The Division of Physical Chemistry (PHYS) *is hosting the following 10 oral symposia, consisting of both invited and contributed papers, as well as a general poster session.* ***Abstract submission is now open through September 29, 2025****. For those interested in an oral presentation, please submit abstracts to the appropriate symposium via ACS-MAPS. For each symposium, the organizers (listed below) will select some contributed papers for oral presentations; contributions not selected for oral presentations will be assigned to the poster session.*

The Icy Universe Revealed by JWST

The origin of life on Earth remains one of the most significant and unresolved "Grand Challenges" in science. Recent advancements in modern observatories, coupled with progress in astrochemical modeling and laboratory experiments, have revealed that complex organic molecules (COMs), including prebiotic species, are abundantly formed in both the interstellar medium (ISM) and the Solar System. Throughout the star-formation process, a dynamic interplay exists between gas-phase species and solid-phase molecules frozen on the surfaces of interstellar dust particles. Current understanding suggests that COMs are primarily synthesized in the solid phase and can transition to the gas phase via thermal and non-thermal desorption mechanisms. The intricate chemical complexity observed in star-forming regions serves as the foundational material for future exoplanetary systems. Despite this, our knowledge of these organic molecules within interstellar ices and their physicochemical evolution in space remains limited. The James Webb Space Telescope (JWST), with its unparalleled resolution and sensitivity in the near- to mid-infrared spectral range, has revolutionized our understanding of the Universe. It has provided unprecedented insights into the early stages of star formation, capturing detailed observations of protostars and protoplanetary disks. The JWST has enabled the first direct detection of COMs in ices during early protostellar phases, advanced the study of exoplanetary atmospheres, and delivered remarkable imaging of our Solar System. The timing of this symposium is particularly relevant, as by spring 2026, JWST will have nearly completed its Cycle 4 observations across its full suite of instruments. This gathering will celebrate the groundbreaking scientific discoveries facilitated by JWST in recent years. With a strong emphasis on the interdisciplinary field of astrochemistry—including laboratory research, theoretical modeling, and observations of the ISM, from diffuse regions to dense molecular clouds, protostars, protoplanetary disks, and our Solar System—this symposium aims to engage a broad audience of chemists and (planetary) astronomers, fostering collaboration and innovation at the Atlanta meeting.

Jennifer Bergner | University of California, Berkeley | jbergner@berkeley.edu
Sergio Ioppolo | Aarhus University | s.ioppolo@phys.au.dk

Physical Principles of Mesoscopic Chemical Design

The deterministic design of chemical properties remains one of the major goals of the chemistry and materials communities. While conventional approaches to tailoring chemical phenomena (organic chemistry protection/deprotection, ligand substitution, assembling heterogeneous systems, incorporation of metal centers to tune electronic and spin levels, etc.) has been so successful as to transform human life, there remains tremendous interest and opportunity in building chemical systems from physical interactions and to define fundamental rules governing the use of physical, optical, magnetic, and other modal couplings that can be leveraged to enhance technologies in catalysis, photo-induced chemical transformations, energy storage, and information processing. The organizers of this symposium intend to bring together researchers from different, but complementary, sub-fields of physical chemistry who are attempting to identify and apply novel constituents of matter, and their interactions, to form material systems with desired chemical properties. By presenting findings where researchers use nanoparticles, metal-centered clusters, meta-atoms, proteins, and hybrid organic-inorganic micro-structures to form new materials systems that possess distinct chemistries, the organizers intend to build bridges between these sub-fields towards the development of more fundamental rules connecting physical interactions to chemical properties. This development would then help inform more refined exploration of ways in which the physical principles of material synthesis can be used to control chemical phenomena.

Aaron Rury | Wayne State University | gk7795@wayne.edu
Blake Simpkins | Naval Research Laboratory | blake.s.simpkins.civ@us.navy.mil

Physical Chemistry of Biomembranes

We aim to highlight recent advances in understanding the complex physical and chemical processes underlying biomembrane behavior and function. Biomembranes are essential to cellular organization and activity, providing structural integrity while mediating crucial biological interactions. Bringing together experts from experimental, computational, and theoretical disciplines, the symposium will delve into the latest insights into membrane physical chemistry, with a focus on areas such as membrane biophysics, including lipid organization, phase behavior, and lipid-protein interactions; the dynamics of small molecules, such as drugs, metabolites, and polymers, interacting with membranes and membrane proteins; advances in high-resolution imaging and spectroscopic techniques for probing membrane structure, dynamics, and interactions; and breakthroughs in computational methodologies for simulating membrane behavior. While these areas provide a framework for discussion, the scope of the symposium remains broad, encouraging diverse perspectives and contributions that extend beyond these outlined themes.

Atanu Acharya | Syracuse University | achary01@syr.edu
Chayan Dutta | Georgia Institute of Technology | cdutta@gsu.edu

Fundamentals of Chemical and Electrochemical Doping in Conducting Polymers

Various emerging technologies based on organic electronic materials, such as thermoelectrics, bioelectronics, electrochromics, photovoltaics, and neuromorphic computing, rely on improving strategies to dope conjugated polymers. Two major types of doping methods have emerged as powerful ways to modulate the electronic and mechanical properties of conjugated polymers: Chemical doping and electrochemical doping. Although these methods share many similarities in their underlying physical phenomena, chemical and electrochemical doping are often used for different applications. Better integration of the two communities that focus on chemical and electrochemical doping is expected to synergistically advance our fundamental knowledge of doping.

Chris Grieco | Auburn University | czg0090@auburn.edu
Connor Bischak | University of Utah | connor.bischak@utah.edu
Ben Schwartz | UCLA | schwartz@chem.ucla.edu

Electric Field Effects in Vibrational Spectroscopy

The past decade has witnessed the rise of vibrational spectroscopy techniques as important tools for characterizing molecular environments in solutions and interfaces. External electric fields are often invoked as microscopic descriptors determining frequencies and lineshapes. A widely known example is Vibrational Stark Spectroscopy (VSS) which, in its commonly used form, provides a linear map between observed vibrational frequencies of certain functional groups (e.g., C≡N, C=O stretches) and local (solvent) electric fields. This symposium aims to bring together experimentalists and theorists working in the field of condensed-phase spectroscopy to discuss recent developments, challenges, and successes in using spectroscopic techniques for elucidating electric fields in complex heterogeneous environments such as biological systems, interfaces, and systems where the traditional VSS has shown limited applicability. The symposium's interdisciplinary nature spans the divisions of physical and analytical chemistry fostering cross-disciplinary discussions and collaboration.

Alexei Kananenka | University of Delaware | akanane@udel.edu
Bogdan Dereka | University of Zurich | bogdan.dereka@chem.uzh.ch

Physical Chemistry Research at Undergraduate Institutions

This symposium provides an opportunity for PUI faculty in PHYS division to gather and present research accomplished in collaboration with their undergraduate students.

Carol Parish | Richmond University | cparish@richmond.edu
Todd Hopkins | Butler University | tahopkin@butler.edu

Crystalline Organic Electronics and Photonics-Theory and Experiment

Crystalline conjugated organic electronic materials are emerging as a new frontier in the design of electronic and photonic devices. While traditional organic electronic devices typically rely on disordered films, the development of highly ordered crystalline materials and epitaxial interfaces offers a pathway to improved charge transport, excitonic behavior, photonics, and stability. This symposium will explore advances in theory, molecular design, interface engineering, and fabrication techniques that form the basis for crystalline organic semiconductors for applications in transistors, light-emitting diodes, solar cells, catalysis, and integrated photonics. Emphasizing both experimental and computational approaches, discussions will highlight the role of molecular packing, epitaxy, and predictive modeling in tailoring material properties for next- generation organic electronic and photonic technologies.

Noa Marom | Carnegie Mellon University | nmarom@andrew.cmu.edu
Barry Rand | Princeton University | brand@princeton.edu
Chris Giebink | University of Michigan | ngiebink@umich.edu
Oles Isayev | Carnegie Mellon University | olexandr@cmu.edu

PHYS Division Poster Session

Contributions from all areas of physical chemistry are highly encouraged for the poster session. Multiple awards will be given for exemplary work. To be eligible for the awards, the presenting author must be a graduate or undergraduate student at the time of the poster presentation and must be present during judging.

Bern Kohler | The Ohio State University | kohler@chemistry.ohio-state.edu

Mechanisms of Photoredox Catalysis

Photoredox catalysis has emerged as a powerful technique for effective synthesis of pharmaceutical, polymeric material and other fine chemical products. In the past 2–3 decades, this field has evolved through complementary efforts by researchers in physical, inorganic, and organic chemistry. Physical chemistry has provided the experimental and computational tools for understanding the earliest excited-state dynamics leading to reaction initiation. Inorganic chemistry has advanced the design of new photocatalysts and has elucidated the role of these catalysts in photoredox reaction mechanisms. Organic chemistry has leveraged photoredox catalysis to develop new methods that enable streamlined synthesis of various complex targets via unprecedented and selective bond construction strategies involving highly reactive open-shell radical and ionic species. This symposium showcases the unique contributions of each discipline to photoredox catalysis and highlights how the field has recently benefited from the interdisciplinary connections between inorganic, physical, and organic chemistry. By providing a venue to further strengthen these connections, this symposium aims to accelerate research in photoredox catalysis towards new directions in mechanistic understanding, catalyst design, and reaction discovery.

Bryan Kudisch | Florida State University | kudisch@chem.fsu.edu
Miguel Gonzalez | Dartmouth College | Miguel.I.Gonzalez@dartmouth.edu
Qilei Zhu | University of Utah | q.zhu@utah.edu

Electronic Structure Methods for Time-Dependent, Frequency-Dependent and Spectroscopic Properties

Electronic structure methods are more and more commonly being employed to examine the dynamics and response of the electronic system to external perturbations. For example, electronic structure techniques are used to calculate explicit experimental spectra using either linear-response techniques in the frequency domain or through direct time-dependent propagation under the influence of an external electric field. Real- time methods are further used to probe ultra-fast electronic processes directly, such as in the context of charge migration, electron relaxation, or charge- and spin-transport dynamics. To tackle these problems, methods ranging from highly efficient tight-binding DFT techniques all the way to highly correlated methods have been developed. Furthermore, the inclusion of spin-orbit coupling or a spin-generalized framework also becomes fundamental when tackling x-ray spectroscopy or many spin-dependent dynamical properties. This symposium aims to bring together scientists working at the forefront of the algorithmic development, software development, and application of electronic structure methods for real-time, frequency-dependent, and spectroscopic properties. The symposium will cover applications ranging from attosecond scale dynamics in small molecules to extended material systems.

Joshua Kretchmer | Georgia Institute of Technology | jkretchmer@gatech.edu
Joonho Lee | Harvard University | m.pavanello@rutgers.edu
Daniel Nascimento | University of Memphis | drnscmnt@memphis.edu

Reactions, Couplings, and Dynamics: Symposium Celebrating the Life and Work of Martin Karplus

This joint symposia celebrates the life and works of Martin Karplus.

Charles Brooks | University of Michigan | brookscl@umich.edu
Alexander MacKerell | University of Maryland | alex@outerbanks.umaryland.edu