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Structural Characterization of Strain Relaxed (100)-Oriented $Nd_{0.5}Sr_{0.5}MnO_3$ Thin Films DI LU, GLAM & Dept. of Physics, Stanford Univ., YASUYUKI HIKITA, SIMES, SLAC Nat. Acc. Lab., ARTURAS VAILIONIS, SSRL, SLAC Nat. Acc. Lab. & GLAM, Stanford Univ., HIROKI SATO, SIMES, SLAC Nat. Acc. Lab. & Dept. of Adv. Mater. Sci., Univ. of Tokyo, BONGJU KIM, GLAM, Stanford Univ., TAKEAKI YAJIMA, SIMES, SLAC Nat. Acc. Lab. & Dept. of Adv. Mater. Sci., Univ. of Tokyo, CHRISTOPHER BELL, SIMES, SLAC Nat. Acc. Lab., HAROLD HWANG, SIMES, SLAC Nat. Acc. Lab. & GLAM, Stanford Univ. — Half-doped manganites exhibit intriguing charge ordering (CO) properties. Pseudocubic (110)-oriented thin films can preserve bulk properties and show a charge ordering-ferromagnetic (CO-FM) transition. However, for (100) oriented films grown on traditional perovskite substrates, no CO-FM transition has been reported so far. Here we successfully realized the CO-FM transition in (100)-oriented $Nd_{0.5}Sr_{0.5}MnO_3$ (NSMO) thin films grown on $SrTiO_3$ substrates by inserting a perovskite-like flexible buffer layer $Sr_3Al_2O_6$. From temperature-dependent X-ray elastic scattering, we observed changes in the NSMO lattice constants exactly at the CO-FM transition temperature determined from transport and magnetization measurements. Moreover, we observed CO peaks suggesting a different ordering pattern compared to the bulk or (110)-oriented thin films. These results provide new opportunities to create and study novel electronic ground states unexplored in films grown on the rigid substrates used up to now.

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