Natural photosensitizers for dye sensitized solar cells (Visco)

AliBatry, S.A.M. 1, Abu1, O. 2, Sapyan I. 2
Department of Manufacturing and Materials Engineering, International Islamic University Malaysia, Malaysia

Abstract

Dye-sensitized solar cells (DSSCs) were constructed by using the Lawsonia inermis leaves, Sunnus/Ru5s fruits, and Curcuma longa roots as natural sensitizers of anatase-based nanorod structure TiO2 thin film. P25 coated on ITO conducting glass. The orange-red Lawsonia, red purple anthocyanin and yellow Curcumin are the main components in the natural dyes obtained from those natural products. A blend of 50:40:10% iron oxide and 50:40% polyethylene oxide (PEO) was used as a solid state thin film electrolyte. The polymer blend was completed by ammonium iodide (NH4I) and some iodine crystals were added to the polymer-NH4I solution to provide I2-3 redox couple. The ionic conductivity of the polymer electrolyte is 1.1x10-3 S cm-1 at room temperature. Structural and optical properties of the semiconductor thin films were characterized by X-ray diffraction and UV- Vis spectrophotometer respectively. The XRD shows nanocrystalline structures for TiO2 thin films (D=10nm). The photovoltaic properties of the cell have been studied and the best overall solar energy conversion efficiency of 1.5% was obtained, under AM 1.5 irradiation, with the red purple Sunnus/Ru5s extract, that showed a reasonable current density (Jsc = 0.8) mA/cm2.

Author keywords

DSSC; Natural photosensitizers; Photovoltaic; Solar energy; Solid state electrolyte

References (36)