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Supplementary Information

Adsorption-Reduction Synergistic Effect of Mesoporous Fe/SiO_2-NH_2 Hollow Sphere for Removal of Cr(VI) ions

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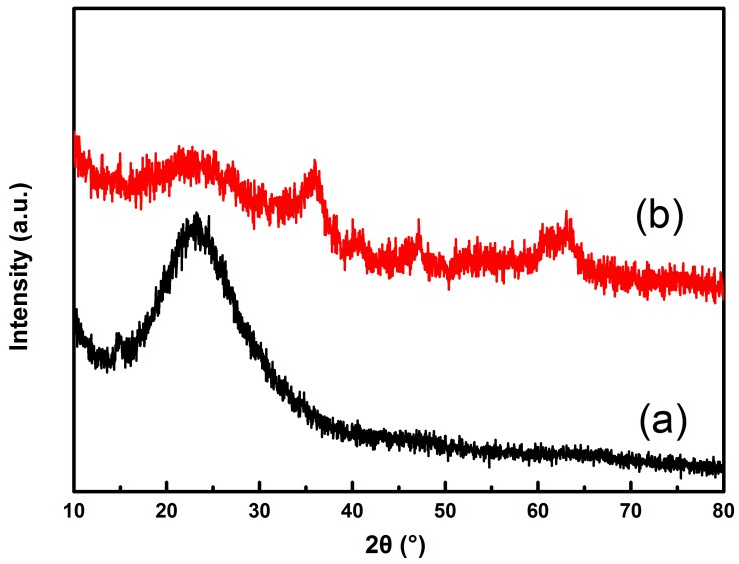

Fig. S1 XRD patterns of (a) silica colloidal spheres and (b) ISHSs.

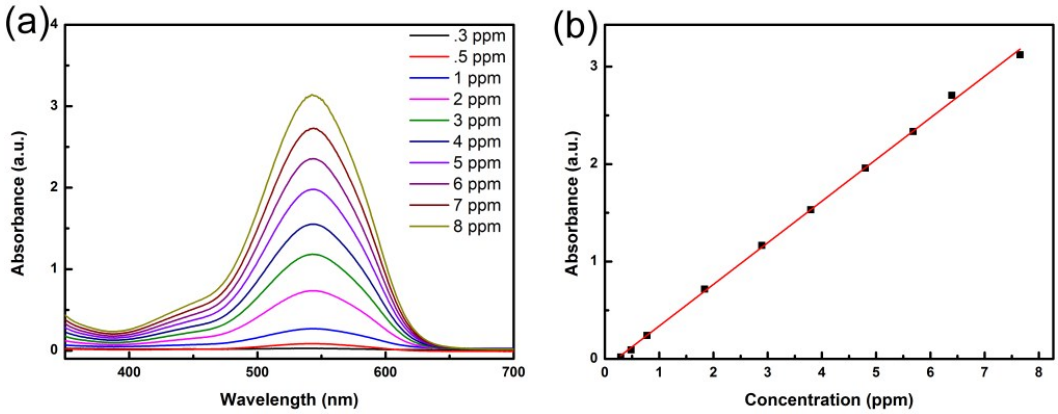

Fig. S2 (a) UV-Vis spectra of standard Cr(VI) solutions with different concentration; (b) linear relationship between Cr(VI) concentration and UV-Vis absorption.

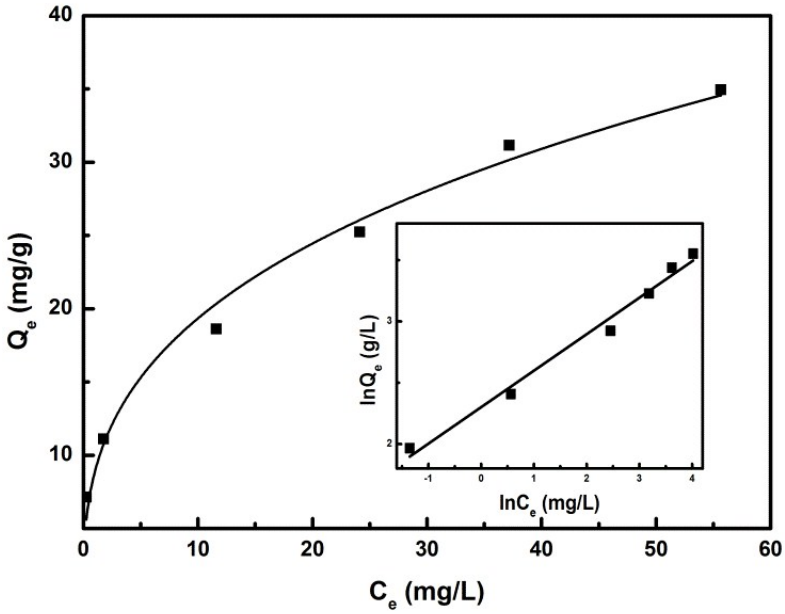

Fig. S3 Adsorption isotherm of Cr(VI) ions on Fe/SiO_2-NH_2 HSs at room temperature.

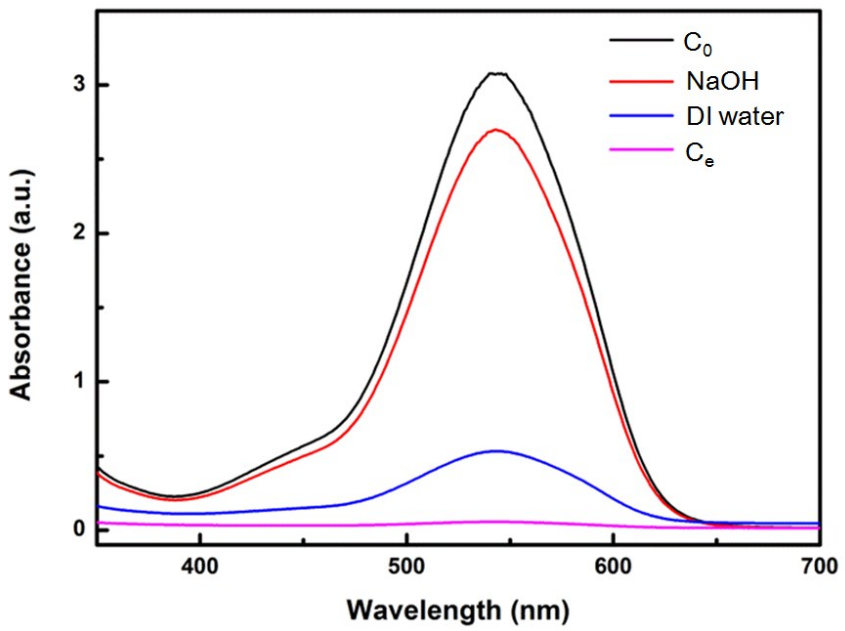

Fig. S4 UV-Vis spectra of the eluted solutions with deionized (DI) water and NaOH solution. C_0: initial concentration; C_e: equilibrium concentration

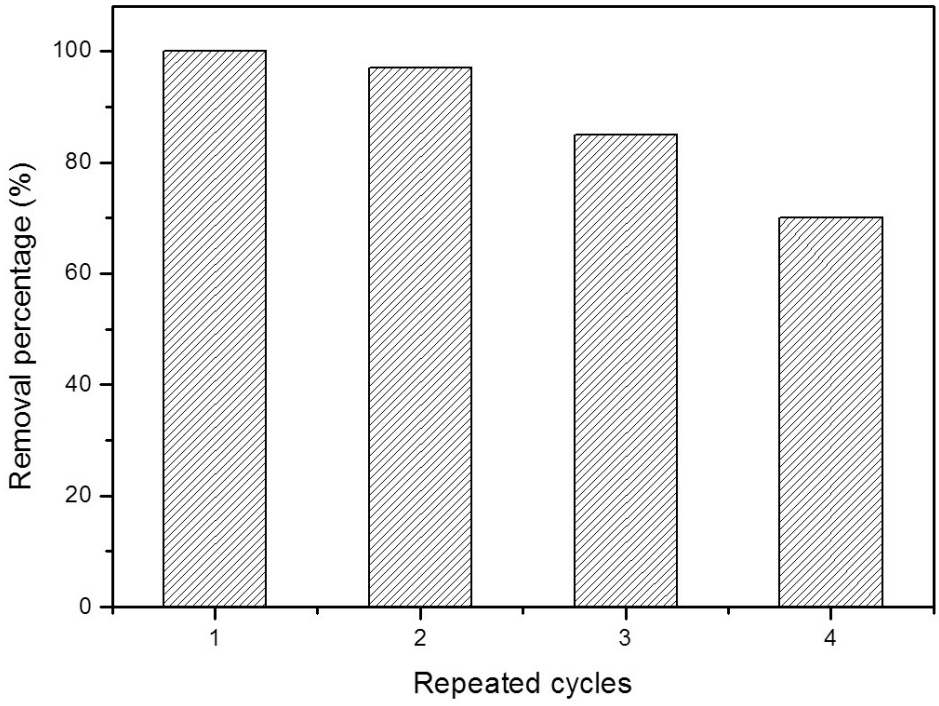

Fig. S5 Adsorbent recyclable of Cr(VI) ions on Fe/SiO_2-NH_2 HSs after four cycles.

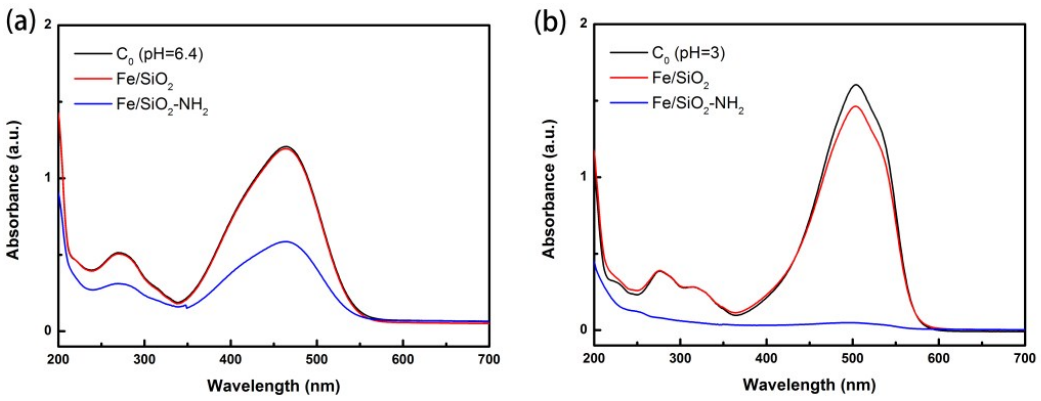

Fig. S6 UV-Vis spectra of MO solutions after being treated by Fe/SiO_2 HSs and Fe/SiO_2-NH_2 HSs at (a) pH = 6.4 and (b) pH = 3. The initial concentration of MO was 20 mg L^{-1}.

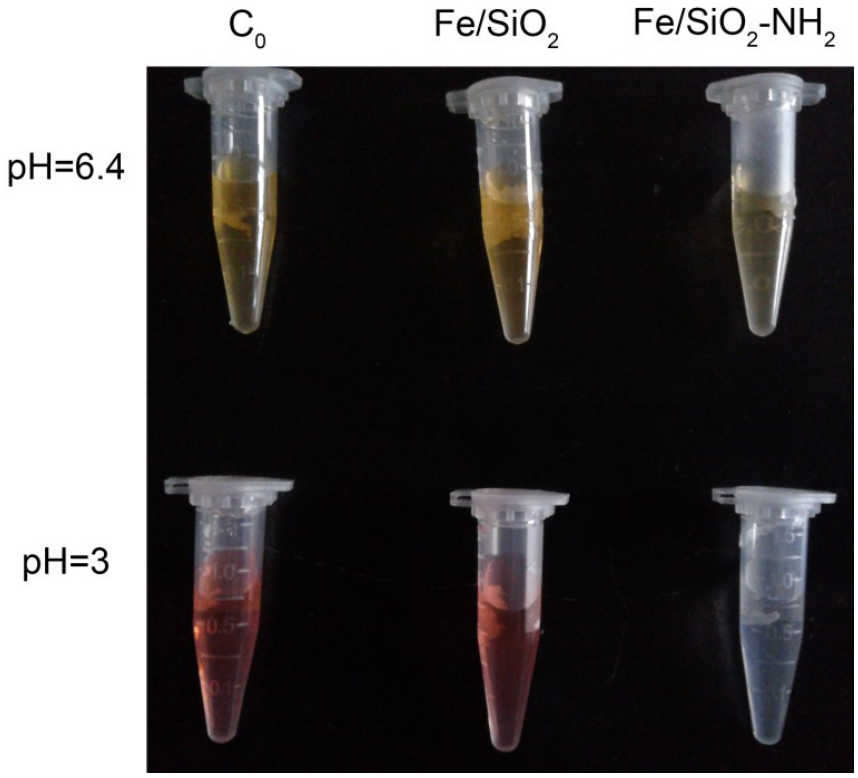

Fig. S7 The digital camera image of MO solutions after being treated by Fe/SiO_2 HSs and Fe/SiO_2-NH_2 HSs.

Table S1 Parameters for Langmuir and Freundlich Models of Cr(VI) adsorption on Fe/SiO_2-NH_2 HSs.

models	equations	parameters		R^2
Langmuir	$Q_e = \frac{bQ_mC_e}{1+bC_e}$	Q_m(mg·g^{-1})	b	0.836
		37.62	0.116	
Freundlich	$Q_e = K_f C_e^{\frac{1}{n}}$	K_f	n	0.985
		8.87	2.95	

Table **S2** The maximal removal capacities (q_m) of various adsorbents used for Cr(VI) removal

Classification	Adsorbents	q_m (mg·g^{-1})	References
Large size ZVI	Micron Fe	19.2	41
	Scrap iron	1.75	42
nZVI	Bentonite supported nZVI	16.67	43
	Resin supported nZVI	43.1	44
	Bentonite-supported nZVI	7.3	45
	Resin-supported nZVI	28	46
	Entrapment of nZVI in chitosan beads	4	47
	Silica fume supported-nZVI	88	48
	Porous carbon-encapsulated iron	10.07	49
	Fluidized nZVI	10.19	50
	Iron-doped aerogels	55	51
	NZVI/AC	17.4	52
	nZVI/K-MMT	8.95	53
Iron oxide	Magnetic iron-nickel oxide	30	54
	γ-Fe_2O_3–δ-FeOOH	25.8	55
This work	Fe/SiO_2-NH_2 HSs	37.62	This work

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