

Comparison of Transparent Nickel Doped Cobalt Sulfide and Platinum Counter Electrodes Used in Quasi-Solid State Dye Sensitized Solar Cells

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Abstract : Transparent nickel doped cobalt sulfide was fabricated on a SnO₂:F electrode and tested as an efficient electrocatalyst and as an alternative to the expensive platinum counter electrode. In order to investigate how this electrode could affect the electrical characteristics of a dye-sensitized solar cell, we manufactured cells with the same TiO₂ photoanode sensitized with dye (N719) and employing the same quasi-solid electrolyte, altering only the counter electrode used. The cells were electrically and electrochemically characterized and it was observed that the ones with the Ni doped CoS₂ outperformed the efficiency of the cells with the Pt counter electrode (3.76% and 3.44% respectively). Particularly, the higher efficiency of the cells with the Ni doped CoS₂ counter electrode (CE) is mainly because of the enhanced photocurrent density which is attributed to the enhanced electrocatalytic ability of the CE and the low charge transfer resistance at the CE/electrolyte interface.

Keywords : nickel doped cobalt sulfide, counter electrodes, dye-sensitized solar cells, quasi-solid state electrolyte, hybrid organic-inorganic materials

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