

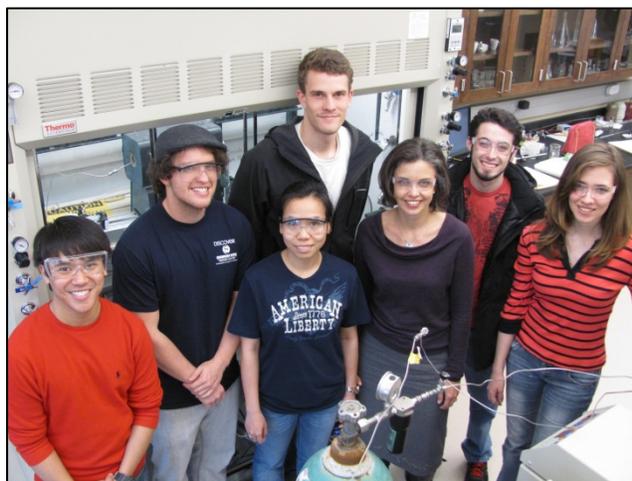
Novel Catalyst Synthesis and Characterization

Dr. Christy Wheeler, Assistant Professor

Catalysts composed of noble metals and reducible metal oxides are of great significance for modern energy applications. These applications include key reactions in hydrogen production such as water-gas shift (WGS), preferential oxidation (PROX), as well as fuel cell electrodes. WGS is a crucial step in hydrogen enrichment, and effective catalysts that have been identified are platinum or gold in conjunction with ceria or other partially reducible oxides. For economic feasibility, minimizing the amount of precious metal is vital. Recent research provides evidence that catalysts having extremely low loadings of these metals can still exhibit high activity, as the degree of reaction rate enhancement depends on interfacial area between active metal sites and oxides. Thus, methods of synthesizing supported catalysts with intimate contact between the two are essential.

Dr. Wheeler's research focuses on the synthesis and characterization of highly active, stable, and efficient WGS catalysts prepared using supercritical fluid deposition (SCFD). In this technique, organometallic precursors are adsorbed on to a catalyst support from a supercritical fluid solvent. Supercritical fluids (SCFs) offer unique advantages for interfacial deposition processes. Liquid-like

density promotes dissolution of metal precursors; viscosity and diffusivities more akin to those of gases facilitate transfer through the SCF and surface adsorption. Using SCFD, Dr. Wheeler is investigating preparation methods to maximize the contact between noble metals and reducible metal oxides, thus generating highly efficient catalysts.



Dr. Wheeler and her student researchers: Left to right: Phong Le, Jacob Deal, Thai Huynh, Blake Corey, Dr. Wheeler, Nathan Griffin, and Rachel Sweat.