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【622】LaVO3 Thin Films under Epitaxial Strain

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Interplay between spin, charge, orbital and lattice degrees of freedom is extremely strong and at the origin of numerous phenomena in complex oxides [1]. The bulk 3d2 LaVO3 showcases an interesting phase diagram where the low temperature orbital and spin ordering are strongly dependent upon the A cations size [2]. The GdFeO3-type distortions remove the t2g degeneracy and modify the bandwidth to generate a Mott state. Above the transition temperature (140 K), LaVO3 is a paramagnetic insulator while below, an orbital and spin order establishes [3]. The transition can be described mainly by one-dimensional orbital correlations between dxz and dyz states since the lowest energy dxy orbitals have an occupation number close to one. We have explored different effects of biaxial strain in epitaxial thin films of LaVO3. X-ray diffraction reveals that the layers accommodate the strain imposed by the substrate assuming different patterns of octahedral tilts and rotations. We used temperature dependent X-ray diffraction, muon spectroscopy and optical conductivity to investigate how the strain-induced crystal field splitting [4] alters the d-d orbital correlations.

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