



Natural dyes extracted from *Catharanthus* flower petals for dye-sensitized solar cells application

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Abstract

Dye-Sensitized Solar Cells (DSSCs) are one of the most studied cost-efficient solar cells with commercially available Ru-based dyes as the photosensitizer[1]. There has been a considerable interest to utilise natural dyes due to being environmentally friendly and economically superior to the commercially available Ru-based dyes [2]. This study focuses on utilising natural dyes extracted from *Catharanthus* flower petals as a photosensitizer for fabricating TiO₂ based DSSC. Fresh flower petals were washed with deionized water before drying them to make a powder sample. Dyes were then extracted by soaking the powder with ethanol and DI-water.

The UV-Visible spectroscopy study reveals the presence of Chlorophyll and Anthocyanin in the ethanol extract. However, no distinguished peaks were observed for the dye-coated TiO₂ films due to the interference of the TiO₂ absorbance. Moreover, the uniform distribution of the dye molecules in the dye-coated TiO₂ films was confirmed by the AFM study. DSSCs were then fabricated by doctor-blade method with the effective area of 0.25 cm² utilising natural dye, I⁻ / I₃⁻ redox couple and Pt electrode as a sensitizer, electrolyte and counter electrode, respectively. Finally, the photovoltaic performance of the fabricated devices was investigated under simulated irradiation of intensity 100 mW/cm² with AM 1.5 filter. The device with ethanol extract of *Catharanthus* flower sensitized photoanode pronounced photovoltaic properties with short circuit current density, open circuit voltage and fill factor, 0.39 mAcm⁻², 0.56 V and 0.50, respectively.

Keywords: DSSCs; Natural dye; *Catharanthus*; Solar cell; Photovoltaic

Reference

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