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The Effect of Doping on the Magnetic Properties of Lanthanum Ferrite by the Sol Gel Method

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Abstract

We have studied the structural and dielectric properties of nano-crystalline $LaFe_{1-x}Zn_xO_3$ (x=0, 0/05, 0/2, 0/4, 0/5) pervoskite samples synthesized through sol–gel technique. X-ray diffraction used to confirm the single phase characteristics. Microstructural features are investigated using scanning electron microscope and compositional analysis is performed through energy dispersive spectroscopy. The size of the nanoparticles is reduced from 56 to 26 nm. The average grain sizes, calculated from the Scherrer formula. The hysteresis (M-H) curves display a weak magnetic order and a shift in the hysteresis loops.

Keywords: nano-crystalline, perovskite, magnetic, hysteresis loops

1.Introduction

Since the discovery of Y-type hexaferrites by Jonker in 1956, they have been frequently used as an interesting material in many applications [1]. Based on their structures, hexaferrites are classified into six main classes [2]: M-type or BaFe12O19, W-type or $BaMe_{2-x}Fe16O27$, X-type or $Ba_2Me_2Fe_{28}O_{46}$, Y-type or $Ba_2Me_{2-x}Fe_{12}O_{22}$, Z-type or $Ba_3Me_2Fe_{24}O_{41}$ and U-type or $Ba_4Me_2Fe_{36}O_{60}$ where Me is a first row of divalent transition metal cations such as Ni, Cu, Co