Supporting Information for

Controlled synthesis of novel flowerlike $\alpha$-Fe$_2$O$_3$

nanostructures via a one-step biphasic interfacial

reaction route

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Synthesis of α-Fe$_2$O$_3$ sample in the absence of liquid-liquid interface: (a) 0.353 g Fe(acac)$_3$, 0.45 g urea and 1.0 g polyvinylpyrrolidone (PVP, K30) were first dissolved in 35 ml of 50 °C hot water under vigorous stirring to form a homogeneous solution. The resulting solution was then transferred into a 50 ml Teflon-lined stainless autoclave, sealed and maintained at 130 °C for 24 h. After the solution was cooled to room temperature, the products were centrifuged and washed alternatively with distilled water and acetone several times, and then dried at 60 °C under air for 6 h. (b) 0.45 g urea and 1.0 g polyvinylpyrrolidone (PVP, K30) were first dissolved in 25 ml of deionized water in a 50 ml Teflon-lined autoclave to form a transparent solution at room temperature. Then, 0.353 g Fe(acac)$_3$ was dissolved in 10 ml of anhydrous ethanol under continuous stirring. The resulting Fe(acac)$_3$ solution was then added to the autoclave. Subsequently, the autoclave was sealed and maintained at 130 °C for 24 h, followed by natural cooling to room temperature. Afterward, the products were centrifuged and washed alternatively with distilled water and acetone several times, and then dried at 60 °C under air for 6 h.
Figure S1. Nitrogen adsorption-desorption isotherm and the corresponding BJH pore size distribution curve (insert) for the nanobundles-built flowerlike α-Fe₂O₃.
**Figure S2.** Low-magnification FESEM images of the products prepared at 130°C for 24 with different urea concentrations: (a) 0.15 mol/L, (c) 0.60 mol/L. High-magnification FESEM images of the products prepared at different urea concentrations: (b) 0.15 mol/L, (d) 0.60 mol/L.
Figure S3. (a) Low- and (b) high-magnification FESEM images of the products synthesized without adding PVP; (c) Low-magnification TEM image, and (d) Magnified TEM image of the selected area marked with a white rectangle in (c) when no PVP was added in the reaction system while other conditions unchanged.
Figure S4. (a) FESEM image of the sample synthesized in 35 ml water without benzene, (b) FESEM image of the sample synthesized in a mixture of 10 ml of anhydrous ethanol and 25 ml water.
Figure S5. FT-IR spectra of (a) the samples synthesized for 40 min, and (b) pure PVP.
Figure S6. XRD patterns of the products obtained at different reaction times: (a) 40 min, (b) 1.5 h.
**Figure S7.** Nitrogen adsorption-desorption isotherm and the corresponding BJH pore size distribution curve (insert) for the commercial hematite power.