

Electronic Supplementary Material (ESI) for New Journal of Chemistry.
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Electronic Supplementary Information

Resistant, stable HKUST@MC composite for highly-efficient gas adsorptive desulfurization

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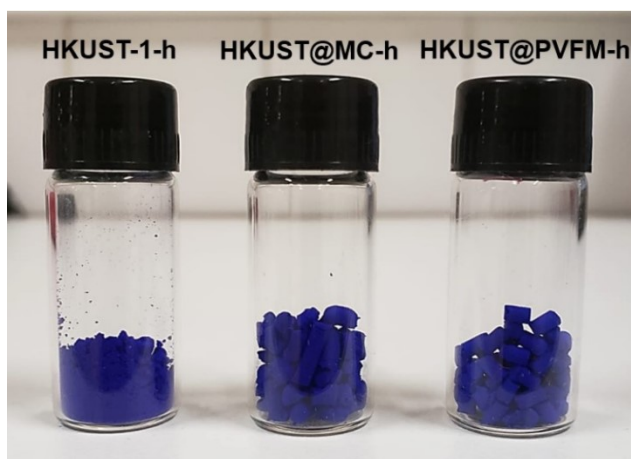


Fig. S1 Photograph of heating activated samples HKUST-1-h, HKUST@MC-h and HKUST@PVFM-h

Materials for synthesis of HKUST-1-s

Copper (II) nitrate trihydrate (CAS 10031-43-3), 1,3,5-benzenetricarboxylic acid (CAS 554-95-0), N,N-dimethylformamide (DMF) (CAS 68-12-2) and ethanol (EtOH) (CAS 64-17-5) were purchased from Sigma-Aldrich. All the materials were analytical grade and used without further purification.

Synthesis of HKUST-1-s

Copper (II) nitrate trihydrate (3.0 g) and 1,3,5-benzenetricarboxylic acid (2.0 g) were added to a 250 ml round bottom flask containing DMF as solvent (150 ml). The mixture was sonicated for 30 min. The solution was then heated at 80 °C in an oil bath at reflux condition at atmospheric pressure for 12 h. After this stage, the product was washed twice with DMF and ethanol. Therefore, 150 mL of a mixture of ethanol and deionized water (volume ratio of 1:1) and the solid were placed on a magnetic stirrer and stirred for 12 h. Then, the solid was isolated by filtration and dried at 110 °C for 24 h.

XRPD Analysis

The samples were activated at 110 °C for 24 h, stored in Eppendorf tubes and analyzed by PXRD immediately after heating activation and after 30 days. The HKUST-1-s-h showed a completely different XRPD pattern 30 days after activation process (Fig. S2), while HKUST-s@MC-h maintained the XRPD pattern characteristic of HKUST-1.

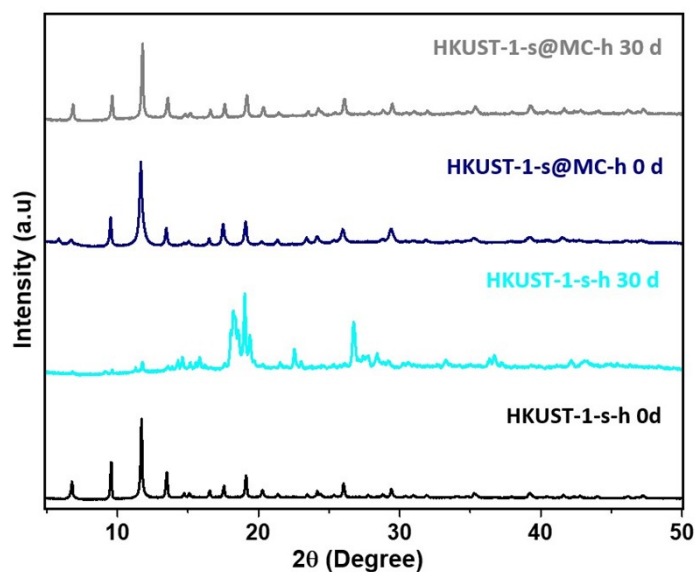


Fig. S2 XRPD patterns of HKUST-1-s-h and HKUST-s@MC-h at 0d, and 30d after heating activation

Nitrogen adsorption/desorption measurements

The BET specific surface area of the HKUST-s@MC-h after 30 days of storage was 1820.6 m²g⁻¹, while that of HKUST-1-s-h was only 496.6 m²g⁻¹. The micropore volumes were also very different for shaped sample and pristine MOF, 0.75 m³g⁻¹ and 0.20 m³g⁻¹, respectively. The composite exhibited a type I isotherm characteristic of HKUST-1, whereas the pristine MOF exhibited a type 4 isotherm (Fig. S3). The characteristic textural properties of HKUST-1 were maintained in the shaped composite.

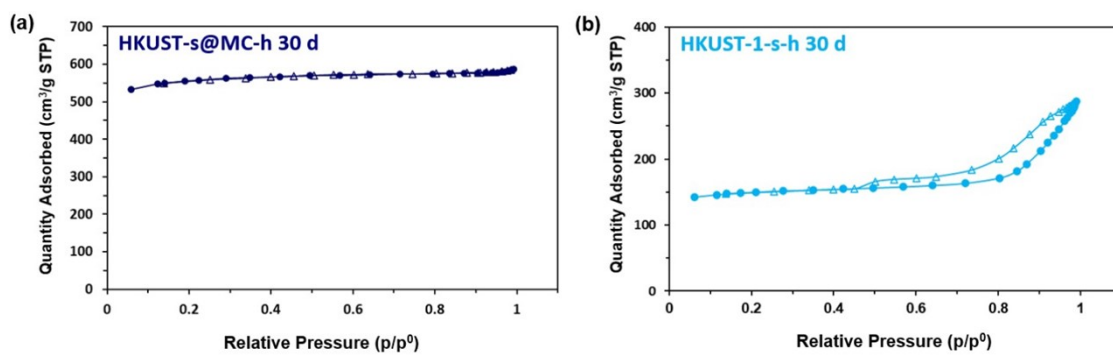


Fig. S3 Nitrogen adsorption/desorption isotherms of HKUST-1-s-h and HKUST-1@MC-h