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Emergent phenomena in LaAlO3/GdAlO3 superlattices by breaking inversion symmetry HAI-TIAN ZHANG, RYAN HAISLMAIER, JASON LAPANO, VENKAT GOPALAN, ROMAN ENGEL-HERBERT, Penn State University — Recently, tremendous interest has been focused on materials by design, where hybrid improper ferroelectricity was proposed from first principles predictions in perovskite superlattice structures (ABO3)n/(A'BO3)m , which is directly coupled to the oxygen octahedral rotations [1]. Such oxygen octahedron rotations are anticipated stable at high temperatures, thus being a potential materials candidate for high temperature piezoelectric sensor and transducer applications. In this talk we will present the homoepitaxial growth of LaAlO3 and GdAlO3 by hybrid molecular beam epitaxy, where a volatile aluminium alkoxide precursor and elemental La/Gd (flux 2×10^{13} $cm^{-2}s^{-1}$) were co-supplied in the presence of an oxygen plasma (RF plasma power 250 W). Growth mode, film surface morphology and defect type for films grown under La/Gd-rich and Al-rich growth conditions will be discussed and directly related to structure and properties characterization of the LaAlO3 and GdAlO3. Changes in the octahedral tilts, probed by scanning transmission electron microscopy in the proximity of GdAlO3/LaAlO3 interface are discussed and compared to first principle predictions.

Hai-Tian Zhang
Penn State University

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