

**E1-03 A natural rubber based polymeric electrolyte for rechargeable lithium batteries**

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Polymer electrolytes formed between poly (ethylene oxide) (PEO) and Lithium triflate, LiCF<sub>3</sub>SO<sub>3</sub> has attracted much attention due to the possibility of using this in the form of a thin layer electrolyte in high energy density Li batteries. In the present study it was observed that the mechanical properties of this polymeric electrolyte could be greatly improved by incorporating natural rubber without significantly affecting its conductivity.

This offers the advantage of the possibility of making thin electrolyte films flexible enough for different battery configurations. Natural rubber latex stabilised with NH<sub>4</sub>OH was first coagulated by adding CH<sub>3</sub>COOH. The solid rubber coagulum was subsequently washed thoroughly with distilled water and dried in vacuum for 3 days. Two films, one containing PEO & LiCF<sub>3</sub>SO<sub>3</sub> only, and another with half the amount of natural rubber by weight in place of PEO were prepared using anhydrous isoamylacetate as the common solvent. The solid electrolyte films were obtained by the well known solvent casting method. The films were dried in vacuum for 24h to prior conductivity measurements.

Ionic conductivity of thin film samples was measured up to 110°C using complex impedance technique in the frequency range of 20 Hz to 10 MHz. The DC polarization test, performed on both electrolytes at 90°C under a 2V bias potential showed the ionic nature of the conduction process. Typically the ionic conductivity of the PEO : NR : LiCF<sub>3</sub>SO<sub>3</sub> electrolyte at 105°C is 2.55x10<sup>-5</sup> S cm<sup>-1</sup> whereas the conductivity of the (PEO)<sub>9</sub>-LiCF<sub>3</sub>SO<sub>3</sub> is 1.20x10<sup>-4</sup> S cm<sup>-1</sup> at the same temperature.

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