

UNH Materials Science Seminar

11:10-12:00, Thursday, February 12, 2009

DeMeritt Hall 240

University of New Hampshire

Renewed Catalytic and Magnetic Properties of Noble Metal Containing Nanostructures

Prof. Xiaowei Teng

Chemical Engineering, University of New Hampshire

Noble metals containing bimetallic nanomaterials have been used in various technologically important areas for many years due to their unique catalytic, electronic, and magnetic properties. In addition to size, shape, and chemical composition, the performance of bimetallic nanomaterials are also associated with their structural diversities to a great extent.

First, we will talk about the synthesis of Pt and PtRu porous nanostructure, with surface area around 18-22 m²/g. The catalytic performance of those materials towards direct methanol fuel cells (DMFCs) reactions will be discussed. Then, the design of heterogeneous AuPd alloy nanostructure through the galvanic replacement reaction will be presented. By using combined techniques such as high-resolution transmission electron microscopy (HRTEM), X-ray diffraction (XRD), and extended X-ray absorption fine structure (EXAFS) spectroscopy, AuPd near surface alloy (NSA) with Au-rich core and Pd-rich shell has been determined. This is the first study to demonstrate the synthesis of NSA via benign wet chemistry approach, without the ultra high vacuum technique. Finally, our recently work on the unusual magnetic study of Pt and AuPt nanowires will be presented. We have shown that in the confined nanoscale, Pt and AuPt appear interesting ferromagnetic properties, in contrast to paramagnetism and diamagnetism in their bulk counterparts.

Dr. Teng is an Assistant Professor at Department of Chemical Engineering, University of New Hampshire. His research interests include nanomaterials, fuel cells, and catalysis. Dr. Teng received his PhD from University of Rochester.

Host: Professor Jim Krzanowski x2315