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ABSTRACTS

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Analysis of polymer electrolytes with additives and fabrication of a ceramic electrolyte

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In polymer electrolytes such as Polyethylene Oxide (PEO), ions are taking a prominent place in the conduction of electricity, unlike standard conductors of which the electrons are the only charge carriers. Specifically high molecular weight PEO with complex lithium salts (LiX), still seems to be an emerging candidate which can be used in polymer electrolytes. They seem to be capable of acting as good conductors, but are experienced to be quite problematic at ambient temperatures. Due to this problem the usage of polymer electrolytes in practical applications seems to be challenging. Incorporation of nano-sized ceramic fillers has shown much effective results when compared to other approaches and out of those, only a very few studies have been carried out to investigate the changes of the structure of the polymer electrolytes with the addition of nano-sized fillers. To study the addition of these fillers the, polarisation microscope was used. Change in *spherulite* growth with the addition of alumina (Al_2O_3) and TiO_2 were identified, and the effective amounts were determined to be 12.5% and 4% by weight respectively. *Spherulites* are structures which hinder conductivity. Furthermore, a study was carried out in order to prepare a mineral filler, which in turn can fully or partially replace the need of polymers in electrolytes. The ceramic electrolyte is found to be with many advantages over the normal polymer electrolyte. The ceramic electrolyte is supposed to be with minimal adverse effects on the environment and can be easily and safely disposed since the constituents are completely nontoxic. Besides they possess excellent mechanical, thermal and chemical properties which will give rise to better stability than the other electrolytes. There has not been any published work with positive results of a complete ceramic electrolyte. The constituents used in the present study were kaolinite, feldspar and quartz, with an efficiency of 3.62% for the solar cell setup. The efficiency could be improved by optimizing various factors of the constituents. The ceramic electrolyte is a new environmentally friendly, sustainable approach in the fabrication of solar cell.

Keywords
Spherulite, Electrolyte, Polymer, Ceramic, Conductivity, Nanomaterial