

Supplementary Information:

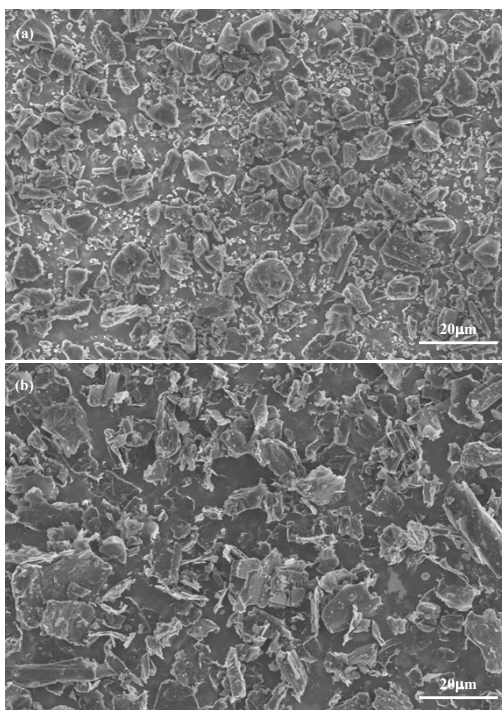


Figure S1. SEM images of the commercial activated carbon (a) and graphite (b).

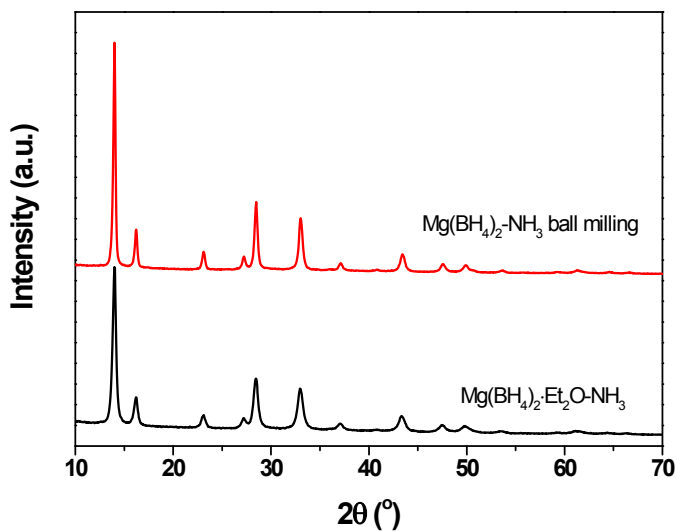


Figure S2. XRD patterns of Mg(BH₄)₂·6NH₃ synthesized through reacting Mg(BH₄)₂·2Et₂O with NH₃ under magnetic stirring and ball milling Mg(BH₄)₂ under NH₃ atmosphere, respectively.

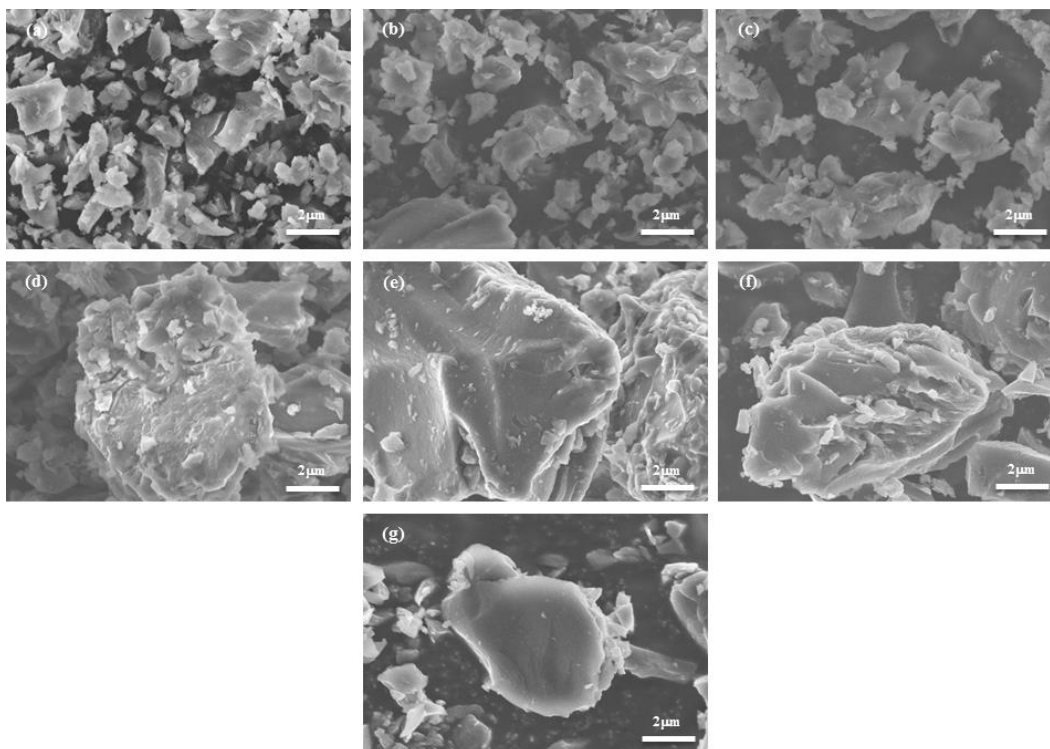


Figure S3. SEM images of the bulk $\text{Mg}(\text{BH}_4)_2 \cdot 6\text{NH}_3$ (a), the $\text{Mg}(\text{BH}_4)_2 \cdot 6\text{NH}_3@AC$ nanocomposites (b: 1:1, c: 0.8:1, d: 0.6:1, e: 0.4:1, f: 0.2:1) and AC (g).

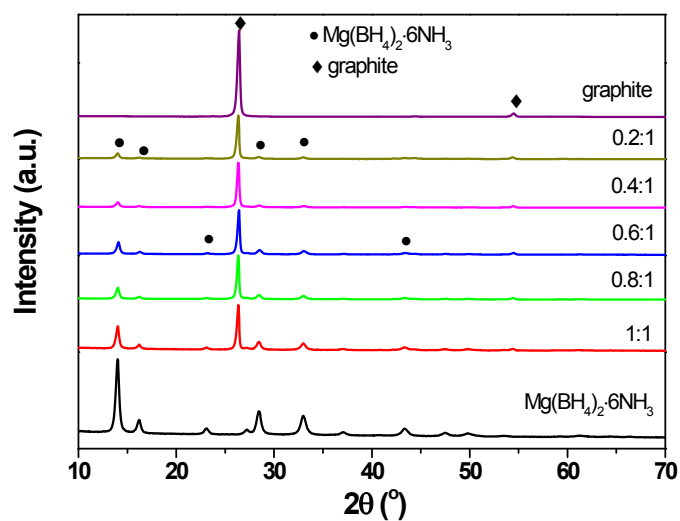


Figure S4. XRD patterns of the commercial graphite, $\text{Mg}(\text{BH}_4)_2 \cdot 6\text{NH}_3$ and $\text{Mg}(\text{BH}_4)_2 \cdot 6\text{NH}_3@graphite$ nanocomposites.

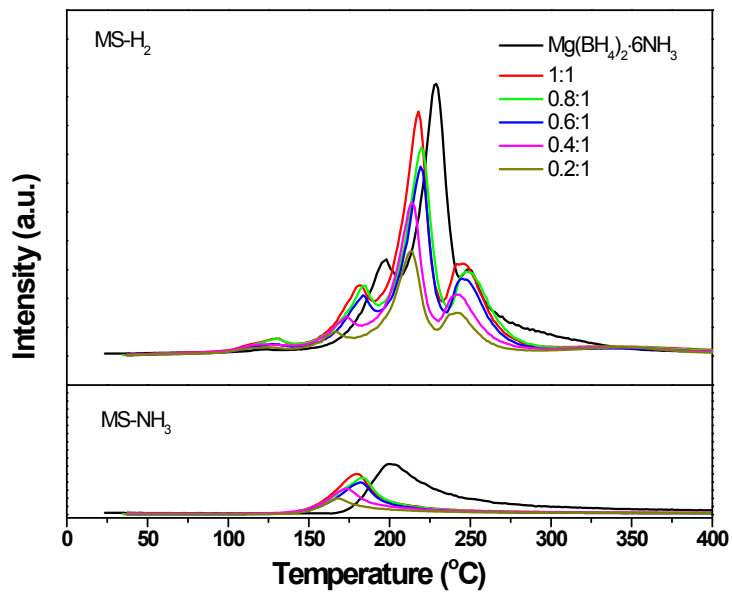


Figure S5. MS results of the bulk $\text{Mg}(\text{BH}_4)_2 \cdot 6\text{NH}_3$ and $\text{Mg}(\text{BH}_4)_2 \cdot 6\text{NH}_3 @ \text{AC}$ nanocomposites.

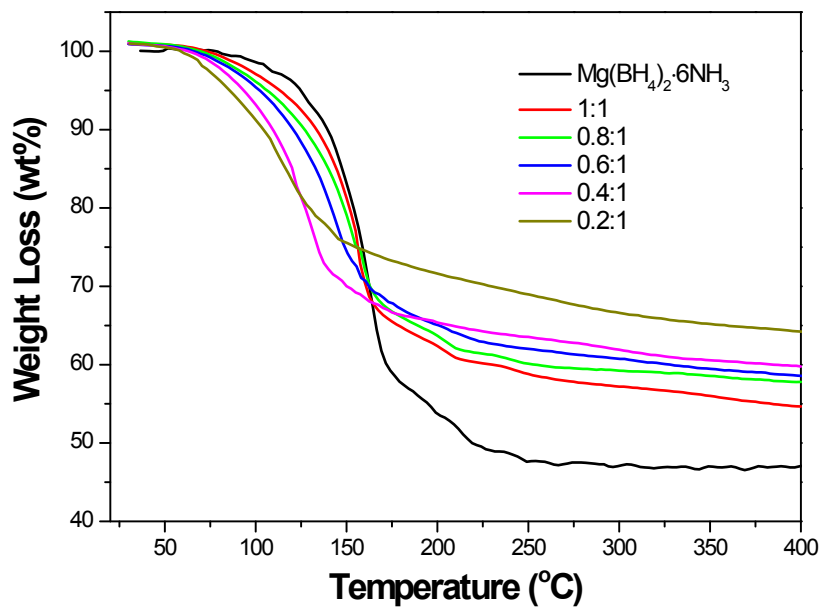


Figure S6. TG curves of the $\text{Mg}(\text{BH}_4)_2 \cdot 6\text{NH}_3 @ \text{AC}$ nanocomposites and bulk $\text{Mg}(\text{BH}_4)_2 \cdot 6\text{NH}_3$.

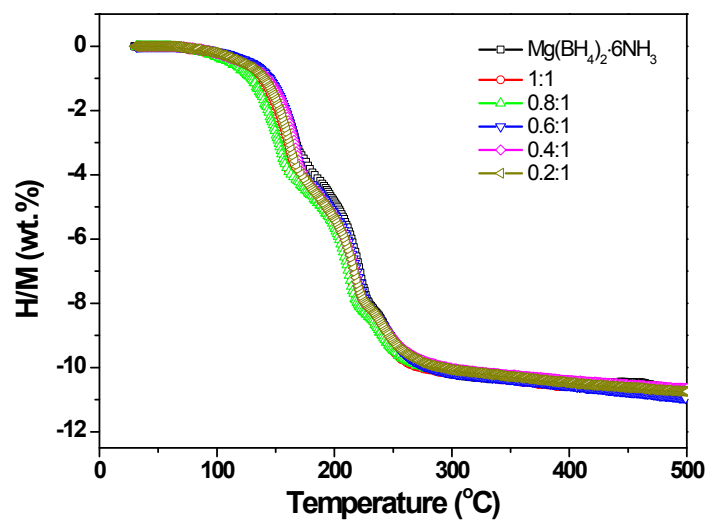


Figure S7. Volumetric release curves of the $\text{Mg}(\text{BH}_4)_2 \cdot 6\text{NH}_3$ @graphite nanocomposites and bulk $\text{Mg}(\text{BH}_4)_2 \cdot 6\text{NH}_3$.

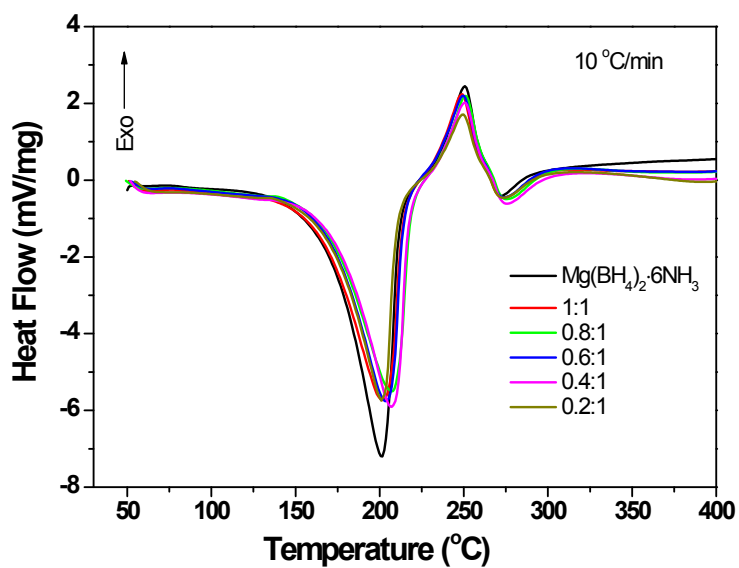


Figure S8. DSC curves of the bulk $\text{Mg}(\text{BH}_4)_2 \cdot 6\text{NH}_3$ and $\text{Mg}(\text{BH}_4)_2 \cdot 6\text{NH}_3$ @graphite composites.

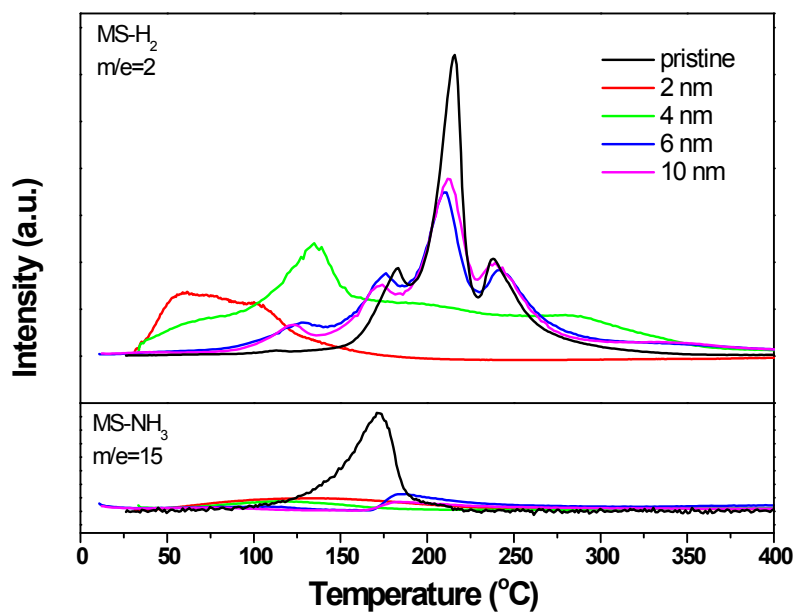


Figure S9. MS results of the $\text{Mg}(\text{BH}_4)_2 \cdot 6\text{NH}_3 @ \text{AC}$ and $\text{Mg}(\text{BH}_4)_2 \cdot 6\text{NH}_3 @ \text{PC}$ nanocomposites.

Table S1. Microstructural characteristics of activated carbon and porous carbons with different pore sizes

	Surface area (S_{BET} , $\text{m}^2 \text{g}^{-1}$)	Total pore volume ($\text{cm}^3 \text{g}^{-1}$)	Micropore volume ($\text{cm}^3 \text{g}^{-1}$)	Micropore size (nm)	Particle Size (μm)
Activated carbon	2051.00	1.048	0.8353	2	5 ± 1
Porous carbon (4 nm)	1034.49	1.301	0.426	4	1 μm in length and 500-600 nm in width
Porous carbon (6 nm)	222.305	0.3022	0.093	6	0.5
Porous carbon (10 nm)	105.257	0.3992	0.050	10	45 ± 5