Fall 14

Colloquium Cukrovarnická

V úterý dne 9. prosince 2014 v 10:00 hod.
ve Fyzikálním ústavu Cukrovarnická v seminární místnosti
(budova A, 1. patro)

Nanochemistry at surfaces: From single molecules to complex ensembles and dynamics

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Supramolecular engineering and control of molecular species at interfaces is key to advance molecular science, nanochemistry and the development of novel low-dim materials. The insights gained affect various fields of application, including catalysis, sensing, light-harvesting, nanomagnetism and organic electronics. Here we explore molecular modules, steer their organization and dynamics, and afford novel functions using well-defined surfaces or sp2-nanotemplates as construction platforms. The presented scanning probe real-space observations visualize structural features with atomistic precision, revealing molecular recognition and self-assembly phenomena mediating the expression of genuine nanoarchitectures. Multitechnique studies of flexible species such as metalloporphyrins exemplify the delicate interplay between conformational adaptation, electronic signature and axial ligation of adducts or magnetic features. We assess single-molecule conductance switching via prototropy within a tetrapyrrole macrocycle and stimulate rotational movements of rare-earth porphyrinato sandwich complexes created in vacuo. The devised bottom-up fabrication protocols implement biological and *de novo* synthesized building blocks and exploit error-corrective noncovalent bonding or metal-directed assembly. They yield distinct nanoarchitectures: supramolecular gratings, hierarchic structures, flexible chains and regular or glassy networks. Using porous nanomeshes we demonstrate tunable electron confinement and follow thermal motion of caged units. The developed strategy presents a rationale for the control of adaptive molecular species at interfaces and the design of highly organized molecular nanosystems with complex features, intricate dynamics and tunable functional properties. Furthermore some ongoing research activities addressing molecular nanosystems are described.

J.J. Mareš, ved. sekce 3