Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supporting Information

$Na_3V_2(PO_4)_3$ Particles Partly Embedded in Carbon Nanofibers with Superb Kinetics for Ultra-High Power Sodium Ion Batteries

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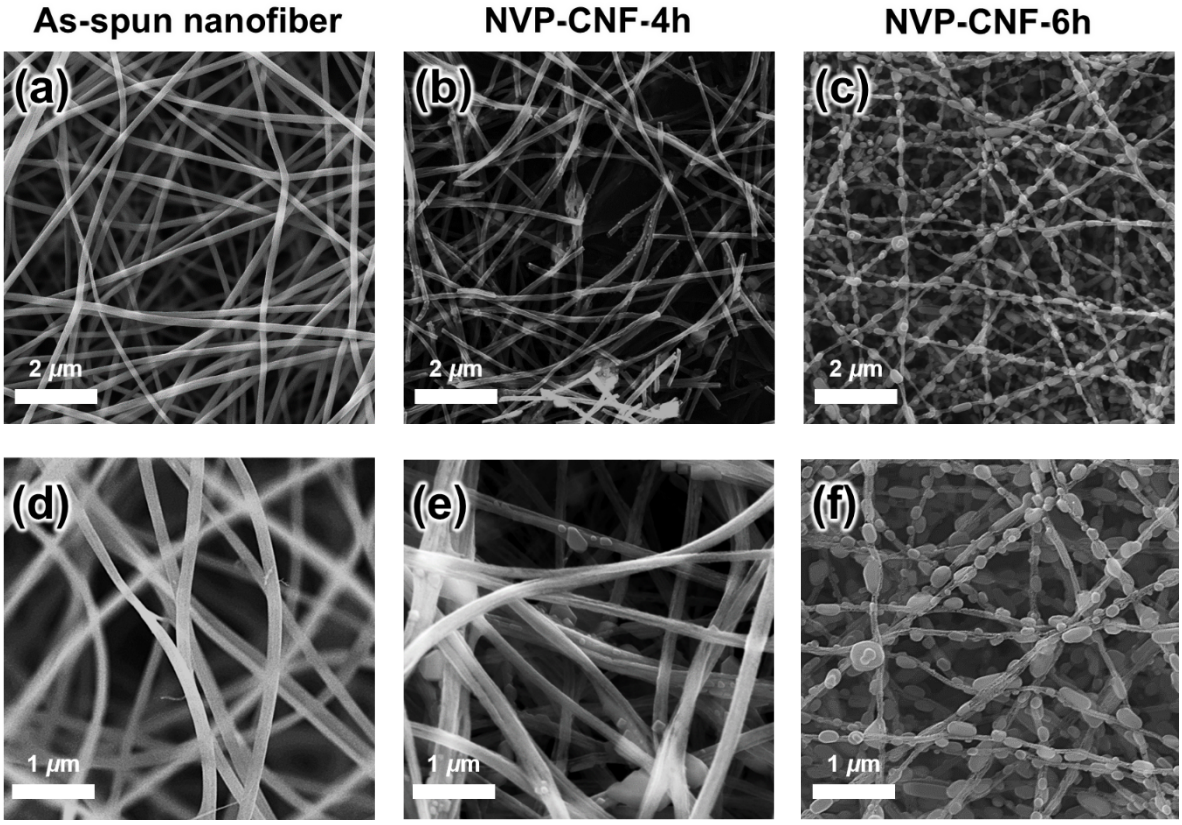

Fig. S1 FE-SEM images of (a,d) As-spun NVP-CNF composite nanofibers, (b,e) NVP-CNF-4h and (c,f) NVP-CNF-6h at different magnification.

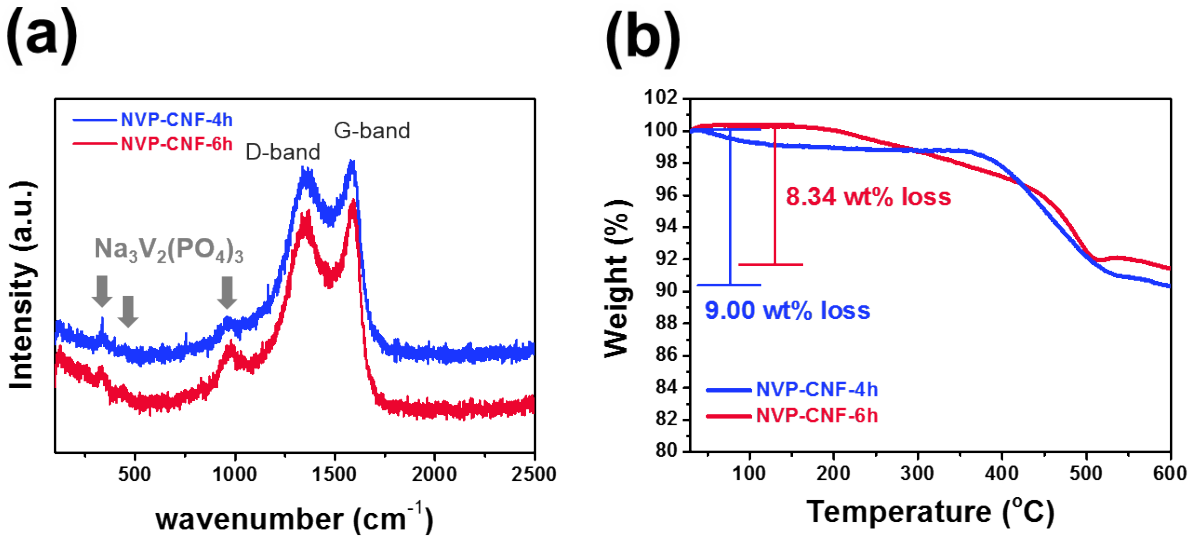

Fig. S2 (a) Raman spectra and (b) thermogravimetric analysis results of NVP-CNF-4h and NVP-CNF-6h.

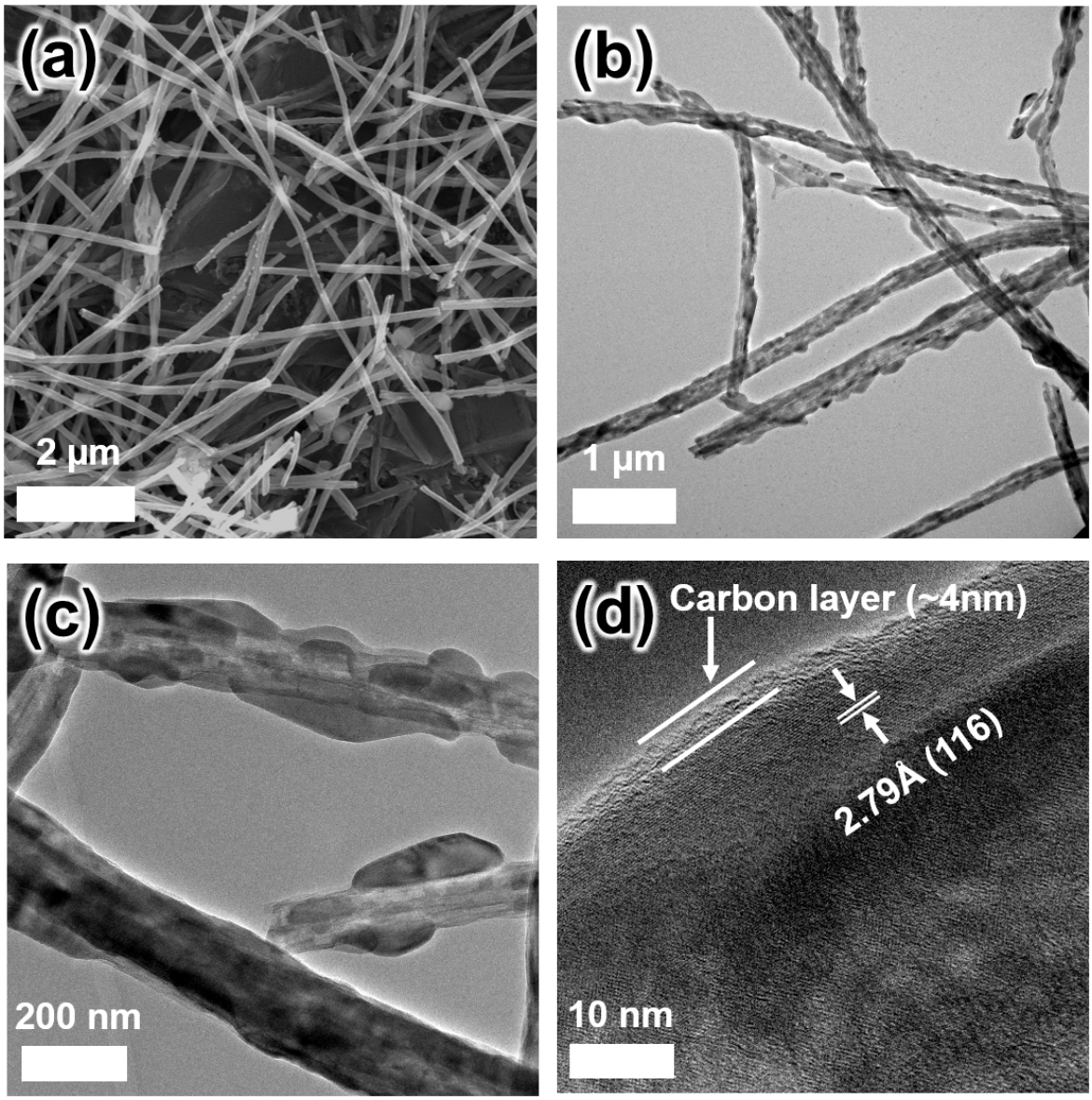

Fig. S3 Representative SEM image (a) and TEM images (b-d) of NVP-CNF-4h at different magnification.

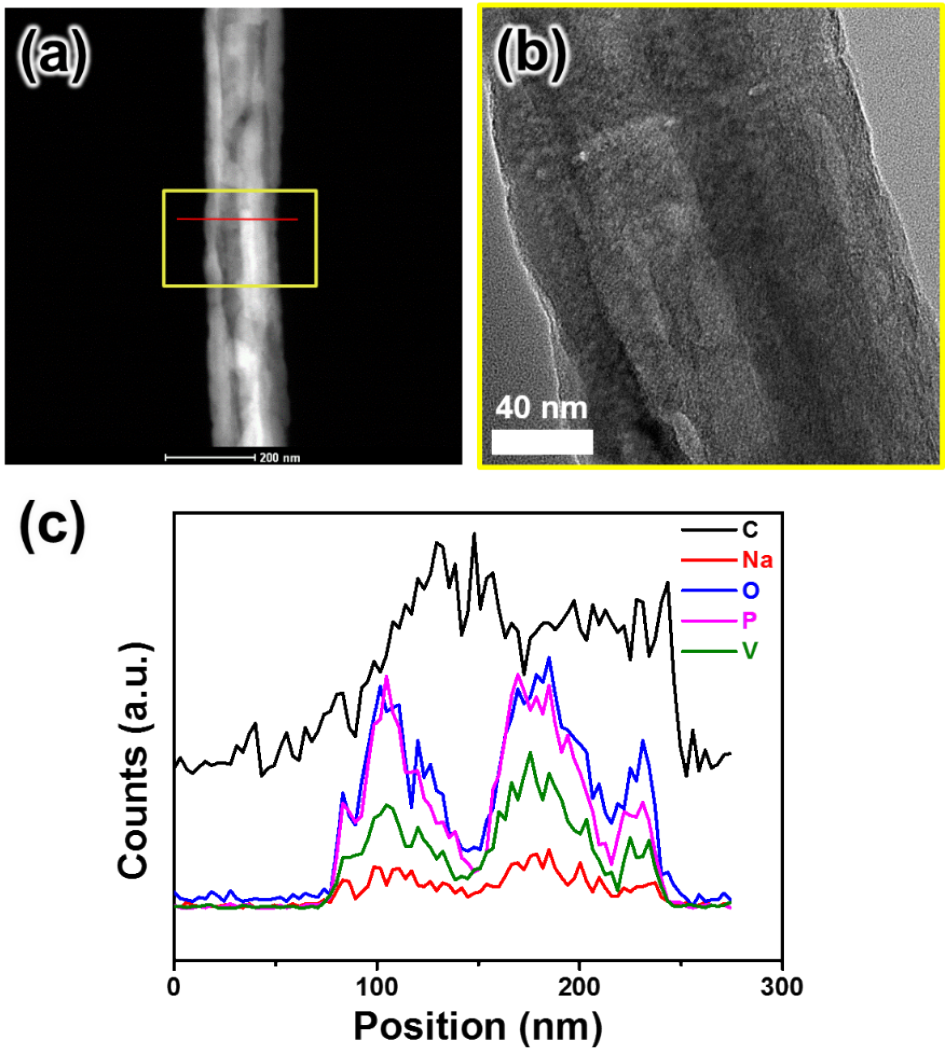

Fig. S4 (a-b) STEM and TEM images of NVP-CNF-4h respectively and (c) corresponding EDS line scan elemental analysis results for atom C, Na, O, P and V.

Figure S4a and S4b show STEM and TEM image of NPV-CNF-4h, respectively. The red line in Figure S4a indicates EDS line scan range and the yellow box corresponds to the area in which TEM image was obtained. EDS elemental analysis demonstrated the existence of NVP as well as carbon. Interestingly, NVP was unevenly distributed inside nanofibers as shown in Figure S4c. The TEM image in Figure S4b shows the trace of line scanning because the image was obtained after STEM analysis. TEM image clearly demonstrated the difference between bright region and dark region. According to EDS line scan analysis, the bright region is mainly composed of carbon, while NVP constitutes the dark region.

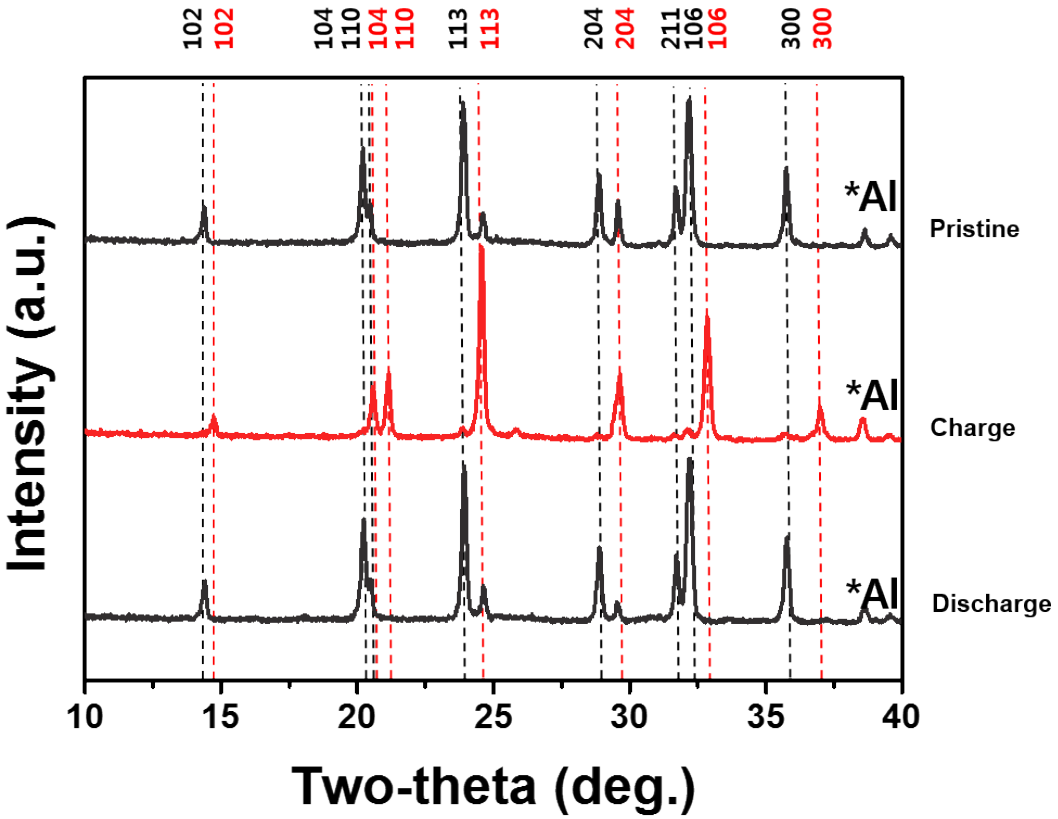

Fig. S5 Ex-situ XRD patterns of NVP-CNF-6h obtained at pristine, charged and discharged state during 1st cycle at 0.1C. Black dot line and red dot line each indicate the peak location of $Na_3V_2(PO_4)_3$ and $NaV_2(PO_4)_3$.

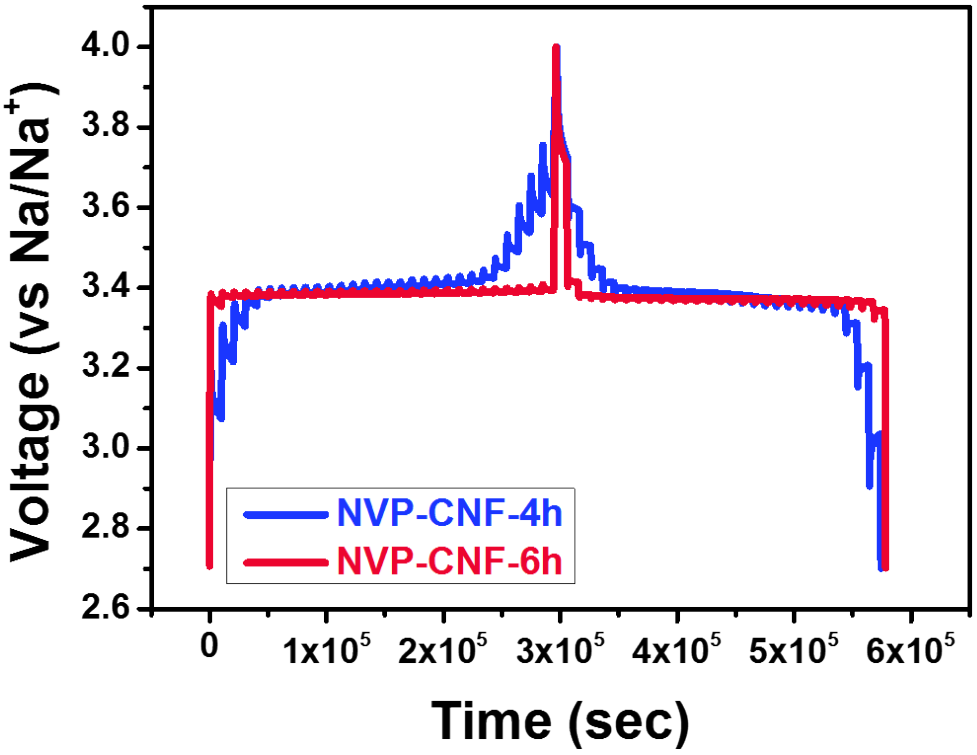

Fig. S6 Galvanostatic intermittent titration (GITT) curves of NVP-CNF-4h and NVP-CNF-6h.

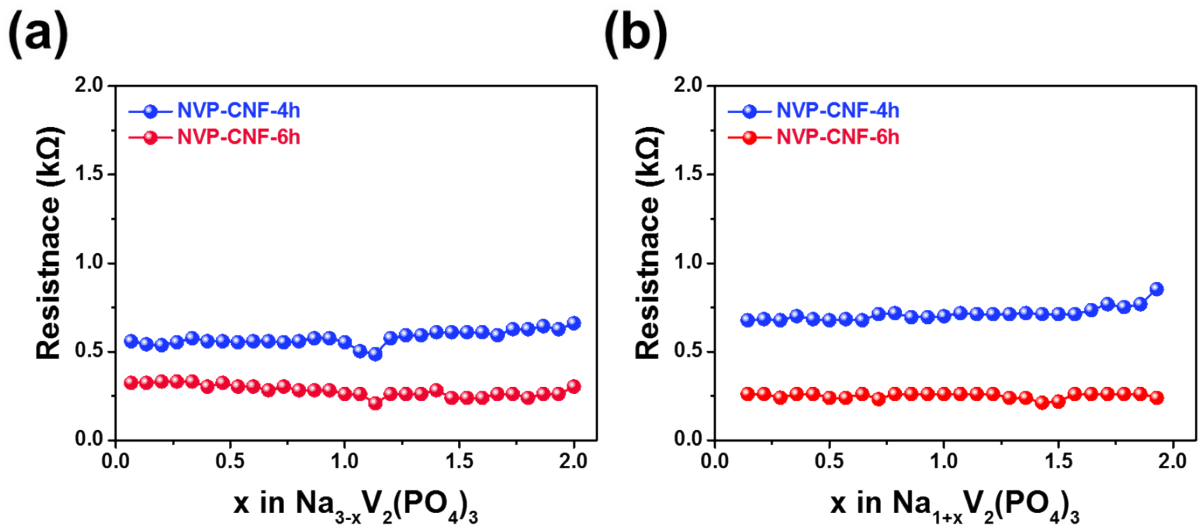

Fig. S7 Calculated IR-drop resistance calculated from GITT during (a) charging and (b) discharging.

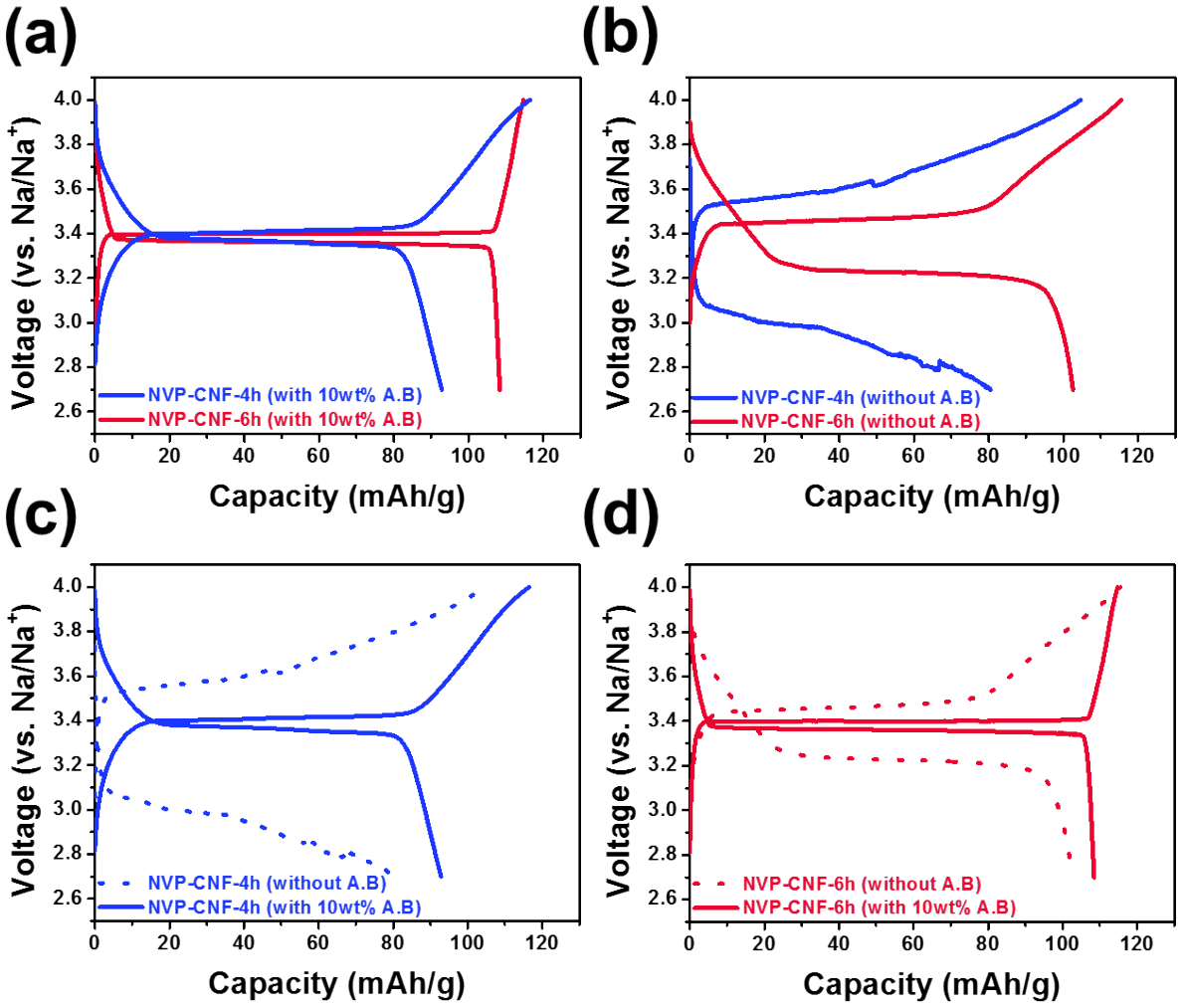

Fig. S8 Initial galvanostatic (0.1 C) voltage profiles of NVP-CNF-4h and NVP-CNF-6h (a) with 10wt% acetylene black (A.B) (b) without acetylene black. (c) galvanostatic voltage profiles of NVP-CNF-4h comparing the effect of 10wt% acetylene black. (d) galvanostatic voltage profiles of NVP-CNF-6h comparing the effect of 10wt% acetylene black.