

Dye sensitized solar cell application

Dye-sensitized solar cells (DSSCs) have arisen as a technically and economically credible alternative to the p-n junction photovoltaic devices. In the late 1960s, it was discovered that electricity can be generated through illuminated organic dyes in electrochemical cells.

Dye sensitised solar cells operate as a photoanode (n-DSC), where photocurrent result from electron injection by the sensitized dye. Photocathodes (p-DSCs) operate in an inverse mode compared to the conventional n-DSC, where dye-excitation is followed by rapid electron transfer from a p-type semiconductor to the dye (dye-sensitized hole ...

The dye-sensitized solar cell (DSSC), a molecular solar cell technique, has the potential to generate solar cells for less than \$0.5/W_{peak} [5]. Researchers and industry professionals around the world have been drawn to DSSCs due to their favorable PCE, low-cost materials, and suitable fabrication techniques.

For indoor and outdoor dye-sensitized studies of solar cells, three novel organic dyes based on anthracene, denoted as 11, 12, and 13 were synthesized by Tsai et al. [91]. Further, they prepared flexible and rigid modules, as well as small cells, and their PV efficiencies were evaluated.

For indoor and outdoor dye-sensitized studies of solar cells, three novel organic ...

?,?----,··1991?·2010? ;,,?...

Illustration of the factors affecting efficiency of DSSC

The full operating process of DSSCs consists of the following phases.^{53,54,55,56,57}

(i) Excitation of sensitizer (absorption of photonic energy): When sunlight strikes the DSSC, the sensitizer gets excited to a higher energy state [lowest unoccupied molecular orbital (LUMO)] from their ground state [highest occupied molecular orbital (HOMO)] and subsequently produces electrons and holes.

(ii) Injection of electron: The excited sensitizer is oxidized and an electron is inserted into the conduction band (CB) of the semiconductor (TiO₂), whereby electrons pass through the thin film of porous TiO₂ to the transparent conducting oxide glass substrate to cathode from the anode through an external loop, creating current and completing cycles.

(iii) Regeneration of sensitizer: The redox pairs present in the electrolyte (e.g. iodide and tri-iodide [I⁻ = I₃⁻] redox pairs) donate the electron to oxidized-sensitizer, and thus it gets regenerated.

(iv) Electrochemical reduction: In addition, iodide and the redox mediator in the electrolyte travel to the CE and are regenerated on the cathode by reducing tri-iodide.

Contact us for free full report

Web: <https://kary.com.pl/contact-us/>

Email: energystorage2000@gmail.com

WhatsApp: 8613816583346

