Chair’s Message

This year was highlighted by two outstanding faculty hires. Associate Professor Yugang Sun joined Chemistry in January. He is a world-renowned expert in the synthesis and characterization of novel materials potentially useful to a diverse range of technological applications ranging from electronics to catalysis. He was named one of the World’s Most Influential Scientific Minds – 2015 by Thomson Reuters. Chemical biologist Ross Wang, formerly of Scripps research Institute, joins us this summer.

With over 150 papers published in 2015, the department’s world-class research benefits a highly talented group of graduate students and postdoctoral associates, as well as a significant number of undergraduates. Working with our faculty, many of these chemistry majors culminate their research experiences with publications in prestigious journals and continue their research at elite graduate institutions.

This newsletter also features the Grant R. Krow Memorial Symposium, which highlighted the many teaching and research contributions Grant made to our department and the external scientific community. Finally, the department takes great satisfaction in producing superbly qualified graduates who continue to find rewarding, career-advancing opportunities both in the workplace and at world-renowned graduate-level chemistry programs. Deeply appreciative of the continuously increasing financial contributions from alumni and friends, we are proud of our accomplishments and excited about our future growth in teaching and research.

Sincerely,

Daniel Strongin,
Professor and Chair, Department of Chemistry

Chemistry Dept. researchers investigating next generation of solar cells and LEDs

Four Chemistry Department researchers are engaged in a collaborative research project that has the potential to significantly enhance the efficiencies of both photovoltaic, dye-sensitized solar cells and optoelectronic, light-emitting diodes (LEDs).

The collaboration is bringing together the ultrafast photophysical measurement and evaluation capabilities of the laboratories of Hai-Lung Dai, professor of physical chemistry, and Yi Rao, research associate professor of physical chemistry, with the materials synthesis expertise of Bradford B. Wayland, professor of inorganic chemistry, and Graham E. Dobereiner, assistant professor of organometallic chemistry.

The group is concentrating on the charge transfer mechanisms involved with 2D layered and 3D halide perovskite materials.

“Our initial focus has been on utilizing ultrafast photophysical techniques to gain a better, fundamental understanding of how these energy conversions occur,” says Rao, the principal investigator on the project. To do so, the techniques the group is utilizing include transient absorption microscopy, luminescence lifetime and ultrafast interfacial spectroscopy—all of which build on the Dai group’s pioneering work on second harmonic generation (SHG) techniques.

Meanwhile, the Wayland and Dobereiner groups have been utilizing their materials expertise, which includes characterizing complex organic/inorganic substances and pursuing mechanistic understanding, including the kinetics and thermodynamics involved in electron transfers, to improve the perovskite materials.

“Our preliminary research has resulted in efficiency improvements of 14 percent,” says Rao, “and we believe there is a definite potential to enhance that. Our goal is to develop the next generation of photovoltaic and optoelectronic materials.”

The group’s research is currently being funded by a two-year targeted research grant from Temple University’s Office of the Vice Provost for Research, which was granted last year. Based on their preliminary results, the researchers are seeking outside funding to further the research.
Kyle Knouse
Next Stop: PhD program at Scripps Research Institute

As he heads west to pursue a doctorate in organic chemistry at the highly ranked Scripps Research Institute in La Jolla, California, Kyle Knouse, BS ’16 chemistry, already has authored a list of published, peer-reviewed papers that would be the envy of many doctoral students.

He is the lead author, along with co-author William Wuest, an assistant professor and Knouse’s research advisor, of a paper published earlier this year in the Journal of Antibiotics. He also co-authored, with Wuest and other Temple researchers, two papers published in the Journal of the American Chemical Society; and one or two more future papers. In addition, his medicinal chemistry internship with Teva Pharmaceutical Industries in West Chester, Pennsylvania, resulted in another submitted paper.

His Journal of Antibiotics paper, and the two Temple JACS papers, focus on a potential new antibiotic, Promysalin, a compound produced by bacteria found in the root system of a Sri Lankan rice plant. “To survive, the bacteria produce compounds like Promysalin to fight off and hinder the growth of other bacteria, a very specific, targeted activity that you often don’t find in other antibiotics,” Knouse explains.

“Kyle has been in my lab for three years and he is an absolute rock star,” says Wuest.

The New Oxford, Pennsylvania, native gravitated to chemistry his sophomore year when, he says, “I couldn’t get enough of organic chemistry, which everyone else was struggling with and hating.”

Once he started working in Wuest’s lab, he says, “I fell in love with it and decided this is what I want to do for the rest of my life.”

Of his acceptance to Scripps, Knouse says, “I am blown away by the opportunity.” Whether his graduate work leads to an academic or industrial career, Knouse adds, “I want to pursue research that benefits human health.”

Graduate students host distinguished lecturers

Since the fall of 2013, the Graduate Student Distinguished Lectureship program has brought eminent speakers to the campus to conduct departmental interdisciplinary seminars. Each semester the students select, invite and correspond with one speaker from among a rotating list of chemistry sub-disciplines. Once the speakers arrive, the bulk of their time is spent with the students.

“It is motivating to spend time with scientists of such esteem,” says the most recent student host, Colin Fitzpatrick, a doctoral student with Professor Robert J. Levis’ Center for Advanced Photonics Research. “You not only hear about the newest research in the field, but get to see how passionate and engaging they are after such long, successful careers.”

Under the program, a succession of notable chemists has come to Temple, including Dick Zare of Stanford University (fall 2013), Harry Gray of Caltech (fall 2014), Gabor Somorjai of the University of California, Berkeley (fall 2015) and George Schatz of Northwestern University this spring.

On Nov. 17 the fall speaker will be Caltech chemist Gregory Fu, whose lab focuses on nickel and copper transition-metal catalysis. On March 2, 2017, the speaker will be Edward Solomon, a Stanford University bioinorganic chemist.

PSM in forensic chemistry degree program

The professional science master’s (PSM) in forensic chemistry degree program prepares students for a wide range of positions in the public and private sectors, including criminal investigation and prosecution, civil litigation, legal reform, homeland security and the advancement of technology.

The two-year program, which can be completed on either a full- or part-time basis, includes: core requirements in current topics in forensic chemistry, applied biopharmaceutics, toxicology and data analysis, as well as law, ethics and policy. Annual seminars, hands-on forensic chemistry laboratory training, an independent research project and a forensic chemistry internship are included.

To enable full-time working professionals to be enrolled in the program, most of the classes are offered in the evenings or on weekends—at either Temple University’s main campus, the Fort Washington campus, or the Center for Forensic Science Research and Education in Willow Grove, Pennsylvania.

A BS in chemistry or a closely related discipline is a prerequisite.

PROFESSIONAL SCIENCE MASTER’S IN FORENSIC CHEMISTRY DEGREE PROGRAM

For more information, contact Professor Susan Jansen Varnum, the degree program director and associate dean for science education, at susan.varnum@temple.edu or Eileen Weinberg, assistant director of graduate services, at eileen.wienberg@temple.edu.
Yugang Sun comes to Temple from the Center for Nanoscale Materials at the Argonne National Laboratory. In Thomson Reuters’ Highly Cited Researchers 2014 he is listed as both a materials scientist and a chemist, and last year the same organization named him one of the World’s Most Influential Scientific Minds. His research focuses on developing novel approaches for synthesis of a range of nanostructures including metal nanoparticles with well-controlled morphologies and metal/semiconductor nanocomposites with multiple functionalities. Sun has more than 100 publications in respected journals such as the Journal of the American Chemical Society.

Willets helps lead department’s plasmonics research

Associate Professor Katherine (Kallie) Willets is one of several new faculty members who are leading the department’s rapid expansion in the field of plasmonics. Plasmons occur when incident light drives surface conduction band electrons in nanoscale noble metal structures to oscillate back and forth across the nanostructure surface, effectively focusing the light to nanoscale dimensions while enhancing its intensity by many orders of magnitude. For molecules sitting close to the surface of these plasmonic materials, their spectroscopic signals can be enhanced more than a million-fold. This has important implications for biological and chemical sensing. Plasmonic materials also can promote photocatalytic reactions at their surface, which makes the materials promising candidates for energy research.

Willets uses ultra-sensitive fluorescence and Raman microscopy techniques to study how molecules interact with plasmonic materials. Her National Science Foundation-funded work focuses on understanding how these materials can be optimized for sensing applications, while her DOE-funded research looks at understanding how plasmonic materials can lower energy barriers for electrochemical reactions.

FACULTY NOTES

- Protein Science published a special edition on Dec. 28, 2015, which honored the career contributions of Ronald M. Levy, Laura H. Carnell Professor of Biophysics and Computational Biology and professor of chemistry, physics and biology.
- Professor C.N.R. Rao, FRS, one of the world’s most highly regarded chemists, has been appointed a Distinguished Adjunct Professor of Chemistry at Temple. Rao, who twice visited CST in 2015-16, is honorary president of the Jawaharlal Nehru Centre (JNC) for Advanced Scientific Research, India, and director of JNC’s International Centre for Materials Science.
- Mike Klein, CST dean and Laura H. Carnell Professor of Science, was elected a 2015 American Association for the Advancement of Science (AAAS) Fellow.
- Professor Scott Sieburth was elected secretary of the Division of Organic Chemistry of the American Chemical Society.
- Andrew Price and Vladimira Wilent received the CST Dean’s Distinguished Teaching Awards.
- Steven Fleming won the Lindback Distinguished Teaching Award.
- Professor David Dalton is retiring effective July 1. His seminal contributions to the department over the last five decades have contributed to the excellence of both our teaching and research mission. We wish him well.
Symposium honors memory and career of organic chemist Grant Krow

Eighty-one researchers, professors and students gathered on May 21 for the Dr. Grant R. Krow Symposium to honor the memory and career of the long-time chemistry professor who died last year at the age of 73.

Sponsored by the Department of Chemistry and CST, the symposium featured presentations by professors from Temple, Yale University, the University of Wisconsin-Madison and Penn State-Abington.

A professor of organic chemistry at Temple for 42 years, Krow taught and mentored hundreds of students, authored more than 110 scientific papers and won numerous awards.

“In his heart he was a physical organic chemist, and he made fundamental and insightful contributions to our understanding of the chemistry of small, strained heterocyclic compounds,” says Seth Herzon, BS ’02, one of Krow’s students who earned his PhD from Harvard University in 2006 and has taught at Yale University, where he is a professor of chemistry, since 2008. “His work had important implications in terms of basic chemistry, synthetic methods, and our models of structure and bonding.”

Prior to the symposium, Herzon also spoke about how influential Krow was in his eventual career path. “He was especially generous with his time when working with students and undergraduates,” Herzon says. “I spent hours in his office discussing material I had questions about.

“That availability, which was really kind of special, coupled with his intellectual capabilities, which were outstanding, made him a very effective and influential mentor.”

Associate Professor Rodrigo B. Andrade co-organized the conference with Herzon, who also gave the last of the symposium’s afternoon presentations at the college’s Science Education and Research Center.

The Krow Symposium was made possible in part through support from established chemistry funds and from the generosity of donors to the department. If you are interested in establishing your own fund to support chemistry, contact John R. Walker, associate vice dean, at 215-204-8176 or john.walker@temple.edu

Chemistry at ACS Philly

Plan on attending our CHEMISTRY DEPARTMENT ALUMNI AND FRIENDS RECEPTION during the Fall American Chemical Society National Meeting in Philadelphia. The reception will be held 5-7 p.m. Tuesday, Aug. 23, at the Ritz-Carlton, 10 Avenue of the Arts.

To register, or for more information, please contact Barbara Fies, CST’s director of special events, at 215-204-5214 or barbara.fles@temple.edu.

Highlights

- Assistant Professor Graham Dobereiner organized an ACS-sanctioned Career Workshop titled “Preparing for Life After Graduate School” for graduate students.
- Several Temple chemistry students won awards at the ACS Poster Session held at the Philadelphia University of the Sciences in February 2016, including graduate students Andrew Steele and Kayleigh Jones.
- Professor Stephanie Wunder hosted an on-campus “Thermal Analysis Research in the Delaware Valley: a bio/nano/materials interface” symposium in April 2016.
- The Temple University Chemical Society raised more than $5,000 through OwlCrowd, Temple’s online fundraising tool. The funds were used for society members to attend the ACS national meeting in San Diego. Approximately 40 donors made online gifts. Thank you for your support!