

X-ray diffraction, Mössbauer spectroscopy, and magnetoelectric effect studies of multiferroic $\text{Bi}_5\text{Ti}_3\text{FeO}_{15}$ ceramics

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In this work multiferroic $\text{Bi}_5\text{Ti}_3\text{FeO}_{15}$ Aurivillius compound was prepared by the standard ceramic route and investigated using X-ray diffraction, Mössbauer spectroscopy, and magnetoelectric effect measurements. As it was proved by XRD studies a single-phased $\text{Bi}_5\text{Ti}_3\text{FeO}_{15}$ compound was obtained. Mössbauer studies revealed paramagnetic character of the compound at room temperature. Magnetoelectric measurements were carried out using lock-in dynamic method. The sample was placed into DC magnetic field with superimposed AC field. The value of magnetoelectric coupling factor α_{ME} monotonically increases with increasing frequency of AC magnetic field and saturates above 7 kHz reaching maximal value $\alpha_{ME} = 10.7 \text{ mV}\cdot\text{cm}^{-1}\cdot\text{Oe}^{-1}$. Additional magnetoelectric studies were carried out after initial electric polarization of the sample. The maximal value of the magnetoelectric factor $\alpha_{ME} = 20.7 \text{ mV}\cdot\text{cm}^{-1}\cdot\text{Oe}^{-1}$ was found being almost two times bigger than in the case without the initial polarization.