

All Back-Contacted for all

Publieke samenvatting / Public summary

Aanleiding

In the PV market, there is a growing demand for modules that not only demonstrate high powers but also nice aesthetics. The 'all black' modules containing IBC cells are well positioned to meet this need, but these are expensive, "high-end" products that currently serve a niche market with less than 1% share. After IBC-leader Sunpower, now also Sharp, LG, AUO, Jolywood have introduced showcase IBC panels. For example, Sunpower's X21 panel, with world's highest W/m² containing solar cells with 25% efficiency, is 75% more expensive than 'regular' panels from Tier-1 manufacturers. These high prices are due to more expensive n-type silicon, expensive metallization and complex processing of the solar cells. Clearly a huge gap between mainstream products and niche products can be discerned. Another observation in the market is the giant rise of PERC technology that is believed to be the dominant technology in five years from now. In the slipstream of the industrial implementation of PERC, the bifacial variant PERC+, with partial Aluminum metallization, is emerging and is adopted by players such as JA Solar, Longi, Solarworld, TRINA and NSP.

Doelstelling

With the PERC-like p-type IBC we introduce a solar cell that is less expensive than the existing n-type IBC solar cells. Our goal is to obtain a good balance between cost and performance, enabling the corresponding PV panels to bridge the gap between the "mainstream" and the "niche" market. As a result, we expect that p-IBC based aesthetic panels will be much less costly and therefore can get a

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serious market share. The p-IBC solar cell should outperform the PERC(+) cell in terms of efficiency, but at minimal added costs

Korte omschrijving

Work package 1 (WP1) focuses on the recombination minimization of the relevant surface areas of the IBC cell: The top surface, the rear base area and the rear emitter area. Tempress & ECN will establish an industrial n-poly emitter and Levitech & ECN will assess double-sided Al₂O₃ deposition. Unmetallized halffabs will be processed and the project partners will select the most promising flows. WP2 focuses on the device architecture. Special attention is directed to the reduction of the j₀-value of the Al-Si alloyed contact that will be the limiting factor for the Voc. Experimental test vehicles, in which Al paste and geometries are varied, will be processed and assessed to find the optimal conditions. WP3 combines the results of the previous WPs and, with the assistance of simulations, the optimum architecture will be determined and the corresponding solar cell will be manufactured. WP4 focuses on cost reduction by enhanced throughput and reduced maintenance time of equipment as well as to double-sided Al₂O₃ deposition with the Levitrack.

Resultaat

The result of this project is the realization of a low-cost, industrial, PERC-like, p-type IBC solar cell with 23% efficiency. Further cost reductions are realized by reduced maintenance times and enhanced through-put of equipment of partners Levitech and Tempress. The resulting solar cell will be more cost effective compared to existing n-type IBC cells and is able to bridge the gap between the “mainstream” and “high-end” products in the market, also paving the way for affordable aesthetic panels.

Voor meer informatie over de TSE / Energie-Innovatie regelingen die RVO aanbiedt, ga naar www.rvo.nl/tse.