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Tunable strain-induced phase transitions in manganite thin films on BaTiO3 substrate WENGANG WEI, JINJIE CHEN, KAI ZHANG, ZHANG DU, WENBIN WANG, LIFENG YIN, JIAN SHEN, Fudan Unversity — The transport and magnetic properties of manganites depend sensitively on the lattice parameters, which can be conveniently tuned by the epitaxial strain in thin films. In an extreme case of manganites thin films grown on ferroelectric BaTiO3 (BTO), sudden jumps of both magnetization and resistivity have been observed upon cooling (or warming) in accordance with the temperature-dependent structural transitions of the BTO substrate. Surprisingly, both up and down jumps have been reported for both magnetization and resistivity of the LCMO films at the same temperature point where BTO undergoes a structural transition from orthorhombic to rhombohedra. Here we solve the puzzle by showing that the physical origins of the up and down jumps of both magnetization and resistivity are tied to the relative orientations of c-axis of the BTO substrate with respect to the LCMO film plane during the structural transition. Based on this understanding, we demonstrate the ability to control the up and down jumps by electric field poling of the BTO substrate upon cooling.

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