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(Autonomous)
Kodambakkam, Chennai - 600024, India

BOOK OF ABSTRACTS

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Comparative analysis of *Withania somnifera* (Ashwagandha) with Lithium Nitrate ($LiNO_3$) and Lithium Chloride (LiCl) based membrane as an electrolyte for Electrochemical Device Fabrication

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Abstract

In recent decades, Energy demand is improved substantially due to the depletion of fossil fuels [1] etc., To overcome the issue, electrochemical energy storage and conversion devices can be developed with highly safe, eco-friendly and cost effective nature [2]. In present work, solid biomaterial based electrolytes are prepared using solution casting technique with Withania Somnifera [3] (WS) (Ashwagantha) as host material and lithium salts ($LiNO_3$ and LiCl) as an additive. **X-Ray diffraction (XRD)** method has been carried out to analyze the crystalline/amorphous nature of an electrolyte. **AC Impedance analysis** is done to measure the ionic conductivity of the prepared electrolytes and the membrane synthesized with WS and $LiNO_3$ resulted with better ionic conductivity in contrast to the membrane prepared with the composition of WS and LiCl. The maximum ionic conductivity of the membrane with the concentration of 1g WS + 0.5 M.wt% of $LiNO_3$ and 1g WS + 0.8 M.wt% of LiCl is 1.10×10^{-2} S/cm and 3.12×10^{-3} S/cm respectively. **Transference number measurement** has been carried out using the highest ion conducting membrane (1g WS + 0.5 M.wt% of $LiNO_3$ & 1g WS + 0.8 M.wt% of LiCl) of both the systems in order to assure that the majority of charge carriers involved in transportation is ions. Using highest ion conducting membrane as an electrolyte, a **Primary Li-ion conducting cell** has been constructed and it results with an open circuit voltage of 1.93 V (1g WS + 0.5 M.wt% of $LiNO_3$) and 1.90 V (1g WS + 0.8 M.wt% of LiCl). A Li-ion conducting coin cell has been constructed and the charge/discharge analysis of the cell is examined using **Cyclic Voltammetry (CV)** and **Galvanostatic charge-discharge (GCD)**. The fabricated cell has undergone Cyclic Voltammetric analysis fixed with the potential range of 0 – 1 V using different scan rates to study the cyclic stability of the cell. The performance of the coin