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Longitudinal Conical Magnetic Structure in Scandium doped M-type Barium hexaferrite

M-type barium hexaferrites (BaM) has attract a lot of attention due to their multiferroic and other functional properties [1, 2]. We have investigated the doped M-Type Barium hexafer-rite, BaFe12-xTxO19, where T = Sc with x = 2.5. The structural and magnetic properties were characterized using XRD, VSM and Neutron diffraction measurements. XRD analysis reveals that the samples are in single phase with space group P63/mmc. Magnetization data reveal interesting behavior, Zero-field cooling (ZFC) and field cooled warming (FCW) curves in temperature range of 5 K to 750 K indicate several transitions for the Scandium doped com-pound. Transitions observed at lower temperatures indicate antiferromagnetic order. Tem-perature dependence neutron diffraction measurements performed at a wavelength of, λ = 2.315 Å, in the temperature range 3 K – 300 K, analysis of neutron data reveals non-collinear magnetic order at the lowest temperature. Magnetic satellite reflections start appearing at low angles on decreasing of temperature, refinement of this magnetic reflection indicates the presence of conical magnetic structures at low temperatures. This shows that the direc-tion of magnetic moments, when compared with the parent compound, is no longer along the hexagonal c-axis. Magnetic structures for the Scandium doped with doping concentra-tion x = 2.5 is analyzed and presented in details.

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