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## Liquefaction of Li-Mg-N-H hydrogen storage system by LiBH<sub>4</sub> as a way to accelerate its dehydrogenation

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Hydrogen storage in light hydrides for mobile applications is a widely discussed but highly controversial topic. Is it safe enough? Is it effective enough? Does hydrogen energy have a future? The questions are numerous and multifaceted but almost none of them has a clear answer so far. A complex hydride system  $6\text{Mg}(\text{NH}_2)_2 \cdot 9\text{LiH}$  with  $\text{LiBH}_4$  as a dopant is one of promising candidates on a role of on-board hydrogen storage, since it actively decomposes already at the  $180^\circ\text{C}$ , releasing only hydrogen. The role of the  $\text{LiBH}_4$  is expressed in forming of a low-melting liquid-phase with high hydrogen mobility with an intermediate product  $\text{LiNH}_2$ , which highly enhances the rate of the dehydrogenation reaction. There are 2 mixed phases with a high Li-ion conductivity described: a metastable  $\text{Li}_2\text{BH}_4\text{NH}_2$  and a peritectically melting  $\text{Li}_4\text{BH}_4(\text{NH}_2)_3$ , and both of these phases were registered while performing DSC and XRD measurements. This 2-component system is investigated and a number of ratios was analyzed and thereupon a phase diagram was created. Its lowest melting point, i.e. eutectic point is located at 33%  $\text{LiNH}_2$  and at  $90^\circ\text{C}$ . The behavior under heating and the intrinsic structure of this eutectic composition was investigated by neutron total scattering. The composition corresponding to this eutectic mixture would be  $6\text{Mg}(\text{NH}_2)_2 \cdot 9\text{LiH} : 6\text{LiBH}_4$ .

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