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IAP-SEMINAR

EINLADUNG

Termin: **Dienstag, 12.10.2010 um 16:00 Uhr**
Ort: **Technische Universität Wien,
Institut für Angewandte Physik,
Seminarraum 134A, Turm B (gelbe Leitfarbe), 5. OG
1040 Wien, Wiedner Hauptstraße 8-10**

Vortragender: **Prof. Dr. Georg Held**
Department of Chemistry, University of Reading, UK

Thema: **Water Dissociation on Modified Transition Metal Surfaces**

Kurzfassung

Water dissociation on surfaces of late transition metals has been a topic of intense discussion in the last few years [1-4]. It is remarkable in this context that different members of the Pt group, which normally show very similar chemical behaviour, cause water to react in very different ways. This is mainly caused by electronic differences, affecting the balance between inter-molecular hydrogen bonds and water-substrate bonds. Atomic or molecular co-adsorbates are convenient means of modifying both types of bonds and were used in a systematic study to study this effect further. We compare the reactivity of water on clean and O-modified Pd{111}, Ir{111}, Pt{111}, Rh{111} and Ru{0001} using LEED, TPD, high resolution XPS and NEXAFS. All five surfaces have the same surface symmetry and very similar lattice constants. Except for Ru{0001} and Rh{111}, no dissociation is observed on the clean surfaces, even after prolonged irradiation with X-rays. Small amounts of oxygen, however, cause water to dissociate forming mixed (OH+H₂O) layers on all surfaces, whereas high oxygen coverages (> 0.25ML) tend to leave water intact with more stable surface bonds than for the clean surfaces [5,6]. On Pt{111} and Ir{111} the maximum oxygen coverage is 0.25 ML and dissociation is observed for all coverages. Molecular co-adsorbates, such as CO and methanol tend to inhibit water dissociation at low temperatures. Possible geometrical effects were investigated using Pt{111}, {110} and {531}, these surfaces represent a series with increasing atomic roughness and coordination numbers decreasing from 9 to 6. No dissociation is observed on any of the clean surfaces but small amounts of oxygen promote water dissociation on all three surfaces. High coverages (exceeding half the saturation coverage) prevent water dissociation on Pt{531} and Pt{110}, but not on Pt{111}.

- [1] A. Thiel, T.E. Madey, Surf. Sci. Rep. 7 (1987) 211;
[2] M.A. Henderson, Surf. Sci. Rep. 46 (2002) 1.
[3] A. Hodgson, S. Haq, Surf. Sci. Rep. 64 (2009) 381.
[4] P.J. Feibelman, Science 295 (2002) 58.
[5] M.J. Gladys, et al. Chem. Phys. Lett. 414 (2005) 311.
[6] A. Shavorskiy et al. PCCP 10 (2008) 6150

*Alle interessierten Kolleginnen und Kollegen sind zu diesem Seminar
(45 min mit anschließender gemeinsamer Diskussion) herzlich eingeladen.*

*U. Diebold e.h.
(Seminar-Chairperson)*

*H. Störi e.h.
(LVA-Leiter)*