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Ultra-thin Perovskite Manganite films on SrTiO₃ and SrTiO₃/Si heterostructures A. PRADHAN, Norfolk State University, D. HUNTER, K. ZHANG, B. LASLEY, K. LORD, T.M. WILLIAMS, R.R. RAKHIMOV, Center for Materials Research, Norfolk State University — We report on the growth and characterization of high-quality ultra-thin La_{0.7}Ba_{0.3}MnO₃ and La_{0.7}Sr_{0.3}MnO₃ epitaxial films on SrTiO₃ and SrTiO₃-buffered Si (100) and Si (111) substrates by pulsed-laser deposition. The films demonstrate remarkable magnetic and electrical properties associated with the colossal magnetoresistance behavior at and above room temperature. The enhanced transition temperature of manganite films on buffered Si substrates is discussed in terms of the strain relaxation at the interface between the manganite film and the SrTiO₃ buffer layer which is caused by the smaller grain size. We also report the doping of Ru (x=0.3 to 0.4) into Mn sites in LSMO films grown both on STO and STO buffered Si. The films display remarkable hardening of H_c due to the charge-transfer-enhanced exchange coupling. We have optimized doping for the compensation of hole doping by the valence effect of Ru. This effect has been explained in terms of the charge transfer between the Mn⁴⁺ and Ru⁴⁺ species and ferromagnetic interaction between the resultant Mn³⁺ and Ru^{5+/4+}. The electrons in Ru⁴⁺ partially occupy the degenerated t_{2g} orbitals due to the fact that Ru is a heavy metal, we expect a single-ion anisotropy of Ru spins through a spin-orbit channel. This structure is highly applicable for fabrication of the magnetic tunnel junctions.

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