Low Temperature Magnetic and Dielectric Properties of the Perovskite-Based $Eu_2Bi_2Fe_4O_{12}$ Compound

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The monophasic polycrystalline ceramic perovskite-based $Eu_2Bi_2Fe_4O_{12}$, synthesized by the method of solid-state reaction is reported. X-ray diffraction technique in the Bragg-Brentano recipe and the Rietveld refinement reveal that this compound crystallizes in an orthorhombic structure with space group Pnma (#62) and lattice parameters a=5,6251(1) Å, b=7,7626(2) Å, c=5,4120(1) Å. The average grain size of 450 nm is calculated of a log-normal distribution and obtained by using scanning electron microscopy images. Results from magnetization and complex impedance measurements as a function of temperature (15K up to 400K) reveal a dielectric and magnetic relaxation process starting simultaneously at 150 K. The tendency of the curves of the real and the imaginary parts of the dielectric permittivity at higher temperatures has also shown strong dc conductivity contributions probably due porosity effects. The magnetization hysteresis loop at room temperature confirms that this new perovskite-based material has a ferromagnetic response.