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Linear Crack Arrays and Resistive Anisotropy in $Nd_{0.2}Sr_{0.8}MnO_3$ 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 $Nd_{0.2}Sr_{0.8}MnO_3$ 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 (0.3-10 μm) that decreases with increasing thickness. Films grown under compression on $LaAlO_3$(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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