Supporting information

Enhanced adsorptive removal of anionic and cationic dyes from single or mixed dye solutions using MOF PCN-222

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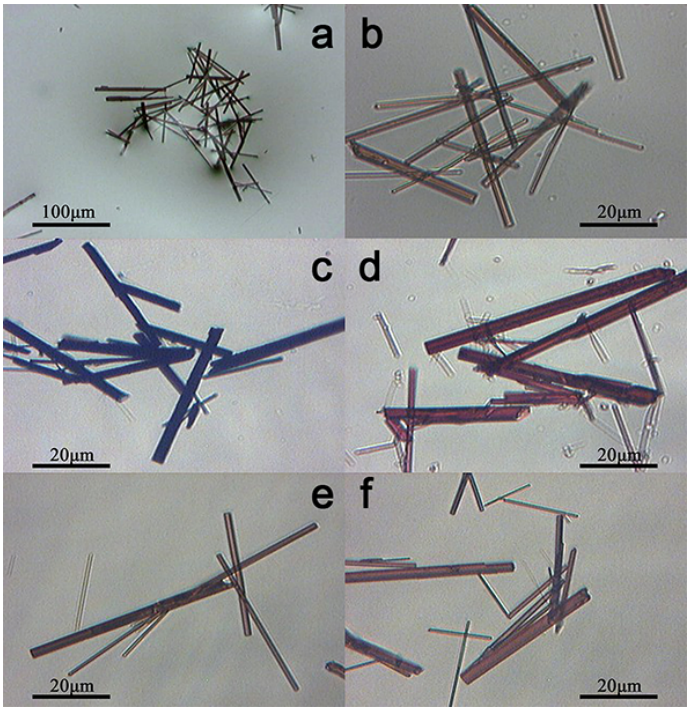


Fig. S1 Optical microscopy images of PCN-222 before adsorption under magnification of (a) low magnification and (b) high magnification , (c) after adsorbing MB, (d) after adsorbing MO, (e) after 8 reuse cycles of MB adsorption/removal, and (f) after 8 reuse cycles of MO adsorption/removal.

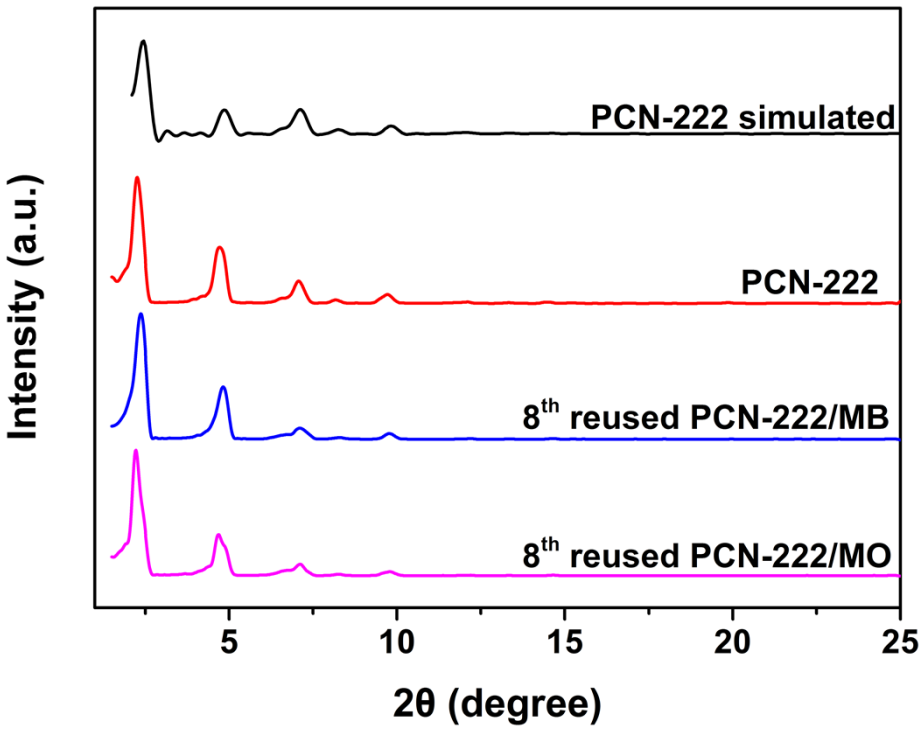


Fig. S2 Powder XRD patterns of PCN-222 as prepared (red line) and after reused for 8 cycles with MB (blue line) and with MO (purple line) and simulated (black line) .

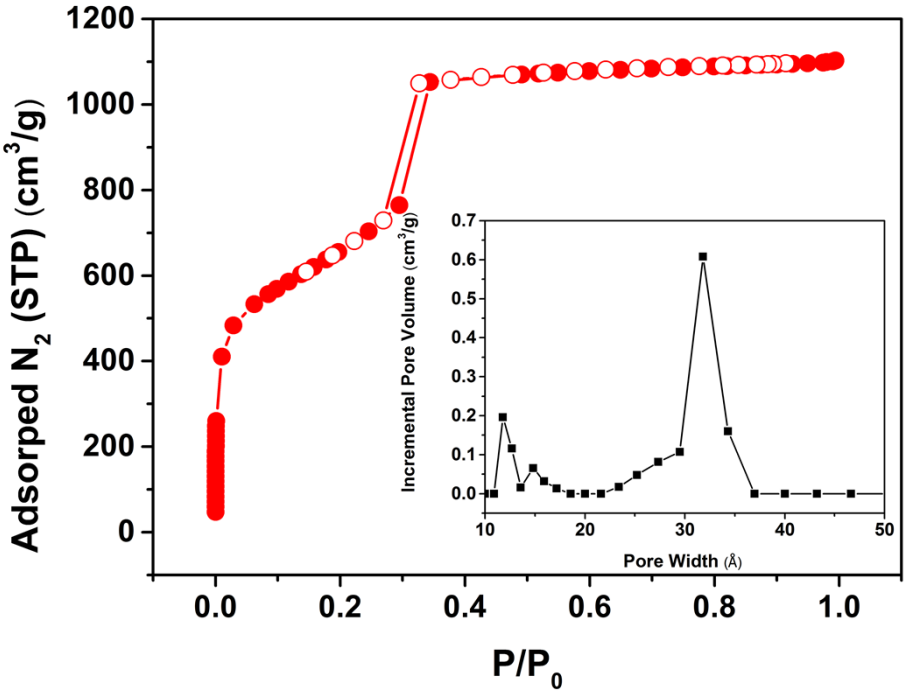


Fig. S3 N_2 adsorption (open red dots)/desorption (solid red dots) isotherms and the corresponding pore size distribution (inset) of PCN-222 as synthesized based on the density functional theory (DFT) method.

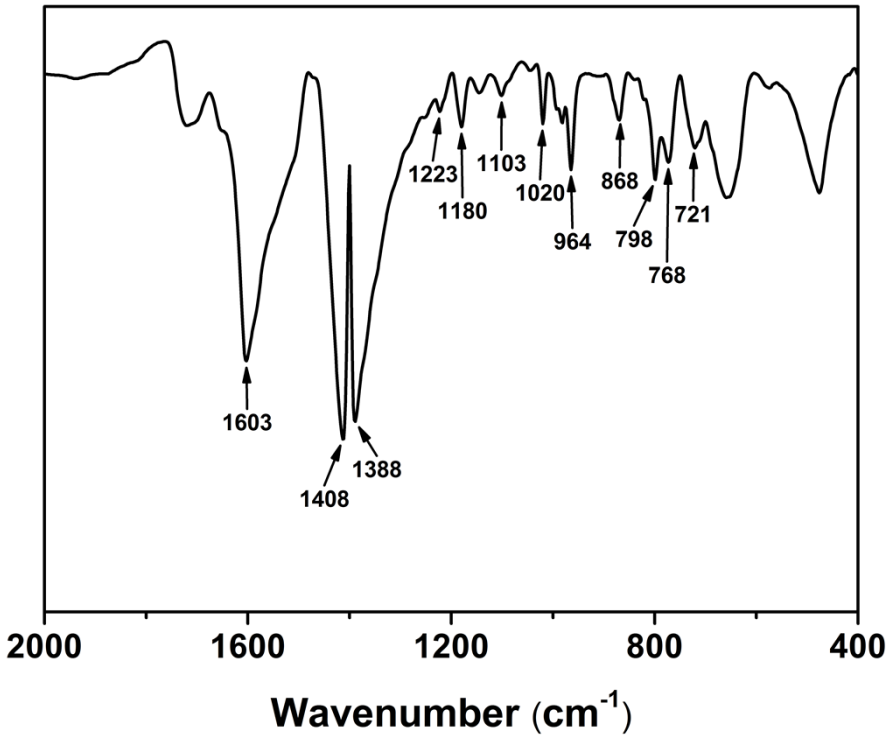


Fig. S4 FT-IR spectrum of PCN-222 powder.

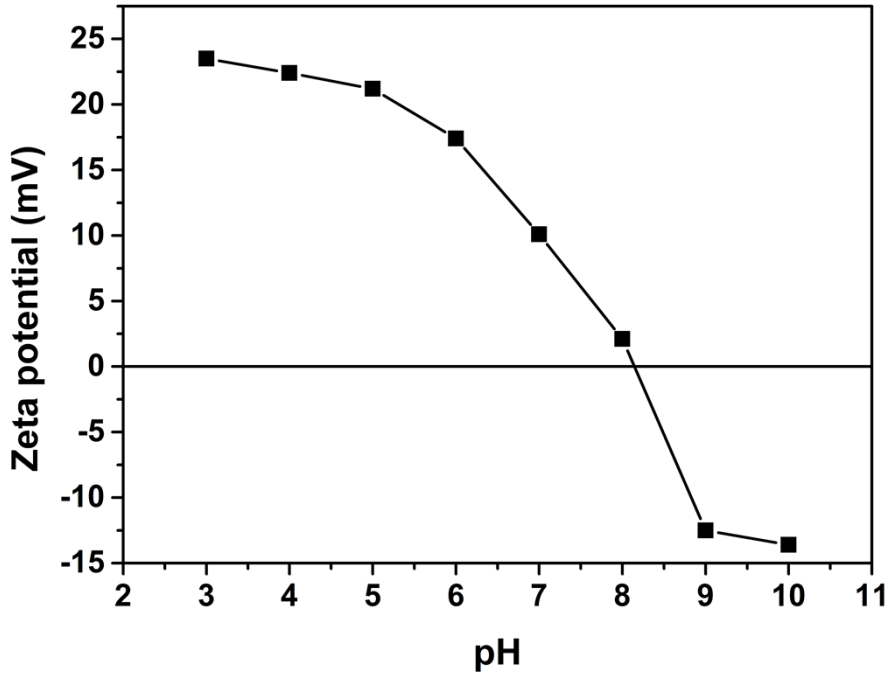


Fig. S5 Effect of initial pH on Zeta potential of PCN-222.

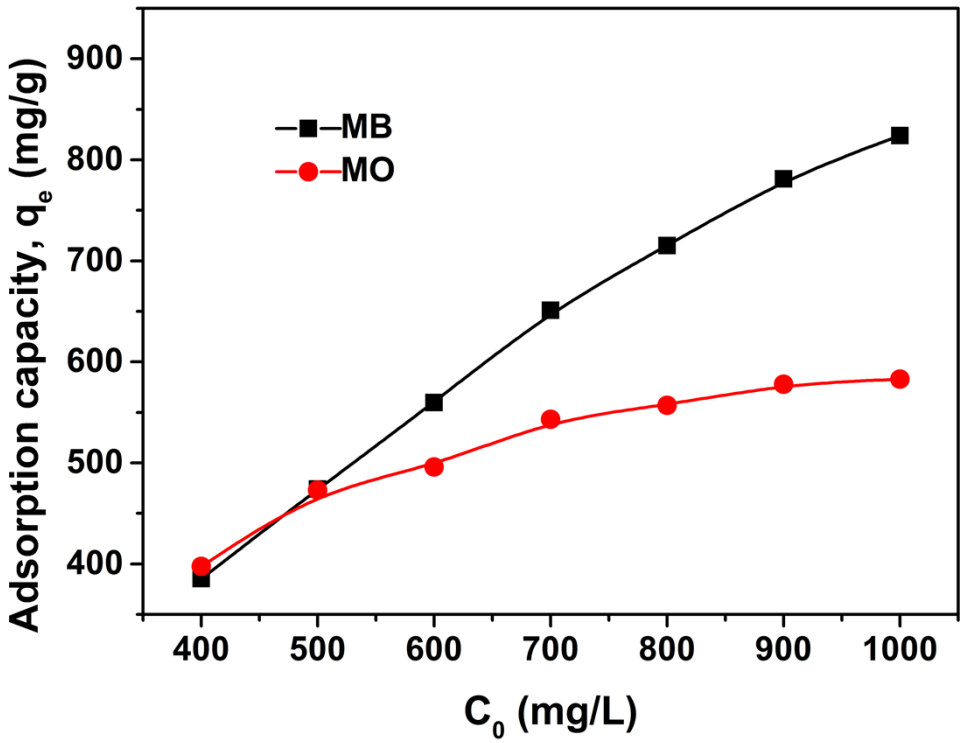


Fig. S6 Experimental adsorption capacities of MB (black solid squares) and MO (red solid circles) as a function of initial concentration at pH 9 and 5 respectively and room temperature.

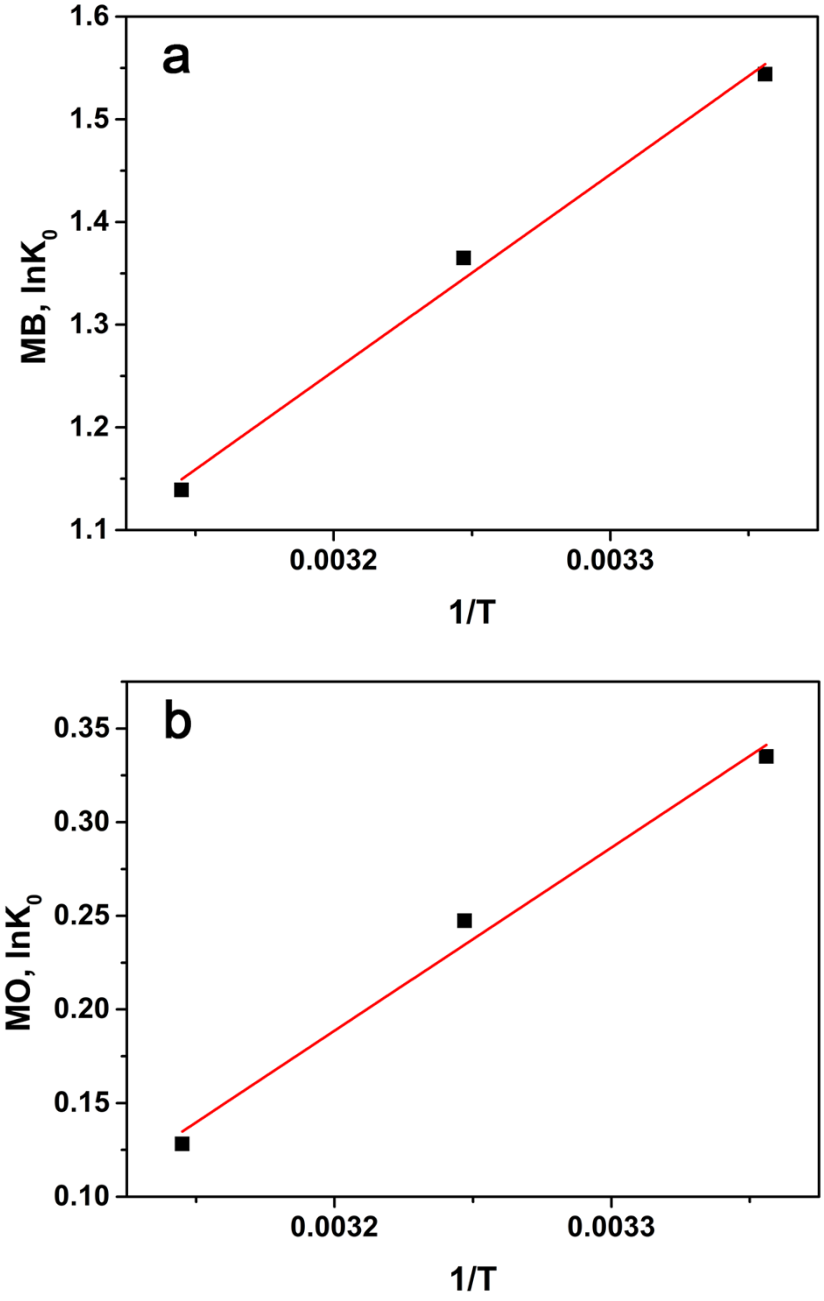


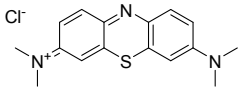
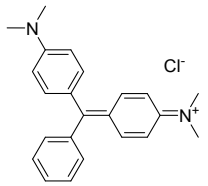
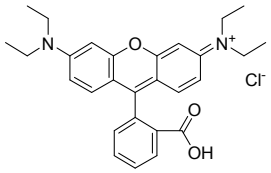
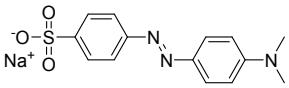
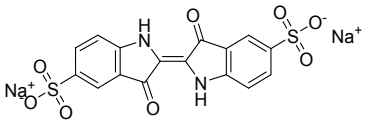
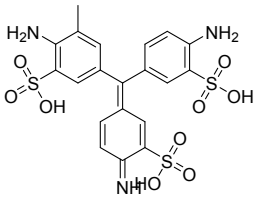
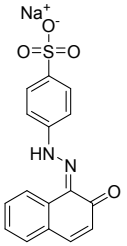
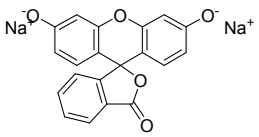
Fig. S7 Van't Ho□ plot of (a) MB and (b) MO adsorption onto PCN-222.

Table S1. FT-IR fingerprint bands of the organic linker of PCN-222.

Modes	FT-IR (cm^{-1})		Descriptions
	This work	Reference	
υ_{25}	721	721	γ(C-H, N-H, OH)
υ_{28}	768	768	breath (pyr) + γ(C-H, N-H, OH)
υ_{30}	798	798	Porph γ(C-H, N-H)
υ_{34}	868	868	δ(C-N-C) + Phenyl γ(C-H)
υ_{35}	964	964	breath (pyr + phenyl)
υ_{39}	1020	1020	def (phenyl)
υ_{41}	1103	1103	Pyr δ(C-H)
υ_{44}	1180	1176	phenyl δ(C-H) + δ(O-H)
υ_{45}	1223	1223	phenyl (breath + δ(C-H + O-H))
υ_{50}	1388	1385	$\upsilon(C_\alpha + C_\beta)$
υ_{52}	1408	1402	phenyl δ(C-H)
υ_{59}	1603	1605	def (phenyl)

Table S2.

The adsorption amounts of eight cationic and anionic dyes at pH 6 (Test with a column).

Dye	Structure	Maximum adsorption wavelength (nm)	Maximum adsorption capacity (mg/g) at pH 6
MB		664	601
MG		617	2880
RhB		554	200
MO		464	572
IC		610	497
AF		547	1472
AO		372	748
FD		490	301