

Salicylic acid-based organic dyes acting as the photosensitizer for solar cells

Abstract

A D-π-A metal-free organic dye, featuring salicylic acid as a novel acceptor/anchoring unit, has been designed, synthesized and applied to dye-sensitized solar cell. The detailed photophysical, electrochemical, photovoltaic and sensitizing properties of the organic dye were investigated, in addition to the computational studies of the dye and dye-(TiO₂)₆ system. A solar cell device using this new organic dye as a sensitizer produced a solar to electric power conversion efficiency (PCE) of 3.49% (J_{sc} = 6.69 mAcm⁻², V_{oc} = 0.74 V and ff = 0.70) under 100 mWcm⁻² simulated AM 1.5 G solar irradiation, demonstrating that the salicylic acid-based organic dye is a suitable alternative to currently used organometallic dyes