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Optimization of growth conditions for $(La_{1-y}Pr_y)_{1-x}Ca_xMnO_3$ thin films on annealed oxide substrates[1] BRIAN SCHAEFER, DANIEL GRANT, AMLAN BISWAS, Department of Physics, University of Florida, Gainesville, FL 32611 — Consistent growth of flat, epitaxial thin films is essential for uncovering the unique transport characteristics of rare-earth manganite systems. We have developed pulsed laser deposition growth conditions for $(La_{1-y}Pr_y)_{1-x}Ca_xMnO_3$ (LPCMO, $y = 0.4, 0.5, 0.6$) thin films on annealed $NdGaO_3$ (NGO) and $SrTiO_3$ (STO) substrates. The extra annealing step for NGO and STO produces atomically flat substrates with well-defined terraces of unit cell step height. Films grown on these annealed substrates demonstrate better lattice matching compared to films grown on as-received substrates. Consequently, annealing substrates before film growth leads to higher quality thin films with a more controllable thickness. We demonstrate that these optimized growth parameters yield LPCMO thin films that are also atomically flat, as confirmed by atomic force microscopy. We are using these thin films to restrict phase growth to reduced dimensions and to study the origin of thermodynamic phase competition due to first order transitions in manganites.

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Amlan Biswas
Department of Physics, University of Florida, Gainesville, FL 32611

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