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Tuning the metal-insulator transition temperature of $Sm_{0.5}Nd_{0.5}NiO_3$ thin films via strain H. JEFFREY GARDNER, VIJAY SINGH, LE ZHANG, XIA HONG, Department of Physics and Astronomy, University of Nebraska-Lincoln, NE 68588 — We have investigated the effect of substrate induced strain and film thickness on the metal-insulator transition of the correlated oxide $Sm_{0.5}Nd_{0.5}NiO_3$ (SNNO). We have fabricated epitaxial 3 – 40 nm thick SNNO films on (001) $LaAlO_3$ (LAO), (001) $SrTiO_3$ (STO), and (110) $NdGaO_3$ (NGO) via off-axis RF magnetron sputtering. The SNNO films are atomically smooth with (001) orientation as determined by atomic force microscopy and x-ray diffraction. SNNO films grown on LAO, subject to compressive strain, exhibit a sharp metal-insulator transition at lower temperatures. Conversely, films grown on STO and NGO, subject to tensile strain, exhibit a smeared albeit above room temperature metal-insulator transition. For all substrates, we have observed that the metal-insulator transition temperature (T_{MI}) increases monotonically with decreasing film thickness until the electrically dead layer is reached (below 4 nm). We discuss the effect of strain and oxygen deficiencies on the T_{MI} of SNNO thin films.

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