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MONO- AND POLYCRYST SILICON JUSTIFIED THE SUN SIMPLE OPERATION OF THE ELEMENTS TO VOLTAGE LIGHT INTENSITY INFLUENCE SINTON SUNS- VOC DEVICE USING DETERMINATION

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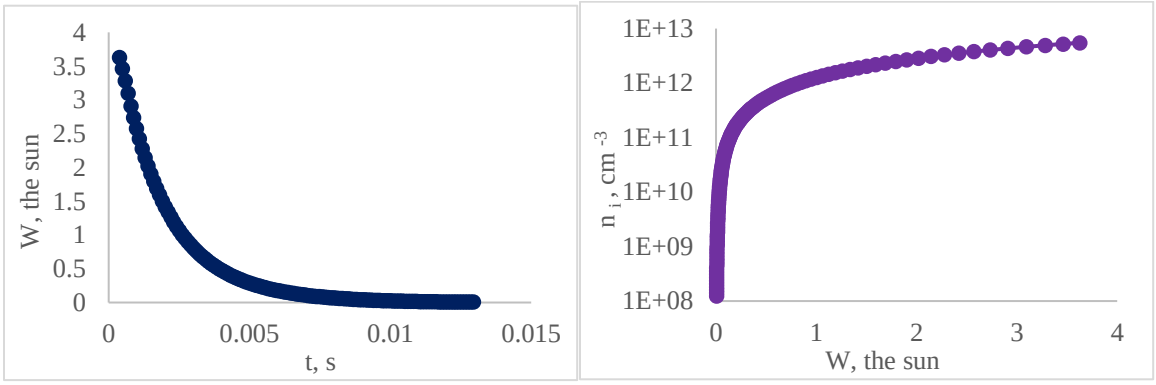
Abstract:
This article describes the determination of the effect of light intensity on the operating voltage of mono- and polycrystalline silicon-based solar cells using the Sinton Suns-Voc device.

Keywords: photoelectric parameters, Sinton Suns- Voc, Sentaurus TCAD, Mono - and polycryst silicon.

The sun from the light coming light intensity constant respectively changed stands. That's why for the sun elements main photoelectric parameters light intensity dependence learning important from tasks one. Silicon justified the sun of the elements short connection from 0.1 sun to 10 sun intensity between linear increases. That's why also for the sun from the element known error with pyranometer as if used will be.

Scientific research during single crystal silicon justified the sun element's only operation voltage light intensity dependence was studied . Scientific our research take going Suns-Voc of Sinton Company automatic from the device was used. This in the device light of the source intensity from 0.1 to 10 suns to be changed can From this except automatic to time depends respectively intensity change can (Graph1, a). This is the sun element's only operation voltage light intensity dependence to determine possibility gives

Experience during simple , size 156x156 mm ² has been single crystal silicon justified the sun element checked . The sun of the element unimportant charge carriers of concentration light intensity dependence graph harvest done (Graph1,b). That is light intensity when it increases unimportant charge carriers concentration is also logarithmic increased .



a b

Figure 1. a- light intensity to time dependence , b – unimportant charge carriers concentration light intensity dependence

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Unimportant charge carriers concentration if it changes , the sun element's only operation the voltage is the same respectively will change . Experience received the result is just work Voltage light intensity increase logarithmic increase showed (Graph 2). Intensity 0.1 sun just work when there is voltage 0.4 V, 3.6 to 0.67 V in the sun enough. If current strength to intensity right proportionality attention if we take, the intensity is from 0.1 to 3.6 suns when it changes vine power is also 36 times increases, salt consumption Voltage and 1.68 times increases . So the sun of the element exit 60 times the power increases . Useful the work coefficient and 1.68 times increases .

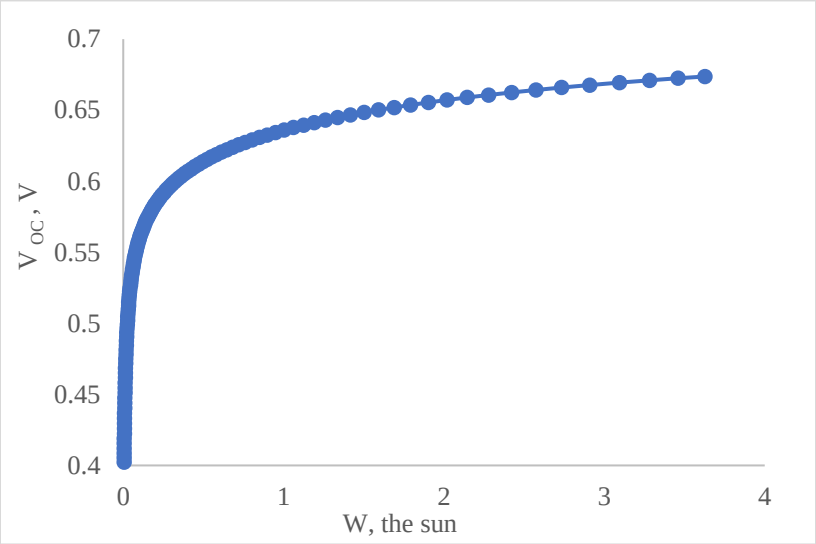

Figure 2. Single crystal silicon justified the sun element's only operation voltage light intensity dependence

Above received just work from the results voltage light intensity dependence is shown in formula 9 our writing can

$$V_{oc} \approx V_{ocn} + \frac{nkT}{q} \ln\left(\frac{I}{I_N}\right) (9)$$

Here : V_{oc} is just work voltage , I_N is known intensity , V_{ocn} – I_N just work in intensity , I – light intensity , T - temperature , q - electron charge , k – Boltzmann constant , n is ideality coefficient of .

Of course experience and in the model received results one one with suitable coming need. We are also single crystal silicon justified the sun element We modeled in Sentaurus TCAD . Above taken Sinton Suns- Voc on the device results with was compared . To the results according to in modeling received results experiment with suitable coming was determined .

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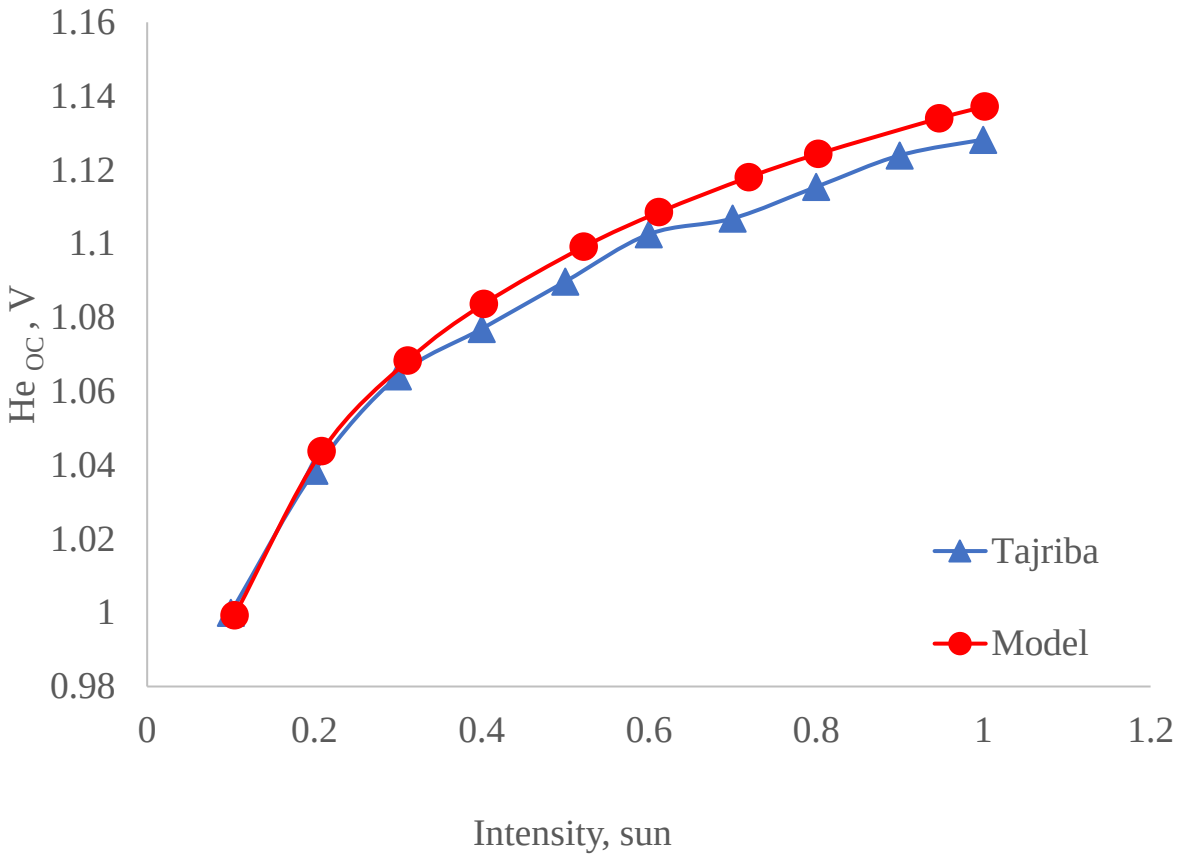

Graph 3. In the experiment and modeling through defined behavior voltage light intensity dependence Summary by doing the sun of the elements photoelectric parameters light intensity dependence positivity we say can. So , the sun elements useful the work coefficient increase for the light concentrate using the method to the goal according to.

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