

AAA

Publieke samenvatting / Public summary

Aanleiding

Atomic-layer-deposited (ALD) Al₂O₃ is well-known as outstanding surface passivation material for crystalline silicon (c-Si) solar cells and is used as such in PERC cells in industry. Nevertheless, the photovoltaic (PV) community is starting to progress towards more efficient c-Si solar cell architectures, which comprise passivating contacts, such as polycrystalline silicon (poly-Si). Preliminary results have pointed out a new application for Al₂O₃ in this emerging field: as (sacrificial) capping layer, ALD Al₂O₃ greatly improves passivating contact properties.

Doelstelling

The goal of this project is to pave the way for application of ALD Al₂O₃ as sacrificial capping layers in the c-Si PV industry, as this is of high importance to Dutch ALD equipment manufacturers. To achieve this, this project aims at a clear fundamental understanding as well as the in depth investigation of the benefits of ALD Al₂O₃ capping layers for several emerging passivating contact schemes.

Korte omschrijving

The TU/e and TUD will study the fundamental working principles of capping by ALD Al₂O₃, such as the hydrogenation of passivating contacts and their interface with c-Si. Advanced analysis procedures and techniques such as isotope labeling, secondary ion mass spectroscopy and effusion experiments will be used to this end. Moreover, the effects of hydrogenation by ALD Al₂O₃ on the passivating contact properties will be monitored for the most

Projectinformatie / Project information

Projectnummer / Project number

TKITOE1409104

Subsidiebedrag / Grant amount

€ 114.512,00

Algemene informatie / General information

Penvoerder / Secretariat

TU Eindhoven

Publicaties en materialen / Publications and attachments

- 18.11.2019

Eindrapport AAA 2018

(TKITOE1409104)

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relevant passivating contact materials for upcoming c-Si solar cells, most prominently n- and p-type poly-Si. Together with ECN and Levitech the potential for ALD Al₂O₃ as capping layer in PV industry will be mapped, e.g., by investigating which solar cell architectures can benefit (most) from the hydrogenation.

Resultaat

The AAA project will clearly demonstrate the potential and fundamental working principles of ALD Al₂O₃ as hydrogenation layer for passivating contact materials. The results will be disseminated in peer-reviewed journal articles and at PV conferences and will successively serve as showcase for the introduction of (sacrificial) ALD Al₂O₃ capping layers in PV industry. This new application for ALD Al₂O₃ will further strengthen the market position of Dutch ALD equipment manufacturers. Moreover, the project will enable the improvement of the quality of passivating contacts, and in this way will contribute to the increase of the energy yield of high-efficiency commercial c-Si PV modules.

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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