THE EFFECT OF MnS QUANTUM DOT IN CdS BY SILAR METHOD FOR A CO-SENSITIZED SOLAR CELL

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Quantum dots have secured their identity as a potent candidate in opto-electronics and photovoltaic applications. Highly efficient, low-cost quantum dot-sensitized solar cells (QDSSCs) have been fabricated with CdS quantum dots by co-sensitization with MnS quantum dots. The CdS and MnS quantum dots layer, which was deposited on the photoanode using the Successive Ionic Layer Adsorption and Reaction (SILAR) technique. Cadmium (II) Acetate ($C_4H_6CdO_4$), Manganese (II) Acetate [Mn $(CH_3CO_2)_2$] and Sodium Sulfide (Na_2S) used to prepare the mentioned quantum dots. Device configuration of the fabricated QDSSC was FTO/TiO_2 -P90/ TiO_2 - P25/CdS/MnS/electrolyte/Pt. Poly-sulfide redox couple was used as the electrolyte. Solar cells resulted in an efficiency of 1.18 % with an open-circuit voltage of 467.9 mV and a short-circuit current density of 8.94 mA cm^{-2}, and fill factor of 28.2% under the illumination of 100 mW cm^2 with AM 1.5 spectral filter. Active area of the cell was limited to 0.16 cm^2. The efficiency of co-sensitized MnS QDSSC is 1.16 times greater than only CdS quantum dot sensitized solar cells. Morphological, optical and electrical characterizations of photoanodes and cells have been studied with standard methods. They really supported to clarify the results.

Keywords: *Low cost, Photoanode, Photovoltaic applications, Quantum dot, Successive Ionic Layer Adsorption and Reaction (SILAR).*

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