Electronic Supplementary Information

Covalent organic framework-LZU1@PEI@Fe_3O_4-based magnetic dispersive micro-solid phase extraction of tetracyclines from environmental water prior to HPLC analysis

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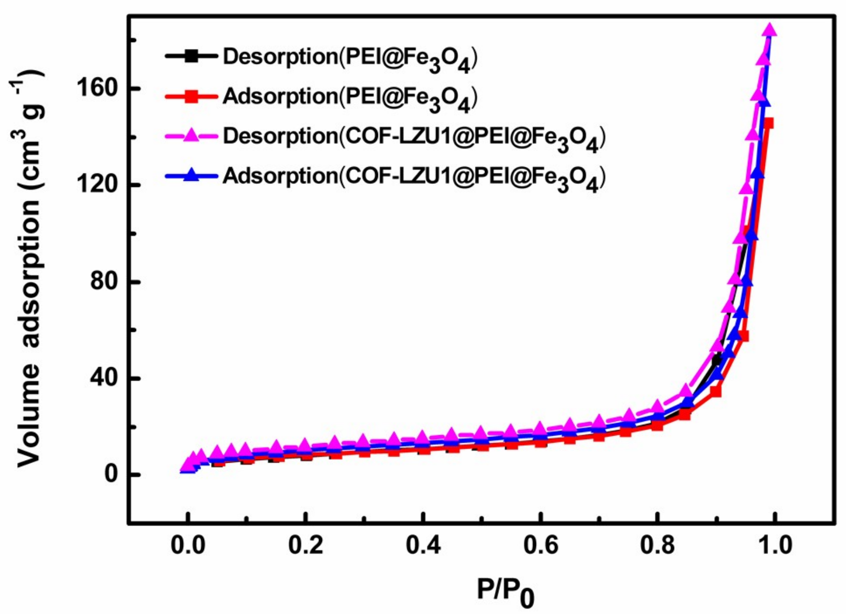

Fig. S1 Nitrogen adsorption and desorption isotherms of PEI@Fe_3O_4 and COF-LZU1@PEI@Fe_3O_4.

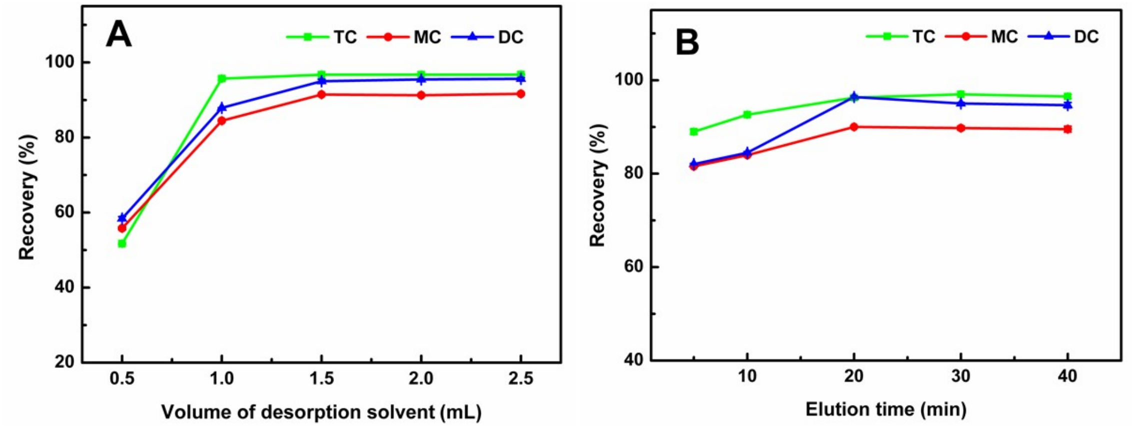

Fig. S2 Effect of desorption conditions on the extraction efficiency. (A) Volume of elution solvent; (B) Elution time, 1.50 mL elution solvent. Other conditions: amount of adsorbent, 5.0 mg; extraction time, 30 min; sample volume, 10.00 mL; sample pH, 7.0; extraction temperature, 30 °C.

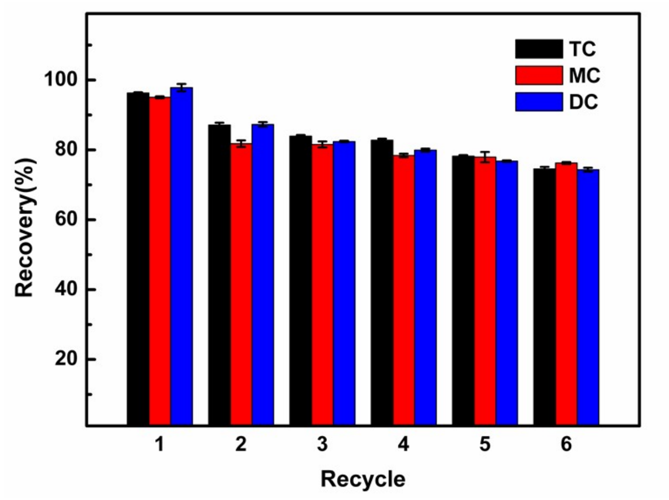

Fig. S3 Reusability of COF-LZU1@PEI@Fe_3O_4.

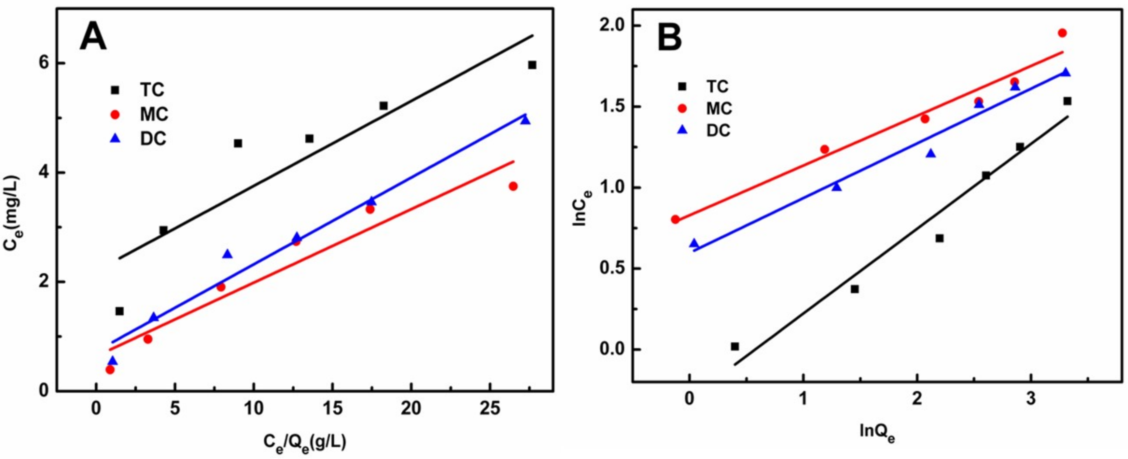

Fig. S4 Adsorption isotherms of TCs on COF-LZU1@PEI@Fe_3O_4 fitted by (A) Langmuir model; (B) Freundlich model.

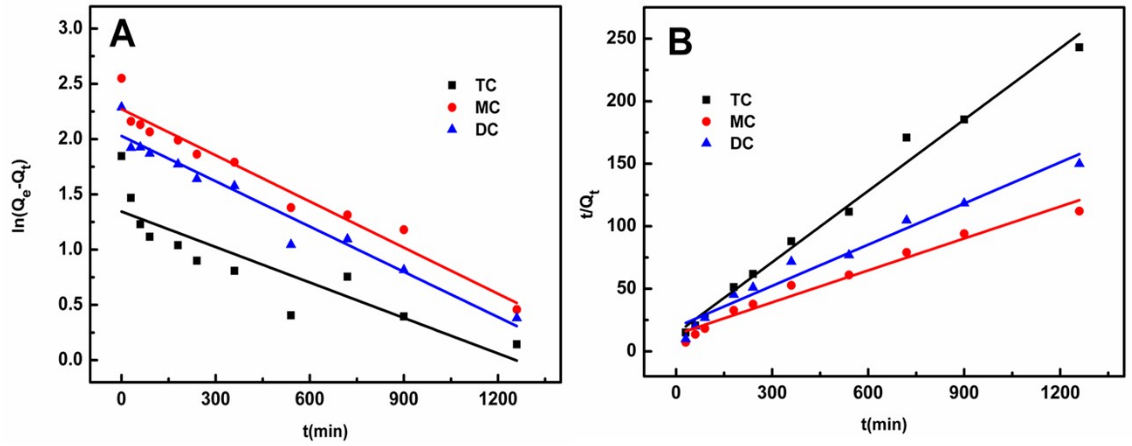

Fig. S5 Adsorption kinetic model of COF-LZU1@PEI@Fe_3O_4 to TCs. (A) pseudo-first-order kinetics; (B) pseudo-second-order kinetics.

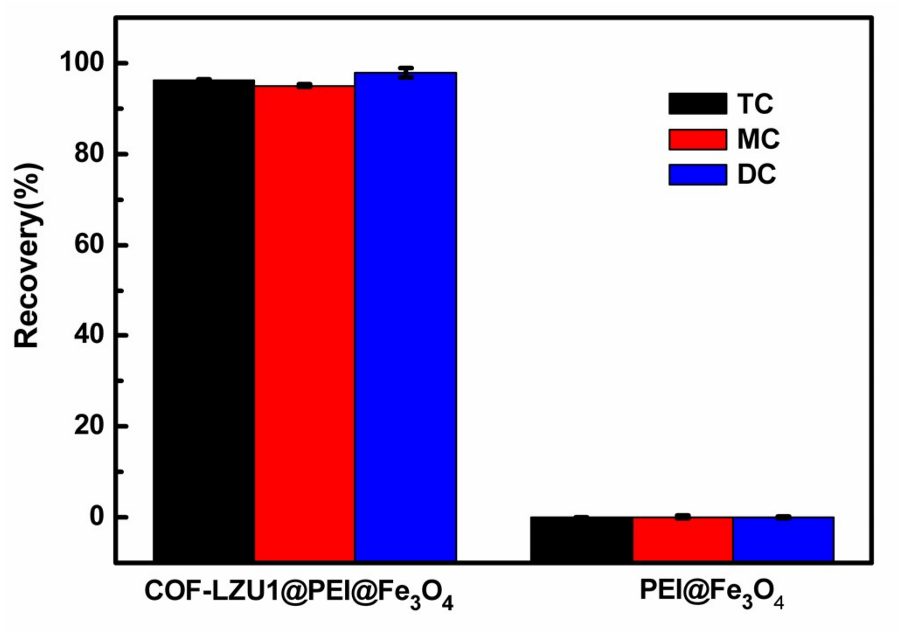

Fig. S6 COF-LZU1@PEI@Fe_3O_4 and PEI@Fe_3O_4 performance comparison.

Table S1 Inter-batch precision of COF-LZU1@PEI@Fe_3O_4

Analytes	Recovery(%)			RSD(%)
	1	2	3	
TC	94.6	96.9	95.8	1.2
MC	90.2	92.0	91.1	1.5
DC	97.6	94.1	96.2	1.9

Table S2 Experimental data of the thermodynamics studies of TCs on COF-LZU1@PEI@Fe_3O_4 (303 K).

	TC	MC	DC
C_e (mg mL^{-1})	1.49	0.88	1.04
	4.27	3.28	3.64
	9.01	7.92	8.33
	13.54	12.69	12.73
	18.25	17.39	17.48
	27.68	26.47	27.24
Q_e (mg g^{-1})	1.02	2.23	1.92
	1.45	3.44	2.72
	1.99	4.16	3.34
	2.93	4.63	4.53
	3.50	5.22	5.05
	4.64	7.06	5.51

Table S3 Parameters of adsorption isotherms for TCs on COF-LZU1@PEI@Fe_3O_4 (303 K).

Analytes	Q_e(mg g^{-1})	Langmuir			Freundlich		
		Q_{max}(mg g^{-1})	K_L(L mg^{-1})	R^2	K_F(mg g^{-1})	N	R^2
TC	4.64	6.44	0.71×10^{-1}	0.8339	0.74	1.91	0.9648
MC	7.06	7.44	2.09×10^{-1}	0.9242	2.29	3.25	0.9652
DC	5.51	6.29	2.17×10^{-1}	0.9721	1.82	2.96	0.9743

Table S4 Experimental data of the kinetics studies of TCs on COF-LZU1@PEI@Fe_3O_4 (303 K).

Time (min)	**Q_t (mg g^{-1})**		
	TC	**MC**	**DC**
0	0	0	0
30	2.00	4.14	3.02
60	2.92	4.39	3.00
90	3.28	4.93	3.37
180	3.51	5.50	3.98
240	3.88	6.38	4.71
360	4.10	6.83	5.02

Table S5 Parameters of adsorption kinetic for TCs on COF-LZU1@PEI@Fe_3O_4 (303 K) .

Analytes	Q_e (mg g $^{-1}$)	pseudo-first-order			pseudo-second-order		
		K_1(min^{-1})	Q_e,cal (mg g^{-1})	R^2	K_2 (g mg^{-1} min^{-1})	Q_e,cal (mg g^{-1})	R^2
TC	6.34	1.10×10^{-3}	3.84	0.7782	2.54×10^{-3}	5.26	0.9885
MC	12.83	1.40×10^{-3}	9.70	0.9563	0.54×10^{-3}	11.74	0.9714
DC	9.83	1.40×10^{-3}	7.60	0.9555	0.62×10^{-3}	9.12	0.9717

Table S6 Results of sample analysis for the determination of TCs.

	Added (μg L^{-1})	Shapan reservoir			Jinhua river			Qingxikou reservoir		
		Found (μg L^{-1})	Recovery (%)	RSD (%)	Found (μg L^{-1})	Recovery (%)	RSD (%)	Found (μg L^{-1})	Recovery (%)	RSD (%)
TC	0	--	--	--	--	--	--	--	--	--
	5	4.5	89.3	2.6	4.8	95.6	3.1	5.1	101.4	1,7
	10	9.9	98.6	0.9	9.8	98.4	0.6	10.0	100.2	1.4
	30	27.5	91.7	0.4	30.1	100.3	0.4	30.6	102.0	1.1
	50	48.0	96.0	3.9	43.5	87.0	5.1	44.1	88.2	1.7
	100	93.5	93.5	1.6	89.8	89.8	0.8	94.8	94.8	0.4
MC	0	--	--	--	--	--	--	--	--	--
	5	4.8	95.4	2.3	4.8	97.0	2.2	4.8	95.4	2.3
	10	9.6	96.4	1.1	10.8	108.2	1.4	9.9	98.9	4.6
	30	32.7	109.0	0.8	31.8	106.0	0.4	31.8	106.0	0.4
	50	56.9	113.8	1.5	49.1	98.2	1.7	53.3	106.6	1.6
	100	111.0	111.0	1.2	105.6	105.6	1.2	108.3	108.3	0.8
DC	0	--	--	--	--	--	--	--	--	--
	5	4.5	90.6	2.9	4.6	91.5	1.5	4.9	98.1	2.7
	10	8.7	86.8	2.2	9.6	96.4	1.3	9.7	97.3	1.3
	30	27.9	93.0	0.6	27.5	91.7	2.5	28.3	94.3	1.2
	50	49.3	98.6	1.2	47.3	94.6	4.9	47.7	95.4	3.7
	100	94.7	94.7	0.6	96.3	96.3	4.2	94.7	94.7	3.1