

Abstract Submitted
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Magnetic coupling at vertical perovskite-spinel epitax-

ial interface QING HE, ELKE ARENHOLZ, Advanced Light Source,
JAN-CHI YANG, YING-HAO CHU, National Chiao Tung University

— Interfaces in complex oxides have been the focus of scientists because of their intriguing and unique properties that cannot be found in bulk. Vertical nanostructure is one of the most interesting heterostructure that has been studied for interface phenomena due to its high interface-volume ratio. In this study, (La,Ca)MnO₃ (LCMO) (perovskite, matrix) / CoFe₂O₄ (CFO) (spinel, pillars, 50-200 nm in size) vertical nanostructure has been taken as model system to investigate the interface magnetic coupling with X-ray absorption spectroscopy and photoemission electron microscopy (PEEM), taking the advantages of their element sensitivity and spatial resolution. Matrix and pillars were studied separated with the photon energy set to different absorption edges. The magnetic order and valence states as well as site occupancy in CFO pillars were characterized by XMCD measurements at Co and Fe L-edges with the application of external magnetic fields. In order to investigate the exchange coupling at the interface, we combined this XMCD study with angular dependent XMLD measurements at Fe and Mn L-edges, which give us the information of orbital order in LCMO, while CFO pillars are magnetized in different directions. Similarly, XMCD studies at the Mn L-edges provide detailed insights into the magnetic order of the LCMO matrix, the Mn valence state and elucidate the impact of the CFO pillars. In addition, PEEM measurement provides spatially resolved XMCD/XMLD images that give more insight of the magnetic coupling at the matrix-pillar interface.

Qing He
Advanced Light Source

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