

Seminář odd. 26

Tenkých vrstev a nanostruktur

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TÉMA

Carbon-Based Nanomaterials in 2D Confinement: Surface Reactions, Aromaticity and Molecular Topology

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The synthesis of carbon-based and heterocyclic nanostructures on surfaces has attracted considerable attention as a versatile approach for the functionalization of interfaces and the preparation of new materials. In this lecture, examples for the on-surface synthesis of novel conjugated hydrocarbon and nitrogen-doped materials, organometallic compounds, and metal complexes with cyclic and open-chain topology will be discussed. Unusual regioselectivity of C-C coupling reactions achieved by monoselective aromatic C-H bond activation will be explained on the basis of a detailed discussion of the relevant reaction mechanisms.[1] Using a non-alternant aromatic precursor, it is shown that 2D confinement enables thermodynamic control over the competition between macrocycle and chain formation.[2] In this context, effects of the molecular topology on the metal-organic interaction at the interface will be demonstrated. Furthermore, it will be shown that naphthalocyanines and their expanded homologs can be prepared by template-directed on-surface synthesis from suitable dinitrile-based precursors. The on-surface synthesis approach also gives access to linear open-chain counterparts of naphthalocyanines. These chains represent a novel class of non-cyclic oligopyrroles. Structure, electronic properties and reactivities of the oligopyrrole monolayers will be discussed on the basis of extensive experimental results and theoretical modelling.

References

[1] Q. Fan, S. Werner, J. Tschakert, D. Ebeling, A. Schirmeisen, G. Hilt, W. Hieringer, J.M. Gottfried, *J. Am. Chem. Soc.* 140 (2018) 7526.

[2] C.K. Krug, Q.T. Fan, F. Fillsack, J. Glowatzki, N. Trebel, L.J. Heuplick, T. Koehler, J.M. Gottfried, *Chem. Comm.* 54 (2018) 9741.