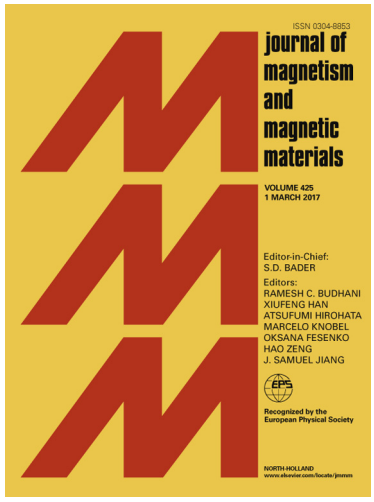

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Effect of Y-La-Co substitution on microstructure and magnetic properties of M-type strontium hexagonal ferrites prepared by ceramic method

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Abstract

M-type permanent magnetic ferrites $Sr_{0.95-x}Y_{0.05}La_xFe_{11.75}Co_{0.25}O_{19}$ (x=0.00, 0.10, 0.20, 0.30, 0.40) have been prepared by ceramic process and investigated systematically. The phase compositions were examined by X-ray diffraction, the results showed that the single phase was obtained when $x \leq 0.30$. The morphology of the magnets was investigated by scanning electron microscopy (SEM), the micro-morphology of the particles exhibited the uniform plane hexagonal structure with different lanthanum content. Magnetic properties of the sample were measured by a physical property measurement system-vibrating sample magnetometer (PPMS-VSM). The saturation magnetization (M_s) decreases constantly with the increasing of La content (x). However, the coercivity (H_c) increases as the increasing of doping content.

Keywords: Hexagonal ferrites; Micro-morphology; Magnetic properties

1. Introduction

Hexagonal M-type $SrFe_{12}O_{19}$ (SrM) ferrites plays an important role in hard magnetic materials especially for its large magnetic anisotropy, high performance-to-cost ratio and good chemical stability [1-5]. In addition, they also display considerable properties in microwave devices, magneto-optics and magnetic recording media [6, 7]. Therefore, for the purpose of achieving more extensive application fields, improving the magnetic properties of M-type hexaferrites is of great significance in magnetic field. The crystal structure of SrM comprises alternative stacks of spinel (S, $Fe_6O^{2+}_8$) and hexagonal (R, $MFe_6O^{2-}_{11}$) blocks in the form RSR*S*, where * denotes 180° rotation around the hexagonal c-axis [8]. The O^{2-} ions exist as close-packed blocks, with the M^{2+} ion substituting for the O^{2-} ion in R blocks. The Fe^{3+} ions

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