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Tuning Electronic Structure of Epitaxial Sr_2IrO_4 Thin Films via Strain[1] S.S.A. SEO, J. NICHOLS, J. TERZIC, E.G. BITTLE, O.B. KORNETA, L.E. DE LONG, J.W. BRILL, G. CAO, Department of Physics & Astronomy, University of Kentucky — Recent research on Sr_2IrO_4 has shown that the energy scale associated with spin-orbit coupling is comparable to the crystal-field energy and the on-site Coulomb interaction. The strong competition between these fundamental interactions creates the potential for the emergence of novel electronic states. To understand the physics of Sr_2IrO_4 and to find a way of tuning its multiple competing interactions, we have investigated the transport, magnetic, and optical properties of *c*-axis oriented Sr_2IrO_4 epitaxial thin films grown on various oxide substrates. Under tensile (compressive) strain, increased (decreased) Ir-O-Ir bond-angles are expected to result in increased (decreased) electronic bandwidths. However, the films under various strains have little change in their transport properties. In optical spectroscopic measurements, we have observed that two optical absorption peaks near 0.5 eV and 1.0 eV are shifted to higher (lower) energies under tensile (compressive) strain, indicating that the electronic-correlation energy is affected by in-plane lattice-strain and interlayer-spacing. Our observations strongly suggest that not only the electronic bandwidth, but also the magnitude of the electronic correlation energy can be manipulated by lattice strain, which provides an important insight into the physics driven by the coexistence of strong spin-orbit coupling and electronic correlation.

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