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Electronic and magnetic properties of $Ca_{2-x}Sr_xRuO_4$ epitaxial thin films[1] LUDI MIAO, WENYONG ZHANG, PUNAM SILWAL, XIAOLAN ZHOU, ILAN STERN, JIN PENG, Tulane University, LEONARD SPINU, University of New Orleans, ZHIQIANG MAO, DAEHO KIM, Tulane University — Strongly correlated $Ca_{2-x}Sr_xRuO_4$ (CSRO) has attracted much attention for its rich physical properties such as Mott metal-insulator (MI) transition, antiferromagnetism (AFM), and spin-triplet superconductivity. We have grown epitaxial CSRO thin films on $LaAlO_3$ (001) substrates using a pulsed laser deposition method and investigated their electronic and magnetic properties. Ca_2RuO_4 thin films show strong compressive strain leading to an itinerant ferromagnetic (FM) phase coexisting with insulating AFM phase in the ground state and a suppressed broad and gradual MI transition. This is in sharp contrast to bulk Ca_2RuO_4, which exhibits an AFM Mott-insulating ground state and sharp MI transition. While the x=0.1 and 0.5 CSRO films also exhibit coherent strain, the MI transition and itinerant ferromagnetism are partially suppressed in the x=0.1 film and fully suppressed in the x=0.5 film. In contrast, Sr_2RuO_4 thin films are not susceptible to strain on any perovskite substrates including $LaAlO_3$; superconductivity in these films is suppressed due to disorders resulting from strain relaxation.

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