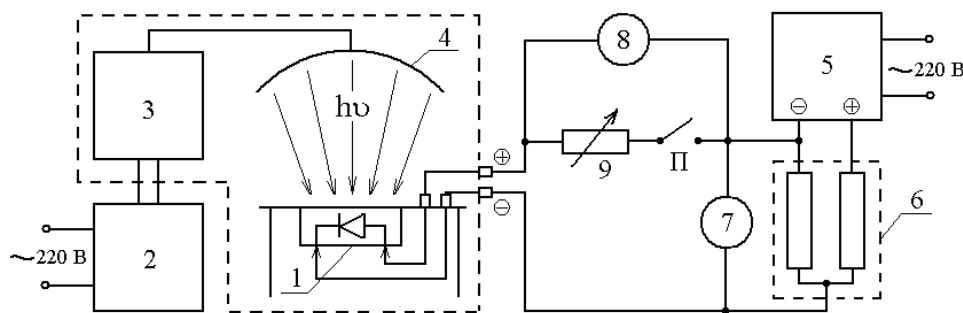


ATTESTATION OF SOLAR CELLS BY BACK EMF METHOD

D. D. Lobatenko, M. V. Kirichenko, R. V. Zaitsev, V. R. Kopach

National Technical University "Kharkiv Polytechnic Institute"
21 Frunze str., Kharkiv, 61002, Ukraine
e-mail: kolimba0@gmail.com

The main focus in grown of solar energetics is expanding the use of solar cells (SC). Widespread and affordable semiconductor material for solar cells mass production is silicon. At present, solar cells based on polycrystalline silicon are the most attractive by the "quality - cost" criterion. For the best laboratory solar cells based on polycrystalline silicon efficiency (η) reaches up to 20.4%. Improving the quality of polycrystalline Si-SC serial samples to the level of the best laboratory is an important scientific and technical problem, whose solution is required to use relevant at this point methods for determination output parameters of solar cells. One of them is the back-EMF method, which allows to carry out the measurement of illuminated current-voltage characteristics (CVC) and make an analytical processing for calculation values of output parameters: short circuit current I_{sc} , open circuit voltage U_{OC} , fill factor FF of illuminated CVC. The back EMF method is in connected in series with permanently illuminated SC the DC power supply, which is in the direction opposite to the photocurrent in the test device and further variation the compensating voltage values in the range $0 \div U_{OC}$ and measuring the current in the SC circle. Experimental study of illuminated CVC performed in AM 1.5 regime of stationary illumination via the measurement installation, shown schematically on Figure.



1 – SC sample; 2 - stabilized power supply for USO-3; 3 - control unit of USO-3 radiating element; 4 - USO-3 radiating element; 5 - stabilized DC source HUAYI Electronics HY3020MR; 6 - resistive voltage divider; 7,8 - Multimeters MASTECH MS8040 for measuring compensating voltage (7) and current in the SC circuit (8); 9 - reference resistor

Figure - Block diagram of the installation for measuring in steady irradiation illuminated CVC by back EMF method.

Measured by indicated method illuminated CVC of solar cells based on polycrystalline silicon test samples subjected to analytical processing using a PC to determine photocurrent and output parameters: I_{sc} ; U_{OC} ; FF; and efficiency.

For a comparative analysis of the output parameters and the measured CVC found that the best efficiency of the samples up to 10.1% due to higher short-circuit current, which is 0.574 A and has a greater impact on the efficiency of the sample than the value of fill factor in 0.594 and provides the above advantage within the meaning of efficiency over other samples of the investigated series.