University of Minnesota
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Department of Chemistry

Dow Lecture Series

9:45 a.m. Thursday, November 29, 2012 • 331 Smith Hall

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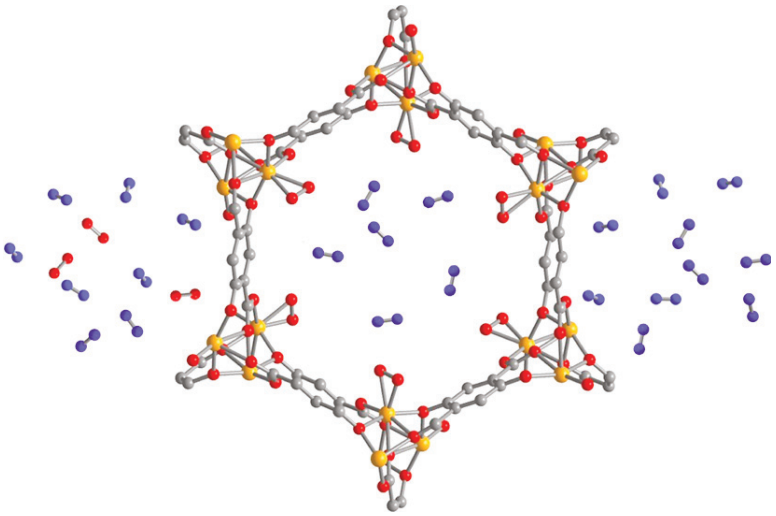
Carbon Dioxide Capture in Metal-Organic Frameworks

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/

Abstract

Efforts to utilize metal-organic frameworks, a new class of materials exhibiting high surface areas, tunable pore dimensions, and adjustable surface functionality, for CO_2 capture will be presented. Open metal coordination sites on the framework surface can deliver a high CO_2 loading capacity at low pressures. However, additional criteria such as water stability and the selective binding of CO_2 over N_2 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 ($BTTri^{3-}$) as a bridging ligand has led to sodalite-type frameworks of the type $M_3[(M_4Cl)_3(BTTri)_8]_2$, possessing open M^{2+} coordination sites and exhibiting good chemical and thermal stability. Attachment of ethylenediamine to the M^{2+} sites within this structure can generate a material that selectively binds CO_2 over N_2 with excellent cycling performance. In addition, the application of frameworks with redox-active transition metal sites for the capture of O_2 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.



Host: Professor Lawrence Que Jr.
Refreshments will be served prior to the seminar.