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Investigations on multiferroic characteristics of sol-gel synthesized (1-x) Pb ($Fe_{0.5}Nb_{0.5}$)O_3 x $PbTiO_3$ thin films S.B. MAJUMDER[1], V. RAJASEKARAKUMAR, R.S. KATIYAR, University of Puerto Rico, A. MANIVANNAN, West Virginia University — $Pb(Fe_{0.5}Nb_{0.5})O_3$ (PFN) ceramics exhibit very high dielectric constant and therefore it is an attractive candidate for multilayer capacitors. From our earlier studies on bulk PFN ceramics we have found that the paraelectric to ferroelectric phase transition temperature (T_c) is diffused in nature with a dielectric constant $\sim$ 58000 (measured at 1 kHz) at T_c ($\sim$390K). The process optimized perovskite PFN ceramics also exhibit room temperature ferromagnetic behavior, and therefore, PFN ceramics qualify as typical multiferroic materials. To promote the perovskite phase formation and reduce the loss tangent in PFN, we have synthesized solid solution thin films of PFN with $PbTiO_3$ (PT) deposited on platinized silicon and single crystalline strontium titanate substrates. The PT contents were systematically varied up to 40.0 at % and the films were characterized in terms of their phase formation behavior, microstructure evolution, dielectric and ferroelectric properties. Unlike bulk ceramics, PFN thin films on strontium titanate substrates exhibited typical anti-ferromagnetic ordering with a Neel temperature $\sim$ 120K. The effect of PT contents on the magnetic ordering of PFN-PT thin films will be discussed.

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