

# Colloquium

**Prof. Dr. Martin Hartmann**

Erlangen Center for Interface Research and Catalysis, FAU Erlangen-Nürnberg

**Monday, 30 May 2022**  
**2:30 – 3:30 pm CEST**

Exp.-HS (room 029, Johannisallee 29)

## Hydrogen storage with porous materials: A chemist's dream or nightmare?

Advanced nanoporous molecular sieves are interesting materials for a wide range of potential applications. In the last decade, hierarchical zeolites as well as porous coordination polymers (metal–organic frameworks, MOFs) have been identified as novel classes of nanoporous materials which play a major role in the development of advanced technologies for energy storage, air and water treatment, sensing, separation, catalysis and medicine. MOFs are inorganic-organic hybrid materials comprised of metal clusters linked by organic ligands principally through coordination bonds. In particular, their modular design allows a rational construction of tailor-made pore systems, which can be adjusted in form and function to the interacting molecules.

In this talk, I will focus on cryogenic hydrogen storage on selected zeolites and MOFs at different temperatures between 77 and 195 K in order to determine the temperature-dependent sorption swing between 1 and 30 bar. Moreover, I present the in-depth characterization and hydrogen release studies of ammonia borane (AB) confined in metal–organic frameworks. The influence of different metal centers and linker functionalization on the AB decomposition and hydrogen release temperature. Particular emphasis is placed on in-situ characterization employing NMR spectroscopy and X-ray diffraction. These techniques allow to follow the formation of intermediates during decomposition of AB as well as the breathing behavior of the MOF.

*The <sup>1,2,3</sup>H Colloquium will be streamed via Zoom:*



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Meeting ID: 672 2166 4393 / Passcode: 245588

**CV of Prof. Dr. Martin Hartmann:**

Martin Hartmann is Director of the Erlangen Center of Interface research and Catalysis and Professor of Catalysis at FAU Erlangen-Nürnberg, Germany. He was born in 1965 and obtained his Ph.D. degree in Physical Chemistry from TU Dortmund in 1993. Martin Hartmann held post-doc positions at the University of Houston (TX, USA) and the University of Stuttgart (Germany). He became Assistant Professor of Chemical Technology at TU Kaiserslautern in 2002. Prior to joining FAU as Full Professor in 2009, he has been Professor of Advanced Materials in the Department of Physics at University of Augsburg, Germany from 2005 to 2008. His research focusses on the synthesis, characterization and industrial application of porous materials such as zeolites, mesoporous silicas and carbons as well as metal organic frameworks (MOF) in energy storage, separation and heterogeneous catalysis. He uses infrared spectroscopy as well as solid-state NMR and ESR spectroscopy for the characterization of nanoporous materials also under in-situ and operando conditions. His research work resulted in more than 250 publications and an H-index of 60 as well as several patents. In 2018, he received the Richard A. Glenn award from the ACS Energy and Fuels Division. He serves on the board of the International Zeolite Association (IZA) since 2016 and became its President in 2019.

