To the Media

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Zentrum für Sonnenenergie- und Wasserstoff-Forschung Baden-Württemberg (ZSW)

Location: Meitnerstr. 1
70563 Stuttgart
Germany

Helmholtz Zentrum Berlin (HZB)

Location: Hahn-Meitner-Platz 1
14109 Berlin
Germany

Thin-film PV is key technology to drive global energy transition

The German research institutes ZSW and HZB see huge potential in CIGS for both climate and business

CIGS thin-film PV is set to become a key pillar of the global transition towards renewable energy sources. With its high performance, low costs, small carbon footprint, and visual appearance, CIGS has some considerable advantages against other technologies, especially when it comes to highly demanding applications like buildings and vehicles. A new whitepaper compiled by ZSW and HZB describes in detail the benefits of CIGS and the huge business opportunities arising from it.

CIGS is an absorber based on the chemical elements copper, indium, gallium, and selenium. Its properties are remarkable: It exhibits high conversion efficiencies, outperforming all other thin-film PV technologies with a cell efficiency of 23.35% on the cell and 17.5% on the module level. The production costs of CIGS are highly competitive in comparison to other PV technologies with regard to capital and, in particular, to operational expenditure. And its visual appearance is far superior both in its all black standard form and in its coloured or patterned versions.

These unique properties allow CIGS to be deployed in a wide range of solar products for which other technologies would be inappropriate. In addition to rooftop or large-scale applications, where it is competitive with other PV technologies, it is particularly suitable for integration into buildings, e.g. as facade, window, or roofing material. When used on flexible substrates like steel or polyimide, lightweight CIGS modules can also be easily applied to the roof of vehicles, e.g. electric cars, buses, trucks, boats, or trains.

In terms of environmental impact, CIGS provides a role model for other technologies as well. Its carbon footprint is only 12 to 20 g CO_2 equivalent per kilowatt hour which is substantially lower than that of crystalline silicon (50 to 60 g) and, of course, way lower than that of fossil-based technologies (700 to 1,000 g). Its energy payback time is less than 12 months which is also significantly lower than with crystalline silicon (12 to 18 months). Furthermore, CIGS can be recycled with low impact and in high quality and is set to fulfil the upcoming end-of-life standards in the European Union and other jurisdictions.

With all these properties, CIGS is ideally positioned to meet the needs of future energy systems. Therefore, it presents a highly attractive business case for investors. With CIGS, it is possible to build fully integrated production facilities with high levels of automation. And there is

still a compelling cost-reduction potential, especially with regard to operational expenditures. In terms of technology development, Europe has the ideal ecosystem due to the established network of advanced production equipment suppliers and the unparalleled network of CIGS research institutes and endeavours. In order to take advantage of this unique ecosystem and to realise the huge potential of CIGS and other PV technologies for both climate and business, we need a favourable policy framework. The expansion targets for PV at German and European levels need to be increased and regulatory barriers need to be removed, in order to enable PV, in particular thin-film PV, to drive the global energy transition.

Download the whitepaper here:
https://cigs-pv.net/download/

About ZSW

The Zentrum für Sonnenenergie- und Wasserstoff-Forschung Baden-Württemberg (Centre for Solar Energy and Hydrogen Research Baden-Württemberg, ZSW) is one of the leading institutes for applied research in the areas of photovoltaics, renewable fuels, battery technology, fuel cells and energy system analysis. There are currently around 260 scientists, engineers and technicians employed at ZSW's three locations in Stuttgart, Ulm and Widderstall. In addition, there are 90 research and student assistants.

About HZB

At the Helmholtz Zentrum Berlin für Materialen und Energie (HZB), we conduct research on complex material systems that help to accelerate the energy transition. The HZB research portfolio includes solar cells, solar fuels, thermoelectrics and materials for new energy-efficient information technologies (spintronics). The research on these energy materials is closely linked to the operation and further development of the photon source BESSY II. An important research approach is thin-film technologies. 1150 employees work at HZB.

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Germany

Media contacts

Claudia Brusdeylins
Zentrum für Sonnenenergie- und
Wasserstoff-Forschung Baden-Württemberg (ZSW)
Meitnerstr. 1, 70563 Stuttgart, Germany
Phone +49 (0)711 7870-278, claudia.brusdeylins@zsw-bw.de
www.zsw-bw.de

Dr. Ina Helms
Helmholtz Zentrum Berlin (HZB)
Hahn-Meitner-Platz 1, 14109 Berlin, Germany
Phone +49 (0)30 8062-42034, ina.helms@helmholtz-berlin.de
www.helmholtz-berlin.de

Expert contacts

Prof. Dr.-Ing. Michael Powalla
Zentrum für Sonnenenergie- und
Wasserstoff-Forschung Baden-Württemberg (ZSW)
Meitnerstr. 1, 70563 Stuttgart, Germany
Phone +49 (0)711 7870-263, michael.powalla@zsw-bw.de
www.zsw-bw.de

Prof. Dr. Rutger Schlatmann
Helmholtz Zentrum Berlin (HZB)
Hahn-Meitner-Platz 1, 14109 Berlin, Germany
Phone +49 (0)30 8062-15680, rutger.schlatmann@helmholtz-berlin.de
www.helmholtz-berlin.de

Façade with integrated CIGS thin-film solar modules at the ZSW institute building in Stuttgart, Germany (Photo: ZSW)