

# Non-permanent contacting for the characterization and classification of busbarless solar cells

## Application area

Busbarless solar cells promise to deliver higher efficiency than solar cells in which the current is transported via wide collecting conductors (busbars) due to reduced recombination, reduced shadowing and reduced series resistance.

The invention described here makes it possible to determine the electric properties of busbarless solar cells and record the correct current-voltage characteristics (I-V characteristics). The inventive device also enables classification of such busbarless solar cells on an industrial scale.

## State of the art

Previously known techniques for characterizing the electrical properties of solar cells relate to solar cells with busbars. They cannot be applied to busbarless solar cells because each contact finger must be contacted repeatedly over reversibly releasable connections in order to be able to measure I-V characteristics accurately. This can require 1,000 or more contact points under certain circumstances - and this without shading the cell and thereby distorting the results.

## Innovation

Scientists at the University of Konstanz have developed a measuring device for non-permanent contacting of busbarless solar cells that allows for precise and direct characterization of electrical properties.

Thin conductors are located parallel to one another in depressions on elastic filler e.g. silicone on a rigid carrier plate made of glass or transparent plastic. The filler material cushions the conductors so that production-related differences in height in the solar cell can be compensated for. The solar cell to be tested is also affixed to a retaining plate using light vacuum. The substrate plate built into the frame is applied to the mounting plate in such a way that the conductors of the support plate are perpendicular to the contact fingers of the solar cell and contact them. It is pressed onto the solar cell by its own weight and negative pressure. Current and voltage measuring devices can then be connected to the contacts of the conductors located in the frame.

All materials can be selected so that the shading by the measuring device is adjusted to suit the operating conditions of the solar cell so that a realistic I-V characteristic results.

## Your benefits at a glance

- ✓ Classification of busbarless solar cells
- ✓ Direct determination of electrical parameters during measurement without correction factors
- ✓ Current flow via multiple contact fingers
- ✓ Homogenization of current flow through optional resistors to compensate for locally uneven contacts
- ✓ Can be easily integrated into existing industrial processes and devices

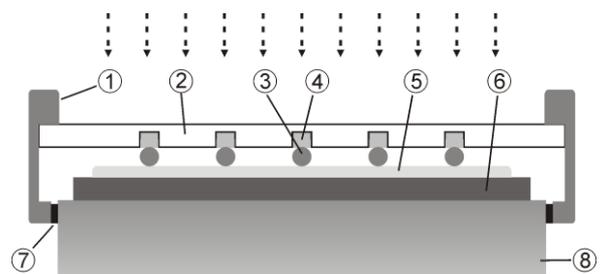


Figure 1: Diagram of the measurement device:

(1) Frame, (2) Transparent plate, (3) Wires, (4) Trenches filled with silicone, (5) Transverse finger contacts, (6) Solar cell, (7) Seal, (8) Measuring table.

## Technology transfer

Technologie-Lizenz-Büro GmbH is responsible for the exploitation of this technology and offers customers the opportunity to obtain licenses.

## Patent portfolio

This invention was registered for a patent in Germany in 2012 (DE 10 2012 017 564). Patents granted in China (CN 2013 800 577 64.8) and Switzerland (CH 0290/15).

## Contact

Dr.-Ing. Hubert Siller

[hsiller@tlb.de](mailto:hsiller@tlb.de)

Technologie-Lizenz-Büro (TLB)

der Baden-Württembergischen Hochschulen GmbH

Ettlinger Straße 25, 76137 Karlsruhe, Germany

Phone: 0721 79004-0, Fax 0721 79004-79

[www.tlb.de](http://www.tlb.de)

Reference no.: 12/067TLB