Supporting Information

Growth-dissolution-regrowth Transitions of Fe₃O₄ Nanoparticles as Building Blocks for 3D Magnetic Nanoparticle Clusters under Hydrothermal Conditions

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**Fig. S1** FT-IR spectra of the 120 nm Fe₃O₄ clusters synthesized by the solvothermal reaction with 0.68 g FeCl₃·6H₂O, 1.2 g NaAc and 0.034 g EDTA-2Na in 20 mL ethylene glycol at 200 °C for 10 h. The bands at 1640 and 1400 cm⁻¹ were associated with carboxylate group, while typical bands assigned to the Fe-O stretching were visible at around 580 cm⁻¹. The bands at 2920 and 2850 cm⁻¹ were attributed to -CH₂, while adsorption at 1060 and 3440 cm⁻¹ are ascribed to the C-H vibrating and O-H vibrating, respectively.
Fig. S2 The photograph of the water dispersion (2 mg mL$^{-1}$) of grain-5 (a) for 6 h and grain-20 (b) for 30 min.
Fig. S3 TEM images of Fe₃O₄ clusters obtained at different amount of EDTA-2Na: 0.015 mmol (a), 0.010 mmol (b), 0.005 mmol (c) and 0.002 mmol (d), respectively, while other parameters were kept unchanged.
Fig. S4 TEM image of 120 nm Fe₃O₄ clusters synthesized by the solvothermal reaction with 0.68 g FeCl₃·6H₂O, 2.4 g NaAc and 0.034 g EDTA-2Na in 20 mL ethylene glycol at 200 °C for 10 h. Some particles displaying a transient state between cluster and solid particle, as well as some solid particles were observed.
Fig. S5 The TEM image of magnetite microspheres synthesized by the solvothermal reaction with 0.68 g FeCl$_3$·6H$_2$O and 2.4 g NaAc in 20 mL ethylene glycol at 200 °C for 10 h.
Fig. S6 The representation of the fluorescent images of MCF-7 cells treated with 120 nm Fe₃O₄ clusters for 2 d. (a) 2 mg/ml; (b) 1 mg/ml; (c) 0.5 mg/ml; (d) 0.1 mg/ml; (e) 0.05 mg/ml
**Fig. S7** SWSV (A) and calibration curves (B) on 2 mm glassy carbon electrode for Pb\(^{2+}\) at different concentrations from 0.05 to 0.1, 0.2, 0.3, 0.4, 0.5 and 0.6 mg L\(^{-1}\) (a to g). SWASV conditions: acetate buffer (pH 4.0) containing 200 \(\mu\)g L\(^{-1}\) Bi\(^{3+}\), deposition potential at -1.2 V, deposition time of 300 s, amplitude of 0.025 V, increment potential of 0.004 V, and pulse period of 0.2 s.