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Ion Conductivity and Thermal Properties of Nano-composite Polymer Gel Electrolytes containing NH_4SCN for Electrochemical Devices

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Abstract: Nano-composite polymer gel electrolytes consisting of polyethylene oxide (PEO) as polymer, ammonium thiocyanate (NH_4SCN) as salt, propylene carbonate (PC) as solvent, nano-sized titanium dioxide (TiO_2) as nano-filler has been prepared and characterized. The addition of polymer increases the viscosity of electrolytes along with a small increase in conductivity. An increase in conductivity with the addition of polymer has been explained to be due to the dissociation of ion aggregates and undissociated salt present in the electrolytes by increasing the dielectric constant of the electrolytes. The effect of addition of nano-sized titanium dioxide on the conductivity and viscosity behaviour of polymer gel electrolytes has been studied. The mechanical stability along with ionic conductivity of the gels has been improved. The thermal stability of nano-composite polymer gel electrolytes has been checked by DSC/TGA studies. The conductivity of nano dispersed gels does not show much change over 30-100°C temperature range and also remains constant with time, which is desirable for device applications like batteries, fuel cells, supercapacitors and other electrochromic devices.
Keywords : nano-composites; nano-filler; ion aggregates, conductivity, viscosity.

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