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# Efficiency enhancement in dye sensitized solar cells with blended PVdF-HFP and PEO gel electrolytes

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Electrolyte plays an important role in the photovoltaic performance of dye-sensitized solar cells (DSSCs) as it is responsible for efficient electron transfer from the counter electrode to the sensitizer via the redox species in the electrolyte. DSSCs containing liquid electrolytes have been reported with higher efficiencies. However, these DSSCs suffer several major draw backs due to the liquid nature of the electrolyte such as leakage, evaporation and thus, they need perfect sealing when long term stability is concerned. To overcome such problems, solid or quasi-solid (gel) state electrolytes have been utilized in these devices. Most of the DSSC gel electrolytes reported so far have been prepared using polyethylene oxide (PEO), polyacronitrile (PAN), poly (vinylidene fluoride-co-hexafluoropropylene) (PVdF-HFP) etc. Very few studies have been carried out on the utilization of blended polymer electrolytes in DSSCs. Therefore, in this study blended polymer electrolytes with PEO and PVdF-HFP were synthesized by varying the polymer composition ratios to obtain DSSCs with enhanced efficiency. DSSCs with the gel electrolytes were characterized by photocurrent-voltage and Electrochemical Impedance Spectroscopy (EIS). DSSCs with blended gel electrolyte having PVdF-HFP: PEO ratio of 80:20 wt% showed the highest efficiency of 6.46% under 100 mW $cm^{-2}$ illumination and the highest ionic conductivity of 6.79 mS $cm^{-1}$ at room temperature. The electrochemical impedance spectroscopy (EIS) measurements in DSSCs indicated a reduction of interfacial resistance between electrolyte and the Pt counter electrode and $TiO_2$ photo-anode because of the generation of a higher photo current due to usage of blended gel electrolytes.

**Keywords:** dye sensitized solar cells, blend polymers and electrolyte

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