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Manipulation of magnetic phase separation and orbital occupancy in manganites by strain engineering and electric field BIN CUI, CHENG SONG, FENG PAN, Tsinghua Univ, KEY LABORATORY OF ADVANCED MATERIALS (MOE) TEAM — The modification of electronic phases in correlated oxides is one of the core issues of condensed matter. We report the reversible control of ferromagnetic phase transition in manganite films by ionic liquid gating, replicating the $La_{1-x}Sr_xMnO_3$ (LSMO) phase diagram. The formation and annihilation of an insulating and magnetically hard phase in the soft magnetic matrix, which randomly nucleates and grows across the film, is directly observed under different gate voltages (V_G). The realization of reversible metal-insulator transition in colossal magnetoresistance materials can lead to the development of four-state memories. (Adv Funct. Mater. DOI: 10.1002/adfm.201402007) The orbital occupancy and magnetic anisotropy of LSMO films are manipulated by V_G in a reversible and quantitative manner. Positive and negative V_G increases and reduces the occupancy of the orbital and magnetic anisotropy that were initially favored by strain (irrespective of tensile and compressive), respectively. This finding fills in the blank of electrical manipulation of four degrees of freedom in correlated system. [Adv Funct. Mater. (revised)]

Bin Cui
Tsinghua Univ

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