Supplementary Information for

Ultra-large scale syntheses of monodisperse nanocrystals via a simple and inexpensive route

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Figure S1. FT-IR spectra of the iron-oleate complex. Red curve: the iron-oleate complex. Black curve: the complex after heating at 380 °C.
**Figure S2** Thermogravimetric analysis (TGA) and differential scanning calorimetry (DSC) data of iron-oleate complex.

![Thermogravimetric and differential scanning calorimetry data](image)

**Figure S3** TEM images (upper images: low magnification, bottom images: higher magnification) of the iron oxide nanoparticles taken at various reaction time intervals.
**Figure S4** Particle size distribution histograms of iron oxide nanocrystals. (a) 5 nm, (b) 9 nm, (c) 12 nm, (d) 16 nm and (e) 22 nm.

Average diameter = 5.09 nm  
Size variation = ± 0.21 nm (± 4.11%)

Average diameter = 9.01 nm  
Size variation = ± 0.19 nm (± 2.10%)
Average diameter = 11.72 nm
Size variation = ±0.27 nm (± 2.30%)

Average diameter = 16.25 nm
Size variation = ±0.44 nm (± 2.73%)
Average diameter = 22.06 nm
Size variation = ±0.79 nm (± 3.57%)
Figure S5 The size control of monodisperse iron oxide nanocrystals by varying the relative concentration of oleic acid. (a) 9 nm (1.5 mmol); (b) 12 nm (3 mmol); (c) 14 nm (4.5 mmol).
Figure S6 The powder X-ray diffraction (XRD) patterns of (a) 12 nm sized Fe$_3$O$_4$ nanocrystals, (b) 12 nm sized MnO nanocrystals, (c) pencil-shaped CoO nanorods, and (d) 20 nm sized Fe nanocrystals.
**Figure S7 (a)** Field dependence of magnetization measured at 5 K after zero-field cooling from 380 K. The inset shows the full hysteresis curve of 16 nm sample measured at 5 K up to 5 Tesla. **(b)** Size dependence of coercive field, $H_c$, measured at 5 K after zero-field cooling from 380 K. **(c)** The normalized coercive field ($H_c/H_{c0}$) as function of reduced temperature ($T/T_B$) for 12 nm sample, where $H_c$ is the coercive field measured at temperature $T$, $H_{c0}$ the estimated coercive field at $T=0K$, and $T_B$ the measured blocking temperature from $M(T)$. The solid line is guide for eyes and the dashed line is for a theoretical curve for a single domain of fine particles, $(H_c/H_{c0}) = 1-(T/T_B)^{1/2}$. 
**Figure S8** TEM images of (a) 9 nm sized manganese ferrite and (b) 8 nm sized cobalt ferrite nanocrystals.
(c) Energy dispersive X-ray spectroscopic (EDX) results on the nanoparticles of manganese ferrite and cobalt ferrite.

We have conducted energy dispersive X-ray spectroscopic (EDX) studies on the nanoparticles of cobalt ferrite and manganese ferrite. The molar ratio of Co:Fe was 1:1.93, demonstrating that a stoichiometric cobalt ferrite nanoparticles were produced. The molar ratio of Mn:Fe was 1:2.80, showing that iron-rich manganese ferrite was produced.

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Figure S9 TEM images and electron diffraction patterns of the products after reacting iron-oleate complex in octadecene (a) at 260 °C for 1 day, (b) at 260 °C for 3 days, (c) at 240 °C for 3 days, and (d) at 200 °C for 3 days.
Figure S10. (a) In-situ FT-IR spectra of the iron-oleate complex at various temperatures. (b) Plot of the temperature dependence of the peak intensity of C-H stretching mode (2930 cm\(^{-1}\)) in the IR spectra. (c) In-situ FT-IR spectra of the solution-phase reaction mixture at various temperatures (background spectra from octadecene solvent was subtracted).