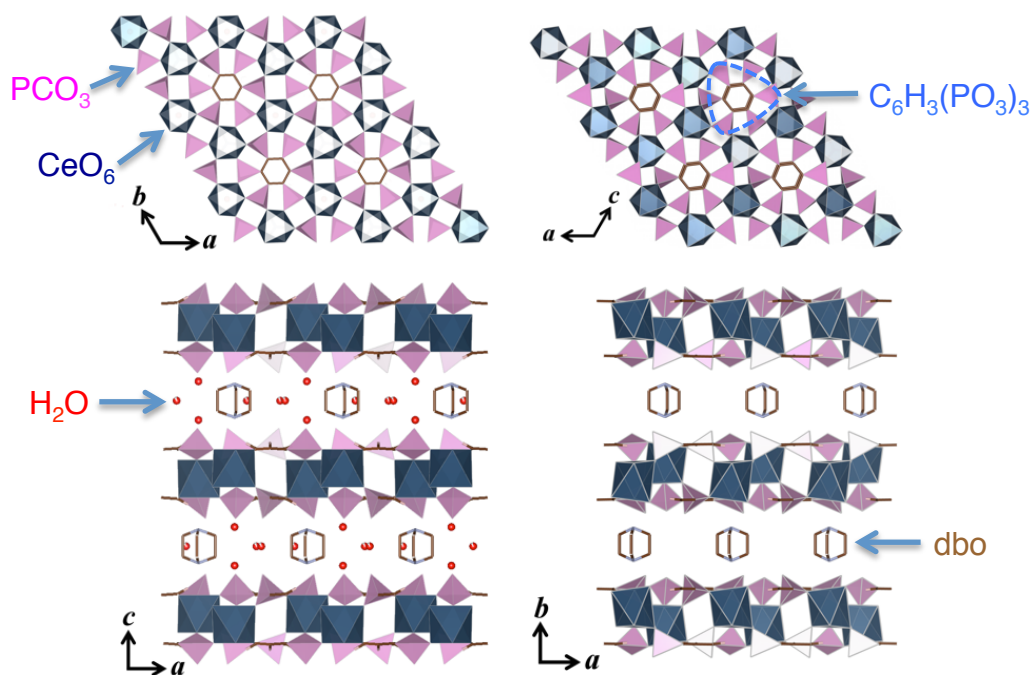
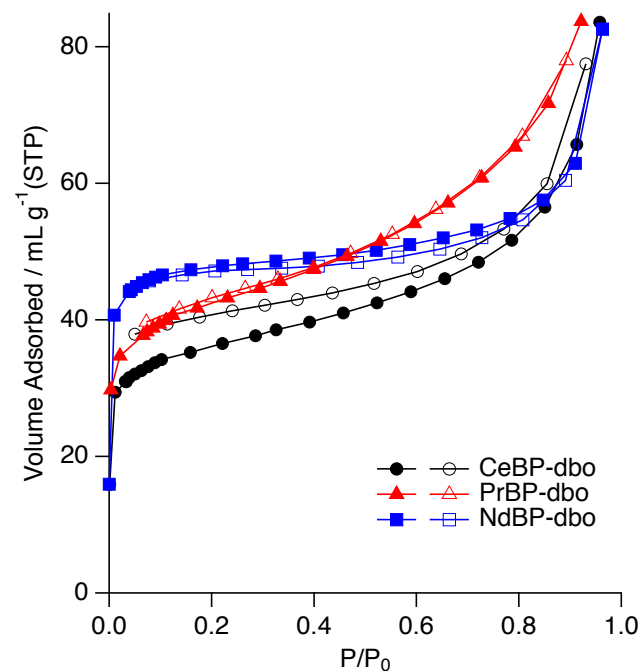


Ordered Microporous Layered Lanthanide 1,3,5-Benzenetriphosphonates Pillared with Cationic Organic Molecules

Abstract: Novel isomorphous pillared-layer-type crystalline lanthanide 1,3,5-benzenetriphosphonates were prepared with dbo (1,4-diazabicyclo[2.2.2]octane) as the organic pillar (LnBP-dbo; Ln: Ce, Pr, and Nd). Ab-initio crystal structure solution using synchrotron X-ray powder diffraction data revealed that the organic pillar does not exist as a neutral coordinating ligand but as a cationic molecule. LnBP-dbo phases have ordered interlayer space filled with water molecules between the dbo pillars, and the interlayer water is successfully removed by heating under vacuum with slightly distorted but basically retained pillared layer structures. Microporosity of the materials is confirmed by adsorption of N_2 , CO_2 , and H_2 gases. Such microporous layered metal phosphonates pillared with a cationic molecule should be unprecedented and should offer new strategies to design ordered microporous materials.



Crystal structure of CeBP-dbo (left) and the degassed form (right) viewed perpendicular to (top) and along the layers (bottom).



N_2 adsorption isotherm of LnBP-dbo at 77 K