Supplementary Information

Mesoporous alumina nanosheets and nanorolls derived from topologically identical Al-based MOFs

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Experimental

Synthesis of MIL-53 and DUT-5

MIL-53 template was synthesized by the solvothermal method. A mixture of $Al(NO_3)_3 \cdot 9H_2O$ (1.326g,), 1,4-benzenedicarboxylic acid (0.294g) and deionized water (20ml) was placed in a 50ml Teflon lined stainless steel autoclave and heated at 220°C for 72h. After filtering and washing with distilled water, a white powder was obtained. The excess terephthalic acid molecules in the pores were removed upon heating at 330°C for 48h in the air. Finally, an earth yellow powder was obtained.

DUT-5 template also was synthesized by the solvothermal method. Mixture of $Al(NO_3)_3 \cdot 9H_2O$ (1.88g,) and biphenyl-4,4′ -dicarboxylic acid (0.8g,) are solubilized in 60 ml of dimethylformamide(DMF). The solutions are homogenized for 20 min under sonication and afterwards heated for 24 h at 180 °C in a 200 ml Teflon lined stainless steel autoclave. After filtering and washing with DMF followed by activation at 200 °C under vacuum, a white powder was obtained.

Synthesis of alumina

For the synthesis of alumina derived from MIL-53 (denoted as Al/MIL), the as-made MIL-53 crystal was placed in a tube furnace under N_2 gas flow at 550°C for 3h with a heating rate of 5°C/min. After that, the brown powder can be obtained. Then obtained carbon/alumina composite (denoted as C-Al/MIL) above was placed in a tube furnace at 650°C for 3 h in O_2 gas with a heating rate of 5°C /min to remove the carbon residue. Finally, the white powder was obtained.

For the synthesis of alumina derived from DUT-5 (denoted as Al/DUT), the as-made DUT-5 crystal was placed in a tube furnace under N_2 gas flow at 700°C for 3 h with a heating rate of 5°C/min. After that, the black powder can be obtained. Then

obtained carbon/alumina composite (denoted as C-Al/DUT) was placed in a tube furnace at 650°C for 3 h in O_2 gas with a heating rate of 5°C /min to remove the carbon residue. Finally, the white powder can be obtained.

Physical Measurements

X-ray diffraction (XRD) data of samples were collected by using X-ray diffractometer (D/max-2200) with CuKα radiation at room temperature. Transmission electron microscopic (TEM) investigations were carried out using an instrument (JEOL.JEM-2000FXII) operated at 160 kV accelerating voltage. Nitrogen adsorption/desorption isotherms were measured at 77 K using surface area and pore size analyzer (3H-2000PS2). CO_2 adsorption/desorption isotherms were measured at 273 K using PS2-M351 analyzer.

Table S1 The BET surface area(S_{BET}), total pore volume(V_t) and average pore diameter(D_p) of samples derived from MIL-53 and DUT-5

Sample	$S_{BET}(m^2g^{-1})$	$V_t(cm^3g^{-1})$	$D_p(nm)$
C-Al/MIL	78.8	0.331	16.82
Al/MIL	88.6	0.259	11.74
C-Al/DUT	253.9	0.823	12.96
Al/DUT	269.9	1.397	20.70

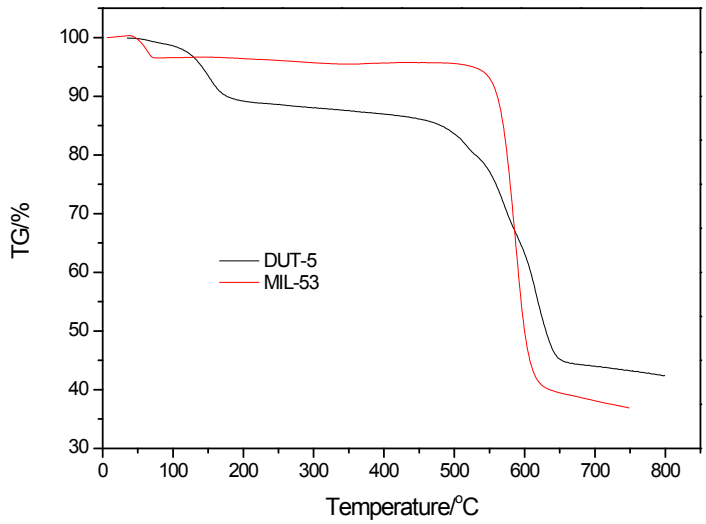

Fig. S1 TG curve of MIL-53 and DUT-5

Fig. S2 TEM of C-Al/MIL

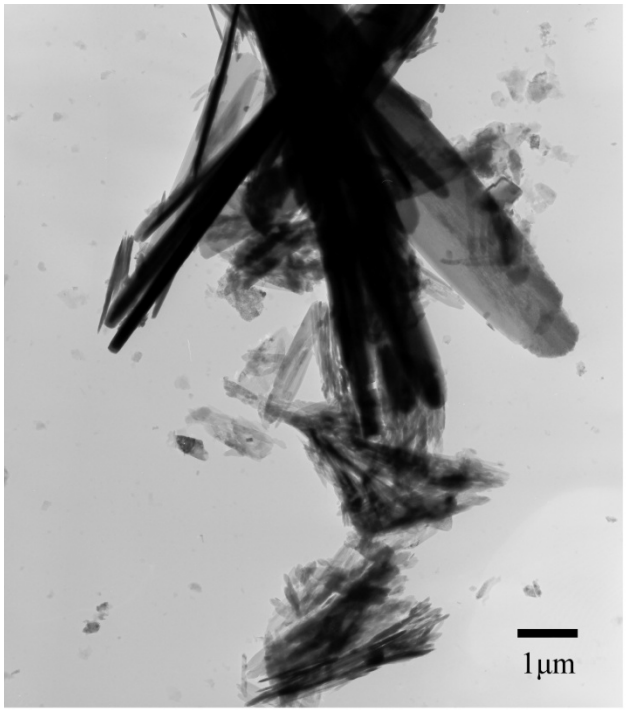

Fig. S3 TEM of Al/MIL

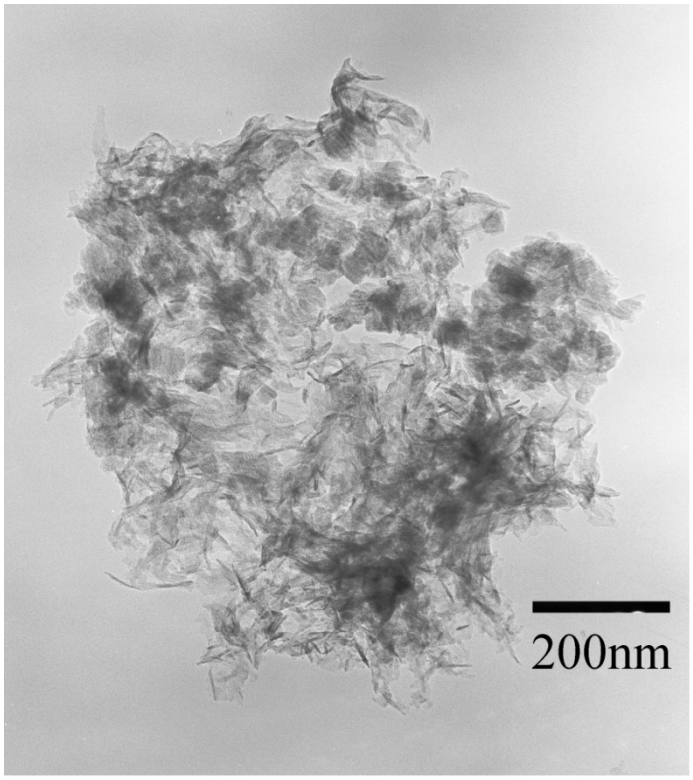

Fig. S4 TEM of C-Al/DUT

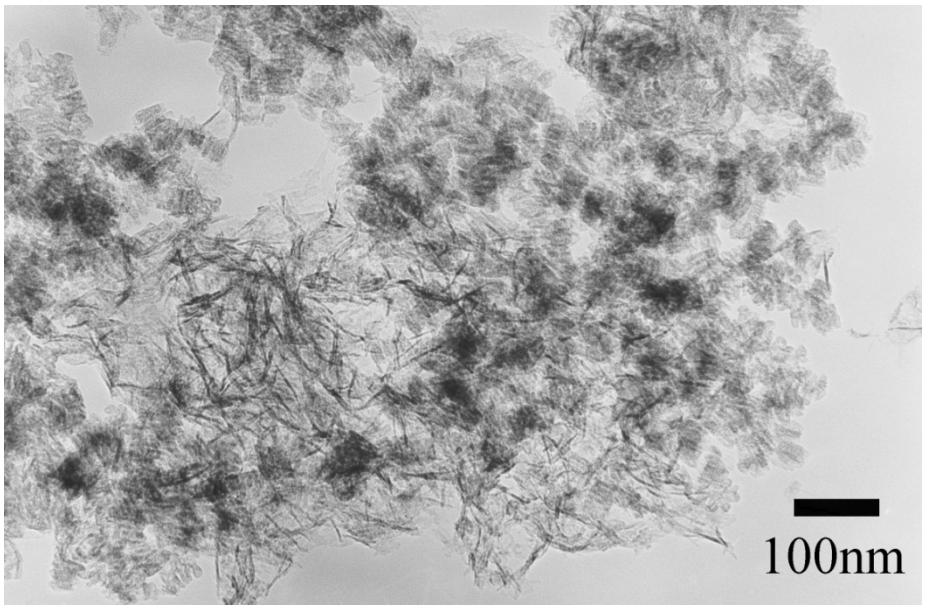

Fig. S5 TEM of Al/DUT