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Tuning intralayer and interlayer couplings in artificial layered structure of perovskite iridate LIN HAO, Univ of Tennessee, Knoxville, DEREK MEYERS, Brookhaven National Lab, CLAYTON FREDERICK, JUNYI YANG, Univ of Tennessee, Knoxville, MARK DEAN, Brookhaven National Lab, JIAN LIU, Univ of Tennessee, Knoxville — Layered Ruddlesden-Popper series Srm+1IrmO3m+1 iridates have attracted great attention recently for their novel Mott insulating state, spin-orbit Heisenberg magnetism, and latent superconductivity. While intense investigation has been devoted to the bulk crystals, their electric and magnetic properties may be mimicked and tailored by confining ultrathin SrIrO3 layers in artificial superlattices, which affords a versatile platform for tuning the competing interactions. In our present work, we have varied both intralayer and interlayer couplings by preparing [(SrIrO3)m, (SrTiO3)n] (m = 1, 2, 3, 4, and ∞, while n = 1, 2, 3) superlattices through layer-by-layer epitaxial growth. Such a thorough dimensionality-modulation is absent in the bulk but can provide unique insight into the spin-orbit-entangled Mott physics. The results from a combination of synchrotron x-ray diffraction, spectroscopy, electrical and magnetic measurements reveal the interplay between m and n, and a control over the structural, electronic, and magnetic degrees of freedom.

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