

Poster Presentation

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The electronic and magnetic properties of strained La_{0.85}Zr_{0.15}MnO₃ films

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The electronic and magnetic properties of strained tetravalent-ion-doped La_{0.85}Zr_{0.15}MnO₃ (LZMO) thin films that were epitaxially grown on SrTiO₃ (STO) and MgO substrates were studied using temperature-dependent x-ray diffraction (XRD), x-ray absorption near-edge structure (XANES), x-ray linear dichroism (XLD) and x-ray magnetic circular dichroism (XMCD) at the Mn L_{3,2}- and K-edge. XRD studies reveal that the LZMO thin films have compressive and tensile strains on the STO and MgO substrates, respectively. As temperature is reduced from room temperature to below magnetic transition temperature, the preferentially occupied Mn majority-spin e_g orbital changes from the in-plane dx₂-y₂ to the out-of-plane d_{3z²-r²} orbital for LZMO/STO, and vice versa for LZMO/MgO. Experimental results suggest that the new hopping path that is mediated by the Mn²⁺ ions triggers a stronger d_{3z²-r²} orbital ordering of Mn³⁺ ions and enhances the ferromagnetic coupling between the Mn spin moments of t_{2g} electrons in LZMO/STO, whereas the tensile strain stabilizes the dx₂-y₂ orbital by inducing lattice distortions of the MnO₆ octahedra in LZMO/MgO.

Keywords: XANES, XLD, XMCD