

Electronic Supplementary Information for:

Cobalt Ferrite Nanorings: Ostwald Ripening Directed Synthesis and Magnetic Properties

Hui Zhang, Chuanxin Zhai, Jianbo Wu, Xiangyang Ma, Deren Yang*

State Key Lab of Silicon Materials and Department of Materials Science and Engineering,
Zhejiang University, Hangzhou 310027, People's Republic of China. Fax:

86-571-87952322; Tel: 86-571-87951667; E-mail: mseyang@zju.edu.cn

Synthesis of Cobalt Ferrite Nanorings: $\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$, $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$, poly(vinylpyrrolidone) (PVP, $K=27\sim 33$), N-dimethylformamide (DMF) and N_2H_4 (85wt%) were purchased from Shanghai Chemical Reagents Company. All the chemicals were analytic grade reagents and used without further purification. For synthesis of CoFe_2O_4 nanorings, 0.474 g $\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$, 0.648 g $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$ and 0.2 g PVP were dissolved into 100 ml DMF under stirring. After 10 min, 10 ml N_2H_4 (85wt%) were dropwise added into the above-mentioned solution, which was then transferred into Teflon-lined stainless steel autoclaves, sealed, and maintained at 200 °C for 20 h. After cooling down to room temperature, the black precipitates were centrifuged, washed with distilled water and ethanol to remove the ions possibly remaining in the final products, and finally dried at 60 °C in air. The effects of the grow conditions such as reactant and reaction time on the morphology and structure of CoFe_2O_4 were also investigated, while keeping other conditions unchanged.

Characterization of Cobalt Ferrite Nanorings: The products were characterized by X-ray powder diffraction (XRD) using a Rigaku D/max-ga x-ray diffractometer with graphite monochromated CuK α radiation ($\lambda=1.54178\text{\AA}$). The morphology and structure of the samples were examined by field emission scanning electron microscopy (FESEM, FEI SIRION), transmission electron microscopy (TEM, JEM 200 CX 160 kV) and high-resolution transmission electron microscopy (HRTEM, JEOL JEM-2010F). Magnetization measurement was carried out using a Physical Property Measurement System (PPMS-9, Quantum Design).

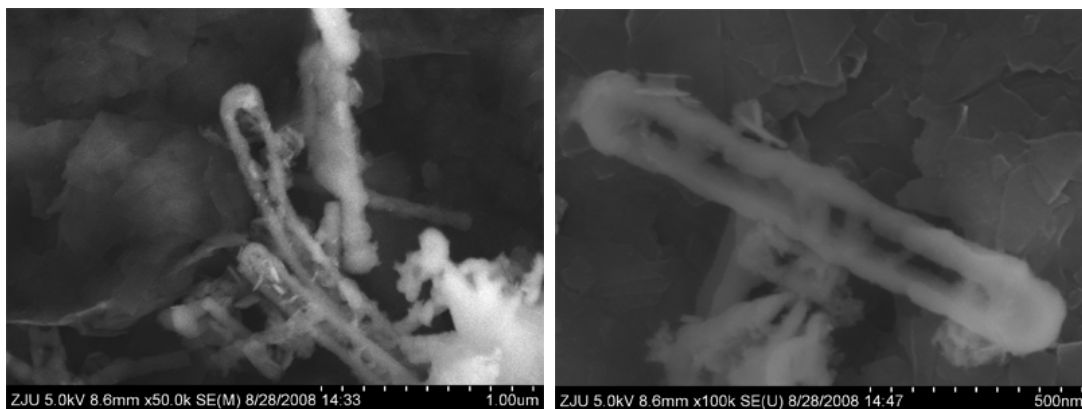


Fig. S1 FESEM image of CoFe₂O₄ nanorings

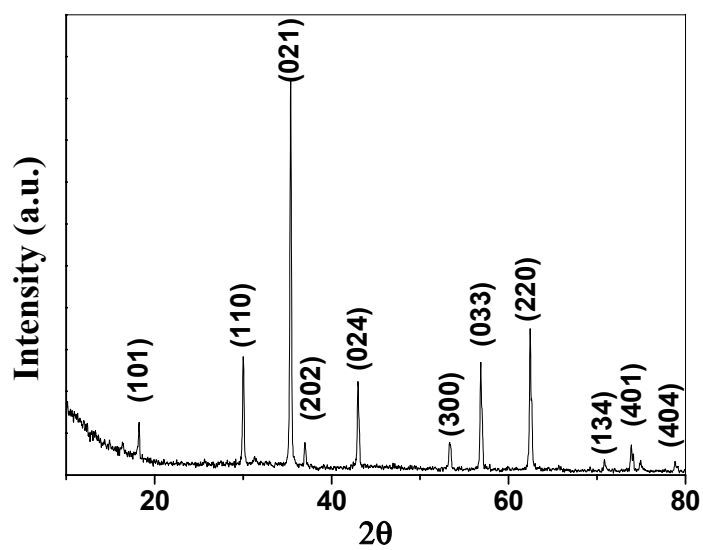


Fig. S2 XRD pattern of CoFe_2O_4 nanorings