Supporting Information

# Amino group functionalized metal -organic framework as luminescent probe for highly selectively sensing metal ions

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## **S1. Experimental Sections**

## S1.1 Synthesis of UMCM-1

As-synthesized UMCM-1 was prepared by the solvothermal method. Zn(NO<sub>3</sub>)<sub>2</sub>•6H<sub>2</sub>O (1.312 g, 4.41 mmol), Terephthalic acid (BDC, 0.208 g, 1.25 mmol) and 4,4',4"-benzene-1,3,5-triyl-tribenzoic acid (BTB, 0.466 g, 0.964 mmol) were dissolved in 100 mL DMF. The solution was divided into 10 equal portions and transferred to 10 scintillation vials (20 mL capacity). The vials were placed into an isothermal oven and heated at 85 °C for 48 h, then transferred to an argon-filled glovebox and cooled to room temperature. The product was isolated by filtration and rinsed with 3×10 ml DMF, and dried to yield the product. Thereafter, the compound UMCM-1 was soaked in CHCl<sub>3</sub> for 3 days with fresh CHCl<sub>3</sub>, during which the activation solvent was decanted and freshly replenished three times. It was then evacuated at 200 °C in vacuum for 24 h before use.

## S1.2 Synthesis of UMCM-1-NH<sub>2</sub>

As-synthesized UMCM-1-NH<sub>2</sub> was prepared by the solvothermal method.  $Zn(NO_3)_2$ •6H<sub>2</sub>O (3.2128 g, 10.8 mmol), 2-Amino-1,4-benzenedicarboxylic acid (NH<sub>2</sub>-BDC, 0.490 g, 2.7 mmol) and 4,4',4"-benzene-1,3,5-triyl-tribenzoic acid (BTB, 0.424 g, 0.97 mmol) were dissolved in 100 mL DMF. The following procedures are the same as those of UMCM-1.

## S1. 3 Characterization of Materials

Powder X-ray diffraction(PXRD) measurements were carried out using a D/MAX 2000 X-ray diffractometer with Cu-k $\alpha$  line ( $\lambda$ =1.54178 Å) as incident beam. Thermogravimetric analysis(TGA) data were obtained on a STA449C (NETZSCH) instrument with a heating rate of 5° min<sup>-1</sup> under Ar atmosphere. The photoluminescence (PL) spectra were recorded by using F-7000 FL Spectrophotometer. The lifetimes were fitted by the F900 Edinburgh Instruments

software (Medium Instrument Lab, Chmesity Colledge, Peking University)

## **S1. 4 Luminescent measurements**

The PL properties of UMCM-1 and UMCM-1-NH<sub>2</sub> in different solutions and solvent emulsions were investigated at room temperature. Metal ions-incorporated UMCM-1 and UMCM-1-NH<sub>2</sub> were prepared by introducing 2 mg of UMCM-1 and UMCM-1-NH<sub>2</sub> into 10 mL (10<sup>-3</sup> mol L<sup>-1</sup>) DMF solution of  $M(NO_3)\chi$  (M=Co<sup>2+</sup>, Cu<sup>2+</sup>, Mg<sup>2+</sup>, Ni<sup>2+</sup>, Cd<sup>2+</sup>, Fe<sup>3+</sup> or Cr<sup>3+</sup>). The PL properties of UMCM-1-NH<sub>2</sub> containing various concentration Fe<sup>3+</sup>-DMF solutions (10<sup>-3</sup>-10<sup>-5</sup> mol L<sup>-1</sup>) were also investigated.



**Fig. S1** Synthesis scheme of UMCM-1 and UMCM-1-NH<sub>2</sub> in this work. Second building units (left) are connected with organic linkers (middle) to form 3D MOF structure (right). BTB = 1,3,5-tris(4-carboxyphenyl)benzene; BDC = Terephthalic acid; 2-methylimidazole = mIM; BDC-NH<sub>2</sub> = 2-aminoterephthalic acid; DEF = N,N-diethylformamide.



Fig. S2 Powder XRD patterns using Cu K $\alpha$  radiation of UMCM-1 and UMCM-1-NH<sub>2</sub>. The simulated diagram of UMCM-1 is also included for comparison.



Fig. S3 The emission decay curves of  $Fe^{3+}$ -incorporated MOF UMCM-1-NH<sub>2</sub> activated 10<sup>-3</sup> mol L<sup>-1</sup> DMF solution of  $Fe(NO_3)_3$  (blue) and MOF UMCM-1-NH<sub>2</sub> (red).