Abstract Submitted
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Effect of periodicity on order parameters of multiferroic superlattices[1] SHALINI KUMARI, NORA ORTEGA, Department of Physics and Institute for Functional Nanomaterials, University of Puerto Rico, San Juan, PR 00931-3334, USA, ASHOK KUMAR, National Physical Laboratory (CSIR), Delhi, India, RAM KATIYAR, Department of Physics and Institute for Functional Nanomaterials, University of Puerto Rico, San Juan, PR 00931-3334, USA — Superlattice (SL) structures with alternating perovskite oxide layers have attracted enormous attention due to involved fascinating physics and technology. The half-metallic oxide $La_{0.67}Sr_{0.33}MnO_3$(LSMO) and multiferroic $Pb(Zr_{0.53}Ti_{0.47})_{0.60}(Fe_{0.5}Ta_{0.5})_{0.40}O_3$(PZTFT) materials have been chosen to fabricate SLs by pulsed laser deposition technique on cubic LSAT substrates with LSMO or $LaNiO_3$ as bottom electrodes. X-ray diffraction studies revealed superlattice structure with satellite peaks modulated around main peaks. Atomic force microscopy studies disclosed a systematic decrease in grain size with decrease of modulation periodicity (Λ) in SLs. Piezo force microscopy studies of SL films confirmed ferroelectricity at a nanoscale level. XPS studies of SLs with Λ =5 nm confirmed the existence of all elements in the films. A relatively small reduction in saturation magnetization from 28 to 20 emu/cm^3 at H=5 kOe, remanant polarization from 21 to 10 μC/cm^2 and increase in dielectric constant from 530 to 743 were observed with decrease of Λ.The observed features will be explained in context of finite size, interfaces, stress, lattice distortion, and grain sizes effects.

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