

Highly Electrocatalytic H_3PO_4 Treated Copper Sulfide Counter Electrodes for Quantum Dot Sensitized Solar Cells

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The present study reports the effect of H_3PO_4 treatment on the surface of CuS counter electrodes to improve the photovoltaic performance and stability of quantum dot sensitized solar cells (QDSSCs). The various concentrations of H_3PO_4 treated CuS thin films were successfully grown on a conducting FTO substrate by chemical bath deposition (CBD) method. Solar cell devices were designed using CdS/CdSe photoelectrodes and H_3PO_4 treated CuS counter electrodes with a polysulfide electrolyte.

Under the illumination of one sun (AM 1.5 G, 100 mW cm^{-2}), 4 ml H_3PO_4 treated CuS counter electrode based QDSSC exhibit excellent short-circuit current density, open circuit voltage, fill factor and power conversion efficiency. The improved photovoltaic parameters of QDSSCs is due to the high electrocatalytic activity of H_3PO_4 treated CuS counter electrodes.