*Proceedings of the 32nd Technical Sessions of Geological Society of Sri Lanka*
*Published Online - 26th February 2016 (http://www.gsslweb.org)*

**GSSL-2016-(SIV)-4**

# SRI LANKAN VEIN GRAPHITE AS AN EFFECTIVE SUBSTITUTION FOR THE SYNTHETIC CARBON ANODE IN Li-ION RECHARGEABLE BATTERIES

H.P.T.S. Hewathilake[1], R.I.C.N. Karunarathne[1], N.W.B. Balasooriya[2], H.W.M.A.C. Wijayasinghe[1] and H.M.T.G.A. Pitawala[3]

[1]*National Institute of Fundamental Studies, Kandy, Sri Lanka*
[2]*Faculty of Applied Sciences, South Eastern University, Sammanthurai, Sri Lanka*
[3]*Department of Geology, Faculty of Science, University of Peradeniya, Peradeniya, Sri Lanka*
[*]*Corresponding Author – e-mail: tharindu.tsh@gmail.com*

Lithium-ion rechargeable batteries (LIBs) are the energy source for most of the portable electronic devices and there is a strong interest in utilizing LIBs for electrical vehicles and grid storage systems. Though LIBs have high capacity, high energy density and very low self-discharge rate, anode and cathode materials should be further developed to achieve high Columbic efficacy in a cost effective manner. Presently synthetic carbon fulfills the anode requirement of the LIBs. Many investigations have proved the natural graphite are low cost anode material for LIBs. Sri Lanka is famous for vein graphite that possess high quality, high crystallinity and morphological variations suitable for anode material for LIBs. Nevertheless to compete with synthetic anode materials Sri Lankan vein graphite should be developed as a battery grade anode material which composed of high capacity with minimum irreversible capacity, high Columbic efficacy and stable cyclability. Therefore the present study focused on the evaluation of the performance of purified and surface modified vein graphite as an anode material for LIBs. Powder samples (<53 μm) were taken for this study. CR 2032 coin cells were assembled with graphite anode. Lithium metal counter electrode separated by glass fiber film. A mixture of anode materials (80% active material + 15% PVDF + 5% acetylene black admix in N-Methyl-2-pyrrolidone solvent) was cast~~ed~~ on a copper foil. 1 M $LiPF_6$ in ethylene carbonate and dimethyl carbonate (EC: DMC; vol. 1:1) was the electrolyte. The charge-discharge tests were performed by using a battery tester (0.2 C rate – 0.002-1.50 V at RT). Further analysis was conducted by cyclic voltammetry and impedance spectroscopy. All the results proved that purified and surface modified Sri Lankan vein graphite was able to achieve constant capacity of 378 mAh/g higher than the theoretical capacity 372 mAh/g throughout the 50 cycles with negligible fading and Columbic efficiency over 99%.