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Title:

Dependence of interfacial conduction on oxygen annealing in MBE-grown LaAlO<sub>3</sub>/SrTiO<sub>3</sub> heterostructures

Abstract:

The observation of interfacial metallicity in thin-film heterostructures of LaAlO<sub>3</sub> (LAO) and SrTiO<sub>3</sub> (STO) has sparked great interest in recent years. This metallicity has been attributed to electronic reconstruction induced by interfacial polar discontinuity [1]. However, the intrinsic oxygen variability of STO is also believed to influence the conduction of LAO/STO films [2], especially in films grown by pulsed laser deposition which can induce defects in STO [3]. To better understand the role of such defects, we study LAO films of varying thickness grown on STO by molecular beam epitaxy and post-annealed in oxygen. X-ray photoelectron spectroscopy is used to correlate the atomic valences with the conduction properties, in an effort to relate the interfacial electronic structure with the presence of oxygen vacancies. [1] J. Mannhart et al., MRS Bull. 33, 1027 (2008) [2] A. Kalabukhov et al., Phys. Rev. B 75, 121404 (2007) [3] Y. Chen et al., Nano Letters 11, 4 3774 (2011)