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## Structural and multiferroic properties of $\text{Bi}_{0.885}\text{Sm}_{0.115}\text{FeO}_3$

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**Abstract:** The structural, vibrational, ferroelectric, and magnetic properties of monophasic and highly crystalline pure  $\text{BiFeO}_3$  and  $\text{Bi}_{0.885}\text{Sm}_{0.115}\text{FeO}_3$  solids as prepared by standard solid-state reaction route were reported. X-ray diffraction (XRD) patterns confirmed the rhombohedral  $R3c$  structure of both  $\text{BiFeO}_3$  and  $\text{Bi}_{0.885}\text{Sm}_{0.115}\text{FeO}_3$  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  $\text{Sm}^{3+}$  ion (0.96 Å) substituted at higher ionic radii  $\text{Bi}^{3+}$  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:**  $\text{Bi}_{0.885}\text{Sm}_{0.115}\text{FeO}_3$ , X-ray diffraction, Raman scattering, Multiferroic properties.

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