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Heterostructuring iridate-based spin-orbit Mott materials JIAN LIU, DI YI, CLAUDY R. SERRAO, JIUN-HAW CHU, S. SURESHA, ASHVIN VISHWANATH, UC Berkeley, ELKE ARENHOLZ, Lawrence Berkeley National Laboratory, XAVI MARTI, RAMAMOORTHY RAMESH, UC Berkeley — Mott materials with strong spin-orbital coupling (SOC) have emerged as a new playground for searching quantum many-body phases with exotic electronic and magnetic properties. Numerous attentions have been paid to 5d transition metal oxides due to the intriguing opportunities to obtaining novel topological insulators, superconductivity, Weyl semimetals, quantum spin liquid, and so on. While realizing these fascinating phenomena would lead to a new generation of electronic and spintronic devices, the rich physics derived from the cooperation of strong correlation and SOC remains to be explored. Here we present our investigation on using epitaxy to control perovskite-based strontium iridates, a prototype of 5d complex oxides, as ultrathin films and heterostructures. We utilize epitaxial stabilization, strain, confinement and interfacial coupling to tune the competing interactions and the multiple degrees of freedom. The combination of these various controls offers a unique pathway to novel phase behaviors and innovative functions. Our experimental findings derived from transport, magnetometry and advanced resonant x-ray spectroscopy, including linear and circular dichroism, will be discussed.

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