

18th ASIAN CONFERENCE ON SOLID STATE IONICS ACSSI - 2024

19th - 22nd FEBRUARY, 2024

MEENAKSHI COLLEGE FOR WOMEN
(Autonomous)

Kodambakkam, Chennai - 600024, India

BOOK OF ABSTRACTS

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For

Asian Society for Solid State Ionics

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First Edition: February 2024

Published by

Subramanian – Thangathai Educational Trust
(Register. No: 60/BK-IV/2013)

200 – A, Thiruvalluvar Nagar,
Ramanathapuram, Coimbatore – 641045, India

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ISBN Number: 978-93-340-1267-5

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Fabrication of Proton Conducting Primary Battery Using Biomaterial (Cassia Auriculata) With Ammonium nitrate as Biomaterial Based Solid Electrolyte

S. Akila^{a,b,*}, S. Sukumari^a, S. Aafrin Hazaana^{b,c}, R. Meera Naachiyar^{b,c}, N. Muniraj@Vignesh^{b,d}, S. Selvasekarapandian^{b,e}

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Abstract

In the present study, bio degradable solid biomaterial based membranes have been prepared using the flower part of Cassia Auriculata (CA) [1] with different composition of Ammonium Nitrate (NH₄NO₃) using simplest solution casting technique. The prepared biomaterial based membranes have been characterized using various techniques such as X-ray diffraction (XRD) analysis, Transference Number Measurement (TNM) and Ac impedance analysis. The amorphous/ crystalline nature of the prepared biomaterial based membranes has been analyzed by X-ray diffraction method. The ionic conductivity of all the membranes has been analyzed using Ac impedance spectroscopy at room temperature. The highest ionic conductivity of 1.02×10^{-2} S/cm has been obtained for 1g of CA + 0.5 M.wt % of NH₄NO₃. Transference number measurement is done to confirm that the majority of charge carriers are ions. Finally, a primary proton conducting battery has been fabricated using the highest ion conducting membrane as an electrolyte with Zinc metal powder + ZnSO₄.7H₂O+ Graphite as an anode and PbO₂+V₂O₅+Graphite as cathode [2]. The constructed battery shows an open circuit voltage of 1.70 V and 17 μ A of current is drawn while connecting a load of 100 k Ω to the constructed cell.

Keywords: Cassia Auriculata, NH₄NO₃, AC impedance, XRD, Primary proton battery