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The electric field effect on the electronic soft matter in the manganite ($\mathbf{L}_{1-y}\mathbf{Pr}_y)_{0.67}\mathbf{Ca}_{0.33}\mathbf{MnO}_3$($y$=0.4, 0.5 and 0.6) TARA DHAKAL, JACOB TOSADO, SUNGHEE YUN, AMLAN BISWAS, Department of Physics, University of Florida — Hole-doped manganites are known for their colossal magnetoresistive (CMR) property and insulator to metal phase transition near their curie temperatures. For certain compositions of manganites a coexistence of a charge ordered insulating (COI) and ferromagnetic metallic (FMM) phases has been observed. Changing the temperature, magnetic field or strain modifies the spatial arrangement and relative proportions of these two phases, in this mixed phase state. This property suggests the existence of electronic soft matter in manganites. We have studied the properties of the electronic soft matter in one such material $(La_{1-y}Pr_y)_{0.67}Ca_{0.33}MnO_3$(LPCMO, y=0.4, 0.5 and 0.6). We have grown thin films of LPCMO using pulsed laser deposition. To understand the dynamics of the local phase, we have experimentally mapped the temperature-magnetic field ($T-H$) phase diagram of this material. The phase diagram shows 4 distinct regions, namely the COI state, the fluid phase separated state (FPS), the static phase separated state (SPS), and the FMM state. We have measured the effect of an electric field on this phase diagram and observed that the electric field can significantly modify the FPS state. We will explain the reason behind the electronic soft matter like behavior in the FPS state and the origin of the electric field effect in manganites.

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