O 54: Gaede Prize Talk

Time: Wednesday 13:15–13:45 Location: HE 101

Invited Talk O 54.1 Wed 13:15 HE 101

Porphyrin molecules at interfaces — •Willi Auwärter — Physik Department E20, Technische Universität München, Germany

Porphyrins and related tetrapyrrole molecules possess an impressive variety of functional properties - including axial ligation, electron transfer, light harvesting and catalytic transformations - that have been exploited in natural and artificial systems. From a surface science perspective, porphyrins are thus ideally suited as building blocks for surface-anchored functional nanostructures [1-3]. We will review recent scanning tunneling microscopy and spectroscopy results, complemented by space-averaging techniques and computational modeling based on density functional theory, addressing such porphyrin systems with sub-molecular resolution. Key aspects include molecular switching, conformation, axial ligation, metalation and self-assembly protocols. Particular emphasis is put on on-surface dehydrogenation reactions yielding novel porphyrin species on Ag(111), including covalently linked dimers and longer oligomers. Furthermore, the formation of metal-organic coordination networks and porphyrin arrays on atomically thin boron nitride (BN) layers grown on Cu(111) is discussed [4]. The BN template dictates the electronic level alignment of the porphyrin nanostructures and supports distinct coordination motifs.

[1] W. Auwärter et al., Nature Chem., DOI: 10.1038/NCHEM.2159 (2015)
[2] K. Seufert et al., Nature Chem. 3, 114 (2011)
[3] W. Auwärter et al., Nature Nanotech. 7, 41 (2012)
[4] S. Joshi et al., ACS Nano 8, 430 (2014)