

Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Lanthanide Metal-Organic Framework Materials PING-YEN HSIEH, University of Maryland-College Park, MARK A. GREEN, National Institute of Standards and Technology, ROBERT M. BRIBER, University of Maryland-College Park — A series of lanthanide metal-organic framework materials (MOF) with variable organic linkages including benzene-dicarboxylic acid (BDC); 1,3,5-benzene-tricarboxylic acid (BTC); and 1,3,5-tris(4-carboxyphenyl)benzene (BTB) have been synthesized. The low density and high porosity of MOFs make them candidates molecular sieve or hydrogen storage materials. The crystal structures have been determined using a combination of single crystal X-ray diffractometer and synchrotron powder X-ray diffraction work. Holmium with the BDC ligand material (Ho-BDC) crystallizes in a monoclinic C2/c space group, with lattice parameters of $a = 17.06 \text{ \AA}$, $b = 10.67 \text{ \AA}$, $c = 10.57 \text{ \AA}$, $\beta = 96.12^\circ$. The crystal structure of Ho-BTC is in tetragonal P 41 2 2 space group and Ho-BTB is in a triclinic P-1 space group. A comprehensive examination of Ho-MOF with different ligands by x-ray and thermogravimetric analysis shows that there is a stable nanoporous structure for dehydrated Ho-BTC up to 250°C. The same phenomenon is not observed in the Ho-BDC and Ho-BTB materials. The collapsed structure with BDC and BTB indicates the stability of dehydrated samples is strongly related to the interactions between the metal and the organic linkers.

Ping-Yen Hsieh
University of Maryland-College Park

Date submitted: 08 Dec 2008

Electronic form version 1.4