



ACS DIVISION OF
PHYSICAL CHEMISTRY
239th NATIONAL MEETING
San Francisco, CA
March 21-25, 2010



Call for Papers

The Physical Chemistry Division has organized the following topical oral symposia, consisting of both invited and contributed papers, and also topical and general poster sessions. **The abstract deadline is October 19, 2009.** 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 presentation; contributions not selected for oral presentation will be assigned to the poster session.

MULTISCALE NANOMATERIALS, POLYMER, AND BIOMOLECULAR DYNAMICS

What are the implications of varying complexity at multiple scales on biological and materials functionality? For example, ordered structures emerge at large scales even in systems that are disordered at short scales. From an experimental perspective, many chemical events happen over time regions that scale multiple orders of magnitude, and thus make certain demands/restrictions on the types of measurement/modeling techniques that are used or must be developed. From a theoretical and computational perspective, the grand challenge is how to incorporate detailed dynamics and structure along multiple time and length scales self-consistently. The combination of these approaches in furthering our understanding of chemical phenomena in dynamic and heterogeneous chemical systems such as materials and biophysical systems will be addressed. For example, how do defects, both local and global, impede or enhance transport, assembly, and higher order function in nanomaterials? How does microscopic heterogeneity drive dynamics in synthetic polymer materials? How do such considerations affect the nature of proteins and nucleic acids? Novel theoretical and experimental approaches—many of which are being pursued by physical chemists—to solve these questions will be highlighted.

Rigoberto Hernandez, *Georgia Tech*, hernandez@chemistry.gatech.edu

Christy F. Landes, *Rice University*, cflandes@rice.edu

OPTICAL SCIENCE AND EMERGING ENERGY TECHNOLOGIES

With increasing attention being devoted to the development of devices that produce power efficiently, the scientific and engineering communities have recognized the need to understand quantitatively and predictively how such devices convert fuels and oxygen directly into electricity and products. Particular attention has focused on various types of fuel cells (FC), including proton exchange membrane (PEMFC) and solid oxide (SOFC) devices. Optical science, broadly defined, is well positioned to address questions related to oxidation/reduction mechanisms occurring in FCs and to structural changes occurring within FC materials. Optical spectroscopy and imaging can examine *in situ* and non-invasively those changes and identify steady-state intermediates present in FCs during operation and as a function of changing conditions. These capabilities complement traditional electrochemical methods that can only report changes in performance without identifying specific molecular or material species responsible for performance evolution. This symposium will bring together scientists and engineers involved in PEMFC and SOFC research for the express purpose of highlighting advances of optical science in fuel cell applications. A second goal of this symposium will be to identify how optical spectroscopy and imaging can address pressing questions related directly to reduction/oxidation chemistry in FCs and mechanisms responsible for FC failure.

Robert Walker, *Montana State University*, rawalker@chemistry.montana.edu

Jeffrey Owrutsky, *Naval Research Laboratory*, jeff.owrutsky@nrl.navy.mil

RECENT ADVANCES IN OBSERVATIONAL AND EXPERIMENTAL ASTROCHEMISTRY

Understanding the formation and processing of simple and complex molecules in the outer solar system, within star forming regions and within the interstellar media has attracted considerable attention from the chemistry, physics and astronomy communities. Ground based measurements and space craft campaigns have yielded a wealth of information regarding the presence of many complex molecules, some of which may have pre-biotic significance. The observations probe disk forming regions, molecular clouds, interstellar grains and icy satellites. Laboratory-based spectroscopic measurements have been carried out to assist in the identification of these molecules. Laboratory experiments involving simulated outer solar system and interstellar surfaces under low temperature and ultrahigh vacuum conditions have also been carried out with the intent of understanding the dynamics and reaction mechanisms leading to complex molecule formation. This symposium brings together observational astronomers with theoretical and experimental chemists and physicists interested in unraveling the details which lead to the formation of complex molecules in the universe and more locally in our solar system.

Thomas M. Orlando, *Georgia Tech*, thomas.orlando@chemistry.gatech.edu

Geoff Blake, *Caltech*, gab@gps.caltech.edu

PHYSICAL CHEMISTRY POSTER SESSION

Contributions from all areas of physical chemistry are highly encouraged for the poster session to be held on Wednesday evening, March 24, 2010. See announcement below for information about the Physical Chemistry Student Poster Awards.

Mark A. Johnson, *Yale University*, mark.johnson@yale.edu

DYNAMICS IN CLUSTERS AND FLOPPY SYSTEMS: THEORY AND EXPERIMENT

The focus of this symposium will be on the synergistic interactions between theory and experiment to explore the vibrational and electronic spectroscopy as well as the dynamics that are captured by these approaches with an emphasis on systems that display large amplitude motions. With the recent advances in experiment and theory systems, questions are being explored that we could not have envisioned engaging a decade ago. As we move away from strongly-bound, small molecular systems that explore a single potential minimum to molecular clusters or molecular systems that may possess multiple stable conformations, new and novel experimental approaches are necessary to fully sort out the spectroscopy and dynamics. In parallel, while electronic structure calculations and, from these, calculations of harmonic and anharmonic vibrational frequencies can be performed routinely on *well-behaved* systems, there are a growing number of systems and problems that are not straight-forward to study by these approaches. This symposium seeks to explore: recent advances in experiment and theory, interesting systems that illustrated the above issues, and recent work towards an understanding of their spectroscopy and dynamics.

James M. Lisy, *University of Illinois*, j-lisy@uiuc.edu

Anne B. McCoy, *The Ohio State University*, mccoy@chemistry.ohio-state.edu

FLUORESCENT PROBES IN BIOPHYSICS AND CHEMISTRY

This symposium highlights recent advances in the use of fluorescent probes, nanoparticles, and surfaces to study the physical chemistry of biomolecules. Special emphasis will be placed on the development of tools and probes that enable the exploration of biomolecular structure-function relationships and cellular processes. An important aspect of this effort involves understanding biomolecular and cellular interactions with nanoparticle probes and surfaces, and applications of the basic science for biological sensing, imaging, and therapies will also be presented. Limitations in biocompatibility and biodistribution of inorganic probes are important issues, and therefore chemical rationales for controlling stability and bio-compatibility will be included in the scope of this symposium.

Clemens Burda, *Case Western Reserve University*, burda@case.edu

Kim Hamad-Schifferli, *Massachusetts Institute of Technology*, schiffer@mit.edu

Hedi Mattoussi, *Naval Research Laboratory*, hedi.mattoussi@nrl.navy.mil

Shimon Weiss, *University of California at Los Angeles*, sweiss@chem.ucla.edu

MEASURING AND MANIPULATING CONDENSED PHASE CHEMISTRY IN TIME AND FREQUENCY: CELEBRATING 50 YEARS OF THE LASER

The advent of ultrashort laser pulses has exploded the potential for new spectroscopies available to probe matter. Applications of these new methods have been particularly useful for condensed phase systems that are difficult to decipher using frequency based measurements. This symposium will focus on new spectroscopic methods that harness ultrashort laser pulses to explore and manipulate matter. The primary focus will be research using new ultrafast laser methods and the interplay between time and frequency, nonlinear spectroscopies and their application to complex condensed phase systems. For example, we will feature multidimensional, high order, and coherent Raman methods, featuring application to microscopy, and multidimensional spectroscopic analogs of magnetic resonance techniques.

Nancy Levinger, *Colorado State University*, levinger@lamar.colostate.edu

Valeria Kleiman, *University of Florida*, kleiman@chem.ufl.edu

PHYSICAL CHEMISTRY OF IONIC LIQUIDS

Ionic liquids are experiencing explosive growth in many areas of research and practical applications. They present a wide range of complex physical and chemical behaviors, including ambient vapor pressures ranging from UHV to weakly volatile, a substantial variety of distinct condensed phases, including multiple crystal isomorphs, glasses, amorphous plastic and liquid crystal phases, deep supercooling, and interesting dynamical and transport phenomena. Experiments and simulations have shown that their intrinsic self-organization at the nanoscale is responsible for several of these properties. The symposium will assemble an international array of speakers to discuss ionic liquids in the context of their heterogeneous environments, solvation, dynamics and transport, interfacial properties, and the fundamentals of chemical reactivity in these systems.

Edward W. Castner, Jr., *Rutgers University*, ed.castner@rutgers.edu

James F. Wishart, *Brookhaven National Laboratory*, wishart@bnl.gov

On-Line Abstract Submission Deadline:

October 19, 2009

<http://abstracts.acs.org>

PHYSICAL CHEMISTRY STUDENT POSTER AWARDS

At the meeting in San Francisco, CA, several awards with monetary prizes will be awarded for posters presented by students at the Physical Chemistry Poster Session on Wednesday evening of the meeting. To be eligible for the awards, the **presenting author** must be a graduate or undergraduate student at the time of the poster presentation. Poster presenters will be contacted by e-mail and invited to declare their eligibility (student status) and desire to participate in the student poster award competition.

Mark A. Johnson, PROGRAM CHAIR