FOXSI
Functional Oxide Surfaces and Interfaces

EINLADUNG

zum Vortrag
von

Dr. Lutz Hammer

Lehrstuhl für Festkörperphysik, Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany

LEED Intensities –
A Tool for Monitoring and Understanding Surface Structures

am

Freitag, 13. Dezember 2013, um 15:30

Technische Universität Wien, Institut für Angewandte Physik
Seminarraum 134A, Turm B (gelbe Leitfarbe), 5. OG
1040 Wien, Wiedner Hauptstraße 8-10

Abstract:

Most UHV chambers for surface analysis are equipped with an optics for Low Energy Electron Diffraction (LEED), which is routinely used to analyse the crystallographic orientation of the sample and the periodicity of occurring superstructures. However, in LEED there is much more structural information available, which can be drawn more or less easily from this method. As in any diffraction experiment the information about the detailled crystallographic structure is hidden in the intensities of the diffraction beams, which are usually measured as a function of electron energy (so called I(E) spectra).
There are well-developed facilities for fast data acquisition available, which even allow for an every-day characterisation of the actual sample preparation. It will be demonstrated for a number of examples that I(E) spectra are indeed an extremely sensitive fingerprint of the actual surface status. They allow not only to reliably discriminate between different structures of the same periodicity, but also to detect under-/overdosing in adsorption phases, surface contamination or phase mixing.
Moreover, the spectral changes may also serve as a monitor for the thickness of growing films or the elemental composition within the near-surface region in multi-component systems. Beyond the mere recognition of structural alterations the quantitative determination of the full crystallographic structure of a surface phase or a grown film is of great importance for the understanding of its physical properties. For that purpose diffraction intensities have to be calculated for a variety of model structures and fitted to the experimental data set. Though this is usually a quite elaborate task and often performed only by 'specialists', the technique is fully developed and computer codes are readily available. A successful LEED analysis is rewarded by the detailed knowledge of the position and chemical identity of every single atom within the unit cell, whereby the spacial accuracy lies in the picometer range. Even in cases, where the quantitative structural details are (or appear to be) of no further interest, LEED analyses can reveal surprising structural modifications, which hardly could have been anticipated from common knowledge. This is of particular importance for structurally flexible systems like e.g. oxide films, for which a number of examples are given.

FWF SFB F45 „Functional Oxide Surfaces and Interfaces (FOXSI)"
Prof. Günther Rupprechter (Speaker), Melanie Schärer (SFB FOXSI Secretary)
Vienna University of Technology, Institute of Materials Chemistry, 1060 Vienna, Getreidemarkt 9, Austria
Tel.:+43-(0)1 58801-165102 - Fax: +43-(0)1 58801-16599
e-mail: grupp@imc.tuwien.ac.at, e-mail: melanie.schaerer@tuwien.ac.at
web: http://foxsi.tuwien.ac.at/