TECHNISCHE UNIVERSITÄT CHEMNITZ

PHYSIKALISCHES KOLLOQUIUM

Mittwoch, 07.05.2014, um **16:00 Uhr**

Ort: Reichenhainer Str. 90; Neues Hörsaalgebäude, Raum: 2/N113

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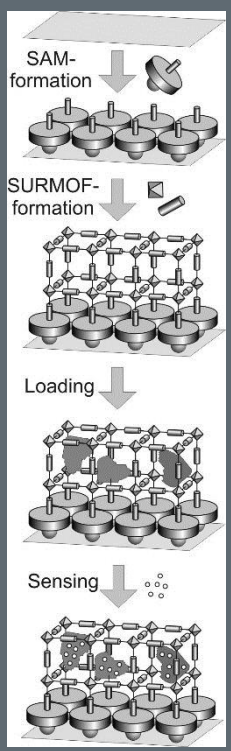
Supramolecular Chemistry for Interface Functionalisation : From Surface-templated Assembly of Molecular Frameworks to Epitaxially-grown Designer Solids

Supramolecular chemistry holds unique prospects for the fabrication of novel functional materials. Molecularly precisely defined, nanometer-sized subunits which may already be rather complex self-assemble to form even more complex structures which exhibit functionalities not provided by the individual building blocks.

In this presentation it is demonstrated that supramolecular chemistry also has a huge potential with regard to the functionalization of surfaces and interfaces. We will demonstrate that this potential goes beyond surface-templated assembly of two-dimensional networks of organic molecules (ligands) interacting through hydrogen bonds or ionic interactions [1] and allows to construct three-dimensional, crystalline, perfectly ordered and oriented multilayers.

The basis for the approach described here are highly porous metal-organic frameworks (MOFs), a novel class of porous bulk compounds with more than 20.000 different reported structures. In order to apply them for interface functionalization, we have developed a liquid phase epitaxy process, which allows growing MOFs on modified substrates using a layer-by-layer procedure [2]. The availability of porous frameworks rigidly anchored to solid surfaces, SURMOFs, opens the prospect of adding additional functionality to these ultrathin surface coatings [4] by placing nanoobjects inside the pores within the MOFs, e.g. metal clusters or dye molecules [3]. We will demonstrate the potential of this approach by loading the three-dimensional porous scaffolds, or “designer solids”, with metal-containing molecules such as ferrocene and then characterizing their properties using electrochemistry [5].

We will close the presentation by introducing SURCOFs, which are made by removing the metal ions from a SURMOF framework via a cross-linking process involving secondary linkers. The subsequent removal of the metal ions using complexation agents [6] converts the MOF held together by ionic bonds to a COF. The potential of these SURCOFs (surface-bound covalent organic frameworks) for life-science applications will be demonstrated.



[1] O. Shekhah, J. Liu, R. A. Fischer, Ch. Wöll, Chem. Soc. Rev., 40, 1081 (2011)
[2] O. Shekhah, H. Wang, S.Kowarik, F.Schreiber, M.Paulus, M.Tolan, C.Sternemann, F.Evers, D.Zacher, R.A. Fischer, Ch.Wöll, J. Am. Chem. Soc. 129, 15118 (2007)
[3] H.K. Arlsan, O. Shekhah, D.C.F. Wieland, M. Paulus, C. Sternemann, M. A. Schroer, S. Tiemeyer, M. Tolan, R.A.Fischer, Ch. Wöll J. Am. Chem. Soc. 133 , 8158 (2011)
[4] MOF thin films: existing and future applications, O.Shekhah, J.Liu, R.A.Fischer, Ch.Wöll Chem.Soc.Rev. 40, 1081 (2011)
[5] A.Dragässer, O. Shekhah, O. Zybaylo, C. Shen, M. Buck, Ch. Wöll, D. Schlettwein, Chem. Comm., 48, 663 (2012)
[6] M. Tsotsalas, J. Liu, B. Tettmann, S. Grosjean, A. Shahnas, Z. Wang, C. Azucena, M. Addicoat, T. Heine, J. Lahann, J. Overhage, S. Bräse, H. Gliemann, Ch. Wöll, J. Am. Chem. Soc., DOI:10.1021/ja409205s (2013)

Alle Zuhörer sind ab 15:45 Uhr zum Kaffee vor dem Hörsaal eingeladen.

Informationen zum Vortrag erteilt Prof. Dr. Dietrich R.T. Zahn, Tel.: 0371 531 21730