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## PROCEEDINGS

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## DEVELOPMENT OF SRI LANKAN VEIN QUARTZ, THROUGH PURIFICATION AND MODIFICATION, FOR THE ANODE APPLICATION OF RECHARGEABLE LITHIUM-ION BATTERIES

<sup>1</sup>Y. M. I. B. Samarakoon, <sup>2</sup>T. H. N. G. Amaraweera, <sup>3</sup>R. J. K. U. Ranatunga,

<sup>4</sup>H.W.M.A.C. Wijayasinghe

<sup>1,4</sup>*National Center for Advanced Battery Research, National Institute of Fundamental Studies, <sup>2</sup>Department of Applied Earth Sciences, Uva Wellassa University, <sup>3</sup>Department of Chemistry, University of Peradeniya, Sri Lanka*

### ABSTRACT

Silicon and its oxidative derivatives have been identified as a promising anode material for lithium-ion batteries (LIB) due to volumetric energy, high power density, and long cycle life. However, high cost, volume expansion during lithium intercalation, and low electrical conductivity limit its practical applications. Therefore, this study aimed to develop cheaper and greener anode material using Vein Quartz (VQ) from Sri Lanka. VQ was ball milled and acid leached to obtain high-purity quartz and modified further with a pyrolysis technique. The X-ray diffraction phase analysis performed on this developed quartz reveals the existence of only the signature crystalline structure and its fingerprint phases without any minority phase. Raman spectroscopy analysis conducted on developed VQ also reveals the presence of the signature crystalline structure. Coin cells were assembled in an argon-filled glove box with the developed VQ anode electrodes, Li-foil as the reference and counter electrodes, and the non-aqueous electrolyte of 1M LiPF<sub>6</sub> in ethylene carbonate and dimethyl carbonate (1:1 wt %). The cyclic-voltammograms obtained on LIB half-cells assembled with anode electrodes fabricated from developed quartz reveals a stable and reversible reduction and oxidation during charging and discharging. Finally, Electrochemical impedance spectroscopy analysis exhibited improved electrical conductivity. Altogether, this study reveals the potentiality of developing Sri Lankan vein quartz for the anode application in rechargeable lithium-ion batteries.

Keywords: Sri Lankan vein quartz, lithium-ion rechargeable battery, electrochemical analysis