Electronic Supplementary Information

Well-dispersed magnetic iron oxide nanocrystals on sepiolites nanofibers for arsenic removal

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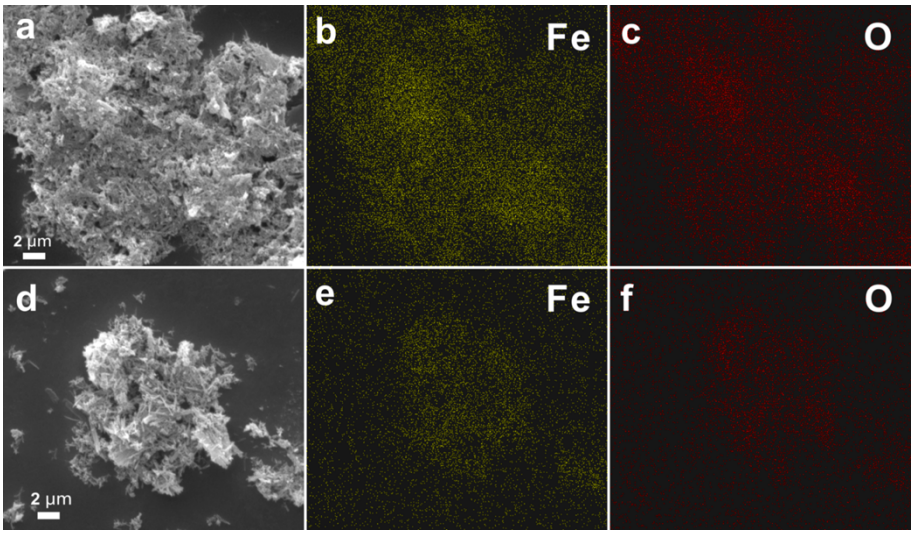

Fig. S1 SEM images of the MI/SEPs-250 (a) and MI/SEPs-500 (d), and corresponding elemental mappings of iron (b, e) and oxygen (c, f), suggesting the homogeneous dispersion of Fe and O in these MI/SEPs.

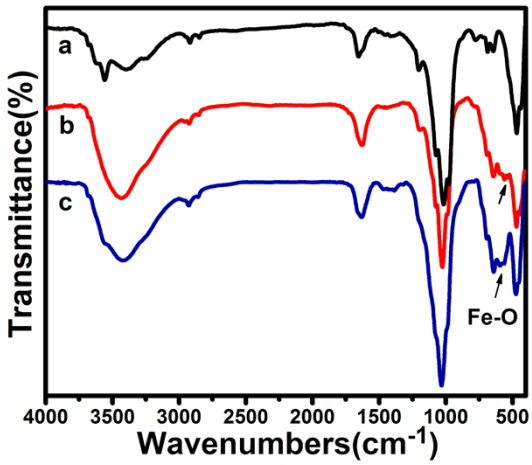

Fig. S2 FT-IR spectra of the pristine SEPs (a), MI/SEPs-250 (b), and MI/SEPs-500 (c).

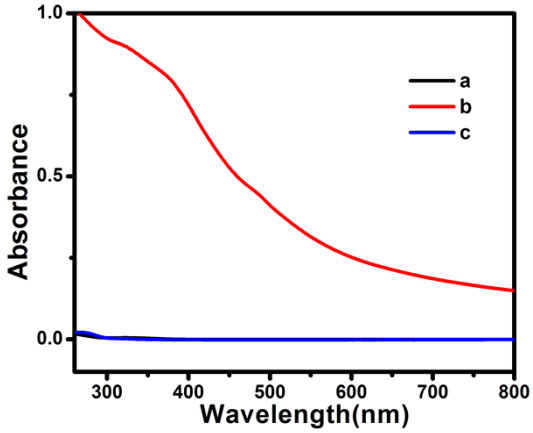

Fig. S3 UV-vis absorption spectra of As(III) solution (a), As(III) solution with dispersed MI/SEPs (b), and As(III) solution after magnetic separation (c).

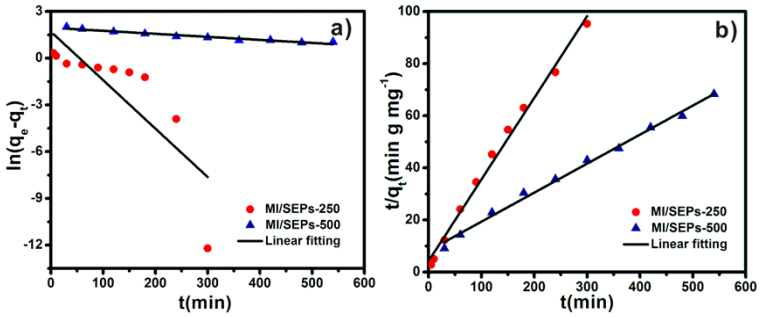

Fig. S4 Pseudo-first order kinetic (a) and pseudo-second order kinetic (b) adsorption curves of arsenic (III) on MI/SEPs. The initial concentration was 1 mg L^{-1}, the dosage of adsorbents was 0.5 g L^{-1}, and the initial pH values for the solutions were 7.0.

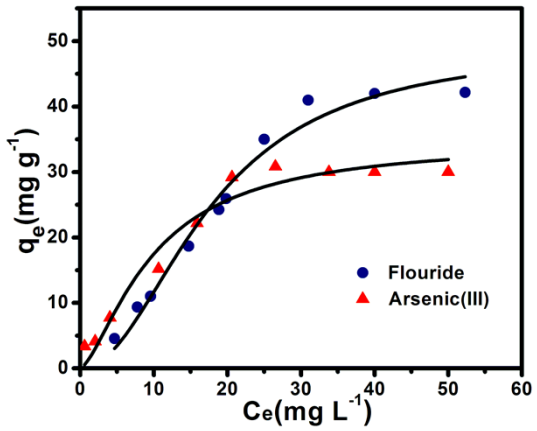

Fig. S5 Adsorption isotherms of arsenic (III) and fluoride on MI/SEPs-250.

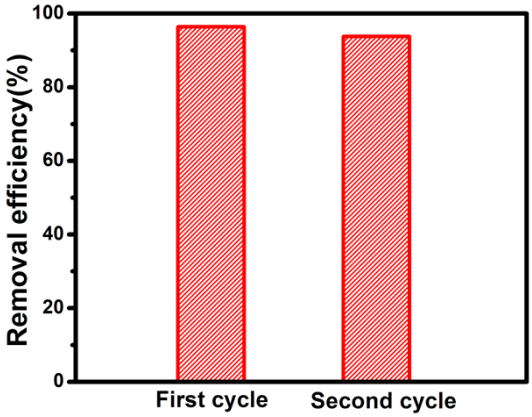

Fig. S6 The comparison of arsenic uptake of MI/SEPs in the first and second cycle.

Table S1 The specific surface area, pore size and pore volume of samples.

Samples	Surface area (m^2 g^{-1})	Pore size (nm)	Pore volume (cm^3 g^{-1})
SEPs	297.19	6.19	0.46
MI/SEPs-250	125.75	9.78	0.31
MI/SEPs-500	104.96	10.65	0.28

Table S2 Saturation Magnetization (**M_S**), Coercivity (**Hc**), Remanence (**M_R**) for MI/SEPs at 300K.

Samples	M_S (emu g^{-1})	M_R (emu g^{-1})	Hc (Oe)
MI/SEPs-250	31.95	0.40	5.65
MI/SEPs-500	29.53	0.24	4.58

Table S3 The calculated Langmuir and Freundlich isotherm parameters for arsenic adsorption on MI/SEPs.

Samples	Langmuir isotherm			Freundlich isotherm		
	q_m (mg g^{-1})	K_L (L mg^{-1})	R^2	K_F (mg g^{-1}) (L^3 mg^{-1})$^{-1/n}$	n	R^2
MI/SEPs-250	35.15	0.2126	0.9959	6.208	1.952	0.9656
MI/SEPs-500	50.35	0.1039	0.9984	5.080	1.597	0.9750

Table S4 Comparison of arsenic (III) adsorption capacities.

Adsorbents	Concentration(mg L^{-1})	Q_{max}(mg g^{-1})	Reference
γ-Fe_2O_3@Carbon	0-18	29.4	1
Graphene-CNT-γ-Fe_2O_3	0-10	6.4	2
Fe_3O_4-RGO	3-7	13.1	3
Iron oxide/CNTs	0-12	8.13	4
Cellulose@Fe_2O_3	0-30	23.16	5
MI/SEPs	0-50	50.35	This study

Table S5 The calculated kinetic parameters for arsenic adsorption on MI/SEPs.

Samples	$q_{e,exp}$	Pseudo-first order			Pseudo-second order		
	(mg g^{-1})	k_1 (min^{-1})	$q_{e,cal}$ (mg g^{-1})	R^2	k_2 (g mg^{-1} min^{-1})	$q_{e,cal}$ (mg g^{-1})	R^2
MI/SEPs-250	3.15	3.111×10^{-2}	5.474	0.6312	2.300×10^{-2}	3.192	0.9915
MI/SEPs-500	7.900	1.950×10^{-3}	7.053	0.9417	1.500×10^{-3}	8.979	0.9940

Table S6 Composition of real groundwater in Jianghan Plain, Hubei.

Composition	Concentration (μg L^{-1})
Chromium	73.14
Nickel	23.11
Copper	5.36
Plumbum	4.32
Arsenic	456.5
TOC (Total organic carbon)	3013.2
UV_{254}	0.05

Reference

1 Z. X. Wu, W. Li, P. A. Webley and D. Y. Zhao, *Adv. Mater.,* 2012, **24**, 485.

2 S. Vadahanambi, S. H. Lee, W. J. Kim and I. K. Oh, *Environ. Sci. Technol.* 2013, **47**, 10510.

3 V. Chandra, J. Park, Y. Chun, J. W. Lee, I. C. Hwang and K. S. Kim, *ACS Nano,* 2010, **4**, 3979.

4 J. Ma, Z. L. Zhu, B. Chen, M. X. Yang, H. M. Zhou, C. Li, F. Yu and J. H. Chen, *J. Mater. Chem. A,* 2013, **1**, 4662.

5 X. L. Yu, S. R. Tong, M. F. Ge, J. C. Zuo, C. Y. Cao and W. G. Song, *J. Mater. Chem. A,* 2013, **1**, 959.