Single Crystalline Magnetite Nanotubes

Zuqin Liu[†], Daihua Zhang[†], Song Han[†], Chao Li[†], Bo Lei[†], Weigang Lu[‡], Jiye Fang[‡],
and Chongwu Zhou^{†,*}

[†] Dept. of Electrical Engineering–Electrophysics, University of Southern California, Los Angeles, CA 90089, USA ; [‡] Chemistry Department and Advanced Materials Research Institute , University of New Orleans, New Orleans, LA 70148

Supporting Information

Figure S1 shows the schematic drawing of the PLD system for Fe_3O_4 deposition. A laser beam from a pulse mode Nd:YAG laser ($\lambda = 532$ nm) was focused onto a Fe_3O_4 target and the generated plume was then deposited onto the substrate with MgO nanowires. During the deposition, the temperature of the tube furnace was kept at 350 °C. The pressure inside the quartz tube was 70 mTorr with ultrahigh purity Ar gas flowing (5 sccm) in the opposite direction to the laser beam. The samples were then cooled down gradually without further baking step.

Figure S1. Schematic drawing of the PLD system for Fe_3O_4 deposition.

Figure S2 shows an SEM image of the Fe_3O_4 nanotube device used in the transport study, which consists of a 5 μm -long Fe_3O_4 nanotube and four metal electrodes evenly distributed on the top. The device was fabricated as follows: We first sonicated the Fe_3O_4 nanotubes off the Si/SiO₂ substrate into 1-isopropanol, followed by dispersing the suspension onto another Si/SiO₂ substrate with metal alignment marks. E-beam lithography and evaporation were then used to pattern and deposit four Ti/Au electrodes to contact the nanotubes. The thickness for Ti and Au is 5 nm and 140 nm, respectively.

Figure S2. An SEM image of the Fe_3O_4 nanotube device used in the transport study. The boxed region was further enlarged and shown in the upper-right inset.