Electronic Supplementary Information

Photochemical Treatment of As(III) with α-Fe_2O_3 Synthesized from Jarosite Waste

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Experiment for the detective of Total As

A nondispersive atomic fluorescence spectrometer (AFS) model PF-6 from Pgeneral (Beijing, China) is used for the analytical determinations. Boosted discharge hollow-cathode lamps for Arsenic, from General Research Institute for Nonferrous Metals (GRINM, Beijing, China), are employed as excitation sources. The operating parameters used for the AFS instrument are given in Table S1.

All reagents used are analytical grade and all solutions are prepared in ultrapure water with a minimum resistivity of 18.0 MΩ cm obtained from a Milli-Q Millipore system (Bedford, MA, USA). The reductant solution is prepared daily from 1.5% (w/v) KBH_4 and 0.5% (w/v) NaOH and filtered before use. For total inorganic As analysis, samples are prereduced with 10 g L^{-1} thiourea and 10 g L^{-1} L-ascorbic acid in 2% (v/v) HCl. Reagent blanks contain the same concentration of thiourea, L-ascorbic and HCl as in the detective samples. Argon with purity higher than 99.999% is employed as carrier gas.

Table S1 The atomic fluorescence spectrometer parameters

Parameter	Setting
Hollow cathode lamp	Arsenic 197.26 nm
Lamp current	30 mA
Ar carried gas flow	400 ml min^{-1}
Ar auxiliary gas flow	600 ml min^{-1}
Quartz furnace temperature	180 °C
Negative high voltage of photomultiplier	280 V
Analytical parameters	Peak area

Experiment for the adsorption of As (III) under photo illumination

The photo irradiation system is assembled by our group as reported previously.[S1] The simulated As (III) polluted water is conducted in a quartz tube with 3.3 cm inner diameter and 14.5 cm length. The tube is surrounded by four wideband lamps (4W, PhilipsTL/05) with a predominant wavelength at 365nm. The light intensity at different wavelengths has been measured by a UV radiometer (made by Research Institute of Measurement, Chinese Academy of Science). Since the arsenite does not absorb light with wavelengths greater than 220nm, no oxidation of arsenic is observed under photo illumination when the solution containing As(III) only.

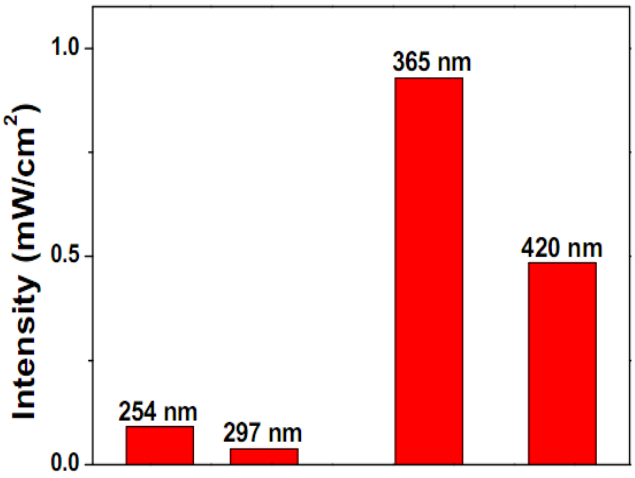

Figure S1. The intensities of the lamp at different wavelengths. Reproduced with permission from reference S1. Copyright 2010 American Chemical Society.

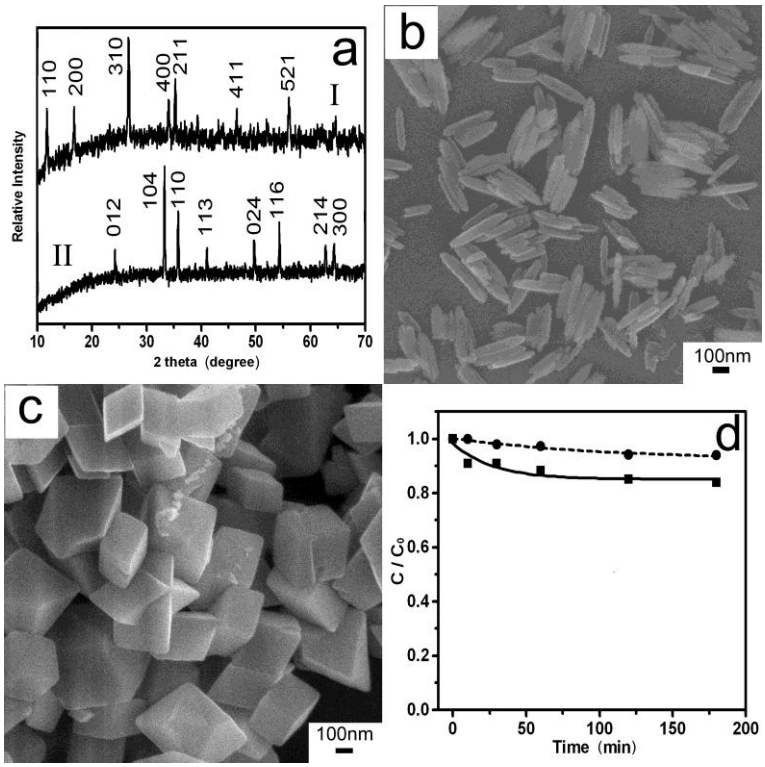

Figure S2. XRD pattern of the precursor (a, curve I) and α-Fe_2O_3 (a, curve II) in the absence of Na_2SO_4; SEM images for the corresponding precursor (b) and α-Fe_2O_3 (c) for F2; Adsorption rate of As (III) with (d, solid line) and without (d, dashed line) photo illumination for the α-Fe_2O_3 (F2) with As(III)=2 mg L^{-1}, pH=4.

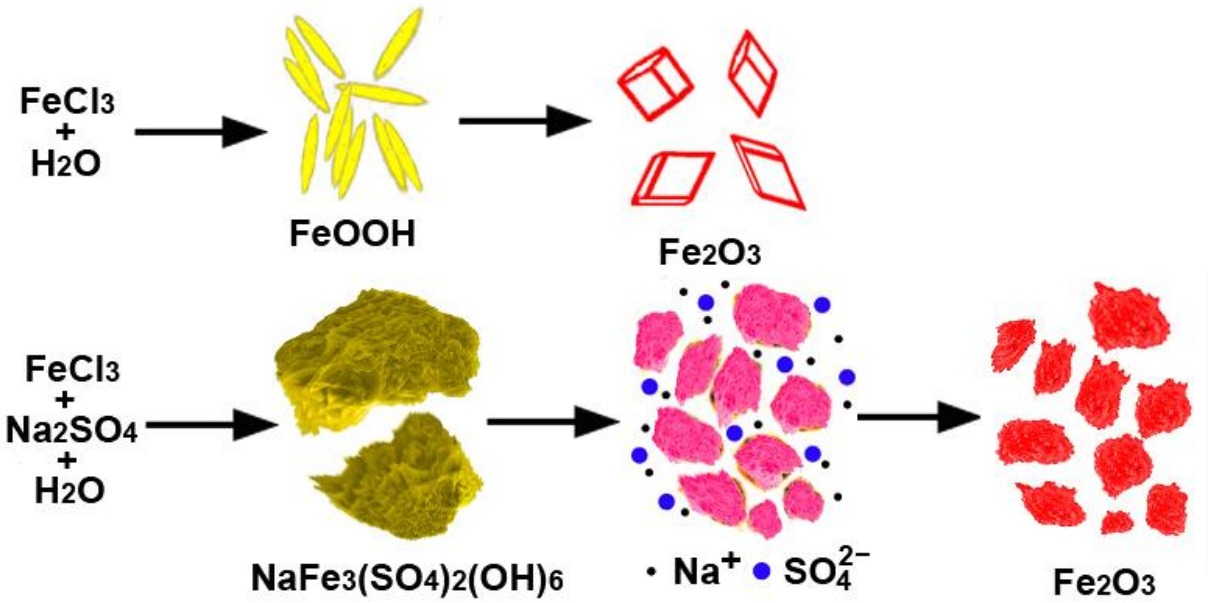

Figure S3. Schematic illustration of the formation process of α-Fe_2O_3.

[S1] J. D. Zhuang, W. X. Dai, Q. F. Tian, Z. H. Li, L.Y. Xie, J. X. Wang, P. Liu, X. C. Shi and D. H. Wang, *Langmuir*, 2010, **26**, 9686.