

Passivated contacts in n-PASHA solar cells

Publieke samenvatting / Public summary

Aanleiding

One route to further reduce the levelized cost of electricity from Si photovoltaics is to increase the cell and module efficiency. The high efficiency n-PASHA (bifacial n-type) cell process has been developed by ECN and Tempres Systems (both from The Netherlands), and other partners. N-PASHA was brought to pilot production in a co-development project by Yingli Green Energy, China, ECN, and Tempres, in 2009/2010, and is in production by Yingli. In 2014 a second generation of n-PASHA was installed and ramped-up at Mission Solar Energy in the USA. In the meantime a 3rd generation of n-PASHA is in development and also MWT variants of n-PASHA are in pilot line production. All these generations of n-PASHA have one common denominator; production worthiness and cost effectiveness are essential for success. Over the past several years, a steady cell efficiency increase has been realized for the n-PASHA process. To continue this trend, efficiency-limiting recombination at the solar cell contacts has to be reduced.

Doelstelling

The goal of this project is to develop industrial polysilicon passivated contact technology for solar cell processing, and an industrial n-type silicon cell manufacturing process with a rear polysilicon passivated contact. The passivated contact is to significantly increase conversion efficiency (target of this project is 22% cell efficiency), and the integral cell process should result in reduced cost, compared to the current n-PASHA cell process. In this project the new processes incorporating a

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passivated contact in n-PASHA will be developed and tested for industrial applicability, including module production and reliability testing.

Korte omschrijving

The project focuses on mass production and tools. Methods for low-cost and reliable creation of the passivated contact will be developed. This involves work on the processes for the dielectric layer, polysilicon layer, and doping. A process flow that integrates this passivated contact on the rear of an n-PASHA cell with conventional front diffusion and front contacts will be developed. This involves adaptation of the integral cell process, including features for light management, and metallization. The project goals include demonstration of a cell efficiency of 22% on a full size industry standard wafer. The reliability of the cells after module integration will be tested in accelerated degradation tests. The partners are Tempres, Yingli Green Energy, ECN and University of Twente (UT). Tempres develops processes and tools related to the passivated contact. ECN will develop, characterize and model the integral cell and module technologies. Yingli contributes with processing in R&D lines and investigate the possibilities for incorporation of the technology in mass production. UT brings in expertise on polysilicon and contact schemes, as well as characterization.

Resultaat

Both Tempres and ECN receive interest from multiple industry parties for the n-type cell technology and Tempres particularly receives interest for the polysilicon passivated contact technology. The results from this project will strengthen the sales position of Tempres on multiple fronts (for n-type cell technology customers as well as polysilicon and tube furnace customers). This development will in general support the Dutch industry in maintaining and improving its current and future competitive position as equipment and technology suppliers for the PV industry.

De data in deze applicatie is afkomstig van de Rijksdienst voor Ondernemend Nederland (RVO) en wordt in samenwerking met de Topsector Energie ontsloten.

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