WATER IN THE UNIVERSE

Formed from two of the most abundant elements in the universe, the special chemical and physical properties of water play a critical role in understanding our origins. Dramatic advances in observational capabilities from millimeter-wave to infrared wavelengths and in our ability to study water vapor, liquid water, and water ice from first principles calculations have led to a new generation of methods now enables astronomers, planetary scientists and chemists to follow the "water trail" from the interstellar medium to mature (exo)planetary systems. With a strong focus on the chemistry of, and enabled by, these frontier observations, we will discuss the chemical evolution of these systems. This symposium will highlight the cosmic history of water, its critical role in the formation and early evolution of planetary systems, and the means by which habitable environments are created across the Universe. Topics will include water at cosmic distances, water in the interstellar medium, in planetary disks and in the Solar System, and water in exoplanetary systems.

Jesse Kroll, California Institute of Technology, jkroll@caltech.edu
Sergio Ioppolo, Queen Mary University of London, lioppolo@gmail.com

GETTING TO THE BOTTOM:
OPTICAL AND ELECTRONIC IMAGING OF REACTIVE CHEMICAL SYSTEMS

Much of our current understanding of complex reactive chemical systems, whether a living organism or a working battery, comes from experimental measurements of macroscopic behavior. It is generally unclear how individual components in a complex chemical network communicate at the atomic and molecular levels, and how these interactions ultimately lead to system-level behavior. This symposium will bring together chemists who represent "the bottom" of the chemistry underlying real-world applications ranging from human health to energy production and storage using the methods of experimental physical chemistry. This symposium aims to provide a comprehensive perspective of the latest developments in in situ and operando spectroscopy and electron spectroscopy techniques applied to a wide range of molecules, interfaces, and materials. Speakers include experts in areas ranging from energy generation and storage to cell biology.

Julie Bittner, University of Michigan, jbitten@umich.edu
Emilie Ringe, University of Cambridge, er807@cam.ac.uk
Justin Sambataro, Colorado State University, jsambat@colostate.edu

HYDRATION FROM THE GAS TO THE CONDENSED PHASE

This symposium will focus on experimental and theoretical progress in our understanding of hydration structure and dynamics from small clusters to aqueous solutions and interfaces. We will discuss recent developments and applications of experimental techniques, theoretical models, and simulation approaches to the molecular-level characterization of structural, thermodynamic, and dynamical properties of aqueous systems across different phases, in different environments, and under changing conditions. A specific focus will be on the relationship between spectroscopic signatures and underlying structure/dynamics of the hydrogen bond network. We will highlight recent experimental work obtained with static, phase-resolved high-resolution mass spectrometry, as well as advances in the representation of molecular interactions, data-driven algorithms, and simulation techniques that have recently enabled the study of complex systems with an unprecedented level of accuracy and detail. This session provides a unique opportunity to bridge the gap between the hydration structure and dynamics in the gas-phase, liquid-phase, and interface. By updating the progress in each of these fields, we aim to share the knowledge between these fields, thereby fostering the growth of networking within the larger community, and stimulating interdisciplinary collaborations.

Ellen Backus, Max Planck Institute for Polymer Research, backus@mpip-mainz.mpg.de
Miroslav Mikhalsky, Massachusetts Institute of Technology, miroslav@mit.edu
Francesco Paesani, University of California, San Diego, fpaesani@ucsd.edu

PHYSICAL CHEMISTRY OF THE ATMOSPHERE

Many of the atmospheric processes central to air quality, human health, and climate – including the formation of particulate matter, the degradation and transformation of pollutants, the absorption and scattering of light, and the climate change potential of different gas species – are controlled by a complex interplay of chemical reactions, photolytic processes, and phase changes. A detailed understanding of these processes is critical for accurate modeling of atmospheric composition and prediction of climate and air quality. This symposium explores the properties and evolution of atmospheric constituents. Specific topics include nucleation (forming new particles, cloud droplets, and ice crystals), the properties of particulate matter (phase, viscosity, water uptake, and optical properties), the chemical processes controlling radical concentrations, and the chemical transformations of organic compounds in both the gas and condensed phases.

Akua Asa-Awuku, University of Maryland, asa-awuku@umd.edu
Miriam Freedman, Pennsylvania State University, mrf119@psu.edu
Jesse Kroll, Massachusetts Institute of Technology, jkroll@mit.edu

RECENT DEVELOPMENTS IN BIOMATERIALS

This symposium will focus on new biomaterials with a focus on communicating latest developments in: 1) fundamental understanding in biomaterial behavior under relevant biological conditions; 2) synthetic biology, soft material synthesis, characterization and potential implementation towards smart materials; 3) ability to control self-assembly over multiple length scales and time scales to better interface with biological systems; 4) improved knowledge in kinetic pathway and non-equilibrium states in biomaterials; 5) potential for biomaterials development from different disciplines, patient-specific and disease-specific strategies, using biomaterials to achieve basic understanding in and, ultimately, controlling how materials behavior under biological condition spatially and temporally. The interdisciplinary symposium will provide a venue for bringing together experts in different disciplines such as polymer chemists, materials scientists, and engineers; with certain monomer sequence control, synthetic biology with increasing knowledge at single cell level, various characterization techniques enabling probing biologic interface with unparalleled spatial and temporal resolution; and the potential use of accessing nonequilibrium states.

Michael Alexander-Katz, Massachusetts Institute of Technology, skatz@mit.edu
Ting Xu, University of California, Berkeley, tingxu@berkeley.edu
Lihua Yang, University of Science and Technology of China, lhyang@ustc.edu.cn

AT THE INTERFACES OF EXPERIMENTAL AND THEORETICAL NONLINEAR OPTICAL SPECTRO-IMAGING

The rapid development of optical microscopy and electron microscopy has provided fundamental molecular insights into biological systems, energy materials and chemical sciences. A joint force from both experimental and theoretical approaches can push the boundary of science that neither approach can achieve by itself. This symposium will bring together experts in the field of nonlinear optical microscopy and microscropy with the goal of stimulating discussion and synergies of further integrating experimental and theoretical research to achieve a deeper understanding of the fundamental behavior of complex molecular interfaces, interfacial phenomenon as well as the interaction with new light sources (e.g., THG, FEL, frequency upconverted THz sources etc.), hyperspectral microscopy in resolving specia and dynamics of molecular systems.

Wei Xiong, University at California, San Diego, w2xiong@ucsd.edu
Lu Wang, Rutgers University, lwang@chem.rutgers.edu

NANOSCALE AND MOLECULAR ASSEMBLIES: DESIGNING MATTER TO CONTROL ENERGY TRANSPORT

Recent experimental, theoretical and computational advances have enabled the design and realization of molecular and nanoscale structured assemblies with novel, complex, and often unusual electronic properties unattainable in their individual constituents. Such assemblies are of particular interest to manipulate energy flow in technological devices by controlling electronic and excitonic energy flow initiated by UV and visible excitation to vibrational and phononic energy flow initiated by IR, terahertz, and microwave excitation. Contributions may be in the areas of nanoscale molecular and nanoscale structured assemblies towards controlling energy flow at molecular and nanoscale dimensions; talks that develop or utilize theoretical and/or computational methods towards this end are encouraged.

Justin Caram, University of California, Los Angeles, jcaram@chem.ucla.edu
Jay Foley, Williams Patterson University, jfoley10@wpu.edu
Dugan Hayes, University of Rhode Island, dhayes@ursa.uri.edu

TOWARD CHEMISTRY IN REAL SPACE AND TIME

This symposium will focus on new understanding of real space and time limits, in its sunset year. It will focus on science at aiming visualized molecular dynamics and chemistry at the ultimate limits of resolution in space and time and with sensitivity reaching the single molecule limit. The symposium will principally focus on near-field techniques: combinations of light, electrons, and force-based ultraspectroscopy, experiment and theory. Since plasmonics plays an intimate role in many of these approaches, it will be featured in most of the nine invited talks covering over 90 years of wave to infrared domain reaching the Å-molecule limit. The symposium will primarily focus on near-field techniques: contributions from light, electrons, and force-based ultraspectroscopy, experiment and theory. Since plasmonics plays an intimate role in many of these approaches, it will be featured in most of the nine invited talks covering over 90 years of wave to infrared domain reaching the Å-molecule limit. It will focus on science aimed at visualizing molecular dynamics and chemistry at the ultimate limits of resolution in space and time and with sensitivity reaching the single molecule limit. Contributions may be in the areas of nanoscale molecular and nanoscale structured assemblies towards controlling energy flow at molecular and nanoscale dimensions; talks that develop or utilize theoretical and/or computational methods towards this end are encouraged.

Eric Potma, University of California, Irvine, epotma@uci.edu

MOLECULAR, ELECTRONIC, AND IONIC TRANSPORT IN MATERIALS FOR ENERGY

Myriad phenomena underlie the power output of solar cells, batteries, and electronic devices, and electronic transport properties are important in self-assembled materials used for energy conversion and storage technologies. Fundamental physicochemical understanding of transport mechanisms will help guide the development of new materials for future energy technologies. This symposium will focus on interfacial and transport phenomena in energy materials. We will also include more general contributions having relevance for transport at the fundamental level. The symposium will cover a range of theoretical and experimental work, with the hope of generating connections among the major fields represented as well as building intellectual synergy between the participants.

Edward Valev, Virginia Tech, e valev@vt.edu
T. Daniel Crawford, Virginia Tech & AAS, tcrawford@vt.edu
C. David Sherrill, Georgia Tech, c david@ach.technion.ac.il
Peter R. Schmuki, University of Konstanz, Germany, peter.r.schmuki@uni-konstanz.de

COMPUTATIONAL QUANTUM CHEMISTRY: FROM PROMISE TO PROMINENCE

This symposium will focus on the computational chemistry of polymeric and supramolecular materials, and electron drive important properties in self-assembled materials used for energy conversion and storage technologies. Contributions in general physics, chemistry and, broadly, theoretical chemistry. To highlight the rapid developments in the field of quantum chemistry in recent years. It will focus on science aimed at visualizing molecular dynamics and chemistry at the ultimate limits of resolution in space and time and with sensitivity reaching the single molecule limit. Contributions may be in the areas of nanoscale molecular and nanoscale structured assemblies towards controlling energy flow at molecular and nanoscale dimensions; talks that develop or utilize theoretical and/or computational methods towards this end are encouraged.

Louis Maden, Virginia Tech, lmaden@vt.edu
Xavier Roy, Columbia University, xavier.roy@columbia.edu

INVESTIGATOR RESEARCH AWARDS

Our PHYS Division Young Investigator Research Award talk will be presented during the relevant PHYS technical symposia. See http://phys.acs.org/postdocs/announcements_2019.html

PHYSICAL CHEMISTRY POSTER SESSION

Contributions from all participants will be on display during the poster session to be held on Wednesday (28 August), from 6:00 to 8:30 PM. Up to six awards with monetary prizes will be given for exemplary work. To be eligible for the awards, the presenting author must be a student. The selection committee will provide feedback on the present during judging.

On-Line Abstract Submission Deadline: 18 MARCH 2019
http://abstracts.acs.org

For INFORMATION ABOUT THE PHYSICAL CHEMISTRY DIVISION, VISIT OUR WEBSITE: http://phys.acs.org

ACS DIVISION OF PHYSICAL CHEMISTRY
258th NATL ACS MEETING
San Diego, CA © 25-29 August 2019
Meeting Theme: “Chemistry & Water”

The Division of Physical Chemistry has organized the following oral symposia, consisting of both invited and contributed papers, as well as topical and general poster sessions. The abstract submission deadline is 1 March 2019. For those interested in an oral presentation, please submit abstracts to the appropriate symposium. 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.

For more information, please visit http://phys.acs.org/