Supplementary Information

Experimental Details

Materials. Zinc(II) nitrate hexahydrate, benzene-1,4-dicarboxylic acid(BDC), and N,N-dimethylformamide(DMF) were purchased from Fluka and used without further purification. ½ inch anodized aluminum oxide (AAO) discs were purchased from Whatman (Anodisc 13, 0.2μm pore size, 60μm thickness) and used as received as substrates for the film preparation.

Substrate preparation. Conductive coatings on AAO discs were prepared using a thermal evaporator and a plasma sputterer for amorphous carbon and Au/Pd coating, respectively. Graphite-coated substrates were made by painting the substrates with a HB pencil.

Deposition of MOF-5 films under microwaves. In a typical preparation of Zn-MOF-5 films, the precursor solution was prepared by first dissolving 1 mmol of zinc(II) nitrate hexahydrate in 8 g of DMF. 1 mmol of BDC was dissolved in 11 g of DMF separately. After stirring the two solutions vigorously for about 10 minutes, the zinc solution was added dropwise into the BDC solution followed by additional stirring for 10 min. Typically 5 g of the precursor solution was used for an experiment in a 30 ml borosilicate vial. An AAO disc with or without a conductive coating was then mounted vertically on a home-made Teflon sample holder to prevent MOF crystals formed in the bulk solution from sedimenting on the substrate. MOF-5 crystals were grown on the substrate under microwave irradiation in a domestic microwave oven (Kenmore, 1 kW) with 500 W power for 5 ~ 30 seconds as illustrated in Figure 1. After the synthesis, the vial was quickly removed from the microwave oven and transferred to a water bath for cooling. MOF-5 powder and MOF-5 film were recovered from the vial. The film was rinsed under sonication for 10 seconds to remove any crystals settled from the bulk solution. The powder and film were then dried under vacuum for 6 hours at room temperature. The samples were then stored in a vacuum desiccator to prevent contact with moisture for further analysis.

Characterization. X-ray diffraction (XRD) measurements were performed using the Bragg-Brentano sample geometry with a Bruker-AXS D8 Diffractometer with CuKα radiation. Bruker's EVA program was used to determine the peak intensity and Bragg angles. Scanning electron microscopy (SEM) images were taken using a JEOL JSM-6400 operating at 15 keV acceleration voltage.

Supplementary Figures

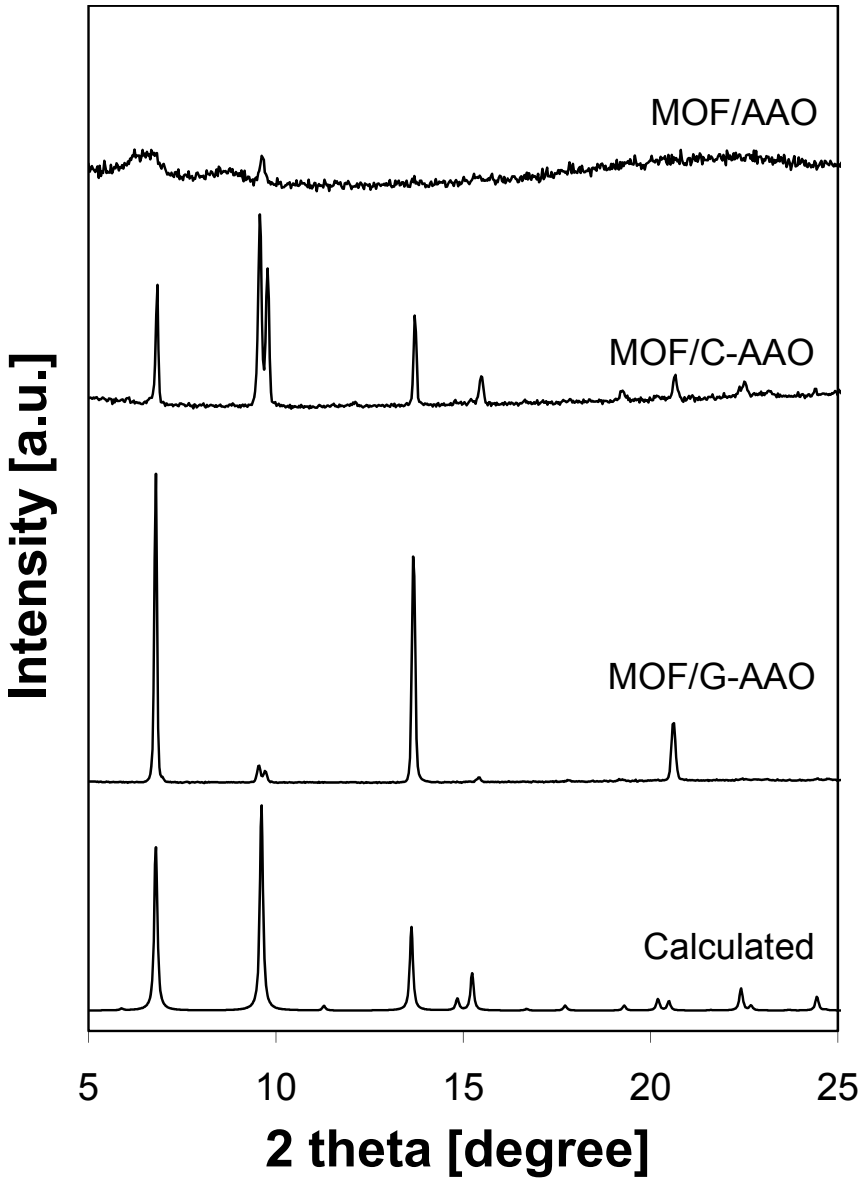

Figure S1. XRD patterns of MOF-5 films grown on G-AAO, C-AAO, and bare AAO substrates as compared with calculated one based on single crystal MOF-5 structure (space group: R-3m).

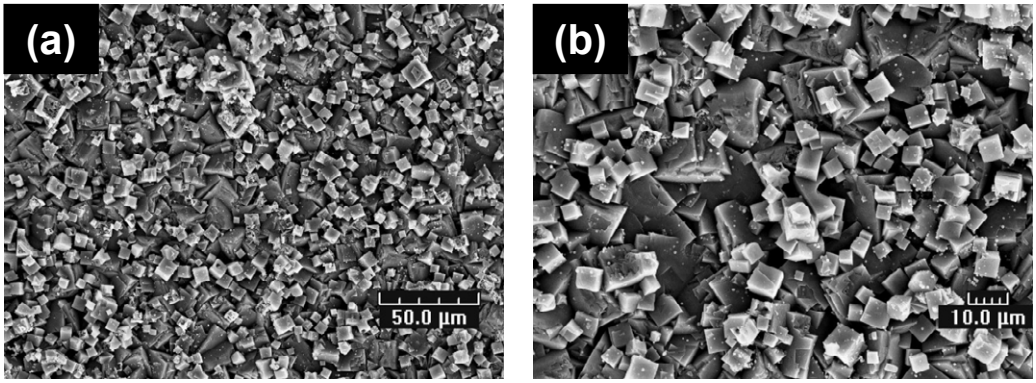

Figure S2. MOF-5 deposited on Au/Pd-coated AAO substrates.

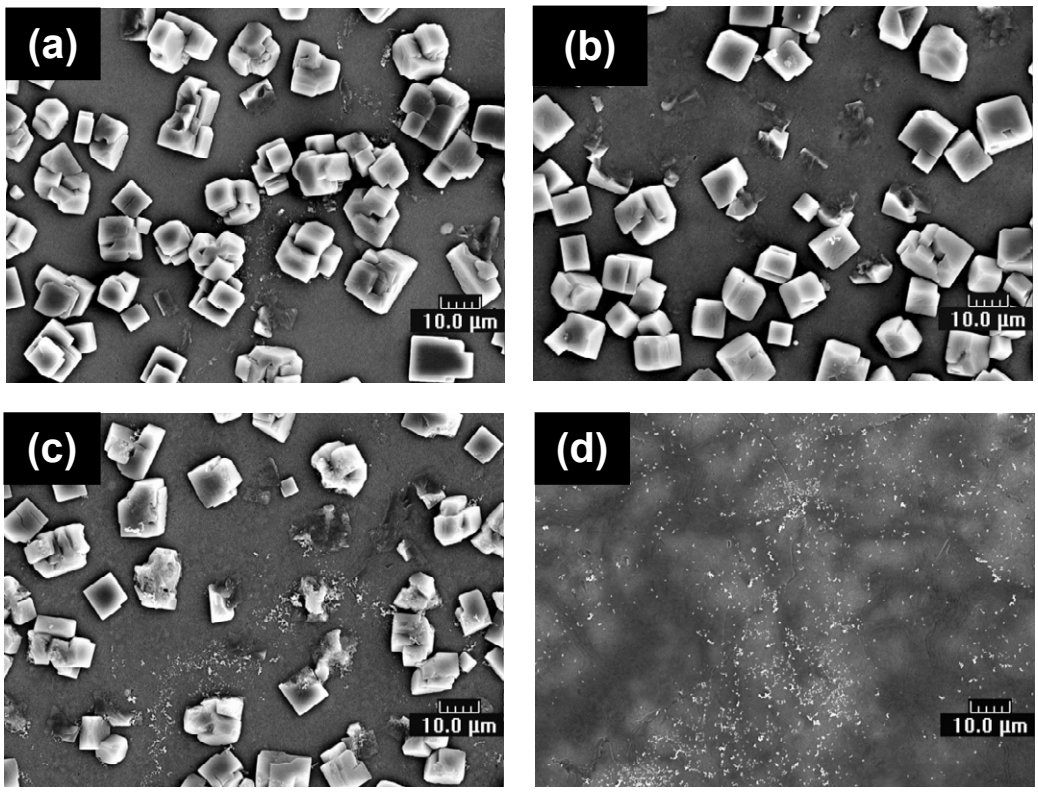

Figure S3. Binding strength of MOF-5 on bare AAO substrates under sonication for (a) 0 min (as prepared), (b) 5 min, (c) 10 min, and (d) 30 min.