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Structural and multiferroic properties of $Bi_{0.885}Sm_{0.115}FeO_3$

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Abstract: The structural, vibrational, ferroelectric, and magnetic properties of monophasic and highly crystalline pure $BiFeO_3$ and $Bi_{0.885}Sm_{0.115}FeO_3$ solids as prepared by standard solid-state reaction route were reported. X-ray diffraction (XRD) patterns confirmed the rhombohedral *R*3*c* structure of both $BiFeO_3$ and $Bi_{0.885}Sm_{0.115}FeO_3$ ceramics. Rietveld refinements of XRD data revealed that the doping ions lead to unit cell contraction in three directions due to lower ionic radii of Sm^{3+} ion (0.96 Å) substituted at higher ionic radii Bi^{3+} ion (1.03 Å). The room temperature ferroelectric and magnetic hysteresis loops present the coexistence of magnetism and ferroelectricity in a single phase. The ferroelectric hysteresis loops exhibit an unsaturated behavior and represent a partial reversal of polarization at room temperature. Besides, this the room temperature magnetization measurement leads to an appearance of weak ferromagnetism.

Keywords: $Bi_{0.885}Sm_{0.115}FeO_3$, X-ray diffraction, Raman scattering, Multiferroic properties.
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