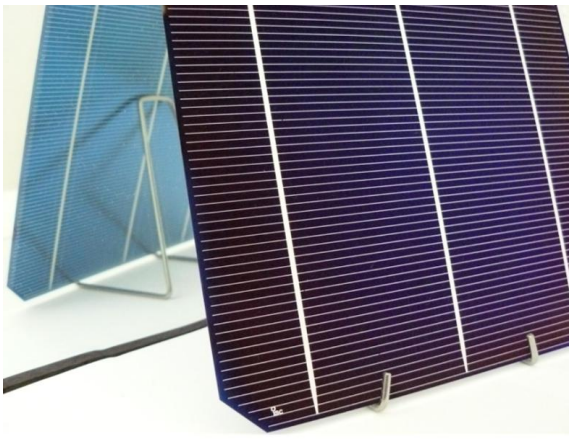
About ISC Konstanz

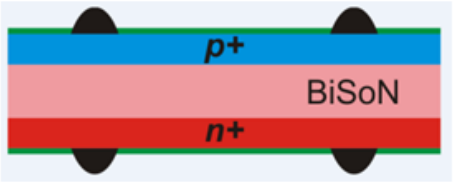
Founded in 2005, ISC Konstanz researches and develops crystalline silicon solar cells, modules and systems. The institute work closely together with leading enterprises and research institutes in this field.

Currently, the ISC Konstanz is conducting about 50 different projects on industrial and publicly funded level. ISC Konstanz employs more than 50 highly dedicated scientists from 20 nations. The researchers evaluate new, cost-efficient silicon raw materials and optimize existing production steps and machinery. Furthermore, they test new technologies for industrial solar cell production, develop innovative solar cell, module and system concepts which are transferred to the industry. The most asked technologies are bifacial concepts-BiSoN (nPERT) and ZEBRA (IBC).

https://www.pv-magazine.com/press-releases/bison-and-zebra-isc-konstanzs-bifacial-modules-displayed-at-snec-show/

To introduce these n-type technologies stronger into the market, ISC Konstanz started to organize n-type workshops from 2011 (www.nPV-workshop.com) and bifacial workshops from 2012 (www.bifiPV-workshop.com).





1. BISON TOPICS

ISC Konstanz has developed a bifacial n-PERT cell structure, which was already transferred into industry three times. However there is a research and development roadmap how to further improve this concept.

1.1 IV measurement cells without busbars (refinedPV/Jan Lossen)

There are many possible improvements – technical and commercial – if BiSoN cells are produced without busbars. The drawback is that those cells can't be measured by IV, neither in the lab nor for sorting in industrial production.

Characterization topic: development and demonstration of method.

1.2 High efficiency approach for BiSoN technology (Adani/REC/Pirmin Preis)

Development of alternative diffusion methods together with according adaption of the metal grid of the BiSoN cell and comparison of different metallization pastes for front and rear side of the cell.

1.3 PID on BiSoN cells and modules (Adani/REC/Jan Lossen)

PID might be a problem for some n-type cell concepts. While PID is long known for p-type modules this a new topic and different physical mechanism in n-type solar cells. Fundamental investigations are planned and methods to overcome the problem should be tested.

1.4 Laser Doping for BiSoN (REC/Christoph Peter)

Laser doping can be used for selective emitter approaches, because it can easily be used for structured emitters. But finding doping adequate sources is not easy. In this work, different approaches should be carried out.

1.5 Reliability and interconnection (InGrid/Andreas Halm)

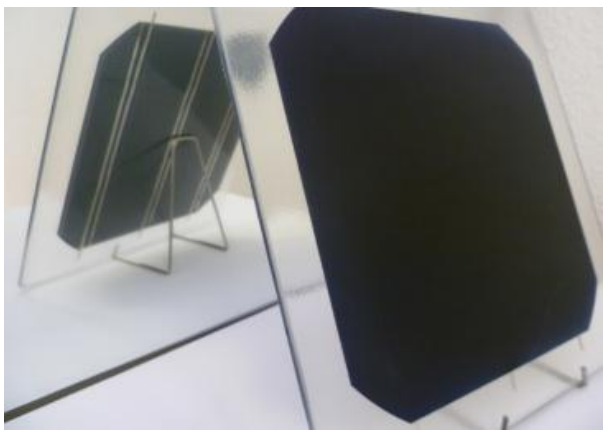
Module integration and reliability needs to be investigated for any new cell type. For the Bison technology, bifacial modules are assembled to harvest their full power potential. Different approaches like soldering and conductive adhesive gluing for ribbon attachment and glass-glass or glass-transparent backsheet architecture for the module need to be tested in respect to performance and robustness against environmental influences.

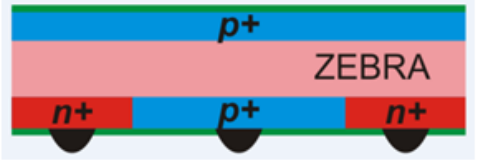
1.6 BiSoN on alternative material (Epi COMM/Giuseppe Galbiati)

n-type silicon substrates still represent high costs in n-type nPERT process. Therefore we develop BiSoN processes on epitaxial wafers from NexWafe which could result in COO reduction.

2. ZEBRA TOPICS

The other interesting cell concept is IBC concept ZEBRA. In 2017 we will most likely transfer this concept for first time.





2.1 Diffusions and break down Voltage (5ct/Giuseppe Galbiati)

Laser doping: discovering selective emitter or selective BSF for IBC process. Reverse- ZEBRA. From processing to cost analysis: where is the gain?

2.2 Cost effective IBC metallization (5ct/Giuseppe Galbiati)

Investigation of advanced metallization for IBC solar cells. Cost effective metalization for IBC technology: Al-ZEBRA, screen printing (point-contact, dash-contact)/PVD

2.3 Ribbon based Interconnection (Z+/Andreas Halm)

Welding of solder-coated Cu ribbon is the standard industrial method to reliably interconnect solar cells. For the Zebra cell this method poses new challenges since all its busbars are located on the rear side. Ribbon attachment causes unilateral mechanical stress and thus cell unwanted warpage. For effective module assembly, the methods to circumvent cell bowing need to be investigated.

3. ADDITIONAL TOPICS

3.1 MoSoN: development of alternative n-type concept (Kosmos/Valentin Mihailetchi)

3.2 Passivated Contacts: work on carrier selective metallisation (TuKaN/Jan Lossen)

3.3 Industry 4.0: modern smart cell factory (FlexFab/Rudolf Harney)