Heterogeneous catalysts prepared in our lab are often composed of small metal particles supported on a high surface area carrier. The particles have been shown to contribute to the overall rate and selectivity of a catalytic reaction. A wide variety of analytical techniques are used to examine the metal particles and metal-support interface. These include adsorption of simple gases, temperature programmed desorption, TEM, FT-IR, laser Raman, and UV-vis spectroscopy, as well as X-ray absorption spectroscopy using synchrotron radiation. Detailed kinetic studies of selected probe reactions are also carried out over catalysts in laboratory microreactors.

“Developing new or improved catalytic materials by studying how the structure of a catalyst affects its performance in a chemical reaction allowing for new relationships between catalyst structures and chemical reactivity to be discovered.”