SUPPORTING INFORMATION

Highly efficient removal of Cr(VI) ions from wastewater by the pomegranate-like magnetic hybrid nano-adsorbent of polydopamine and Fe_3O_4 nanoparticles

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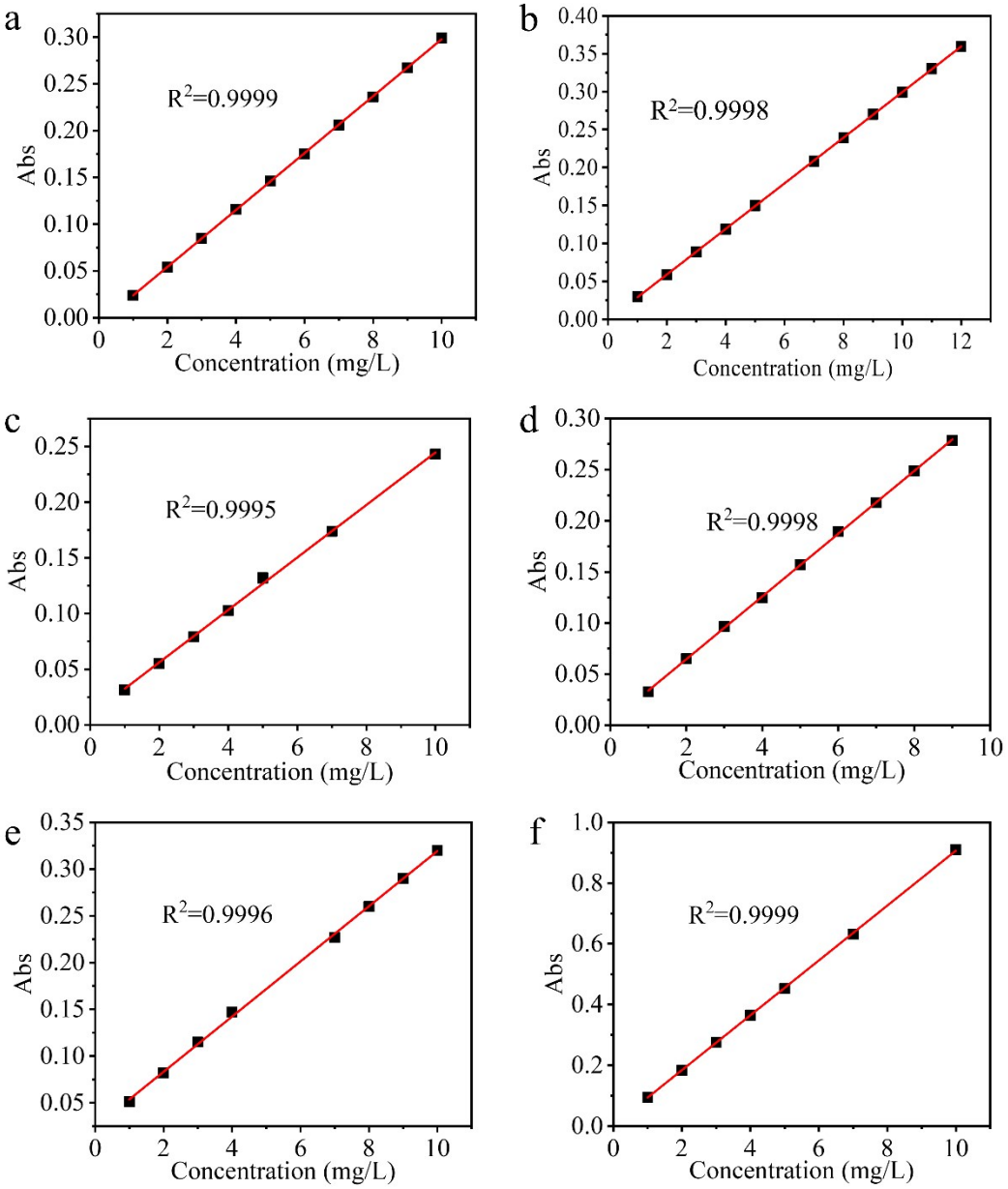


Fig. S1 The standard curve of Cr(VI) ions : (a) pH=2; (b) pH=3; (c) pH=5; (d) pH=7; (e) pH=9; (f) pH=10.

The equation obtained by curve fitting:

pH=2: A=0.0304C-0.0065 (1)

pH=3: A=0.0301C-0.0012 (2)

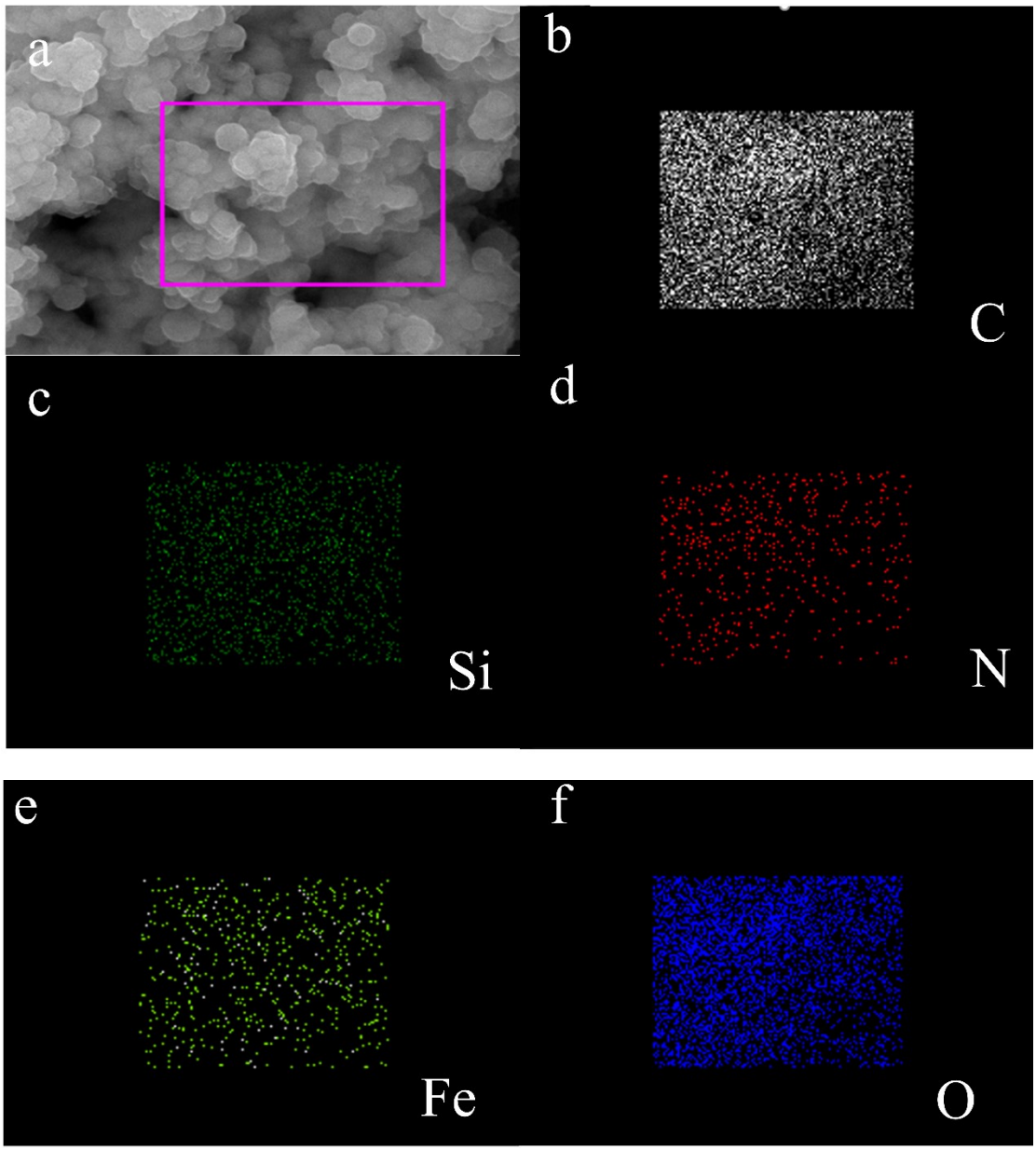
pH=5: A=0.0236C+0.0089 (3)

pH=7: A=0.0308C+0.0027 (4)

pH=9: A=0.0295C+0.0214 (5)

pH=10: A=0.0891C+0.0087 (6)

A is the absorbance of the solution, and C(mg/L) is the concentration of the solution.



Element	wt%	Atomic percent
C	34.88	55.96
N	4.08	5.61
O	19.61	23.61
Si	1.55	1.07
Fe	39.88	13.76
Amounts:	100.00	100.00

Fig. S2 Distribution of PHN nano-adsorbent elements: (a) SEM; (b) C; (c) Si; (d) N; (e) Fe; (f) O; (g) Element content and percentage.

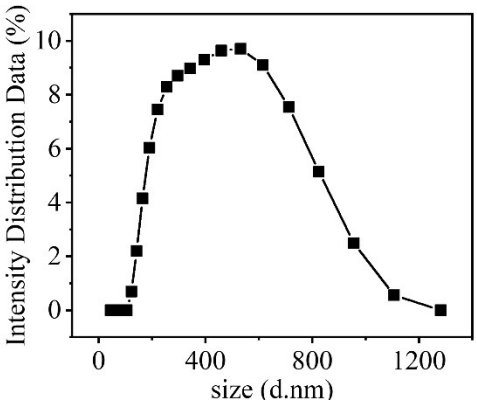


Fig. S3 Distribution of Fe_3O_4@PDA nano-adsorbents particle size strength.

Table S1 Fe_3O_4@PDA nano-adsorbents size test data.

T/℃	Z-Ave/d.nm	Pdl	Pk 1 Mean lnt	Pk 2 Mean lnt	Pk 3 Mean lnt	Pk 1 Area Int	Pk 2 Area Int	Pk 3 Area Int	Scattering Angle/ °
25	527.2	0.549	431	0	0	100	0	0	173

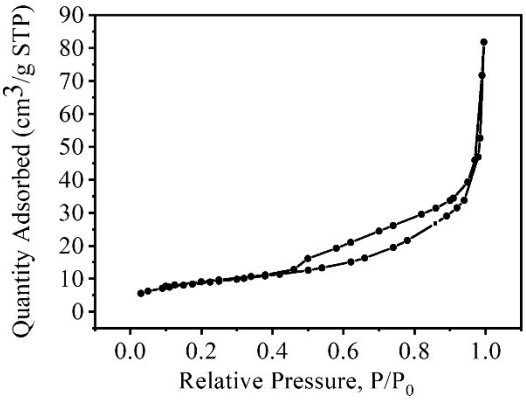


Fig. S4 Nitrogen adsorption–desorption isotherm obtained at 77 K for the Fe_3O_4@PDA nano-adsorbents.

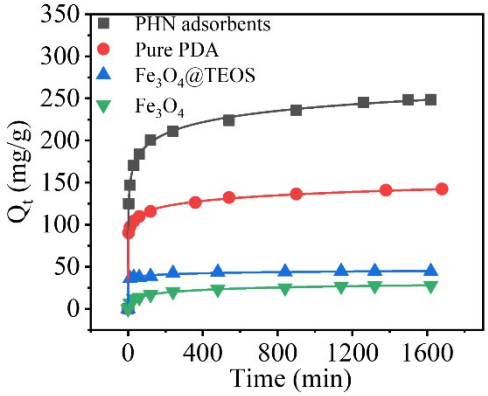


Fig. S5 Adsorption behaviors of Cr(Ⅵ) ions by PHA nano-adsorbent, pristine PDA, TEOS impregnated Fe_3O_4, and pure Fe_3O_4. (Condition: pH=3; Cr(Ⅵ) ions:100 mg/L; Adsorbent:200 mg/L)

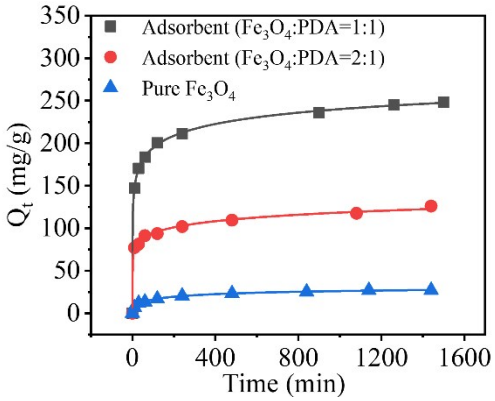


Fig. S6 Effect of different Fe_3O_4 nanoparticles content on adsorption of PHN nano-adsorbents to Cr(VI) (Condition: pH=3; Cr(Ⅵ) ions:100mg/L; Adsorbent:200mg/L)

Table S2 Comparison of Cr(VI) adsorption capacity using PHN nano-adsorbents with other reported adsorbents.

References	Adsorbent/mass	Cr(VI) concentration/ volume	pH value	Temperature	Time	Adsorption capacity (mg/g)	Matching adsorption model
[1]	PDA/PEI@RH/20mg	40mg/L, 20ml	pH=2	-	750	42.8	Langmuir
[2]	PDA/TiO_2/150mg	350mg/L, 40ml	pH=1.5	298K	1800	244.5	Langmuir
[3]	CNC@PDA/10mg	300mg/L, 20ml	pH=3	288K	400	205	Langmuir
[4]	Magnetic biochar (sugarcane bagasse)/100mg	100mg/L, 25ml	pH=4.63	303K	30	43.122	Freundlich
[5]	Polydopamine microsphere/500mg	15mg/L, 500ml	pH=6.2~6.8	333K	10	200.2	Langmuir
[6]	Fe_3O_4@SiO_2–FC/COOH nanohybrids/25mg	50mg/L, 50ml	pH=2	298K	10	228.395	Freundlich
[7]	Fe_3O_4-ZnAl-layered double hydroxide/TiO_2 composites/100mg	50mg/L, 100mL	pH=3	-	480	47.73	Langmuir
[8]	CL-PANI@ Fe_3O_4/30mg	102mg/L, 20mL	pH=2	298K	20	358.8	Langmuir
[9]	Fe_3O_4@C/10mg	100mg/L, 20mL	pH=5	-	400	156.56	Langmuir
[10]	Magnetic Hybrid Cu(I)-MOF@Fe_3O_4/30mg	50mg/L, 10mL	pH=7	298K	400	211.45	Langmuir
[11]	Amino functionalized	33mg/L,	pH=2±0.1	298K	50	123.4	Langmuir

	graphene oxide/Fe_3O_4 /4mg	20mL					
In this work	PHN nano-adsorbent/4mg	10mg/L, 20mL	pH=3	298K	10	454.55	Langmuir

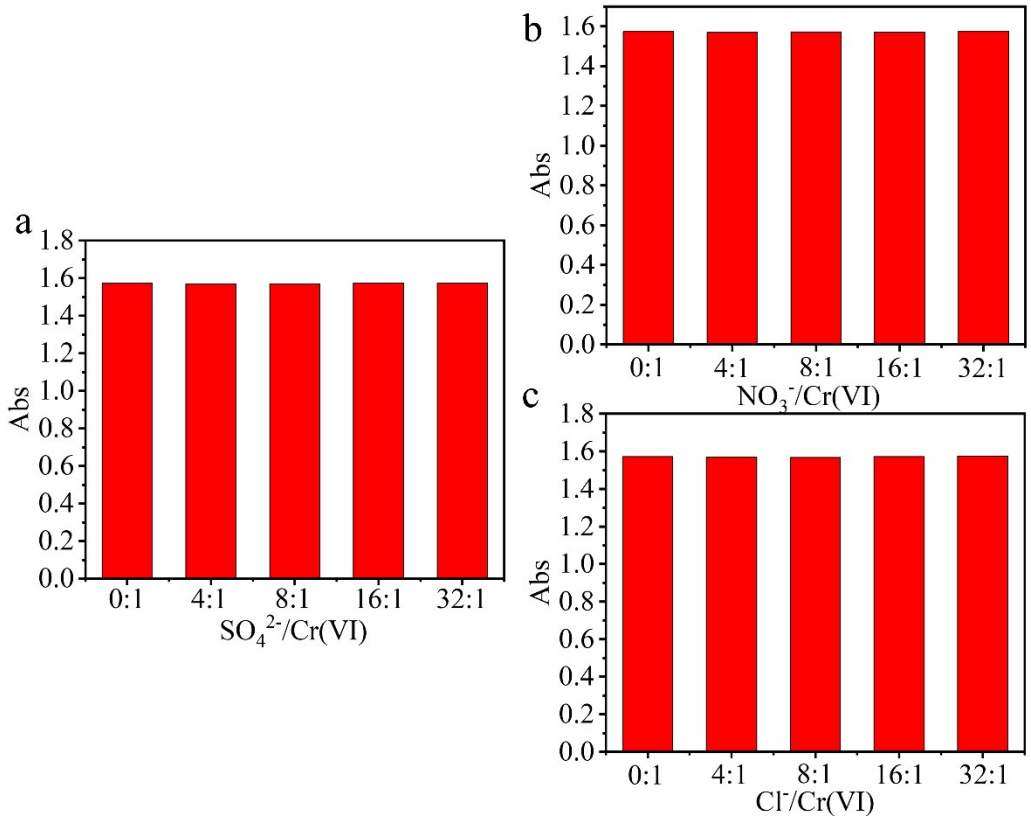


Fig. S7 The original absorbance of Cr(VI) in the presence of different ionic concentrations.(Cr(VI): 50mg/L)

Table S3 Components and content in wastewater

Composition	Content
pH	3.2
SO_4^{2-}	1200 mg/L
NO_3^-	840 mg/L
Cl^-	3100 mg/L
Cr(VI)	82 mg/L

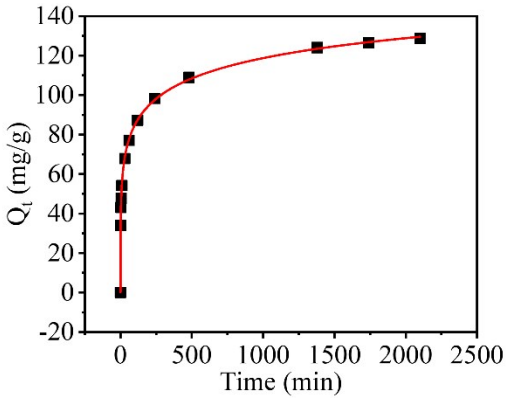


Fig. S8 Real wastewater adsorption test. (PHN nano-adsorbents: 0.5mg/L; Cr(Ⅵ): 80 mg/L.)

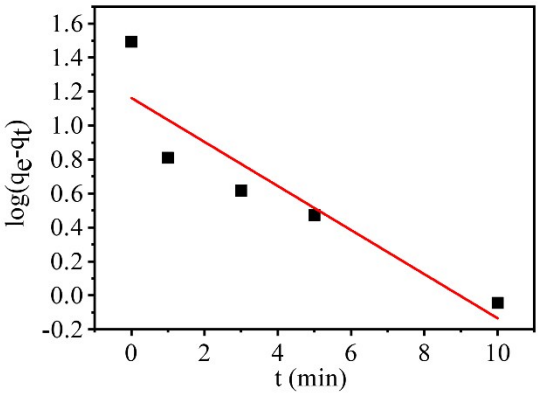


Fig. S9 The fitting result of the pseudo-first-order model.

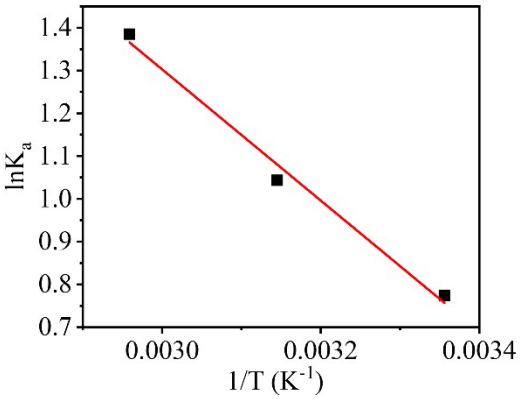


Fig. S10 The plots of lnK_a and 1/T.

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