Fucntionailization of Carbon Nanotubes for applications in electrochemical capacitors

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Electrochemical capacitor is one of the strong candidates for energy storage devices because of its high power density and long cycle stability. Pristine carbon nanotubes have excellent electrical conductivity and high specific surface area. However, the practical application of pristine carbon nanotubes was limited by the aggregation into bundles due to van der Waals force. In this research, we demonstrated the comparative studies on the capacitor performances of the multi-walled carbon nanotubes (MWCNT) functionalized by carboxyl, sulfonic, and amine groups, which would optimize the processibility and electrochemical properties. The resulting materials were characterized by Fourier-transform infrared spectrometer (FT-IR) and Raman spectroscopies. Cyclic voltammetry (CV) was used to evaluate the electrochemical performances such as the specific capacitance and cycle stability. The functionalized MWCNTs showed the enhanced capacitances of pristine MWCNT due to the pseudocapacitance of functional groups while maintaining good dispersion and electrical conductivity. This research provides a simple and effective method to improve the capacitor performance of carbon nanomaterials.