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Linear Crack Arrays and Resistive Anisotropy in $\text{Nd}_{0.2}\text{Sr}_{0.8}\text{MnO}_3$ Thin Films Under Tensile Strain* KRISHNA NEUPANE, JOSHUA COHN, University of Miami, JOHN NEUMEIER, Montana State University — The structure, morphology, and electrical properties of epitaxial a -axis oriented thin films of $\text{Nd}_{0.2}\text{Sr}_{0.8}\text{MnO}_3$ are reported for thicknesses $10 \leq t \leq 150$ nm. Films with $t \geq 20$ nm grown under tensile stress on NdGaO_3 (100) and LSAT (110) substrates develop uniform linear crack arrays (cracks running along film c axis) with a crack spacing ($0.3\text{-}10 \mu\text{m}$) that decreases with increasing thickness. Films grown under compression on $\text{LaAlO}_3(110)$ substrates exhibit no cracks. The room-temperature in-plane electrical resistance ratio, ρ_b/ρ_c , increases approximately exponentially with increasing film thickness to values of ~ 1000 in the thickest films studied. The temperature dependencies for ρ_b and ρ_c are essentially identical, suggesting that very long effective transport paths perpendicular to the cracks are responsible for enhanced values of ρ_b .

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