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## QENS and in-situ SANS Investigations of Complex Hydrides

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With hydrogen as energy carrier, hydrides are in the focus of research for the application of energy storage and energy transportation. Within the complex hydrides, the metal hydride composite  $\text{Mg}(\text{NH}_2)_2 + \text{LiH}$  has recently gained in importance because of good properties for reversible hydrogen storage.  $\text{Mg}(\text{NH}_2)_2 + \text{LiH}$  has faster de- and rehydrogenation kinetics with the addition of  $\text{LiBH}_4$ . So far  $\text{Mg}(\text{NH}_2)_2 + \text{LiH} + \text{LiBH}_4$  is a good candidate to be used for hydrogen storage with the high capacity (ca. 4 wt%) and good reversibility. To understand the effect of the  $\text{LiBH}_4$  additive on the kinetics, neutron scattering experiments were applied at the Heinz Maier-Leibnitz Zentrum (MLZ). With this poster we present the investigated quasielastic neutron scattering (QENS) and in-situ small angle neutron scattering (SANS) measurements.

At the TOFTOF instrument the Time-of-Flight spectroscopy of  $\text{Li}_4\text{BH}_4(\text{NH}_2)_3$  was investigated, which is an intermediate of the dehydrogenated  $\text{Mg}(\text{NH}_2)_2 + \text{LiH} + \text{LiBH}_4$ -system. This product showed in the QENS measurement high degree of freedom for rotational and transversal motions. With the high mobility of the  $\text{BH}_4$ -tetrahedron, the fast absorption/desorption kinetics of the complex hydrides are explained.

In-situ SANS of  $\text{Mg}(\text{NH}_2)_2 + \text{LiH} + \text{LiBH}_4$  at SANS-1 instrument was measured. The analyzed sizes of the nanoparticles are preserved after hydrogenation/dehydrogenation reactions. In addition, a model for these reactions are proposed based on the in-situ measurements.

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