Photocapacitance Study of Quantum Dots Sensitized TiO2 Solar Cell

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Abstract

Quantum dots based solar cells are very attractive due to their high efficiency. Here, we report synthesis and characterization TiO2 based solar cell which is co-sensitized with quantum dots of CdS/ZnS. The quantum dots of CdS/ZnS was deposited on TiO2 film using the successive ionic layer adsorption and reaction (SILAR) method. The junction characteristics of the quantum dots sensitized solar cell was studied using current-voltage, capacitance-voltage and series resistance-voltage measurements. The maximum efficiency of 3.3% was observed for the device under 100 mW/cm(2) illumination. The higher efficiency of our device was due to synergistic effect of CdS and ZnS quantum dots. Both of the quantum dots generate charge carries on illumination and their suitable badgaps provide a cascading energy level for effective charge separation. The transient photocapacitance of the solar cell was studied under 100 mW/cm(2) light intensity. It was observed that the capacitance of the quantum dots co-sensitized solar cell increases on illumination and return to its original value after turning off the illumination. The photocapacitance gain for the solar cell was found to be 1.36. The obtained results suggest that the CdS and ZnS co-sensitization could lead to a solar cell with improved efficiency and better photocapacitive response.

Keywords

Author Keywords: Solar Cell; TiO2; Quantum Dots; CdS; ZnS; Solar Efficiency
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