

现代电子显微学进展及其在材料科学中的应用，
李建奇，中国科学院物理研究所 北京电子显微镜实验室。

Advanced transmission electron microscopy and its applications in material sciences

Jianqi Li, Beijing National Laboratory for Condensed Matter Physics, Institute of Physics,
Chinese Academy of Sciences, Beijing 100190, P. R. China.

Abstract: Recent progresses in the fields of high-resolution electron microscopy (Cs-TEM), electron energy loss spectroscopy and electron holography have been briefly reviewed. It is emphasized that numerous significant structural issues in material science could be well addressed. For instance, charge ordering and oxygen deficiency in functional oxides, magnetic tunnel junctions with MgO-barrier and the manganite-based heterojunctions. My talk will also focus on some experimental results on interfacial structural features and oxygen diffusion in SrTiO₃/Si films and related heterojunctions. High-resolution TEM investigations on the La_{0.9}Sr_{0.1}MnO₃/SrTiO₃/Si heterojunctions suggested that the thickness of the SiO_x interfacial layer change visibly from one sample to another grown under slightly different conditions. The electron-energy loss spectroscopy analyses on the LSMO/STO/Si interfacial region indicated that the Si ions are in intermediate oxidation states in the amorphous layer. Electron holography measurements revealed that notable negative charges accumulate in the amorphous SiO_x layer, the energy barrier between the Si substrate and the LSMO film have been estimated based on experimental data.

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