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Anisotropic magnetotransport behavior in electronic phase-separated $La_{0.67}Ca_{0.33}MnO_3$ (LCMO) films under anisotropic strain[1]
LONGQIAN HU, LIUQI YU, STEPHAN VON MOLNAR, PENG XIONG, Florida State University, LINGFEI WANG, WENBIN WU, University of Science and Technology of China — Anisotropic transport measurements have been performed on LCMO films grown on $NdGaO_3$ (001) substrates. Three samples from a film 48 nm thick were post-annealed for 1.5h, 5h and 20h to produce increasing degrees of anisotropic strain, which promotes electronic phase separation (PS). As demonstrated previously, the presence and growth of antiferromagnetic insulating (AFI) regions in the samples can be controlled by the strain, resulting in a state of coexisting ferromagnetic metallic (FMM) and AFI domains. To study the effects of the strain anisotropy on the PS and formation of the AFI states, we carried out simultaneous magnetotransport measurements along the two orthogonal in-plane directions using an L-bar geometry. Substantial anisotropy in the temperature and magnetic field dependent resistivity between the two directions was observed, implying the formation of the AFI states has an orientation preference under the anisotropic strain. These differences are dramatically enhanced with increasing strain. Furthermore, accompanying the emergence of the AFI states, a glass-like behavior signified by time relaxation was observed in the field-dependent resistivity, which provides new insight into the dynamics of the phase-separated AFI and FMM domains.

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