PHOTO: JOSEPH V. LABOLITO

Spano earns Faculty Research Award

Professor Frank Spano received the 2024-2025 Temple University Faculty Research Award. Spano's research focuses on the theory of excitons, polarons and polaritons in organic materials such as molecular aggregates, crystals and thin films. Spano is driven by the "desire for discovery—the thrill of being the first to appreciate even the smallest fragment of nature's grand design.

"I strive to develop theoretical models that neatly account for experimental observations involving electronic excitations in organic materials. This also has practical utility for the design of devices such as solar cells and flat panel displays," explained Spano. "To me it is deeply inspiring that mathematics precisely describes so many natural phenomena, from the structures of single atoms and molecules to the properties of macroscopic materials like molecular crystals."

Spano's most memorable moment occurred in 2010, while he and a graduate student were conducting numerical simulations on the fluorescence spectra of molecular aggregates. "We had compiled a great many spectra under a wide array of conditions and were amazed to discover what seemed to be an invariant quantity—a property of the spectrum that persists even though the conditions varied widely," he said. "For theoreticians, discovering invariants is like discovering gold. The transformational moment came when we derived, using old-fashioned paper and pencil, an exact expression for the invariant quantity."

His proudest accomplishment? "After several years of intense investigation, we finally succeeded in developing a set of simple rules—the 'ratio rules'—which allow one to determine important material properties, for example, the strength and nature of intermolecular interactions, directly from the absorption and photoluminescence spectra," said Spano. "The rules are applicable to a wide range of materials, from a simple pair of molecules to a molecular crystal, and have been used by many experimentalists to interpret their observations."

NSF GRANT FOR EXPLORING POTENTIAL NANO-SIZED SOLUTIONS

by Stephen Orbanek

Professor Kallie Willets will lead Temple's efforts in The Center for Single-Entity Nanochemistry and Nanocrystal Design (CSENND), which received $20 million in Phase 2 funding through the National Science Foundation's (NSF) Centers for Chemical Innovation program.

CSENND is a collaborative effort between nine universities. Collectively, they will work to explore how individual nanocrystals behave. For the past three years, Willets and her colleagues have worked through phase one of the project.

"We have been working with Phase 1 support, which is similar to an incubator stage," Willets said. "Now we are bringing in more universities and more expertise, so we can really expand our concept. This allows us to push towards innovations in nanoscience that can ultimately be translated into applications for the benefit of humanity."

Over the next several years, CSENND will work to develop high-throughput, artificial intelligence-based technologies that will be able to quickly reveal each nanocrystal's composition and crystalline shape and how these influence their properties and function. The group's findings will then be used to inform other researchers and industry partners, so they can design nanocrystals with applications in biomedicine, electronics, fuel production, chemical manufacturing and other areas.

"There's a lot of different materials, there's a lot of different shapes that we can make and there's even different size scales that we can explore," Willets said. "Our goal is to explore the parameter space of nanocrystal synthesis and function in a more efficient way to get towards those applications that will really have a positive impact on this world."

GRAD STUDENT ATTENDS LINDAU

Zachary O'Dell, a physical chemistry doctoral student, was selected to participate in the 2025 Lindau Nobel Laureate Meetings in Germany.

At Lindau, approximately 35 Nobel Laureates convene to meet the next generation of leading scientists: 600 undergraduates, graduate students and postdocs from around the world.

"It was an amazing opportunity to speak with past laureates, but also meet students, postdocs and junior faculty to share our different research and experiences," said O'Dell. "A highlight was dinner with Stefan Hell, who received the Noble Prize in Chemistry in 2014 for an optical microscopy technique that I became familiar with here at Temple."

Lindau "young scientists" are selected, in part, on their "excellent research" based on publications, presentations and grants. With interests in polarization analysis of plasmonic nanoparticles, CLocK microscopy, O'Dell has been awarded a National Science Foundation Graduate Research Fellowship.

FACULTY NEWS BRIEFS

Professor **Christopher Beaudry** joined the department in 2024. His research group works in the area of synthetic chemistry, natural products, biology and catalysis. With graduate work centered around the biomimetic total synthesis of the polyketide natural products, Beaudry earned his PhD from the University of California, Berkeley. He also conducted postdoctoral research at the University of California, Irvine. Before joining Temple, Beaudry was at Oregon State University.

Steven Fleming, professor of instruction, was selected for the very first group of Honors-Affiliated Faculty at Temple University. Selected from across the university, he is the only CST faculty honored. During his three-year term, Fleming will improve his already-strong connection to the Honors Program and develop new organic chemistry courses.

Carol Manhart has been promoted to associate professor. By understanding DNA repair using biochemistry, biophysics, chemistry, molecular biology and genetics, her lab's work contributes to models of human disease, particularly cancers associated with Lynch syndrome and neurological diseases associated with trinucleotide repeat instability. The research seeks to understand fundamental cellular pathways and develop new diagnostic tools, identify new therapeutic targets, and create technology to improve nucleases used in clinical and biotech applications.

Carol Manhart

PHOTO: DAN Z. JOHNSON

KIM EARNS 'EARLY CAREER' AWARD

by Greg Fornia

Assistant Professor Daniel Kim was awarded the Early Career Investigator honor by the Philadelphia Organic Chemists' Club.

After earning his doctorate at the University of California Irvine and serving as a postdoctoral research fellow at Princeton University, Kim joined Temple in 2020 where he initiated a research program developing new reagents to solve challenges in organic synthesis.

One of the oldest independent chemistry clubs in the United States, the Philadelphia Organic Chemists' Club's central purpose is to facilitate dialogue and interaction among scientists, particularly between those in academia and at chemical and pharmaceutical companies. Each awardee presents a lecture. Kim spoke on investigating new light-driven reactions to develop rapid synthesis to a variety of important bioisostere building blocks.

"Currently, we are especially interested in acyl and acetal radicals and their use in organic synthesis and their potential applications to new materials and pharmaceuticals," explained Kim. "Specifically, we've developed new reagents for the nucleophilic installation of TFMKs (trifluoromethyl ketones). Recently, we've been investigating new opportunities and avenues for acetals as C2 fragments as complementary synthons for the accessing vicinal functional groups."