Solid-state dye-sensitized solar cell with p-type NiO as a hole collector

Jayasundera Bandara*, Hasitha Weerasinghe

Institute of Fundamental Studies, Hantana Road, Kandy, Sri Lanka

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Abstract

A solid-state dye-sensitized solar cells (DSSC) comprising of p-type NiO thin layer on TiO_2 was fabricated in which the dye is adsorbed on the p-type oxide and the thin NiO layer acts as a hole collector as well as a barrier for charge recombination. DSSC with NiO-coated TiO_2 electrodes with Ru-dye delivers $I_{sc} = 0.15$ mA and $V_{oc} = 480$ mV. It was shown that the p-type oxide materials could be successfully used to construct DSSC and the plausible charge transfer mechanism is discussed.

Keywords: Dye sensitization; p-type hole collector; Electron tunneling; Solar cells; NiO; TiO_2