Supporting Information

Boosting Sodium-ion Storage by Encapsulating NiS (CoS) Hollow Nanoparticles into Carbonaceous Fibers

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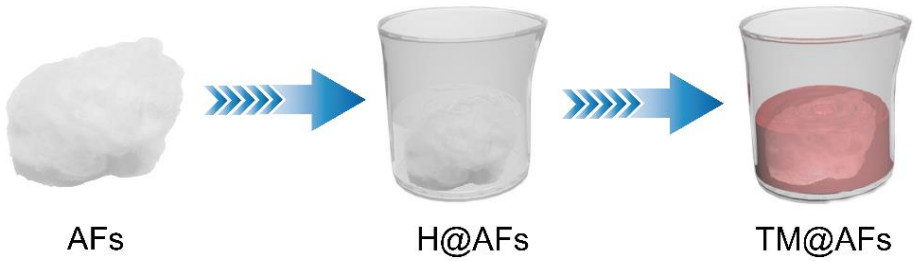

Scheme S1. Schematic illustration of the synthesis of TM@AFs.

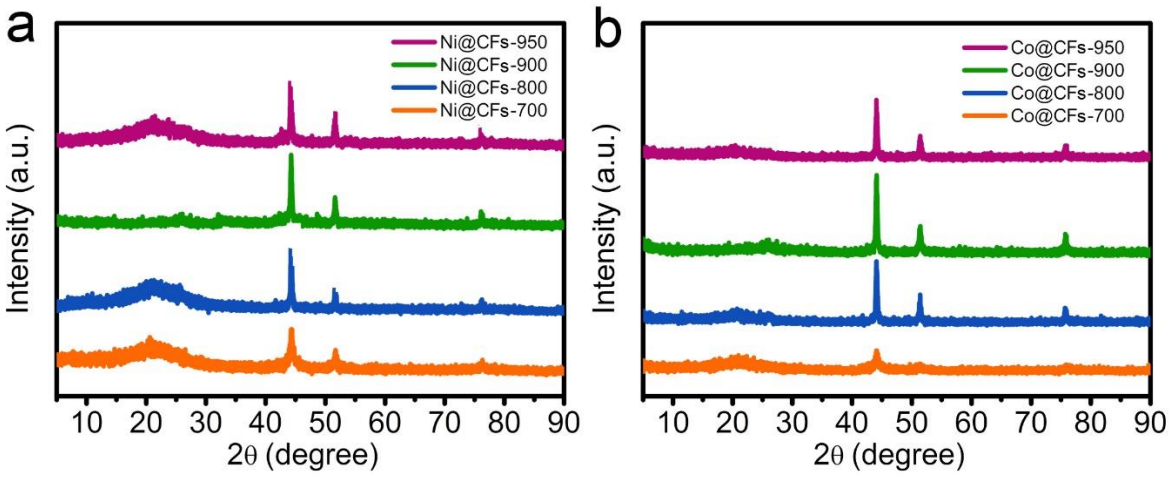

Figure S1. XRD patterns of (a) Ni@CFs-T and (b) Co@CFs-T.

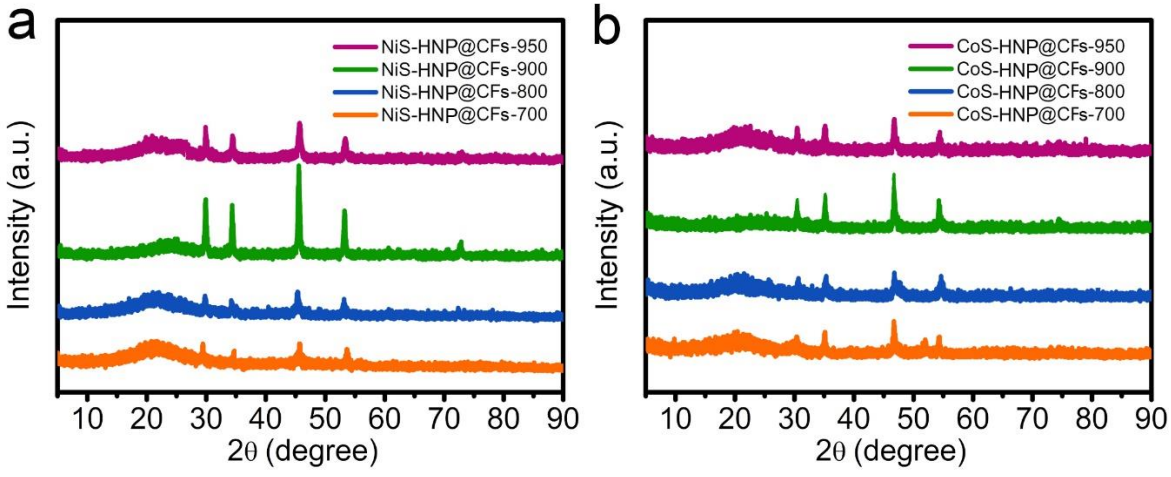

Figure S2. XRD patterns of (a) NiS-HNP@CFs-T and (b) CoS-HNP@CFs-T.

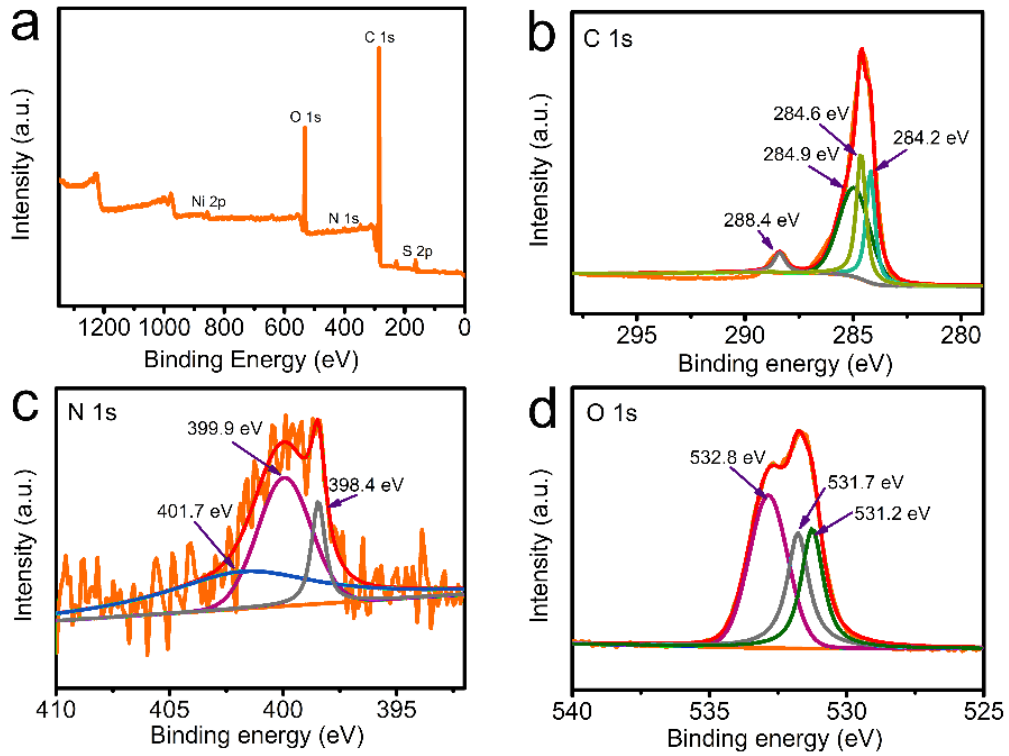

Figure S3. (a) XPS spectrogram, (b) C 1s, (c) N 1s and (d) O1s of NiS-HNP@CFs-900.

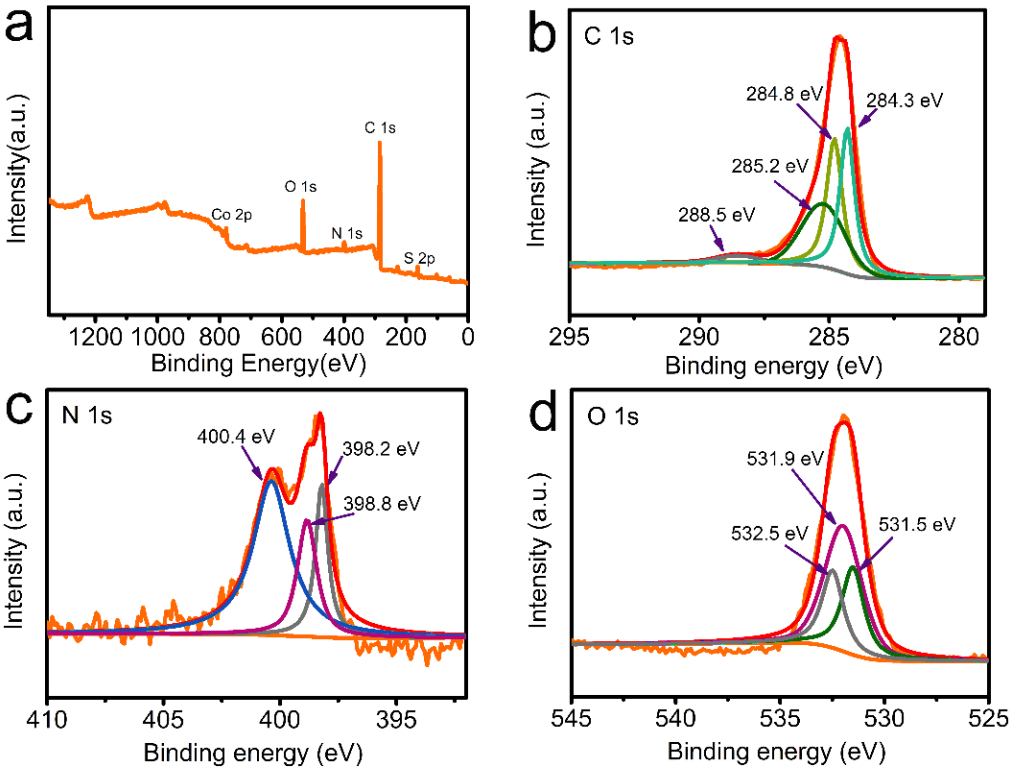

Figure S4. (a) XPS spectrogram, (b) C 1s, (c) N 1s and (d) O1s of CoS-HNP@CFs-900.

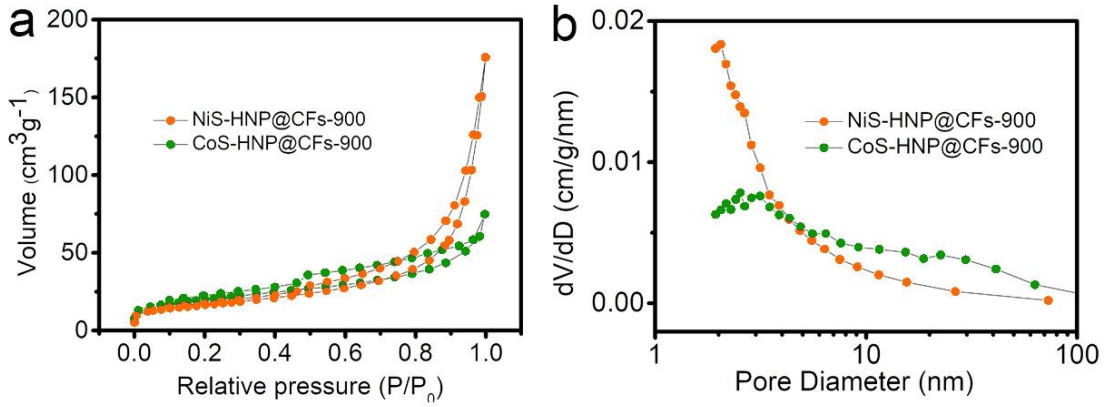

Figure S5 (a) N_2 adsorption/desorption curves and (b) pore distribution of TMS-HNP@CFs-900.

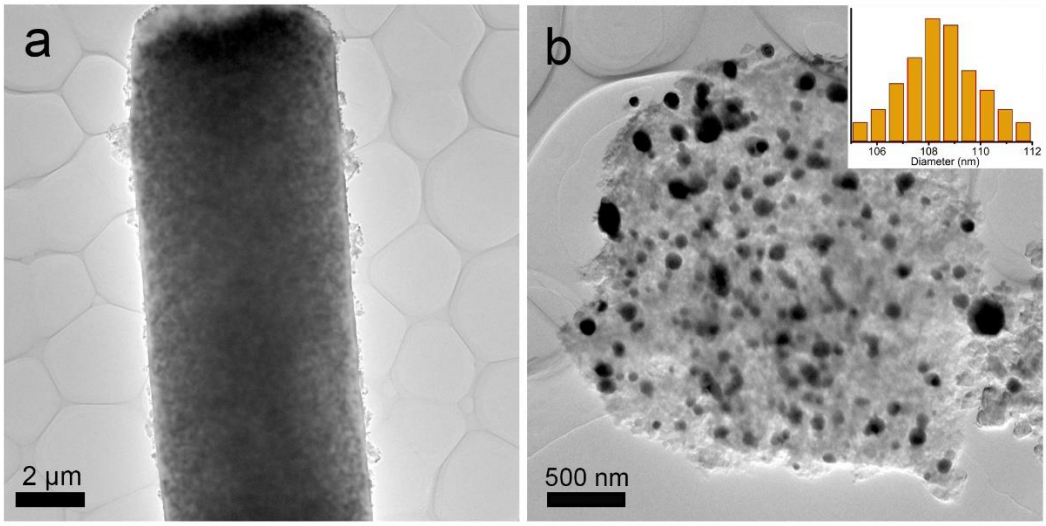

Figure S6. TEM (a) and HRTEM (b) images of Ni@CFs-900.

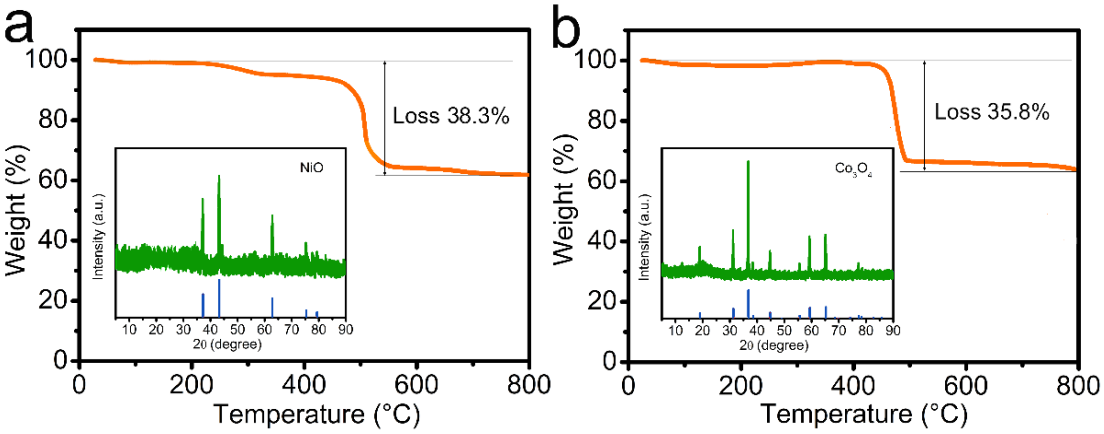

Figure S7. The thermogravimetric analysis (TGA) curve and XRD pattern of the final products of (a) NiS-HNP@CFs-900 and (b) CoS-HNP@CFs-900.

In Figure S6, the values are the loss of specimens, not the carbon content. The carbon content is calculated based on the final mass and product of the sample. For example, in Figure S6b, the loss of the sample is 35.8%, and the final product is Co_3O_4, the carbon content:

$$\mathrm{C}\% = 100\% - \frac{\frac{100-35.8}{59\times 3+16\times 4}\times 3}{1}\times(59+32)\% = 27.2\%$$

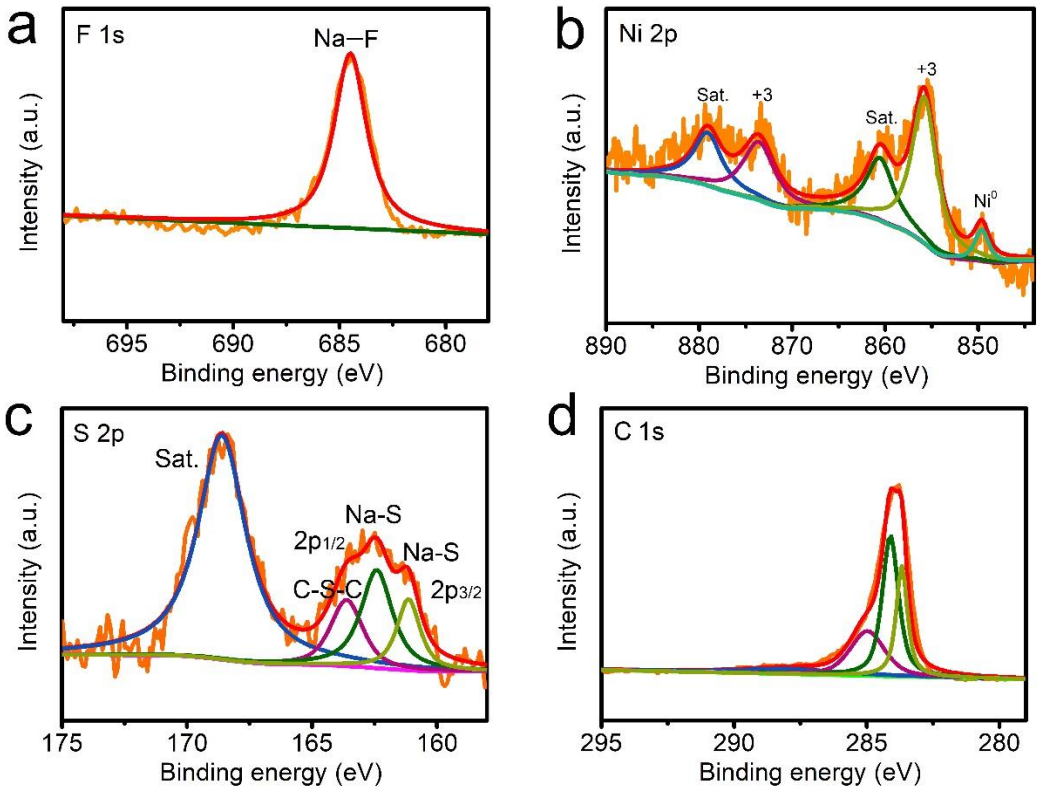

Figure S8. (a) Ex-situ XPS spectrogram of F 1s, (b) Ni 2p, (c) S 2p and (d) C 1s of NiS-HNP@CFs-900 after the first discharge.

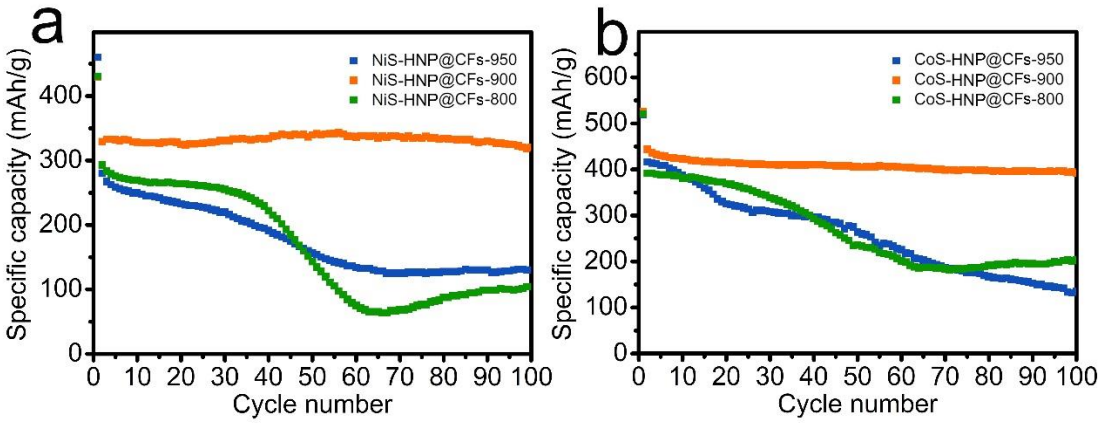

Figure S9. Cycling life of (a) NiS-HNP@CFs-T and (b) CoS-HNP@CFs-T at 1000 mA g^{-1} for the 100 cycles.

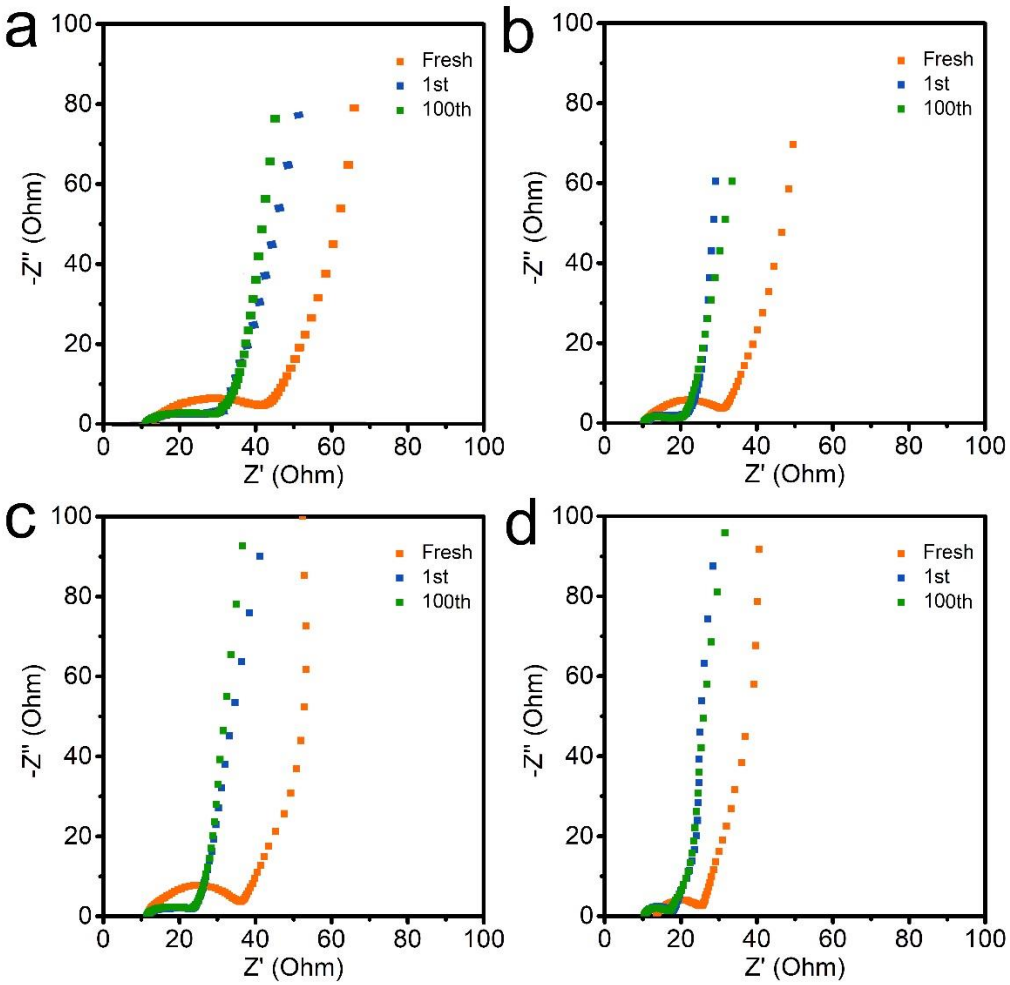

Figure S10. Nyquist plots of (a) Ni @CFs-900, (b) Co @CFs-900, (c) NiS-HNP@CFs-900 and (d) CoS-HNP@CFs-900 (before cycle and after 1st, 100th cycle).

In the Nyquist plots, the high frequency intercept along the Z′ axis is the resistance of the electrolyte and cell components (Re). The compressed semicircle in the high-middle frequency range is related to the charge transfer resistance (Rct) between electrode and electrolyte and the SEI resistance (RSEI). The low-frequency tangent indicates the Warburg impedance (W), which belongs to Na^+ ion diffusion in the electrode materials.

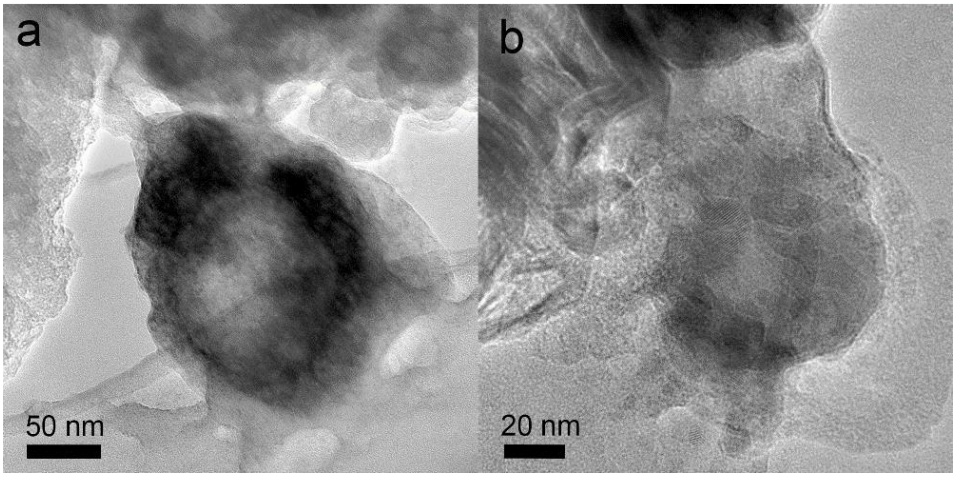

Figure S11. TEM of the (a) NiS-HNP@CFs-900 and (b) CoS-HNP@CFs-900 after 100 cycles.