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Magnetic Properties of CoFe2O4/CoFe2 nanocomposites reduced by activated charcoal in argon atmosphere

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Abstract :

The core-shell architecture of CoFe2O4/CoFe2 nanocomposites was synthesized in a controlled-argon atmosphere by reduction reaction process with activated charcoal at 900 ⊠C. The parent sample (CoFe2O4) was synthesized at 200 oC by glycol-thermal method which was followed by its subsequent partial and full reductions to CoFe2. Full reduction was achieved at a molar ratio of CoFe2O4 to C at 1:8. The phase identification and magnetic properties of the parent sample and nanocomposites were performed by X-ray diffraction, 57Fe Mössbauer spectroscopy and vibrating sample magnetometer. The average crystallite size of the parent sample changed from about 10 nm to about 60 nm after calcination at 900oC. A reduction in coercive field was observed from 337 Oe to about 20 Oe after activation by charcoal. The nanocomposites show enhanced magnetizations with increased carbon or CoFe2 content. The reduction process appears to increase the energy product from 0.86 MGOe for the annealed parent sample to 1.39 MGOe for the fully reduced sample.

Award :

Yes

Level :

Msc

Paper :

Yes

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