

High Tech Applications of Sri Lankan Vein Graphite; Future Trends

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Abstract:

Minerals can play a pivotal role in determining and improving economic performance and the quality of life. Sri Lanka has been well known for processing a variety of economically useful vein type graphite, which are mainly being exported as cheap raw materials but played a main role in modern manufacturing industry internationally. Natural graphite (NG) is an attractive material for Li-ion batteries (LIB) because of its high capacity (372 mAh/g) and low working voltage yields with high energy density (Wh/kg). Introducing performance enhanced cheaper NG electrodes for LIB will definitely reduce their cost and improve the capacity. The objective of the research is to introduce cost effective, time saving, highly economical and more convenient method to convert Sri Lankan vein graphite directly in to the battery grade anode material for Li-ion batteries. Powdered natural graphite sample was treated with mixture of HF, HNO₃ and H₂SO₄ acids at 120 °C till the evaporation of mixture. Results of the Carbon content measurements (ASTM – 561), XRD, SEM and FTIR evidenced that the acid digestion method was successfully purified the Sri Lankan vein graphite over 99.9%. In the preliminary chemical purification study done by acid leaching, revealed the possibility of purifying local graphite using mineral acids with low concentrations at low temperature. It further indicated the ability of surface modification of the vein graphite by mild oxidation. The preliminary investigations on Sri Lankan graphite for rechargeable Li-ion battery (LIB) application and graphite oxide (GO) synthesis has revealed the potentiality of this cheap local mineral for technological applications. Further, it indicated the worthiness of conducting further investigations on the vein graphite to enhance the purity and the properties (homogeneity and particle morphology, electrical conductivity ... etc.) appropriate for the expected high tech applications.

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