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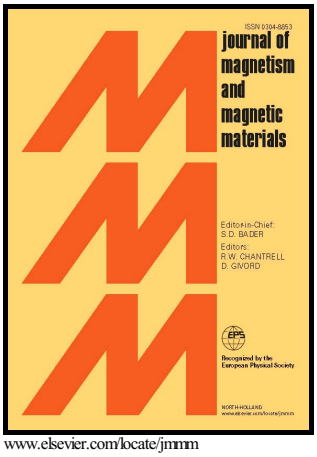

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Synthesis, characterization and magnetic properties of $NiFe_{2-x}Ce_xO_4$ nanoribbons by electrospinning

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Abstract

$NiFe_{2-x}Ce_xO_4$ (x= 0-0.03) nanoribbons have been successfully fabricated using electrospinning technique and followed by calcining in air at 500 ^oC. The crystalline, morphologies and compositions of $NiFe_{2-x}Ce_xO_4$ nanoribbons are characterized by X-ray diffraction, selected area electron diffraction, transmission electron microscope, field emission scanning electron microscopy and energy dispersive X-ray spectroscopy (EDX). The results show that the components, mean crystallite sizes and morphologies change along with the content of Ce^{3+}. A formation mechanism of $NiFe_{2-x}Ce_xO_4$ nanoribbons is proposed. The magnetic hysteresis loops of $NiFe_{2-x}Ce_xO_4$ nanoribbons reveals that the coercivity changes from 165 Oe to 64 Oe and saturation magnetizations change from 40.97 emu/g to 25.05 emu/g at room temperature. Morevover, the Mössbauer spectra of ^{57}Fe in $NiFe_{2-x}Ce_xO_4$ nanoribbons is discussed in detail. It is believed that this work will play important role in magnetic application with the advantage of excellent magnetic properties, efficient functionalization and relatively low cost.

Keywords: electrospinning, nickel ferrites, Ce-doped, magnetic properties, nanoribbons.

1. Introduction

One-dimensional (1D) nanostructures materials with the range of diameters from several micrometers to tens of nanometers have recently attracted much attention due to their unique physical and chemical properties spreading in many fields, such as biosensor [1], cancer therapy [2], drug delivery [3], air and water filtration [4], and micro-nano-electrics devices [5] etc. 1D nanostructures has be fabricated by many methods, including aluminum oxide (AAO) template [6], sol-gel method [7] and electrospinning technique [8]. Among these synthesis techniques, electrospinning technique has been widely utilized, as it owns the advantages of simple operation, high production rate and low cost [9], and it can be used to fabricate much