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# Proceedings

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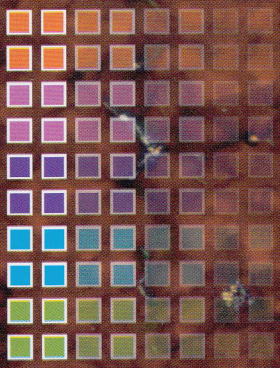

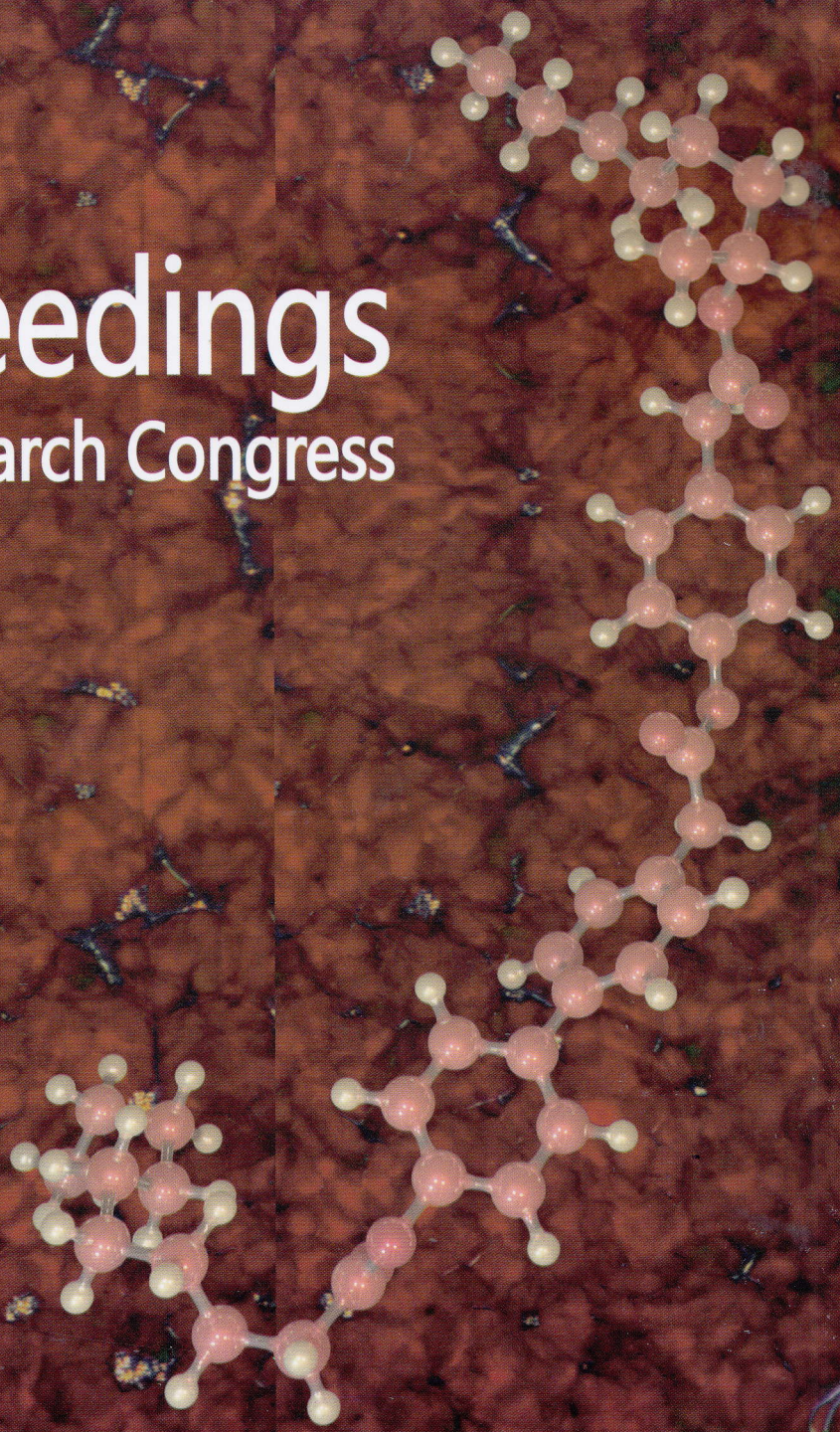

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# DEVELOPMENT OF ELECTROSPUN PVdF-HFP/PEO BLEND POLYMER MEMBRANE ELECTROLYTE FOR DYE SENSITIZED SOLAR CELLS

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The electrolyte is an important component in the fabrication of dye-sensitized solar cell (DSSC), which plays a significant role in the reduction of the oxidized dye by the reduced species of a redox couple and assists the charge transfer mechanism. In this work, a novel polymer blend electrolyte has been prepared using electrospun poly(vinylidene fluoride-co-hexafluoropropylene) (PVdF-HFP) and poly(ethylene oxide) (PEO). Electrospun blend polymer membranes were immersed in a liquid electrolyte made with tetrapropylammonium iodide ($Pr_4NI$), 1-butyl-3-methylimidazolium iodide (BMII) and iodine ($I_2$) dissolved in propylene carbonate (PC). SEM images of the electrolyte membrane showed the formation of a 3-D network of blend polymer fibers. The DSSCs fabricated with this gel electrolyte were characterized by photocurrent-voltage and Electrochemical Impedance Spectroscopy (EIS) and compared with the conventional gel and liquid electrolytes. The ionic conductivities were measured for these three types of electrolytes. The PVdF-HFP/PEO blend polymer membrane electrolyte showed an ionic conductivity of $8.50 \times 10^{-3}$ S $cm^{-1}$. The DSSCs fabricated with electrospun blend polymer membrane-based gel electrolyte showed an energy conversion efficiency of 8.58 %, under the solar illumination of 100 mW $cm^{-2}$, whereas the efficiency of the DSSC made with the liquid electrolyte-based cell was 8.82 % and DSSC made up with conventional gel electrolyte-based cell was 8.17 %. EIS spectra show the intermediate charge transport resistances for electrospun membrane gel electrolyte. This study shows the possibility of replacing the liquid electrolyte in DSSCs by electrospun blend polymer membrane-based gel electrolyte and thereby minimizing some of the major drawbacks associated with liquid electrolyte based solar cells while maintaining an efficiency close to liquid electrolyte based cells.

**Keywords**: Blend polymer membrane, Dye-sensitized solar cell, Electrolyte, Electrospun membrane