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Photovoltaic Properties of Dye-Sensitized Solar Cells using PEDOT:PSS as Hole Conducting Material

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Recently, Dye-Sensitized Solar Cells (DSSCs) based on dye-adsorbed nanoporous titanium oxide (TiO_2) have been widely investigated as a new type of solar cell because of its low production cost, simple structure, easy production, and higher power conversion efficiency (>10%) [1].

DSSC has been established, as described in the multilayer structure. The dye-adsorbed nanoporous TiO_2 film was sandwiched between a fluorine-doped tin oxide electrode and a Pt counter electrode. The space between two electrodes was filled with the electrolyte using PEG, PAN or other conducting polymers as a polymer matrix.

In this study, we fabricated DSSC device using Poly(3,4-ethylenedioxythiophene) : poly(styrenesulphonic acid) (PEDOT:PSS). PEDOT:PSS is commonly used as an anode in polymer light-emitting diodes (PLED) [2]. However, we applied it as hole conducting material instead of PEG, PAN or other conducting polymers.

The measurements were made on open cell, and the active area was 0.25 cm^2. The open-circuit voltage (V_{oc}) of the DSSC devices was 0.36 V, the short-circuit current density (J_{sc}) was 14.01 mA/cm^2, and the overall power conversion efficiency (η) achieved 1.60 %. And then, fill factor (FF) was 0.32.

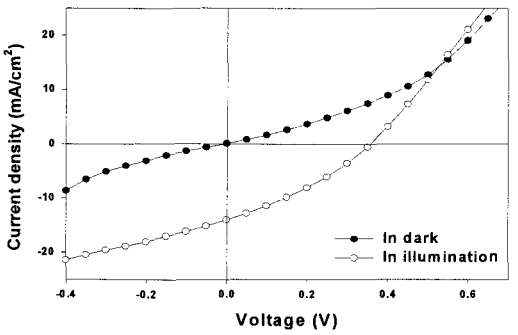

Figure 1. Photocurrent-voltage characteristics of the DSSC device using PEDOT:PSS as a hole conducting material under AM 1.5; light density: 100 mA/cm^2; active area: 0.25 cm^2.

References

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