

*Neutron diffraction studies of Sr doped magneto-electric M-type BaFe<sub>12</sub>O<sub>19</sub> hexaferrites*

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The magneto-electric multiferroic hexaferrites have become very interesting due to their practical applications in multi-bit storage devices [1-2]. The XRD, Neutron, Magnetic and Mössbauer studies of magneto-electric Ba<sub>1-x</sub>Sr<sub>x</sub>Fe<sub>12</sub>O<sub>19</sub> (x=0-1@0.25) hexaferrites are reported. The samples are prepared through conventional solid state reaction method. The phase purity of the samples is confirmed through the XRD by using Rietveld refinement method and the lattice parameters are found to increase with increasing the Sr doping at Ba site. The neutron diffraction studies revealed the off-mirror-plane displacement of trigonal bipyramidal site. The bond angles, bond lengths and magnetic moments of the Fe sites are effected with Sr doping suggesting that the Sr doping at Ba site which is near to the trigonal bipyramidal site changes the structural properties of the crystal. The temperature dependent M-H loops are confirmed the hard magnetic nature. The saturation, remanent magnetisation and coercivity values of the samples are effected with the temperature. The temperature dependent M-T curves of the samples revealed the spin transitions at low temperature which are attributed to the change in the magnetic structure. On the basis of Mössbauer spectra it is found that the Fe ions are in the +3 state and distribution of, Fe<sup>3+</sup> ions in the octahedral, tetrahedral and trigonal bipyramidal sites and their relative occupancy is also evaluated.

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[2]. Kimura.T, et al. (2005). Phy. Rev. Lett, 94, 137201

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