Multi-cycle Growth of Boron Doped ZnO Films as Photoanode for Dye-Sensitized Solar Cell (DSSC)

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The work is concerned with the fabrication of dye sensitized solar cell (DSSC) utilizing multi-layer boron doped ZnO nanorods films. The B-doped ZnO films were prepared on FTO glass substrate via seed mediated hydrothermal method. Multi-layer B-doped ZnO nanorods were obtained by immersing the sample into a growth solution and repeated the growth process at 90 °C for 30 minutes. The structure of the B-doped ZnO film has been found to exhibit the hexagonal wurtzite structure. The length and diameter of the nanorods increase with the number of the growth cycle. The performance of the DSSC fabricated using the multi-layer B-doped ZnO nanorod was found to be significantly higher than that of the DSSC based on the single layer ZnO nanorod arrays. The best photovoltaic parameters with the J_{SC} of 3.5 mA cm⁻², FF of 0.38 and η of 0.67%, respectively was obtained for the device utilizing the layer with 3 cycles since it possesses the lowest photoluminescence in visible region and lowest R_{ct} .

Keywords: ZnO, boron, dye-sensitized solar cell, hydrothermal, nanorod

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