

Two-dimensional growth of nanoclusters and molecules on Suzuki surfaces

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Patterned surfaces are used for confining the growth of molecules and clusters into nanostructured surface regions, which finds nowadays many applications in nanotechnology. In this contribution it is shown that the nanopatterned surface of Cd doped NaCl crystals [1] (Suzuki surface) can be used to confine the growth of palladium clusters and functionalized brominated pentahelicene molecules [2] into the Suzuki regions of the surface. It is shown that especially the combination of noncontact AFM (nc-AFM) and Kelvin probe force microscopy (KPFM) in ultra-high vacuum (UHV) greatly helps in the characterization of the structure and morphology but also the electrostatics of the considered surfaces [3]. The growth of palladium onto the Suzuki surface results into nanometre sized clusters, which form two-dimensional cluster arrays inside the Suzuki regions. The clusters exhibit a high cluster density, are uniform in size, and due to the specific Suzuki structure the clusters are polarized or charged. Brominated pentahelicene molecules perfectly decorate the Suzuki regions and form two-dimensional islands whereas no molecules can be found inside the pure NaCl regions. The molecules are in a flat configuration, which finds strong support from first principle calculations. Due to the specific adsorption of the molecules, the surface dipole of the Suzuki regions is modified by the molecules. It is shown that changing the functional group of the helicene molecules leads to different adsorption characteristics, self-assembly phenomena and different surface dipoles [4].

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[2] S. Goretta, Ch. Tasciotti, S. Mathieu, et al., *Organic Lett.*, 11, 3846, (2009)

[3] C. Barth, A. S. Foster, C. R. Henry and A. L. Shluger, *Adv. Mater.*, 23, 477, (2011)

[4] C. Barth, M. Gingras, A. S. Foster, A. Gulans, T. Hynninen, et al., submitted, (2011)