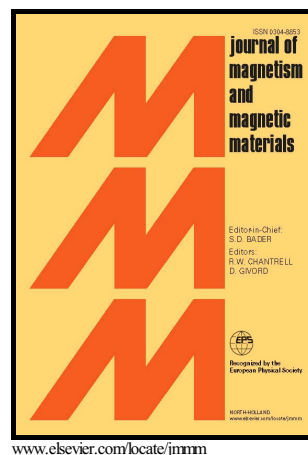


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## Enhancement of soft magnetic properties of La-Zn co-doped Nanocrystalline $\text{Ni}_2\text{Y}$ hexaferrite

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### Abstract

The La-Zn substituted nanocrystalline  $\text{Sr}_{2-x}\text{La}_x\text{Ni}_2\text{Fe}_{12-x}\text{Zn}_x\text{O}_{22}$  (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  $594\text{ cm}^{-1}$  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  $31.4\text{-}43.1\text{ nm}$ . Field emission electron microscopy (FESEM) images confirmed that the grain size was reduced from  $600$  to  $150\text{ nm}$  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  $569\text{ Oe}$ . This behavior can

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