

2-sided POly-Si passivated contacts towards 24% bifacial Plated SI cells

Publieke samenvatting / Public summary

Aanleiding

In 2017, a worldwide capacity of 100 GWp of PV was installed, a value which, even with the recent policy change in China, is expected to increase in the years to come. This is more than a prediction but a requirement to meet the renewable energy targets set by policy makers, and to decarbonize future electricity generation. PV has an increasingly important role to play but needs to drive down the Levelized Cost of Electricity (LCOE) further towards the level of 1 €ct/kWh. The LCOE of PV systems is increasingly becoming more dependent on cell efficiency. Recent advances in p-PERC have driven cell efficiencies towards 22%. This will continue to 23% by 2020. However, the path beyond 23% is not very clear using p-type wafers, and many expect that n-PERT is the only viable candidate. In the past 2 years more than 4 large n-PERT factories have been started with total capacity exceeding 4GWp annually with production cell efficiencies of 20-22%, but widescale adoption is still not taking up because of the relative high cost of n-PERT. This project aims to show the viability of n-PERT at 24% applying 2-side passivating contacts with 2-side plated nickel/silver metallization.

Doelstelling

Since the Achilles heel of PERC technology is contact recombination, a passivating contact technology can give the next boost in efficiency. The tunnel oxide/poly-Si contact is the most advanced and mature passivating contact technology but, while better than PERC cells in this

Projectinformatie / Project information

Projectnummer / Project number
TEUE118003

Subsidiebedrag / Grant amount
€ 969.449,00

Algemene informatie / General information

Penvoerder / Secretariat
Tempres Systems B.V.

Volg Topsector Energie op X / Follow Topsector Energie on X

@TSEnergie

regard, is still limited when combined with traditional screen-printing metallization. Therefore, this project aims at combining poly-Si passivating contacts with next-generation plating technology. Furthermore, the switch to n-type bifacial technology brings several advantages (stable efficiency, bifacial gain, improved reliability with glass/glass module) that can positively impact the LCOE. Final goal of the project is the development of 23-24% plated bifacial n-type cells with poly-Si passivating contacts on both sides. Through the additional power contribution from the rear of the device, effective efficiencies will be 15-20% (rel.) higher depending on the bi-faciality and the installation conditions. Furthermore, this project defines a clear business case to establish a large-scale n-PERT manufacturing cell and module facility, where cost and environmental concerns are addressed.

Korte omschrijving

In cooperation with Tempres, whose main task will focus on the development of a 2-side poly-Si deposition technology, imec will work on the development and integration of the laser patterning and co-plating process, where n-type and p-type poly can be simultaneously metallized when incorporated in bifacial n-type cells. The close collaboration on these 2 areas of expertise is a technology enabler to bring the next generation of Si solar cells to the market. The next step towards the industrialization of the technology will be the main focus of EAM and RHDHV. The contribution of this technology to decrease the LCOE compared to the standard c-Si technologies will be addressed by means of module reliability testing and energy yield analysis for large bi-facial PV-park installations in collaboration with EAM. The plating technology Cost-of-Ownership (CoO) calculations including the wastewater treatment of the process will be worked out with the expertise of RHDHV who will translate this data to actual factory design, taking into account utilities and logistics. This will result in a blueprint for the production line by RHDHV including CoO and capital investment analysis.

Resultaat

This consortium will create the cheapest possible high efficiency cell technology, which is an enabler for the lowest LCOE PV parks. The main cost contributors yielding the cost improvement for this technology are the both side polysilicon deposition and both side plating technology, thereby removing an expensive ALD Al₂O₃ process step and the need for expensive silver paste. The project covers the development of the 2-side (n-type and p-type) poly-Si deposition process technology and equipment, the optimization of the patterning and metallization by plating of poly-Si contacts, the poly-Si integration in bifacial n-type PERT solar cells with efficiencies in the range of 23-24%, 60-cell module fabrication/testing, reliability testing of mini-modules and finally energy yield analysis and CoO calculations to validate the contribution of this technology to reduce the LCOE to very low levels. Further this project will yield the factory lay-out and capex investment for establishing a future factory, which will be the next industrialization step.

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

Voor meer informatie over de Topsector Energie, ga naar www.topsectorenergie.nl.

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