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Influence of the lanthanum content on the physical properties of Bi5Fe0.5Co0.5Ti3O15 multiferroic system
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The Aurivillius’ family systems, when doped with magnetic elements at the B-site of the structure, become potential candidates for practical applications as multiferroic systems. A magneto-electric four-layered structure (Bi5FeTi3O15) can be obtained by inserting BiFeO3 into Bi4Ti3O12, a classical three layers perovskite. The substitution of Fe3+ by Co3+ in the Bi5FeTi3O15 compound enhances the ferromagnetic properties with a remnant magnetization at room temperature around 3.9 memu/g. In this work, the Bi4.2La0.8Fe0.5Co0.5Ti3O15 ceramic system was prepared in order to evaluate the lanthanum influence on the physical properties of the Co3+ co-doped Bi5FeTi3O15 compound. A single-phase orthorhombic perovskite structure (A21am) has been identified by using X-ray diffraction technique. The Scanning Electronic Microscopy image, collected at room temperature, reveals well-defined plates-like grains in correspondence with the Aurivillius’s structure. Ferroelectric and magnetic hysteresis at room temperature showed the multiferroic character of the studied material with a remnant polarization and remnant magnetization of 0.14 µC/cm² and 0.44 emu/g, respectively. The obtained value for the remnant magnetization is higher than the previous reported for the Bi5Fe0.5Co0.5Ti3O15 multiferroic ceramic system, which suggests an interesting material for spintronic applications. The dielectric analysis showed an important effect of the electrical conductivity on the dielectric response. An anomalous behavior has been observed in the temperature dependence of the imaginary component of the dielectric permittivity, which is not observable for the real dielectric permittivity.

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