Gas Adsorption Study on Mesoporous Metal-Organic Framework UMCM-1

(ESI)

*Bin Mu, Paul M. Schoenecker, and Krista S. Walton**

School of Chemical and Biomolecular Engineering, Georgia Institute of Technology, 311 Ferst Drive NW, Atlanta, Georgia 30332

* krista.walton@chbe.gatech.edu

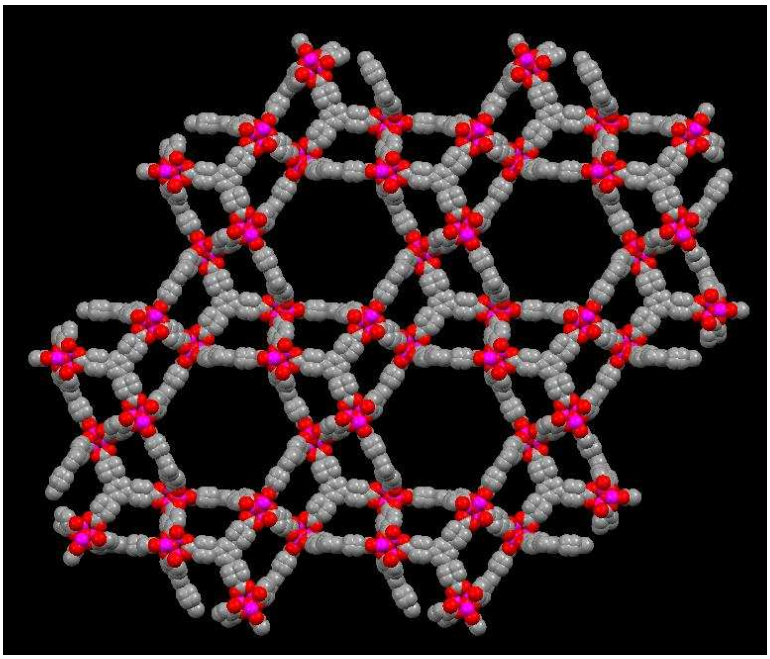

Fig. S1 UMCM-1 demonstrating one-dimensional nanochannel with 3.2 nm diameter

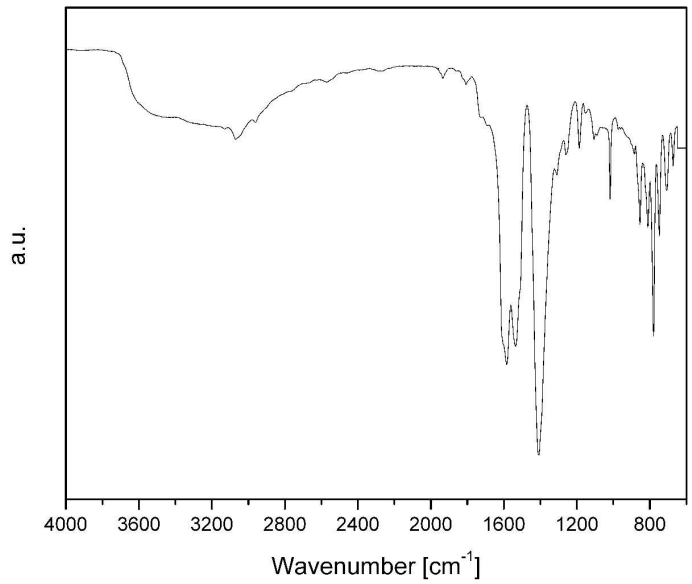

Fig. S2 Infrared spectra of UMCM-1 (after activation)

Buoyancy Correction. Due to higher adsorption pressure up to 25 bar in this study, the buoyancy effects must be considered carefully. Thus, to obtain correct excess adsorption isotherm, data points must be corrected for buoyancies coming from the sample holder and adsorbent material. In this study, a classical helium procedure was applied to determine the volume of sample holder and adsorbent material simultaneously. Although traditional assumption taking helium as nonadsorbing gas is no longer held, whether or not helium adsorbs is actually unimportant in the determination of adsorption excess.[1] Once we got the volume value, the buoyancy correction term can be calculated by the following equation:

$$F_b = \rho^f(T,P)\cdot V^*$$

where F_b is total buoyancy, V^* the volume of sample holder and adsorbent material, ρ^f the density of the adsorbate. Because ρ^f is a function of temperature and pressure, it is calculated at every measurement points using Peng-Robinson equation of state. The weight loss due to the buoyancy was added back into experimental weight to obtain the final excess adsorption data point on the isotherms.

(1) Myers, A. L.; Monson, P. A. *Langmuir* **2002**, 18, 10261.