

Comparative Study of Dye-Sensitized Solar Cell Utilizing Seaweed and Rose Bengal Sensitizer: Influence of Dye Concentration

ABSTRACT

This work is concerned with the performance comparison study of dye-sensitized solar cell utilizing seaweed and rose bengal as dye-sensitizer. The influence of concentration of each dye on the optical absorption, photovoltaic performance and electrochemical impedance spectroscopy (EIS) data has been investigated. The 0.3 mM seaweed dye possesses the highest optical absorption. While, the 0.5 mM rose bengal dye exhibits the highest absorption in visible region. The DSSC utilizing the 0.3 mg/l seaweed dye produces the highest J_{sc} of $0.0183 \text{ mA cm}^{-2}$ due to the highest absorption in visible region and the lowest charge transfer resistance at the interface of Pt/electrolyte (R_{ct}). The device using 0.5 mM rose bengal dye demonstrates the highest J_{sc} that is $0.1436 \text{ mA cm}^{-2}$ due to the highest absorption in visible region and the lowest charge transfer resistance at the interface of Pt/electrolyte. In conclusions, the performance of the device with rose bengal dye is higher than that of the device using seaweed dye. This is because the charge carrier lifetime of the device with rose bengal dye is longer than that of the device with seaweed dye. The power conversion efficiency of the device using both dyes is low.