Patriarca (MS Chem, 1998) has been promoted to Vice President (Product Integrity and Process Improvement) at Binney and Smith (Crayola) Inc., Easton, PA.

Christine Martey-Ochola (PhD 2001) has joined the administration of SUNY (Broome), Binghamton, NY, as Interim Dean for STEM Education. In her afterhours work, she is also the Co-founder and CEO of Nuele Hair. Nuele (www.nuelehair.com), a company which produces a growing line of all-natural product preparations for scalp and brows, sources its botanicals from



Alumni News



women small-tract farmers in Morocco and Ghana. Christine has been Nuele's chief product formulator.

Scott Shreiber (PhD 2022) from the Vicic Lab, received the ACS Division of Fluorine Chemistry Doctoral Thesis Award. This international award acknowledges one outstanding doctoral student each year for excellence in fluorine chemistry. The awardee receives (1) a certificate, (2) one year registration as full ACS and Division of Fluorine Chemistry member, (3) an invitation to present a lecture at the ACS Winter Fluorine Conference, and (4) a cash award of \$300. Congratulations Scott! Scott recently completed postdoctoral research at the University of Pennsylvania and has taken a job at Adhesives Research, Inc.

Jeremy Webber (MS Pharm Chem 2004) who was Director of Partnerships and Clinical Portfolio Operations at Moderna Therapeutics (Boston) for the last eight years joined the professional staff at Stealth Biotech (Boston) as Director for Portfolio and Alliance Management in March 2023. Jeremy formerly held research and management positions at Tesaro, at the Cima Division of Teva, and at MGI Pharma/Eisai Pharmaceuticals.

Sean Maguire (MS Pharm Chem 2004) was promoted to Director of Comparative and Translational Sciences at GSK. In addition to his Lehigh MS, Sean holds a V.D.M. from University of Pennsylvania School of Veterinary Medicine and manages the *in vitro/in vivo* evaluation of candidate pharmaceuticals at Glaxo.

Joseph Karpinski (MS Pharm Chem 2002) retired as Principal Scientist after a long career in medicinal chemistry with GSK Pharmaceuticals and joined the faculty of Harcum College (Bryn Mawr). Joe recently completed 10 years of teaching at Harcum where he now holds the rank of Associate Professor.

Jay Elwood Rowe, Jr., (PhD 1973), after decades of leadership positions (VP for Operations, Director of R&D) in the dyestuff industry with Crompton and Knowles and Yorkshire Color, obtained an MBA and passed the Patent Bar Examination. Jay is now a Registered Patent Agent for Oblon, McClelland, Maier & Neustadt, L.L.P. — Intellectual Property Lawyers, Alexandria, VA.

George Marchesini (MS Org Chem 1989), has been named Senior Director for Commercial Regulatory Affairs at Bristol Myers Squibb. George has been in drug regulatory affairs representing pharmaceutical companies with the FDA while climbing the totem pole with sequential positions in Merck, J&J, Novartis, Celgene, and BMS. His present focus is hematological and cell therapy products.

Raymond J. Pugh (PhD Pharma Chem, 2010) has been promoted to Associate Professor in Chemistry with tenure at University of Wisconsin Platteville. Ray teaches biochemistry and organic chemistry at Plattesville.



Raymond Pugh in the classroom



In Memorium

Alumni News

REMEMBERING James E. Sturm

An Accomplished Chemist

James Sturm was the 'go-to guy' for students striving to master physical chemistry. He also had a fondness for pocket watches and the poetry of Ogden Nash.

James Edward Sturm, 91, professor emeritus of chemistry at Lehigh, passed away peacefully on Thanksgiving Day, Nov. 25, 2021.

Sturm joined Lehigh's faculty in 1956, where he taught physical chemistry, nuclear chemistry and radiochemistry, and pioneered lab reporting protocols. He performed research in chemical kinetics, radiation chemistry, photochemistry and the collisional efficiencies of reactions of high-velocity atoms. He retired from Lehigh in 1995.

Born in New Ulm, Minn., on March 28, 1930 to the late Bernard J. Sturm and Magdalene J. Foerster, Sturm's cherished childhood memories included visiting with family, fishing and skating on the Minnesota River and working odd jobs. With no family car, he walked everywhere in the quintessential mid-western town and never minded the cold.

Inspired by a railroad watch that his father left him, Sturm became an avid watch collector, repairman and expert on antique pocket and railroad watches. He was active in the National Watch and Clock Collectors Association. An enthusiast of Ogden Nash, he also was quick with a limerick or pun.

"Jim was a delightful colleague and accomplished physical chemist, known also for his friendly and supportive disposition, eagerness to help others, ready sense of humor, and love of pocket watches and the poetry of Ogden Nash," said Greg Ferguson, chair of the department of chemistry at Lehigh.

Sturm graduated from St. John's University in Collegeville, Minn., and earned his Ph.D. in chemistry from the University of Notre Dame. He did postdoctoral work at the University of Wisconsin. Additionally, Sturm was a longstanding member of the American Chemical Society. Drawing from his upbringing in "The most German town in America," he used his German skills to translate chemistry journal articles.

Ned Heindel, emeritus Howard S. Bunn Distinguished Professor of Chemistry, said Sturm was the "go-to guy" for Lehigh students striving to master physical chemistry. He said Sturm was generous with his time with struggling students and could explain in multiple ways the meanings behind the P-chem equations. "His approach yielded many grateful students," Heindel said. "He kept very long office hours."

Additionally, Sturm found many occasions to launch his repertoire of Nashisms. "He knew scores of limericks but was especially fond of ones with a chemistry connection," Heindel said. "He had the talent to inject just the right Nash verse–whether on an uncommon acid or on DDT– into his classroom lecture."

These were two of Jim's chemical favorite limericks.

A mosquito cried out in great pain, "A chemist has poisoned my brain!" And the cause of his sorrow Was para-dichloro-Diphenyl-trichloroethane. [Editor's note: for those of you who had trouble with Organic, that's DDT]

The ant has made herself illustrious By constant industry industrious. So what? Would you be calm? Would you be placid? If you were filled with formic acid?

With his wife, Margaret Ruth Sturm, who preceded him in death in 2016, Sturm bought the one-room Wassergass Schoolhouse in Lower Saucon, Pa., in 1959 and was the creative force in transforming the school into a family home where they raised seven children. He was also very active in his community.

Sturm is survived by his children and nine grandchildren.

See story contributed by Prof. Sturm on page 18.



Alumni News

In Memorium

Death of Robert D. Rapp (LU PhD 1967) and Retired Visiting Research Scientist (1992-2018)

It would be just after 8 am on a Monday or Tuesday morning and regular as clockwork Robert D. Rapp (LU PhD 1967) would have arrived at his



7th floor Mudd Laboratory prepared to work. From 1992 to 2018, Rapp, a visiting research scientist, had the longest association with the department of any volunteer alumnus. Bob Rapp passed away on October 4, 2022 at the age of 91 at the Zerbe Home in Lancaster, Pa., from the complications of Alzheimer's disease.

Bob was 34, working in a Reading clinical lab, when he enrolled at Lehigh in pursuit of a PhD in organic chemistry. Not only in age but also in experience, Bob was far from the typical Lehigh chemistry grad student. During the Korean War he'd served as a hospital corpsman in the US Navy (1949-1955), studied chemistry at Tufts under a Naval Midshipman scholarship, worked as a polymer chemist at Alkyd Resins and Polymer Corporation, and was engaged in both routine clinical analyses and clinical research at the Reading Hospital.

Liver enzyme levels, protein bound iodine numbers, blood sugars, glucose tolerance tests, and BUNs were just a few of the countless assays Bob learned to run as individual procedures years before the introduction of the auto-analyzers, ACAs, and microtiter formatted Elisas made clinical chemistry a highly instrumented field. Thanks to a supervising pathologist who encouraged research, Bob published three articles on new analytical methods for serum amino acids and for lactic dehydrogenase. He caught the fever for doing chemistry research.

At Lehigh, Bob's interests in the biomedical aspects of chemistry found fulfillment in his doctoral project on antibiotic syntheses under Professor Irving J. Borowitz. Borowitz taught chemistry at Lehigh from 1959 to 1965. Borowitz, a native New Yorker with strong professional and social ties to the Big Apple moved from Lehigh to Yeshiva University and took several of his Lehigh grad students with him. Bob, however, was well on the way to completing his PhD and in addition had ties to the greater Reading area with a home, wife, and twin daughters (born 1955) so relocation to NYC wasn't feasible. Professor Thomas Young took over as Bob's day-to-day mentor but Borowitz remained Bob's dissertation supervisor and signator of the final document. Four publications in Tetrahedron and in the Journal of Organic Chemistry resulted from Bob's doctoral dissertation.

In 1967, with his Lehigh diploma in hand and some part-time teaching experience as an instructor at Lafayette College, he was appointed Assistant Professorship at Albright College. There he rose through the ranks to full professor. While at Albright Bob steadily encouraged the best and brightest of Albright students to take their own graduate degrees at his alma mater on ol' South Mountain. The annual fall trip of carloads of Albright seniors visiting LU's chemistry



In Memorium Alumni News



Bob Rapp (right) met his former Lehigh PhD adviser, Irving Borowitz (left), at the ACS National Meeting, September 2001.

department for the day was something Bob faithfully arranged each year of his teaching Several of Lehigh's most distinguished career. graduate chemistry alumni came to us from Albright where they'd been encouraged and mentored by Bob. These alumni include Dennis Hess (faculty -- Georgia Tech), Nancy Dodrer Arabinick (research chemist -- Liposome Corp), Jessica Zuber Pfennig (regulatory affairs --Merck), and Sherri Young (faculty -- Muhlenberg College).

When he retired from Albright, Bob came back to Lehigh as a Visiting Scientist to work with Ned Heindel's medicinal chemistry group. In 26 years as a volunteer on the Lehigh research staff he mentored dozens of students, served on dissertation committees, conducted personal research in heterocyclic medicinal agents, and coauthored publications and patents.

Bob retired from Lehigh in October 2018 as a Visiting Research Scientist.

Born in 1930 to a Pennsylvania Dutch family living near Reading, Bob grew up immersed in the local German dialect amidst Deutsch farmers. craftsmen, and tradesmen.

He attended many a Groundhog Day dinner, chowed down on countless servings of hog maw,

Schnitz und Knepp, sauerkraut balls, fastnachts, and shoefly pie all washed down with steins of Old Reading, and even performed regularly as a Schuhplattler in a folk-dance group dressed in his own Lederhosen and alpine hat which he frequently wore to Chem Dept parties. Bob often recalled that a couple liters of Old Reading greatly improved his dancing performance.

Ilse Stoll (LU Chemistry MS 1980), died at the age of 80 in her Bethlehem home, February 3, 2023. Isle immigrated from her native Germany in 1963 where she obtained her first degree in chemistry to work as a chemist analyst at multiple area companies. Ilse did her Lehigh MS - on organometallic syntheses project under Kraihanzel — while raising three Professor daughters as a single mom. After Lehigh Ilse worked for J.T.Baker, Bell Telephone, Agere, and Benchmark Analytics. She retired as President of Benchmark in 2012.



Blast from the Past

In the years before Lehigh admitted female undergraduates (1971) and when nearly all the graduate students were male, the University sponsored a unique way to raise money for Southside charities -- the Ugly Man Contest. Students could self-nominate or be nominated by friends. Canisters placed around campus were emblazoned with the names of the candidates, and the one who received the most donated cash was proclaimed "Ugliest Man."



Here in Fall 1956, on the fire escape steps of Chandler-Ullmann Lab, are the chemistry department's nominees: (l to r): R. Miller, Robert G. Smerko, T. D. Eck, R. Rehwoldt, M. Mizianti and George E. Gonis. (Story and photograph from late emeritus professor James E. Sturm. See In Memorium article on page 15.)



Student News 2021 - 2022 Graduates Doctoral Degrees

Ashley Baxter - Bioanalytical Techniques to Investigate the Consequences of Photosensitized Lipid Oxidation on Lipid Bilayer Formation and Structure

Nicholas Boekell - Studies of Coordination-Induced Bond Weakening in Divalent Samarium Complexes Jennie Cawley - Analysis of Biomolecular Interactions and New Imaging Approaches for Identifying Membrane Heterogeneities

Muhammad Imran - Open-shell N-substituted Bisphenalenyls: Synthesis, Optoelectronic Properties, and Device Applications

David Jakob - Pulsed Force Kelvin Probe Force Microscopy

Jeffrey Julien - In vitro Post-Translational Modifications of Caveolin-1 and its Effect on Protein Structure, Topology, and Oligomerization in Model Membranes

Kiran Khadka - Byproduct-free Synthesis, Characterization, and Reactivity of Aminosiloxane and 1, 2-Diaminosiloxane Monolayers on Silicon/Silicon Dioxide, and a Fundamental Study of Droplet Motion on an Incline

William Leon - Mechanical Properties at the Molecular Scale: Making Nanoindentation Quantitative Scott Shreiber - Advancing Fluoroalkylation Methodologies with Copper, Nickel, and Cobalt Eden Sikorski - Targeting the Tumor Microenvironment with pH-Sensitive Agents for Selective Cancer Therapy



Student News

2021 - 2022 Graduates Bachelor's Degrees

NAME MAJOR Shaya Ameri Biochemistry Gina Angelo Chemistry Bachana Bachiashvili Biochemistry Nicholas Bowers Pharmaceutical Chemistry Lexi Branca Pharmaceutical Chemistry Michael Chan Pharmaceutical Chemistry Hailey Cho Biochemistry Anthony Cusumano Biochemistry Thomas Dressler **Biochemistry** Kiera Englehart Chemistry Pharmaceutical Chemistry Helen Flynn Yunlin Fu Biochemistry Jing Guo Biochemistry Thera Hibbler Pharmaceutical Chemistry Yue Hu Chemistry John Huang Biochemistry David Khayata Biochemistry Hailey Kirkendall **Biochemistry** Hunter Louie Chemistry Brianna Maslonka Biochemistry Alyssa Murphy Biochemistry Sarah Mutchek Biochemistry Isabella Papov Biochemistry Thomas Perone Biochemistry Yanqiu Shen Chemistry Hannah Tan Biochemistry Evan Vela Chemistry

Thomas Corey III - MS Chemistry

2021 - 2022 Teaching Assistants of the Year



Shea Martin and Teng Xue, 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.

Welcome New 2022/23 Graduate Students

Khansaa Alshaloug, University of Basrah Paria Aminroaia, University of Zanjan Brett Berger, Alvernia College Sanaz Hashemipour, Islamic Azad University Tyler Jones, Rutgers University Luc Mauro, Delaware Valley Cherry Mae Ravidas, University of the Philippines Josie Rojo, University of the Philippines



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 By contacting Dept. Chair Greg Ferguson (gf03@lehigh.edu) to discuss specific projects By contacting Lehigh's Advancement Office at (800) 523-0565

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You can email the newsletter editor at lia4@lehigh.edu.

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