INVESTIGATION THE PARAMETERS OF MULTIJUNCTION SINGLE CRYSTAL SILICON SOLAR CELLS WITH VERTICAL DIODE CELLS TEST SAMPLES

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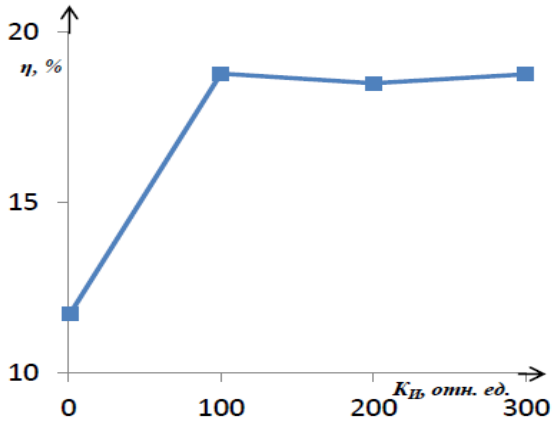
The main idea of solar energetics is converting the solar energy into electrical by means of semiconductor solar cells (SC). The most popular are the one-junction single crystal silicon solar cells (OJ Si-SC) with a perpendicular p-n-junction placement relative to the incident sunlight. But along with the OJ Si-SC developed the multijunction solar cells (MJ Si-SC) with vertical diode cells (VDC) in which the p-n-junction is parallel to the incident light.

Calculations and experiments have shown that at this placement of p-n-junction the recombination of light generated charge carriers play an essential greater role than at perpendicular. Increasing the efficiency of such devices is possible thanks to the addition to design of their VDC thin film optical reflectors from transparent conductive material, as well as by placing them in a stationary magnetic field. A promising direction for MJ Si-SC is using them as part of photovoltaic installations in a highly concentrated solar radiation, where their efficiency can reach 26%. Therefore important to carry out research for select optimal operating conditions for such Si-SC.

The method of investigation was analytical processing of loaded illuminated current-voltage characteristics of MJ Si-SC with VDC measured at a concentration degree $1 \leq C_R \leq 300$ of simulated solar radiation in the pulsed radiation regime.



As a result, it was found that at increasing the concentration of solar radiation is observed the increase of all investigated sample parameters. Namely, with the degree of concentration is observed linear increase of short-circuit current I_{SC}. Meanwhile, the open circuit voltage U_{OC} increases up to a concentration 100 nearly on 6V and then does not change significantly. The fill factor FF remains unchanged, indicating the almost unchanged values of series and shunt resistances of sample. The combination of these parameters gives the dependence of the efficiency from solar radiation concentration on the basis of which it is seen that the most effectively, this type of solar cells can be used at a concentration of radiation no less than 100 as part of highly concentrated photovoltaic installations.