Chemical Physics of Clusters, Nanoparticles, and Nanoscale Materials

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New and surprising behaviors emerge when matter is divided into nanometer or sub-nanometer length scales. The finite size coupled with the large number of surface atoms, reduced coordination and low dimensionality render nano-structured materials properties that are different from the bulk. The stability, band gaps, and reactivity are all found to change with size, composition and the charged state, and clusters of non-magnetic solids can be magnetic. Most appealing are systems that display interesting behaviors, whose composition can be selectively chosen, and whose individual characteristics might be retained when assembled into an extended material. In this context, one promising concept is the possibility that nanoscale materials of desired properties can be formed via the technique of assembling clusters that have been designed to have specific properties, whereby the clusters serve as individual molecular building blocks. The session will highlight novel electronic, magnetic and chemical behaviors associated with clusters and nanostructures and how novel nano-materials with tunable characteristics may be synthesized by assembling size selected clusters/nanoparticles as building blocks.

Theoretical and experimental contributions will be solicited in the following areas:

1. Synthesis and characterization of clusters and nanoparticles.

2. Structure, stability and the electronic behavior of clusters and nanoparticles.

3. Evolution of magnetic behavior with size and the magnetic behavior of molecular nanomagnets.

4. Electronic Transport in molecular systems.

5. Catalytic behavior and the developments of nano-catalysts.

6. Assemblies of Clusters/nanoparticles.