Electronic Supplementary Material (ESI) for RSC Advances.

Iminodiacetic Acid Functionalized Magnetic Nanoparticles for Speciation of Cr (III) and Cr (VI) Followed by Graphite Furnace Atomic Absorption Spectrometry Detection

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Electronic supplementary information

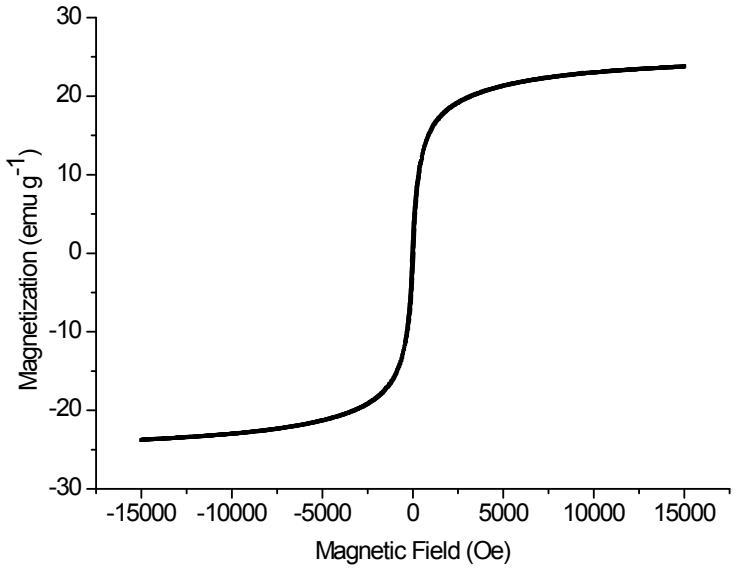

Fig. S1 Magnetic hysteresis loop of Fe_3O_4@SiO_2@IDA.

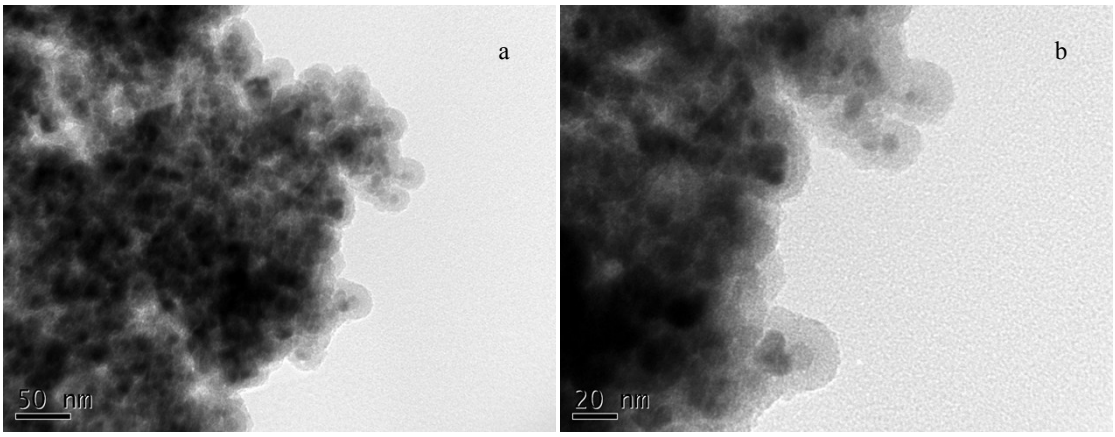

Fig. S2 TEM images of Fe_3O_4@SiO_2@IDA (Magnifications: 300000 x(a), 500000 x(b)).

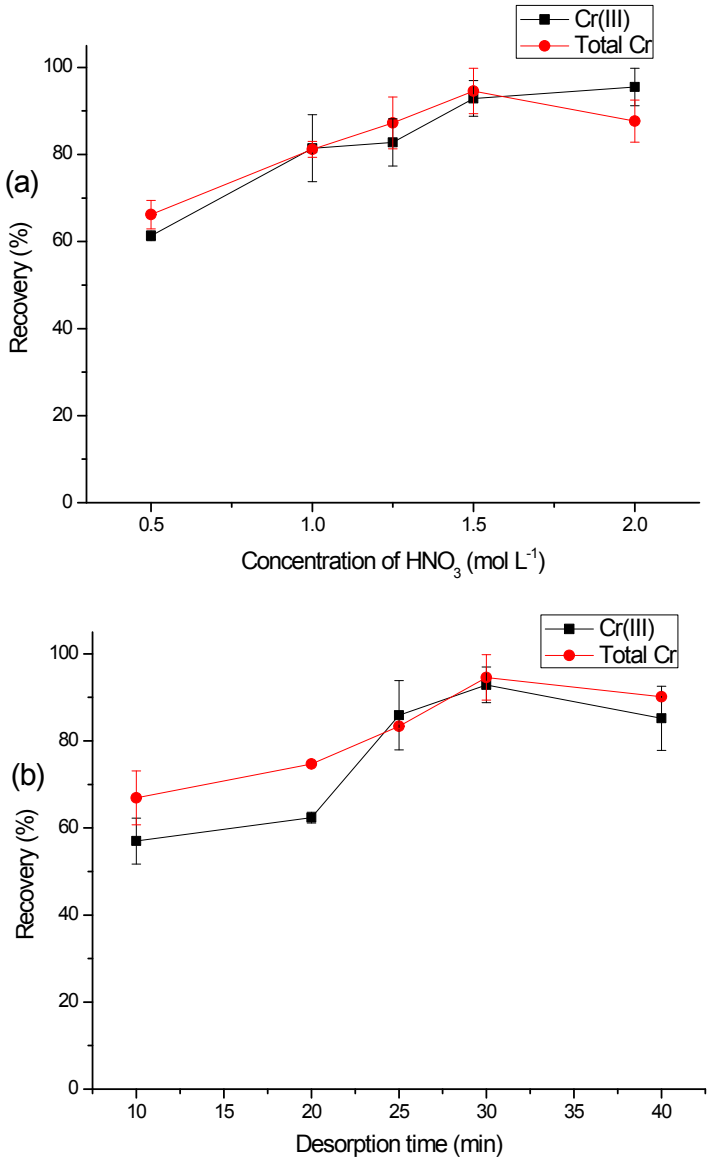

Fig. S3 Optimization of desorption conditions. Conditions: materials, 10 mg; sample volume, 0.5 mL; concentration, 10 μg·L^{-1}; pH, 5(Cr(III)), 3(total Cr); ultrasound extraction time, 20 min. (a) Effect of HNO_3 concentration: desorption volume, 0.5 mL; desorption time, 30 min. (b) Effect of desorption time: desorption reagent, 1.5 mol·L^{-1} HNO_3; desorption volume, 0.5 mL. Error bars show the standard deviation (n= 3).

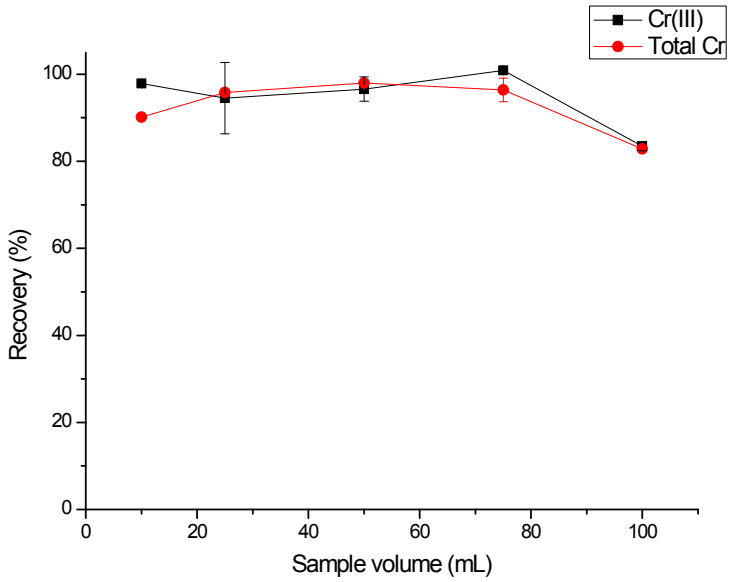

Fig. S4 Effect of sample volume on the recovery of Cr(III) and total Cr. Conditions: materials, 10 mg; mass of metal ion, 5 ng; pH, 5(Cr(III)), 3(total Cr); ultrasound extraction time, 20 min; desorption reagent, 1.5 mol L^{-1} HNO_3; desorption volume, 0.5 mL; ultrasound desorption time, 30 min. Error bars show the standard deviation (n= 3).

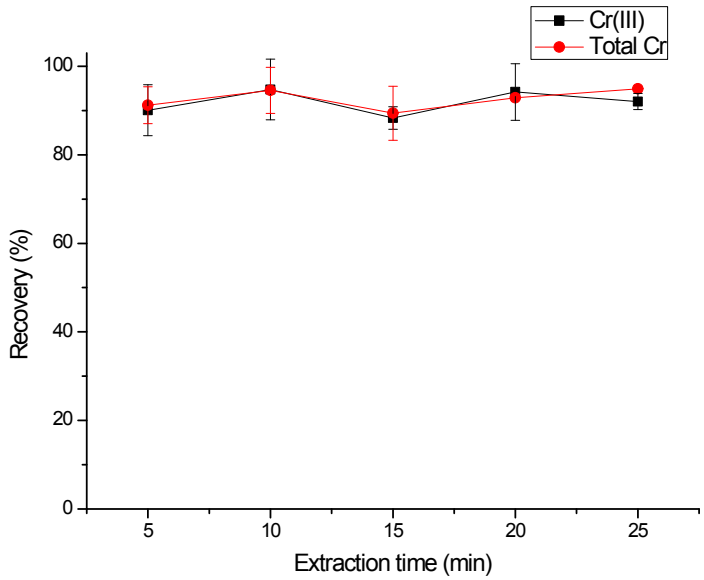

Fig. S5 Effect of extraction time on the recovery of Cr(III) and total Cr. Conditions: materials, 10 mg; sample volume, 50 mL; concentration, 0.1 μg L^{-1}; pH, 5(Cr(III)), 3(total Cr); desorption reagent, 1.5 mol L^{-1} HNO_3; desorption volume, 0.5 mL; ultrasound desorption time, 30 min. Error bars show the standard deviation (n= 3).

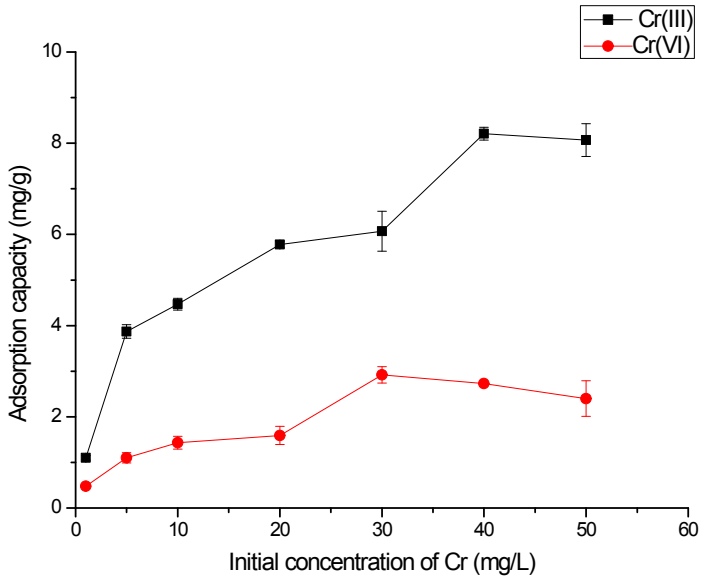

Fig.S6 Adsorption capacity of Cr(III) and Cr(VI) on Fe_3O_4@SiO_2@IDA. Conditions: sample volume, 10 mL; pH, 5(Cr(III)), 3(Cr(VI)); ultrasound adsorption time, 10 min; materials, 10 mg. Error bars show the standard deviation (n= 3).

Table S1 Optimized operating conditions for GFAAS

Graphite Furnace				
Lamp current	7.5 mA			
Wavelength	359.3 nm			
Spectral bandpass	1.3 nm			
Cuvette type	Pyto Tube HR			
Carrier gas(Atomization)	30 mL/min			
Sample volume	20 μL			
Temperature program				
Stage	Temperature(℃)		Time(s)	
	Start	End	Ramp	Hold
1. Drying	80	140	40	
2. Ashing	700	700	20	
3. Atomization	2600	2600		5
4. Cleaning	2700	2700		4