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**Carbon Dioxide Capture in Metal-Organic Frameworks**

Research interests include inorganic and solid state chemistry: new approaches to the synthesis of inorganic clusters and solids are being developed, with emphasis on controlling structure as a means of tailoring physical properties.

Website: [http://chem.berkeley.edu/faculty/long/](http://chem.berkeley.edu/faculty/long/)

**Abstract**

Efforts to utilize metal-organic frameworks, a new class of materials exhibiting high surface areas, tunable pore dimensions, and adjustable surface functionality, for CO₂ capture will be presented. Open metal coordination sites on the framework surface can deliver a high CO₂ loading capacity at low pressures. However, additional criteria such as water stability and the selective binding of CO₂ over N₂ must also be considered. Toward that end, we have targeted air- and water-stable frameworks bearing surfaces coated with alkylamine groups. Use of 1,3,5-benzenetristriazolate (BTTri) as a bridging ligand has led to sodalite-type frameworks of the type M₃[(M₄Cl)₃(BTTri)]₈, possessing open M²⁺ coordination sites and exhibiting good chemical and thermal stability. Attachment of ethylenediamine to the M²⁺ sites within this structure can generate a material that selectively binds CO₂ over N₂ with excellent cycling performance. In addition, the application of frameworks with redox-active transition metal sites for the capture of O₂ from air will be discussed (see Figure 1). Particular emphasis will be placed on diffraction studies aimed at identifying the gas adsorption sites within the structures.