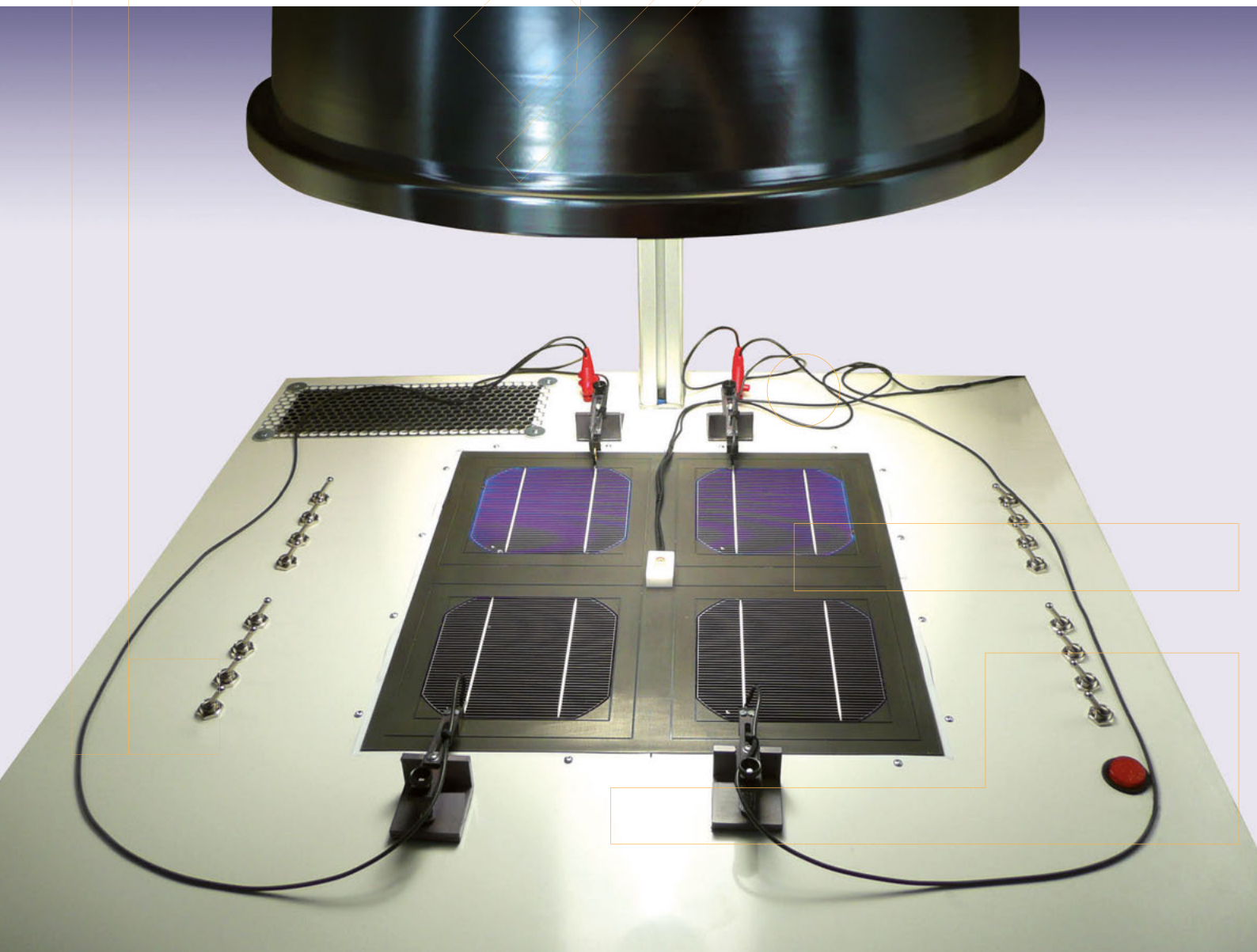


DEGRATEST LABTOOL

Determination of LID effects in solar cells



DEGRATEST LABTOOL

The ISC Konstanz developed a testing device in order to determine the light induced degradation (LID) of silicon solar cells. This test stand is now available at PSE AG.

LID of silicon solar cells reduces the minority carrier lifetime and therefore V_{oc} and I_{sc} on solar cell level. Due to losses in V_{oc} and I_{sc} cell efficiency can be decreased significantly. Therefore investigations of the degradation behavior are quite important to characterize given cells in industry or for research departments.

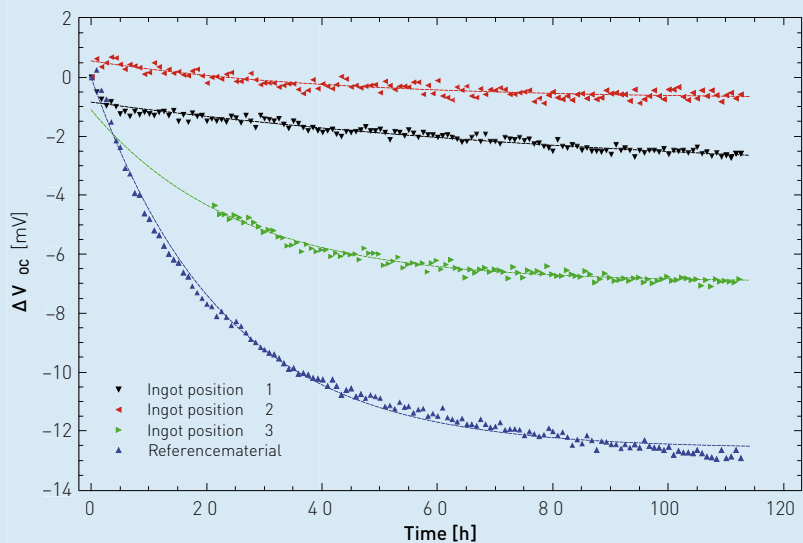
The laboratory device is built in order to perform research regarding LID on silicon solar cells and silicon wafers also including annealing and regeneration processes. It can be used to perform recipe controlled experiments from simple degradation and annealing steps up to high complexity experiments with up to four solar cells in one run.

The test stand is designed to:

- give cell producers the possibility to check the quality of their product,
- give research institutes a reliable tool for the testing and the development of new solar cells,
- give module producers the possibility to check the quality of the cells they use.

Different degradation
of cells determined with
Degratest Labtool.

*The software informs the
user automatically via email
when the tests are completed.*



Test stand

The test stand is designed to determine the LID effects on up to four cells in parallel with a maximum size of to 160 x 160 mm².

The electrical contact pins for the in situ V_{oc} measurement are realized with variable magnetic pin-holders which can be placed in every desired position matching to the actual experiment. The heating of the test area is realized via a high precision temperature controller and can be adjusted from 10°C to 220°C. A metal halide lamp which produces artificial light close to the suns spectrum is used for the illumination of the test area.

Centralized control system

All controls of the test stand are performed in a graphical user interface (GUI). Experiments can be predefined in schedules and are afterwards automatically performed by the program. The following parameters are adjustable:

- intensity of the light
- temperature of the objects
- correction factors

This functionality enables the realization of complex experiments. An implemented notification function informs the operator about status changes, errors and after completion of all sections via e-mail. All data containing time, date, original voltage measurements and also temperature corrected voltage data are saved as tab separated text file, which can be easily opened in Excel, Origin, Matlab or other applications for data evaluation.

A V_{oc} slope saturation detection for automatized experiment process flow is also implemented like in situ data viewing, data review for finished experiments and manual device controls. All settings can be adapted by the operator in a password protected administration area.

Technical specifications

Simultaneous testing capacity of the cells	4
Maximum test size of the cells	160 x 160 mm ²
Temperature range for the testing of the cells	10°C – 220°C
Spectral quality of the lamp	Class B
Maximum irradiance in test area	1000 Wm ⁻²

**The Degretest Labtool is available at PSE AG in Freiburg.
For further information please contact us.**



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