

## **571f Characterization and Kinetic Evaluation of Silver-Containing Bimetallic Catalysts Prepared Via Electroless Deposition**

*Melanie Schaal, Christopher Williams, John Monnier, Anna Pickerell, and Trang Hoang*

Bimetallic catalysts are often used to improve catalyst performance, particularly with respect to enhancing selectivity to the desired products. Such catalysts are typically prepared by either simultaneous co-impregnation of both metal salts onto the catalyst support or by successive steps of metal salt addition. For either of these preparative methods, it is virtually impossible to ensure formation of only bimetallic particles; rather, formation of separate metallic particles of both metals can and does occur. Thus, it is very difficult to characterize such catalytic systems, and even more difficult to correlate catalyst performance with bimetallic catalyst composition. An alternative approach for the preparation of bimetallic catalysts is the use of electroless deposition (ED) of reducible metal salts onto other metals. Electroless deposition has been used extensively in modern technology in fields such as electronics, corrosion protection, batteries, and biomedical applications, but not in the preparation of novel, bimetallic catalysts. ED is a catalytic or auto-catalytic process for the deposition of metallic components by a controlled chemical reaction that is catalyzed by the pre-existing metal (catalysis) or the metal which is being deposited (auto-catalysis). In this work, we report the synthesis, characterization, and evaluation of a series of silver-containing, bimetallic catalysts prepared by electroless deposition. Characterization methods include atomic adsorption, molecule selective chemisorption, and x-ray photoelectron spectroscopy. Kinetic studies were conducted using the selective hydrogenation of 3,4-epoxy-1-butene, a multifunctional molecule that can serve as an intermediate for production of specialty chemicals. The effect of the secondary metal on the activity and selectivity of this reaction will be discussed.