

Up-Scaling of Highly Transparent Quasi-Solid State Dye-Sensitized Solar Devices Composed of Nanocomposite Materials

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Abstract : At the present work highly transparent strip type quasi-solid state dye-sensitized solar cells (DSSCs) were fabricated through inkjet printing using nanocomposite TiO₂ inks as raw materials and tested under outdoor illumination conditions. The cells, which can be considered as the structural units of large area modules, were fully characterized electrically and electrochemically and after the evaluation of the received results a large area DSSC module was manufactured. The module design was a sandwich Z-interconnection where the working electrode is deposited on one conductive glass and the counter electrode on a second glass. Silver current collective fingers were printed on the conductive glasses to make the internal electrical connections and the adjacent cells were connected in series and finally insulated using a UV curing resin to protect them from the corrosive (I-/I₃-) redox couple of the electrolyte. Finally, outdoor tests were carried out to the fabricated dye-sensitized solar module and its performance data were collected and assessed.

Keywords : dye-sensitized solar devices, inkjet printing, quasi-solid state electrolyte, transparency, up-scaling

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