Supplementary Material for CrystEngComm

Supporting Information

Experimental:

Materials: 1,4-benzenedicarboxylic acid (H_2BDC, purity > 99%) was obtained as a powder from Aldrich and used without further purification. $In(NO_3)_3 \cdot xH_2O$ and pyridine were reagent grade and used as supplied. *N,N*-dimethylformamide (DMF, HPLC grade) and methanol purchased from commercial sources (Guangfu Fine Chemical Research Institute, Tianjin, China) were used as solvents without further purification.

Nano seeds and film synthesis: In(OH)(BDC) seeds of approximately 80 nm in size were prepared according to the literature.[36] Typically, 3.0 mg H_2BDC and 25 equiv of pyridine were dissolved in 6 mL DMF to form solution A; 7.8 mg $In(NO_3)_3 \cdot xH_2O$ was dissolved in 3 mL DMF to form solution B. Solution B was dropped slowly into Solution A at stirring. The resulting precursor solution was transferred into a 15 mL Teflon lined autoclave and heated to 100 °C for 30 minutes. The seeds powder was collected by centrifugation and washed using ultrasonic vibration several times with DMF and methanol respectively. For the films synthesis, first of all, a silicon wafer; a stainless steel plate; an aluminum slice and a porous α alumina disk were washed using ultrasonic vibration with distilled water three times and dried at 85 °C. The seeds powder was dispersed in methanol to obtain a white colloidal solution (20 g/L). Then, the seed solution was dropped on the silicon, aluminum, stainless steel and porous α alumina slices. Finally, the seeded wafers were

placed vertically in a Teflon lined autoclave at 100 °C for 6 h and 3 d respectively. The seeded substrates were immersed in a mother solution containing 3.0 mg H_2BDC, 2 equiv of pyridine, 7.8 mg $In(NO_3)_3 \cdot xH_2O$ and 45 mL DMF. The films were taken out, washed with methanol and dried at room temperature. MOF-5 film was synthesized according to the reference (W. J. Son, J. Kim, J. Kim and W. S. Ahn, *Chem. Commun.,* 2008, 6336–6338).

Characterization: The film was characterized by X-ray diffraction (XRD, a Siemens D5005 diffractometer with Cu-Kα radiation (λ = 1.5418 Å)) and field-emission scanning electron microscope (FE-SEM: JEOS JSM6700F). Transmission electron microscopy (TEM) experiment was performed on a JSM-3010 electron microscope (JEOL, Japan) with an acceleration voltage of 300 kV. Atomic force microscopy (AFM) studies were carried out with a commercial AFM instrument (Digital Instruments, Dimension 3100, Santa Barbara, CA) running in tapping mode. Si cantilevers (Nanosensors) with resonance frequencies of 250-350 kHz were used. Energy dispersive X-ray (EDX) data were obtained using JEOS JSM6700F field-emission SEM equipped with INCA 350 EDS system. The FTIR spectra were collected on a Nicolet Impact 410 FTIR in the range 400 - 4000 cm^{-1} by using the KBr disk method.

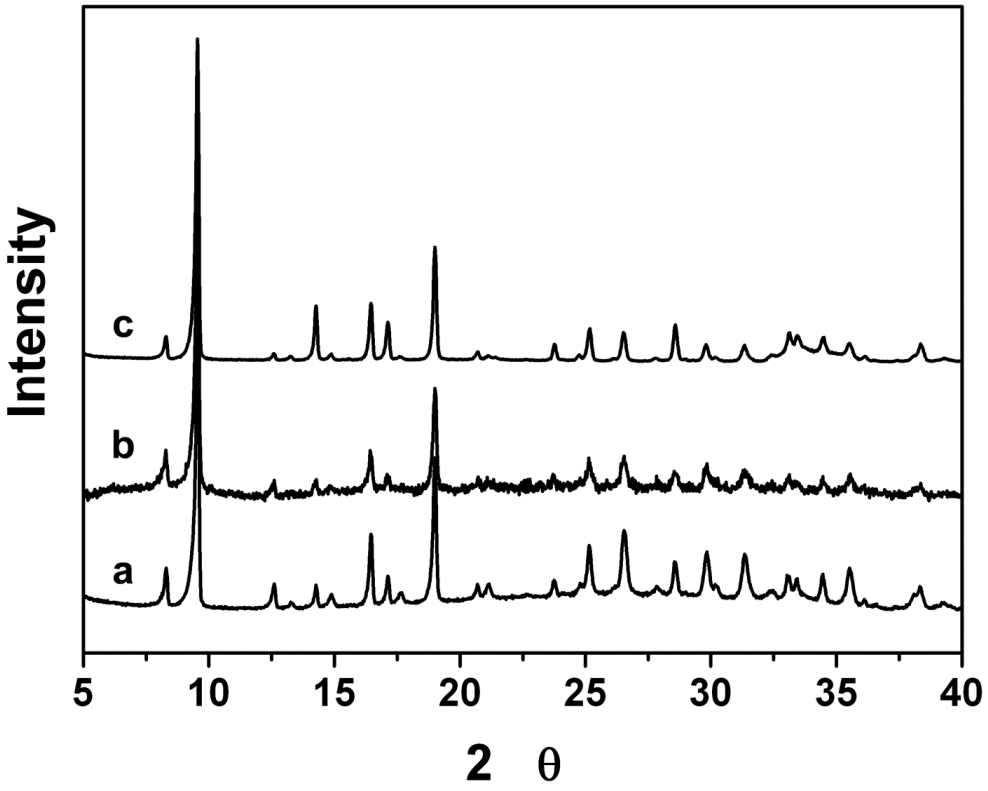

Fig. S1. X-ray diffraction patterns of (a) In(OH)(BDC) crystalline powder and (b) In(OH)(BDC) seed layer and (c) the film after 3 d with the silicon wafer.

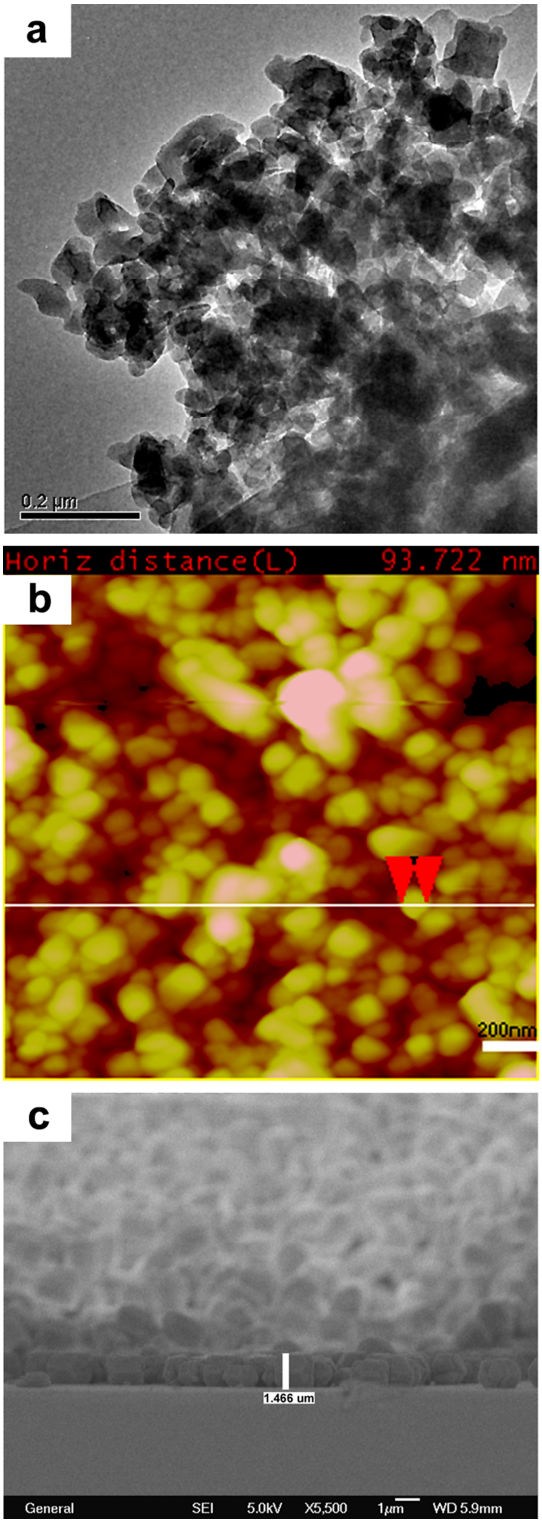

Fig. S2. TEM image of In(OH)(BDC) seeds (a), AFM image of In(OH)(BDC) seeds with the horizontal distance of 93.722 nm (b) and the enlarged cross-sectional view of the film (c).

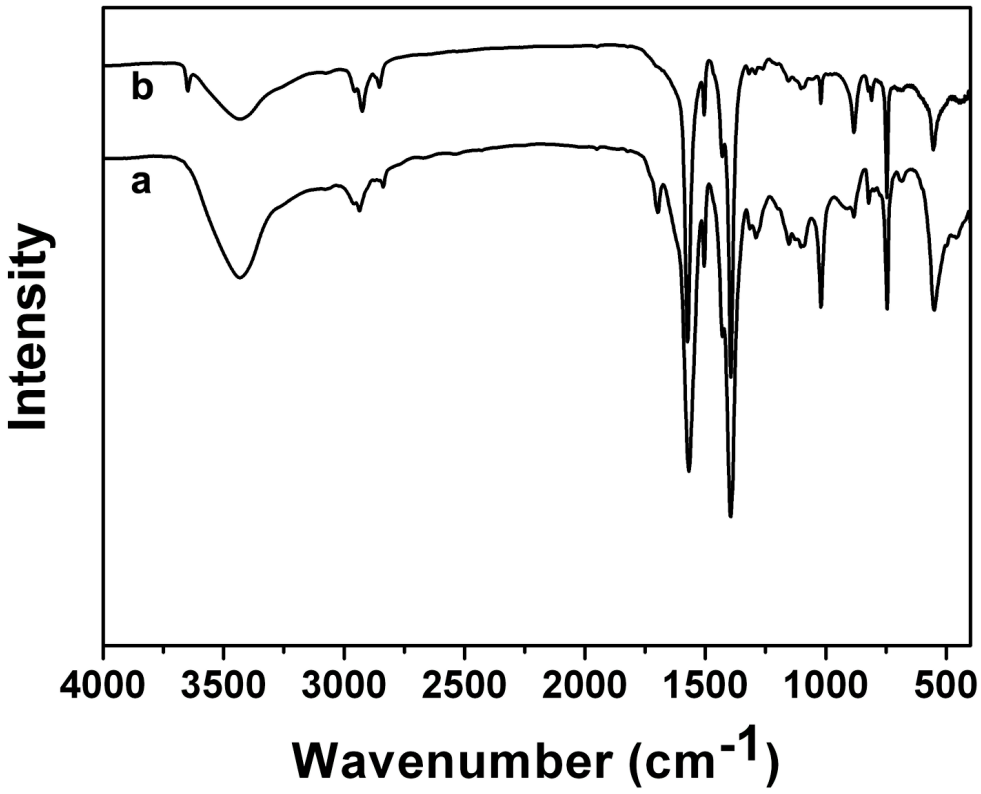

Fig. S3. IR spectra of In(OH)(BDC) seeds (a) and film (b).

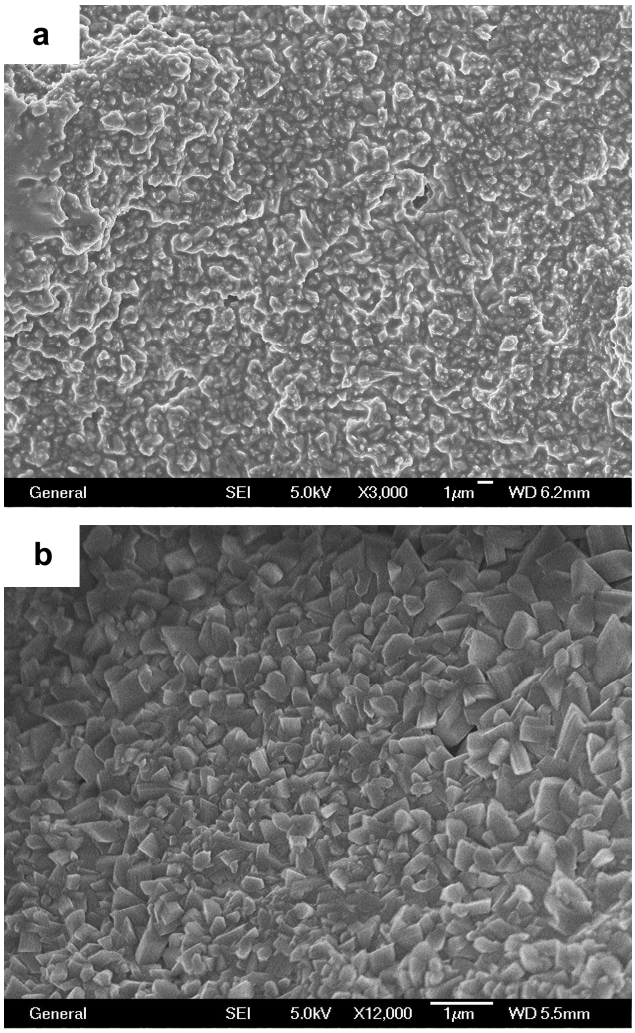

Fig. S4. SEM images of MOF-5 seeds (a) and film (b).