

Back End Advanced Serial Interconnection Technology for CIGS Modules

Publieke samenvatting / Public summary

Aanleiding

Thin Film CIGS modules that are currently produced in industry use interconnection of individual cells using repeated deposition and in-line scribing processes. This approach results in the need for intermediate cleaning steps, alignment and due to this a relatively low production yield. Next to these production aspects, it is also very cost intensive and production disruptive to enable customized free-form production of modules. By separation and consecutive serial interconnection of cells in a so-called back-end approach for interconnection, the cleaning and alignment steps in production can be minimized or even eliminated. In this approach first the full solar cell stack is deposited, after which modules are produced by using laser scribing and inkjet printing to create isolating and conductive pathways. This module technology also has the potential to enable more efficient modules by avoiding the P1 shunt that is typical for CIGS. Research on using a back-end approach for serial interconnection for CIGS in the past years has shown that laser processing as well as inkjet printing depends heavily on the specific CIGS stack and production method used.

Doelstelling

The aim of this project is to use the knowledge obtained and infrastructure that was developed in previous projects to make the module concept of back-end interconnection for CIGS ready for market. The developments so far have shown promising results, however cannot compete yet with the

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industrial state-of-the-art. Further development is necessary to fully unlock the potential of back-end interconnection in CIGS. The main advantages of back-end application of interconnects in CIGS modules are the potential to lower cost of PV by increasing yield in production as well as the possibility to make modules that can be customized without changing an entire production line. The digital nature of the back-end process using laser scribing and inkjet printing for the realisation of interconnections enables easy access to free-form module manufacturing. In this way the project contributes to the goals of the TKI Urban Energy to lower cost of PV by increasing producing yield, as well as increasing application area's by enabling size and form-freedom of module production.

Korte omschrijving

The activities that will be performed by the partners in this project are: supply of industrial CIGS material by AVANCIS, deposition of specific CIGS samples by TNO, supply and support of inkjet printers and printing of inks by Meyer Burger, and back-end interconnection research by Solliance. The processes that will be investigated in the back-end interconnection technology can be divided in: 1. investigation of laser scribing on CIGS and the isolating materials (ECN and TNO) 2. inkjet printing of isolating tracks and conductive bodies (ECN and TNO) 3. device architecture and module concept development (ECN) By looking into the interaction between back-end processing (laser scribing and inkjet printing) and front-end manufacturing (layout and production method) of the CIGS stack a more detailed understanding of the mechanisms will be obtained. This knowledge will be used to optimize the processing conditions, which will enable maximum output of the modules. The process developments will be directed towards smaller (<200µm dead zone) and more efficient (low series resistance) interconnections.

Resultaat

The results of the process optimization with smaller interconnection strategy and improved processing include: • lower cost potential • free-form module

concepts • shorter time to market for this technology The main innovation of this project is the reduction in size of the dead zone of the interconnect. This involves combining processes on small scales and with that increased interaction between these processes.

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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