Strategies for the Reduction of Carbon Dioxide to Methanol

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The Lu lab uses the techniques of inorganic synthesis and spectroscopy to create novel metal-containing molecules and to study their physical and electronic structures, respectively. Through innovative molecular architecture, we investigate strategies for metal-mediated reduction of carbon dioxide.

Heterobimetallic chemistry is often touted for its potential to activate small molecules through the cooperative action of Lewis acidic and basic TM sites. The dual "acid-base" character of early-late TM pairs seems especially suited to activate CO_2: the basic, late metal attacks the electrophilic carbon center of CO_2, while the acidic, early metal stabilizes the nucleophilic oxygen atom. We are investigating metal-alumatranes for activating CO_2. We use a simple 2-step metallation that is modular and allows rapid access to a trio of metal-alumatranes.