Supplementary Information

Preparation and application of amorphous Fe-Ti bimetal oxides for arsenic removal

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Table S1 Fe:Ti molar ratio determined by classical chemical analysis

No.	Abbreviation	Molar ratio of Fe and Ti determined
1	S-Ti	0:1
2	BM-1	0.17:0.83
3	BM-2	0.45:0.55
4	BM-3	0.78:0.22
5	S-Fe	1:0

The compositions of the bimetal oxides were determined by classical chemical analysis. An amount of the oxide was treated with concentrated sulfuric acid solution and at 80 ºC. The oxide was dissolved to form Fe and Ti ions entered into the solution. The content of Fe and Ti was determined using an ICP-OES (700-ES, Varian). The molar ratios of Fe: Ti are shown in Table S1.

Table S2 Arsenic removal efficiency of bimetal oxides with different Fe:Ti molar ratios

Adsorbent		S-Ti	BM-1	BM-2	BM-3	S-Fe
Removal efficiency (%)	As(III)	75.3	89.8	93.4	96.5	86.8
	As(V)	26.6	65.1	80.1	74.1	70.2

Note: Adsorbent dosage, 0.25 g L^{-1}; initial arsenic concentration, 5.0 mg L^{-1}; background electrolyte, 0.05 mol L^{-1} NaCl; pH, 7.0±0.1.

Table S3 Freundlich and Langmuir isotherms parameters for As(III) and As(V) adsorption on BM-3

Model	Freundlich			Langmuir		
	k_d	n	R^2	k	b	R^2
As(III)	36.49	2.88	0.9950	0.44	111.37	0.9633
As(V)	13.42	4.06	0.9736	0.64	31.42	0.9690

Table S4 Composition of different types of water samples

	Surface water	Groundwater	Simulated water
pH	7.2±0.1	7.3±0.1	7.0±0.1
HCO_3^- (mg L^{-1})	112.2	173.1	–
Cl^- (mg L^{-1})	97.6	262.3	1775
SO_4^{2-} (mg L^{-1})	50.2	99.0	–
PO_4^{3-} (mg L^{-1} as P)	0.023	N.D.	–

Table S5 Arsenic removal efficiency with different types of water samples

	As(III) removal efficiency (%)	As(V) removal efficiency (%)
Surface water	86.63	51.79
Groundwater	88.68	54.07
Simulated water	89.05	55.00

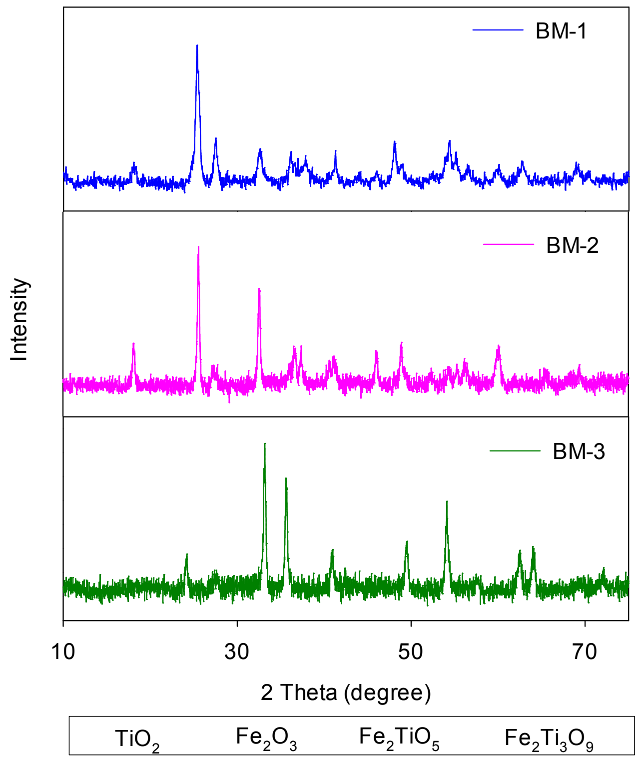


Fig. S1 XRD patterns of the bimetal oxides after heating at 600 ºC.

No sharp peaks appeared in the XRD of the synthesized bimetal oxides, thus the bimetal oxides were heated to 600 ºC. The XRD patterns of the heated bimetals are displayed in Fig. S1. According to XRD library, peaks at 25.3°, 27.4°, 37.8°, 41.2°, 48.0°, 53.9°,55.1°, and 62.7° are characteristic peaks of TiO_2; peaks at 18.1°, 25.5°, 32.5°, 36.6°, 37.3°, 46.0°, 48.8°, and 59.8°are characteristic peaks of Fe_2TiO_5; peaks at 32.1°, 36.2°, 41.3°, and 54.4° are characteristic peaks of $Fe_2Ti_3O_9$; peaks at 24.1°, 33.2°, 35.6°, 40.9°, 49.5°, 54.1°, 62.4° and 64.0° are characteristic peaks of Fe_2O_3. Based on the abundance of peaks, BM-1 is mainly comprised of TiO_2 with partial Fe_2TiO_5 and a little $Fe_2Ti_3O_9$; BM-2 mainly contains Fe_2TiO_5 with partial TiO_2 and a little $Fe_2Ti_3O_9$; BM-3 is mainly Fe_2O_3 with a little TiO_2. Without heating, all the oxides appeared in the amorphous form.

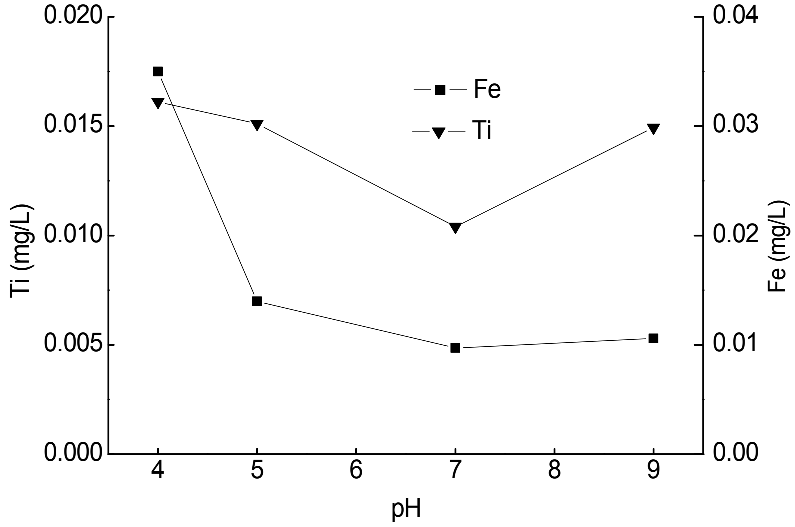


Fig. S2 Dissolved Fe and Ti of BM-3 at different pHs.

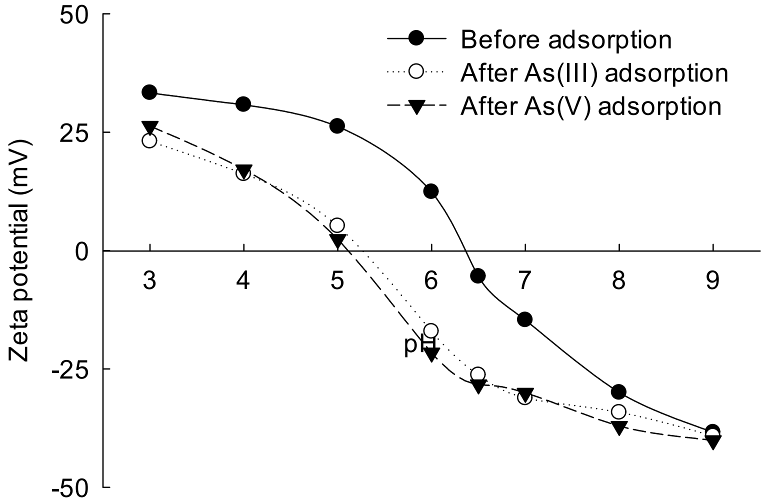
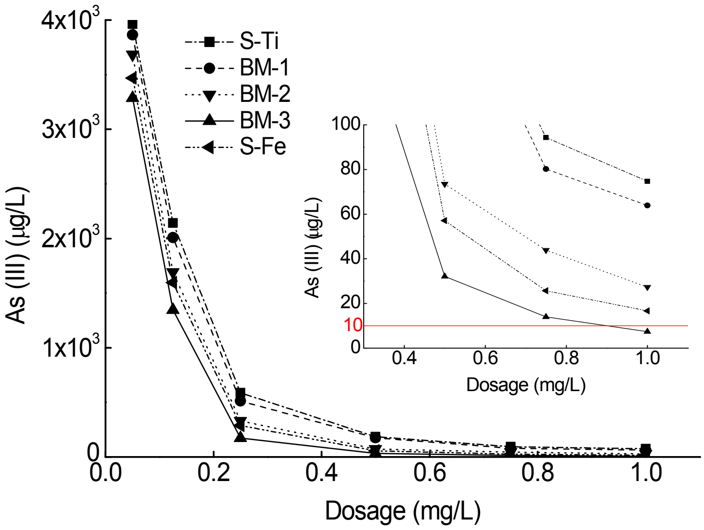


Fig. S3 Zeta potential of BM-3 before and after As(III) and As(V) adsorption.



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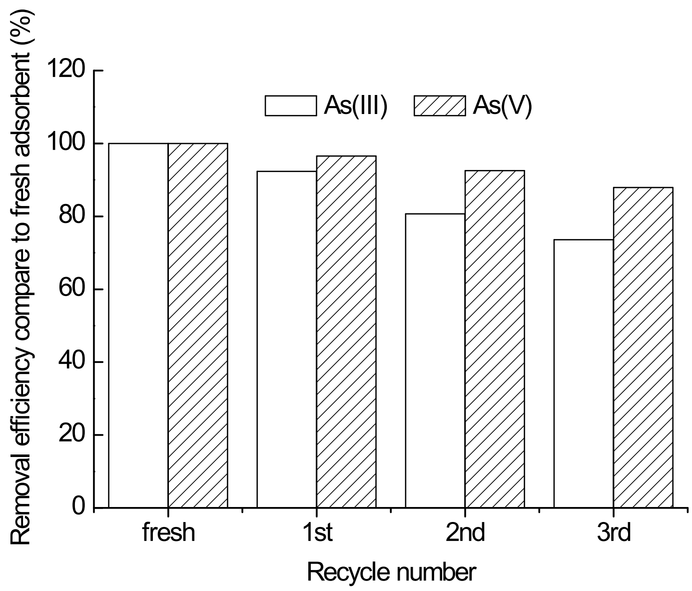

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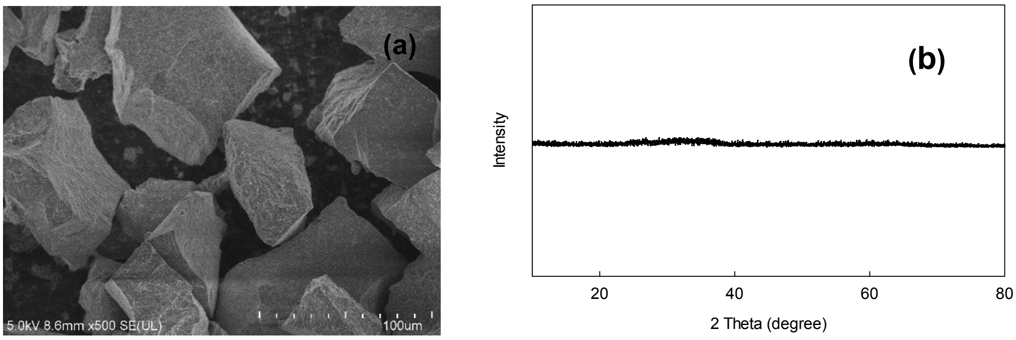

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