Supporting Information for

Iron Oxide Tube-in-Tube Nanostructures

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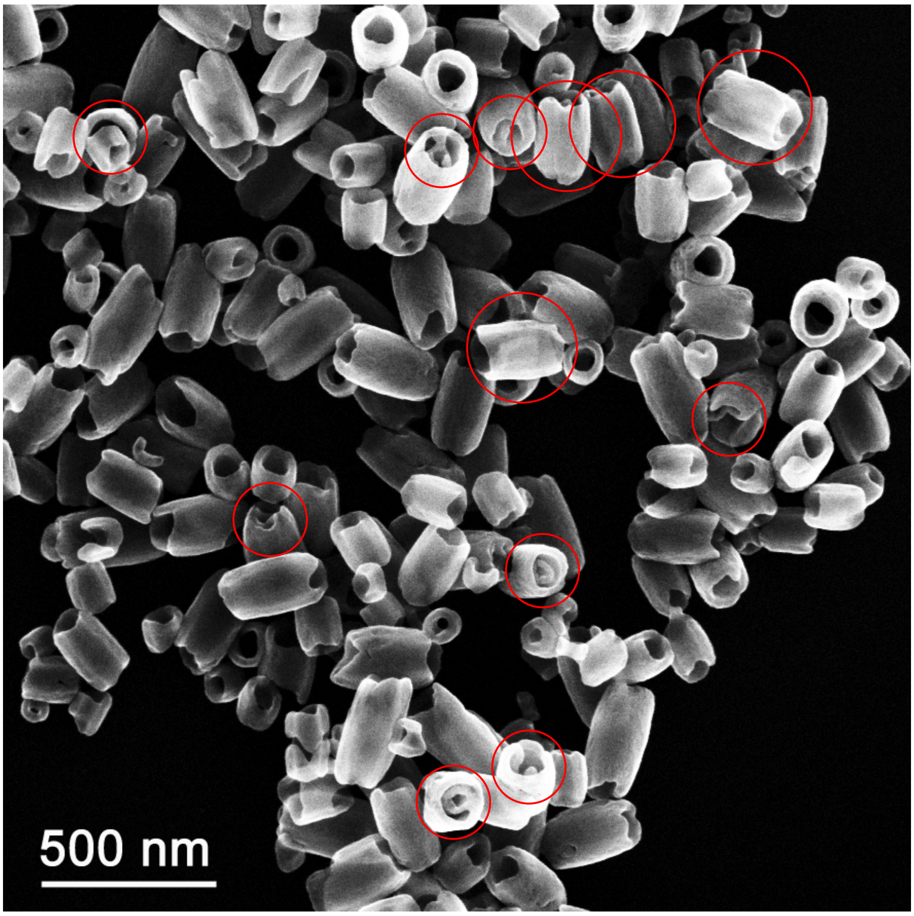

Figure S1 SEM image of the hematite products in a large view; the paticles marked with the red circles were tube-in-tube nanostructures. Large amount of ordinary nanotubes with single wall and a few tube-in-tube nanostructures are observed. The ratio of the tube-in-tube nanostructures is *ca*. 10 %.

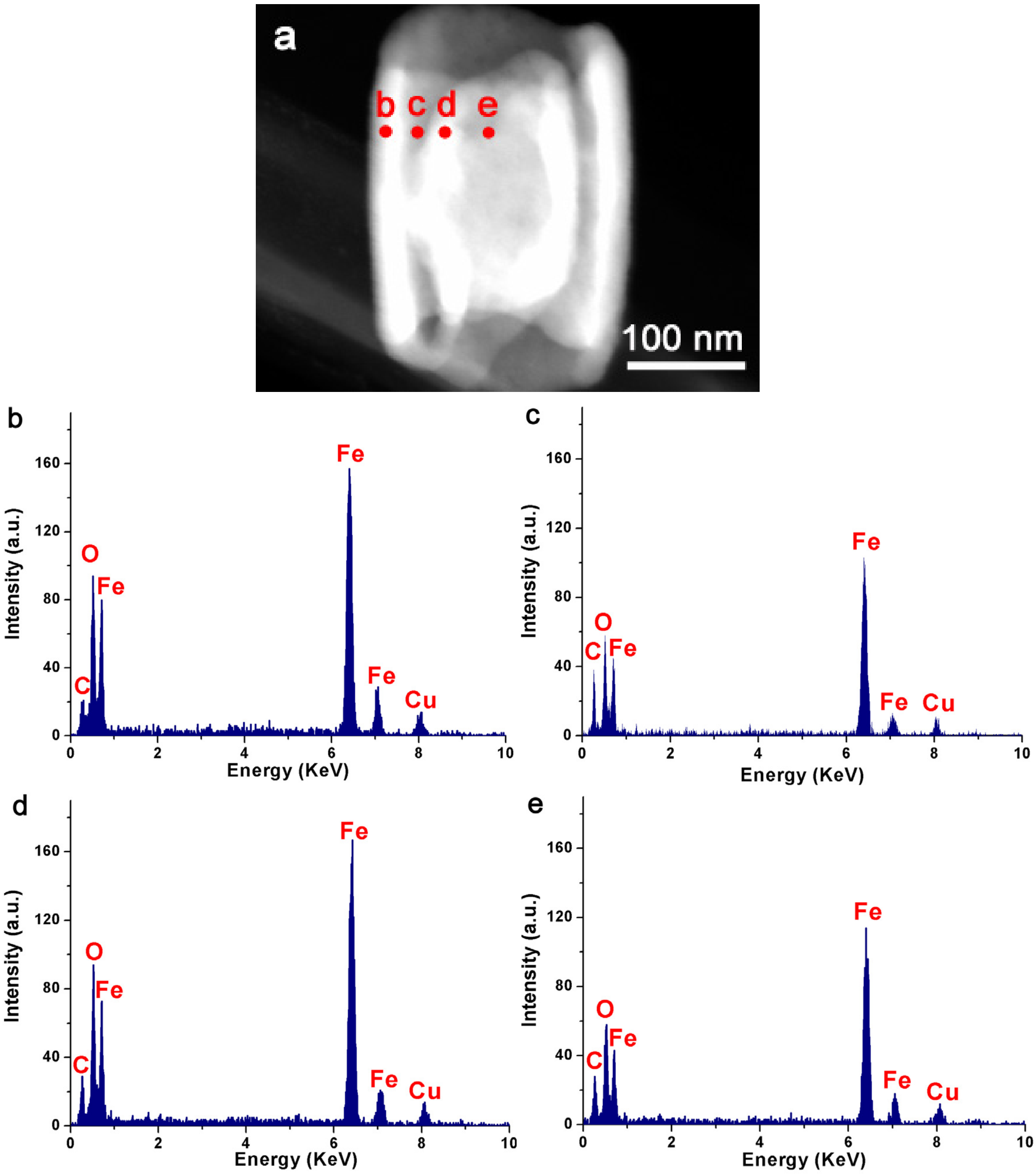

Figure S2 EDX spectra collected with a HAADF detector acquired from the locations labeled with b, c, d, and e in the tube-in-tube nanostructure, respectively. The intensity of Fe and O peaks in the EDX spectra varied with the locations, as indicated in the composition profiles in Figure 2b.

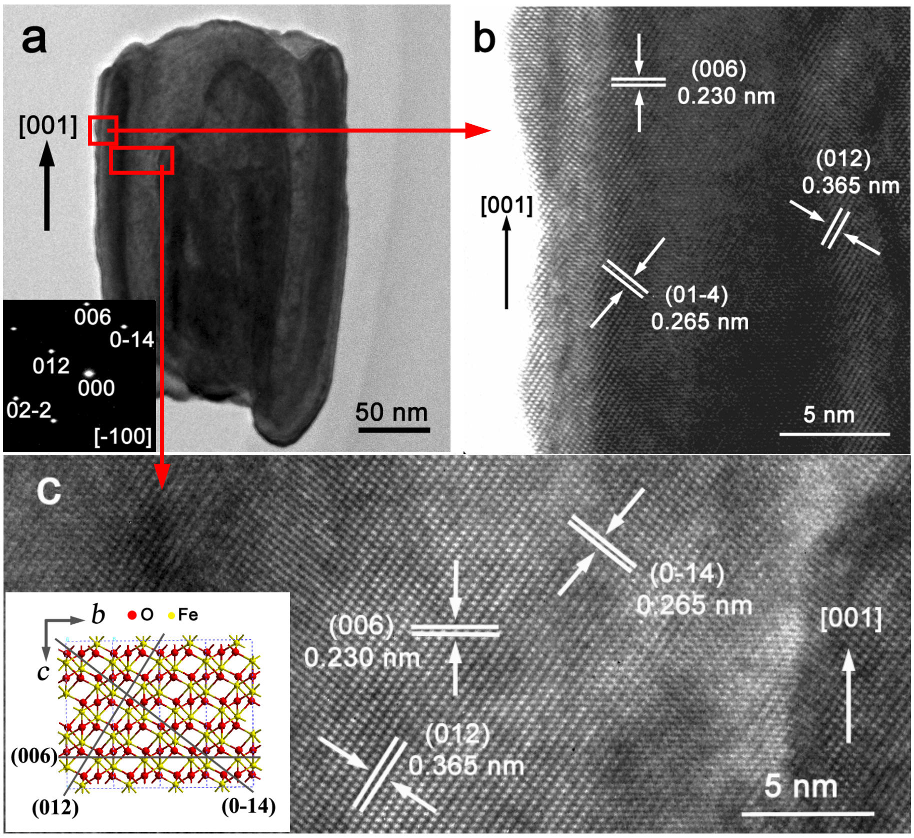

Figure S3 TEM (a) and HRTEM (b, c) images of a tube-in-tube nanostructure viewed from the side. The SAED pattern shows that the whole tube-in-tube nanostructure is a single-crystal one growing along [001]. From the HRTEM image in (c), it is observed that the lattice images of the inner and outer sub-tubes exhibit completely the same periodicity as that with the projection direction of [-100] (inset of c), no disordered superposition of lattice image further confirms that the tube-in-tube nanostructure is not a simple combination of a small nanotube occasionally filling into a big one.

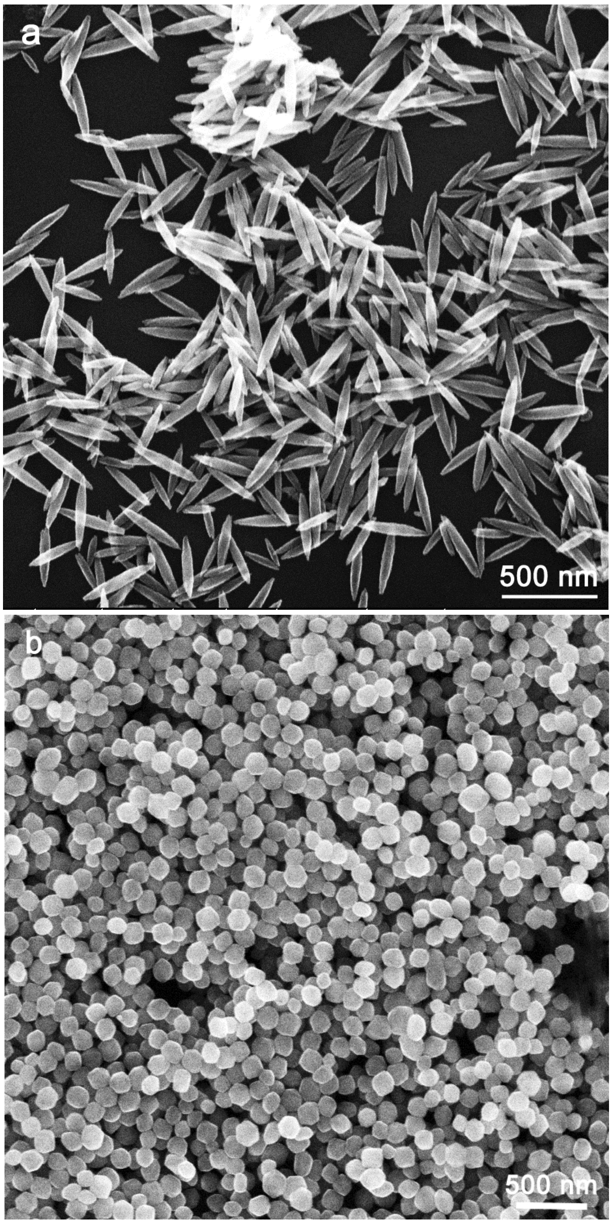

Figure S4 SEM images of hematite products with sulfate or phosphate ions as additives separately prepared at 220 °C for 2 h: (a) [$FeCl_3$] = 0.02 mol·L^{-1}, [$NH_4H_2PO_4$] = 4.5×10^{-4} mol·L^{-1}; (b) [$FeCl_3$] = 0.02 mol·L^{-1}, [Na_2SO_4] = 5.5×10^{-4} mol·L^{-1}.

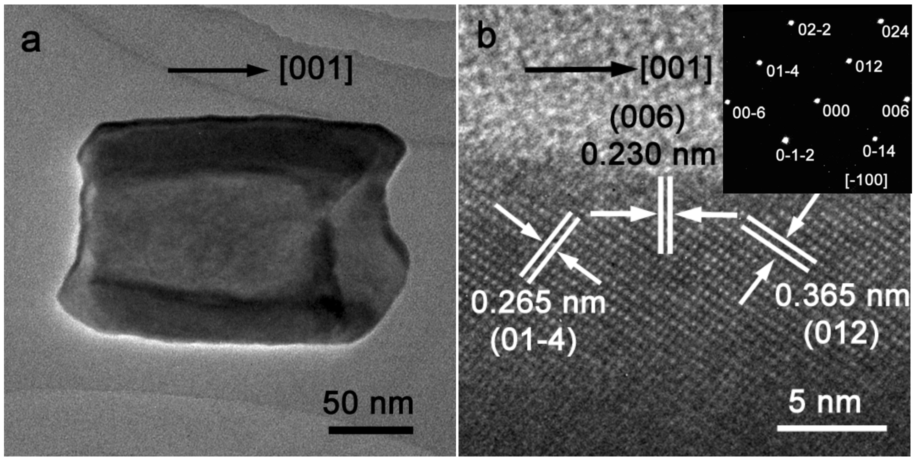

Figure S5 TEM (a) and HRTEM (b) images of a hematite single walled nanotube.

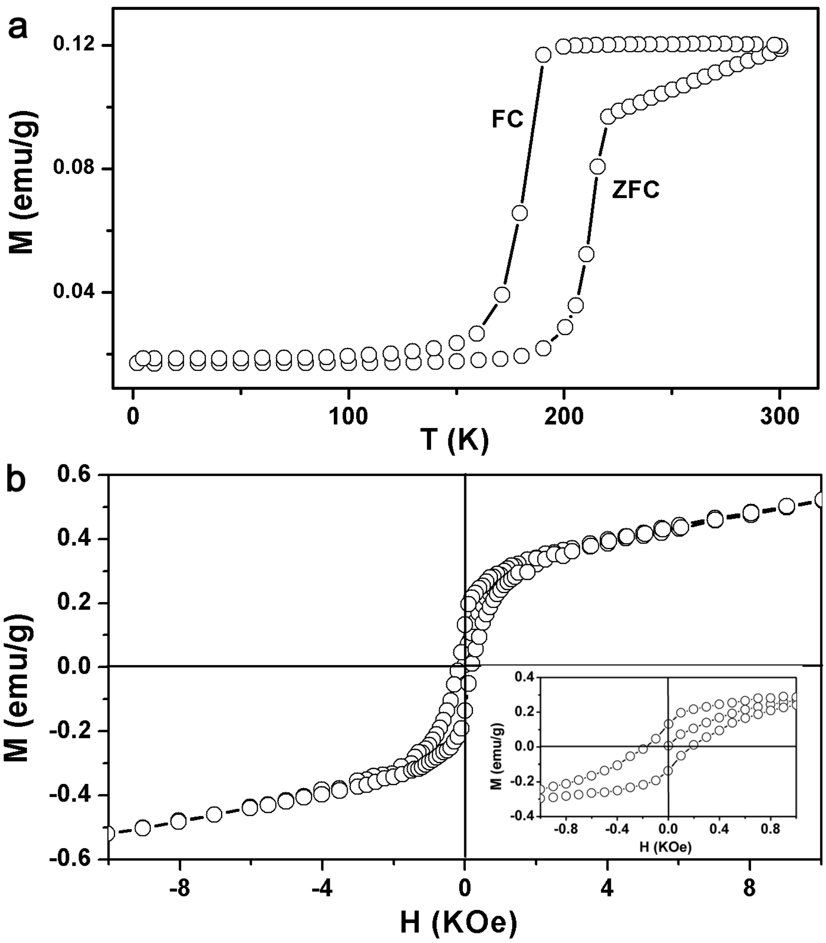

Figure S6 (a) ZFC and FC curves at 100 Oe of the hematite products, (b) hysteresis loop of the hematite products at 300 K (inset: the enlargement of the loop).

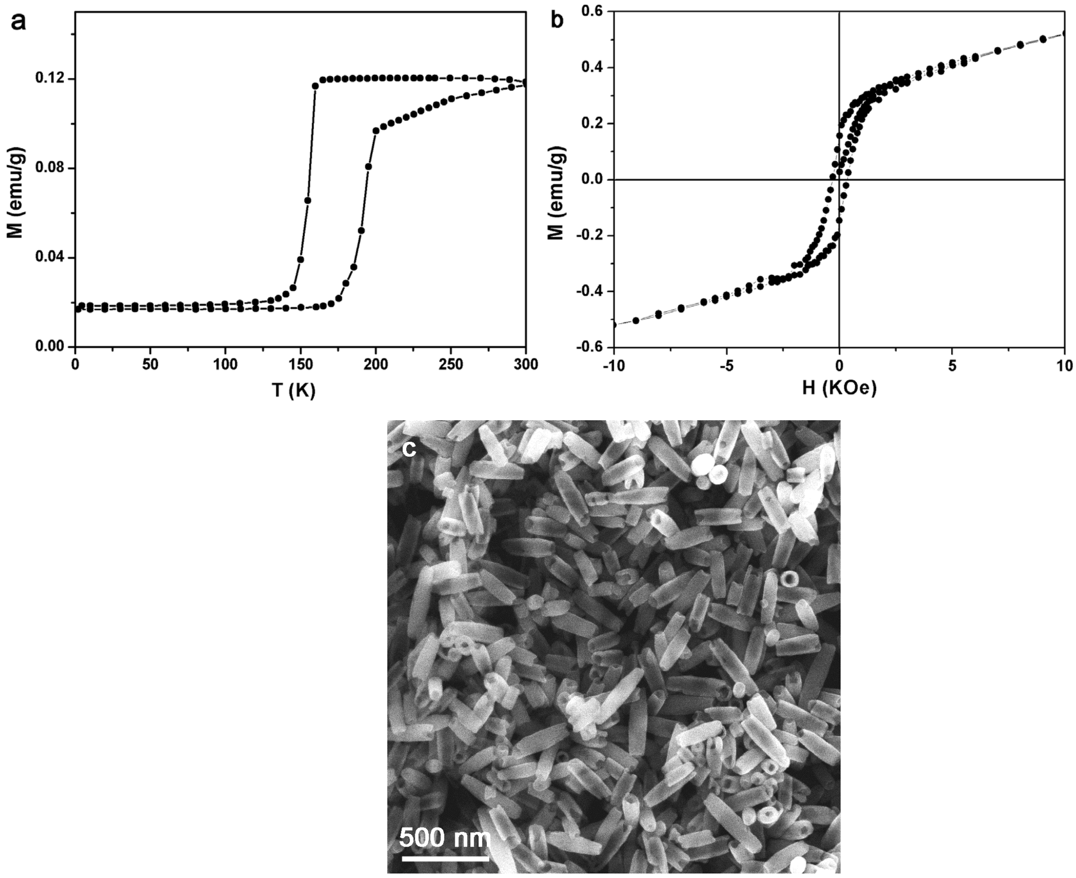

Figure S7 (a) ZFC and FC curves at 100 Oe of the hematite nanotubes,[1] (b) hysteresis loop of the hematite nanotubes[1] at 300 K (inset: the enlargement of the loop), (c) SEM image of the hematite nanotubes.[1]

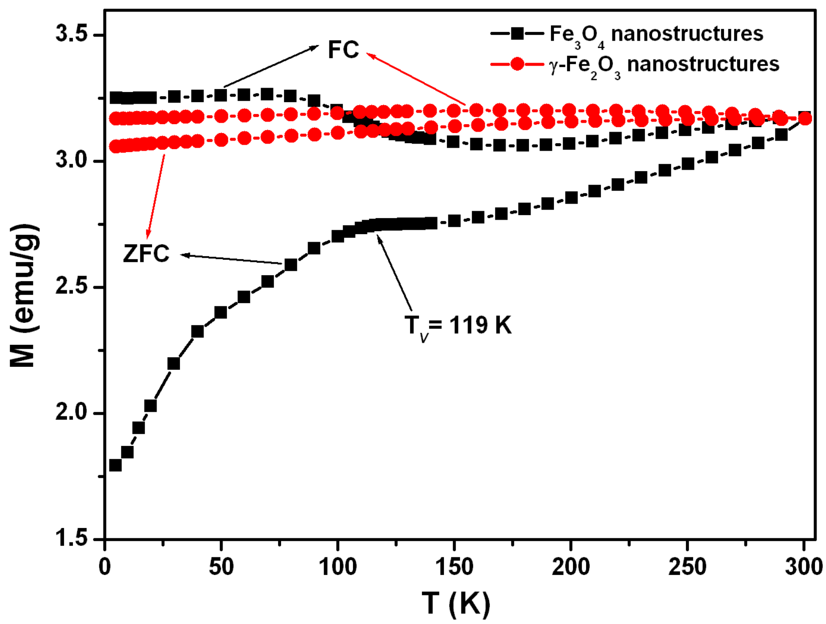

Figure S8 ZFC and FC curves at 10 Oe of the magnetite and maghemite products shown in Figure 4a and b in the text.

Reference:

1. Jia, C. J.; Sun, L. D.; Yan, Z. G.; You, L. P.; Luo, F.; Han, X. D.; Pang,Y. C.; Zhang, Z.; Yan, C. H. *Angew. Chem., Int. Ed*. **2005**, *44*, 4328.