Study of the electrochemical behavior of different carbon materials as anode material for lithium ion batteries

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Since the lithium ion battery was first commercialized by the Sony Corporation in 1991, the development for improvement it is critical for advancements in a variety of applications ranging from hybrid electric vehicles to consumer electronic [1]. Most lithium ion commercial battery use $LiCoO_2$, $LiNiO_2$ or $LiFePO_4$ as cathode material, organic solvent as the electrolyte and carbon composites as anode material [1-2]. The electrochemical reactions involve Li transfer and exchange of electron. A number of studies have so far been performed for providing a high performance carbonaceous material for the anode of Li-ion batteries [3].

In this study, out of the many available carbonaceous materials we have selected some of them to prepared anodes material and study their electrochemical behavior and correlation to their physical, chemical and physic-chemical parameters.

The carbon electrodes were fabricated by coating a slurry mix on a copper current collector, then dried and pressed. The slurry mix was prepared by mixing 80 wt% of the active material powder (carbonaceous material) and 10 wt% conductive additive powder (Super C carbon) with the binder solution of n-methylpyrrolidone and 10 wt% poly-vinylidene fluoride (PVDF). These anode materials were characterized with scanning electron microscope (SEM), X-ray diffraction (XRD), fourier transform infrared (FTIR) spectroscopy and electrochemical techniques such as, , cyclic voltammetry, charge-discharge cycles, galvanostatic discharge at different currents and electrochemical impedance spectroscopy.

References

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