WATER MEDIATED CHEMICAL ASSEMBLY
This symposium focuses on experimental, theoretical, and simulation studies of water's active role in mediating and driving the structure and dynamics of systems including hydrated molecules, clusters, nano-particles, biopolymers, and interfaces. Although pure water and simple aqueous solutions have been extensively studied, vast structural regimes and dynamical landscapes associated with water's role in biological and nano-material chemical-assembly remain to be explored. These include elucidating the impact of cooperative (non-additively/energetic) phenomena in materials ranging from hydrated molecular clusters (at low temperature in the gas phase) to aqueous solutions and nanomaterial aggregates (at room temperature in the liquid phase), as well as understanding the changes in water's structure and dynamics as it interacts with small molecules, nanoparticles, and macroscopic objects. Moreover, collective motions of water networks spanning time scales ranging from femtoseconds to seconds/s will lead to the construction and delivery of new functional materials. This symposium will provide a forum for reporting and discussing experimental and theoretical developments toward understanding the nature of water and a forum for exploring the potential role of water as a means of promoting the innovation of water-mediated nano-machines, devices, and materials.

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SINGLE MOLECULES: THEORY MEETS EXPERIMENT
Advances in single molecule manipulation and detection have found wide applications at the interfaces of chemistry, physics, and biology. The single-molecule approach allows us to observe transient states and kinetic pathways that are difficult to resolve in ensemble measurements, thus providing insights that stimulate new theories and models. Indeed, the field of single molecules has benefited greatly from the lively interactions between theory and experiment, which will be highlighted in this symposium. The proposed symposium features a mixture of physical chemists and biological chemists, and includes a diverse range of subsections: (1) single molecule methods, (2) conformational dynamics, (3) nano/exciton systems, (4) biological applications, (5) photo-synthetic systems, and (6) biochemical systems.

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FROM GECHEMISTRY TO BIOCHEMISTRY AND THE ORIGIN OF LIFE
Planetary chemistry set the stage for the emergence of biochemistry from geochemistry. Physical conditions on ancient Earth gave rise to abiotic (prebiotic) synthesis, which generated a heterogeneous mixture of small molecules and polymers. Entropically driven organization of the available abiotic molecular species resulted in the emergence of molecular systems capable of metabolism, self-replication, and evolution. Interactions between the atmosphere, ocean, mineral surfaces, and space impacted all of these processes, ultimately generating micro- and macroscopic systems. This symposium proposes to bring together chemists working on atmospheres and oceans, on chemical evolution and on biophysical processes necessary for the synthesis of model protocells. On ancient Earth, the air-ocean interface would have acted as a two-dimensional microreactor—a crucible of three-dimensional chemical environments in the atmosphere and in the ocean. Chemical processes would have been shaped by meteorological inflow, hydrothermal vents on the sea floor, icy particles in the atmosphere, and minerals on the Earth's surface, eventually leading to biomolecular synthesis. This symposium will bring together studies from diverse chemical communities contributing to the understanding of key molecular processes fundamental to life.

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FRONTIERS IN HETEROGENEOUS CATALYSIS
Recent experimental and theoretical advances present us with the opportunity to describe and control catalytic systems at an atomic level. Presentations leading to the understanding of fundamental principles and structure-reactivity relationships will form a focal point of this symposium. The emphasis will be put on a synergistic approach between theory and experiments. Sessions dealing with model metal and metal-oxide catalytic systems, nanoscale induced reactivity, structure-reactivity relationships, and non-thermal processes will be held to stimulate the exchange of ideas and the formation of new collaborations in this interdisciplinary field.

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NONADIABATIC DYNAMICS: SURFACE HOPPING AND BEYOND
Surface hopping, pioneered by Tully and Preston in 1971, represents the most popular family of non-adiabatic molecular dynamics (NAMD) techniques. NAMD has become a standard approach for modeling chemical events that involve transitions between multiple quantum states. Surface hopping treats the transitions as stochastic events, in the spirit of the probabilistic interpretation of quantum mechanics. Examples of such studies abound, ranging from the splitting of atoms and small molecules in gas phase, to photoinduced reactions in condensed phases, including solutions, polymers, inorganic materials and organic-inorganic interfaces, to biological processes such as photosynthesis and vision. The surface hopping simulations are strongly motivated by time-resolved optical experiments that are carried out by multiple research groups in every major research university. Some of the recent applications of NAMD include solar energy harvesting, inelastic processes in molecular electronics, biological optical processes, light emitting devices, chemistry of living systems and information processing. The symposium aims for a timely discussion of modern developments, applications and challenges in surface hopping, nonadiabatic molecular dynamics and quantum dynamics in general.

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CURRENT VIEWS ON SECONDARY STRUCTURE
Since Pauling’s 1948 proposal of the alpha helix and beta sheet conformations of the polypeptide backbone, secondary structure has been a central element in the description of protein structure, thermodynamics, and folding. Advances in experimental and computational techniques, the development of robust model systems, and the convergence of experimentally and computationally accessible time scales have combined to produce detailed pictures of the thermodynamics and kinetics of the formation of secondary structure in proteins. This symposium addresses contemporary experimental and theoretical efforts towards the understanding of secondary structure, including analysis of helix and hairpin stability, kinetics and mechanical studies of helix and beta hairpin formation; the effects of membranes, micelles, and solvent environment on polypeptide backbone conformation; and the nature of random coil and polypeptide states.

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PHYSICAL CHEMISTRY OF CO2 SEPARATION
Managing the impact of human activities on the amount of CO2 in the atmosphere is the most far-reaching environmental challenge facing the world today. Our highly developed fossil fuel infrastructure, the relative ineffectiveness and convenience of alternative energy sources, and current estimations that these fuel reserves will last for at least several more centuries only bolster the proposition that fossil fuels will continue to dominate the energy landscape for the foreseeable future. And even as society adopts renewable sources of energy such as solar and wind, it is quite likely that at least a portion of the harnessed energy will be used to convert captured CO2 into hydrocarbon fuels. Any strategy for managing the CO2 problem involves at some stage taking CO2 from a relatively dilute source—a flue gas, a natural gas stream, even the atmosphere—to a high purity state suitable for usage or storage. This symposium will focus on the science of these CO2 separations, from the design and development of novel CO2 separating materials, to their molecular characterization and simulation, to the most far-reaching challenges and opportunities. This symposium will provide a forum for exchange amongst leaders in the field and an opportunity for the Physical Chemistry community to be introduced to the key scientific challenges and opportunities.

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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 28, 2012. See announcement below for information about the Physical Chemistry Student Poster Awards.

Martin Gruebele, University of Illinois, mgruebe@illinois.edu

We welcome suggestions for future symposia!
Please send your ideas to the 2013 Program Chair, Joel Bowman, Department of Chemistry, Emory University, Atlanta, GA 30322, (404) 727-6592, jbmowa@emory.edu

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