

EFFICIENT SOLID POLYMER ELECTROLYTES FOR ENERGY STORAGE DEVICES

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Recently, energy storage devices are soaring demand in transportation, mobile electronic strategies and other applications in renewable energy. Battery is used to give power to the system and stored the electrical energy in the form of chemical energy. Since the electrolyte is the key component in batteries, it affects the electro-chemical performance and safety of the batteries. In lithium batteries, the solid electrolyte is selected based on the best performance in a wide variety of operating temperature, cell capacity, cyclic ability of the batteries and safety. In this study, the electrical conductivity can be obtained by modifying the structure of the insulating polymer chain by doping of metallic ions. Polyvinylpyrrolidone (PVP) based solid polymer electrolytes were fabricated and characterized. Conductivity of the electrolyte has been enhanced by incorporating suitable number of Li-ions. 0.5 g of polyvinylpyrrolidone (PVP) was dissolved in 1 ml of methanol and the solution was continuously stirred using magnetic stirrer for 12 hours to get a homogeneous gel polymer electrolyte. In order to enhance the conductivity of the gel polymer electrolyte, different amount (weight percentages of the polymer) of LiCl was added to the polymer solution and solution was continuously stirred for 12 hours to get a homogeneous gel electrolyte. To get the solid polymer electrolyte film, all gel electrolytes were allowed to dry on glass plate. Semi-transparent solid films were obtained. PVP + 15% lithium-ion combination shows a high conductivity in gel electrolyte and solid polymer electrolyte which are 0.0046 Scm^{-1} and $1.90045 \times 10^{-5} \text{ Scm}^{-1}$ respectively. Fabricated PVP/lithium-ion electrolyte can be used in rechargeable batteries.

Keywords: *Polyvinylpyrrolidone (PVP), Lithium ions, Solid polymer electrolyte, Lithium batteries.*

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