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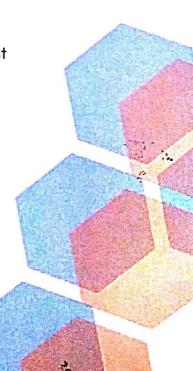
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## For Asian Society for Solid State Ionics

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### Primary Sodium Ion Conducting Battery Fabrication using Biomaterial (Cassia Ariculata) Based Solid membrane as an Electrolyte

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#### Abstract

The ever-growing energy demand and the alarming decrease of fossil fuels leave us with an urgent need of an eco-friendly alternative material for electrochemical devices [1]. In this study, Cassia Ariculata (Avarampoo) flower (AP) is used as a host material and sodium perchlorate (NaClO4) as an additive to prepare bio-material based sodium ion conducting solid membrane using solution casting technique. The biomaterial is dried under shade and made into powder, and then it is made into a solution using distilled water as solvent. The solution is then incorporated with different concentrations of NaClO4 (0.4 M.wt%, 0.5 M.wt% and 0.6 M.wt% of NaClO<sub>4</sub>) and made into a free-standing membrane. X-Ray Diffraction method is done to analyze the crystalline/amorphous nature of the membrane. The Ionic conductivity of the prepared membranes are measured using AC Impedance analysis and the membrane with the concentration of 1g of AP + 0.5 M.Wt % of NaClO4 exhibits high ionic conductivity of 2.08 × 10-2 S/cm at room temperature. Transference number measurement is done to confirm that the majority of charge carriers are ions. At last, a primary sodium ion battery [2] has been fabricated using the highest ion conducting membrane (1 of AP + 0.5 M.wt % of NaClO4) as an electrolyte with sodium metal as anode and MnO2 + G as cathode. The constructed primary battery exhibits an open circuit voltage of 2.47 V and 19 µA of current is drawn while connecting a load of 100  $K\Omega$  to the constructed cell.

Keywords: Cassia Ariculata, XRD, AC impedance analysis.