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NATIONAL LABORATORY

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Frontiers in Chemical Physics
Seminar Series

Professor Will Castleman

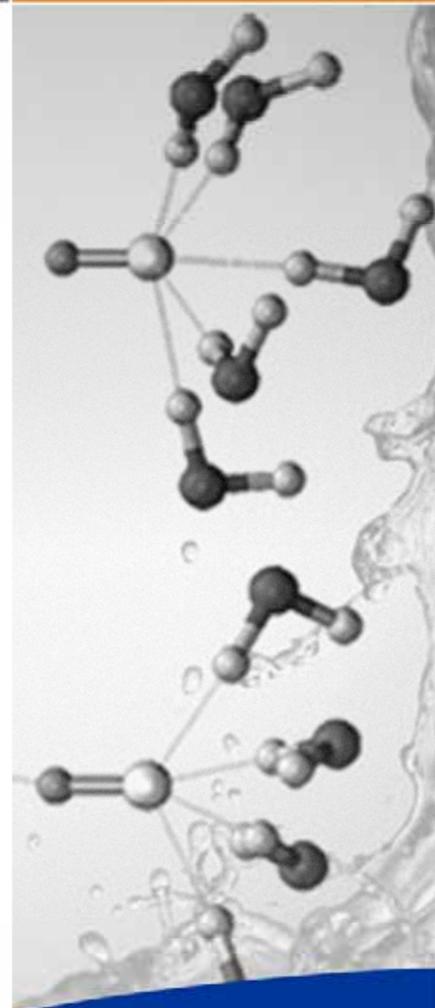
Presenting:

Clusters, Catalysis, and Materials: Kinetic, Superatom and Isoelectronic Concepts

Abstract

During the course of investigating the reactivity and structure of metal and metal-compound clusters, we discovered the ability to mimic elements of the periodic table using selected species termed “superatoms”. The findings are being extended to binary metallic and compound systems, where both electronic and geometric structures are identified as playing a role in governing stability and the presence of reactive centers, the main subject of this lecture. As the behavior of clusters can be controlled by size and composition, the superatoms offer the potential to create unique compounds with tailored properties where each atom makes a difference. Having demonstrated the feasibility of this approach, one of the prime objectives of our current research is to lay the foundation for forming new nanoscale materials via techniques of cluster assembly utilizing these “elements” as the building blocks, utilizing knowledge we acquire about cluster reactions and properties which serve to identify promising species. This pursuit is viewed as one of the most promising frontiers in nanoscale materials research.

It is found that clusters of selected composition, stoichiometry, size and charge-state provide ideal media for investigating fundamental mechanisms of heterogeneous catalysis, especially for oxidation reactions. The interplay and unification of the ideas and concepts that enable the identification of catalytic mechanisms and the design of superatoms mimicking elements of the periodic table will be discussed, also with attention given to quantifying concepts through the isoelectronic principle.



Date: May 10th

Location: EMSL AUD

Time: 11:00 AM