**Supplementary Figure 1** XRD patterns of CNT products obtained at 450 °C, 550 °C and 600 °C.

**Supplementary Figure 2** SEM patterns of (a) Pristine HCNTs and (b) a-HCNTs.
**Supplementary Figure 3** N$_2$ adsorption/desorption isotherms of Pristine HCNTs and a-HCNTs

**Supplementary Figure 4** Pore size distribution of Pristine HCNTs and a-HCNTs
Supplementary Figure 5 CV Curves of (a) pristine HCNTs electrode and (b) the a-HCNTs at different scanning rates in 1M Na₂SO₄ aqueous solution at range of -0.2–0.8 V (vs SCE electrode). (c) CV curves of the pristine HCNTs and a-HCNTs at scanning rate of 0.1 V/s. (d) GCD curves of the pristine HCNTs and a-HCNTs at current density of 0.1 A g⁻¹. (e) GCD curves of a-HCNTs at current densities of 0.1, 0.3, 0.5 and 1 A g⁻¹. (f) Nyquist spectra of a-HCNTs electrode at a sinusoidal signal of 10 mV in the frequency range of 100 kHz to 0.01 Hz.
Supplementary Figure 6 The cycling performance of the a-HCNTs electrode collected at a scan rate of .1 A g⁻¹ for 1000 cycles.