



Nanotechnology Seminar, Wednesday 6. 4.2016, 12:00

IKI Auditorium, Building 51, room 015

Metal-Ligand Chemistry in Multimetallic Nanoparticle Synthesis and Performance

Jill E. Millstone

Department of Chemistry, University of Pittsburgh

Abstract:

Metal-ligand chemistry is shown to be a pivotal tool in the control of metal nanoparticle formation, structure, and emergent properties. Specifically, small molecule ligand chemistry is used to mediate the incorporation and distribution of metals in and on discrete, colloidal nanoparticle substrates, as well as modulate their emergent optoelectronic features once formed. Here, we focus on cases of 3d transition metals in Au and Pt hosts. The resulting structures are characterized by a wide variety of methods including NMR spectroscopy, electron microscopy, and photoelectron spectroscopy techniques. Specifically, we demonstrate that nanoparticle ligand chemistry may be used to access previously unobserved mixtures of metals, unique distributions of metals at the surface of a colloidal particle, as well as composition-tunable and surface chemistry controlled photoemission. These results provide mechanistic platforms for the development of nanoscale alloys and other bimetallic architectures that are promising for a wide variety of applications ranging from light-driven catalysis to covert signaling.

Bio:

Jill E. Millstone received her B.S. in Chemistry and English from Carnegie Mellon University working with Richard D. McCullough, and completed her Ph. D. in Materials Chemistry at Northwestern University under the direction of Chad A. Mirkin. Millstone studied charge transfer in organic-inorganic photovoltaics as post-doctoral researcher at the University of California, Berkeley in the laboratories of Jean M. J. Fréchet and A. Paul Alivisatos. In 2011, she joined the Chemistry Department at the University of Pittsburgh, where she has received awards including the National Science Foundation CAREER Award, the American Chemical Society Unilever Award and the Cottrell Research Scholar Award. She is also a member of the editorial advisory board of *ACS Nano*. Her group studies the chemical mechanisms underpinning metal nanoparticle synthesis, surface chemistry, and optoelectronic behaviors.