Strategies for the Reduction of Carbon Dioxide to Methanol

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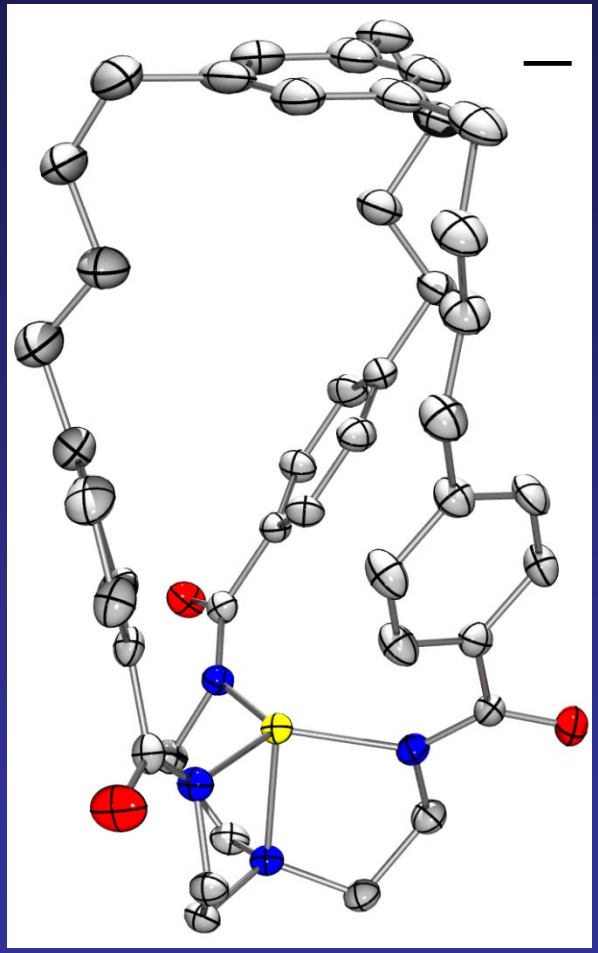

Molecular Structure of an Anionic Zinc-Cage Complex

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.

One strategy is to employ cage structures that allow small-molecules to pass in and out of the metal's binding pocket but shuts down bimolecular decomposition, a common problem in small-molecule activation. The first generation cage ligand shown at left was prepared in five steps with an 25% overall yield. Isolation of the zinc-cage complex clearly demonstrates that the cage ligand will bind transition metal ions, and future work is focused on installing other redox-active metals into the cage scaffold.