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Manipulating the electronic structure and magnetism of spin-orbit Mott insulator by tailoring superlattices

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In this talk, we will introduce how to fabricate and study the artificial 5d iridate superlattices by the combo of oxide molecular beam epitaxy (OMBE), in-situ angle-resolved photoemission spectroscopy (ARPES) and X-ray magnetic circular dichroism (XMCD) techniques.
We successfully fabricated a series of $[(SrIrO3)_m/(SrTiO_3)]_n/SrTiO_3(100)$ superlattices using the layer-by-layer OMBE. The high crystalline quality has been confirmed by both Atomically resolved HAADF-STEM and X-ray diffraction measurements. In this series of superlattices, the metal-insulator transition (MIT) is introduced by tuning the thickness of $SrIrO_3$ interlayer. Besides, the emergent interfacial magnetism by such an artificial dimensionality control of iridates is realized.
The mechanism of this MIT and the elemental specificity of magnetism have been then investigated by the in-situ ARPES system and the XMCD, respectively. Our results could provide a comprehensive understanding of the phase transition in this spin-orbit Mott insulator.

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