

Electronic supplementary information

**Two highly stable inorganic-organic hybrid 3-D frameworks based on
Cu–Ln incorporated polyoxometalate for selective dye removal and
proton conduction**

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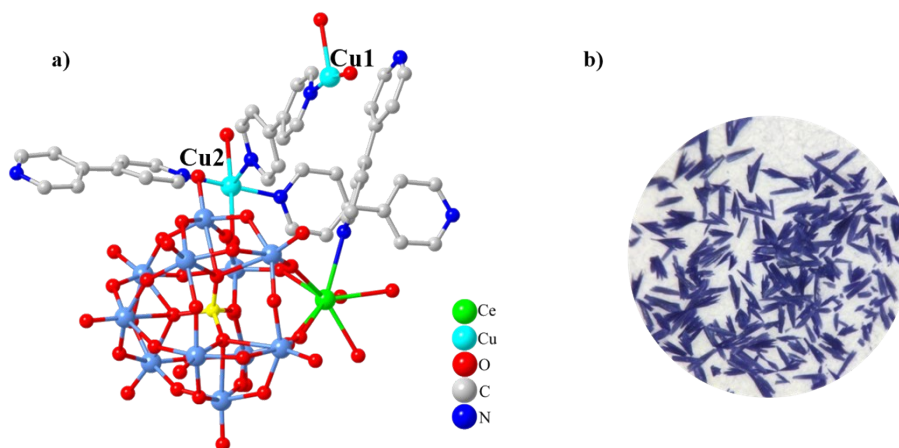


Fig. S1 The asymmetric unit of **1** (a) and the photograph of the crystal morphology of **1** (b)

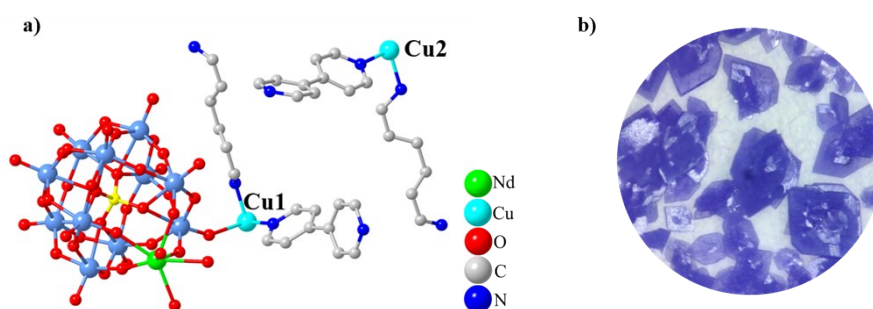


Fig. S2 The asymmetric unit of **2** (a) and the photograph of the crystal morphology of **2** (b)

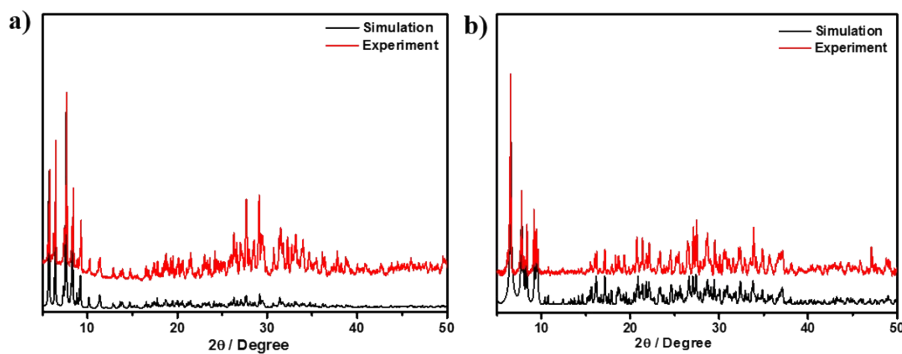


Fig. S3 PXRD patterns for **1** and **2**.

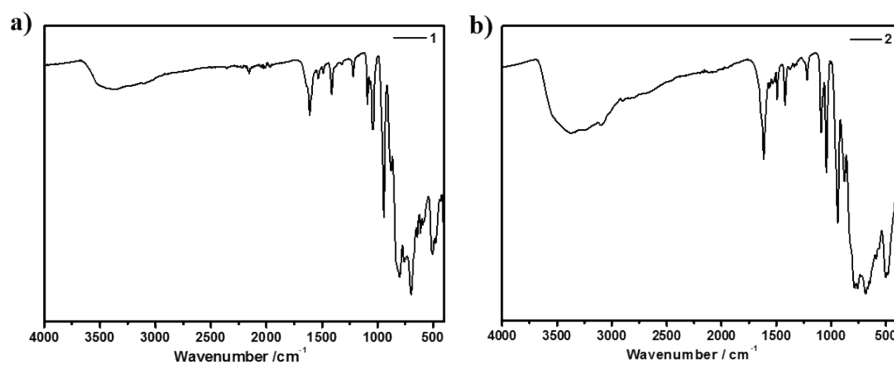


Fig. S4 FT-IR spectra for **1** and **2**.

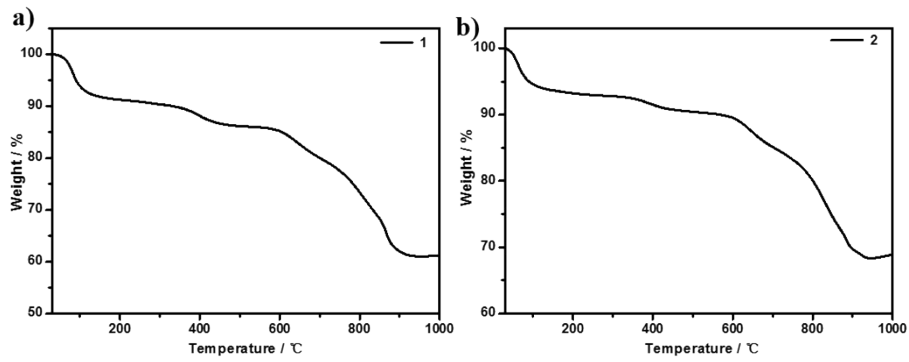


Fig. S5 TGA curves for **1** and **2**.

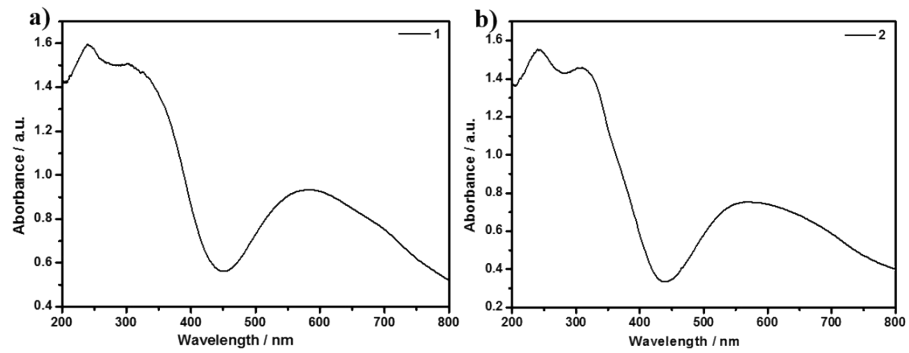


Fig. S6 Solid-state UV-Vis absorption spectra of **1** and **2**.

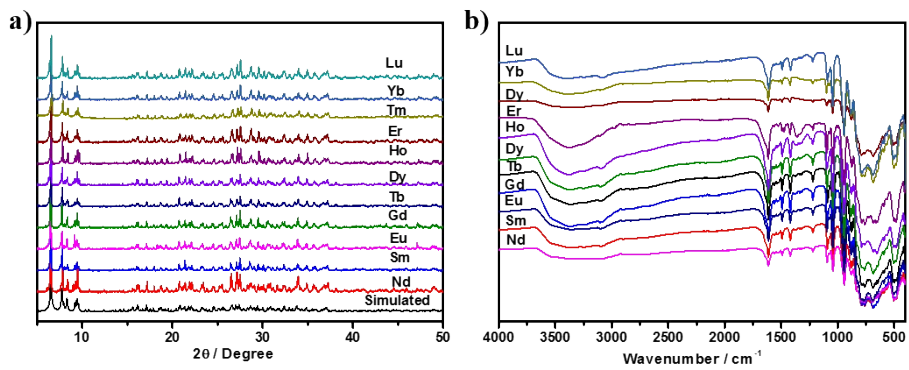


Fig. S7 PXRD patterns (a) and FT-IR spectra (b) for the isostructural compounds of **2**

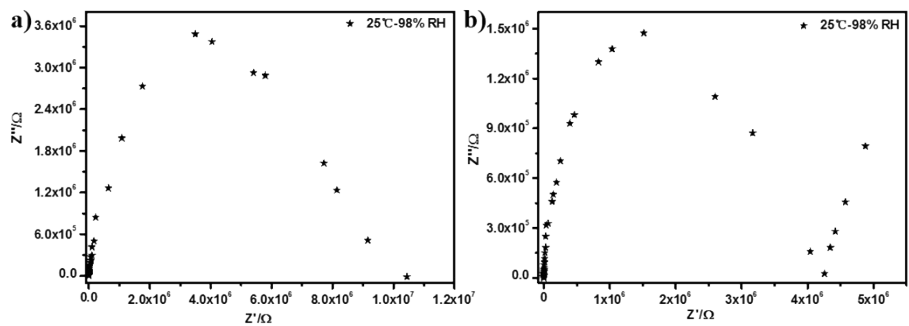


Fig. S8 Nyquist plots for **1** (a) and **2** (b) at 25 °C and 98% RH.

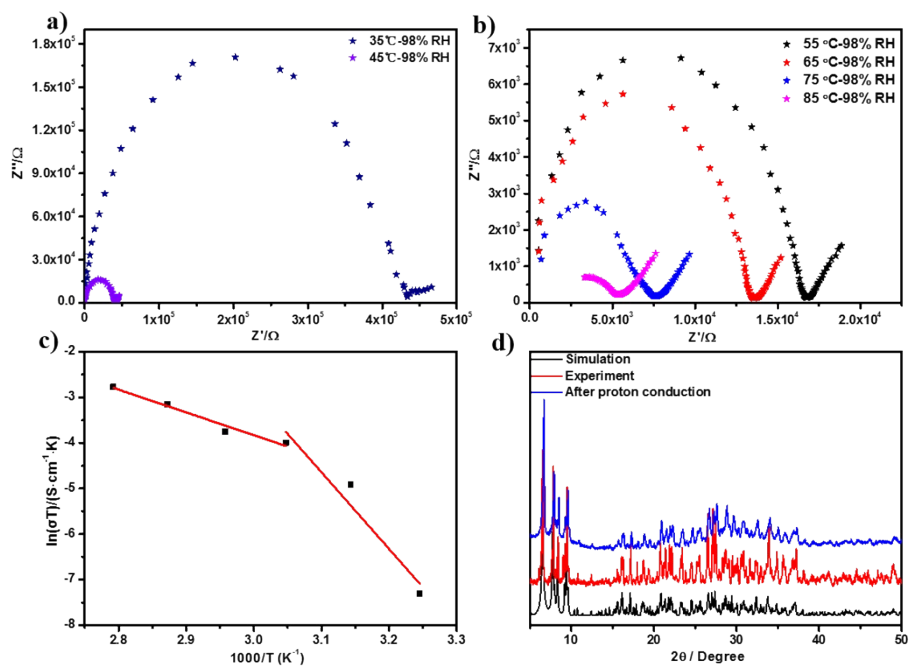


Fig. S9 (a) and (b) Nyquist plots for **2** under different temperatures at 98% RH; (c) Arrhenius plots and linear fitting of the temperature-dependent proton; (d) PXR patterns after proton conduction for **2**.

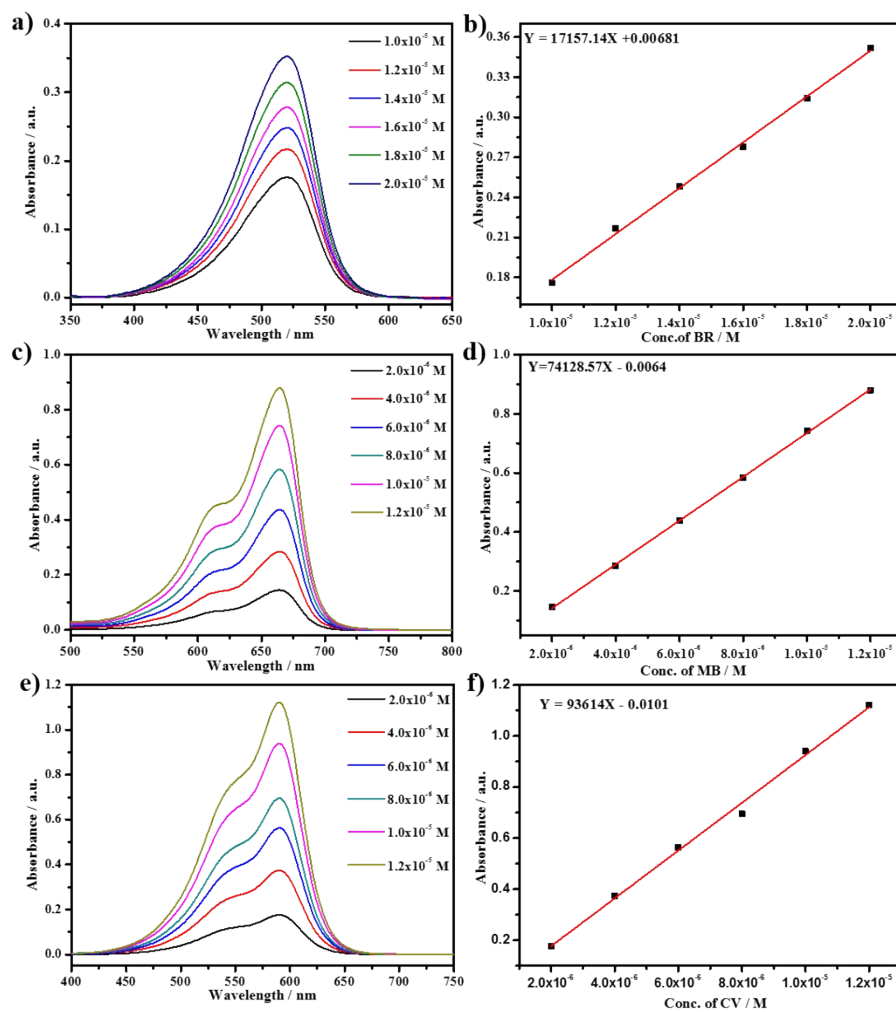


Fig. S10. Calibration plots of standard BR, MB and CV (a & c & e) by UV-Vis spectra in aqueous solution and their

fitting of Abs. vs concentration of respective dye values (b & d & f)

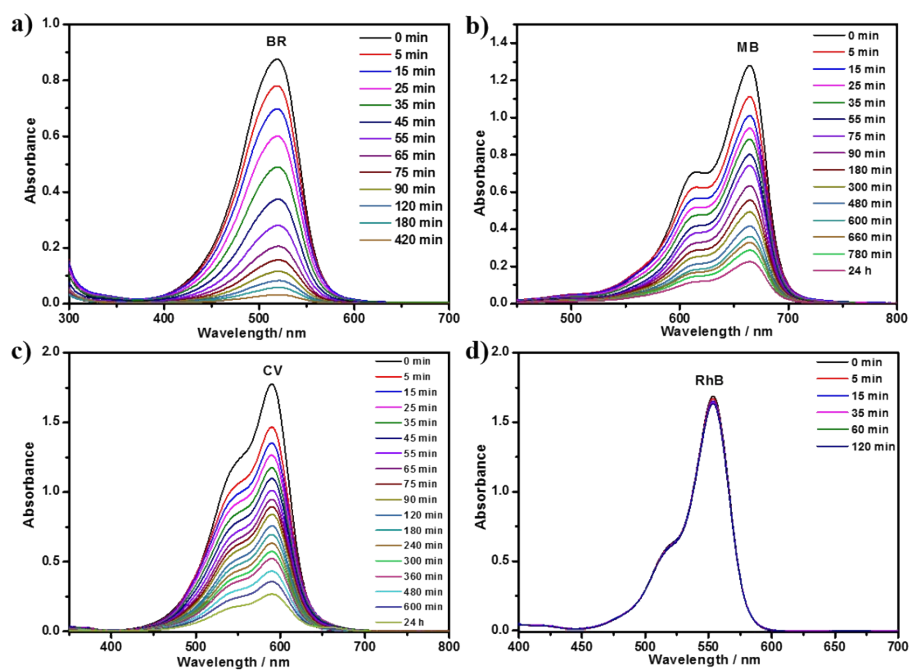


Fig. S11 UV-Vis spectra of cationic dye solutions during an adsorption test with **2** (a) BR, (b) MB, (c) CV, (d) RhB.

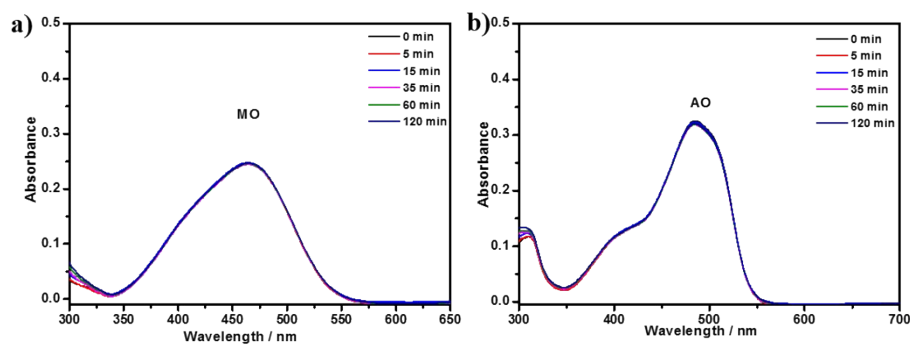


Fig. S12 UV-Vis spectra of anion dye solutions during an adsorption test with **2** (a) MO and (b) AO.

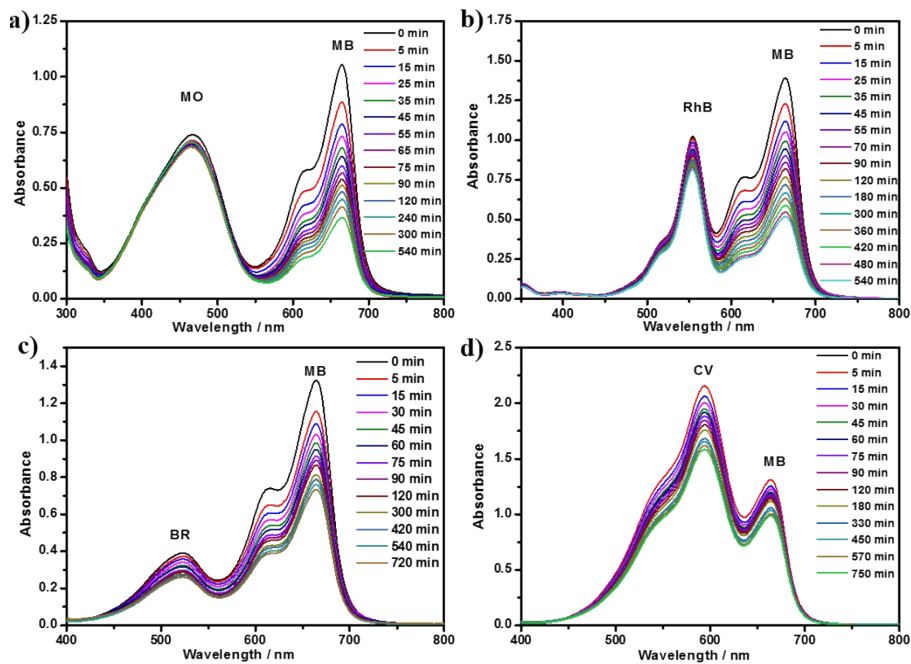


Fig. S13 UV/vis absorption spectra of the mixed dye solutions of MO and MB (a), RhB and MB (b), MB and BR (c), and MB and CV (e) show the adsorption processes with **2** at different times.

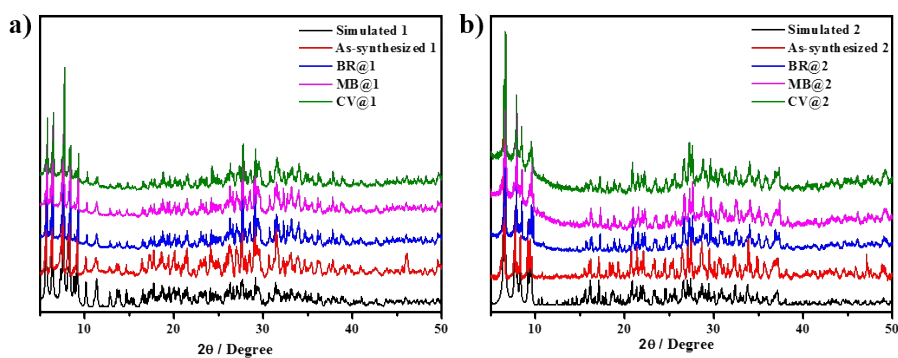
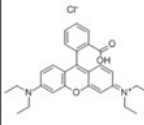
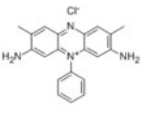
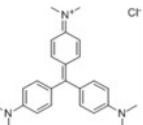
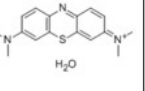
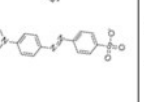
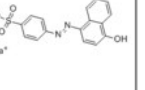


Fig. S14. PXRD patterns of as-synthesized and dye-adsorbed samples for **1** (a) and **2** (b)

Table. S1 Characteristics of organic dye molecules: RhB: Rhodamine B; BR: Basic Red; CV: Crystal Violet; MB: Methylene Blue; MO: Methyl Orange; AO: Acid Orange.

Name	Cationic				Anionic	
	RhB	BR	CV	MB	MO	AO
Structure						
Colour	Pink	Red	Violet	Blue	Orange	Orange
Charge	+1	+1	+1	+1	-1	-1
MW.	443.6	315.4	372.5	284.4	327.3	350.3
X (Å)	6.79	4.30	4.00	4.00	5.31	5.44
Y (Å)	11.80	9.40	12.97	7.93	7.25	10.03
Z (Å)	15.68	11.39	13.74	16.34	17.39	15.67