TRR 80 Sonderseminar

Am Mittwoch, den 23. Februar um 14:00 Uhr

spricht

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über das Thema

Buried Interfaces of Transition-metal Oxides investigated by means of Optical Second Harmonic Generation

The technology for the growth of ultrathin oxide films or heterostructures is approaching the same level of atomic control as in the case of semiconductors. Yet, in contrast to semiconductors, high electron densities lead to novel and sometimes exotic states at the interface. One of the most prominent examples is the formation of a two-dimensional electron liquid (2DEL) at the interface between two textbook band insulators, $LaAlO_3$ (LAO) and $SrTiO_3$ (STO).
However, in spite of intense research efforts, key properties of the 2DEL like the microscopic mechanisms driving it are still controversially discussed. This is only an example but in general there are many open issues regarding the interfacial properties of heterostructures based on transition-metal oxides with a Perovskitic structure.
This is principally due to the lack of experimental probes suitable for investigating so-called 'buried' interfaces with a nanometre and sub-nanometre resolution along the interface. A powerful noninvasive technique specifically sensitive to interfaces is Optical Surface Second Harmonic Generation (SSHG). In its basic version the technique is based on the induction of light waves of frequency 2ω by incident waves of frequency ω. The process couples to the symmetry reduction at the interface while the generation from the centrosymmetric bulk material is suppressed.
SSHG may become very informative when some of these parameters are varied: input photon-energy (Spectroscopic SSHG), lateral spatial resolution (SSHG Imaging), temporal resolution (Pump-Probe SSHG), phase resolution (Phase-Sensitive SSHG).
In the last three years we have applied all these techniques to the study of interfaces between various transition-metal oxides with a Perovskitic structure, including LAO/STO, $LaGaO_3$/STO and $NdGaO_3$/STO interfaces and different terminations of the STO substrate.
In this talk I will review many of the results obtained in these experiments showing that SSHG is a powerful technique for investigating buried interfaces of Transition-metal Oxides that may provide with many information complimentary to other standard techniques.

Gäste sind herzlich willkommen!
Der Vortrag findet im Seminarraum 288/Physik-Süd, Universität Augsburg statt.

Gastgeber: Prof. Dr. Jochen Mannhart
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