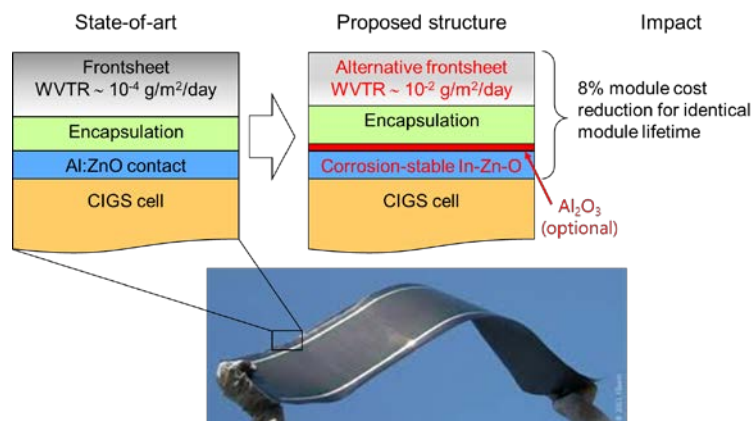


FrontCIGS / 428: Re-Designing Front Window in Flexible CIGS Modules for Cost-Effective Moisture Protection

Project duration: from 01.01.2017 to 31.10.2019
Report submitted: 10.12.2019

Publishable Summary

Flexible PV modules are attractive for installation on buildings (BIPV and BAPV), transport and portable applications because of their lightweight, low energy input for manufacturing, as well as reduced installation costs thanks to easy integration with other construction elements. The project FrontCIGS aimed to improve the cost-competiveness and extend the lifetime of flexible PV modules based on Cu(InGa)Se₂ (CIGS) technology by employing a corrosion-stable electrical contact allowing a less expensive frontsheet.



A corrosion-stable transparent conducting oxide (TCO) based on indium zinc oxide (IZO) was developed and was shown to be more corrosion stable than the reference AZO contact during accelerated lifetime testing. An additional Al₂O₃ coating deposited by spatial atomic-layer deposition (ALD) was shown to further increase the corrosion stability. Both TCOs show identical power conversion at the laboratory cell level, but the power conversion efficiency of industrial-size modules with IZO was ca. 0.5 abs.% lower as compared to the reference AZO modules, which could be attributed to a non-optimized laser scribing and TCO conductivity.

Several alternative frontsheets with a water vapour transport ratio (WVTR) in the 10⁻² g/m²/day were tested for both IZO and AZO-terminated modules. Whereas AZO-based modules degrade fast with all alternative frontsheets, the IZO modules with at least one alternative frontsheet exhibited a lifetime comparable to the reference frontsheet. Assuming the same module efficiency for both AZO and IZO, and a 30% reduction in price for the alternative frontsheet, a total module cost reduction of 8% is predicted. The alternative frontsheet can additionally include a fluopolymer coating with “easy-to-clean” properties desirable for BIPV and portable applications.

Project consortium

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Participating countries and financing:

Country	Number of organisations involved	Project costs in EUR	Public funding in EUR
Switzerland	2	761'764	340'589
The Netherlands	2	711'250	482'000
Austria	1	43'000	0
<i>Total</i>	5	1'516'014	822'589

Funding agencies involved and contracts

Funding Agency	Contract N° and Title
Commission for Technology and Innovation (CTI)	26231.1 PFNM-NM “Re-designing front window in flexible CIGS modules for cost-effective moisture protection”
Rijksdienst voor Ondernemend Nederland (RVO)	TEUE116158 “Re-designing front window in flexible CIGS modules for cost-effective moisture protection”