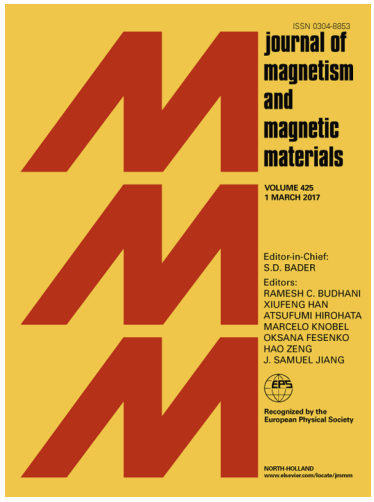

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Investigating the Electric and Magnetic Transport Properties of $Na_{0.5}Bi_{0.5}TiO_3$ – $BaFe_{12}O_{19}$ Nanocomposite System for Magnetoimpedance Sensor Application

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Abstract:

Polycrystalline [90 wt% $Na_{0.5}Bi_{0.5}TiO_3$ (NBT) - 10 wt% $BaFe_{12}O_{19}$ (BaM)] nanocomposite system has been fabricated with the help of solid state reaction method. The Rietveld refinement of X-ray diffraction (XRD) pattern and Transmission electron microscopy (TEM) have been provided the information about the pure phase formation and grain size of desired composite system. Microstructural electric and magnetic transport properties have been carried by complex impedance spectroscopic technique. From electric transport properties it is interestingly observed that, the system has shown double positive temperature coefficient of resistance (PTCR) behaviour due to different transport mechanism of BaM-NBT and NBT-NBT interfaces in different temperature ranges. Magnetoimpedance study has been revealed the negative magnetoresistance [MR (%)] behaviour of both the interfaces. From magnetotransport properties of this nanocomposite system it is explored that BaM-NBT interfaces obey the small polaron tunnelling where NBT-NBT interfaces obey the over lapping large polaron tunneling mechanism for charge transportation.

Keywords: Composite, Impedance, Modulus, Magnetoimpedance