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Influence of substrate strain on $(La_{1-x}Pr_x)_{1-y}Ca_yMnO_3$ phase transition DANE GILLASPIE, J.X. MA, Univ. of Tenn Physics Dept. and ORNL, H-Y. ZHAI, ORNL, Z. WARD, E.W. PLUMMER, Univ. of Tenn Physics Dept. and ORNL, H. CHRISTEN, ORNL, J. SHEN, Univ. of Tenn Physics Dept. and ORNL — The large-scale phase separation between ferromagnetic metallic (FMM) and charge-ordered insulating (COI) domains observed in $(La_{1-x}Pr_x)_{1-y}Ca_yMnO_3$ (LPCMO) crystals has attracted a lot of attention. This coexistence of phases is very sensitive to structural and magnetic changes, and is responsible for the enhanced magnetoresistance in LPCMO compared to its parent compounds. The energy balance of the FMM and COI phases is still not well understood. We can change the energy balance by changing the substrate, and therefore the strain on the thin film, and thereby improve our understanding of the phase transition. We have grown and characterized several different thicknesses of LPCMO on $LaAlO_3$, $SrLaGaO_4$, $NdGaO_3$ and $SrTiO_3$ substrates. We have observed that the compressive strain from the $LaAlO_3$ substrate suppresses the long-range charge ordering in the sample, and enhances magnetoresistance and magnetic hysteresis. The charge ordering is also suppressed in the films on $SrLaGaO_4$, even though the strain is negligible. Conversely, the tensile strain from the $NdGaO_3$ and $SrTiO_3$ substrates enhances the long-range charge ordering and reduces the magnetoresistance and magnetic hysteresis. *Oak Ridge National Laboratory, managed by UT Battelle for the U.S. Dept. of Energy under contract DE-AC05-00OR22725

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