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Effect of strain and disorder in manganite thin films SUNG HEE YUN, RAJIV MISRA, BEN DEGLEE, JACOB TOSADO, TARA DHAKAL, ARTHUR HEBARD, AMLAN BISWAS, Department of Physics, University of Florida — We have studied the effect of strain and disorder on the phase separated state in thin films of the manganite $(La_{1-y}Pr_y)_{0.67}Ca_{0.33}MnO_3$(LPCMO, y = 0.4, 0.5, 0.6) grown on (110) $NdGaO_3$ substrates using pulsed laser deposition. Due to the competition between the charge-ordered insulating and ferromagnetic metallic phases, thin films of LPCMO display a fluid-like phase separation (FPS) near the insulator-to-metal transition temperature. By applying direct mechanical stress on the LPCMO thin films using a three-point beam bending technique, we observed a colossal piezoresistance in the FPS state of these materials. Our observations show that a small amount of strain ($\sim 10^{-4}$) can move the phase boundaries in the FPS state. We then modified the extrinsic disorder in the thin films by bombarding them with Ar-ions. Our measurements show a reduction of piezoresistance in the ion-bombarded samples which suggests that such extrinsic disorder can pin the phase boundaries and reduce the fluidity of the FPS state.

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