

Here within enclosed is our paper for consideration to be published on "New Journal of Chemistry". The further information about the paper is in the following:

The Title: Adsorption property of Cr(VI) on magnetic mesoporous titanium dioxide-graphene oxide core-shell microspheres

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The supporting information in the following:

Desorption and reuse after desorption experiments

For the regeneration, 0.10g $\text{Fe}_3\text{O}_4@\text{mTiO}_2@\text{GO}$ was loaded with Cr(VI) using 100 mL (100 mg/L) metal ion solution at 30°C, pH 2.0 and contact time of 40 min. The Cr(VI)-adsorbed $\text{Fe}_3\text{O}_4@\text{mTiO}_2@\text{GO}$ were immersed in 5 mL of NaOH solution (0.1 mol.L⁻¹) for 5 h and then washed six times with DI water to remove adsorbed alkali, and analyzed the concentration of Cr(VI) metal ions desorbed into the solution by atom absorption spectrometry, then calculate the adsorption capacity of $\text{Fe}_3\text{O}_4@\text{mTiO}_2@\text{GO}$. For one cycle, desorption time was about 6h, and the adsorption time was about 1h. To test the reusability the adsorbent, the $\text{Fe}_3\text{O}_4@\text{mTiO}_2@\text{GO}$ after desorption was reused in adsorption experiments and the process was repeated for ten times.

Practical application

In order to study the effect of the adsorbent in practical application, we taking samples from electroplate factory, and analyzed the concentration of Cr(VI) metal ions in the solution by atomic absorption spectrometry. Then 0.10g $\text{Fe}_3\text{O}_4@\text{mTiO}_2@\text{GO}$ were added to 100 mL of the above Cr(VI) (40 mg L⁻¹) solution under mechanical agitation at 30 °C, pH 2.0 and contact time of 40 min. After the adsorption processes, $\text{Fe}_3\text{O}_4@\text{mTiO}_2@\text{GO}$ was conveniently separated by magnetic separation and the supernatant was immediately analyzed by atomic absorption spectrometry.

Table S1. Parameters for pseudo-first and second order kinetic models.

Models	Rate constant	q_e	R^2
pseudo-first order	$K_1(\text{min}^{-1})$ 0.028	29.31	0.7622
pseudo-second order	$K_2(\text{g.mg.min}^{-1})$ 0.0048	67.0241	0.999

Table S2. Parameters for Langmuir and Freundlich isotherm model

T(K)	Langmuir			Freundlich		
	$q_m(\text{mg.g}^{-1})$	$K_L(\text{L/mg})$	R^2	$K_F(\text{mg}^{1-n}.\text{L}^n/\text{g})$	n	R^2
303	-122.85	-0.0062	0.8016	0.3143	0.753	0.9955

Table S3. The adsorbing capacity of competing/counter ions

Metal ions	Adsorption capacity(mg.g^{-1})	pH	T (K)
chromium	117.94	2.0	303
cobalt	58.22	9.0	303
lead	51.28	5.0	303
zinc	30.32	5.0	303

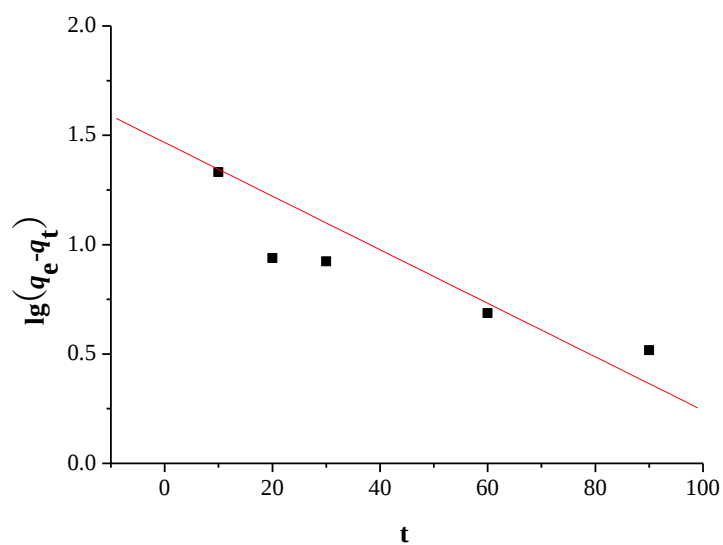


Fig.S1. The pseudo-first order model. The initial Cr(VI) ion concentrations were 60 mg.L^{-1} . The concentration of $\text{Fe}_3\text{O}_4@\text{mTiO}_2@\text{GO}$ was 1.0 g. L^{-1} . The $\text{pH}=2.0$. The temperature was 303K.

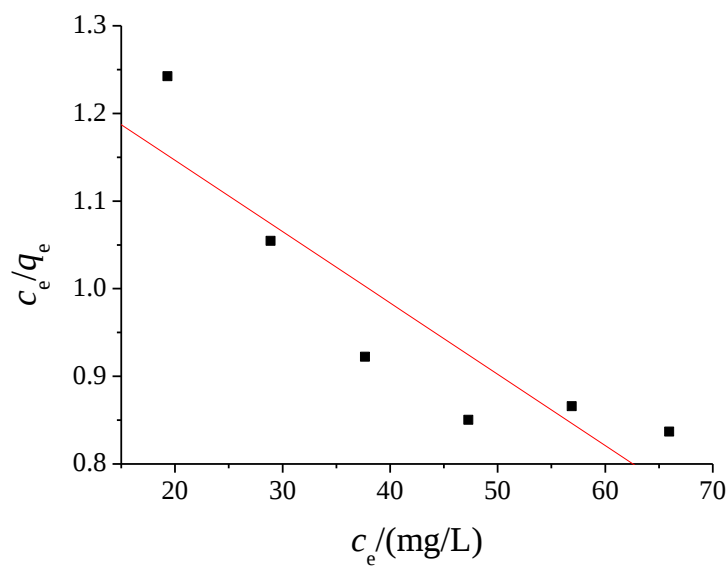


Fig.S2. The Langmuir isotherm model. The concentration of $\text{Fe}_3\text{O}_4@\text{mTiO}_2@\text{GO}$ was 1.0 g. L^{-1} . The contact time was 40 min. The $\text{pH}=2.0$. The temperature was 303K.