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Electrical and Optical Study of Multiferroic Superlattices SANDRA DUSSAN, ASHOK KUMAR, RAM KATIYAR, Department of Physics and Institute for Functional Nanomaterials, University of Puerto Rico, San Juan, Puerto Rico 00931, USA — Highly oriented superlattices (SL) of ferroelectric (piezoelectric) $PbZr_{0.52}Ti_{0.48}O_3$ (PZT) and ferromagnetic $La_{0.67}Sr_{0.33}MnO_3$ (LSMO) materials were grown on $LaAlO_3$ (100) substrates by pulsed laser deposition technique. The x-ray diffraction patterns of PZT/LSMO superlattices with different periodicity evidenced satellite peaks suggest the formation of SL without any secondary parasite phases. Surface topography showed well defined grain with surface roughness ∼2-5nm. Grain size and surface roughness changes with change of periodicity. Room temperature magnetization-field (M-H) exhibit well-shaped magnetization hysteresis loops good saturation and low coercivity. The structural, electrical and magnetic properties were studied. Polarized Raman Spectra showed soft transverse and longitudinal modes at 123 cm^{-1} which soften near the ferroelectric phase transition of SLs. The electrical studies were conducted to understand the frequency and temperature dependent dielectric anomalies around to metal-ferromagnetic to insulator-paramagnetic transition temperature of LSMO.

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