DEPARTMENT OF CHEMISTRY AND PHYSICS OF MATERIALS

ANNOUNCEMENT

PARIS LODRON UNIVERSITÄT SALZBURG

Vortragsankündigung

Mittwoch, 10. April 2024, 11.15 Uhr im SR I

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"Towards sustainable nanoporous energy storage systems: Insights from neutron scattering"

Some key requests for future sustainable energy storage systems are abundant, uncritical, non-toxic and recyclable materials and energy carriers. In this regard, nanoporous materials with "simple" composition like silica or carbon in combination with water and aqueous electrolytes or with molecular hydrogen are very appealing. Although such systems are currently still seldom competitive due to restricted performance, the need of a low carbon footprint over the whole life cycle will make them considerably more attractive in the future.

From a fundamental science perspective, there are still many open questions related to fluid- solid interactions in nanoporous materials and devices. Experimental challenges are related to the difficulty in accessing such systems at the relevant length- and time scales in-situ during operation. Due to their high sensitivity for hydrogen, neutrons are an excellent probe to study the structure and dynamics of such systems. In this lecture I will report on some of our recent neutron scattering experiments on nanoporous systems for:

1) Elastic energy storage by forced water intrusion into hydrophobic nanoporous silica.
2) Carbon-based nanoporous electric double-layer capacitors with aqueous electrolytes.
3) Hydrogen densification in ultramicroporous carbons.

1. L. Michel, et al. Langmuir 38 (2022) 211-220. https://doi.org/10.1021/acs.langmuir.1c02427
2. M. Seyffertitz et al. Faraday Discussions 249 (2024) 363-380. https://doi.org/10.1039/D3FD00124E
3. S. Stock, et al. Carbon 221 (2024) 118911. https://doi.org/10.1016/j.carbon.2024.118911