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Epitaxial Growth of Ca_2IrO_4 Single-Crystal Thin-Films MARYAM SOURI, JOHN H. GRUENEWALD, JASMINKA TERZIC, GANG CAO, JOSEPH W. BRILL, SUNG S. AMBROSE SEO, Univ of Kentucky — Complex oxides containing $5d$ transition metals including iridates have attracted substantial attention due to their potential to create novel electronic and magnetic states that originate from strong spin–orbit coupling and the electron-correlation of $5d$ electrons. However, the progress of experimental research on the $5d$ transition-metal oxides is hindered by the limited number of available materials. To further understand the layered iridates (A_2IrO_4, A: alkaline-earth elements) featuring the J_{eff} =1/2 Mott state, we have synthesized epitaxial thin-films of Ca_2IrO_4. The single crystal Ruddlesden-Popper (R-P) phase of $Ca_{n+1}Ir_nO_{3n+1}$ (n=1) is thermodynamically unstable; hence, we have used epitaxial-stabilization strategies to grow metastable thin-films of Ca_2IrO_4. The R-P phase of Ca_2IrO_4 is synthesized on yttrium aluminum oxide and lanthanum aluminum oxide substrates by pulsed laser deposition. We have studied the electronic structure of these films by transport and optical spectroscopic measurements. The dc-resistivity shows that these Ca_2IrO_4 thin-films are insulating with activation energy of about 100 meV. The optical spectroscopy shows that the optical gap energy is about 0.5 eV. We will discuss the electronic structure of Ca_2IrO_4 by comparing with Sr_2IrO_4 and Ba_2IrO_4.

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