

Abstract

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Construction and Study of Heterojunction Solar Cell Based on Dodecylbenzene Sulfonic Acid-Doped Polyaniline/n-Si

Polyaniline/n-type Si heterojunctions solar cell are fabricated by spin coating of soluble dodecylbenzene sulfonic acid (DBSA)-doped polyaniline onto n-type Si substrate. The electrical characterization of the Al/n-type Si/polyaniline/Au (Ag) structure was investigated by using current-voltage (I-V), capacitance-voltage (C-V), and impedance spectroscopy under darkness and illumination. The photovoltaic cell parameters, that is, open-circuit voltage (Voc), short-circuit current density (Jsc), fill factor (FF), and energy conversion efficiency (%) were calculated. The highest Jsc, Voc, and efficiency of these heterojunctions obtained using PANI-DBSA as a window layer (wideband gap) and Au as front contact are 1.8 mA/cm², 0.436 V, and 0.13%, respectively. From Mott-Schottky plots, it was found that order of charge carrier concentrations is 3.5×10^{14} and 1.0×10^{15} /cm³ for the heterojunctions using Au as front contact under darkness and illumination, respectively. Impedance study of this type of solar cell showed that the shunt resistance and series resistance decreased under illumination.