Seminář odd. 26
Tenkých vrstev a nanostruktur

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TÉMA

Site-specific phenomena in 2^{+} dimensional supramolecular architectures

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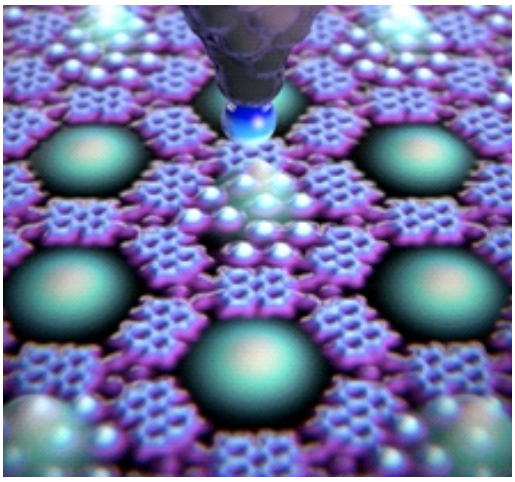

Future quantum technologies, for example, rely on the detailed understanding of the interaction between different well-defined electronic states. Surface supported atomic and molecular systems provide a base for such investigations with the particular advantage of addressability. In our work we establish on-surface architectures which exhibit extraordinary local e.g. electronic, magnetic and quantum properties originating from the reduced dimensionality of the self-assembled and atomically precise architectures. Quantum well arrays, for example, can be produced by the interaction of porous on-surface networks with 2D Shockley-type surface states. Interestingly the periodicity of these (lossy) confinements causes band formation by the coupling between the individual quantum well [1]. In our more recent work the quantum wells have been modified by the adsorption / condensation of Xe atoms [2,3]. Localized and delocalized electronic states can be identified across the 2D array as they lead to new, site-specific physical and chemical behavior.

Sublattices in 2D 'checkerboard' architectures of magnetic molecules on magnetic substrates can be selectively switched by chemical ligation [4]. Also we have observed the first example of 2D ferrimagnetic long-range order and remanence for such a 2D architecture on non-magnetic Au(110) [5]. Uniquely, self-assembled 2D architectures contribute to our understanding of fundamental interactions involved in host-guest systems and allow for the specific operation of quantum states with a partial delocalization delocalized by the supramolecular on-surface architecture.

[1] Lobo-Checa, J. et al., Science 325:300 (2009)
[2] Nowakowska, S. et al., Nat. Commun. 6:6071 (2015)
[3] Nowakowska, S. et al., Small 12:3757 (2016)
[4] Ballav N., et al., JPCL 4:2303 (2013)
[5] Girovsky, J. et al., Nat. Commun., DOI: 10.1038/ncomms15388 (2017).

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