

Photovoltaic Performance of Rainbow Dye-Sensitized Solar Cells using Gardenia Yellow, Blue and Red

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The photovoltaic performance of rainbow dye-sensitized solar cells using yellow, blue and red extracted from gardenia was investigated to harvest light over a wide range of wavelengths. The adsorption characteristics, photovoltaic efficiencies, and electrochemical properties of the rainbow DSSCs were investigated. Adsorption kinetic data for the dyes were obtained in a small adsorption chamber. The adsorption capacities of gardenia yellow, blue, and red were 1532 mg/g, 262 mg/g, and 192 mg/g, respectively. The adsorption kinetic values determined from a pseudo-second-order model were in the range of 8.01×10^{-5} to 3.32×10^{-3} g/(mg min). The photovoltaic performance of a photo-electrode with an adsorbed mixture of the three dyes was evaluated from current-voltage measurements. It was found that the conversion efficiency of the rainbow DSSC was highly dependent on the adsorption properties of the cocktail dyes on TiO₂ films.