Supporting Information

A novel method to prepare nanotubes@mesoporous carbon composite material based on waste biomass and its electrochemical performance

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Figure S1 Schematic diagram of the simple route to prepare the hierarchical carbon composite material: (a) corncob; (b) corncob powder; (c) corncob powder mixed with melamine; (d) CNNTs@CMC composite material

Figure S2 (a) The XRD patterns of CMC and CNNTs@CMC composite material; (b) Raman patterns of CMC and CNNTs@CMC composite material; (c) Thermal gravimetric analysis (TGA) of CNNTs@CMC composite material in air

Figure S3 (a) TEM image of CNNTs@CMC composite material; (b, c) HRTEM images of ball-like material on CNNTs@CMC composite material
Figure S4 XPS of raw corncob and pretreated corncob: (a) C1s scan, N1s scan, (c) O1s scan, (d) S 2p_{3/2} scan
Figure S5 Fe$^{2+}$ ions connect carbon source and nitrogen source together during the processes.

Figure S6 (a) Nyquist plot of the CNNTs@CMC supercapacitor in 1 M LiPF$_6$ electrolyte; (b) Cycling capability at a scan rate of 50 mV s$^{-1}$ in 1 M LiPF$_6$ organic electrolyte (c) Ragone plot of the CNNTs@CMC supercapacitor in 1 M LiPF$_6$ electrolyte.

Figure S7 (a) Free-standing film of CNNTs@CMC; (b) Image of a LED powered by the CNNTs@CMC based symmetrical supercapacitor.
Figure S8 Cycle capacities and Coulombic efficiencies of CMC/S and CNNTs@CMC/S at a current density of 0.5 C.

Figure S9 (a, b) SEM images of CNNTs@CMC before cycle stability test; (c, d) SEM images of CNNTs@CMC after cycle stability test.
Figure S10 CV curves of CNNTs@CMC at scanning rates of 2, 5 and 10 mV s\textsuperscript{-1} in 6 M KOH electrolyte