Supporting Information for

Efficient and Inexpensive Sodium-Magnesium Hybrid Battery

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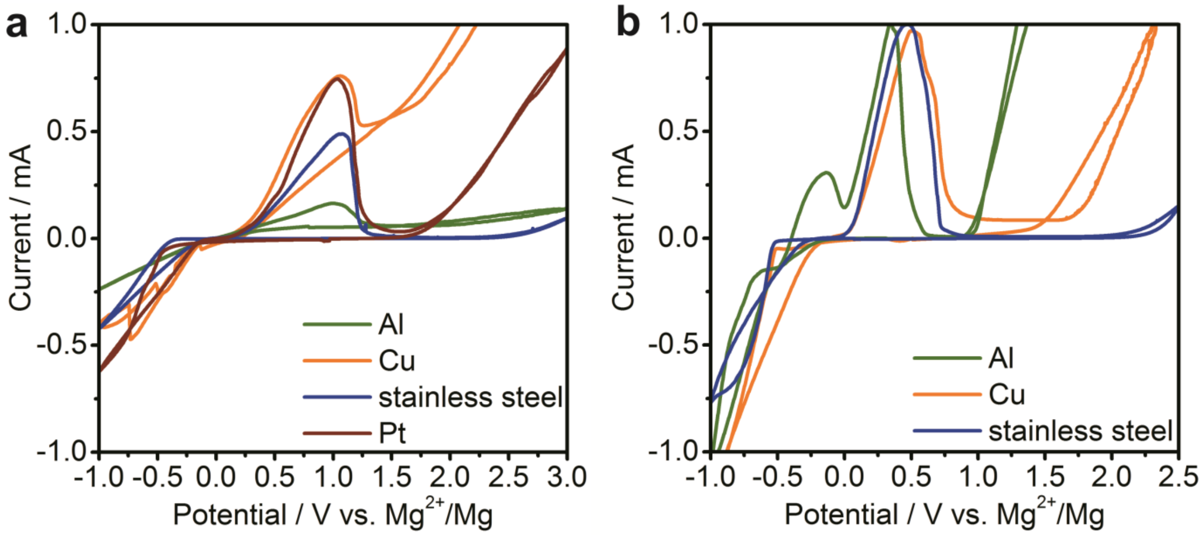

Figure S1. Cyclic voltammograms for Mg plating/stripping tests in three-electrode glass cells using Mg as a quasi-reference and counter electrode with a rate of 5 mV s^{-1} either for (a) 2M $NaBH_4$ + 0.2M $Mg(BH_4)_2$ or (b) 2M $LiBH_4$ + 0.2M $Mg(BH_4)_2$ in diglyme as electrolytes.

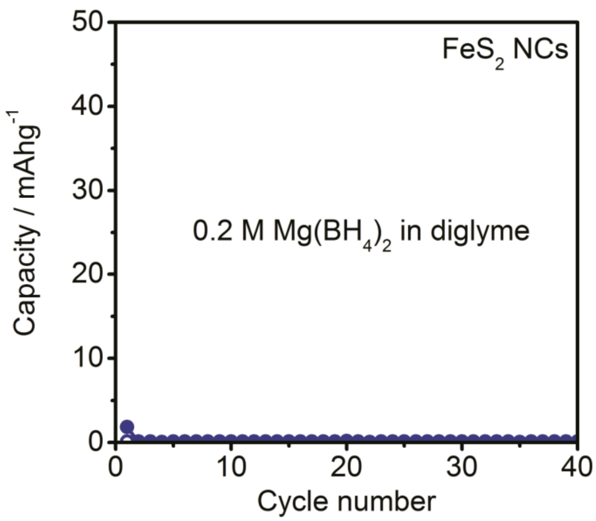

Figure S2. Electrochemical performance of FeS_2 NCs cycled vs. Mg using 0.2M $Mg(BH_4)_2$ in diglyme as the electrolyte. Batteries were cycled with a current of 200 mA g^{-1} in the potential range 0.4-1.95 V after initial discharge to 0.005 V.

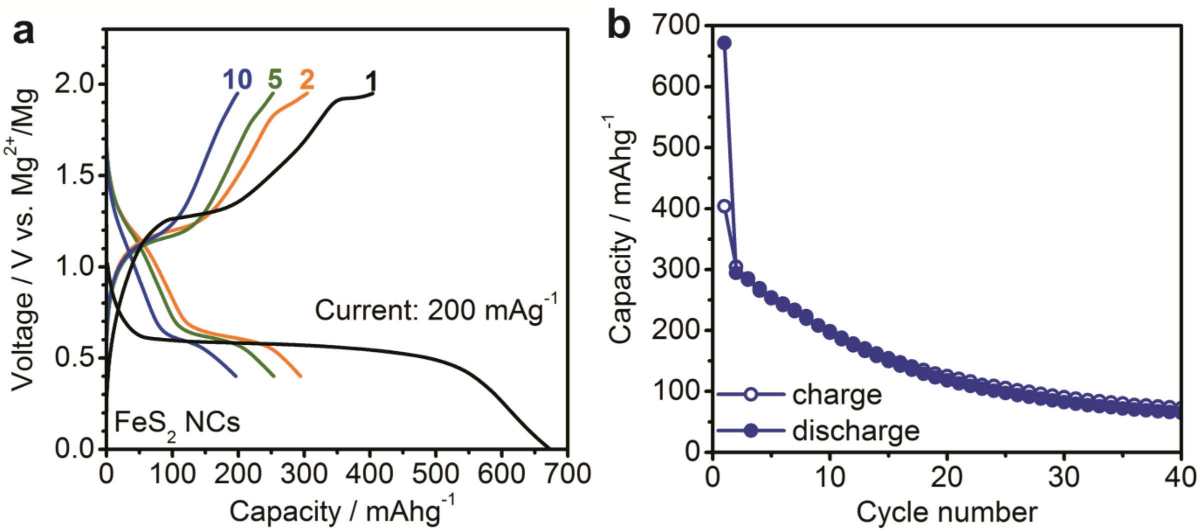

Figure S3. (a) Galvanostatic charge/discharge curves and (b) capacity retention for FeS_2 NCs as the cathode in Li/Mg hybrid batteries. Batteries were cycled with a current of 200 mA g^{-1} in the potential range of 0.4-1.95 V after initial discharge to 0.005 V, using 2M $LiBH_4$ + 0.2M $Mg(BH_4)_2$ in diglyme as the electrolyte.

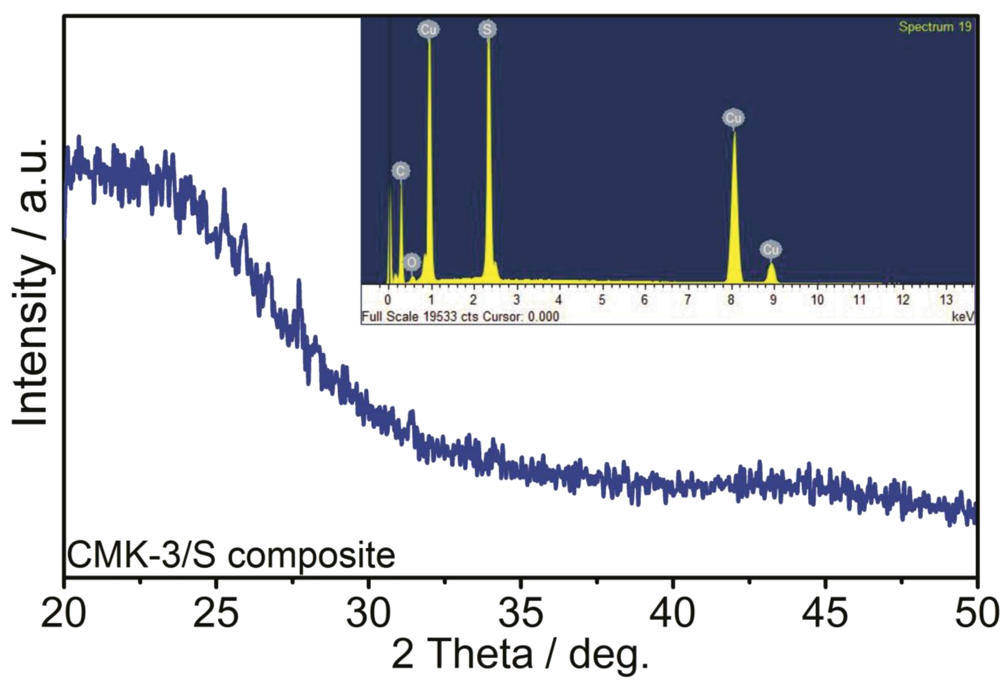

Figure S4. XRD pattern of the CMK-3/sulfur composite prepared by melt-diffusion of sulfur into the CMK-3 matrix. The inset shows the corresponding EDX spectrum. The Cu signal is from the substrate.

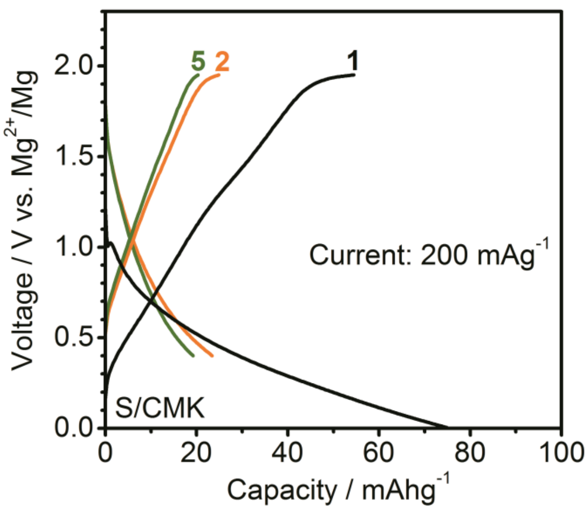

Figure S5. Galvanostatic charge/discharge curves for CMK-3/S as the cathode material in Na/Mg hybrid batteries. Batteries were cycled with a current of 200 mA g^{-1} in the potential range of 0.4-1.95 V after initial discharge to 0.005 V, using 2M $NaBH_4$ + 0.2M $Mg(BH_4)_2$ in diglyme as the electrolyte.

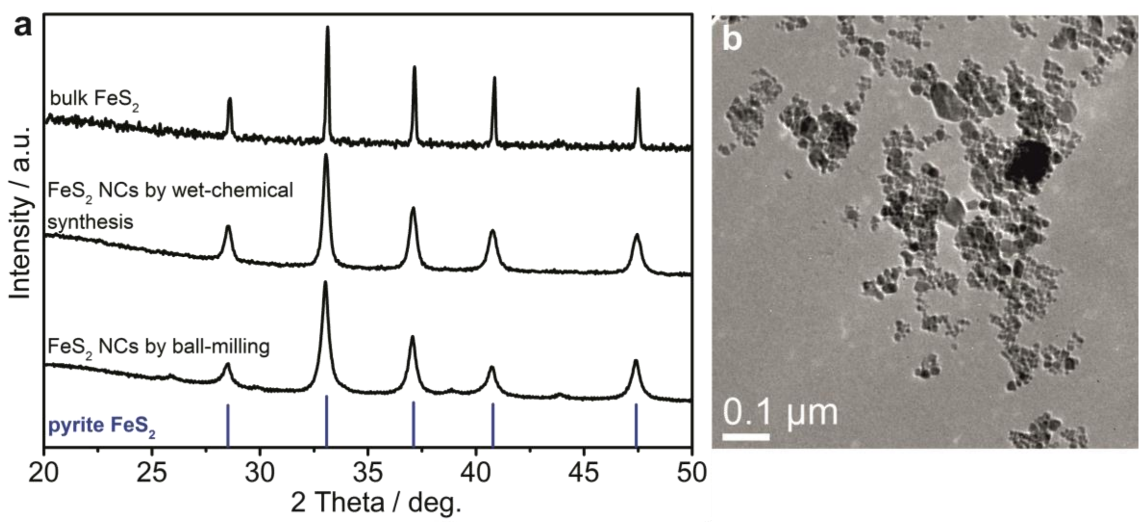

Figure S6. (a) Powder X-ray diffraction patterns of bulk FeS_2, FeS_2 NCs prepared by wet-chemical (colloidal) synthesis and FeS_2 NCs prepared by dry mechanochemical synthesis (ball-milling of Fe and S powders). (b) TEM-image of mechano-synthesized FeS_2 NCs.

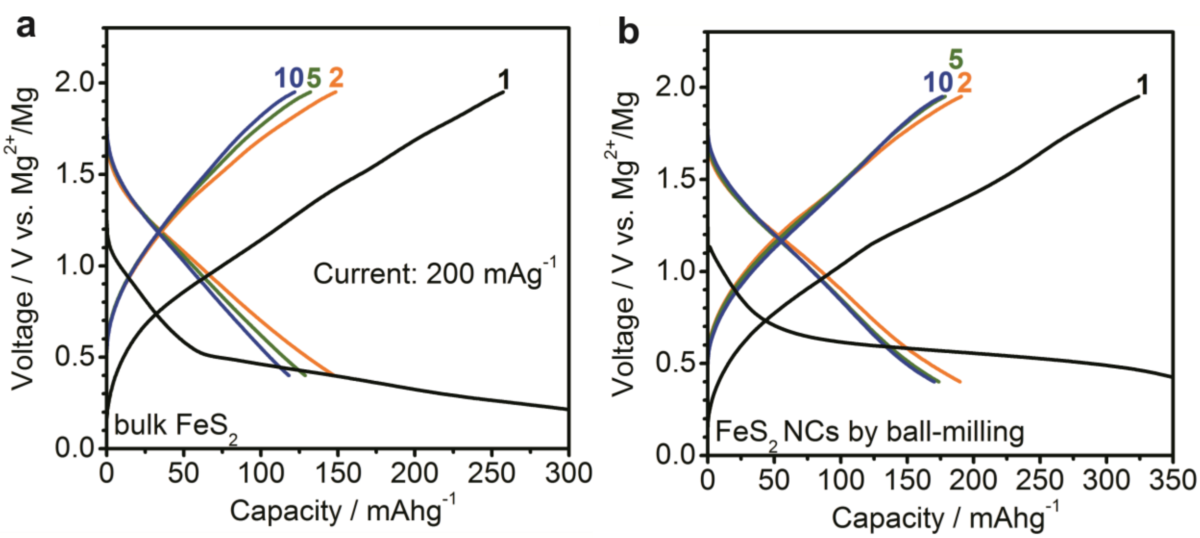

Figure S7. Galvanostatic charge/discharge curves for (a) bulk FeS_2 and (b) mechanosynhesized FeS_2 NCs. Batteries were cycled with a current of 200 mA g^{-1} in the potential range of 0.4-1.95 V after initial discharge to 0.005 V, using 2M $NaBH_4$ + 0.2M $Mg(BH_4)_2$ in diglyme as the electrolyte.

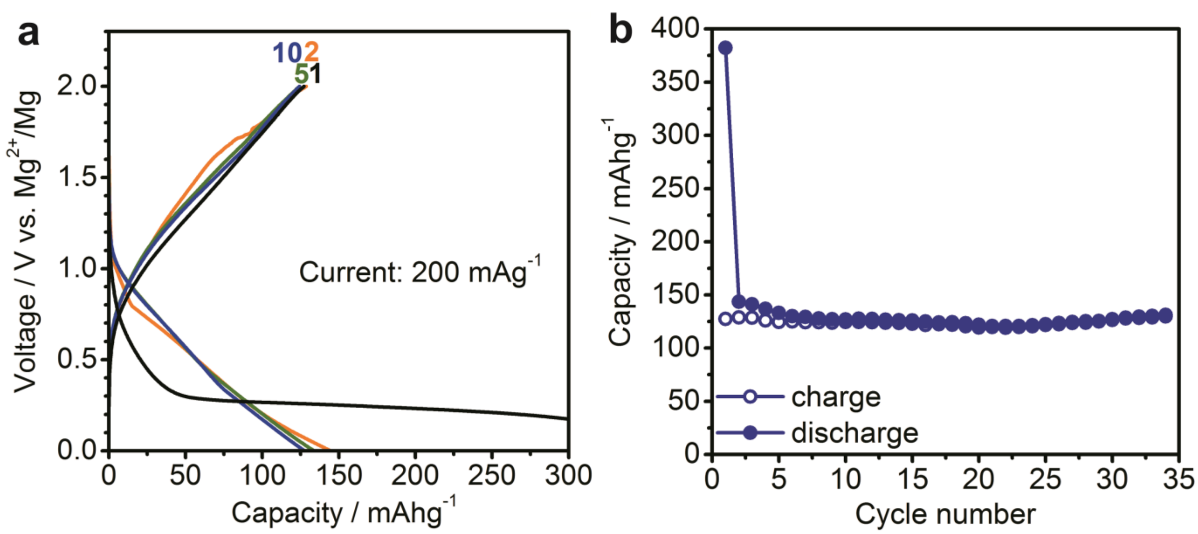

Figure S8. (a) Galvanostatic charge/discharge curves and (b) capacity retention for FeS_2 NCs as the cathode. Batteries were cycled with a current of 200 mA g^{-1} in the potential range of 0.005-2.0 V, using 0.5M NaTFSI + 0.27M Mg_2AlCl_7 in THF as the electrolyte.