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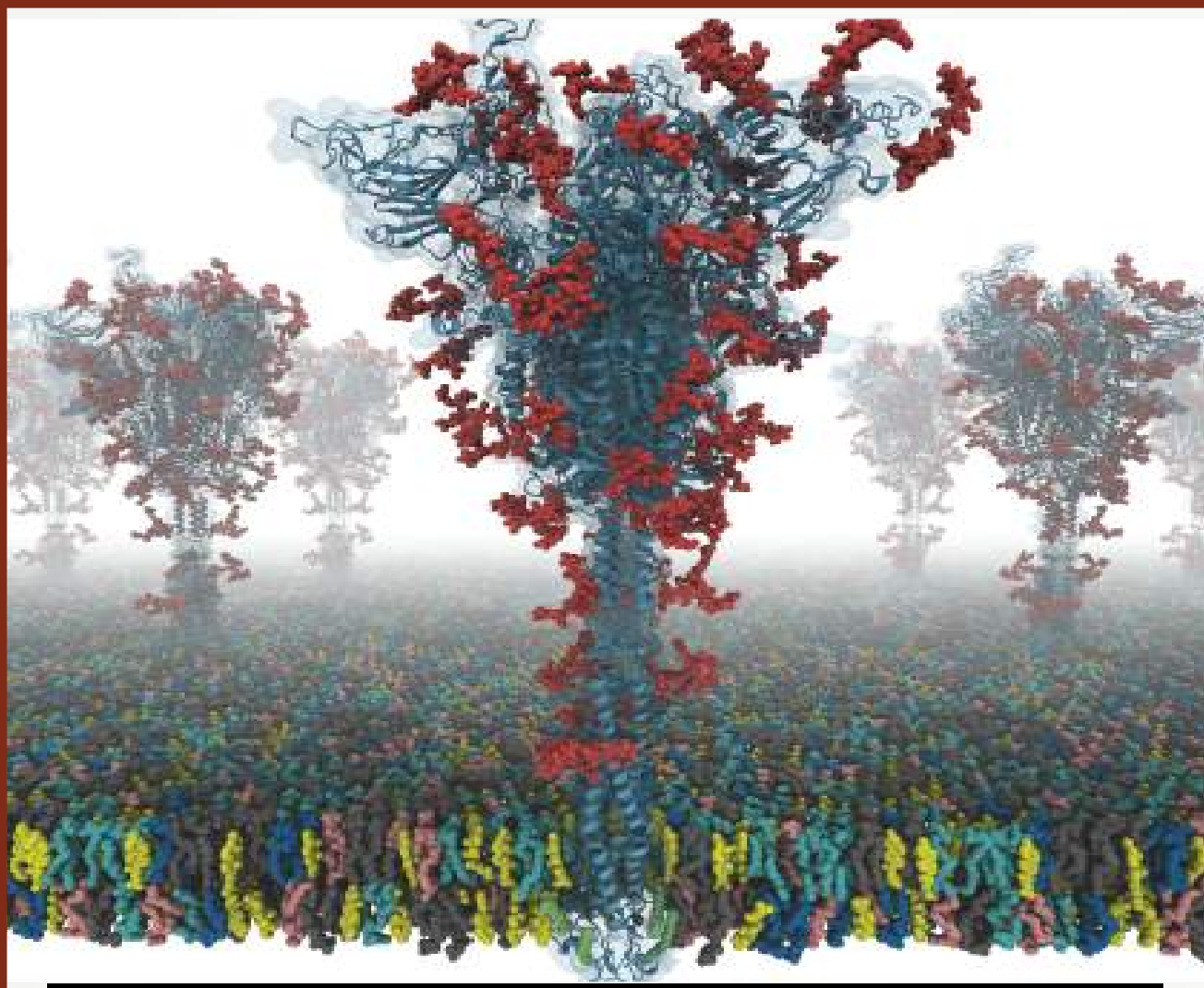
IN
YOUR
EYE



Fall/Winter 2020-2021 Newsletter

No. 50

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



COVID 19 AND THE GLOBAL PANDEMIC YEAR: SCIENCE IN ACTION

50TH
EDITION



LEHIGH
UNIVERSITY

DEPARTMENT OF
CHEMISTRY



Adapting to Challenging World Conditions through Scientific Education and Research Contributions

Transitioning to new types of learning/research modalities to educate next generation scientists and researchers

The Fall 2019 semester (when we published our last newsletter) seems more distant than just under a year-and-a-half ago, so it's hard to believe that within that time we celebrated the announcement that one of our own, Bob Flowers, would be the next Herbert J. and Ann L. Siegel Dean of the College of Arts and Sciences. As that semester drew to a successful close and then as we adjourned to celebrate the 2019 holiday season, the Lehigh Chemistry family felt the customary sense of accomplishment that accompanies that time of year. The academic calendar was only half complete, however, and no one will argue with the notion that the Spring 2020 semester began a calendar year like none we've ever seen before.

Between the start of the Spring 2020 semester in mid-January and Spring Break in March, both Lehigh and the nation had a growing sense of uncertainty about the burgeoning pandemic that had arrived and was quickly spreading. And although we recognized that the University would need to respond to mitigate risk, the abruptness with which we were asked to gather our notes, textbooks, and computer supplies, and begin remote operations was startling. Undergraduates would not return from that spring break until the following fall --and then only first-year students would be living on campus. Our graduate students, postdocs, research fellows, and faculty regained access to laboratories and offices during the summer--once safety protocols, user lists, and sign-in/out sheets for each room were drafted, approved, and posted online.

Significant personnel changes were also woven into the fabric of 2020. During the summer, Lehigh welcomed a new provost, Dr. Nathan Urban, a neurobiologist from the University of Pittsburgh. And then at the beginning of September, we learned that President Simon will step down at the end of the current academic year. Closer to home, we wish the very best to our colleagues Marcos Pires and Yang Yang, who have moved on to new chapters in their life-adventures. You'll learn more in this newsletter about our efforts to continue excellent education and research during these challenging times--and we welcome your news from this unusual year as well, so please stay in touch!



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Department of CHEMISTRY

LEHIGH CHEMISTRY

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 mwr217@lehigh.edu



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ON THE COVER: a representative all-atom molecular dynamics system of a fully-glycosylated full-length SARS-CoV-2 spike (S) protein in a viral membrane.

The membrane consists of a lipid mixture with DPPC:POPC:DPPE:POPE:DPPS:POPS:PSM:Chol=4:6:12:18:4:6:20:30. Color code: S protein in light blue; palmitoylated cysteine residues in green; glycans in red; DPPC and POPC in blue; DPPE and POPE in cyan; DPPS and POPS in pink; PSM in gray; and cholesterol in yellow. For clarity, water molecules and ions are omitted. The illustration was generated using VMD. in the Im lab. (To read more on Wonpil Im's research... please see the "Faculty News" section.)

WITTENBERG LAB USES NIH GRANT

TO DEVELOP NEW
BIOANALYTICAL TOOLS

In the new world of “fast track” chemical research, the Wittenberg lab is funded by the NIH for work on high-throughput analysis of microfluidic nanoarrays.

Heterogeneity pervades biology. Among cells and subcellular structures like organelles there is a great deal of variability in terms of their size, chemical composition, and physiological properties. To understand these heterogeneous properties, researchers often study large groups of single cells, single organelles, or even single molecules. But, studying large samples of single entities comes with a cost. These measurements are usually low-throughput, meaning that many slow and labor-intensive individual measurements are required to gain new insights.

To overcome this challenge and increase throughput, many groups have devised methods to rapidly analyze single cells, organelles, or other biological particles one-after-another. Alternatively, many individual objects can be analyzed simultaneously by arranging them into closely-packed arrays on a surface. The Wittenberg Lab is taking the latter approach for the high-throughput analysis of small vesicles produced by bacteria and isolated nerve terminals, called synaptosomes, acquired from brain tissue. To support this research, Prof. Nate Wittenberg recently received a grant from the National Institutes of Health for a project entitled, “Microfluidic Nanoarrays for High-throughput Analysis of Biological Nanostructures.” The grant will fund two graduate research assistantships through 2021.

The overall goal of this project is to develop technology that enables the simultaneous analysis of hundreds to thousands of individual liposomes, bacterial vesicles, or synaptosomes. These particles are patterned by first creating a nanoscale array of capture spots on glass surfaces using a process that works like a small-scale rubber stamp. The capture spots are small enough (200 nanometer diameter) to capture just a single particle, packed closely together (approx. 1 micron spacing), and they are composed of molecules that specifically capture only the particles of interest. After patterning the capture spots, a microfluidic channel is placed over surface for delivery of particles and reagents to the array.

In collaboration with Prof. Angela Brown (Lehigh Dept. of Chemical & Biomolecular Engineering), graduate students in the Wittenberg group will analyze large numbers of individual bacterial vesicles with fluorescence microscopy to determine how toxins are sorted to vesicles as a function of their size. The synaptosome arrays, also analyzed with fluorescence microscopy, will be used to measure heterogeneity in ion transport, membrane recycling, and neurotransmitter uptake and release.

Nate Wittenberg was born and raised in Eau Claire, WI. He attended the University of Minnesota (B.S.) and Penn State University (Ph.D.), where he studied chemistry. He completed additional research training at the University of Edinburgh (chemistry), the University of Minnesota (chemistry and electrical engineering), and the Mayo Clinic (neurology). His current research group includes four graduate students and multiple undergraduates who work on a variety of bioanalytical projects.

College of Arts and Sciences Names Flowers as New Dean



On November 1, Dr. Bob Flowers took another step along a long and winding path that has led him deep into the heart and soul of Lehigh University--and at perhaps the most critical time in its academic history. Named as the **Dean of the College of Arts & Sciences**, Flowers now sits at the helm of an expanding and very

rapidly evolving College.

A native of Easton, Pennsylvania, he received his B.S. in Chemistry from East Stroudsburg University. Flowers went on to earn his Ph.D. in organic chemistry from Lehigh under the supervision of John Larsen. After leaving Lehigh in 1991, he carried out postdoctoral studies with Ned Arnett at Duke University. It was there that he developed his passion for academia while tutoring undergraduate students in organic chemistry. With this focus in mind, Arnett mentored Bob preparing him well for the launch of his career.

After his work at Duke, he obtained a position at the University of Toledo and rose to the rank of Associate Professor. When Texas Tech offered a position in 2001 with more research capability, he jumped at the chance and settled into an exciting program -- only to be lured back to his alma mater, Lehigh University, in 2003 by a phone call from Lehigh Chemistry Chair, Doyle Daves who has returned to Lehigh as Interim Chair. With much careful consideration, Flowers accepted the position and remained Chair of the Department of Chemistry for nearly 12 years, stepping down in 2015.

After a year on the faculty teaching sophomore organic chemistry, he took the position of Deputy Provost for Faculty Affairs in 2016. During this time, Flowers was very active with his research group which concentrates on the mechanistic analysis and development of electron transfer reagents in organic synthesis, organometallic chemistry, calorimetric analysis of intermolecular interactions, and applications of back-scattering interferometry in molecular recognition.

He has published nearly 130 peer-reviewed papers, a book, a patent, and five book chapters. He has given more than 100 invited U.S. and international lectures at universities and professional meetings and served as a visiting professor at the Research School of Chemistry at the Australian National university and the School of Chemistry at the University of Manchester. He is most

proud of his students and has mentored over 30 M.S. and Ph.D. students and nearly 50 undergraduate students.

Flowers has taught a range of both undergraduate and graduate courses--receiving the Outstanding Teacher Award and designation as Master Teacher at the University of Toledo and the Chancellor's Council Distinguished Research Award while at Texas Tech. In 2008, Flowers was awarded the Danser Distinguished Faculty Chair in Chemistry which is given in honor of excellence in research, teaching, and service. In 2012, he received the Eleanor and Joseph F. Libsch Research Award; in 2016, the Dean's Award for Research, Scholarship, and Creative Activity; and in 2017, he earned the Hillman Award for Excellence in Graduate Advising. He is a Fellow of the American Association for the Advancement of Science and the Royal Society of Chemistry.

When announcing his appointment as Dean, Provost Patrick Farrell noted in the *Lehigh News*, "Flowers has a great deal of experience working on behalf of faculty across Lehigh and brings a well-informed perspective on both academic and administrative issues . . . He brings a unique perspective on this roll, well-informed by his work in the provost's office and his years of teaching and research in the College of Arts and Sciences. Bob has an appreciation for Lehigh's past and for an expansive plan for the future."

Flowers noted that he has benefited from the growing intellectual atmosphere on campus resulting from the hard work of colleagues in the college. He shared that, "The College of Arts and Sciences is on a 'great trajectory' and I believe we are poised to make further strides in national and international recognition." He vows to "provide a supportive and inclusive environment to enable excellence in scholarly activity and teaching and facilitate the efforts of colleagues to achieve a shared vision of the college and university." (To read more, see the article in the online *Lehigh News* -October 29, 2020 edition.)

Xu Named a 2020 Sloan Research Fellow



The Alfred P. Sloan Foundation recognized Dr. Xiaoji Xu as being among "the most promising scientific researchers working today" when it awarded him a prestigious **Sloan Research Fellowship** on February 12, 2020. One of only 23 chemistry recipients across the U.S. and Canada--and nominated for the award by his

peers--Xu shared with Mannan Mehta of *Lehigh's Brown & White* that he will use the two-year, \$75,000 fellowship to "study the formation of aerosols, referring to submicron particles [such as tailpipe emissions]." His research involves a family of techniques called nanospectroscopy and their use in trying to understand how molecules respond to light at the nanoscale level. Xu is developing techniques to bypass the diffraction limit and will use the award, in part, to purchase an aerosol collector that will enable him and his group to use the technique they developed to study the particles' composition and how different chemicals organize to form the particles.

Chemistry Department Chair, Greg Ferguson, noted in a *Lehigh News* interview that Xu is "both a thinker and a doer, conceiving creative solutions to challenging scientific and pedagogical problems and then successfully implementing them."

This is not the first recognition Xu has received for his outstanding research work. He was named one of only ten Beckman Young Investigators awarded in 2018 which came with a prestigious grant from the Arnold and Mabel Beckman Foundation for "the most promising young faculty members in the early stages of their academic careers in the chemical and life sciences." He also received the CAREER award from the National Science Foundation in 2019.

College of Arts & Sciences Dean, Dr. Bob Flowers, stated, "Professor Xu is an extraordinary scholar, mentor and teacher, and this recognition by the Alfred P. Sloan Foundation is an acknowledgement of his current work and promise as a future leader in the development of methods and instruments for measurement and imaging at the nanoscale . . . is important recognition of Professor Xu's scholarly contributions and demonstrates the high quality of research being performed at Lehigh.

In Mehta's discussion with Xu, he attributed his success to "having not been afraid to try new things . . . In this case I feel myself to be very lucky. I had several ideas and when I tried them, almost half of them worked. I was able to bring something new to my research." He notes that getting recognition such as this invigorates research, "When you do research, there's a technical aspect and a confidence aspect. [This gives] a boost to the confidence aspect. . . I am more willing to take scientific risk, conduct high-risk/high reward experiments."

Sloan
Research
Fellows
2020





DEPARTMENT NEWS



The Transition of a University

How the Lehigh University Department of Chemistry redefined pedagogy in three days

It all started with a seemingly innocuous (but nevertheless worrisome) announcement on January 9, 2020: *WHO Announces Mysterious Coronavirus-Related Pneumonia in Wuhan, China*. Say what? What was this . . .? Another bird flu to have to worry about? Should we all check our files to see if we had indeed gotten the swine flu vaccine in 2008 . . . 2009 . . . 2012? Were there soon going to be mad cows roaming the streets? We took a deep breath and settled in to await further news.

It wasn't long in coming. By January 20, the nation's media were screaming that the "bug" had jumped to Thailand and Japan -- and that three airports (JFK, San Francisco and LAX) would begin screening for the coronavirus amongst incoming passengers. But as we now know . . . it was too little--too late. On January 21, the first U.S. coronavirus case was confirmed in Washington state and the virus had killed four people and infected more than 200 in China. On January 31, the World Health Organization declared a global health emergency--followed three days later by a U.S. declaration of a public health emergency. By this point, there were close to 10,000 confirmed cases with 200 deaths reported. Although alarm was growing by the hour, the Center for Disease Control issued a calming note by saying that the virus--now called COVID-19--had only met two of the three required factors to be considered a pandemic: It was an illness resulting in death and it was an illness demonstrating sustained person-to-person spread, but it had not yet reached the standard of worldwide spread.

When a cruise ship docked at a California port on March 6, a random screening of 46 passengers found 21 testing positive for the virus. Like the

WWII novel and movie "Voyage of the Damned", the ship was turned away from the harbor and images began to emerge of sick passengers begging for help. This news set off a panic across the nation. Video of the ship wending its way slowly up the coast towards yet another port seeking asylum and help were heartbreaking and terrifying. The truth could no longer be ignored--and by March 11, the WHO declared COVID-19 a pandemic--followed two days later by the U.S. declaration of a national emergency.

On March 16, Pennsylvania governor, Tom Wolf declared a "stay-at-home" order mandating all residents to stay at home except for essential jobs and life sustaining needs.

However, by February 22, far in advance of these official actions, the Lehigh University Health & Wellness team had begun monitoring the situation and keeping the entire campus community informed of the University health status--and providing guidance on where to get information about the expanding global healthcare concern. On February 28, President Simon issued a caution for students who were planning travel over the March 9-13 spring break week--and by March 5, faculty were being given information from the Center for Innovation in Teaching and Learning (CITL) on prepping for a possible change to remote instruction and encouraged by Provost Farrell to actively plan for this contingency.

On March 12, following confirmation of the first confirmed case of COVID-19 in the Lehigh Valley, President Simon announced that Lehigh was moving to remote learning for the remainder of the spring semester.

In his announcement, Simon acknowledged that, "Making a rapid transition to remote teaching and learning is, without question, a challenge. But Lehigh gets things done. And what we do, we do well. Many of our faculty already have experience using remote teaching approaches. Those who did not, have been actively partnering with our CITL and other Library and Technology Services staff to quickly learn and apply the fundamentals of remote teaching and learning."

For those of you who have experienced the rigorous nature of a Lehigh chemistry course, you may be asking how science courses of this nature could possibly be continued under this environment.

We're glad you asked! Professor of Practice, Andy Ho, who teaches the large general chemistry courses for the department, has shared his experience in making this transition to 100 percent remote instruction -- and then back to a variety of instructional modalities in the Fall 2020 semester.

Q: What was your last day on campus in March of 2020 (and what was that like?) What was your first day back to campus (and what was that like?)

My last day was the Friday (3/13) before the university completely closed down building access "until further notice" on March 18, 2020. This was after the announcement about classes moving online for the rest of the semester had already been made on March 12, so I was there to pick up some items from my office.

My first day back was at the beginning of August – that was primarily to print some documents and collect some more items from my office.

Q: Did you continue to meet virtually with students on a regular basis?

I provided lectures via a variety of technologies and scheduled multiple office hours every week for the duration of the spring semester. This was to ensure that every student had the opportunity to meet with me.

Q: What was that like? Did you use technologies like Zoom or Panopto, to stay connected students? Were classes synchronous, asynchronous—or some blend of those options?

I recorded asynchronous lecture videos using Panopto and posted those for the students to review. I used Zoom for office hours and other meetings.

Q: How were students able to complete the lab portion of their chemistry instruction?

The students were given experimental data that allowed them to write and submit their lab reports.

Q: Have you returned to the campus for in-person instruction in the Fall semester? If so, what are the arrangements for a safe environment while in lectures and labs?

The laboratory portion of CHM 30 is being held in person while the lecture is purely online. The lab capacity has been reduced, so students alternate between in-person and virtual experiments. Students must pass their self-assessment prior to attending lab. While they are in the laboratory every student works by themselves and is distanced from their classmates.

They also wear a mask, goggles, and gloves at all times – to avoid contamination we provide them with a fresh mask when they enter the lab. This mask is then disposed of when they leave. All surfaces are also sanitized between each session.

Q: About what percentage of students are you teaching virtual versus actual on-campus students this semester? What are the challenges in these situations.

Due to safety restrictions, the CHM 30 and 31 lectures are purely virtual. One of the challenges is being accessible to students who may be located all across the world – noon at Lehigh may correspond to midnight in other time zones. It is also impossible to replicate certain benefits of in-person instruction that we often take for granted. Being able to connect with our students is much more difficult.

In addition, while the total amount of instructional time with the students might be the same, preparing and implementing virtual classes is requiring significantly more time than a regular class. This also applies to exams as there are limitations to what we can reasonably expect a student to do online, especially in large introductory courses.

Ho is a native of sunny southern California. He did his undergrad work at UCLA and completed his Ph.D. in Chemistry at Harvard University working under James G. Anderson. He came to Lehigh in 2009 as the manager of the general chemistry labs-- and then accepted a position as Professor of Practice in 2013





Mark Chen

In the past year, the Chen Lab has made significant advances in their development of open-shell organic materials, especially regarding their potential to serve as emitters. Led by the new synthesis developed by Imran, he and Caleb published a communication in the *Journal of the American Chemical Society* **2020**, *142*, 38) that describes a nitrogen-substituted bisphenalenyl π -radical cation that represents a structurally unique doublet emitter, and achieves conductivity via antiambipolar charge transport. Previously, antiambipolarity always required a heterojunction between two disparate material layers. A single layer device that employs our N-substituted π -radical cation is uniquely capable of achieving antiambipolar transport because of the similar energies of holes and electrons that result from a singly-occupied molecular orbital. Exploitation of this electronic property bears potential for simpler fabrication of devices capable of faster signal switching.

The emissive properties of our bisphenalenyl compounds has also led to a collaborative effort between the Chen, Fredin, and Young Labs that is investigating how spin multiplicity affects fundamental electronic structure and photophysics. Since the N-substituted π -radical cation (RC) shares a near-identical emission with its oxidized dicationic (DC) form, we subjected the redox pair to a suite of experimental and computational analyses. We discovered that, despite their similar luminescent properties, DC and RC proceed by different emission mechanisms, where spin (un)pairing controls excited-state reorganization in RC. This manuscript was just recently accepted for publication in *Chemical Science*.

Although the recent and ongoing pandemic did cause the cancellation of all in-person conferences/symposia and on-campus activities, at least temporarily, the group can report some positive social news from the past year. The group welcomed their newest graduate student, Gisselle Rojas, who graduated from Drew University where she worked with Lehigh Chemistry alumnus Prof. Kim Choquette. Kat Dunn also joined the group in Fall 2019 as an undergraduate researcher. In terms of graduations, the group had to sadly say good-bye to Marina Sutija and Olivea Vasquez who both graduated in May 2020 and moved-on to a chemical industry position in NJ and the start of a Chemistry Ph.D. at Tufts University, respectively.

In the next few months, the group will be looking forward to Caleb's Ph.D. graduation (who was a recipient of the College of Arts and Sciences Graduate Research Award in April 2020), along with submitting manuscripts regarding the development of an ink for colorimetric oxygen-sensing (Imran) and transparent organic thin films that achieve efficient electron conduction (Caleb).



Greg Ferguson

Despite the challenges in 2020, Zahed Ghelichkhah remained focused and busy, working in the lab to collect data using electrical impedance spectroscopy, and then and remotely to develop a quantitative description of the growth of an anodic oxide on gold using the point defect model (PDM). The PDM was developed by Digby MacDonald — currently Professor in Residence at UC Berkeley and Professor Emeritus at Penn State—

who collaborated on the project. A full paper describing this work has been submitted and is currently under review. In addition, Kiran Khadka accepted a position as Senior Research Chemist at Versum Materials and plans to defend his PhD dissertation soon. In alumni news from the group, we recently heard from Kexin Chen (B.S., '19), who completed a M.S. in Chemical Engineering Practice at MIT and is now applying to Ph.D. programs.



Oriana Fisher

The Fisher Group welcomed its first members, graduate students Madhura Damle and Andrew Zimmerly, and settled into research space on the 6th floor of Mudd. They are looking forward to being able to safely return to the research projects they began before the pandemic on proteins involved in bacterial copper uptake and signal transduction. Dr. Fisher received a Lehigh Class of '68 Faculty Fellowship and the lab was granted synchrotron beamtime at the Advanced Photon Source to pursue macromolecular crystallographic studies. Dr. Fisher published the following papers in the past academic year:

Fisher, O.S.; Sendzik, M.R.; Ross, M.O.; Lawton, T.J.; Hoffman, B.M.; Rosenzweig, A.C. "PCuAC Domains from Methane-Oxidizing Bacteria Use a Histidine Brace to Bind Copper" *J Biol Chem.* **2019**, *294*, 44, 16351-16363.

Fisher, O.S.; Li, X.; Liu, W.; Zhang, R.; Boggon, T.J. "Crystallographic Studies of the Cerebral Cavernous Malformations Proteins" *Methods Mol Biol.* **2020**, *2152*, 291-302.



Robert Flowers

Robert Flowers gave two invited lectures at Ithaca College and Virginia Tech entitled: “Unraveling the Mechanism of Electron Transfer from Samarium(II)-Water Complexes.” He also gave an invited lecture at the 9th Pacific Symposium on Radical Chemistry entitled: Proton Coupled Electron Transfer in Substrate Reduction by Sm(II)-Proton Donor Complexes. He is also a co-organizer of Angular Momentum, a monthly virtual international conference series highlighting exciting research in f-element chemistry. Details can be found at <https://twitter.com/felementangular>.

His group published the following papers during the past academic year:

Nimkar, A.; Maity, S. Flowers, R.A. II and Hoz, S. “Contrasting Effects of Additives on Photocatalyzed Reactions of SmI₂” *Chem. Eur. J.* **2019**, *25*, 10499-10504.

Ramírez-Solís, A.; Bartulovich, C.O.; León-Pimentel, C.I.; Saint-Martin, H.; Anderson, W.R., Jr. and Flowers, R.A. II “Experimental and Theoretical Studies on the Reactivity of SmCl₂ in Aqueous Media” *Inorg. Chem.* **2019**, *58*, 13927-13932.

Bartulovich, C.O.; Flowers, R.A. II “Coordination-Induced Bond Weakening in Sm(II)-water Complexes” *Dalton Trans.* **2019**, *48*, 16142-16147.

Zhang, Z.; Hilche, T.; Slak, D.; Rietdijk, N.R.; Oloyede, U.N.; Flowers, R.A., II and Gansauer, A. “Titanocenes as Photoredox Catalysts Using Green Light Irradiation” *Angewandte Chemie, Int. Ed.* **2020**, *59*, 9355-9359.

Ramírez-Solís, A.; Bartulovich, C. O.; León-Pimentel, C. I.; Saint-Martin, H.; Boekell, N. G. and Flowers, R.A., II “Proton Donor Effects on the Reactivity of SmI₂. Experimental and Theoretical Studies on Methanol Solvation vs. Aqueous Solvation” *Dalton Trans.* **2020**, *49*, 7897-7902.



Lisa Fredin

The Fredin Group has had a productive year learning more about how disorder in materials affect their photo- and catalytic chemistries, including light-driven faceted-metal nanoparticle catalysis, conduction in open shell organic materials, and manganese dopants and vacancies in perovskite oxides. The group is building computational methodologies bridging physical chemistry, material science, and nanoscience to study a broad range of materials as they are used experimentally including disorder. In addition to fundamental discoveries, we are realizing the technological potential of our research by collaborating with synthetic chemists and material scientists, spectroscopists, and engineers.

This year, the group was awarded two Lehigh CORE grants to seed new projects in modeling amorphous molybdenum oxide with Profs. Strandwitz (Mat. Sci.) and Webb (Mechanical Engineering) and a new class of covalent frameworks with Profs. Landskron and Young. The group has expanded their resources to over 1.5 million computing hours. All these resources came in handy during the transition to remote work when other experimental students were using more computational time and the national computing centers were dedicating resources to the pandemic. In addition, Prof. Fredin, Profs. Rangarajan, Balasubramanian, and Webb (Chemical and Mechanical Engineering), and Dr. Pacheco (Research Computing) were recently awarded \$400,000 from NSF to build a new supercomputer at Lehigh.

This summer Prof. Fredin Co-Chaired the Photochemistry Spotlight virtual symposium, where 23 speakers and 6 discussion leaders had discussions around some of the big questions in photochemistry. Over 830 unique users joined from 43 countries making it one of the largest photochemistry meetings ever! In addition, Prof. Fredin gave an invited talk at North East Centre for Energy Materials (NECEM) at Newcastle University virtually in July.



Jebrell Glover

The Glover group published a paper in *Biophysical Chemistry* entitled "Reconstitution of Full-Length Human caveolin-1 Into Phospholipid Bicelles: Validation by Analytical Ultracentrifugation." The Glover group also published a book chapter in *Methods in Molecular Biology* entitled "Preparation of Caveolin-1 for NMR Spectroscopy Experiments." Former Glover lab member Lucie Loftus started a position as a Downstream Process Development Scientist at Eurofins - Lancaster Labs.



Wonpil Im

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

GRANTS:

NIH R01 GM138472 (PI: 2020-2024)CHARMM-GUI Development of Biomolecular Modeling and Simulation Community

NIH R01 GM087544 (Co-Investigator: 2020-2024; PI: Howard Hang)Studies of Protein LipidationNSF DBI-2011234 (PI: 2020-2024)CIBR: Computational resources for realistic simulations and analysis of protein in natural biomembranes

NIH R01 GM103899 (Co-Investigator: 2019-2023; PI: Vera Moiseenkova-Bell)Structural Insights into TRPV Channel GatingNSF OAC-1931343 (PI: 2019-2023)Collaborative Research: Frameworks: Cyberloop for Accelerated Bionanomaterials Design

INVITED TALKS:

1. Institute for Quantitative and Computational Biosciences, UCLA, LA, USA
2. Center for Complex Biological Systems University of California, Irvine, USA
3. Glyco-lipidologue Symposium, RIKEN, Tokyo, JAPAN
4. PharmCADD CO., LTD., Busan, KOREA
5. Department of Chemistry, Sookmyung Women's University, Seoul, KOREA
6. Arontier, Inc, Seoul, KOREA
7. School of Computational Sciences, Korean Institute for Advance Study, Seoul, KOREA
8. Center for Computational and Integrative Biology, Rutgers-Camden, Camden, USA
9. Center for Biophysics & Computational Biology, Temple University, Philadelphia, USA
10. Molecular Dynamics Software Interoperability, MolSSI workshop, Brooklyn, USA
11. National Renewable Energy Laboratory, Golden, USA
12. Cyberloop for Bionanomaterials Design - Kick-off Meeting, University of Colorado, Boulder, USA
13. Institute for Biomedical Informatics, University of Kentucky, Lexington, USA
14. CHARMM-GUI KIAS School, Seoul, KOREA

PUBLICATIONS:

Cao, Y.; Park, S.J. and Im, W. "A Systematic Analysis of Protein-Carbohydrate Interactions in the PDB" *Glycobiology*, 2020, doi.org/10.1093/glycob/cwaa062

Shin, K.; Kent, J.E.; Singh, C.; Fujimoto, L.M.; Tian, Y.; Im, W. and Marassi, F.M. "Calcium and Hydroxyapatite Binding Site of Human Vitronectin Provide New Insights for Abnormal Deposit Formation" *Proc. Natl. Acad. Sci. USA*, 2020, 117, 31, 18504-18510

Ryzhov, P.; Tian, Y.; Yao, Y.; Bobkov, A.A.; Im, W. and Marassi, F.M. "Conformational States of Bcl-xL Regulate Anti-apoptotic Activity" *Biophys. J.* 2020, in press

Lee, J.; Hitzengerger, M.; Rieger, M.; Kern, N.R.; Zacharias, M. and Im, W. "CHARMM-GUI Supports the Amber Force Fields" *J. Chem. Phys.* 2020, 153, 3, 035103.

Woo, H.; Park, S-J.; Choi, Y.K.; Park, T.; Tanveer, M.; Cao, Y.; Kern, N.R.; Lee, J.; Yeom, M.S.; Croll, T.I.; Seok, C. and Im, W. "Developing a Fully-glycosylated Full-length SARS-CoV-2 Spike Protein Model in a Viral Membrane" *J. Phys. Chem. B.* 2020, 124, 33, 7128-7137

Gao, Y.; Lee, J.; Widmalm, G. and Im, W. "Modeling and Simulation of Bacterial Outer Membranes with Lipopolysaccharides and Enterobacterial Common Antigen" *J. Phys. Chem. B.* in press, 2020, 124, 28, 5948-5956.

Wonpil Im (Cont'd)

Singh, C.; Lee, H.; Tian, Y.; Bartra, S.S.; Hower, S.; Fujimoto, L.M.; Yao, Y.; Ivanov, S.A.; Shaikhutdinova, R.Z.; Asanimov, A.P.; Plano, G.V.; Im, W. and Marassi, F.M. "Mutually Constructive Roles of Ail and LPS in *Yersinia pestis* Serum Survival" *Mol. Microbiol.* **2020**, *114*, 3, 510–520.

Suppahia, A.; Itagi, P.; Burriss, A.; Kim, F.M.G.; Vontz, A.; Kante, A.; Kim, S.; Im, W.; Deeds, E. and Roelofs, J. "Cooperativity in Proteasome Core Particle Maturation" *iScience* **2020**, *23*, 5, 101090.

Patel, D.S.; Morales, P.; Widmalm, G. and Im, W. "Escherichia coli O176 LPS Structure and Dynamics: A NMR Spectroscopy and MD Simulation Study" *Curr. Res. Struct. Biol.* **2020**, *2*, 79–88.

Ongwae, G.; Morrison, K.; Allen, R.; Kim, S.; Im, W.; Wuest, W. and Pires, M. "Broadening Activity of Polymyxin by Quaternary Ammonium Grafting" *ACS Infect. Dis.* **2020**, *6*, 6, 1427–1435.

Dong, C.; Kern, N.R.; Anderson, K.R.; Zhang, X.F.; Miwa, J.M. and Im, W. "Dynamics and Interactions of GPI-Linked Lynx1 Protein with/without Nicotinic Acetylcholine Receptor in Membrane Bilayers" *J. Phys. Chem. B.* **2020**, *124*, 20, 4017–4025 [cover].



Guterres, H. and Im, W. "Improvement of Protein-Ligand Docking Results Using High-Throughput Molecular Dynamics Simulations" *J. Chem. Inf. Model.* **2020**, *60*, 4, 2189–2198.

Cao, Y.; Park, S-J.; Mehta, A.Y.; Cummings, R.D. and Im, W. "GlyMDB: Glycan Microarray Database and Analysis Toolset" *Bioinformatics* **2020**, *36*, 8, 2438–2442.

Im, W. and Khalid, S. "Molecular Simulations of Bacterial Membranes Come of Age" *Annu. Rev. Phys. Chem.* **2020**, *71*, 171–188.

Gao, Y.; Lee, J.; Widmalm, G. and Im, W. "Preferred Conformations of Lipopolysaccharides and Oligosaccharides of *Moraxella catarrhalis*" *Glycobiology* **2020**, *30*, 2, 86–94.

Qi, Y.; Lee, J.; Cheng, X.; Shen, R.; Islam, S.M.; Roux, B. and Im, W. "CHARMM-GUI DEER Facilitator for Spin-pair Distance Distribution Calculations and Preparation of Restrained-Ensemble Molecular Dynamics Simulations" *J. Comput. Chem.* **2020**, *41*, 5, 415–420.

Nawrocki, G.; Im, W.; Sugita, Y. and Feig, M. "Clustering and Dynamics of Crowded Proteins near Membranes and Their Influence on Membrane Bending" *Proc. Natl. Acad. Sci. USA* **2019**, *116*, 49, 24562–24567.

Park, S.; Yeom, M.S.; Andersen, O.S.; Pastor, R.W. and Im, W. "Quantitative Characterization of Protein-Lipid Interactions by Free Energy Simulation Between Binary Bilayers." *J. Chem. Theory Comput.* **2019**, *15*, 11, 6491–6503.

Guterres, H.; Lee, H.S. and Im, W. "Ligand Binding Site Structure Refinement Using Molecular Dynamics with Restraints Derived from Predicted Binding Site Templates" *J. Chem. Theory Comput.* **2019**, *15*, 11, 6524–6535.

Dong, C.; Kania, S.; Morabito, M.; Zhang, X.F.; Im, W.; Oztekin, A.; Cheng, X. and Webb III, E.B. "A Mechano-Reactive Coarse-Grained Model of the Blood Clotting Agent von Willebrand Factor" *J. Chem. Phys.* **2019**, *151*, 12, 124905 (2019).



Kai Landskron

During the 2019–2020 academic year, Dr. Landskron and his colleagues published the following papers:

Zhu, S.; Li, J.; Toth, A.; Landskron, K. "Relationships between the Elemental Composition of Electrolytes and the Supercapacitive Swing Adsorption of CO₂" *ACS Applied Energy Materials* **2019**, *2*, 7449–7456

Stepniowski, W. J.; Paliwoda, D.; Abrahami, S. T.; Michalska-Domanska, M.; Landskron, K.; Buijnsters, J. G.; Mol, J. M. C.; Terry, H.; Misiulek, W. Z. "Nanorods Grown by Copper Anodizing in Sodium Carbonate" *Journal of Electroanalytical Chemistry* **2020**, *857*, 113628



Steve Regen

Professor Regen has been traveling both nationally and internationally within the last year to share his research into molecular assembly, materials, and nanoscience. His timely pre-COVID-19 research regarding cell permeability provided outstanding insights for conference attendees. He gave invited talks as follows:

Department of Energy Workshop, Washington, D.C., "Hyperthin Membranes for Gas Separations", September 2019.

University of Lisbon, Portugal "The Driving Force for Lipid Raft Formation", October 2019

The Gordon Research Conference, Galveston, TX "Gas Transport Across Hyperthin Polyelectrolyte Multilayers", January 2020

In addition, Regen and his research colleagues and graduate students published the following papers:

Pramanik, N. B.; Regen, S. L. "Hyperthin Membranes for Gas Separations Via Layer-By-Layer Assembly" *Chem. Rec.* **2019**, *19*, 1–12.

Pramanik, N. B.; Regen, S. L. "Clicking the Surface of Poly[1-(Trimethylsilyl)propyne](PTMSP) via a Thiol-ene Reaction: Unexpected CO₂/N₂ permeability" *Langmuir* **2020**, *36*, 1768–1772.



Damien Thévenin

During the past year, the Thévenin Lab has continued to develop novel strategies to selectively target tumors for therapeutic purposes. Particularly, the group synthesized a set of peptides capable of re-engaging the immune response to attack cancer cells specifically. In addition, our effort to understand the role of an essential but not fully understood family of human proteins (the Receptor Protein-Tyrosine Phosphatases) and to develop a new class of agents against these proteins for therapeutic purposes has recently been recognized by the National Institutes of Health with a \$1.6 million R01 award. Finally, our group, in collaboration with Dr. Aurelia Honerkamp-Smith (Department of Physics at Lehigh), has been awarded a \$300,000 New Initiative grant from the Charles E. Kaufman Foundation aimed at quantitatively define and predict how cells sense, interpret, and respond to shear flow, an essential phenomenon underlying multiple important biological processes, such as cardiovascular health and embryonic development.

The group also published the following papers:

Wehr J.; Sikorski E.L.; Bloch E.; Feigman M.S.; Ferraro N.J.; Baybutt T.R.; Snook A.E.; Pires M.M. and Thévenin, D. "pH-Dependent Grafting of Cancer Cells with Antigenic Epitopes Promotes Selective Antibody-Mediated Cytotoxicity" *J Med Chem.* **2020**, *63*, 7, 3713–3722.

Bloch, E.; Sikorski, E.L.; Pontoriero, D.; Day, E.K.; Berger, B.W.; Lazzara, M.J. and Thévenin, D. "Disrupting the Transmembrane Domain-Mediated Oligomerization of Protein Tyrosine Phosphatase Receptor J Inhibits EGFR-Driven Cancer Cell Phenotypes" *J Biol Chem.* **2019**, *294*, 49, 18796–18806.

Vasquez-Montes, V.; Gerhart, J.; Thévenin, D. and Ladokhin, A.S. "Divalent Cations and Lipid Composition Modulate Membrane Insertion and Cancer-Targeting Action of pHILIP" *Journal of Molecular Biology* **2019**, *431*, 24, 5004–5018.



David Vivic

Since the last newsletter, the Vivic lab welcomed Fatema Amin as a new graduate student in the group. The published scientific contributions from the group included:

Shreiber, S. T.; DiMucci, I. M.; Khrizanforov, M. N.; Titus, C. J.; Nordlund, D.; Dudkina, Y.; Cramer, R. E.; Budnikova, Y.; Lancaster, K. M.; Vivic, D. A. "[$(\text{MeCN})\text{Ni}(\text{CF}_3)_3$] $^{1-}$ and [$\text{Ni}(\text{CF}_3)_4$] $^{2-}$: Foundations Towards the Development of Trifluoromethylations at Unsupported Nickel" *Inorg. Chem.* **2020**, *59*, 9143–9151.

Shreiber, S. T.; Kaplan, P. T.; Hughes, R. P.; Vasiliu, M.; Dixon, D. A.; Cramer, R. E.; Vivic, D. A. "Syntheses, Solution Behaviour, and Computational Bond Length Analyses of Trifluoromethyl and Perfluoroethyl Cuprate Salts" *J. Fluorine Chem.* **2020**, *234*, 109518.

Hu, W.-Q.; Pan, S.; Xu, X.-H.; Vivic, D. A.; Qing, F.-L. "Nickel-Mediated Trifluoromethylation of Phenol Derivatives via C-O Bond Activation" *Angew. Chem. Int. Ed.* **2020**, *59*, 2–9.

Shreiber, S. T.; Scudder, J. J.; Vivic, D. A. "[$(\text{MeCN})_3\text{Co}(\text{C}_2\text{F}_5)_3$]: A Versatile Precursor to Cobalt(III) Perfluoroethyl Complexes" *Organometallics* **2019**, *38*, 3169–3173.

Yang, Y.; Zhou, Q.; Cai, J.; Xue, T.; Liu, Y.; Jiang, Y.; Luo, G.; Chung, L. W.; Vivic, D. A. "Exploiting the Trifluoroethyl Group as a Precatalyst Ligand in Nickel-Catalyzed Suzuki-Type Alkylations" *Chem. Sci.* **2019**, *10*, 5275–5282.



Nate Wittenberg

During the past year the Wittenberg Lab was awarded an NIH grant to study the heterogeneity of biological nanoparticles (vesicles, synaptosomes, etc) by integrating particle nanoarrays with microfluidic devices. Graduate students Ashley Baxter, Megan Blauch, and Jennie Cawley presented their research at the Annual Meeting of the Biophysical Society in San Diego. In December we hosted a visiting undergraduate researcher, Hailey Nguyen, from Knox College in Galesburg, IL. Nate traveled to Chicago in early March to present two talks at PittCon 2020. One talk was on the analysis of membrane-membrane adhesion mediated by glycolipid-glycoprotein interactions. The other talk covered our work on photosensitized lipid oxidation and how it can alter the physical properties of biological membranes, including how light can be used to trigger changes in membrane curvature.

In the 2019–2020 academic year the Wittenberg Lab published the following papers:

Pisapati, A. V., Wang, Y., Blauch, M. E., Wittenberg, N. J., Cheng, X., Zhang, X. F. "Characterizing Single-Molecule Conformational Changes Under Shear Flow with Fluorescence Microscopy" *Journal of Visualized Experiments* **2020**, *155*, e60784.

Baxter, A.M.; Wittenberg, N.J. "Excitation of Fluorescent Lipid Probes Accelerates Supported Lipid Bilayer Formation via Photosensitized Lipid Oxidation" *Langmuir* **2019**, *35*, 11542–11549.

Jordan, L.R.; Blauch, M.E.; Baxter, A.M.; Cawley, J.E. and Wittenberg, N.J. "Influence of Brain Gangliosides on the Formation and Properties of Supported Lipid Bilayers. *Colloids and Surfaces B Biointerfaces*, **2019**, *183*, 110442.

Vala, M.; Ertsgaard, C.T.; Wittenberg, N.J.; Oh, S.H. "Plasmonic Sensing on Symmetric Nanohole Arrays Supporting High-Q Hybrid Modes and Reflection Geometry" *ACS Sensors*, **2019**, *4*, 3265–3274.

Ryu, Y.S.; Yun, H.; Chung, T.; Suh, J.H.; Kim, S.; Lee, K.; Wittenberg, N.J.; Oh, S.H. and Lee, B.; Lee, S.D. "Kinetics of Lipid Raft Formation at Lipid Monolayer-Bilayer Junction Probed by Surface Plasmon Resonance" *Biosensors & Bioelectronics*, **2019**, *142*, 111568.



Xiaoji Xu

Dr. Xu has been named a Sloan Research Fellow by the Alfred P. Sloan Foundation (See article on Pg. 7).

His lab has published the following papers:

Gusenbauer, C.; Jakob, D.S.; Xu, X.G.; Vezenov, D.V.; Cabane, E. and Konnerth, J. "Nanoscale Chemical Features of the Natural Fibrous Material Wood" *Biomacromolecules* **2020**, *21*, 10, 4244–4252

Wang, H.; Wang, L.; Shang, Y.; Tafti, S.Y.; Cao, W.; Ning, Z.; Zhang, X.F.; and Xu, X.G. "Peak Force Visible Microscopy" *Soft Matter* **2020**, *16*, 8372–8379.

Jakob, D.S.; Wang, H.; Zeng, G.; Otzen, D.E.; Yan, Y. and Xu, X.G. "Peak Force Infrared – Kelvin Probe Force Microscopy" *Angewandte Chemie Int. Ed.* **2020**, *132*, 37, 16217–16224

Li, W.; Wang, H.; Xu, X.G. and Yu, Y. "Simultaneous Nanoscale Imaging of Chemical and Architectural Heterogeneity on Yeast Cell Wall Particles" *Langmuir* **2020**, *36*, 22, 6169–6177

Wang, H.; Janzen, E.; Wang, L.; Edgar, J.H. and Xu, X.G. "Probing Mid-Infrared Phonon Polaritons in the Aqueous Phase" *Nano Letters* **2020**, *20*, 5, 3986–3991.

Jakob, D.S.; Wang, H. and Xu, X.G. "Pulsed Force Kelvin Probe Force Microscopy" *ACS Nano* **2020**, *14*, 4, 4839–4848.

Wang, L.; Wagner, M.; Wang, H.; Pau-Sanchez, S.; Li, J.; Edgar, J.H. and Xu, X.G. "Revealing Phonon Polaritons in Hexagonal Boron Nitride by Multi-Pulse Peak Force Infrared Microscopy" *Advanced Optical Materials* **2019**, *8*, 5, 1901084.

Wang, H.; Li, J.; Edgar, J.H. and Xu, X.G. "Three-Dimensional Near-field Analysis through Peak Force Scattering-Type Near-Field Optical Microscopy" *Nanoscale*, **2020**, *12*, 1817–1825.

Wang, L.; Jakob, D.S.; Wang, H.; Apostolos, A.; Pires, M. and Xu, X.G. "Generalized Heterodyne Configurations for Photo-induced Force Microscopy" *Analytical Chemistry*, **2019**, *91*, 20, 13251.

Phillips, C.; Gilburd, L.; Xu, X.G. and Walker, G.C. "Surface and Volume Phonon Polaritons in Boron Nitride Nanotubes" *The Journal of Physical Chemistry Letters*, **2019**, *10*, 17, 4851.



Liz Young

After a difficult spring, research is back up and running in the Young Lab at Lehigh! The laser is on, molecules are being synthesized, and photophysics are being measured! Before the shutdown, we welcomed a new post-doctoral researcher, Dr. Tao Huang and Prof. Young organized a successful in-person international photochemistry conference (see article on Pg. 5.) Over the spring and summer, the Young Lab held virtual group meetings to discuss research, chemistry, well-being and diversity in chemistry sparked by the "Black Lives Matter" and "Shut Down STEM" (<https://www.shutdownstem.com/action>) movements.

Professor Young published several articles over the past year on her work with proton-coupled electron transfer, the photophysics of several interesting donor-acceptor systems, and on the photophysics of antimony sulfide as a light absorbing material for next generation solar cells (see below). Included in the publication is a perspective piece in *Science* on how to design first-row transition metal complexes for photochemical reactions. Oldacre, A.; Young, E.R.* "Iron Hits the Mark." *Science*, **2019**, *363*, 225–226. Further, Professor Young's work with the Chemistry Women Mentorship Network (ChemWMN, <https://brandicossairt.wixsite.com/chemwmn>) was highlighted in an editorial published concurrently in *Inorganic Chemistry*, *Chemistry of Materials*, and *ACS Central Science*. Coissart B.M.*, Dempsey, J.L.*, Young, E.R.* "The Chemistry Women Mentorship Network (ChemWMN): A Tool for Creating Critical Mass in Academic Chemistry." *Inorg. Chem.*, **2019**, *58*, 12493–12496.

Liz Young (Cont'd)

Recent Publications include:

Oldacre, A. O., Young, E.R.* “Electrochemical proton-coupled electron transfer of an anthracene-based azo dye.” *RSC Advances*, **2020**, *10*, 14804-14811.

Büttner, P.; Scheler, F.; Pointer, C.; Döhler, D.; Barr, M.K.S.; Koroleva, A.; Pankin, D.; Hatada, R.; Flege, S.; Manshina, A.; Young, E.R.*; Mínguez-Bacho, I.*; Bachmann, J.* “Adjusting Interfacial Chemistry and Electronic Properties of Photovoltaics Based on a Highly Pure Sb₂S₃ Absorber by Atomic Layer Deposition” *ACS Appl. Energy Mater.*, **2019**, *2*, 12, 8747-8756.

Martin, K.L.; Smith, J.N.; Young, E.R.*; Carter, K.R.* “Synthetic Emission Tuning of Carborane-Containing Poly(dihexylfluorene)s.” *Macromolecules*, **2019**, *52*, 7951-7960

Pascual-Leone, N.; Conklin, E.; Khomein, P.; Andrade, G.A.; Rosenthal, J.*; Young, E.R.* “Role of Electrostatics in Influencing the Pathway by Which the Excited State [Ru(bpy)₃]²⁺ Is Deactivation by Ferrocene Derivatives” *J. Phys Chem. A*. **2019**, *123*, 7673-7682.

Ly, J.; Martin, K.; Thomas, S.; Yamashita, M.; Yu, B.; Pointer, C.; Yamada, H.; Carter, K.R.; Parkin, S.; Zhang, L.; Bredas, J.-L.*; Young, E.R.*; Briseno, A.L.* “Short Excited-State Lifetimes Enable Photo-Oxidatively Stable Rubrene Derivatives” *J. Phys Chem. A*. **2019**, *123*, 7558-7566.

Strahan, J.; Popere, B.C.; Khomein, P.; Pointer, C.A.; Martin, S.M.; Oldacre, A.O.; Thayumanavan, S.; Young, E.R.* “Modulating Absorption and Charge Transfer in Bodipy-Carbazole Donor-Acceptor Dyads through Molecular Design.” *Dalton Trans.* **2019**, *48*, 8488-8501.

Oldacre, A.O.; Pointer, C.A.; Martin, S.M.; Kemmerer, A.; Young, E.R.* “Anthracene-based azo dyes for photo-induced proton-coupled electron transfer.” *Chem. Comm.* **2019**, *55*, 5875-5877.

Martin, K.A.; Krishnamurthy, A.; Strahan, J.; Young, E.R.*; Carter, K.R.* “Excited state characterization of carborane-containing poly(dihexyl fluorene)s” *J. Phys Chem. A* **2019**, *123*, 1701-1709.

In addition, Young and Prof. Gary F. Moore from Arizona State University organized the 29th Winter Inter-American Photochemical Society Conference that took place in Sarasota, Florida from Jan 2-5, 2020. The conference attracted over 100 participants who joined from primarily undergraduate programs, research-intensive universities and several National Labs. Participants came from the United States, as well as Canada and South America. The conference program included a line-up of invited speakers and two evening poster sessions. Invited speakers covered a large range of topics in photochemistry from photo-redox catalysis to charge transport through molecular, supramolecular systems, and materials systems. They shared examples in which spectroscopy was used for such things as identifying forgeries in art and understanding what gives beer its skunky taste. A group of speakers discussed biologically-inspired work including understanding how Photosystem II functions--to how Nitrogenases fix nitrogen. Another group of researchers used MOFs (metal-organic frameworks) to harvest light and promote energy and/or electron transfer. New spectroscopic techniques including Femtosecond M-edge XANES and time-resolved X-ray Free Electron Lasers were presented. Participants engaged in lively discussions at the evening poster sessions from which nine students and post docs received poster awards for their exciting work.



Emeriti and Retired Faculty & Staff News



Keith Schray

Emeritus Professor Keith J. Schray has emerged from retirement to take a part time job with his son Tom's garage door company, Precision Garage Door of the Lehigh Valley. Keith told this newsletter that he was answering the phone and performing office functions for his son's firm. Dr Schray, who served as department chair from 1996 to 2001, was recognized as an outstanding instructor who shared his research interests in organic chemistry, enzyme mechanisms, and clinical chemistry via introductory chemistry courses through advanced chemistry research labs--and was prescient in his efforts to introduce and assess the effects of workshop chemistry learning lead by in-class peer leaders in introductory organic courses.



Ned Heindel

The research group of Emeritus Professor and Senior Research Scientist, Ned Heindel was recently awarded two patents, U.S.P. 10,570,161 and U.S.P. 10,752,582, for their burn and blister healing accelerant, AidnX, (also known as NDH4338) and its closely related congeners. A 1% ointment of the topical pharmaceutical AidnX, which is in the last stage of preclinical trials, cuts healing time to one-third for open vesicant-induced dermal wounds caused by the terrorist toxin, mustard gas. Lehigh members of the Heindel team who have worked on the project have been Sherri Young, Karine Fabio, Jaya Saxena, Cynthia Fianu-Velgus, Jeff Lacey, Pramod Mohanta, and Christophe Guillon.

In addition, Dr. Heindel (emeritus professor of medicinal chemistry) and his wife Linda, with the help of several attorneys, are resisting the eminent domain seizure of a part of their Williams Township farm by the PennEast (Natural Gas) Company. PennEast proposes to cross a swamp and a steep rocky ridge owned by the Heindels with a high pressure 36" gas pipeline. The legal battle is still on-going but at present the pipeline company is seeking approval for an alternative pathway to bring fracking gas from northeastern Pennsylvania to markets in New Jersey. (Read more at <https://bit.ly/3guAnV2>).



The Department hosted the November meeting of the Lehigh Valley ACS Local Section as a virtual tour of the collegiate chemistry departments of The Valley, their histories, and their current faculties. The program featured nine colleges with five-minute vignettes from each (with a prize-giving quiz based on the content). Moderated by Lehigh's emeritus professor Ned Heindel, the program can be viewed at YouTube: <https://youtu.be/PvMG2F9aknk>

In addition, Dr. Heindel (emeritus professor of medicinal chemistry) and his wife Linda, with the help of several attorneys, are resisting the eminent domain seizure of a part of their Williams Township farm by the PennEast (Natural Gas) Company. PennEast proposes to cross a swamp and a steep rocky ridge owned by the Heindels with a high pressure 36" gas pipeline. The legal battle is still on-going but at present the pipeline company is seeking approval for an alternative pathway to bring fracking gas from northeastern Pennsylvania to markets in New Jersey. (Read more at <https://bit.ly/3guAnV2>).

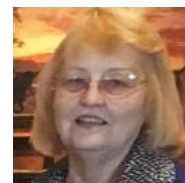


Jack and Jan Alhadeff

Two retired faculty have taken on big business on behalf of environmental preservations. Jack A. Alhadeff, emeritus professor of biochemistry, and his wife Jan engaged an attorney to fight a requested zoning variation by Tree Course Adventures to build an overhead rope course through a nearby forested property.

Jack and Jan argued -- apparently successfully as it now stands -- that the ziplines would draw noisy traffic and bring environmental destruction to their Upper Saucon Township neighborhood. An alternative use -- much favored by the Alhadeffs -- as a vineyard, winery, and tasting room seems to be on track. (Read more at <https://bit.ly/3gnF6YD>).

Mary Alice Murphy, 79, a retired administrative assistant in the Department of Chemistry from 1986 to 1999, passed away at her home in Nazareth on Thursday, December 31, 2020. Mary was survived by her husband, Patrick J. Murphy, and her two children, son Patrick of Easton and daughter Kathleen of Bethlehem, and four beloved grandchildren. Mary served in the department as an editorial assistant to Professor John Larsen in his function as editor-in-chief of the ACS journal, *Energy and Fuels*. Emeritus Professor Larsen commented on her passing, "Mary was really a treat to work with. She was very much a professional and very efficient, especially at shielding the Editor from many aggravated authors." Mary's happy place was at the beach--she loved boating in the bay and being near the ocean. She also loved doing volunteer work for Bethlehem's annual Celtic Fest



ED.A. — Please return — Jim Sturm

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2/26/65

Mr. James E. Sturm
Associate Professor of Chemistry
Lehigh University,
William Chandler Chemistry Laboratory
Bethlehem, Pennsylvania

Dear Professor Sturm:

I am writing this letter in answer to your letter about repairs on that precision polarimeter of yours that was addressed to our northern service firm long ago abandoned.

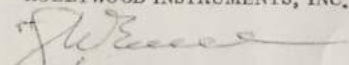
In an era where the writer has seen practically new colorimeters thrown into rivers, and beautiful gold-plated balances with oak cases burned on hillsides by colleges and universities bloated with government grant money, and pitiful appeals from small colleges for equipment (one in Kent, Ohio) stands in my mind, I must say that your letter shook me. My impression of chemistry people has been that they spend hours of their working life looking for Gas chromatography equipment to dress up rooms! And suddenly to find that here in this country we have a man who wants a polarimeter repaired because he realizes that the quality of the instrument is such, etc. well, it was a very refreshing thing indeed.

At any rate, had I been up north, your polarimeter would have been repaired without charge as a matter of faith and principle and love for the non-conformistic mind whether it be in science or the arts. I would have been glad to have done this as a gesture to you as a human being past the groveling gates of your purchasing department who never called us during our years up north, nor ever gave us a penny's worth of business.

I would strongly suggest to you that you take this matter up with your purchasing department who have visitors from supply houses every day, I am sure. These visitors are always wildly awake to giving 95% of their instrumentation business away free just to get 5% of the beaker and chemical business. I am sure they will not ask you to buy one. It would be a deviation from the horrible mutilation and confusion that these people operate under and a thing apart from their terrible manners.

Thank you for writing us. To me, it was not only a poetical thing. It was a kind of religious experience.

Cordially yours,
HOLLYWOOD INSTRUMENTS, INC.


G. K. Marlowe

GKM:fk

Recently found in the Seeley-Mudd Building's Physical Chemistry laboratory, this letter documents correspondence between Dr. Jim Sturm and an instrumentation company located in Florida.

Although Dr. Sturm did not get this polarimeter repaired in 1965 by Hollywood Instruments, he did deeply enjoy being called "poetical" and providing a fellow technician with a "religious" experience--so much that he kept this letter in his files for more than 50 years.

We enjoyed it just as much when it was placed into our department archives -- and so we wanted to share this amazing correspondence with you.



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James E. Sturm (on the faculty 1956-1995) received his B.A. in Chemistry from St. John's University [Minnesota] (1951), Ph.D. with Milton Burton from the University of Notre Dame (1957) and did postdoctoral research with John E. Willard at the University of Wisconsin (1956). Retired since 1995, Dr. Sturm still resides in the Lehigh Valley.

He was involved in research in chemical kinetics, radiation chemistry, photochemistry, and the collisional efficiencies of reactions of high-velocity atoms. Photochemical means was used to produce relatively high-kinetic energy atoms with sufficient translational energy, initially, to react by otherwise endoergic paths. Computer modeling of photochemical processes by both finite difference and stochastic methods was investigated. Attention was given to diffusion which accompanies non-uniform absorption of light in a reaction system. The sensitivity of computed outcomes to the magnitudes of parameters involved was studied as well.

His specialties, developed during graduate and postdoctoral research, led to his offering an elective course in nuclear and radiochemistry. Professor Sturm pioneered the introduction of propagation of errors into the physical chemistry laboratory report that each student would write for every experiment that was done. Not only would an average value of a given result be reported but also the uncertainty in the average. Propagation of errors continues to be an important part of each current student's physical chemistry laboratory report.



2020 UNDERGRADUATE STUDENT AWARDS

AMERICAN CHEMICAL SOCIETY AWARD Presented to the outstanding senior majoring in Chemistry GIORGIO HIOTIS	ACS INORGANIC CHEMISTRY AWARD Granted to the outstanding senior majoring in Inorganic Chemistry MARINA TELES SUTIJA	AMERICAN INSTITUTE OF CHEMIST'S AWARD For an outstanding senior majoring in Chemistry or Biochemistry STEPHEN CRANE	BIOCHEMISTRY AWARD Granted to the highest-ranking junior or senior Biochemistry major LONGHUI GAO
ACS ORGANIC CHEMISTRY AWARD (Organic Division) Recognizes a senior student who displays a significant aptitude for Organic Chemistry and encourages further interest in the field GIORGIO HIOTIS	ACS ORGANIC CHEMISTRY AWARD (Physical Division) Presented to the outstanding senior majoring in Physical-Organic Chemistry CAYSE COACHYS	AMERICAN CHEMICAL SOCIETY AWARD In honor of Lehigh University Professor and Department Chair (1914-38) Harry M. Ullman -- this award goes to the highest-ranked senior in Chemistry GIORGIO HIOTIS	ACS ORGANIC CHEMISTRY AWARD (Physical Division) In honor of Lehigh University President and Department Chair Alpha Diefenderfer -- and sponsored by the ACS Division of Analytical Chemistry, this award is presented to the highest-ranking junior in Analytical Chemistry GIORGIO HIOTIS
Established in 1920 by Mrs. Chandler, the prize is in honor of her husband, William H. Chandler, Professor of Chemistry at Lehigh University from 1871 to 1905 -- and twice an acting Lehigh President			
WILLIAM H. CHANDLER SOPHOMORE PRIZE Presented to the highest-ranking sophomore in the Department of Chemistry THOMAS DRESSLER	WILLIAM H. CHANDLER JUNIOR PRIZE Presented to the highest-ranking junior in the Department of Chemistry LINNAN FANG	WILLIAM H. CHANDLER SENIOR PRIZE Presented to the highest-ranking senior in the Department of Chemistry GIORGIO HIOTIS	

Bachelor's Graduates

BIOCHEMISTRY: Gehar Bitar, Nicole Capogna, Martin Fernandez, Chan Hong, Marvens Jean, Emanuel Luna, Sophia Rizzo, Jonathan Saliby, Alexis Shanley, Alison Toth

CHEMISTRY: Cayse Coachys, Cassidy Hopkins, Marina Teles Sutija

Master's Graduates

Ryan Charlton, Anthony Iaccarino

Ph.D. Graduates

Carolyn Bartulovich – “The Role of Proton Coupled Electron Transfer (PCED) in Reductions Mediated by Low Valent Samarium and Coordinated Proton Donors” (July 31, 2020)

Haomin Wang – “Tip-Enhanced Near-Field Scattering and Photothermal Expansion in Observing Light-Matter Interaction at Nanoscale” (July 17, 2020)

Caleb Wehrmann – “Synthesis and Optoelectronic Properties of Bisphenalenyl Open-Shell Materials ” (November 16, 2020)



WELCOME NEW GRADUATE STUDENTS

Muhammad Bilal - Hokkaido University - Sapporo, Japan
Katrina Brandmier - DeSales University - Center Valley, PA
Robert Hamburger - Kutztown University - Kutztown, PA
Zachary Knepp - Lock Haven University - Lock Haven, PA

Samuel Pash - East Stroudsburg University - East Stroudsburg, PA
Sophie Rizzo - Lehigh University - Bethlehem, PA
Aarshi Singh - East Stroudsburh University - East Stroudsburg, PA
Qing Xie - Shaanxi Normal University - Xi'an City, China

Graduate Student Fellowships:
2019-2020

HONOR FELLOWSHIP: Jiajie Li

FULBRIGHT SCHOLARSHIP: Muhammad Imran (Pakistan)

On Saturday, November 7, 2020, the Department of Chemistry held their fall open house using multiple technologies to give over 50 prospective students (from across the nation and around the globe) a good overview of our doctoral programs. Attendees were given a complete picture of the opportunities available via faculty and grad student presentations, virtual lab tours, and opportunities to talk with both chemistry grad students and faculty lab supervisors. The response was very positive and led to many applications for admission to the program. We welcome the opportunity to discuss program options with any potential graduate students who might be interested in joining the Department of Chemistry.



TENG XUE - VICIC RESEARCH LAB

A Grad Student's Perspective on the COVID-19 Impact



Q: What is your research focus in the Vicic lab—and have you been able to continue your research on a “normal” basis – or are you feeling that things like social- interaction restrictions and social distancing are impacting the progress you are able to make with your research?

My research focuses on organometallic fluorine chemistry at transition metals, especially cobalt and nickel. Before the whole campus was closed in March, my project was in the final stage and about to be published. However, my research had to be suspended for three months during that time. Thankfully, everything got back on the right track after the lab was reopened. Neither safety rules nor supply request fulfillments made any trouble for me. With the great help of my advisor, Dr. Vicic, I wrapped it up and got the paper done in the next two months--and it was accepted by *Organometallics* (ACS) in October.

Q: What was your last day in the lab in March of 2020 – and what was your first day back to the lab?

My last day in the lab was March 20. I still remember how frustrated I was when we were kicked out of the lab by COVID-19. I never expected the spread would be so fast that it even permeated our peaceful Lehigh and Valley. The end of March was supposed to be the end of winter. However, I felt no warmth, but endless cold and helpless from the bottom of my heart. After all, no one knew when it would be over and how far it would go. The only thing we could do was stay at home and pray. My first day back to the lab was June 16--after exactly three months shut down. I was so excited when we were told by our Primary Investigator (Dr. Vicic) that we could finally come back to the lab. I was itching to get back to the real research and running reactions in the glove box. It was a good feeling to see my colleagues and advisor in person (even from a 6-ft. distance) rather than just from a 3" x 3" screen window in Zoom. The first day I got back and saw our full stack of personal protective equipment (PPE) prepared by Dr. Vicic, I knew we could get through and conquer COVID-19 together by following safety rules; that we didn't need to fear it anymore.

Q: Were you working as a TA or RA during this time? And if a TA, did you continue to virtually meet with students?

I was a TA of CHM030 (General Chemistry Lab) in Spring semester and an RA in Summer. I didn't have any experience of meeting with students. All we had to do was to grade their lab reports online and try our best to answer their questions by email.

Q: What is it like to be working with students this Fall (i.e. do you use technologies like Zoom, Panopto, or other technologies to stay connected to Lehigh and any students you are responsible for assisting?)

I'm currently a TA of CHM030 (General Chemistry Lab) in this Fall semester, and we're using Zoom to host office hours with students to answer any of their questions. We're also using Zoom to have TA meetings with course instructors each week. This technology definitely helps a lot to stay connected for both the TA's and the students, even if sometimes it still has limitations like the unstable network issue.

Q: Are working on-campus in the Fall 2020 semester--and can you briefly describe what that atmosphere is like?

I'm currently a TA of CHM030 (General Chemistry Lab) in the Fall semester. The atmosphere on campus was overall reassuring in the first few months of the semester. The policies at both university level and department level are solid and we can easily find PPE everywhere on campus. All students and faculty members I worked with followed the rules, like keeping social distancing and wearing the mask all the time--which makes me feel pretty safe to work on campus.

Q: Since COVID-19 is affecting the entire world, how has it impacted your family?

As an international student at Lehigh, I haven't gotten a chance fly back home since I started my Ph.D program, so my mother visited me during this last Christmas in 2019. However, she wasn't able to get back to China due to this global pandemic. Her flight ticket was cancelled twice and the travel ban made it like a lottery to most people. As a 65-year-old lady, her doctor also didn't advise her to take the risk of a more than 12-hour flight. I applied for an extension to her visa so she was "legal" to live with me during that time. I really appreciate her full support which lets me really focus on my research. (Note to readers: Teng informed us that his mother was able to fly out on a 15-hour flight and arrived home safely on December 7, 2020.)

STAFF NEWS

Chemistry Lab Manager Denise Beautreau Named as Director of Student Access

The Department of Chemistry is pleased to share the news of the appointment of Denise Beautreau as the new Director of Student Access in the Office of Diversity, Inclusion and Equity.



Beautreau came to Lehigh in February of 2013 as the General Chemistry Labs Manager. A native of the Dominican Islands, Denise received her BS in Biochemistry from SUNY Plattsburgh and her MS in Biochemistry from Long Island University. In addition to her teaching assistant experience gained at both universities, she also played a role in student instruction while serving as laboratory manager at Medgar Evers College of the City University of New York and Mercy College. An advocate for showing students not just the intricacies of chemical interactions--but also the many avenues available to all through STEM education, Denise is an annual contributor to the American Association of University Women's "Explore Your Opportunities" Conference.

Always an enthusiastic Lehigh staffer, Denise is a past winner of Lehigh's Club/Organization Advisor of the Year award for her leadership of Alpha Chi Sigma chemistry fraternity and Lehigh's chapter of the National Society of Black Engineers.

In her new role, Beautreau will be working with the [American Talent Initiative](#) and advise the F1RST Club for first-generation students.



Although the global pandemic has delayed the process, the department will be installing a new general chemistry labs manager in the near future--but wishes to recognize the outstanding work done by Interim General Chemistry Lab Instructor Cynthia Fianu-Velgus who stepped into the role at a very challenging time. A predoc research associate in the Heindel Lab, Cynthia has been central to the efforts to transition the on-campus labs to a socially-distanced, staggered schedule, safety-first environment that still provides the "hands-on" laboratory experience so vital to student learning and comprehension.

WELCOME

New Business Manager

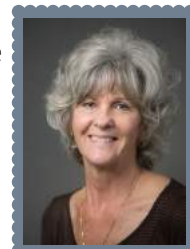
Libby Seyfried



Libby Seyfried joined the Chemistry Department as the Business Manager last October. She began at Lehigh in January 2019 as the Financial Coordinator in the Department of Civil and Environmental Engineering. She holds a B.S in Economics and a Master's of Business Administration, and has gained experience in the corporate sector working primarily with retirement funds, auditing, and financial reporting. She enjoys bicycling, hiking and kayaking adventures with her family, listening to Indie music, and reading.

Retirement Best Wishes

On December 31, 2020, Sharon Zurick began a new chapter in her life as a retiree from Lehigh University after 22 years of exceptional professional and greatly-appreciated service.



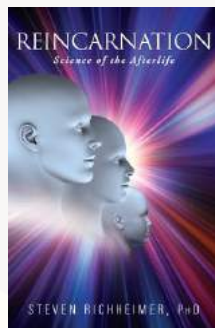
Joining Lehigh in 1998 as a Lab Store Logistics Coordinator, Sharon continued to learn new things at every opportunity and soon became a valued resource--not only for the department--but also for hundreds of faculty, staff and students who relied on her knowledge and expertise--all provided with a generous nature and a willingness to help those in need. For this and so many other reasons, Sharon will be greatly missed--but fondly wished the best of everything in her future endeavors.

With three grandchildren (including a set of 5-year old twins and a 2-1/2 year old grandson), a new daughter-in-law, and many friends and family in the area, she will be busy for many years to come in connecting and reconnecting with loved ones. An avid reader and outstanding cook, Sharon's days will be very full in sharing the joie de vivre of life!

Alumni News

'68 **Steven Richheimer** retired from his position as staff senior chemist at Hauser Pharmaceutical Services in 2008 and now lives in Steamboat Springs, CO. Since graduating from Lehigh and moving to the San Francisco Bay Area to pursue his PhD in chemistry at Stanford University, he learned meditation from an inspirational teacher and developed an interest in how science validates the spiritual worldview.

He recently published his third book, *Reincarnation: The Science of the Afterlife*. The book offers the reader a cross-cultural historical survey, a review of the best-designed scientific studies on reincarnation, and a description of how numerous studies indicate that mind cannot be reduced to brain activity, suggesting that elements of memory and personality can survive death



'69 **Coleman "Cole" R. Hamel** is retired from a long career in teaching at several Lehigh Valley Colleges (principally Kutztown) and now works part-time for Emery Brothers Organs (Allentown). The Emery company lists pipe organ turning, maintenance and restoration of organs as its business mission. Cole recently commented that he'd gotten to work on a variety of ancient classic pipe organs mostly in church settings.

'79 **George Barringer** has joined the staff of the Swedish-based global health systems corporation Getinge AB, as a Product Manager. Getinge manufactures and sells automated computer-controlled bio-containment equipment, bio-reactors, fermenters, and fluid-handing hardware for vaccine and biopharmaceutical manufacturing. The company has >15,500 employees in more than 40 countries. George will cover most of Eastern USA introducing the pharmaceutical industry to Getinge's products and helping purchasers bring them "on line" after acquisition. George was formerly with Applikon Biotech which was recently acquired by Getinge.

'83 **David Carrick** With ten years of employment as Senior Analytical and Catalyst Chemist for Primus Green Energy, David's research involves R&D of catalytic processes for the production of liquid fuels from cellulosic waste and natural gas and also developing analytical methods for in-process/final product streams. Primus Green Energy has plants in the Houston (TX) area and R&D Labs in Hillsborough Township, NJ. They produce methanol and gasoline from natural gas and develop catalysts for other kinds of hydrocarbon conversions.

'89 **Zhongtao Wu** has joined Kashiv Biosciences as a Research Scientist. Kashiv is a fully integrated biosciences company headquartered in Bridgewater, NJ. Kashiv specializes in drug delivery platforms incorporating delayed release technology and gastric retention systems that improve the efficacy and safety of known drugs. Zhongtao was formerly in analytical R&D with Prolong Pharmaceuticals which hosts a portfolio of hematological and oncological candidate products.

'89 **Mary Jo Kulp** was named an ACS Hero of Chemistry (see C&EN, 2 November, 2020, p. 35) for her role in commercializing DuPont's chemical-mechanical planarization pads for polishing semiconductors. Mary Jo, who did her Lehigh doctorate in physical chemistry under the supervision of the late Professor and Department Chair, Frederick M. Fowkes, on a project on the surface chemistry of fillers, was a senior scientist in DuPont's Electronics and Imaging division when CMP polishing was commercialized.

The ACS award for industrial creativity which Mary Jo and her DuPont coworkers shared in 2020 was, in fact, launched by another Lehigh PhD, Michael L. Losee (PhD 1967). Like Mary Jo, Mike Losee also spent his post-Lehigh career in industry, retired as President of NutraSweet Technologies in 1995 and immediately joined the ACS as its Director of Industry Relations. Mike convinced ACS's Board that while it had more than 50 awards for academic achievements it scarcely acknowledged the accomplishments of its corporate chemists. Mike started ACS Heroes of Chemistry in 1996 to annually recognize the teams of industrial chemists who have brought valuable chemical products to the marketplace. A quarter-century after Mike's creation of the Award, a fellow Lehigh chemist is the recent honoree.

'92 **Marsha Miller** ('96 U Penn PhD in Pathology) was promoted to Executive Director for Global Regulatory Affairs at Celgene. In this capacity Marsha directs the regulatory filings for all biologics, small molecules, and biosimilar pharmaceuticals the company is advancing world-wide. Since completing her graduate work, Marsha has been employed in communications and regulatory affairs in steadily increasing responsibility roles at Dupont Pharma, AstraZeneca, Sanofi, BMS, and Celgene.



Alumni News

'96 **Lori Getts** is Vice President, Preclinical and Process Development at Genisphere, Huntington Valley, PA. Genisphere's mission is to provide and develop a unique DNA-based targeted drug delivery system. Lori was a graduate of Lehigh under a cooperative program our Department of Chemistry operated with Fox Chase Cancer Center (Philadelphia) in which biochemistry students wishing a more clinically-oriented research experience could conduct their research at Fox Chase

'03 **Michael A. Gentile** has been named Director of Medical Affairs for Immuno-Oncology, at Merck, West Point, Pennsylvania.

'04 **Lee Schaller** was recently recognized by Glaxo Smith Kline for the completion of 25-years of service to the company. Lee commenced his career with GSK as a medicinal chemist and has advanced to Core Consultant for the Strategy Realization Office, the corporate group that manages development of IT software.

'04 **Sherry Young** was promoted to Associate Professor of Chemistry with tenure at Muhlenberg College, Allentown. As noted in their website, organic chemistry is at the core of Sherry's teaching interests--particularly in the medicinal and biological applications of organic chemistry in the "real world". Her research interests lie at the interface of chemistry and biology and is focused on improving the ability of known drugs to enter the brain by altering their properties (e.g., polarity).

'06 **Edward Scanzano** has joined the R&D Staff of CloudCath as Head of Software Development. CloudCath is a developer of outpatient point-of-care wireless diagnostic devices for monitoring sufferers of End Stage renal disease undergoing at-home dialysis through a permanent indwelling catheter. Metabolic changes and infections are detected in the dialysate fluid and the results transmitted to a medical provider who can intervene pre-crisis. CloudCath is a new biomedical start-up company located in San Francisco.

'11 **Jonathan Rado** was just promoted to Product Leader in vaccines Value-Chain Management at Merck (West Point, Pennsylvania).

Three recent Lehigh PhD graduates have been hired as Research Scientists by Croda USA, the American arm of the British specialty company, Croda International. The firm has interests in cosmetics, personal care, agrochemicals, and oleochemicals and has major locations in Edison, NJ, and Atlas Point, Delaware.

Croda USA recently landed a large contract to develop and manufacture candidate excipients for the new Pfizer Covid-19 vaccine.

Lehigh chemists **Peter Kaplan** (PhD 2017), **Tesia Chciuk** (PhD 2017), and recent grad **Caroline Bartulovich** (PhD 2020) have all been brought on-board to help with the vaccine and related product R&D.

Kaplan did his dissertation under Professor Vicic, while Chciuk and Bartulovich were in Professor Flowers' group.

Michael Paul Aronson ('69) of W. Nyack, NY passed away on Monday June 8, 2015 at his residence surrounded by his family. Mr. Aronson was born June 26, 1945, in Queens, New York. He was 69 years old.

Margaret "Peggy" Kittek (BSCM '75; MS '86) died January 24, 2020 at her home in Bethlehem. Peggy was one of the first 100 women admitted to Lehigh when the university went co-ed in 1971 and one of an even smaller number to select Chemistry as a major. She completed her BS with highest honors, joined the R&D staff of Air Products, and retired recently as Senior Research Chemist. Peggy worked in analytical, organic, and polymer chemistry and developed critical skills in electron microscopy.

She fondly remembered her years in the Department and remarked how a placement in a summer research experience in industry (with IBM Essex Junction Labs in Burlington, Vermont) helped prepare her for an industrial career.

She was born on July 30, 1953, in Fountain Hill and was the daughter of the late Frank H. "Huck" Kittek and Elsie Barbara (Warjas) Kittek. Peg graduated from Notre Dame Catholic High School, Bethlehem Township in 1971 as class salutatorian. and went on to earn both a Bachelors Degree with Highest Honors in 1975 and later, a Masters Degree in Chemistry. At Lehigh she was accorded academic honors; participated in Town Council and the *Brown & White*; and interned with IBM in Vermont.

She spent the majority of her career at Air Products and Chemicals. Margaret was a member of the American Chemical Society, and the Electron Microscopy Society. She is survived by a daughter, Claudia (Anewalt) Francis, PhD. and her husband, Bradley of Mishawaka, IN; a son, Tyler Anewalt and his wife, Michele Amicucci of Jersey City, NJ; three grandchildren: Evelyn H. Francis; Elsie R. Francis and Henry N. Anewalt; and her brother Fran Kittek and his wife, Sue of Coopersburg, PA. She was a proud parent, encouraged her children to pursue their passions, and raised them to be strong and compassionate adults. She was a terrific grandparent and found creative ways to share her love of science with her grandchildren, encouraging them to explore and learn about the world around them.

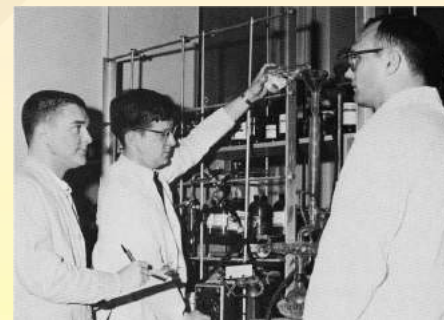
Edward A. Klemens ('50) of Woodland Terrace at the Oaks, Allentown, died Friday, February 10, 2017 at Lehigh Valley Hospice.

Born in Lansford on January 26, 1925, Edward was the son of the late John and Anna Klementovic. He was a Lansford High School graduate and he earned his B.S. in Accounting from Muhlenberg College and a Chemical Engineering degree from Lehigh University. Edward was a Navy veteran of WWII. He worked as a chemical engineer for Quaker Chemical -- but chose to retire as a self-employed C.P.A.

Preceded in death by his wife, Mildred (Kupsky) Klemens and his brothers Laddie and John and his sister, Anne Roberts, he is survived by his daughter, Carol Frisch (Raymond) and his granddaughter, Katie, as well as his brother, Joseph Klementovic of Lansford. Edward was a Christian by faith--an animal lover and his hobbies included gardening and spending time with his family.

Cyrus J. Ohnmacht ('66) came to Lehigh in 1962 as an organic chemistry graduate student. He had completed his BS-Chem at Muhlenberg on a football scholarship, worked briefly in the syn-chem division of Eastman Kodak in Rochester, and returned to the Lehigh Valley to join Professor Thomas Young's group developing syntheses of novel heteroaromatic sulfonium salts. Cy obtained his doctorate in 1966 and joined the Heindel laboratory as a postdoc in medicinal chemistry. After a subsequent postdoc (with Professor Robert E. Lutz at UVA), Cy spent 35 years as a medicinal chemist with AstraZeneca (Wilmington) retiring in 2005. He was the first to synthesize the anti-malarial drug Mefloquine, and he headed the discovery team for the anti-psychotic drug Seroquel. Cy held more than 40 patents on candidate pharmaceuticals and had authored more than 50 publications. He and his wife of 56 years, Joanne, were living in retirement in Audubon, PA. Cy was 80-years old.

Cy Ohnmacht (right), Assistant Professor Ned Heindel (center) and graduate student James Molnar (left) working in the Chandler Laboratory. (c. 1968)





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 in either of two ways:

- By contacting Dept. Chair Greg Ferguson (gf03@lehigh.edu) to discuss specific projects
- By contacting Lehigh's Advancement Office at (800) 533-9656

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