

Conversion of Magnesium Waste into Complex Magnesium Hydride

System: $\text{Mg}(\text{NH}_2)_2\text{-LiH}$

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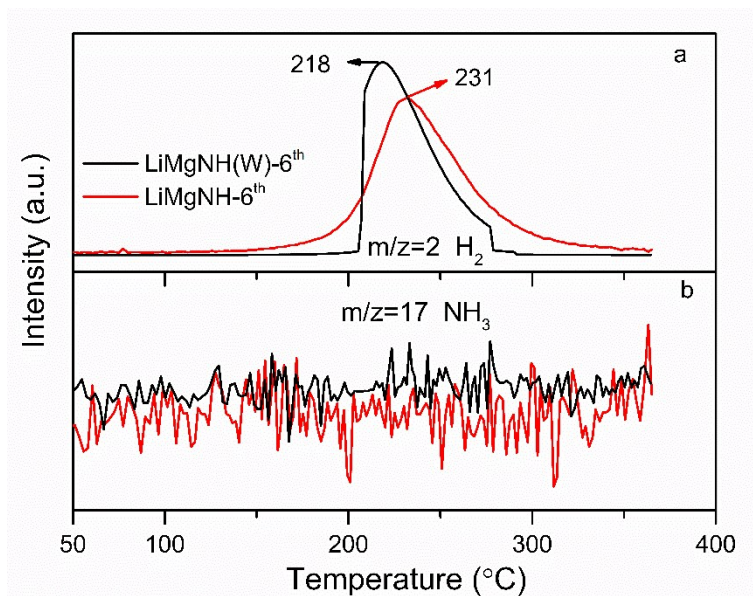


Figure S 1. TPD-MS signal of H_2 (a) and NH_3 (enlargement of 100 times) for decomposition of the 6th $LiMgNH(W)-Abs$ and $LiMgNH-Abs$; the samples are heated to 400 °C with a heating rate of 5 °C /min.

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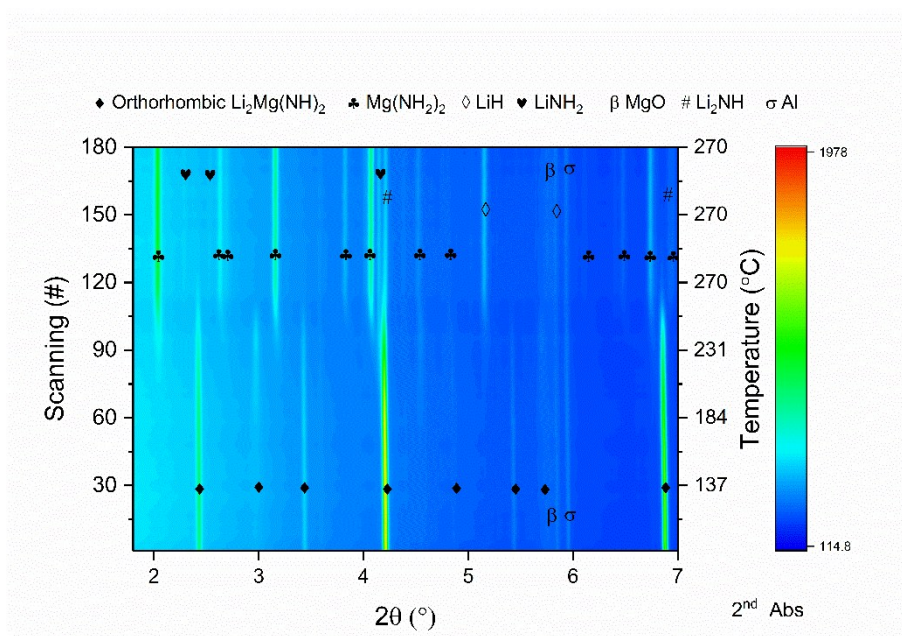


Figure S 2. *In situ* XRD of the 2nd hydrogenation of the $\text{LiMgNH}(\text{W})\text{-Des}$. The sample is heated to 270 °C with a heating rate of 10 °C/min under 180 bar of H_2 .

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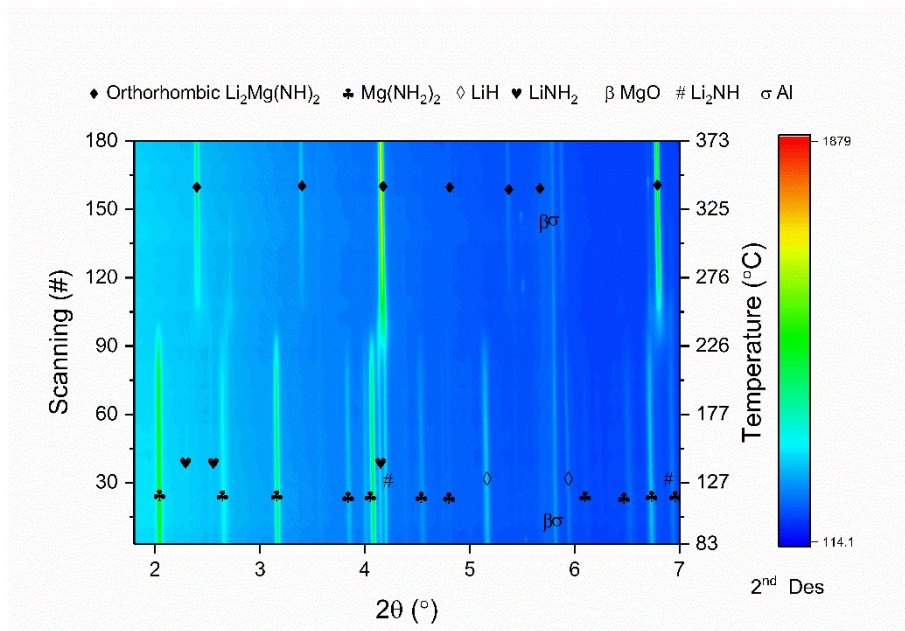


Figure S 3. *In situ* XRD of the 2nd dehydrogenation of the $\text{LiMgNH}(\text{W})\text{-Abs}$. The sample is heated to 270 °C with a heating rate of 10 °C/min under 180 bar of H_2 .

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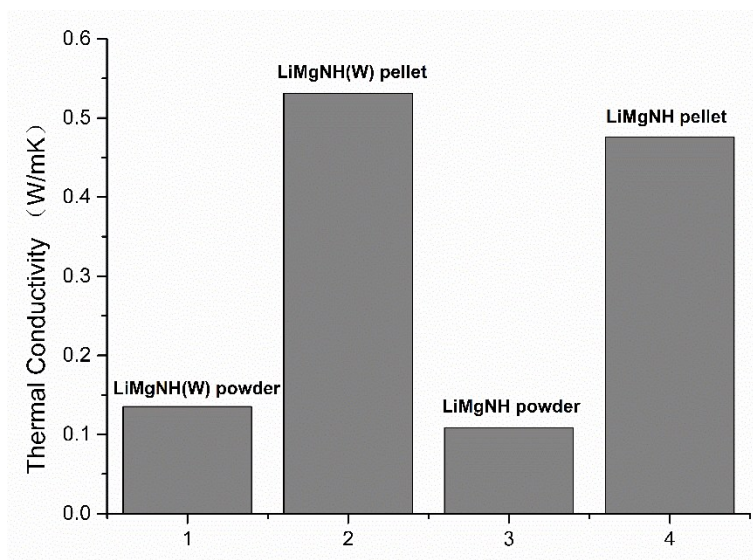


Figure S 4. Thermal conductivities of LiMgNH(W)-Abs and LiMgNH-Abs in powder and pellet stages.

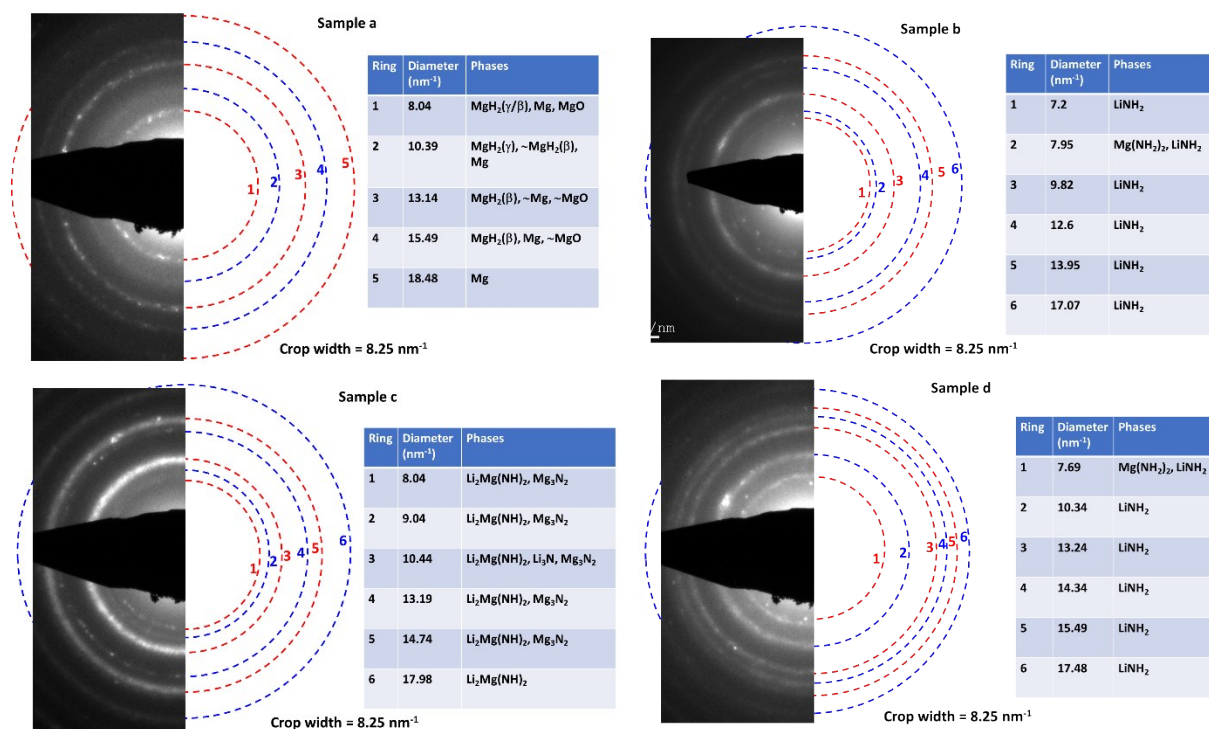


Figure S5. General diffraction patterns derived from the HR-TEM of the magnesium alloy AZ91 under different conditions (a) LiMgH(W); (b) LiMgN(W); (c) LiMgNH(W)-Des; (d) hydrogenated LiMgNH(W)-Abs.