Functionalization of Carbon Nanotubes by Ionic Liquids for Applications in Lithium Rechargeable Battery Anodes

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Recently, the ionic liquid(IL)-functionalized carbon nanomaterials have emerged as soft hybrid materials in electrochemical applications such as lithium batteries, supercapacitors. We report the IL-functionalization of multi-walled carbon nanotubes (MWCNT) in lithium rechargeable battery anodes. 1-Butyl-3-methylimidazolium tetrafluoroborate (BMIMBF4) ILs were used to improve the processiblity and electrochemical properties of MWCNT due to the unique characteristics of ILs. The structure and interactions of resulting materials were characterized by fourier-transform infrared spectrometer (FT-IR), Raman spectroscopy, transmission electron microscope(TEM). Galvanostatic charge discharge(GCD) was used to obtain the capacity, rate capability and cyclic performances of all samples. We compared the anode performance of MWCNT with those of MWCNT/IL hybrids. In particular, metal oxides such as FeOx, SnOx were in situ synthesized and directly deposited on the surface of IL-functionalized MWCNT to improve the battery performance of MWCNT/IL hybrids. This approach provides new way to design high performance electrodes in energy storage devices.