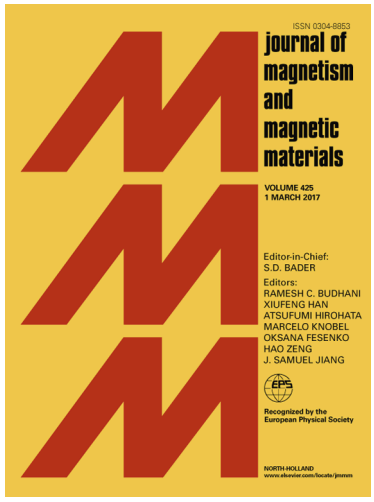

Rietveld refinement, morphology analysis, optical and magnetic properties of magnesium-zinc ferrite nanofibers

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Rietveld refinement, morphology analysis, optical and magnetic properties of magnesium-zinc ferrite nanofibers

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Abstract

The magnesium-zinc ferrite ($Mg_{1-x}Zn_xFe_2O_4$) nanofibers (with x=0, 0.05, 0.10, and 0.15) were successfully prepared by the electrospinning technique followed by calcinations at temperature 550 ^{0}C. The structural, morphological, optical properties and magnetic characterization of the prepared nanofibers were studied by X-ray diffraction (XRD), scanning electron microscopy (SEM), Fourier Transform Infrared (FTIR), DRS and VSM. The XRD pattern has been analyzed employing Rietveld technique and revealed the diffraction peaks are mainly assigned to the cubic structure of the $MgFe_2O_4$ phase. The SEM images exhibit fabrication of the smooth and free of beads nanofibers with average diameter ranged from 180±20 to 100±20 nm. The absorption spectra and optical band gap were estimated by diffuse reflectance spectroscopy (DRS). DRS study showed an increase in the band gap energy of $MgFe_2O_4$ nanofibers upon increase in doping concentration. Magnetic properties of the pure $MgFe_2O_4$ and 10% Zn-doped $MgFe_2O_4$ nanofibers were characterized by using VSM magnetometer. Magnetic results showed saturation magnetism and eminence decrease with Zn doping.

Keywords: magnesium-zinc ferrite; Nanofibers, Electrospinning, XRD, SEM, FT-IR, DRS, VSM

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