

## Supporting Information

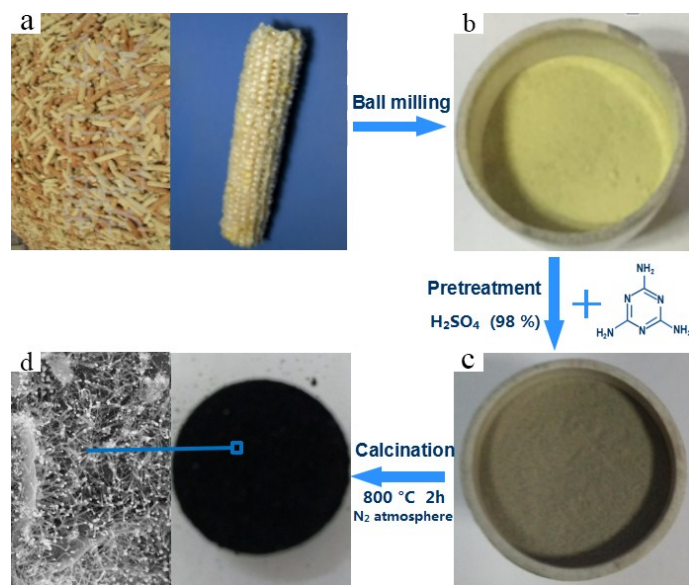
### **A novel method to prepare nanotubes@mesoporous carbon composite material based on waste biomass and its electrochemical performance**

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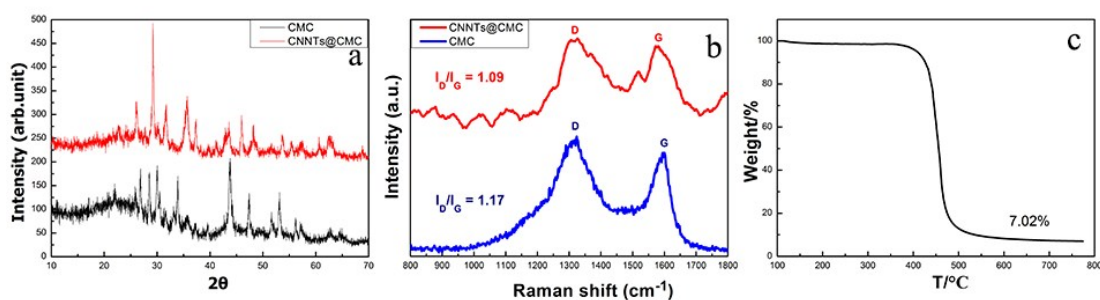
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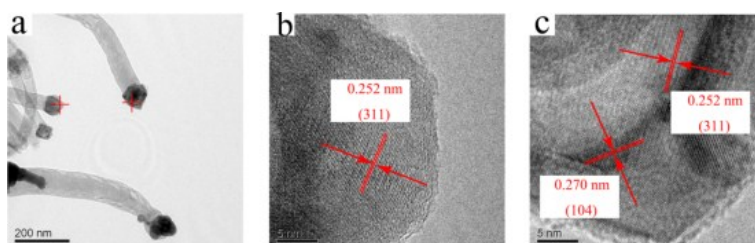
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**Figure S1 Schematic diagram of the simple route to prepare the hierarchical carbon composite material: (a) corncob; (b) corncob powder; (c) corncob powder mixed with melamine; (d) CNNTs@CMC composite material**



**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**

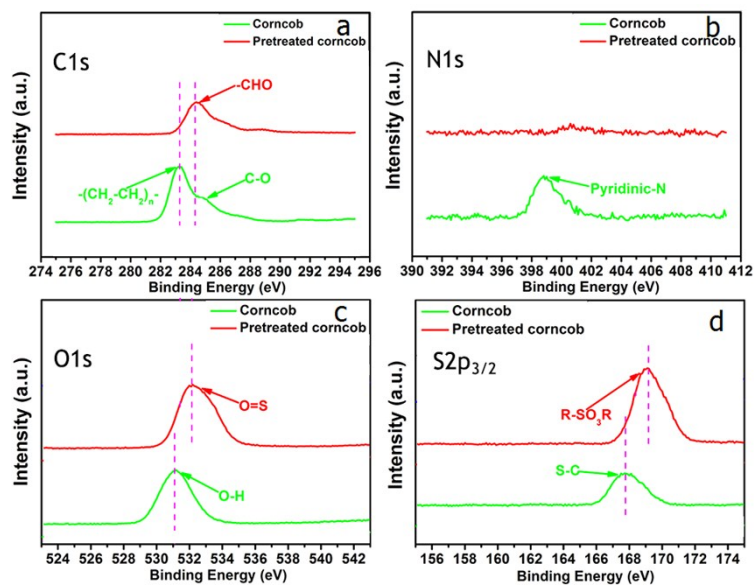
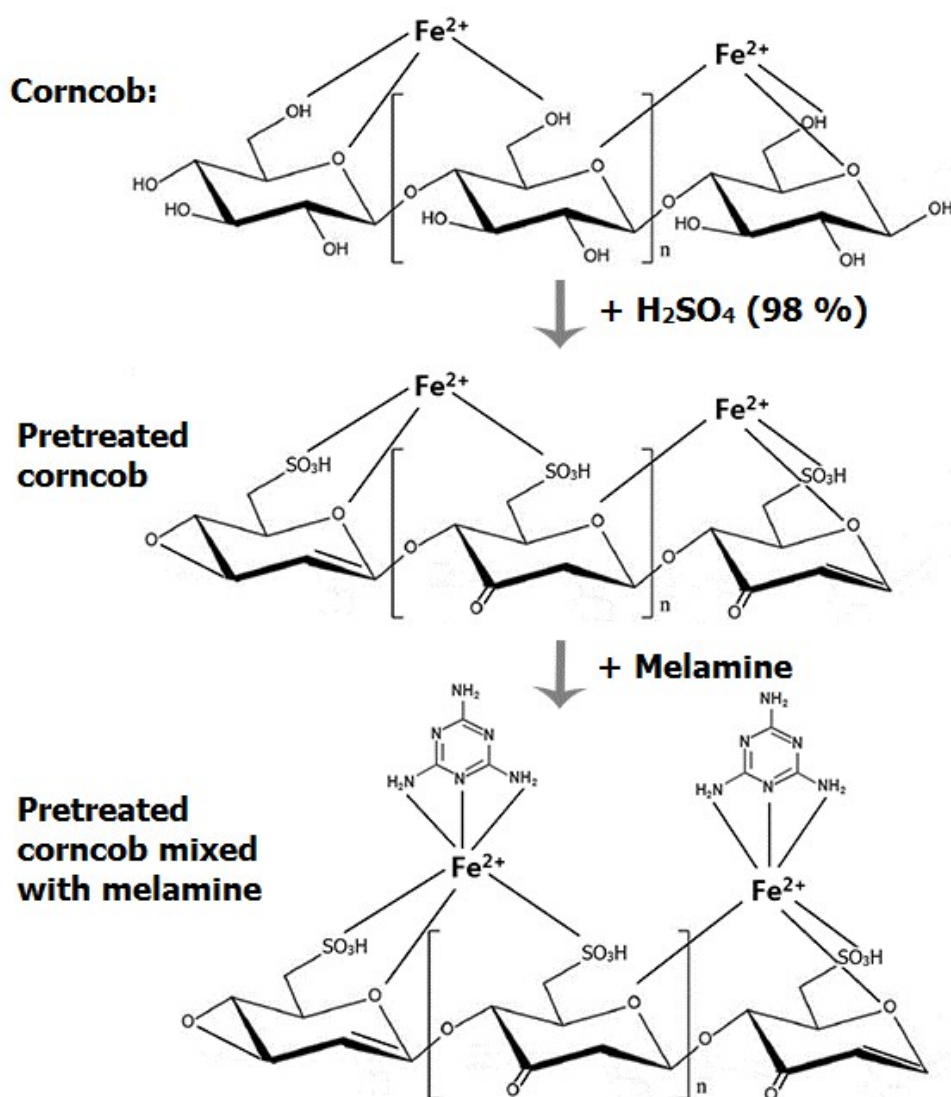
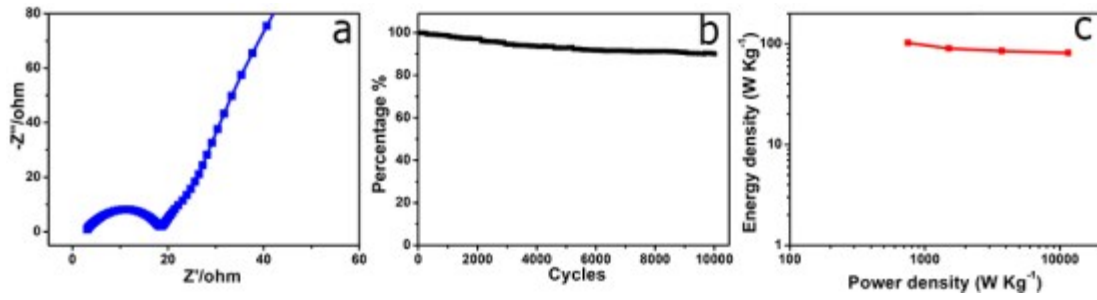


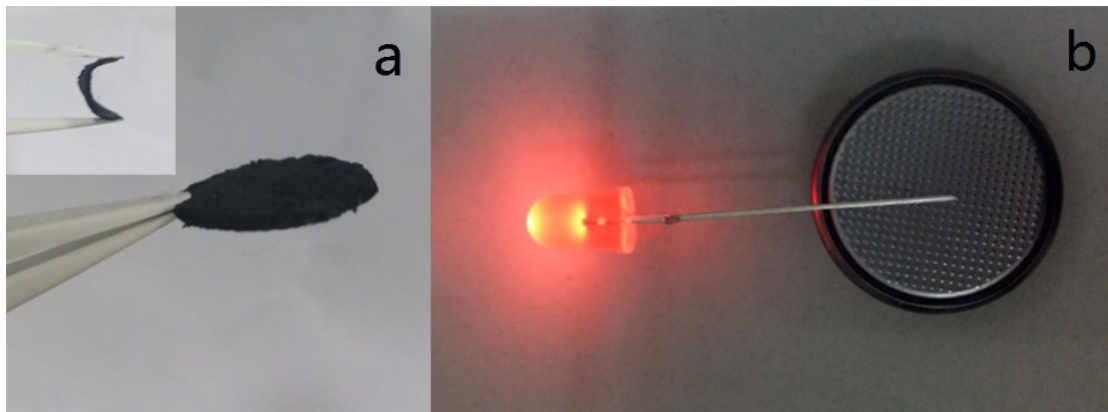
Figure S4 XPS of raw corncob and pretreated corncob: (a) C1s scan, N1s scan, (c) O1s scan, (d) S 2p<sub>3/2</sub> scan



**Figure S5 Fe<sup>2+</sup> 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<sub>6</sub> electrolyte; (b) Cycling capability at a scan rate of 50 mV s<sup>-1</sup> in 1 M LiPF<sub>6</sub> organic electrolyte (c) Ragone plot of the CNNTs@CMC supercapacitor in 1 M LiPF<sub>6</sub> electrolyte**



**Figure S7 (a) Free-standing film of CNNTs@CMC; (b) Image of a LED powered by the CNNTs@CMC based symmetrical supercapacitor**

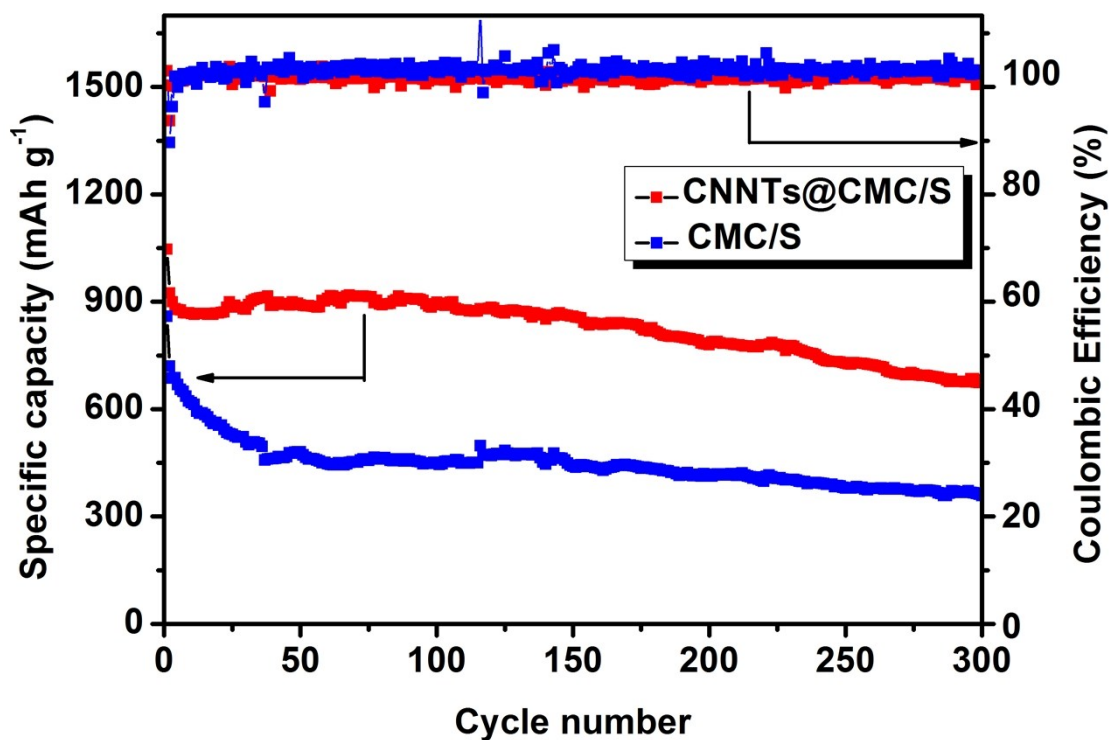


Figure S8 Cycle capacities and Coulombic efficiencies of CMC/S and CNNTs@CMC/S at a current density of 0.5 C

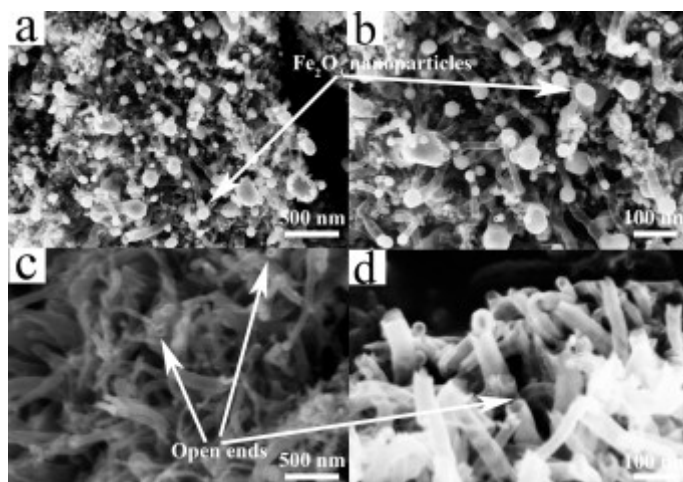


Figure S9 (a, b) SEM images of CNNTs@CMC before cycle stability test; (c, d) SEM images of CNNTs@CMC after cycle stability test

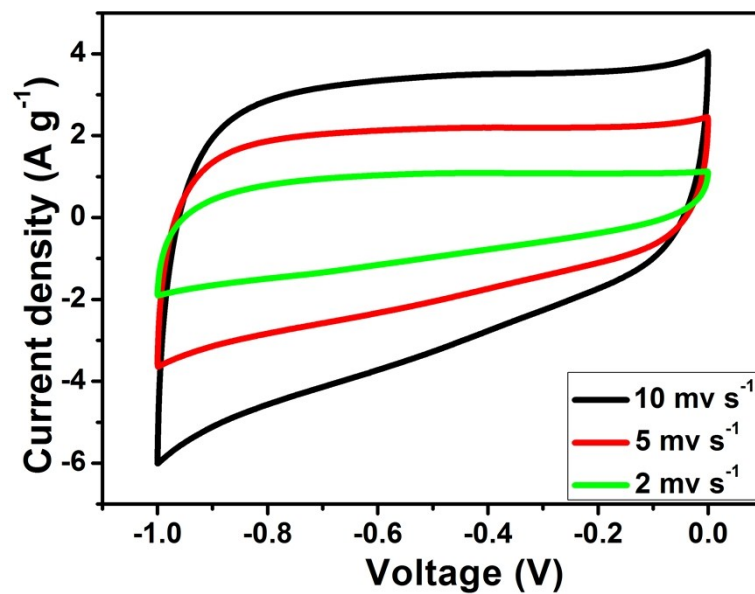


Figure S10 CV curves of CNNTs@CMC at scanning rates of 2, 5 and 10  $\text{mV s}^{-1}$  in 6 M KOH electrolyte