High temperature dielectric anomaly induced by external magnetic field on highly strained epitaxial $Bi(Fe_{0.5}Mn_{0.5})O_3$ thin films

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We report on the single phase stabilization of $Bi(Fe_{0.5}Mn_{0.5})O_3$ (BFMO) perovskite thin films deposited on $SrTiO_3$(001)-Nb(0.5%) by pulsed laser deposition. Temperature dependent impedance spectroscopy, SQUID magnetometer and VNA-FMR measurements were used to determine their dielectric and magnetic properties as a function of epitaxial strain and crystal texture. Magnetic measurements show evidence of magnetic ordering on the films with an estimated magnetic transition at ≈560K, feature not observed in bulk. The small magnetization of 0.4 μB/f.u. at room temperature exceeds the theoretical 0.2 μB/f.u. for ferrimagnetism, thus suggesting the influence of spin canting effect. Finally the magneto-electric coupling is discussed as a result of the dielectric measurements performed with and without magnetic field. A large dielectric anomaly is observed at ≈440K under a magnetic field suggesting large magneto-electric coupling well above room temperature.