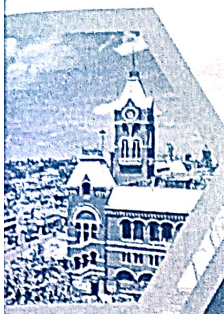

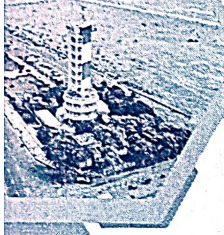

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Proton - Conducting Electrochemical Devices Developed by Biomaterial, Centella Asiatica Leaf with Ammonium Nitrate

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Abstract

In recent years, medicinal plant (biomaterial) derived solid bio-membrane electrolytes have been encouraged due to abundance in nature [1, 2]. This work discusses the incorporation of ammonium nitrate (NH_4NO_3) salt in the host material of Centella Asiatica Leaf (CAL) as an electrolyte for a primary proton battery and a single fuel cell. The solid bio- membranes have been prepared using the solution-casting method based on the leaf powder of Centella Asiatica (CAL), ammonium nitrate (NH_4NO_3), and double distilled water as a solvent. The amorphous nature of the solid bio-membranes has been examined by X-ray diffraction analysis (XRD). The glass transition temperature of the solid bio-membranes has been evaluated by differential scanning calorimetry (DSC). The electrical, dielectric and transport properties have been studied by AC impedance analysis. The electrochemical properties of the highest conducting bio-membrane (CAL+0.4 M. wt% of NH_4NO_3) have been explored by linear sweep voltammetry (LSV) and cyclic voltammetry (CV). The wagner's polarization method has been used to measure the nature of the ions responsible for the high ionic conductivity. The optimized highest proton-conducting bio-membrane (CAL+0.4 M. wt% of NH_4NO_3) has exhibited an ionic conductivity value of 3.37×10^{-3} S/cm at room temperature. With the highest proton-conducting bio-membrane, a primary proton- conducting battery has been constructed, and it shows an open circuit voltage of 1.57 V. Using various loads, the constructed battery's discharge performance has been investigated. A single fuel cell with the highest proton-conducting bio-membrane has been fabricated, and its open circuit potential is observed as 645 mV. The performance of the single fuel cell has been investigated with different loads.

teferences
1]. Muniraj Vignesh N, Jayabalakrishnan SS, Selvasekarapandian S, Aafrin Hazaana S, Kavitha
, Vengadesh Krishna. Ionics. 2023 Jan;29(1):331-44.
2]. Sabeetha T, Chandra ML, Selvasekarapandian S, Vignesh NM, Naachiyar RM, Hazaana SA.
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