

Abstract

In this paper, some models that have been put forward to explain the characteristics of a photovoltaic solar cell device under solar spot-illumination are investigated. In the experimental procedure, small areas of the cell were selected and illuminated at different solar intensities. The solar cell open circuit voltage (V_{oc}) and short circuit current (I_{sc}) obtained at different illumination intensities was used to determine the solar cell ideality factor. By varying the illuminated area on the solar cell, changes in the ideality factor were studied. The ideality factor obtained increases with decreasing illumination surface ratio. The photo-generated current at the illuminated part of the cell is assumed to act as a dc source that injects charge carriers into the p–n junction of the whole solar cell while the dark region of the solar cell operates in a low space charge recombination regime with small diffusion currents. From this analysis, a different model of a spot illuminated cell that uses the variation of ideality factor with the illuminated area is proposed.