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Ordered phase separation in low dimensional manganite thin films B. KIM, C. BELL, Y. HIKITA, SIMES, SLAC. Nat. Acc. Lab., H.Y. HWANG, GLAM, Stanford University — Two central challenges in ultra-thin oxide films are to understand the fundamental properties of low dimensional materials, and to create novel electronic ground states. In this context, manganites are of interest due to their complex phase diagrams which depend on the electronic band width. Here, we study in detail ultra-thin $\text{La}_{0.7}\text{Sr}_{0.3}\text{MnO}_3$ films on TiO_2 terminated SrTiO_3 (001) substrates around the dead layer thickness. We find a strong anisotropy in the electronic transport properties depending on the current flow direction with respect to the step and terrace direction just above the dead layer thickness. Furthermore, the magnetoresistance showed significant differences when the bias current was parallel and perpendicular to the steps. This suggests the presence of an emergent insulating phase at the step edges and ordered phase separation in these low dimensional complex oxide films.

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