
Short CV

PD Dr. Hubertus Marbach

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Education and Scientific Career

- 1991 – 1997 Studying physics at the **University of Dortmund**, main subject of advanced studies: condensed matter physics
- 1996-1997 Preparation of diploma thesis at the Institut für Neuroinformatik, Chair for Theoretical Biology, **Ruhr-Universität-Bochum** with Prof. Dr. Werner von Seelen. Title of the thesis: "Objekterkennung mittels Methoden der fraktalen Geometrie und nichtlinearer Dynamik" (translation: Object recognition by means of fractal geometry and nonlinear dynamics) Graduation as "Diplom, Physiker", **University of Dortmund**
- 1997 - 2002 Dissertation at the Institut für Physikalische Chemie und Elektrochemie, **University of Hannover**, with Prof. Dr. Ronald Imbihl, title of the dissertation: " Der Einfluss von Alkalimetallen auf musterbildende Reaktionen auf einer Rh(110) Oberfläche" (translation: The influence of alkali metals on pattern forming reactions on a Rh(110) surface)
- 2002 PhD graduation (Dr. rer. nat.) with highest praise (summa cum laude), **University of Hannover**
- 2002 – 2004 Postdoctoral research associate at the Surface Science Center, **University of Pittsburgh, PA/USA**, Department of Chemistry with Prof. Dr. John T. Yates, Jr. and Prof. Dr. Jeremy Levy
- Since 2004 Scientific assistant and research group leader of „Microscopy and Nanolithography“ group at the Lehrstuhl für Physikalische Chemie II, **University Erlangen-Nürnberg**
- 2010 Habilitation and venia legendi in Physical Chemistry (Dr. rer. nat. habil.) Thesis title: "Microscopic and Spectromicroscopic Insight and Fabrication of Nanoscaled Structures on Surfaces", **University Erlangen-Nürnberg**
- 2012-2013 Locum Professor (interim chair holder) for experimental Physics **University Erlangen-Nürnberg**
- 2014-2017 **Nürnberg**

Research Interests

The generation and investigation of nanostructures on surfaces is in the center of the current research activities of the Marbach group. The activities of the group follow different routes to fabricate tailor-made nanoscaled structures. The first (bottom-up) approach is based on the self-assembly of molecules or atoms on surfaces. In this context the geometric and electronic structure of porphyrin derivatives as prototype examples for functional molecules has been intensively studied on different substrates. In a second (top-down) approach a highly focused electron beam is

used to locally dissociate adsorbed precursor molecules (electron beam induced deposition, EBID) or to directly modify the properties of the substrate with lithographical control (focused electron beam induced surface activation, FEBIA). For both projects the group targets the understanding of the fundamental physical and chemical processes on an atomic level based on microscopic and spectromicroscopic investigations. The main methods are scanning tunneling microscopy and spectroscopy, scanning electron microscopy, local Auger electron spectroscopy and atomic force microscopy in an ultra-high vacuum environment.

The scientific activities of H. Marbach are documented in 74 publications in refereed journals, more than 350 conference contributions as presenter or co-author and more than 50 invited lectures at international conferences and scientific institutions.

10 Most Important Publications

- [1] T. Lukasczyk, M. Schirmer, H.P. Steinrück, and H. Marbach, Electron-beam-induced deposition in ultrahigh vacuum: Lithographic fabrication of clean iron nanostructures. *Small* **2008**, 4, 841
- [2] F. Buchner, K. Seufert, W. Auwärter, D. Heim, J.V. Barth, K. Flechtner, J.M. Gottfried, H.P. Steinrück, and H. Marbach, NO-Induced Reorganization of Porphyrin Arrays, *ACS Nano* **2009**, 3, 1789.
- [3] M.-M. Walz, M. Schirmer, F. Vollnhals, T. Lukasczyk, H.P. Steinrück, and H. Marbach, Electrons as "Invisible Ink": Fabrication of Nanostructures by Local Electron Beam Induced Activation of SiO_x, *Angew. Chem. Int. Ed.* **2010**, 49, 4669 (Very Important Paper (VIP)).
- [4] F. Buchner, E. Zillner, M. Röckert, S. Gläsel, H.-P. Steinrück and H. Marbach, Substrate mediated phase separation of two porphyrin derivatives on Cu(111), *Chemistry – A European Journal* **2011**, 17, 10226.
- [5] S. Ditze, M. Stark, M. Drost, F. Buchner, H.-P. Steinrück and H. Marbach, Activation energy for the self-metalation reaction of 2H-tetraphenylporphyrin on Cu(111), *Angew. Chem. Int. Ed.* **2012**, 124, 11056.
- [6] S. Ditze, M. Stark, F. Buchner, A. Aichert, N. Jux, N. Luckas, A. Görling, W. Hieringer, J. Hornegger, H.-P. Steinrück and H. Marbach, On the energetics of conformational switching of molecules at and close to room temperature, *J. Am. Chem. Soc.* **2014**, 136, 1609.
- [7] H. Marbach* and H.-P. Steinrück, Studying the dynamic behaviour of porphyrins as prototype functional molecules by scanning tunneling microscopy close to room temperature, *Chem. Commun.* **2014**, 50, 9034.
- [8] H. Marbach, Electron beam induced surface activation: a method for the lithographic fabrication of nanostructures via catalytic processes, *Appl. Phys. A* **2014**, 117, 987.
- [9] M. Stark, S. Ditze, M. Lepper, L. Zhang, H. Schlott, F. Buchner, M. Röckert, M. Chen, O. Lytken, H.-P. Steinrück and H. Marbach, Massive conformational changes during thermally induced self-metalation of 2H-Tetrakis-(3,5-di-tert-butyl)-phenylporphyrin on Cu(111), *Chem. Commun.* **2014**, 50, 10225.
- [10] H. Marbach, Surface-Mediated in Situ Metalation of Porphyrins at the Solid-Vacuum Interface, *Acc. Chem. Res.* **2015**, 48, 2649.