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The observation and control of electronic nematic phase in manganites by stripy domains CHANGCHENG JU, School of physics,Nanjing University — During the past decades, novel electronic liquid crystal phases have been revealed in strongly correlated electronic systems, especially the electronic nematic phase in strontium ruthenate and superconductors. Transport measurements show strongly transport anisotropies in these otherwise isotropic electronic systems. In this work, we report 71° striped ferroelectric domains created in BiFeO3 can also epitaxially lock the perovskite manganites leading to the emerge of an electronic nematic phase. Firstly, La1-xSrxMnO3/BiFeO3 (LSMO/BFO) bilayer samples are deposited by PLD. The 71° periodic striped ferroelectric domains and coherent growth are demonstrated by PFM and X-ray rocking curve. X-ray reciprocal space mapping have been used to confirm the epitaxial relationships of the layers and in-plane lattice constants. Transport measurements reveal a nematic phase transition without high magnetic fields. By changing the thickness of BFO and LSMO layer respectively, we observed substantial anisotropic resistivities and a shift of transition temperature for nematic phase and M-I transition. Unlike the other electronic liquid crystals, magnetic fields perpendicular to the film can suppress the appearance of nematic phase. XMCD and NEXAFS at the Mn L2, 3 edge revealed an in-plane preferential occupation of orbitals and a broken rotational symmetry for Mn-O-Mn bonds at nematic phase. At last, we also demonstrate a nonvolatile electric-field control of anisotropic resistivity switching.

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