Supporting Information

A green and high energy density asymmetric supercapacitor based on ultrathin MnO_2 nanostructures and functional mesoporous carbon nanotubes electrodes

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Part I: Supplementary Figures

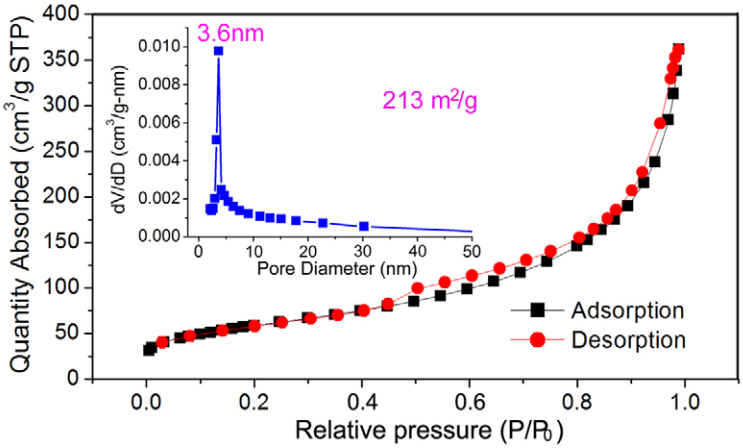

Figure S1 Nitrogen adsorption and desorption isotherms and their corresponding pore-size distribution curve (inset) of the ultrathin MnO_2 nanoflowers.

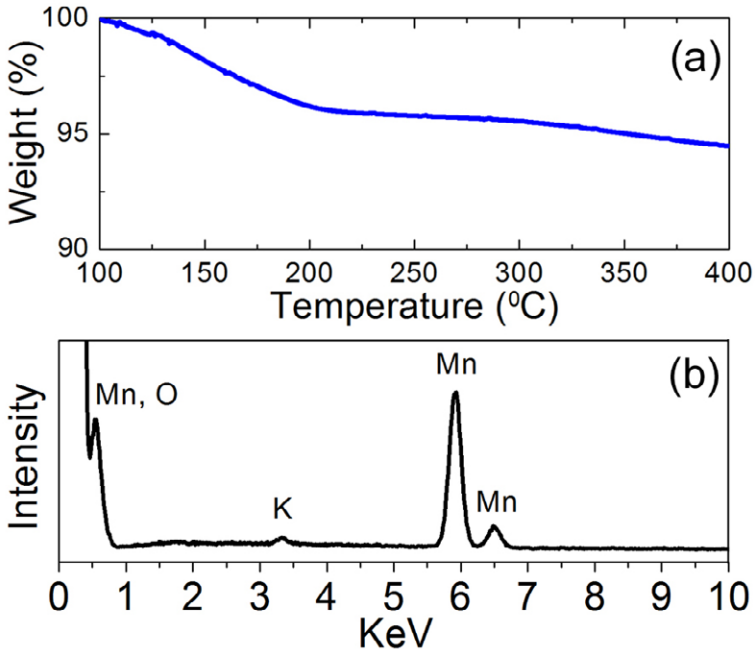

Figure S2 TG curve and EDS spectrum of the as-synthesized MnO_2; it can be observed that there is a weight loss of ~4% in TG curve, indicating the presence of hydrates. Also, the corresponding EDS spectrum confirmed the existence of K^+.

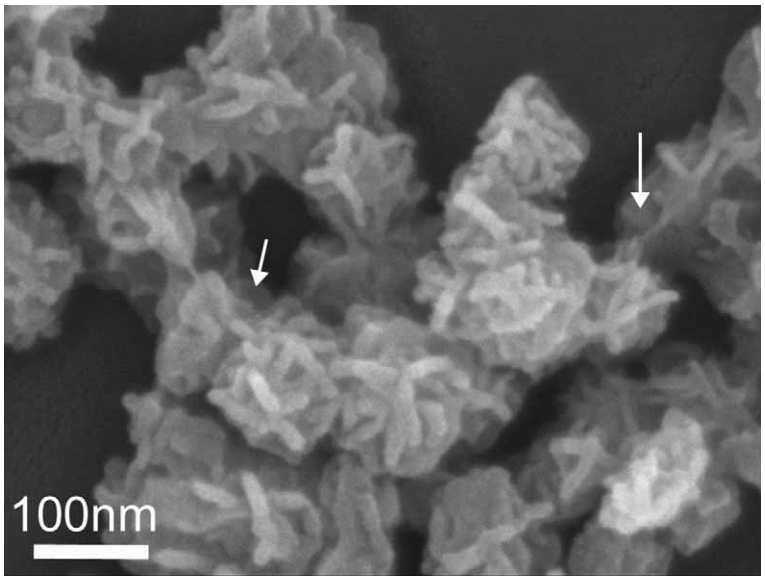

Figure S3 High magnification SEM image of the MnO_2 nanoflowers.

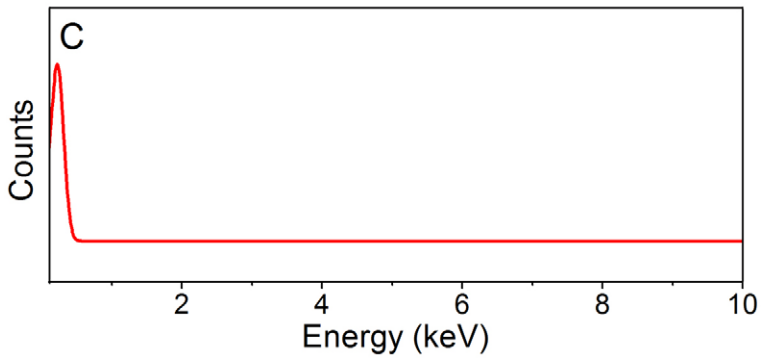

Figure S4 EDS spectrum of the FMCNTs

Part II: Calculations

The specific capacitance was calculated from the CV curves according to the following equation:

$$C = Q/(\Delta V m),$$

where C (F g^{-1}) is the specific capacitance, m (g) is the mass of the active materials, Q (C) is the average charge during the charging and discharging process, and ΔV (V) is the potential window.

The discharge specific capacitance could also be calculated from the discharge curves by the following equation:

$$C = I\Delta t/(m\Delta V),$$

where I (A), Δt (s), m (g) and ΔV (V) are the discharge current, discharge time consumed in the potential range of ΔV, mass of the active materials (or mass of the total electrode materials), and the potential windows, respectively.

The energy density (E) and power density (P) were calculated by the following equations:

$$E = C(\Delta V)^2/2,$$

$$P = E/\Delta t$$

where C is the specific capacitance of the active materials, and ΔV is the potential window of discharge.

The Coulombic efficiency (η) was calculated according to the following equation:

$$\eta = (q_d/q_c) \times 100\%$$

where q_d and q_c are the total amounts of discharge and charge of the capacitor obtained from the galvanostatic experiments.