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Fabrication of efficient dye - sensitized solar cell using the dye of Chinese rain bell flower

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Available solar energy converting devices are comparably expensive and cutting down the cost of the PV devices is a prime need. Therefore, fabrication of PV devices with low cost materials and techniques is very important. Dye sensitized solar cell (DSSC) is one of the best alternatives since the processing technique is very simple and materials used are low cost. Performances of DSSCs are mainly based on the dye used as the sensitizer and researchers are currently focusing on their attention on dyes extracted from natural resources due to the environmentally friendliness, non-toxicity and cost-effectiveness. In this study, *Strobilanthes hamiltoniana* “Chinese rain bell” has been explored as a possible sensitizer for DSSCs. Dye is extracted using water as the solvent. Indium dope tin oxide (ITO) coated glasses are used for making electrodes and titanium dioxide (TiO₂) coating is used as the charge conveyor medium. TiO₂ paste which is made by grinding 3.5 g of TiO₂ and 2.5 ml of Monoethyleneglycole (MEG) is thoroughly applied on the conducting side of the ITO glass using “Doctor blade method” and heated it at 500 °C for 2 hours. The heated ITO is immersed in the dye for 16 hours and hence the working electrode is fabricated. The counter electrode is fabricated by applying a graphite layer using a candle flame on the conducting side of the ITO glass. Finally a drop of redox solution which is made by mixing 0.82 g of KI and 0.123 g of I₂ with 10 ml of acetonitrile, is put on the counter electrode and the two electrodes are pressed together as in the way the active sides of the working electrode and the counter electrode face each other. To optimize the cell, the immersing time in the dye is varied and the most effective cell is obtained with the immersing time of 18 hours. Ultimately the best DSSC (18 hours) fabricated with Chinese rain bell dye exhibited V_{oc} of 347.3 mV, J_{sc} of 75.1 μA/cm², FF of 0.43 and η of 0.012%.

Keywords: Dye sensitized solar cell, *Strobilanthes hamiltoniana* (Chinese rain bell)