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Supporting Information

Fine tuning of pore size in metal-organic frameworks for superior removal of U(VI) from aqueous solution

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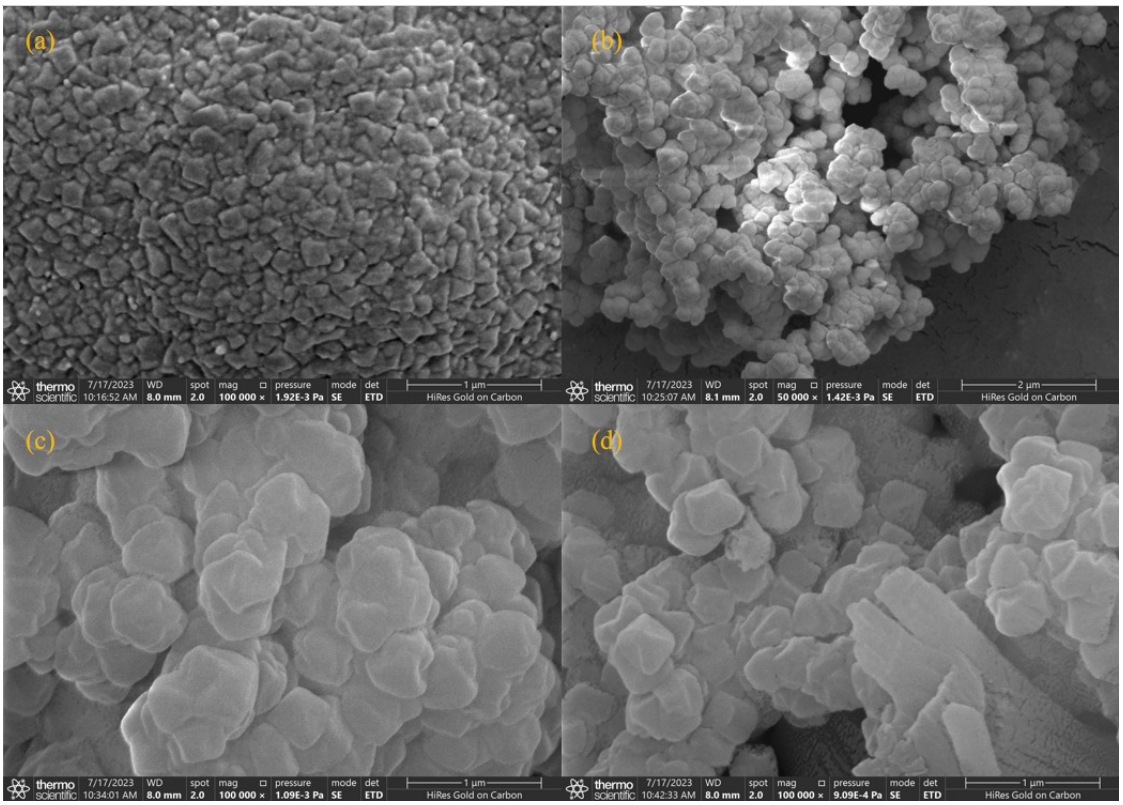


Fig. S1. SEM images of (a) MOF-A, (b) MOF-B, (c) MOF-C, (d) MOF-C with U.

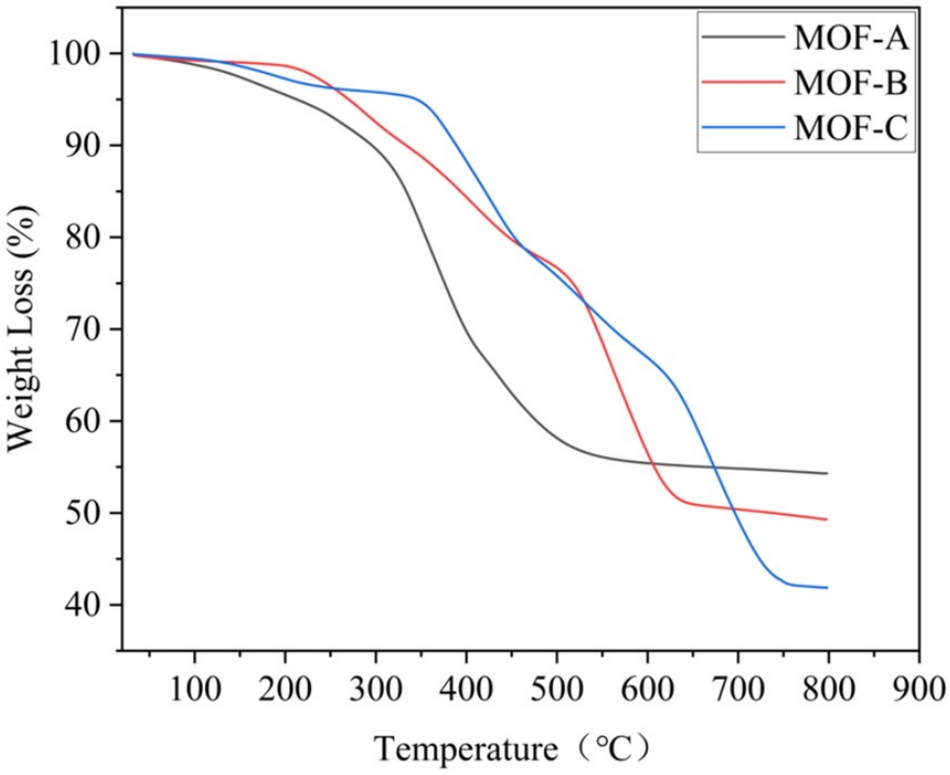
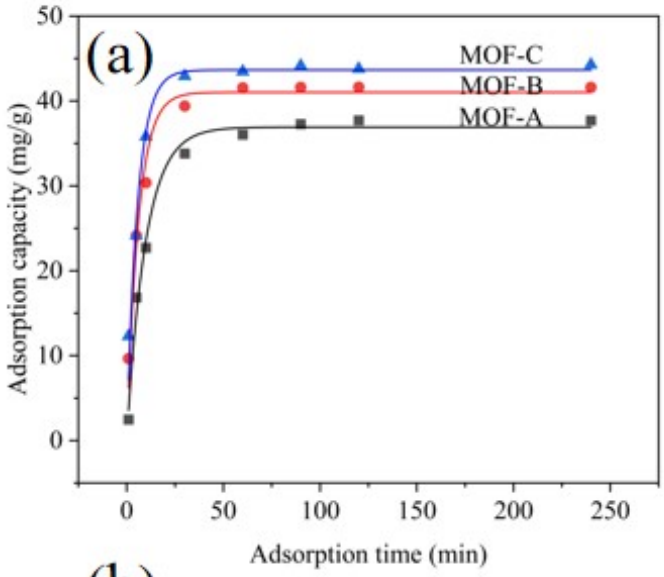
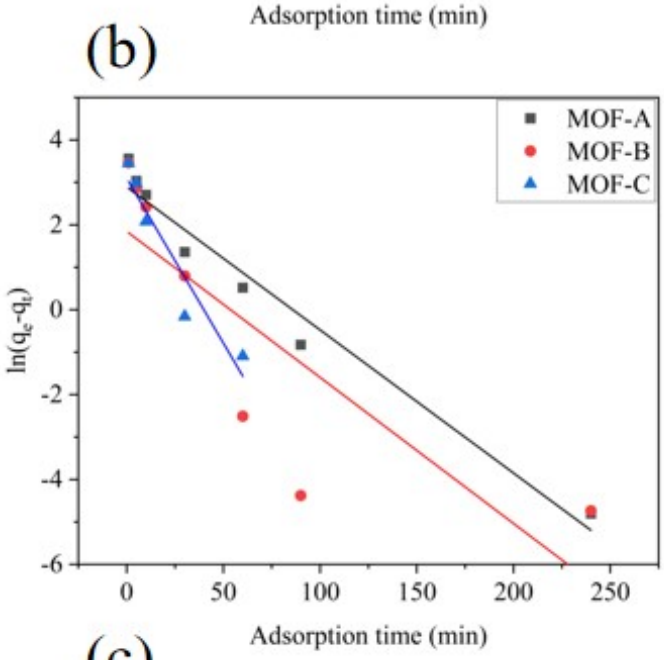


Fig. S2. The thermogravimetric curves of three MOFs.

Table S1 Kinetic parameters for the U(VI) adsorption of MOFs

Adsorbents	Pseudo-first-order kinetics			Pseudo-second-order kinetics		
	Q_e(mg·g^{-1})	K_1(min^{-1})	R^2	Q_e(mg/g mg·g^{-1})	K_2(min^{-1})	R^2
MOF-A	18.08	0.0777	0.968	39.34	0.0034	0.998
MOF-B	6.34	0.0792	0.691	42.30	0.0087	0.999
MOF-C	22.18	0.1579	0.882	43.29	0.0090	0.999


(a)
MOF-C
MOF-B
MOF-A
Adsorption capacity (mg/g)
Adsorption time (min)


(b)
MOF-A
MOF-B
MOF-C
ln(qe-qt)
Adsorption time (min)

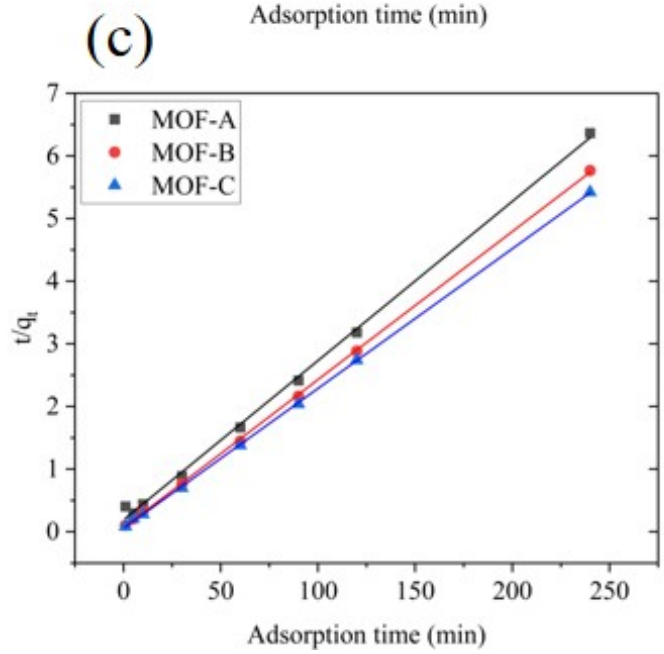

(c)
MOF-A
MOF-B
MOF-C
t/qt
Adsorption time (min)

Fig. S3. (a) Effect of contact time on the U(VI) adsorption by MOF-A, MOF-B, and MOF-C (m=10 mg, pH=11 (MOF-A), pH=5 (MOF-B and MOF-C), T=308 K, C_0=20 mg·L^{-1}); (b) Pseudo-first-order kinetics fitting and (c) pseudo-first-order kinetics fitting for the three MOFs.

Table S2 Parameters of Langmuir and Freundlich isotherm models of the U(VI) adsorption on three MOFs

Adsorbents	Langmuir model			Freundlich model		
	Q_m(mg·g^{-1})	K_l(L·mg^{-1})	R^2	K_f(L·mg^{-1})	1/n	R^2
MOF-A	51.91	0.12576	0.993	14.14	0.27717	0.943
MOF-B	550.03	0.04212	0.993	60.04	0.44265	0.942
MOF-C	584.13	0.04679	0.995	65.67	0.44778	0.931

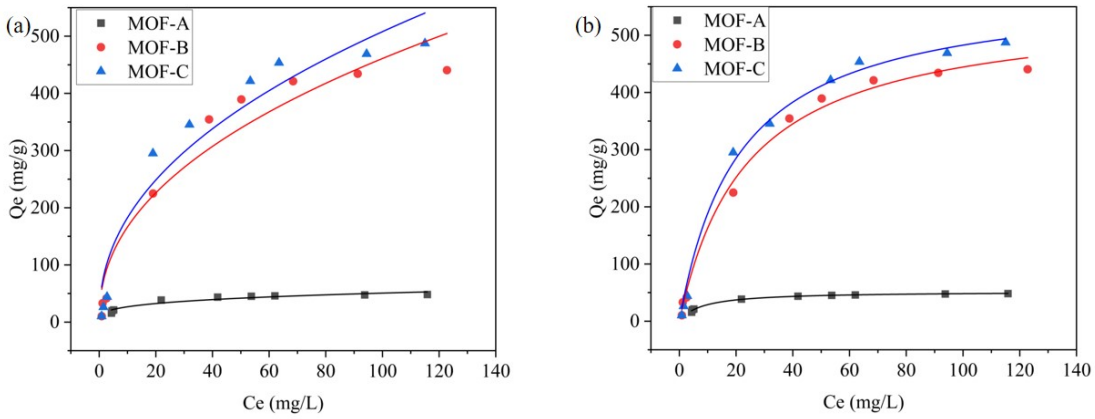


Fig. S4. Adsorption isotherms of U(VI) on MOF-A, MOF-B and MOF-C (adsorbent amount: 10 mg; pH: 11 (MOF-A), 5 (MOF-B and MOF-C); temperature: 308 K; contact time: 90 min); (a) Freundlich model fitting; (b) Langmuir model fitting.

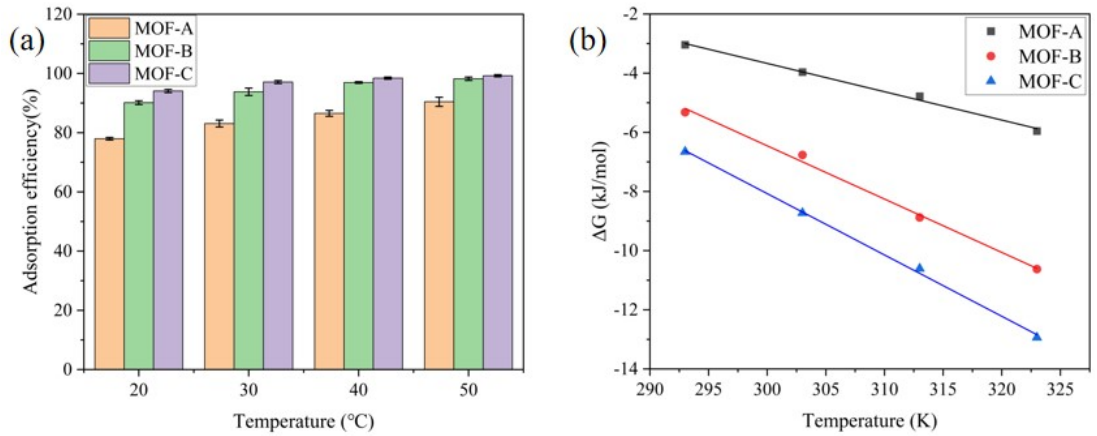


Fig. S5. (a) Effect of temperature on the U (VI) adsorption performance of MOF-A, MOF-B and MOF-C (adsorbent amount: 10 mg; pH: 11 (MOF-A), 5 (MOF-B and MOF-C); initial U (VI) concentration: 20 mg·L^{-1}; contact time: 90 min); (b) Thermodynamic fitting of three MOFs.

Table S3 Thermodynamic parameters of uranium adsorption by MOFs

Adsorbents	ΔG(kJ/mol)				ΔH(kJ/mol)	ΔS(kJ/mol)	R^2
	293 K	303 K	313 K	323 K			
MOF-A	-3.04	-3.96	-4.78	-5.96	25.04	0.095	0.994
MOF-B	-5.32	-6.76	-8.88	-10.62	47.60	0.18	0.995
MOF-C	-6.65	-8.72	-10.61	-12.94	54.12	0.21	0.998