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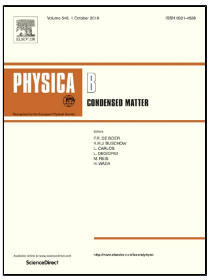

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Investigations on the structural, magnetic and mossbauer properties of Cerium doped Strontium ferrite

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Abstract

In this paper, we have studied the influence of Ce^{3+}on the structural, magnetic and Mossbauer properties of $Sr_{1-x}Ce_xFe_{12}O_{19}$ (x= 0.0, 0.05, 0.1, 0.15, 0.2 and 0.25). We have synthesized $Sr_{1-x}Ce_xFe_{12}O_{19}$ using the sol – gel technique. We have investigated the structural and magnetic properties of the grown samples using X-ray diffractometer and Vibrating sample magnetometer. We have used Scanning electron microscope, FTIR and Raman spectrometer to study the morphological properties. We have also focused on the Mossbauer spectroscopy analysis. The XRD studies confirm the hexagonal with M-type magnetoplumbhite structure. The SEM image confirms the coarseness in the sample with porosity which decreases with increasing Ce^{3+} in $SrFe_{12}O_{19}$. The FTIR spectrum confirms the formation of single phase ferrite in the grown sample. Raman spectrum reveals the formation of different vibrations of Fe-O bonds is observed at different peaks. The VSM studies confirm the hard nature of strontium ferrite as the cerium content is increased. The saturation magnetization and remnant magnetization of all doped strontium ferrite decrease as and when the cerium is increased. Mossbauer spectrum analysis reveals that the iron ions exist in Fe^{3+} state. Mossbauer study confirms that all the five sextets are attributed to the Fe^{3+}ions. The obtained results with Ce^{3+} doping of $SrFe_{12}O_{19}$ demonstrate the usefulness for magnetic recording and memory devices.

Keywords: Ce^{3+}, $SrFe_{12}O_{19}$, X-ray diffraction, FESEM, FTIR, Magnetic Properties, Mossbauer spectrum, Raman spectrum.

1. Introduction