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Solar Research: On the Hunt for the Super-cell

European Sharc25 project aims to achieve 25 percent efficiency with thin-film solar cells

A new European research project that goes by the name Sharc25 is setting out to make an extremely efficient thin-film solar cell for the next generation of more cost-effective solar modules. Its objective is to achieve up to 25 percent efficiency in thin-film solar cells made by the coevaporation of copper indium gallium (di)selenide, or CIGS for short. That kind of performance would top the previous best mark by just over three percentage points. The Centre for Solar Energy and Hydrogen Research Baden-Württemberg (ZSW) is coordinating the project. Eleven research partners from eight countries are on board. Launched in May, the project will run for 3.5 years and get €4.6 million in EU funding sourced from the research framework program Horizon 2020. The Swiss government is providing another €1.6 million. The results of this project could well give the European solar industry a boost.

ZSW's partners in this endeavor are the EMPA (Swiss Federal Laboratories for Materials Science and Technology), the universities of Luxembourg (LU), Rouen (F), Parma (I) and Aalto (FIN), the IMEC (Interuniversitair Micro-Elektronica Centrum VZW in B), the HZB (Helmholtz-Zentrum Berlin für Materialien und Energie in D), the International Iberian Nanotechnology Laboratory INL (P), Flisom AG (CH), and Manz CIGS Technology GmbH (D). The idea behind this EU project is to pool these eleven organizations' multidisciplinary skills in a bid to develop better cells.

A new opportunity for European cell manufacturers

The performance of thin-film solar cells based on chalcopyrite has improved markedly in recent years. Able to achieve 20.4 percent efficiency, CIGS solar cells on plastic foil are almost on par with multicrystalline solar cells. CIGS cells on glass topped that mark for the first time in 2013 and increased their lead by 1.3 percentage points to 21.7 percent in 2014. These two world records were achieved by two partners of the Sharc25 project: EMPA holds the record for the foil substrate and ZSW for glass.

Sharc25, an acronym for 'super high efficiency Cu(In, Ga)Se₂ thin-film solar cells approaching 25%', aims to raise the bar even higher. The five research institutes, four universities and two companies are pursuing three strategies to achieve this goal: Improve the absorber material,

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harness the power of new designs for more efficient surfaces and interfaces, and optimize light management to raise the efficiency threshold another few notches. An increase of about three percentage points to 25 percent efficiency would be quite the leap in performance.

An improvement on this scale would challenge the dominance of multicrystalline solar cells from Asia, and the newfound competitive edge could give the European thin-film PV industry a decisive boost. This project's mission also calls for the scientists to devise a strategy for translating research results into industrial applications. If the solar industry succeeds in applying the technology, the cost of manufacturing solar modules in Europe could drop below 35 Eurocents per watt peak and the cost of installed PV systems to below 60 Eurocents per watt peak. Further savings could be achieved by ramping up the new technology for mass production. This would drive down investment costs, for example, to less than 75 Eurocents per watt peak for solar CIGS module factories with more than 100 MW manufacturing capacity.



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 641004.



The Centre for Solar Energy and Hydrogen Research Baden-Württemberg (ZSW) is one of the leading institutes for applied research in the fields of photovoltaic energy, renewable fuels, battery technology, fuel cells and energy systems analysis. The three ZSW sites at Stuttgart, Ulm and Widderstall are currently staffed with around 230 scientists, engineers and technicians supported by 70 research and student assistants.

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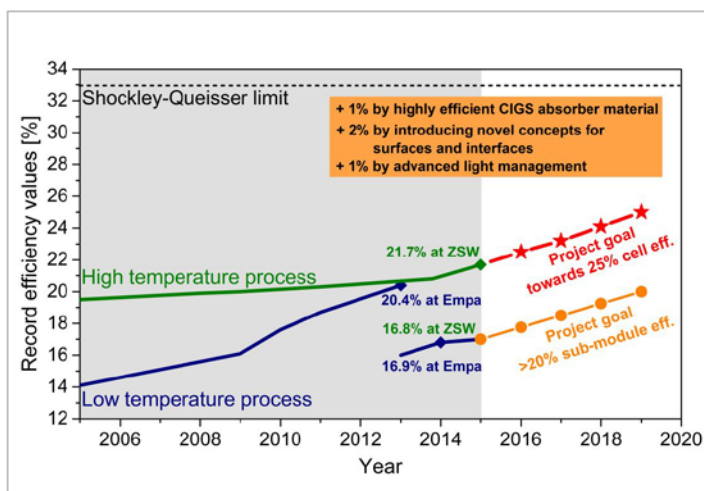


Researching CIGS thin-film solar cells

Photo: ZSW

Images and a fact sheet about ZSW are available from:

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The goals of the European research project Sharc25.

Image: Sharc25