

Dedicated Sample Environment for Energy Research

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For a successful operation of a neutron facility it is of particular importance to provide the users the best technical and scientific support in order to perform highest impact investigations. The quality of the available sample environment support is certainly a key aspect for excellent scientific results.

Except for the unique compatibility with complex sample environments, Neutron scattering offers several key advantages including sensitivity to oxygen and hydrogen, seen likely as the energy carrier in future energy distribution, which motivate research on hydrogen storage materials, hydride batteries and solid oxide fuel cells. The performance of the material components for these applications is sensitive to external parameters, such as the temperature and the partial pressure of Hydrogen, Oxygen or water. To achieve greater understanding it is essential to use complex sample cells for extensive in-situ studies under conditions that mimic the operational conditions for the real application.

Sample environment at the Helmholtz-Centre Berlin is traditionally focused on extreme physical parameters combined with a strong user support. In the last decade the increasing complexity of neutron investigations required the development of different in-situ sample environment equipment. In this presentation we show several examples for neutron investigations using dedicated equipment for neutron scattering experiments under controlled gas atmospheres. Thereby, the focus is on structural investigations on host materials for gas storage [1-3] as well as on the in-situ synthesis and catalysis studies [4-7]. Examples of gas pressures cells, high and low temperature environments and gas dosing equipment are presented and discussed in the context of these and related applications. Another important issue is the support in sample- and experiment preparation by providing labs, expertise and equipment to the neutron users even beyond their particular beamline investigations.

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