

Comprehensive Characterization of Mixed Metal Oxide (MMO) Catalysts for Enhanced Catalyst Lifetime During Bio-based C₂-C₆ Oxygenates to Olefins Processes

Goals:

- Gain a fundamental understanding of MMO catalyst deactivation mechanisms through advanced characterization
- Synthesize tailored catalyst compositions with enhanced stability for C₂-C₆ oxygenates to olefins and hydrogen
- Accelerate catalyst development towards demonstration scale

Approach:

- Cutting edge characterization of fresh, working, spent, and regenerated catalysts will be utilized to identify changes in active site structure(s) that impact catalyst lifetime and inform the synthesis of next generation catalysts with improved performance

Impact on the Bioenergy Industry:

- Gevo's MMO catalysts have the potential to take advantage of cellulosic ethanol as a feedstock, as well as converting biomass to liquid fuels via Fischer-Tropsch type technology
- Municipal wastes, industrial waste gases, or byproducts (inedible corn oil) are also potential low-cost feedstocks for oxygenates to biofuels and renewable hydrogen



ChemCatBio Capabilities Leveraged:

- Advanced Synthesis and Characterization (ACSC) project will provide structural and compositional analysis and active site characterization with a focus on *in situ* and *operando* investigations to inform targeted syntheses of next generation MMO catalysts and accelerate scale up efforts