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FKE - Guest Lecture

Prof. Dr. Hubertus Marbach

Microscopy and Nanolithography Group, Lehrstuhl für Physikalische Chemie II,

Friedrich-Alexander-Universität Erlangen-Nürnberg

Electron Beam Induced Surface Activation

A new route for the fabrication of clean metallic nanostructures

With the availability of localized electron probes, e.g., in scanning electron microscopy (SEM), it became possible to apply electron induced processes on the nanometer scale. Thus in Focused Electron Beam Induced Processing (FEBIP) the generation of extremely small, pure nanostructures can be targeted with lithographic control. Currently we were able to expand the FEBIP techniques with the exploration of Electron Beam Induced Surface Activation (EBISA) [1-3]. Thereby, in a first step, the chemical properties of the surface itself are modified via the e-beam such that it becomes active towards the decomposition of certain precursor molecules. In a second step the surface is exposed to the precursor which decomposes at the preirradiated areas and eventually continues to grow autocatalytically. We demonstrate the feasibility of FEBIA with Fe(CO)5 for different oxide surfaces, e.g. TiO2(110) [4] (Fig 1)and silica [3] and expand it to porphyrin layers on Ag(111) [5]. With our specific “surface science” approach to FEBIP we are able to fabricate clean metallic deposits with both EBID and EBISA. The underlying processes and applications will be discussed.

[1] M.-M. Walz, M. Schirmer, F. Vollnhals, T. Lukasczyk, H.P. Steinrück, and H. Marbach, Ang. Chem. Int. Ed., 49, 4669 (2010)
[2] F. Vollnhals, T. Woolcot, M.-M. Walz, S. Seiler, H.P. Steinrück G. Thornton, H. Marbach, J.Phys.Chem.C, 117, 17674 (2013)
[3] F. Vollnhals, P. Wintrich, M.-M. Walz, H.P. Steinrück and H. Marbach, Langmuir, 29, 12290 (2013)

Host: Ass.Prof. Dr. Heinz Wanzenboeck

Date:	Thursday, January 23rd 2014
Time:	17:15 s.t.
Venue:	FKE Seminar room,
	Floragasse 7, 1. Stock, 1040 Wien