第9回 GRL 浜松セミナー

～若手研究者のための光・電子・情報科学に関する情報交換～

Lattice Distortions and Lattice Modulations in Epitaxial ABO_3 Perovskite Thin Films

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Transition-metal oxides exhibit a wide variety of exotic magnetic, electronic and structural properties that are highly intertwined. The unusual behavior points to the presence of strong electron-electron and electron-lattice correlations in these materials. The latter one can be modified by hydrostatic or chemical pressure. For thin epitaxial ABO_3 perovskite films the substrate-induced biaxial stress is an effective tool to modify the electron-lattice coupling. Here I present a study of the lattice effects in $La_{0.67}Sr_{0.33}MnO_3$ (LSMO) and $SrRuO_3$ thin films grown under different tensile and compressive stresses on a number of single crystal substrates: $SrTiO_3$, $DyScO_3$, $NdGaO_3$ and $(La,Sr)(Al,Ta)O_3$[1-3]. I will show that the lattice distortions in perovskite thin films are caused by BO_6 octahedra rotations which are known to play a significant role in magnetic and electronic properties of the ABO_3 perovskites. The results demonstrate that the misfit strain modifies the degree and direction of BO_6 octahedra rotations. Under tensile and compressive stresses the ABO_3 thin film structures assume distinct unit cells that can be identified by taking into account BO_6 octahedral tilting described by the Glazer tilt systems [4]. The described lattice distortions and lattice modulations are believed to be common and applicable to other perovskite thin films.

[1]. A. Vailionis, H. Boschker, E. Houwman, G. Koster, G. Rijnders, and D.H. A. Blank, Appl. Phys. Lett. **95**, 152508 (2009).
[2]. A. Vailionis, W. Siemons, and G. Koster, Appl. Phys. Lett. **93**, 051909 (2008).
[3]. A. Vailionis, W. Siemons, and G. Koster, Appl. Phys. Lett. **91**, 071907 (2007).
[4]. A.M. Glazer, Acta Cryst. B**28**, 3384 (1972).

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