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Supplementary Information

Metal ion supported mesoporous silica materials for the removal of sulfamethizole from water

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Table. S1 Structural parameters of Ni-AAPTMS-SBA-15.

Materials	BET surface area (m^2/g)	Average pore diameter (Å)	Total pore volume (cm^3/g)
AAPTMS-SBA-15[1]	212.6	126.3	0.67
Ni-AAPTMS-SBA-15	142.7	123.5	0.37

Table. S2 Kinetic parameters of Ni-AAPTMS-SBA-15 for SIZ adsorption.

Kinetic models	R^2	K	$Q_{e,\,Cal}$ (mg/g)
PFO	0.9886	0.0006	3.99
PSO	0.9997	0.0379	31.45

Table. S3 Isotherm parameters of Ni-AAPTMS-SBA-15 for SIZ adsorption

Langmuir			Freundlich			Temkin			Dubinin-Radushkevic		
Q_m	K_L	R^2	K_F	n	R^2	B_1	K_T	R^2	Q_m	E	R^2
(mg/g)	(L/mg)		(L/g)				(L/mol)		(mg/g)	(kJ/mol)	
188.68	0.04	0.9902	15.75	1.78	0.9970	39.19	0.49	0.9851	169.81	21.32	0.9346

Table S4 Comparison of Ni-AAPTMS-SBA-15 with other reported SAs adsorbents.

Materials	Targets	Equilibrium time (min)	Q_{max} (mg/g)	Removal efficiency (%)	Ref.
Carbonaceous nanospheres	SDZ	40	96.6	96.8	[2]
HKUST-1@CNS	SMZ	120	31.64	96.1	[3]
Fe-N-BC	SMZ	480	42.9	93.4	[4]
BCN	SMZ	30	28.75	-	[5]
Activated Carbon	SDZ	60	66.22	99	[6]
CD-DGO	SMZ	120	143.08	-	[7]
	SDZ	120	149.01		
Ni-AAPTMS-SBA-15	SIZ	2	188.68	90	This work

References

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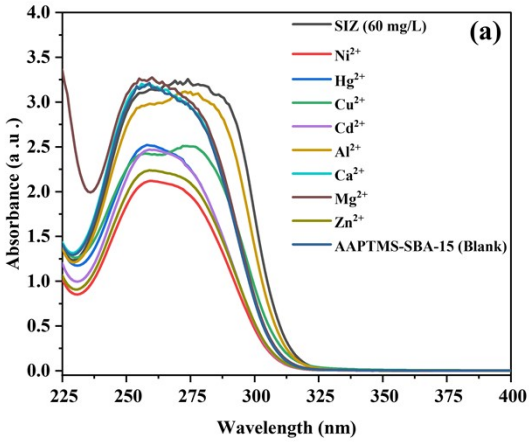

Fig. S1 The adsorption of SIZ by AAPTMS-SBA-15 in the absence and presence of different metal ions.

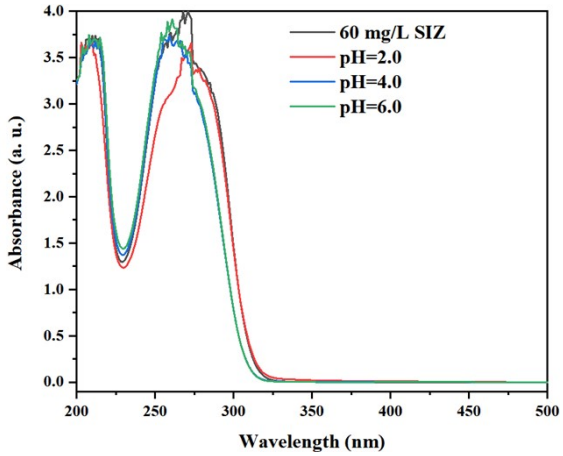

Fig. S2 The adsorption of SIZ by AAPTMS-SBA-15 at different pH.

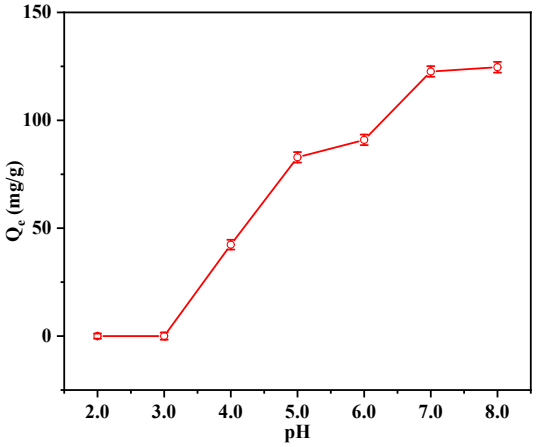

Fig. S3 The adsorption capacity of Ni^{2+} by AAPTMS-SBA-15 at different pH values.

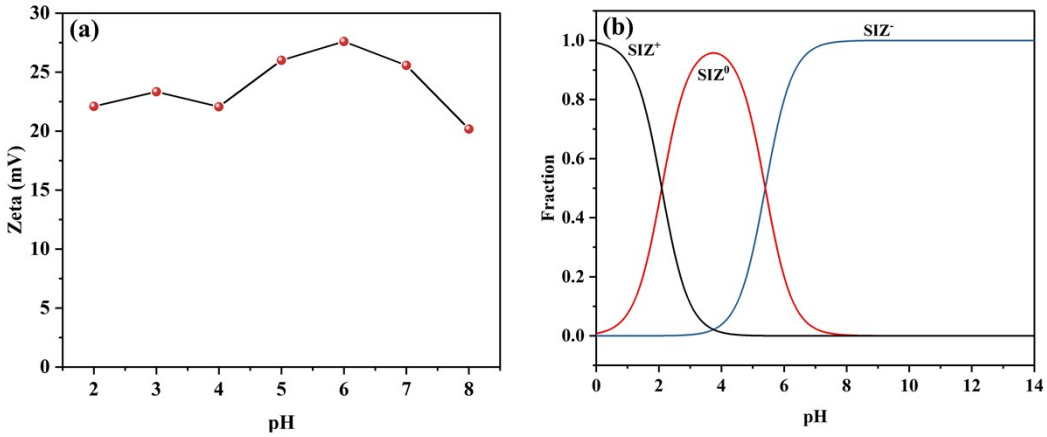

Fig. S4 Zata potential of Ni-AAPTMS-SBA-15 and the distribution coefficient of SIZ at different pH values.

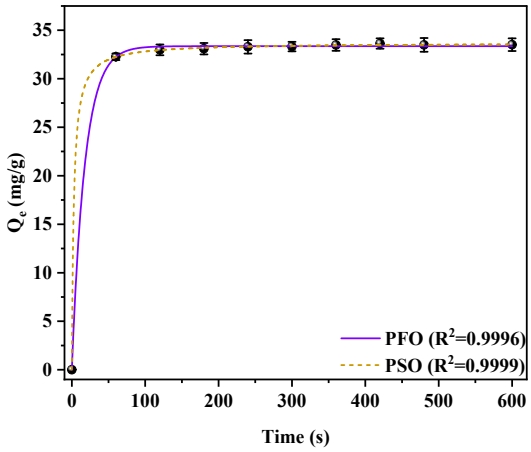

Fig. S5 Nonlinear fitting of adsorption kinetics of SIZ by Ni-AAPTMS-SBA-15.

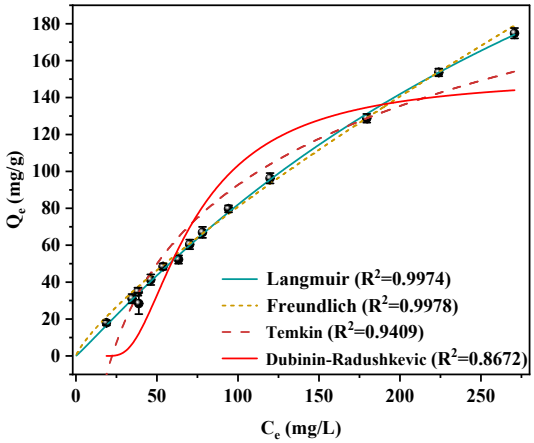

Fig. S6 The effect of concentration on SIZ adsorption and its nonlinear fitting.

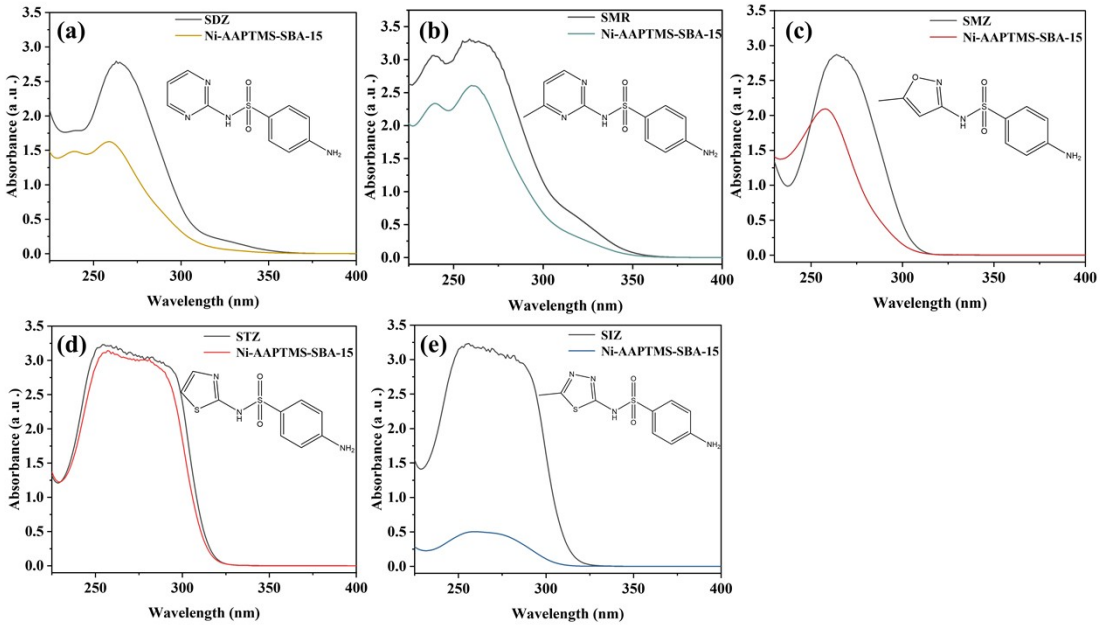

Fig. S7 UV-Vis spectra of SDZ (a), SMR (b), SMZ (c), STZ (d), and SIZ (e) after adsorption by usingNi-AAPTMS-SBA-15.

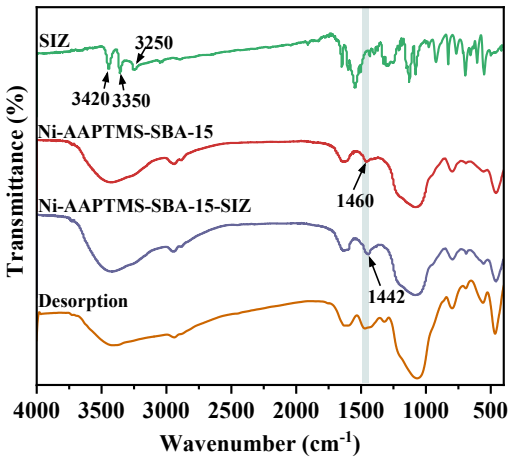

Fig. S8 FT-IR spectra of Ni-AAPTMS-SBA-15 before and after adsorption of SIZ.

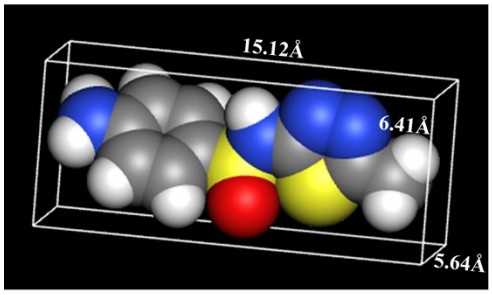

Fig. S9 The size information of SIZ.

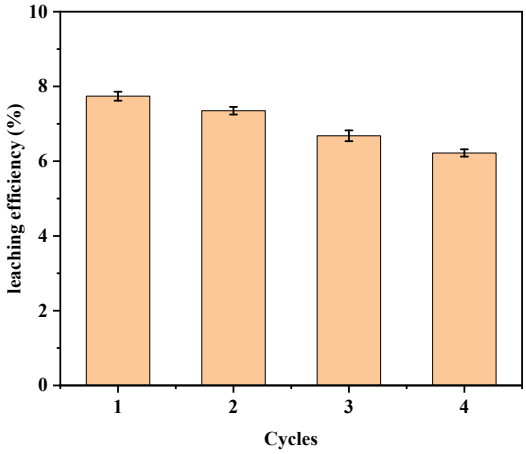

Fig. S10 Leaching efficiency after regeneration.