

Supplementary Information:

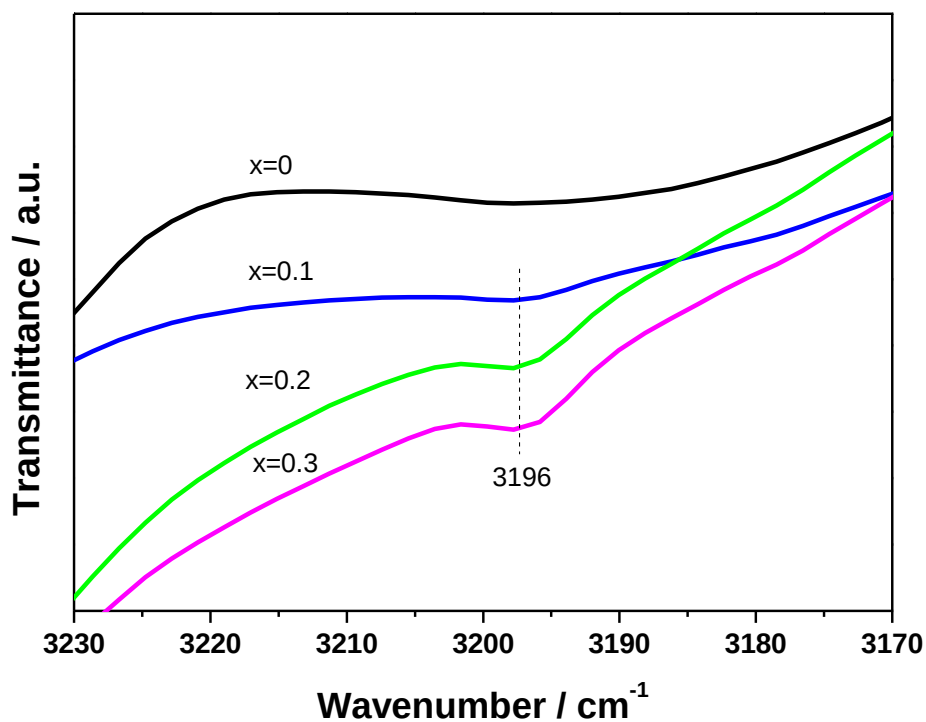


Fig. S1 FTIR spectra of the as-milled $\text{Mg}(\text{NH}_2)_2\text{-}2\text{LiH-xMg}(\text{BH}_4)_2$ ($x = 0\text{-}0.3$) composites

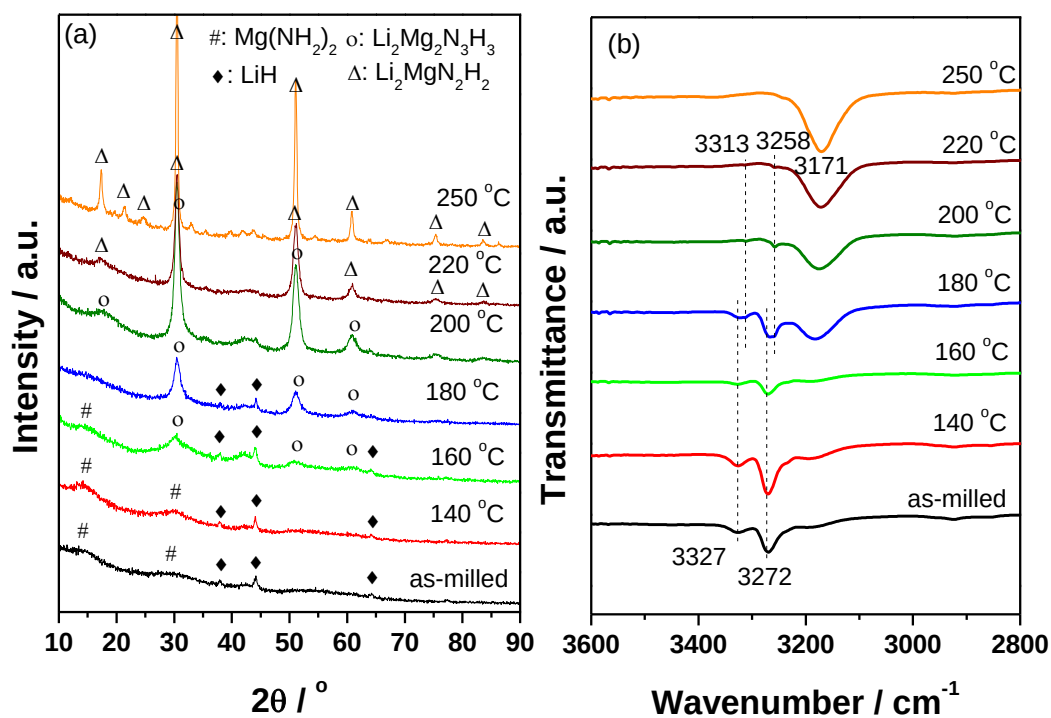


Fig. S2. XRD patterns (a) and FTIR spectra (b) of the dehydrogenated $\text{Mg}(\text{NH}_2)_2\text{-}2\text{LiH}$ samples at different temperatures

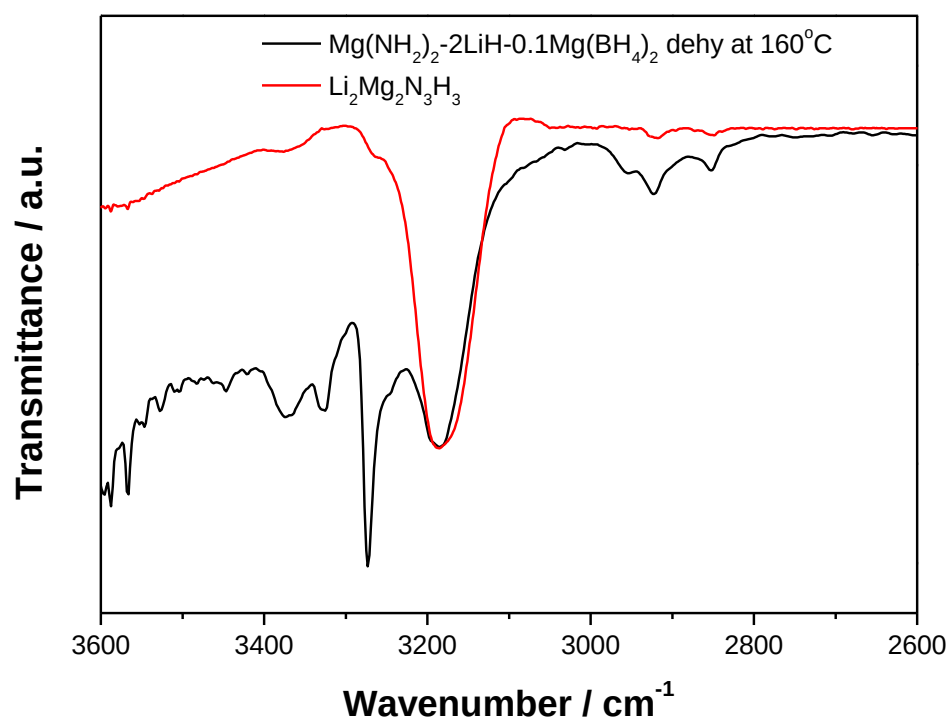


Fig. S3. FTIR spectra of the dehydrogenated $\text{Mg}(\text{NH}_2)_2\text{-}2\text{LiH}\text{-}0.1\text{Mg}(\text{BH}_4)_2$ sample at 160°C and $\text{Li}_2\text{Mg}_2\text{N}_3\text{H}_3$

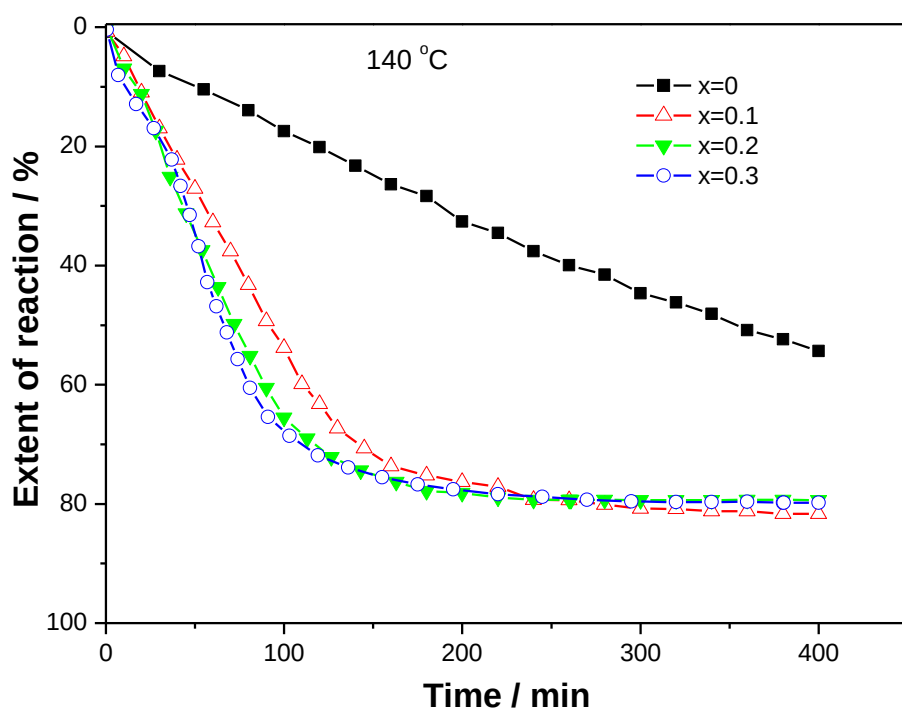


Fig. S4. Isothermal dehydrogenation curves of the $\text{Mg}(\text{NH}_2)_2\text{-}2\text{LiH}\text{-}x\text{Mg}(\text{BH}_4)_2$ samples at 140°C

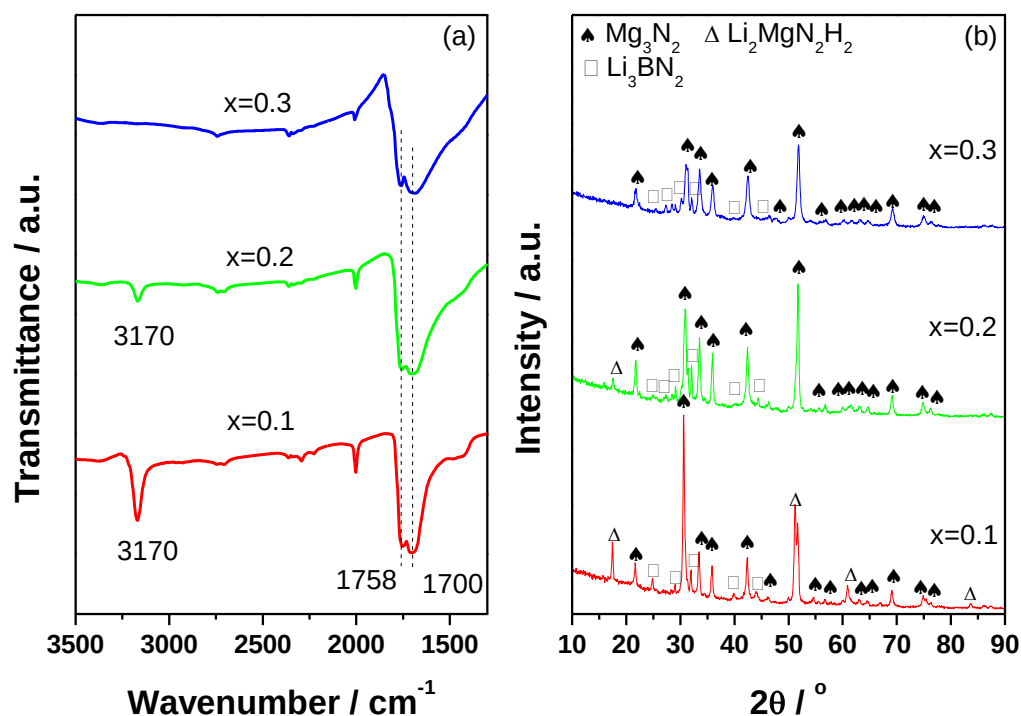


Fig. S5. FTIR spectra (a) and XRD patterns (b) of the fully dehydrogenated $\text{Mg}(\text{NH}_2)_2\text{-}2\text{LiH-xMg}(\text{BH}_4)_2$ samples

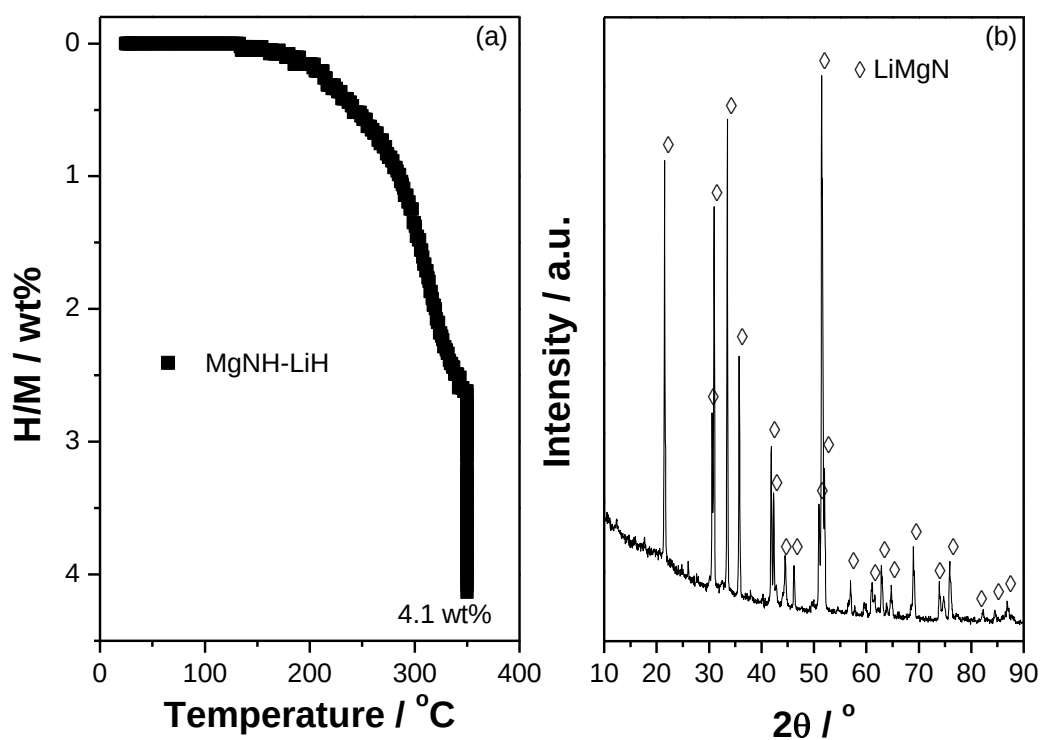


Fig. S6. Dehydrogenation curve of the MgNH-LiH sample at 2°C min^{-1} (a) and XRD pattern of the dehydrogenation product (b)

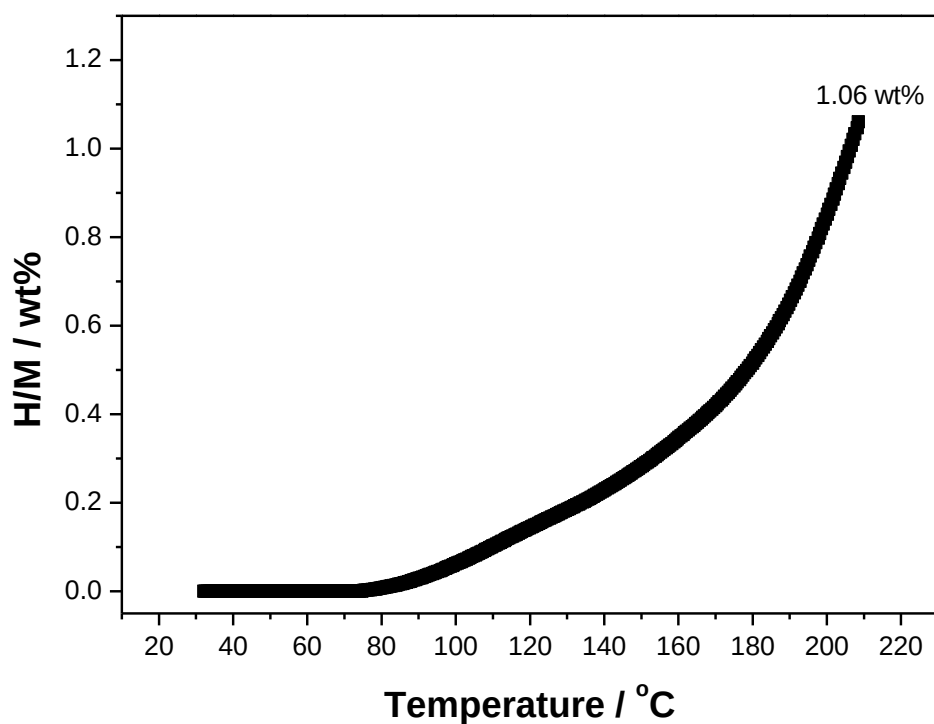


Fig. S7. Hydrogenation curve of the fully dehydrogenated $\text{Mg}(\text{NH}_2)_2\text{-}2\text{LiH}\text{-}0.1\text{Mg}(\text{BH}_4)_2$ sample at $1\text{ }^\circ\text{C min}^{-1}$

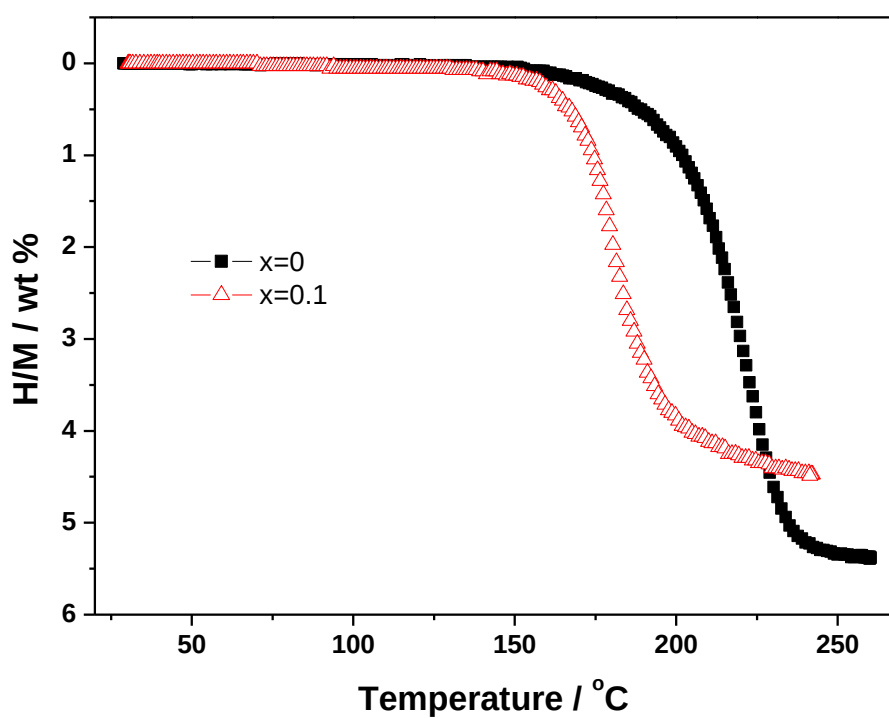


Fig. S8. Re-dehydrogenation curves of the fully hydrogenated $\text{Mg}(\text{NH}_2)_2\text{-}2\text{LiH}\text{-}x\text{Mg}(\text{BH}_4)_2$ samples at $2\text{ }^\circ\text{C min}^{-1}$