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Novel magnetic and electronic states in manganite-iridate heterostructures[1] JOHN NICHOLS, SHINBUHM LEE, JON PETRIE, TRICIA MEYER, XIANG GAO, ERJIA GUO, Oak Ridge National Laboratory, JOHN FREELAND, Argonne National Laboratory, DI YI, JIAN LIU, University of Tennessee, DANIEL HASKEL, Argonne National Laboratory, THOMAS ZAC WARD, GYULA ERES, VALERIA LAUTER, MICHAEL R. FITZSIMMONS, HO NYUNG LEE, Oak Ridge National Laboratory — Strong correlation between spin, charge, lattice, and orbital order parameters has proven to give rise to exotic physical phenomena, while epitaxial design of materials with strong interfacial coupling is an efficient technique to tune such parameters. Although there have been numerous studies of interfaces between $3d$-$3d$ and $4d$-$3d$ compounds, only few studies reported work on $3d$ and $5d$ materials and there has been no report on strong interfacial coupling in such systems. We have synthesized high quality $[(AMnO_3)_m/(SrIrO_3)_n]_z$ (A = Sr, La) heterostructures by pulsed laser epitaxy on $SrTiO_3$ (001) substrates and have observed interesting novel magnetic and electronic ground states, which are highly sensitive to the degree of dimensional confinement in the heterostructures. Based on studies with x-ray diffraction, SQUID, *dc*-transport, x-ray circular dichroism, and polarized neutron reflectometry measurements, we will report intriguing magnetic and transport properties that provide the first evidence of strong interfacial coupling between $5d$ and $3d$ materials.

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