

P-HT22 : The Effect of Coadsorbed Oxygen on the Reaction of Methanol on Rh(111) and on a Rhodium/Vanadium Surface AlloyR. Schennach¹, G. Krenn¹, K.D. Rendulic¹

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Molecular adsorption of methanol can be observed on all transition metal surfaces at low temperatures. Methanol is adsorbed on Rh (111) at 98 K. With increasing methanol exposure first a mono-layer and then multi-layers of methanol are formed at this surface temperature. During heating, desorption of the methanol from physisorbed multi-layers is detected at about 120 K, followed by desorption of methanol from a chemisorbed mono-layer at 170 K. About 50 % of the adsorbed methanol undergoes a dehydrogenation reaction to form hydrogen and carbon monoxide adsorbed on the surface. These reaction products desorb at 300 K and 480 K, respectively. Less than 0.05 monolayers of coadsorbed oxygen increases the amount of methanol that reacts on the surface to about 80%. Experiments using a Rh/V surface alloy were performed, in order to distinguish between steric and electronic effects in the adsorption and reaction processes. Deposition of 0.3 monolayers of V on the Rh (111) surface leads to the formation of a subsurface alloy, with V atoms in the second atomic layer only. The initial reaction probability was measured as a function of surface temperature and molecular beam energy. A marked difference was found between the two surfaces. On the clean surface methanol adsorption and reaction stops above 198 K, whereas on the alloy surface adsorption and subsequent reaction occurs up to 473 K. The effects of coadsorbed oxygen are similar on both surfaces. The results are discussed in terms of the possible reactions of the adsorbed methanol on the surface.

P-HT23 : Adsorption and Initial Film Growth of P-Quaterphenyl on Gold SurfacesO. Stranik¹, E. Zojer¹, A. Winkler¹¹ Inst. f. Festkörperphysik, TU Graz

Highly ordered organic thin films have attracted considerable interest in the recent past due to the promising role of these materials for opto-electronics and photonics. The adsorption behavior and the initial steps of film growth are of crucial importance for the formation of crystalline organic films. In this contribution we report on experimental studies of adsorption and layer growth of para-quaterphenyl (4P) on polycrystalline gold and Au(111) surfaces. The investigations have been carried out under ultra-high vacuum conditions using TDS (thermal desorption spectroscopy) and XPS (X-ray photo electron spectroscopy). Thin films have been grown by evaporation of 4P from a Knudsen type quartz source. Quantitative experiments have been performed by controlling the layer thickness in-situ by a quartz microbalance. The main results are as follows: Adsorption of para-quaterphenyl (4P) on a gold surface (foil or Au(111)) depends on the surface temperature: Layer-by-layer growth at 93 K but Stranski-Krastanov (SK) growth at 300 K. The thickness of the monolayer is about 0.2 nm, demonstrating that in the first layer the 4P molecules are lying flat on the surface. Desorption proceeds in form of a 0th order reaction from the multi-layer (islands) and in form of a 1st order reaction with repulsive interaction from the monolayer. The latter desorption peak depends strongly on the surface cleanliness. Desorption starts at around 450 K for a carbon covered, but at 620 K for a clean Au surface. This work has been supported by the Austrian "Fonds zur Förderung der wissenschaftlichen Forschung", Proj. No.S 8102.