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STM studies of electronic inhomogenities in $La_{0.35}Pr_{0.275}Ca_{0.375}MnO_3$ thin films A. K. GUPTA, UDAI RAJ SINGH, S. CHOWDHURY, R. C. BUDHANI, Physics Department, Indian Institute of Technology, Kanpur-208016, INDIA — We report on temperature dependent STM/S measurements of Laser ablated epitaxial thin films ($\simeq 400\text{nm}$ thick) of $La_{0.35}Pr_{0.275}Ca_{0.375}MnO_3$ (LPCMO) on $NdGaO_3$ (NGO) substrate. Four-probe resistivity measurement on this film shows a sharp transition near 145K (T_{MI}) and a significant hysteresis with temperature between 90K and 160K. The topographic STM images show a clean terraced surface at all temperatures (77-350K) with mono-atomic steps and terrace width of 300-400nm. Some inhomogenities are observed in the conductance images on a length scale of $\simeq 20\text{nm}$ and more apparent near the terrace steps. Although spatial variations in spectra are seen at all temperatures but with some common features that evolve with temperature. The spectra become gap-like below 210K (i.e. T_{CO}) and with cooling this charge-ordering (CO) gap becomes more pronounced with a magnitude of 0.4-0.5eV. This shows an increase in the strength of the CO order parameter and makes us believe that with cooling the CO fraction in the phase-separation scenario is not decreasing with temperature. In this case the large resistivity change at T_{MI} may have to invoke a third phase (other than metallic and CO phases) that becomes metallic with cooling rather than CO fraction melting into metallic phase.

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