Supplementary Information (SI) for New Journal of Chemistry.
This journal is © The Royal Society of Chemistry and the Centre National de la Recherche Scientifique 2025

Supporting Information

A fluorescent sensor utilizing quinoline-functionalized UiO-66 for the detection and removal of zinc ions from aqueous solutions

Yiying Xiong[#], Ying Yang[#], Xue Li, Jing Feng, Yingming Mao, Yuanyuan Zhang*

School of Environmental and Chemical Engineering, Jiangsu Ocean University, Lianyungang, 222005, P. R. China

[#]These authors contributed equally to this work.

*Corresponding author

E-mail addresses: zhangyy@jou.edu.cn (Y. Zhang)

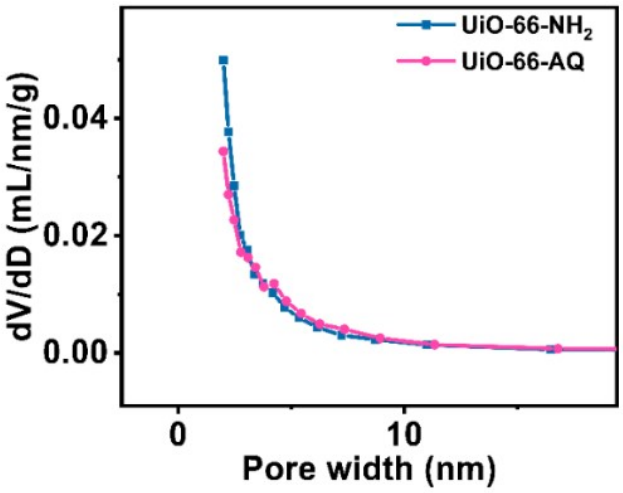

Fig. S1. N_2 adsorption-desorption pore size distribution.

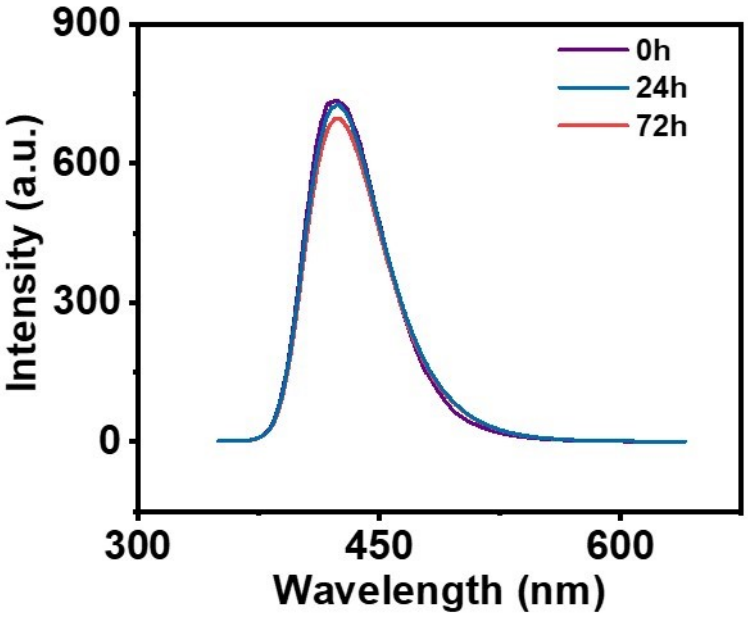

Fig. S2. Fluorescence changes of UiO-66-AQ suspension with added Zn(II) after long-term storage.

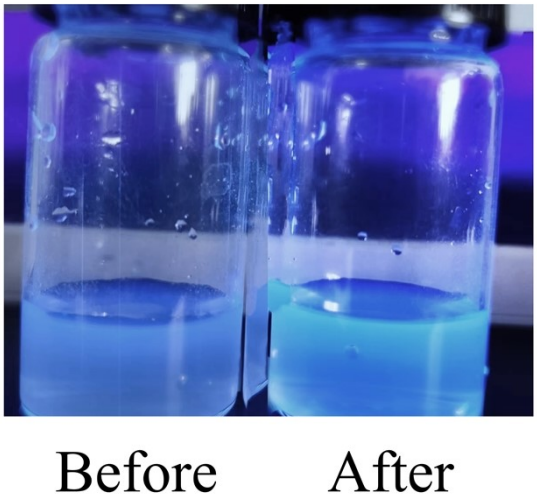

Fig. S3. Changes in fluorescence intensity before and after the addition of Zn(II) under 375nm ultraviolet lamp.

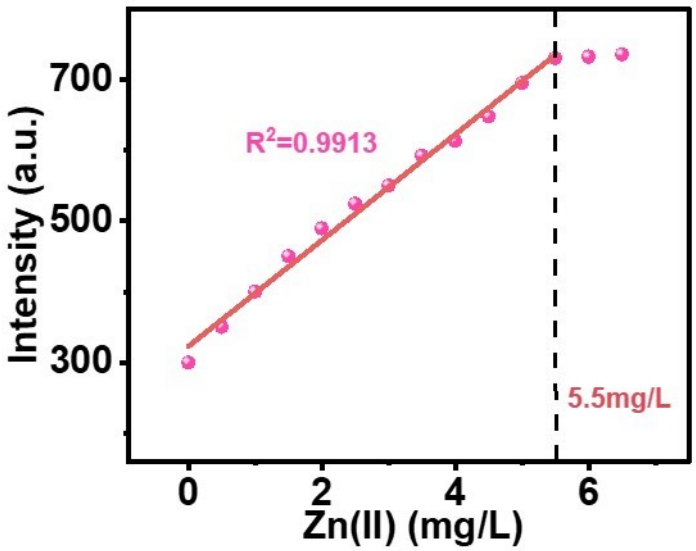

Fig. S4. Linear regression of the emission intensity of fluorescence at 423 nm with [Zn(II)] at 25 °C.

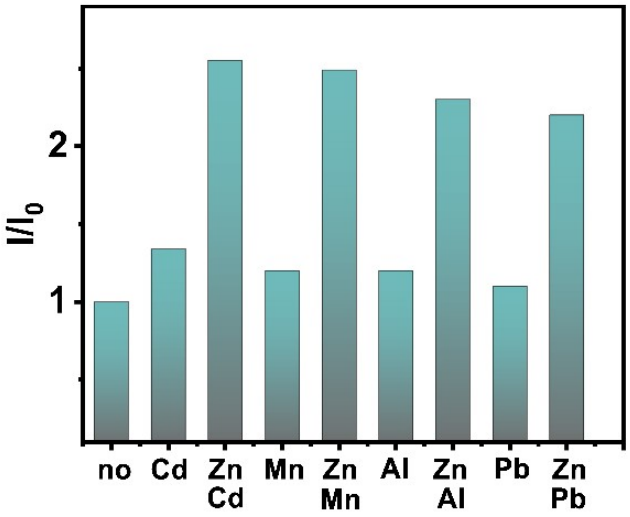

Fig. S5. I/I_0 plots of UiO-66-AQ (0.1 mg/mL) in the presence of mono and binary ion systems (25 °C).

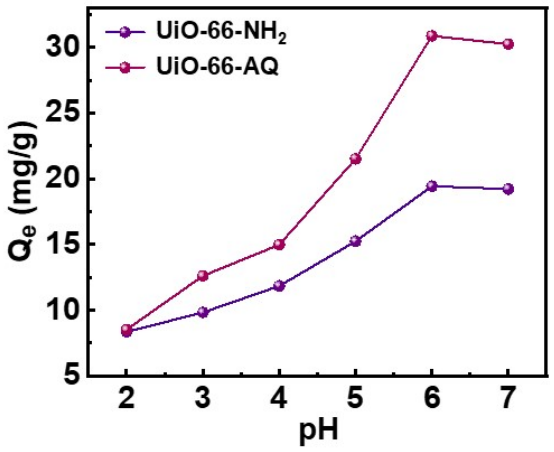

Fig. S6. Effect of pH on the adsorbed amount of Zn(II).

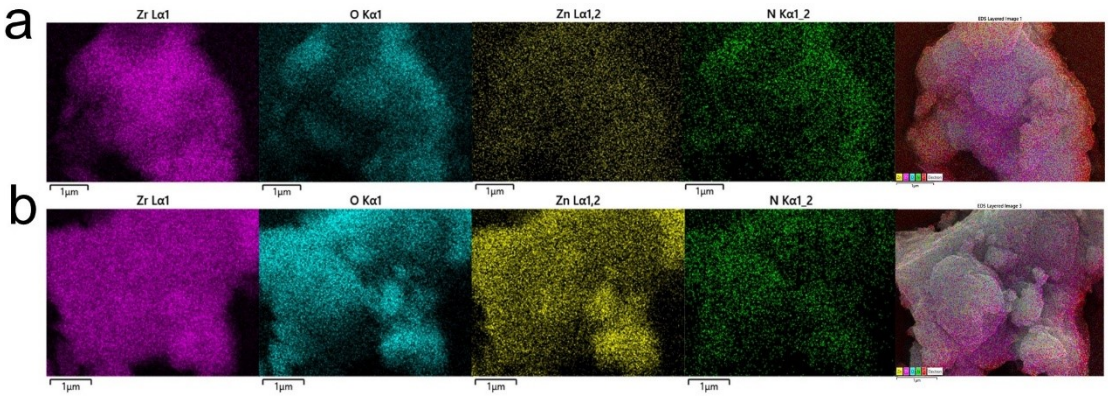

Fig. S7. EDS mapping analyzes of (a) UiO-66-AQ and (b) UiO-66-AQ/Zn.

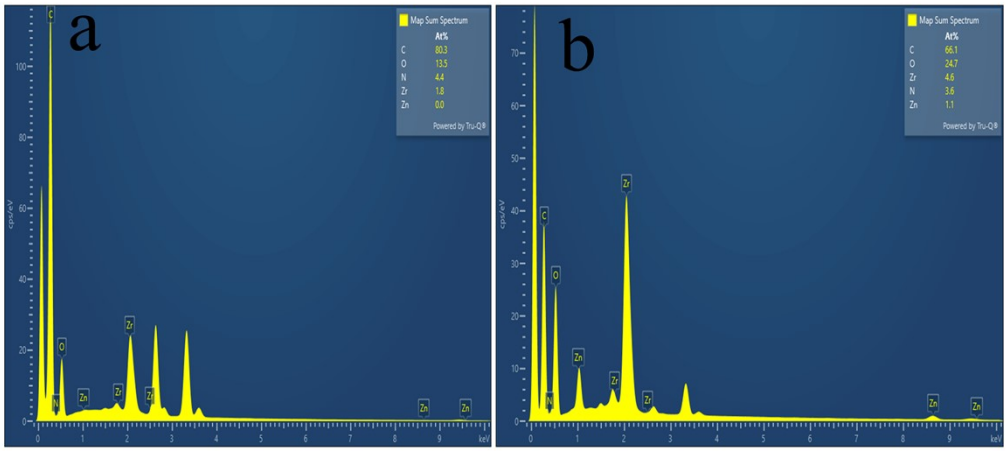

Fig. S8. Energy dispersive X-ray spectra of (a) UiO-66-AQ and (b) UiO-66-AQ/Zn.

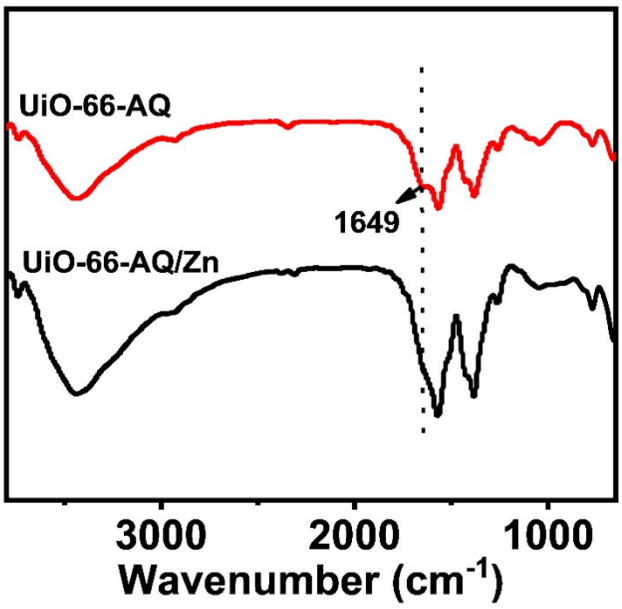

Fig. S9. FTIR spectra of UiO-66-AQ before and after adsorption of Zn(II)

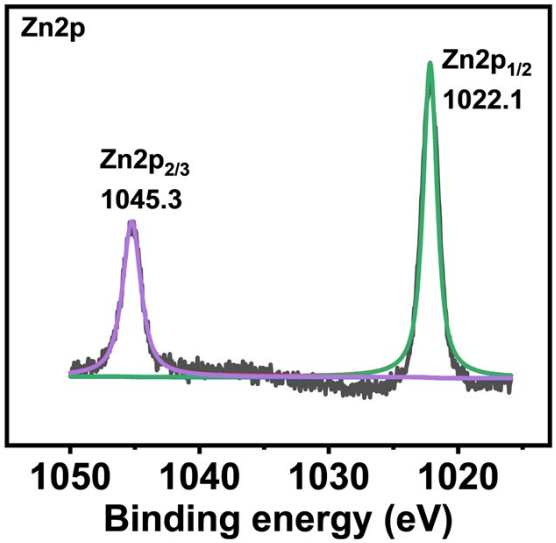

Fig. S10. Zn 2p XPS spectrum of UiO-66-AQ after adsorption of Zn(II).

Table S1. UiO-66-NH_2 and UiO-66-AQ pore structure parameters

Sample	Specific surface area (m^2/g)	Pore volume (mL/g)	Aperture diameter (nm)
UiO-66-NH_2	796	0.539	2.68
UiO-66-AQ	401	0.466	2.38

Table S2. Fitting parameters of adsorption kinetics model

Model	Parameter	UiO-66-NH_2	UiO-66-AQ
Pseudo-first-order	k_1 (1/min)	0.0299	0.0140
	Q_e (mg/g)	16.0801	30.2606
	R^2	0.9486	0.9766
Pseudo-second-order	K_2 (mg/(g•$min^{1/2}$)	0.0022	5.1388
	Q_e (mg/g)	18.00	34.4341
	R^2	0.9886	0.9885
Elovich	α (mg/(g•min))	2.0223	1.1288
	β (g/mg)	0.3209	0.1358
	R^2	0.9809	0.9874

Table S3. Fitting parameters of Diffusion model in particles

Sample	k_{d1} (mg/(g·$min^{1/2}$))	R^2	k_{d2} (mg/(g·$min^{1/2}$))	R^2	k_{d3} (mg/(g·$min^{1/2}$))	R^2
UiO-66-NH_2	2.55	0.913	1.01	0.989	0.0156	0.857
UiO-66-AQ	3.42	0.998	2.30	0.996	0.120	0.940

Table S4. Fitting parameters of Langmuir, Freundlich, Temkin and D-R isothermal adsorption models

Model	Parameter	UiO-66-NH_2	UiO-66-AQ
Langmuir	Q_{max} (mg/g)	35.74	49.82
	K_L (L/mg)	0.01391	0.0278
	R^2	0.9966	0.9956
Freundlich	K_F (mg/g)	2.8511	7.2555
	1/n	0.4682	0.3303
	R^2	0.9523	0.9575
Temkin	A (mg/L)	0.1131	0.2744
	B	10.4117	10.1026
	R^2	0.9847	0.9729
D-R	Q_{max} (mg/g)	28.9651	35.4773
	β (mol^2/KJ^2)$\times 10^{-3}$	951.928	444.4528
	R^2	0.8771	0.84592

Table S5. R-P isotherm model parameters for adsorption of Zn(II) UiO-66-NH_2 and UiO-66-AQ

Parameter	UiO-66-NH_2	UiO-66-AQ
K_{RP}	0.60829	1.3993
α_{RP} $(L/mg)^{\gamma}$	0.01419	0.0385
γ	0.9974	0.9563
R^2	0.9966	0.9956