

INTERFACE MODIFICATION OF DYE-SENSITIZED SOLAR CELLS USING SELF-ASSEMBLED MONOLAYER

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Dye-sensitized nanoporous TiO_2 solar cell is a promising system for cost-efficient solar energy conversion application. In these solar cells, Ru-based dye molecules, adsorbed on the surface of a nanoporous sintered TiO_2 film, are used to absorb visible light and to inject electrons into the TiO_2 conduction band. I^-/I_3^- redox couple in a liquid electrolyte is used to regenerate the oxidized dye molecule. Pt coated FTO glass was used as the top contact.

In this study, the TiO_2 /electrolyte interface was modified by self-assembled monolayer having different dipole moments. Self-assembled monolayer of benzoic acid derivative with an electron donating group ($-\text{OCH}_3$, $-\text{OR}$, $-\text{CH}_3$ etc.) which attached to the para position enhanced the overall performance of the dye-sensitized solar cell by over 80 % compared to the controlled device with no interface modification.