

Abstract No: PO-25

A new Sodium based electrolyte – PEO₁₀NaBrO₃

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The necessity of new and environmental friendly rechargeable batteries is increasing day by day due to the current technology development and power demand. Hence, efficient and low-cost new electrolyte materials have to be discovered and more attention has to be placed on searching environmental friendly, non-toxic materials. Sodium salts are the most potential materials due to their abundance and low-cost. This study focuses to investigate the electrical conductivity of a sodium-based electrolyte which can be used in solid state batteries. Composite of *Poly Ethylene Oxide (PEO)* and *Sodium Bromate (NaBrO₃)* are used as the electrolyte and samples were prepared by the *hot-pressed* method. Electrical conductivity measurements were carried out for samples prepared by varying the molar ratio of *PEO* and *NaBrO₃*. According to the results, *PEO-NaBrO₃* has the potential to be developed as a sodium-based electrolyte. Experimental results revealed that the highest electrical conductivity is being produced for *PEO₁₀NaBrO₃* samples. Best sample exhibited $3.44 \times 10^{-5} \text{ S cm}^{-1}$ conductivity in room temperature (30 °C) and $2.14 \times 10^{-2} \text{ S cm}^{-1}$ conductivity at 100 °C. These results show the evidence of potential usage of *PEO₁₀NaBrO₃* as an electrolyte in solid state Batteries. However, further investigations should be carried out to investigate the contribution of the Sodium ions for the observed conductivity.

Keywords: Sodium based electrolytes, Electrolyte, Polymer electrolytes