
Electronic Supplementary Information

Investigation on the adsorption properties of Cr(VI) ions on a novel graphene oxide (GO) based composite adsorbent

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The method of determine the concentrations of total chromium and Cr(VI) ions

After the mixtures were filtered through a 0.2 µm pore size membrane, a moderate amount of the filtrate was moved to 25 mL colorimetric tube. The concentrations of Cr(VI) ions in aqueous samples were determined on a UV-7502 PC at 540 nm using diphenyl carbazide as the complexing agent. To measure total Cr concentration, the filtrate was firstly oil bath at 408 K by the addition of excess potassium permanganate prior to the 1,5-diphenylcarbazide reaction. **Fig. S1** shows the relationship between total chromium and Cr(VI) ions under different initial Cr(VI) ions concentration during adsorption.

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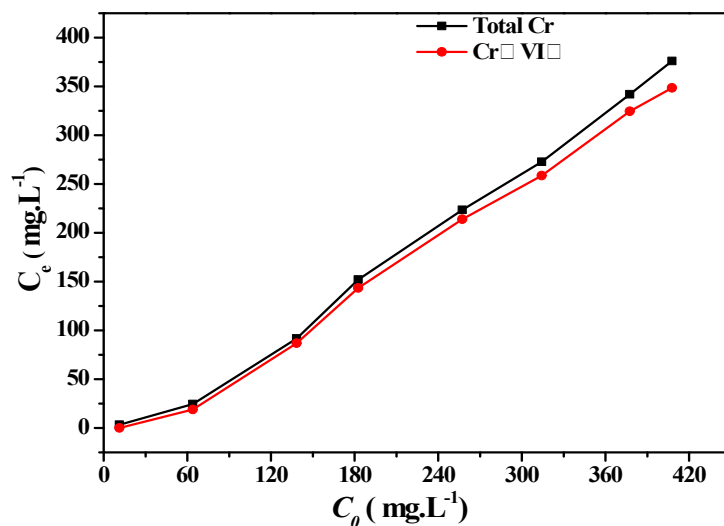


Fig. S1

Desorption performance of heavy metal ions and reusability

For desorption studies, 0.10 g PEI-GO was first contacted with 1000 mL 60 mg/L Cr(VI) for enough time at 298 K under the same procedure mentioned above. After being filtered through a 0.2 μm membrane, the preloaded-Cr PEI-GO adsorbents were immersed into 100 mL 0.1 M NaOH solution at 298 K, with a shaking speed of 120rpm for 1 h. Before the second adsorption, the adsorbents were treated by 0.1 M HCl solution. The above procedure was repeated for 5 times to test the reusability of the adsorbent.

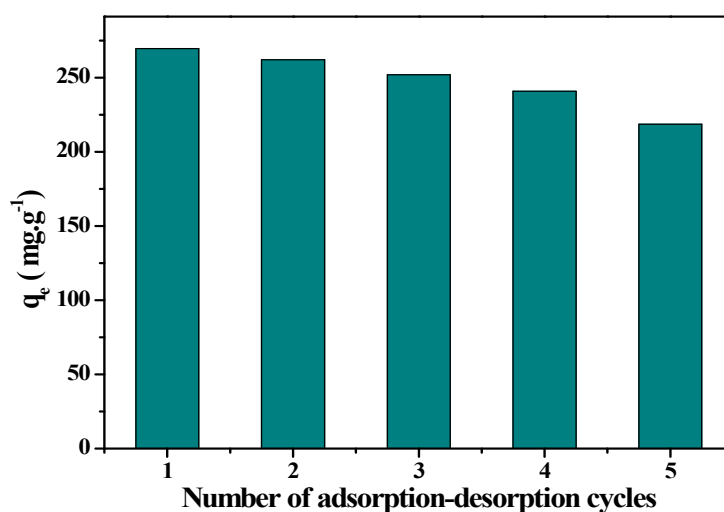


Fig. S2

Just as **Fig. S2** indicated that the total adsorption capacity of the 4PEI-GO for Cr(VI) ions after five cycles decreased from 269.6 to 218.5 mg.L⁻¹, the Cr(VI) adsorption capacity still remained by 81% after 5 times usage. The adsorption-desorption results indicated that the prepared 4PEI-GO could be an ideal heavy metal adsorbent.

Statistical analysis

The regression equation of the working curve using diphenyl carbazide as the complexing agent to determine the total concentrations of chromium and Cr(VI) ions in aqueous samples and the linear range, R (correlation coefficient), LD (the limit of detection: calculated by $3S_b/k$, which referred to the quotient between three of the blank reagent's standard deviation and the slope of the working curve, n=11) and the limit of quantification (LOQ, calculated by $10S_b/k$, n=11) are listed in **Table S1**. The percentage recovery of spiked samples was also studied as shown in **Table S2**

Table S1

Regression equation	Linear range (mg.L ⁻¹)	LD (mg.L ⁻¹)	R	LOQ (mg.L ⁻¹)	S _b
A=0.7153C+0.0095	0.005-5.0	2.19x10 ⁻³	0.9974	7.30x10 ⁻³	5.222x10 ⁻⁴

Table S2

Samples	Average found (mg.L ⁻¹)	Cr(VI) spiked (mg.L ⁻¹)	Cr(VI) Found (mg.L ⁻¹)	Recovery (%)	R.S.D. (%)
A	—	2.0	1.95	97.5	2.6
B	—	3.0	3.04	101.3	2.1
C	—	4.0	4.10	102.5	1.9

Scheme 1. Synthesis and chemical structure of PEI-GO composites

