How functional groups improve the capacitor performances of carbon nanotubes?

박슬기, 박호석*
경희대학교
(phs0727@khu.ac.kr*)

Electrochemical capacitors have attracted much attention in the electronics industry and been the most strong energy storage devices due to high power density and long cycle stability. Carbon nanotubes are a promising material because of their high electrical conductivity and large specific surface area for an application in electrochemical capacitors. However, pristine carbon nanotubes have suffered from the aggregation due to van der Waals force and low capacitance attributable to non-faradaic energy storage mechanism. In this research, we systematically investigated the effect of various functional groups such as carboxyl, sulfonic, and amine groups on the capacitor performance of multi-walled carbon nanotubes (MWCNT). The pristine and functionalized MWCNTs were characterized by fourier-transform infrared (FT-IR), Raman spectrum and X-ray photoelectron spectroscopies (XPS). The electrochemical performances such as the specific capacitance, cycle stability and rate capability were studied by cyclic voltammetry (CV) and charge-discharge curves. This research provides a simple and effective method to improve the capacitor performance of carbon nanomaterials.