LEAD SULFIDE QUANTUM DOT SENSITIZED TITANIUM DIOXIDE PHOTOANODE FOR DYE SENSITIZED SOLAR CELLS

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Solar cells are becoming most promising alternative energy source in recent years due to its cleanness, abundant, low-cost and easy fabrication.

In this study, TiO_2 working electrode was prepared by using doctor blade method. The dye on the photoanode as a sensitizer with the iodide/triiodide-based liquid electrolyte gave maximum efficiency of 5.77%. In contrast, dye-PbS quantum dots (QDs) sensitized on TiO_2 gave an efficiency of 2.54% and 2.01% in drop cast method and successive ionic layer adsorption and reaction (SILAR) method respectively. QDs were fabricated on TiO_2 photoanode its efficiency was very low. This might be due to the corrosive effects of iodide ions towards the PbS QDs.

In order to overcome this problem, polysulfide-based quasi-solid-state gel polymer electrolyte was introduced to the quantum dot-sensitized solar cell (QDSCs)-based system. The device consisting of the polysulfide-based gel electrolyte showed the conductivity of 1.178×10^{-4} Scm^{-1}, the maximum efficiency of the Dye-QD coupled sensitized solar cell with drop cast method was 0.04% and SILAR methods was 0.01%. PbS QDs fabricated on the TiO_2 photoanode gave 0.03% of efficiency using drop cast method and 0.01% of efficiency using SILAR method. The IV characteristic measurements were obtained under the AM 1.5 Irradiation at 25 ^{o}C by using solar simulator. When TiO_2 was sensitized with quantum dots overall performance of the cell degrades but still the results are confirms that drop cast method gives better solar cell performances than conversional SILAR method.