Supporting Information

Facile solid-state synthesis of Fe/FeOOH hierarchical nanostructures assembled by ultrathin nanosheets and their application in water treatment

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Table S1 The mass loss[a] of Fe/FeOOH after each cycle for the removal of CR or Cr(VI).

Cycle number	1	2	3	4	5	6	7	8	9
Removal of CR	13.27%	10.46%	8.71%	10.23%	8.52%	17.06%	5.75%	6.35%	6.35%
Removal of Cr(VI)	20.01%	17.23%	14.96%	5.91%	13.78%	9.65%	/	/	/

[a] Mass loss = [lost mass/initial mass]×100%

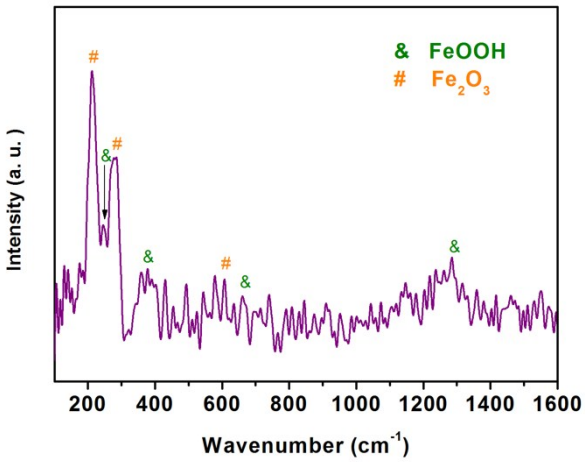

Fig. S1 Raman spectrum of the obtained hierarchical nanostructures.

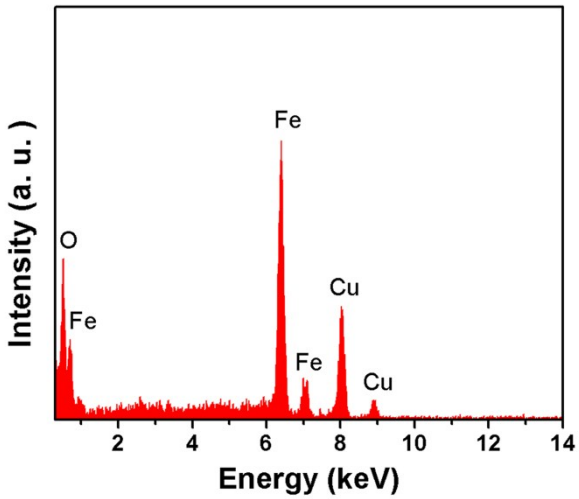

Fig. S2 EDS pattern of the obtained hierarchical nanostructures.

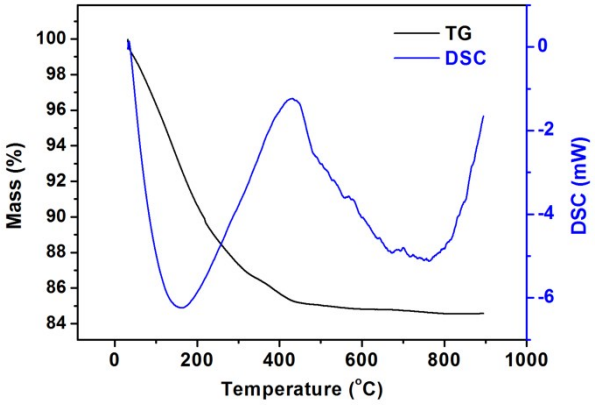

Fig. S3 TGA and DSC curves of the obtained hierarchical nanostructures.

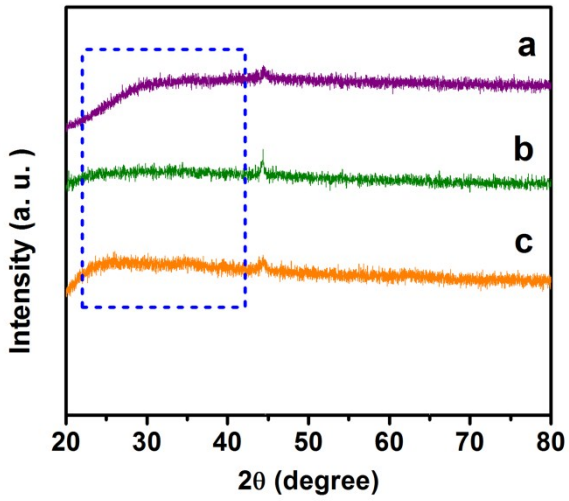

Fig. S4 XRD patterns of the samples obtained at different drying time: (a) 0.5 h; (b) 8 h; (c) 12 h.

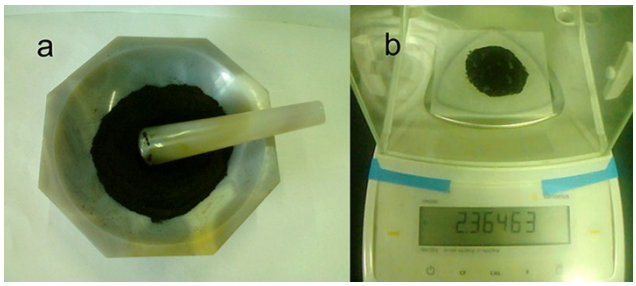

Fig. S5 (a) Photo of the Fe-HNs prepared by the solid-state rout; (b) photo of the Fe-HNs prepared by a large-scale synthesis.

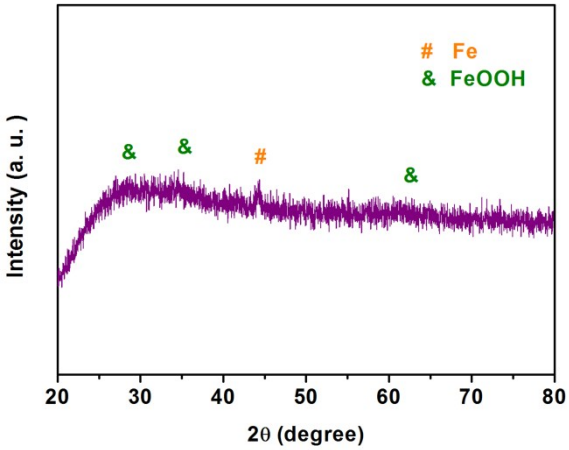

Fig. S6 XRD pattern of Fe-HNs stored in air for one week.

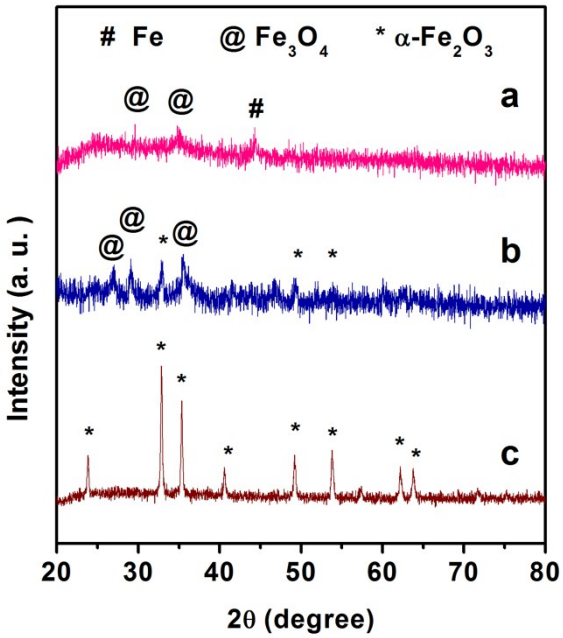

Fig. S7 XRD patterns of the samples obtained by heating treatment of Fe-HNs in air with different temperature: (a) 200°C; (b) 400°C; (c) 600°C.

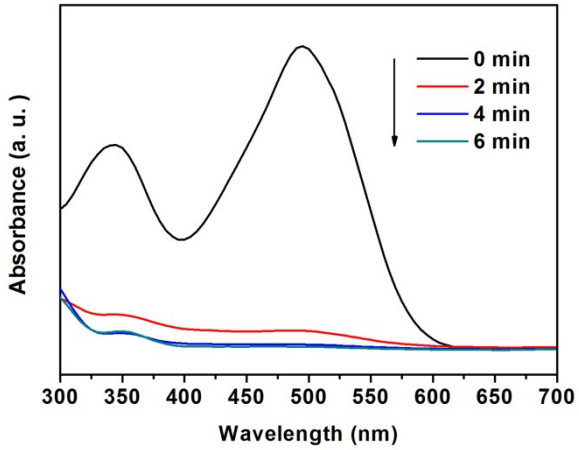

Fig. S8 UV-vis absorption spectra of CR solution in the presence of Fe-HNs along with the duration.

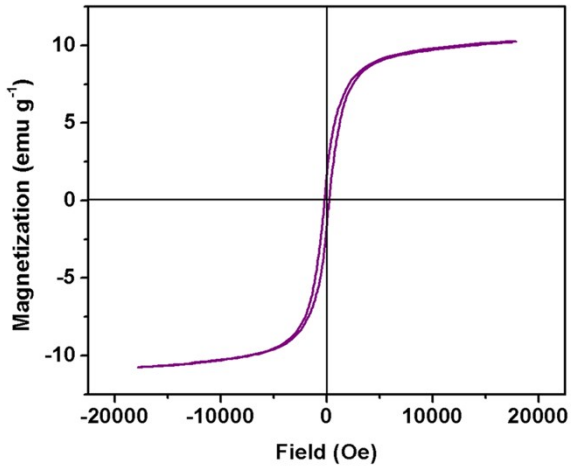

Fig. S9 Room temperature hysteresis loops of the Fe-HNs.

Table S2 Summary of CR maximum adsorption capacities (q_m) on various adsorbents.

Type of adsorbent	q_m (mg g^{-1})	Reference
Fe/FeOOH hierarchical nanostructures	167.8	Present study
Urchin-like α-FeOOH hollow spheres	275	[1]
α-FeOOH hierarchical nanostructures	239	[2]
α-Fe_2O_3 hierarchical nanostructures	66	[2]
Multishelled Co_3O_4-Fe_3O_4 hollow spheres	125	[3]
Mesoporous CeO_2 hollow spheres	84	[4]
Hierarchical Fe_3O_4 nanochain assemblies	67	[5]
MnO_2 hierarchical hollow nanostructures	60	[6]
α-FeOOH hierarchical nanostructures	56.3	[7]
γ-Fe_2O_3 hierarchical nanostructures	58.2	[7]
Mesoporous Fe_2O_3	53	[8]
Hollow Zn-Fe_2O_4 nanospheres	16.1	[9]

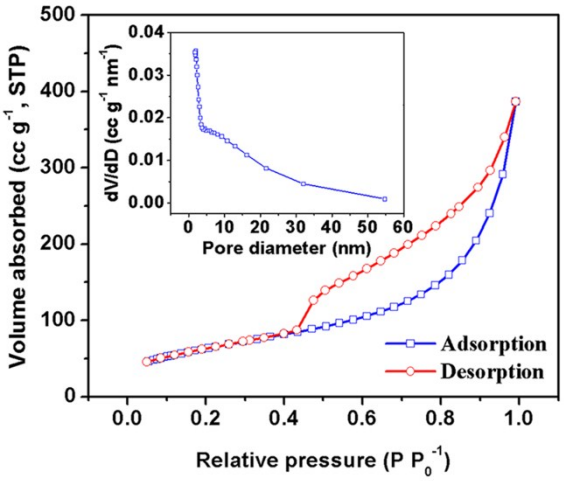

Fig. S10 Nitrogen adsorption-desorption isotherm of the Fe-HNs, inset: pore size distribution of the Fe-HNs.

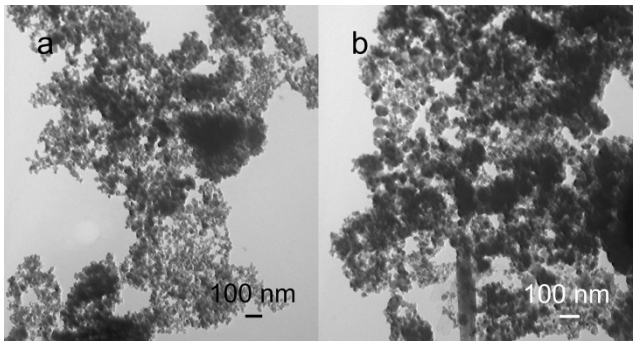

Fig. S11 Typical TEM images of the Fe-HNs after cycles in adsorption of contaminants: (a) CR; (b) Cr(VI).

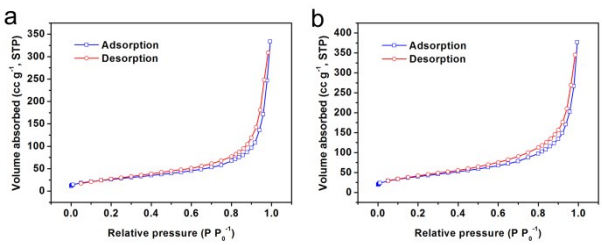

Fig. S12 Nitrogen adsorption-desorption isotherms of the Fe-HNs after cycles in adsorption of contaminants: (a) CR; (b) Cr(VI).

Table S3 Summary of Cr(VI) maximum adsorption capacities (q_m) on various adsorbents.

Type of adsorbent	q_m (mg g^{-1})	Reference
Fe/FeOOH hierarchical nanostructures	57.9	Present study
Hollow urchin-like α-FeOOH hierarchical structure	58.97	[10]
Flowerlike α-Fe_2O_3 nanostructures	30	[11]
Fe_3O_4 nanoparticles	11.2	[12]
Hierarchical spindle-like γ-Al_2O_3 materials	6.7	[13]
Flowerlike CeO_2 micro/nanocomposite structure	5.9	[14]
Flowerlike α-Fe_2O_3 nanostructures	5.4	[15]
ZnAl-layered double hydroxides hierarchical film	2	[16]

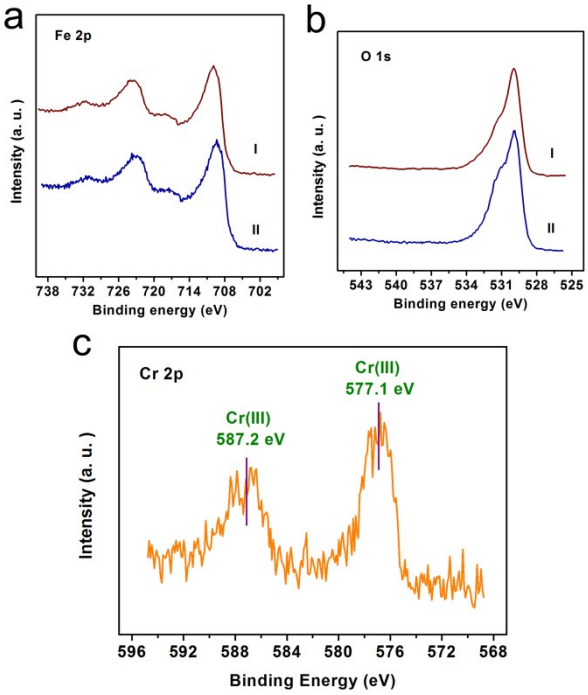

Fig. S13 XPS data of the Fe 2p region (a) and O 1s region (b) for Fe-HNs after cycles in adsorption of CR (I) and Cr(VI) (II); (c) XPS data of the Cr 2p region for Fe-HNs after cycles in adsorption of Cr(VI).

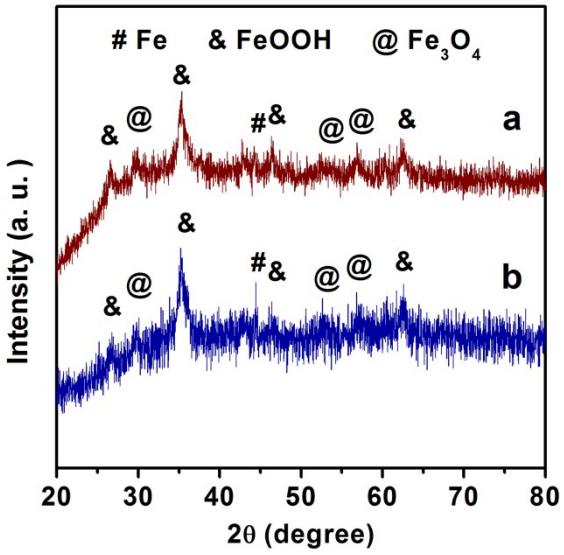

Fig. S14 XRD patterns of the Fe-HNs after cycles in adsorption of contaminants: (a) CR; (b) Cr(VI).

References

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