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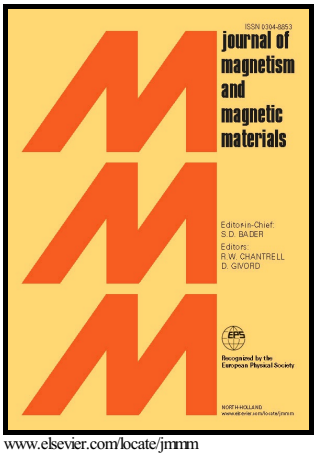

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Enhancement of soft magnetic properties of La-Zn co-doped Nanocrystalline Ni_2Y hexaferrite

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Abstract

The La-Zn substituted nanocrystalline $Sr_{2-x}La_xNi_2Fe_{12-x}Zn_xO_{22}$ (with x = 0.0, 0.4, 0.5, 0.6, 0.7, 0.8 and 0.9) hexaferrites were prepared using sol-gel auto-combustion method to investigate the microstructure and magnetic properties. Fourier transform infrared spectroscopy (FT-IR) spectra showed two main absorption bands at 429 and 594 cm^{-1} corresponding to the stretching and vibration of tetrahedral and octahedral groups in S blocks. The X-ray diffraction pattern confirmed the phase formation of Y-type hexaferrite with R-3m space group which also provided the lattice constants and crystallite sizes of each product. Furthermore, the crystallite size (D) was found to be in the range of 31.4-43.1 nm. Field emission electron microscopy (FESEM) images confirmed that the grain size was reduced from 600 to 150 nm due to the increase of dopant cations and, subsequently, caused soft magnetic properties to improve. By performing a thorough investigation on the M-H hysteresis loops, it was found that the magnetization first increased up to x=0.7 and then decreased, while coercivity monotonously decreased from 1313 to 569 Oe. This behavior can