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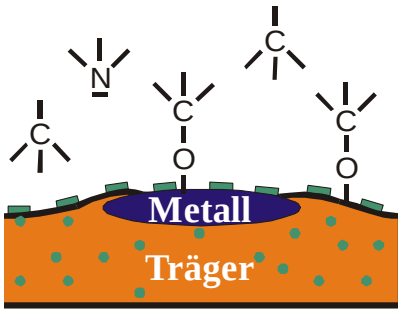

SFB 558
„Metall-Substrat-Wechselwirkungen in der heterogenen Katalyse“

Einladung
zum Vortrag von

Prof. Dr. Rodolfo Miranda
Universität Madrid
(Gast von Prof. Wöll)

“Imaging the Charge Density and Dynamics at Complex Surfaces: What do we see with STM and Molecular Beam Scattering?”

Abstract: Complex surfaces such as alloys or transition metal oxides are of increasing importance in condensed matter physics. Complex materials provide an interesting case of strong coupling between charge and spin of the electrons and the lattice degrees of freedom. Breaking symmetry by creating the surface disturbs this coupling, giving rise to charge density waves, soft phonon modes, peculiar surface reconstructions, antiferromagnetic ordering or superconductivity. Atoms of different chemical nature are frequently found at the external surface of these materials. Imaging the charge density at surfaces can be done with STM, but the analysis of the images to relate them to specific atomic species involves sophisticated first principles calculations and accurate modelling of the geometry and composition of the tip, usually fairly unknown [1]. The scattering of atoms and certain molecules can be used for the same purpose with the advantage that the quantitative analysis is much simpler. Furthermore, the dynamics of low energy surface excitations can be determined in the same experiment by using Time of Flight (TOF) techniques, since atom and molecules can also interact inelastically with the electronic degrees of freedom of a surface [2]. I report on results obtained along this direction for ordered O layers adsorbed on Ru(0001), where the issue is to distinguish what is O and what is Ru in atomically resolved STM images for increasing O coverage approaching RuO_2(110). I will also report Ne and D_2 diffraction spectra from NiAl(110), an unreactive surface with both Ni and Al atoms at the external surface and an unusually strong standing wave pattern at 300K, which suggests that electron-phonon coupling is important.
[1] F. Calleja, A. Arnau, J.J. Hinarejos, A.L. Vázquez de Parga, W. A. Hofer, P.M. Echenique and R.Miranda, Phys. Rev. Lett. 92, 206101 (2004).
[2] J.P. Toennies, Europhys. News, 23, 63 (1992).

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