JAMES MADISON UNIVERSITY

SEMINAR

Friday, March 29

Dr. Michelle L. Personick

Department of Chemistry
University of Virginia
Charlottesville, VA

Precision Engineering of Metal Nanoparticle Surfaces for Fundamental Studies of Catalytic Reactivity

Dilute bimetallic nanoparticles, whose surface is composed of a more reactive metal dispersed in a less reactive metal, hold particular promise for achieving selectivity in challenging chemical transformations related to sustainable chemical production and renewable energy generation. However, due to the complexity of these surfaces it can be difficult to define catalytic mechanisms, which are important for enabling rational catalyst design. Our research group has shown that shaped metal nanoparticles with well-defined, faceted surfaces can be used as powerful models for testing predictions from fundamental surface science studies under conditions of catalytic turnover. The controlled, deliberate synthesis of the shaped and/or bimetallic nanoparticles required to probe these hypotheses is non-trivial because materials with differing reactivity in their metallic forms also have metal ion precursors with differing reduction potentials and reduction kinetics. To address this challenge, our group has developed a versatile toolbox of synthetic techniques, including an integrated electrochemical approach to nanoparticle synthesis. These approaches have enabled the synthesis of nanostructures with previously unachievable architectures and compositions.

Meet the Speaker 2:00pm, PCB 3144
Seminar 3:30pm, King 159