DEVELOPMENT OF SRI LANKAN GRAPHITE - SILVER COMPOSITE FOR LITHIUM-ION RECHARGEABLE BATTERY ANODES

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by

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Abstract

Li-ion rechargeable battery (LIB) is a high end technological application which uses graphite as its anode material due to high capacity (337 mAh/g) and low potential (0.1 – 0.3 V vs. Li^+/LI) of its lithium intercalation compound (Li_xC_6, X=1) (Kurzweil and Brandt, et al., 2009). However, the present generation of LIBs still has many limitations such as expensiveness and capacity fading. Few studies have focused the environmental condition such as humidity for manufacturing LIBs. The graphite surface is differ from its crystalline structure and consist of edge planes, basal planes, surface functional group and defects (Noel and Suryanarayanan, 2002).Those surface structures are of great importance of electrochemical performance and sensitivity to humidity . Recent studies show that the deposition of ultrafine metals such as Cu and Ag on the surface of the natural graphite lowered the sensitivity of anode material to humidity and improved the cycleability and specific capacity (Nishimura et al., 1997, Wu et al., 2002).

This study is focused to develop graphite-silver composite in order to upgrade the quality of vein graphite as anode material for lithium ion rechargeable batteries.

Electrical characterization and structural characterization was done by four probe electrical conductivity and Fourier Transformation Spectroscopy (FTIR) respectively. According to the results, the study reveals that Ag-graphite composite can be successfully produced from vein graphite. This method can evidently lower the sensitivity of anode material for humidity. Therefore, vein graphite in Sri Lanka is a promising material for industries to manufacture lithium ion batteries under less critical conditions.

Key words: Surface modification, Ag-graphite composite, Solid electrolyte interface