Thermally Stable and Catalytically Active Pd@Silica Core-shell Nanoparticles

Renee W. Y. Man and Michael O. Wolf*

Department of Chemistry, University of British Columbia, Vancouver, BC, V6T 1Z1.

Email: mwolf@chem.ubc.ca

Core-shell nanoparticles consisting of a nanoparticle core and porous oxide shell been heavily utilized in many fields – from catalysis to spectroscopy. Namely, silica shells have been demonstrated to lead to enhanced nanoparticle catalyst stability at high temperatures, thus preventing sintering and decrease in catalytic activity. Despite the large number of core-shell nanoparticle morphologies that have been reported, there are very few reports of silica shells on nanosized Pd catalysts. In these examples, the particles ripen and lose integrity upon heating to high temperature due to incomplete incorporation of the Pd nanoparticles in the shells. We demonstrate a simple, scalable one-pot synthesis of Pd-silica core-shell nanoparticles, where the catalytically active Pd nanoparticles are spatially separated from each other by a permeable shell of mesoporous silica (**Figure 1**). The thermal stability, catalytic activity, and utilities of the nanoparticles will be presented.

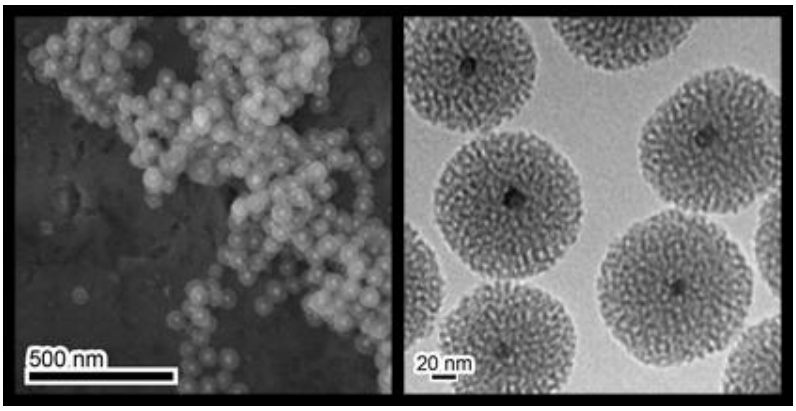

Figure 1. Scanning electron microscopy (left) and transmission electron microscopy (right) images of Pd-silica core-shell nanoparticles.