

E1-31: Ionic conductivity of melt-cast PEO/LiCF₃SO₃ polymer electrolytes

M A Careem

(Dept of Physics, Univ of Peradeniya & De Montfort Univ, Leicester, UK)

The polyethylene oxide (PEO) based polymer electrolyte films are usually prepared using the solvent casting technique. The morphology and the conductivity of such polymer films are often substantially modified by the presence of water. A number of different approaches have been reported, to eliminate water from electrolyte films such as drying at some chosen temperature for prolonged periods, rapid microwave drying etc. However, none of these procedures give consistent results due to the resulting different morphologies.

In this work, a different procedure was adopted to produce films of PEO/LiCF₃SO₃ electrolytes with consistent morphology. The solvent cast films were melted completely and allowed to reform at pre-set temperatures in a vacuum oven. The electrical conductivity of these films were measured as a function of temperature up to 120°C using the complex impedance technique. The melt-cast films showed higher conductivities of over 2 orders of magnitude, at normal temperatures, compared to those of the films dried by the conventional methods. Also the conductivity values were more stable against thermal cycling. The increased conductivity of the melt-cast films may be attributed to the enhanced mobility of ions in the amorphous region between the spherulites due to lower ion association effects.

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