PREPARATION OF POLY(ACRYLONITRILE-BUTYL ACRYLATE) POROUS MEMBRANE FOR LITHIUM-ION BATTERIES

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There is great interest in the development of high-performance sources of energy for applications such as mobile telephones, laptops, and also electric vehicles and energy/battery hybrid vehicles. Lithium-ion batteries seem to be an excellent solution, offering both reliability and high power density. Gel polymer electrolyte (GPE) has been attractive for developing Li-ion batteries due to its combined advantage of liquid electrolyte (high ionic conductivity) and solid electrolyte (free of leaking). Usually, the GPE is fabricated by dissolving the polymerization products into liquid electrolyte and cast the viscous polymer solution on to a glass or steel plate to form the gel electrolyte film in an anhydrous environment. However, the highly viscous property of the GPE made by the solution casting method makes it inconvenient for assembling batteries, especially for large size batteries. To overcome these difficulties, scientists developed phased-inversion method to make porous structure membranes. In this way, the GPE is formed by immersing the porous polymer membrane into a liquid electrolyte, leaving it in an anhydrous environment and heating it over 60 °C until being gelled.

The as-prepared gel polymer electrolytes presented ionic conductivity in excess of 3.0×10^{-3} S/cm at ambient temperature, a decomposition voltage over 6.6 V, and the fracture strength as high as 18.98 MPa. The results showed that the as-prepared gel polymer electrolytes were promising materials for Li-ion batteries.

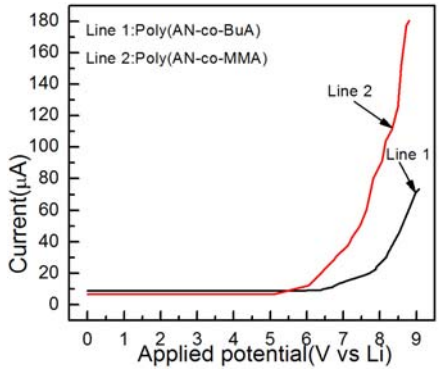

Fig.1 *Current-voltage curves of different polymer membranes cells at 25 ℃ (scan rate 1 mV/s)*

The electrochemical stability of different gel polymer electrolyte membranes was evaluated by linear sweep voltammetric measurements.