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Temperature dependent dielectric and ferroelectric studies of BiFeO3 thin film[1] ANAND P.S. GAUR, None, SUJIT K. BARIK, RAM S. KATIYAR, Dr. — Although $BiFeO_3$ (BFO) has received a lot of interest due to its good multiferroic properties at room temperature, high leakage current limit its usage for practical applications. Recently, it is found that these properties in thin films can be different due to strain effect induced by substrate, preparation conditions and electrode effects, etc. In this context, we have studied the temperature dependence of polarization and dielectric properties of BFO thin film by varying the bottom electrode thickness and using different electrodes. The strain dependent ferroelectric switching behaviors have also been investigated with a traditional ferroelectric tester and switching spectroscopy piezoresponse force microscopy (SS-PFM), respectively. We used pulsed laser deposition to fabricate thin films of BFO using Si (100) substrate and $SrTiO_3$ (STO) as buffer layer with different bottom electrodes such as $SrRuO_3$ (SRO), $LaNiO_3$ (LNO) and Pt/Si. The thickness of STO layer is kept fixed around 70 nm and the thicknesses of BFO and electrode layer were varied from 70 nm to 200nm. The layers were grown under optimized conditions and polycrystalline nature is found from room temperature XRD. A large enhancement of polarization is found while using LNO electrode and also with reducing the thickness of BFO layer. The remnant polarization and cohesivity also shows large increase with increaisng temperature, although leakage current increases significantly.

[1]NSF

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