Photovoltaic Performances of Dye-Sensitized Solar Cells assembled with Porous Membrane

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Photoelectrochemical solar cell based on nanostructured dye-sensitized TiO_2 has been considered as an alternative to a conventional silicon solar cell because of low cost and high conversion efficiency. It consists of a dye-sensitized nanoparticulated TiO_2 electrode, an electrolyte containing redox couple and a Pt coated counter electrode. Such solar cells have impressive conversion efficiencies reaching around 10 %, where the electrolyte usually used in the cell is an I^-/I_3^- redox couple in organic solvents. However, the long-term durability of the cell is limited by the leakage or evaporation of the liquid electrolyte. Therefore a significant effort is taken in order to replace the liquid electrolyte by a gel polymer electrolyte or a solid polymer electrolyte. In our work, a porous membrane was prepared with the copolymer by a phase-inversion method, and gel polymer electrolyte was prepared by soaking the porous membrane in electrolyte solution containing I^-/I_3^- redox couple. In this study, we report on the assembling and performance of a dye-sensitized solar cell (DSSC) assembled with the porous gellable membrane.