

Supercapacitors using singlewalled carbon nanotube electrodes

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We have investigated the key factors determining the performance of supercapacitors using singlewalled carbon nanotubes (SWNTs) electrodes. We obtained a maximum specific capacitance of 180 F/g with large power density of 20 kW/kg at an energy density of 6.5 Wh/kg. The heat-treatment at high temperature was necessary to increase the capacitance and reduce the CNT-electrode resistance. SWNTs and Polypyrrole (Ppy) hybrid electrodes have been also introduced to improve the specific capacitance of the supercapacitors. To characterize the SWNT-Ppy nanocomposite electrodes, charge-discharge cycling test for measuring specific capacitance, cyclic voltammogram, and AC impedance test are executed. The SWNT-Ppy nanocomposite electrode shows much higher specific capacitance than pure Ppy and as-grown SWNT electrodes, due to uniformly coated Ppy on the SWNTs.