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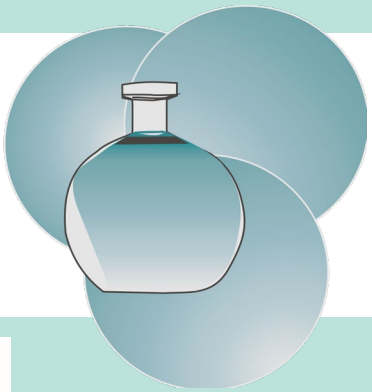

lädt ein

gemeinsam mit der Gesellschaft Deutscher Chemiker zum

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GESELLSCHAFT DEUTSCHER CHEMIKER

Vortrag

von Frau

Dr. Dana D. Medina-Tautz

Department of Chemistry and Center for NanoScience (CeNS)

Ludwig-Maximilians-Universität München

“On-surface Molecular Frameworks – Synthesis, Properties and Function”

am: **Dienstag, 04.03.2025**

um: 11:00 Uhr

wo: im Raum **1/153**

Gäste sind herzlich willkommen!

TECHNISCHE UNIVERSITÄT
IN DER KULTURHAUPTSTADT EUROPAS
CHEMNITZ

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"On-surface Molecular Frameworks – Synthesis, Properties and Function"

Crystalline and porous molecular framework materials with specific encoded properties hold promise as a novel, highly tunable, functional platform.[1] Through the concepts of reticular chemistry, numerous two- and three-dimensional molecular frameworks with diverse structural, optical, and electrical properties are in reach. On-surface deposition of molecular framework coatings is crucial for their utilization as active layers in advanced device-based applications, including separation, sensing and optoelectronics. In addition to the variable backbone properties, gaining control over the molecular framework film morphology is of critical importance for achieving the intended functionality.[2]

In my presentation, I will first provide an overview of the synthesis of 2D molecular frameworks. In particular, I will discuss new insights into and crystallization process of covalent organic frameworks (COFs).[3] Following this, the on-surface synthesis of metal- and covalent-organic frameworks (MOFs and COFs) as films and deposits will be presented. Here, the synthesis of novel layered thiophene-extended benzotrithiophene-based (BTT) COFs as highly oriented and crystalline thin films and their respective directional electrical conductivity will be illustrated.[4] In addition, thienothiophene (TT) isomer alloying of a COF scaffold will be introduced as an efficient tool for band-gap engineering of ordered organic solids in both bulk and film forms [5] For MOFs, vapor-assisted conversion (VAC) will be presented as a versatile method for the deposition of thin films of both 3D and 2D MOFs, particularly for the metal (Ni^{2+}, Co^{2+}, Cu^{2+}) catecholate M-CAT-1 series.[6] The films obtained by VAC feature thicknesses in the nanometer scale with a particular morphology, topography and roughness. Subsequently, M-CAT-1 films are implemented as active layers into devices to be tested for a variety of applications ranging from (opto)electronics to wastewater treatment.[7, 8] For the latter, ultrahigh flux separation of oily pollutants from water is achieved with a filter mesh decorated with MOF nanoscale architectures.

References

[1] A. Mähringer, D. D. Medina, *Nat. Chem.*, **2020**, *12*, 985–987.
[2] D. D. Medina, T. Sick, et al. *Adv. Energy Mater.*, **2017**, *7*, 1700387.
[3] C. Gruber, L. Frey, et al. *Nature*, **2024**, *630*, 872–877.
[4] L. Frey, J. F. Pöhls, et al. *Adv. Funct. Mater.*, **2022**, *32*, 2205949.
[5] R. Guntermann, L. Frey, et al. *J. Am. Chem. Soc.*, **2024**, *146*, *23*, 15869.
[6] (a) E. Virmani, J. M. Rotter, et al. *J. Am. Chem. Soc.*, **2018**, *140*, 4812–4819. (b) P. I. Scheurle, A. Mähringer, et al. *Chem. Mater.*, **2021**, *33*, *15*, 5896–5904.
[7] A. Mähringer, A. C. Jakowetz, et al. *ACS Nano.*, **2019**, *13*, 6711–6719.
[8] A. Mähringer, M. Hennemann, et al. *Angew. Chem. Int. Ed.*, **2021**, *60*, 5519–5526.

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