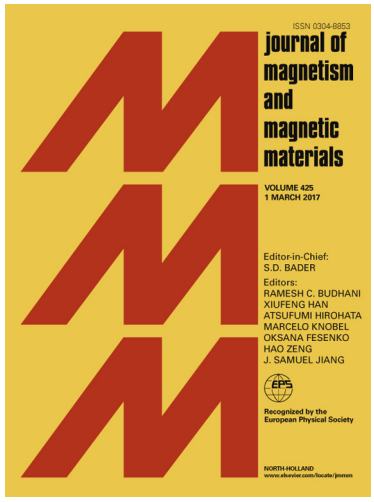

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The hexaferrite $Sr_3Co_2Fe_{24}O_{41}$ thin films by chemical solution deposition method: synthesis and characterization

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Abstract

Thin films of $Sr_3Co_2Fe_{24}O_{41}$ hexaferrite were prepared through the chemical solution deposition method using $SrTiO_3$(111) single crystal substrates. The influence of the annealing temperature and annealing duration time on the phase composition, structural, microstructural and magnetic properties was investigated by examining the out- and in-plane crystallographic orientation, temperature and magnetic-field dependence of the magnetization, and surface topography. The Rietveld analysis performed on the XRD patterns indicates $Sr_3Co_2Fe_{24}O_{41}$ being the dominant phase, according to the XRD texture analysis the orientation relationship between Z ferrite and substrate can be expressed as $(00l)_Z \parallel (111)_{STO}$ || and $[110]_Z \parallel [100]_{STO}$. The magnetization data show anomalies in the magnetic behavior occurring at temperatures close to the room temperature that are characteristic for collinear to non-collinear spin structure transitions. The magnetic-field dependence of the magnetization proves soft magnetic character of ferrite film together with pronounced magnetic anisotropy, and shows a two-step increase of magnetization at lower fields ($\leq$ 1 T) before it becomes almost saturated at around 2 T.

Key words: hexaferrites, $Sr_3Co_2Fe_{24}O_{41}$, thin films, chemical solution deposition