

Physical Chemistry Seminar

Tuesday,
January 22, 2013

11:00 am

Room 1315
Chemistry Building

Correlations of cluster size, electronic structure and (electro)catalytic activity for Pd_n and Pt_n on planar substrates



Professor Scott Anderson

*Department of Chemistry
University of Utah*

Host: Professor Gil Nathanson

Real-world catalysts and catalytic electrodes typically have a broad distribution of different size catalytic metal particles dispersed on high surface area oxide or conductive supports. It is known that particle size is a variable that can be adjusted to influence catalytic activity and selectivity, but the detailed dependence on size is difficult to study in these complicated materials. We use size-selected cluster deposition on planar supports to prepare model catalysts with mono-disperse and tunable particle size, and then study both the physical properties and catalytic activity. Two very different types of reactions will be presented: 1. Gas-surface catalysis leading to CO oxidation over Pd_n/TiO₂ and Pd_n/alumina. 2. Electrochemical oxygen reduction and carbon oxidation catalyzed by Pt_n on glassy carbon electrodes. We find that even for these very different kinds of reactions, there is a unifying theme. Activity of the metal as an oxidation catalyst is correlated with the size-dependent electronic structure, as measured by X-ray photoelectron spectroscopy.

Refreshments will be available prior to the seminar at 10:45 a.m. outside room 1315

Graduate Students may meet with the speaker at 1:00 p.m. in Room 8335