Conductance of perovskite oxide thin films and interfaces

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Propositions

accompanying the dissertation

Conductance of perovskite oxide thin films and interfaces

1. Given that there is interest in using manganite thin films as so-called Mott-type field-effect transistors, there is a surprising lack of data on the carrier density in manganite ultrathin films.

   Newns et al., APL **73**, *780 (1998)*
   Chapter 4, this thesis

2. The polaron liquid which was observed in the metal-insulator transition of microbridges of $La_{0.7}Ca_{0.3}MnO_3$ may also exist in $La_{0.7}Sr_{0.3}MnO_3$. To investigate this, the problem of oxygen depletion in very narrow bridges of the latter material has to be overcome.

   Beekman et al., PRB **83**, *235128 (2011)*
   Chapter 5, this thesis

3. The stoichiometry of the $LaAlO_3$ film can be expected to be important for the charge transfer to the $LaAlO_3/SrTiO_3$ interface, and the occurrence of conductance at the interface.

   Chapter 6, this thesis

4. As attractive as it may be, it is difficult to fully rule out oxygen depletion in the bulk of $SrTiO_3$ as a mechanism for inducing the conducting interface between $SrTiO_3$ and $LaAlO_3$.

   Scullin et al., Acta Mater. **58**, *457 (2010)*
   Chapter 6, this thesis

5. The reconstruction of the TiO_2-terminated $SrTiO_3$ surface, as it exists at the start of the growth of $LaAlO_3$, may well be a parameter in determining the conductance of the interface, since that reconstruction depends on both the growth temperature and the O_2 partial pressure.

   M. B. S. Hesselberth, private communication

6. Even if large single crystal areas of graphene can be grown on Cu, the difference in thermal expansion coefficients between the two materials will seriously hinder the production of high-mobility graphene.

7. A clean Au(111) surface with an artificial gold atom chain on top, is probably a more suitable surface for pulling atomic chains with an STM than a Au(110) surface with Missing Row Reconstruction.

   E. Tartaglini et al., accepted for Fizika Nizkikh Temperatur, 2013

8. Scanning Tunneling Spectroscopy on $La_{0.5}Sr_{0.5}CoO_3$ thin films grown on $SrTiO_3$, show that some metallic areas become highly resistive in an externally applied magnetic field, opposite to what is expected in the phase-separation scenario for such films. It suggests the special situation of a non-ferromagnetic insulator with metallic ferromagnetic domains.

   S. J. Kelly, PhD Thesis 2012

9. Even time cannot tell whether a decision was right or wrong.

10. Cycling in the rain shortens the distance to a PhD.

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Leiden, February 6, 2013