

Abstract Submitted
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Metal-Insulator crossover in SrVO₃ thin film¹ GAOMIN WANG, ZHEN WANG, MOHAMMAD SAGHAYEZHIAN, CHEN CHEN, LINA CHEN, HANGWEN GUO, Louisiana State University, YIMEI ZHU, Brookhaven National Laboratory, JIANDI ZHANG, Louisiana State University — Paramagnetic metallic oxide SrVO₃ (SVO) represents a prototype system for the study of the mechanism behind thickness-induced metal-to-insulator transition (MIT) or crossover due to its simple structure and itinerancy. Here SrVO₃ thin films with different thicknesses were obtained through the layer-by-layer growth by laser Molecular Beam Epitaxy on SrTiO₃ (001) surface. Ultraviolet Photoemission Spectroscopy and Scanning Tunneling Spectroscopy measurements confirm a MIT at the thickness of ~3 unit cell, while atomically resolved Scanning Transmission Electron Microscopy and Electron Energy Loss Spectroscopy analysis reveal the depletion of Sr, change of V-valence and expansion of the out-of-plane lattice constant in the first three unit cell above the interface, thus different from the rest of the films. The existence of significant amount of oxygen vacancies is proposed, which is also supported by X-ray Photoelectron Spectroscopy, therefore providing a possible explanation of MIT.

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