

Effect of La, Mn and Ti doping on structural, dielectric, and magnetic properties of multiferroic $\text{Bi}_{0.5}\text{La}_{0.5}\text{Fe}_{0.5}\text{Mn}_{0.45}\text{Ti}_{0.05}\text{O}_3$

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In recent years, multifunctional materials have attracted valuable interest due to the coexistence of more than two properties simultaneously in one material e.g. multiferroicity. BiFeO_3 and BiMnO_3 are two interesting multiferroic materials which show both ferroelectricity and magnetic ordering comparatively at higher temperature. In this investigation we have synthesized $\text{Bi}_{0.5}\text{La}_{0.5}\text{Fe}_{0.5}\text{Mn}_{1-x}\text{Ti}_x\text{O}_3$ (where $x=0\%$ and 5%). The Rietveld refinement of X-ray diffraction patterns shows that the systems crystallize in orthorhombic Pnma space group (Figure 1). Observed Raman modes support the XRD results. Appearance of prominent A1-3 and weak E-2 modes in $\text{Bi}_{0.5}\text{La}_{0.5}\text{Fe}_{0.5}\text{Mn}_{1-x}\text{O}_3$ indicate the presence of chemically more active Bi-O covalent bonds. Ferroelectricity of the system $\text{Bi}_{0.5}\text{La}_{0.5}\text{Fe}_{0.5}\text{Mn}_{1-x}\text{O}_3$ is enhanced by Ti doped at Mn site (Figure 2 and 3).

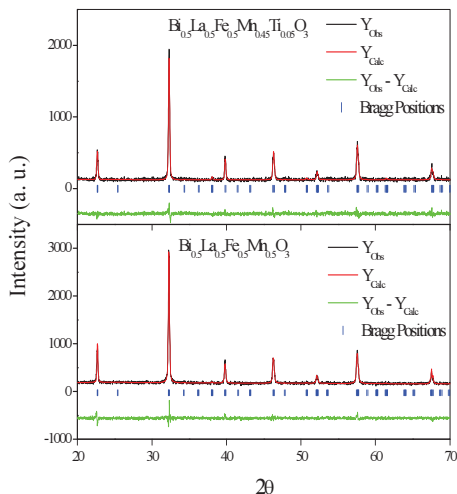


Figure 1: Rietveld refined X-ray diffraction patterns of $\text{Bi}_{0.5}\text{La}_{0.5}\text{Fe}_{0.5}\text{Mn}_{0.45}\text{Ti}_{0.05}\text{O}_3$.

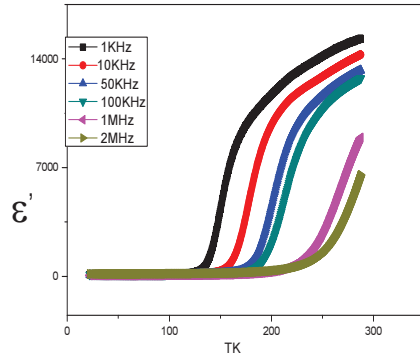


Figure 2: Variation in ϵ' for $\text{Bi}_{0.5}\text{La}_{0.5}\text{Fe}_{0.5}\text{Mn}_{0.45}\text{Ti}_{0.05}\text{O}_3$ at various frequencies as a function of temperature.

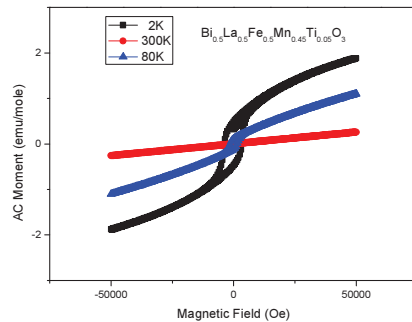


Figure 3: M-H loops of $\text{Bi}_{0.5}\text{La}_{0.5}\text{Fe}_{0.5}\text{Mn}_{0.45}\text{Ti}_{0.05}\text{O}_3$ at different temperatures.

Reference

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- A. K. Ghosh, G. D. Dwivedi, B. Chatterjee, B. Rana, A. Barman, S. Chatterjee, and H. D. Yang, *Solid State Commun.* 166, 22 (2013).