

UTILIZING SWCNT PROPERTIES IN Li-ION BATTERIES.

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Single walled carbon nanotubes(SWCNT) are potentially useful for lithium ion batteries with theoretical capacities three times higher than that of graphitic carbon. In addition, SWCNTs have the ability to be freestanding electrodes, eliminating the need for copper substrates or polymer binders, and as a conductive additive in cathodes reducing the electrode mass and volume. The electrochemical cycling performance of high purity SWCNT paper electrodes has been measured vs. lithium metal for a range of anode thicknesses. SWCNTs were produced from laser vaporization or obtained commercially from Carbon Nanotechnologies Inc. (i.e. HiPco material) and purified through acidic and oxidative processes. Free-standing paper electrodes were fabricated using vacuum filtration and 2016 coin cells were assembled for testing opposite lithium metal foil and a Celgard 2325 separator. Galvanostatic charging at 186 mA/g was performed at room temperature using an Arbin Instruments BT 2000 to charge and test SWCNT half cells. The measured reversible capacity for the laser SWCNT and HipCo SWCNT electrodes were 324 and 404 mAh/g, respectively. Therefore the anode capacity of SWCNT electrodes demonstrates promise towards impacting the next generation of Li-ion battery cells.