ABSTRACT

Polymers are insulating materials offering a diversity of molecular structures and properties thus lending themselves to be employed in variety of applications. They increasingly replace more traditional materials such as wood, metals, ceramics and natural fibres which make them potential materials for various applications in the electronics industry. Polymer electrolytes have been adopted in a wide verity of applications. The fields that have attracted the most attention from the scientific community at large are secondary batteries, fuel cells, sensors, actuators, supercapacitors, ultracapacitors, electrochromic displays and dye-sensitized solar cells. The role of the polymer electrolyte in these applications generally is to: separate two electrodes, provide good electronic insulation and allow a fast and selective transport of the desired ions. To be suitable for applications in a device, a polymer electrolyte must simultaneously satisfy three fundamental requirements such as performance, durability and cost. Polymer electrolyte plays an important role in the development of lithium polymer rechargeable batteries because they can lead to flexible laminated structures with tailor made geometries. Polymer electrolytes are classified into three categories. Solid polymer electrolyte, gel polymer electrolytes and composite polymer electrolytes. PEO is the prototype polymer electrolyte for modern battery applications. Since PEO-based electrolytes are generally poor ion conductors at ambient temperatures due to their high degree of crystallinity, research focuses on the ways to improve their electrical conductivities and mechanical properties at ambient and elevated temperatures:

Work over the last two decades has shown that adding inorganic nanoparticles to a polymer/lithium-salt complex improves its ionic conductivity. This also increases the mechanical stability of the polymer host and the electrolyte interfacial stability. In the proposed research work, it is planned to

- Prepare PEO polymer films by complexing with nanometallic salts.
- Characterize the sample by using different characterization techniques such as IR, DSC, SEM, TEM and XRD etc.
- Study the electrical properties by complex impedance analysis.
- Study the AC and DC conductivity studies for all the above films as a function of temperature.
- Study the application of polymer electrolytes in batteries.