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Emergent Phenomena in La5/8Ca3/8MnO3 /Pr5/8Ca3/8MnO3 Superlattices ZHU YINYAN, DU KAI, ZHANG KAI, YIN LIFENG, SHEN JIAN, Fudan University — In this work, we study the magnetic and transport properties of La5/8Ca3/8MnO3 (LCMO)/Pr5/8Ca3/8MnO3(PCMO) superlattices. For comparison, La1−x−yPryCaxMnO3 (LPCMO) thin films with the same nominal doping concentration have also been grown and characterized. The spatial rearrangement of the doped cations and the presence of interfaces appear to have dramatic effect on the physical properties of the superlattices. Specifically, the transport and magnetic properties of the [LCMO2n/PCMOn]t show strong dependence on n, which differ greatly from those of the La10/24Pr5/24Ca3/8MnO3 thin films. It is especially striking that the n=1 superlattice has a metal-insulator transition temperature that nearly 100 K higher than that of the La10/24Pr5/24Ca3/8MnO3 thin film. These emergent phenomena are caused by the interplay between interfacial effect and artificial chemical phase separation between two contrasting ground states along the film stacking direction.

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