

Hydrothermal preparation of high saturation magnetization and coercivity cobalt ferrite nanocrystals without subsequent calcination.

Abstract

In this work, CoFe₂O₄ nanocrystals with high saturation magnetization (M_s) and high coercivity (H_c) have been fabricated via a simple hydrothermal method and without subsequent calcination. The resulting CoFe₂O₄ nanocrystals are characterized by X-ray diffraction, transmission electron microscopy, scanning electron microscopy, energy-dispersive X-ray spectrometry, differential scanning calorimetry and vibrating sample magnetometry. The results indicate that CoFe₂O₄ nanocrystals are single crystal and the average crystallite size is increasing with the hydrothermal temperature. The electron micrographs show that the nanocrystals are well-dispersed and possess uniform size. The shape of CoFe₂O₄ nanocrystals is transformed from spherical into rod by increasing the hydrothermal temperature. The nanocrystals show relatively high M_s of 74.8 emu g⁻¹ and H_c of 2216 Oe, as compared to previous reported results. The obtained results reveal the applicability of this method for efficiently producing well crystallized and relatively high magnetic properties CoFe₂O₄ nanocrystals as compared to other methods. More importantly, it does not require further calcination processes.

Keyword: Chemical synthesis; Magnetic materials; Magnetic properties; Nanostructures..