

Laboratory of Surface Interactions on Metals

Investigation of the structure and behaviour of metal-oxide-metal systems and multicomponent metal surfaces using field-ion and field emission microscopy and other surface-sensitive methods.

Microscopic techniques (**FEM** - *Field Emission Microscopy*, **FIM** - *Field Ion Microscopy*) are used for the physical characterisation of active sites (growth of metal clusters, initial location and propagation of reaction zones, spillover effect etc.) in surface reactions on single- and bimetallic systems (metallic single crystals, submonolayers and thick layers of a second metal, deposited in situ onto the crystal, oxide supported metallic and bimetallic systems) on atomic scale.

Macroscopic studies (**TPD** - *Temperature Programmed Desorption*) represent a complementary investigation of similar systems, with the aim to understand the chemistry of the surface reactions. For characterization of chemical composition, electronic properties and the nature of chemisorbed species is used Photoelectron Spectroscopy (**ESCA** - *Electron Spectroscopy for Chemical Analysis*), **SR PES** - *Synchrotron Radiation induced Photoelectron Spectroscopy*)

Instrumentation



The UHV apparatus for FEM, FIM.

Evaporation sources mounted on a rotatable x-y-z manipulator enable deposition of different metals or oxides onto field emission tip. The field emission and field ion images can be captured by a astronomical CCD camera with very high quantum efficiency, 16-bit digitization, low noise, fast USB interface and ability to integrate light during long exposures.



The UHV apparatus for TPD.

The mass spectrometer (QMS 200 M1, Prisma, Pfeiffer, Austria) is housed inside a differentially pumped shield with an aperture of 3 mm diameter on the front end. The computer-multiplexed mass spectrometer allowed up to 12 masses to be monitored simultaneously. The thickness of the deposited metal layers in the TPD experiments can be monitored by a quartz crystal thickness monitor, model IL 150 (produced by Intellemetrics Ltd., UK).

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Recent publications

Interaction of CO with Palladium Supported on Oxidized Tungsten

I. Jirka, J. Plšek, F. Šutara, V. Matolín, V. Cháb, K.C. Prince, *J. Phys. Chem B*, *in press*.

Metal - Support Interactions in Systems Palladium Deposited on Oxidized Tungsten Surfaces

J. Plšek, I. Jirka, V. Nikolajenko, Z. Knor, *Surf. Sci.* **600** (2006) 3943.

Properties of physisorbed water layers on gold revealed in a FEM study

J. Plšek, P. Hrubý, K. Nikiforov, Z. Knor, *Appl. Surf. Sci.* **252** (2005) 1553.