Poster

DETERMINATION OF THE NANO SCALE ENERGY LANDSCAPE OF H-BN/Rh(111) NANOMESH BY PHOTOEMISSION FROM ADSORBED XENON

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At 1000 K the adsorption of borazine $(HBNH)_3$ on Rh(111) leads to the formation of hexagonal boron nitride layers with a 3.2 nm superstructure, called nanomesh [1]. From recent low temperature scanning tunnelling microscopy (STM) studies [2] and from theoretical considerations [3] it follows that the surface consists of a corrugated single monolayer h-BN film on top of the rhodium substrate. The corrugation pattern looks like a mesh where 'holes' with a diameter of about 2 nm are separated by 'wires' of 0.5 Å height.

Because of its structure and thermal stability this surface is a good candidate for functionalisation by means of adsorption of molecules or metal clusters. In order to understand and eventually predict the bonding mechanism of such adsorbates, the detailed energy landscape on the nanometer scale has to be accurately determined. One of the goals of the present work is to provide complementary information which is not easily accessible by other techniques, on a nano structured surface which has recently received a lot of attention especially in the STM community.

In this work we show results obtained by Photoemission-spectroscopy of Adsorbed Xe (PAX) on the nanomesh formed on Rh(111). We find a difference in the Xe 5p binding energy between the holes and the wires of 450 meV, which is close to theoretical predictions for an idealised mesh. Furthermore from photoemission spectra recorded during temperature programmed Xe desorption it is possible to determine the Xe bond energy difference between adsorption in the holes and on the wires. Using this technique we also succeeded in mapping the Xe/nanomesh bond energy landscape inside the holes, where the observations suggest that Xe is most strongly bound to the rims of the holes. These results suggest that the nanomesh can be used as a template for a wide variety of adsorbates.

References:

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[3] R. Laskowski, P. Blaha, Th. Gallauner, K. Schwarz, Phys. Rev. Lett, **98** (2007) 106802.