



Thin film solar cells integrated in façade elements

Week van de Oppervlakte Technologie – 14/11/2018

26 November, 2018



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- Coatings in TF solar cell manufacturing
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Solliance is...



ECN



innovation
for life



Holst Centre
Open Innovation by imec and TNO



universiteit
hasselt



Delft
University of
Technology



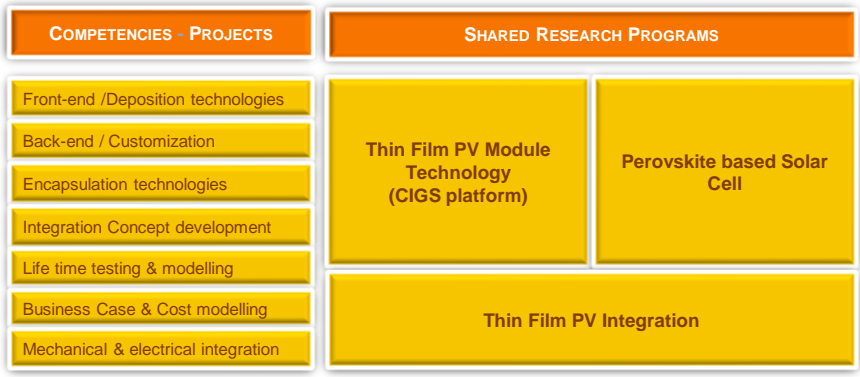
Technische Universiteit
Eindhoven
University of Technology

UNIVERSITY
OF TWENTE.

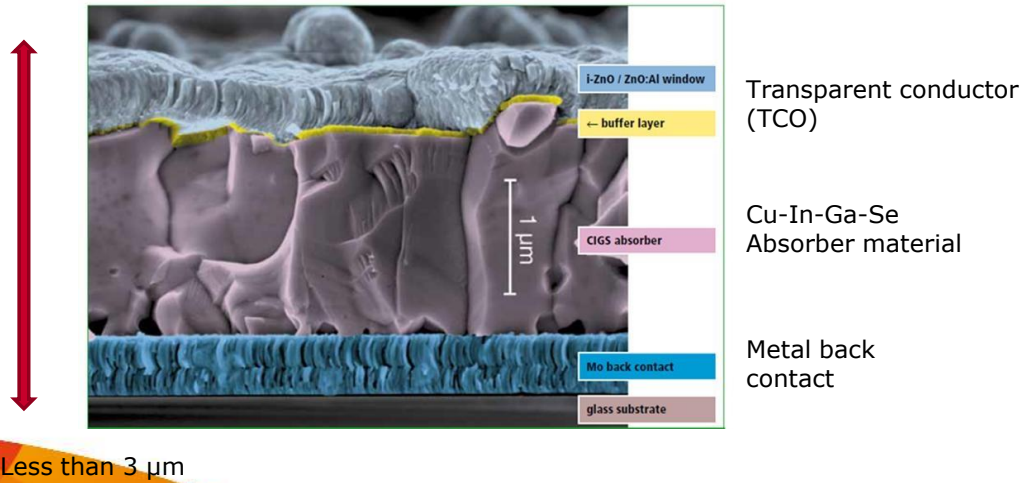
SOLLIANCE IS A PARTNERSHIP OF EUROPEAN RESEARCH ORGANIZATIONS AND INTERNATIONAL INDUSTRIAL PARTNERS,
WORKING IN THIN FILM PHOTOVOLTAIC SOLAR ENERGY



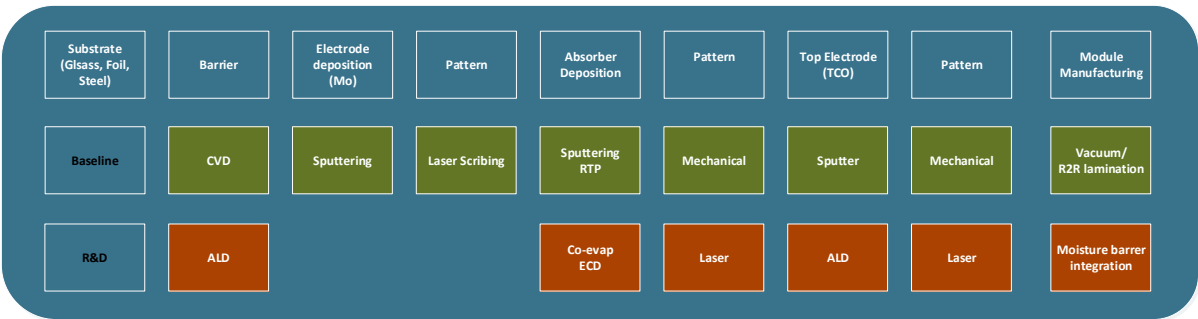
Solliance program structure



Copper Indium Gallium Selenide (CIGS)



TF- PV is all about coating

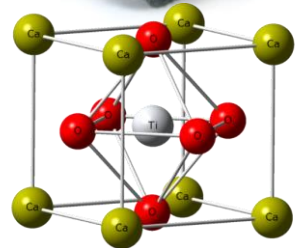
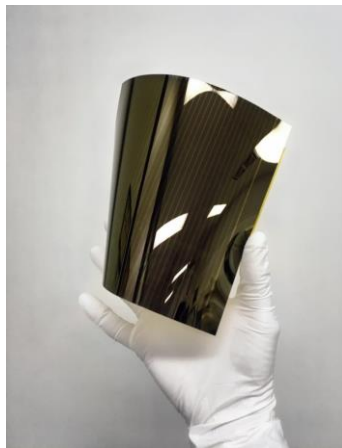




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Perovskites: printable solar cells

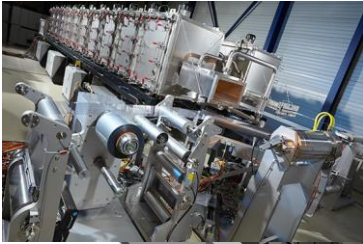


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Towards industrial processing


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Why Integration of PV ?

- **Do things that are not possible today**
- **Reduction of assembly related labor and material costs**
- **Opportunity for expanding portfolio/adding product value**
- **Opportunity for new business approach; selling/leasing energy instead of selling products**

Indien voor 2050 de gehele Nederlandse gebouwde omgeving getransformeerd is tot energie neutraal, dan houdt dit een renovatie opgave van zo'n 200.000 woningen per jaar in. Om tot een klimaatneutrale gebouwde omgeving te komen moet een belangrijk deel tot NoM of beter gerenoveerd worden en dus gebruik maken van een geïntegreerde dakoplossing.

"Stroomversnelling"

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Connecting 2 separate worlds

■ Building Industry

- High mix of product variety
- Low degree of industrialization/automation
- Low degree of integration in products



■ Solar industry

- Low mix of product variety
- High degree of industrialization/automation
- Low degree of integration in products



Vision

- A significant increase in use of solar energy can be realized by integrating PV functionality in the world as we know it (buildings, infra, transport vehicles).
- This is not possible with the nowadays-limited solar industry's standardized products
- PV is a functionality, not a product

Flexible PV semi-fabricates are the key towards esthetical and automated product integration





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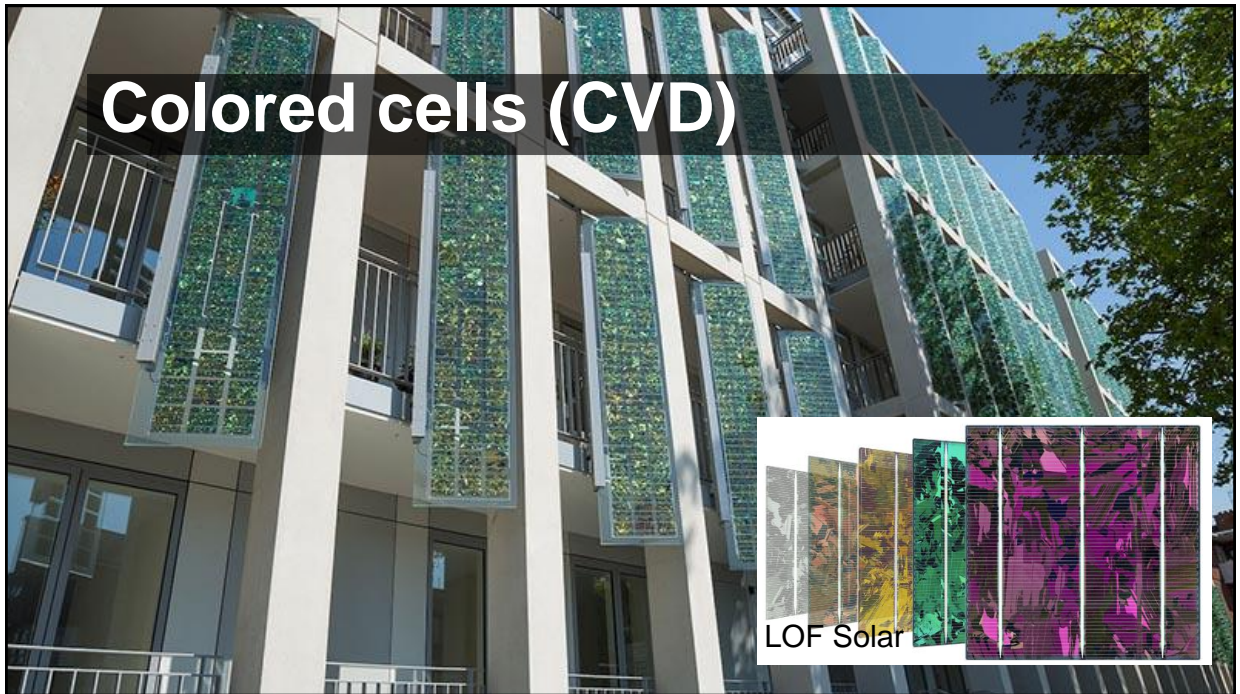
PV in Façade Elements



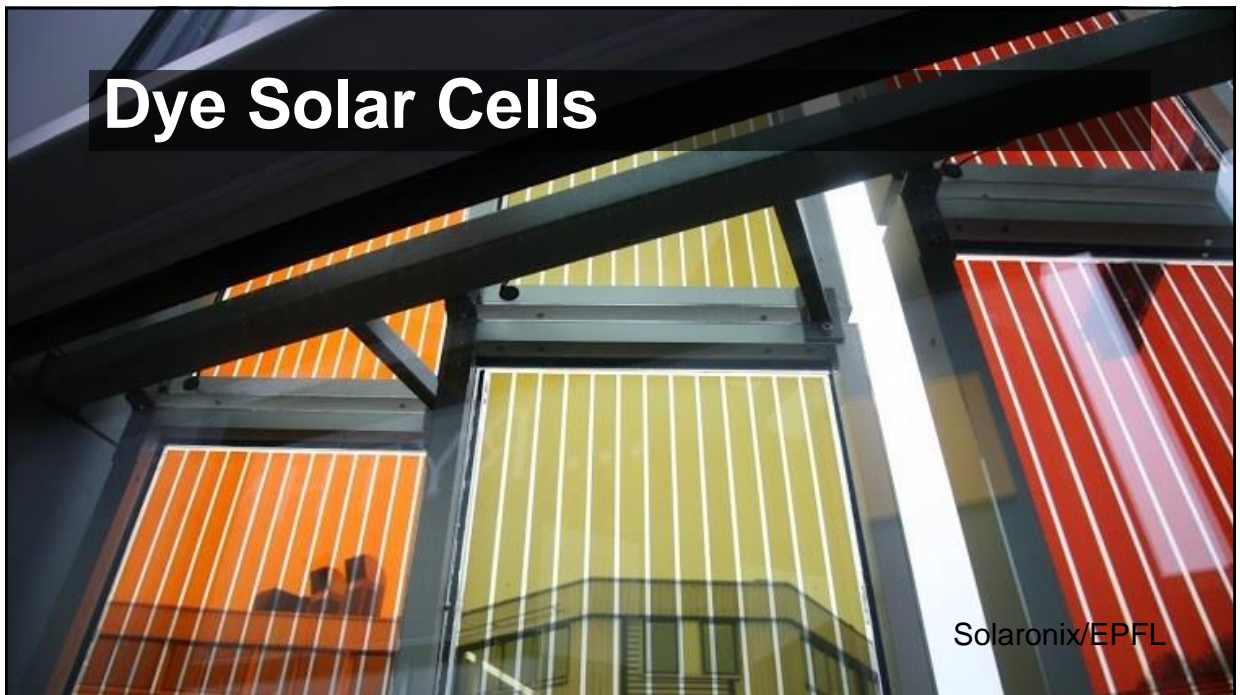
“costumized” panels

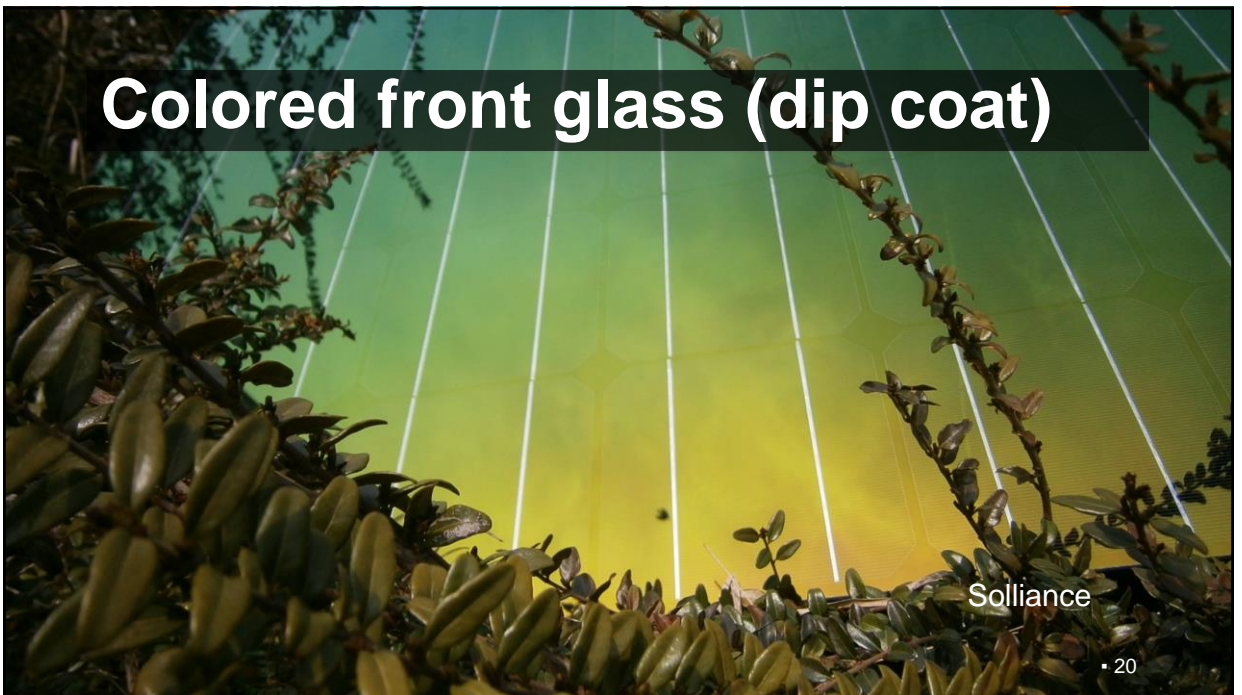
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Colored cells (CVD)



Dye Solar Cells



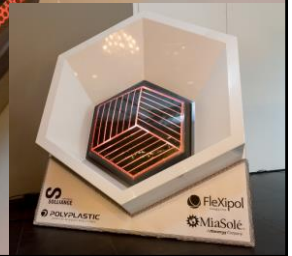


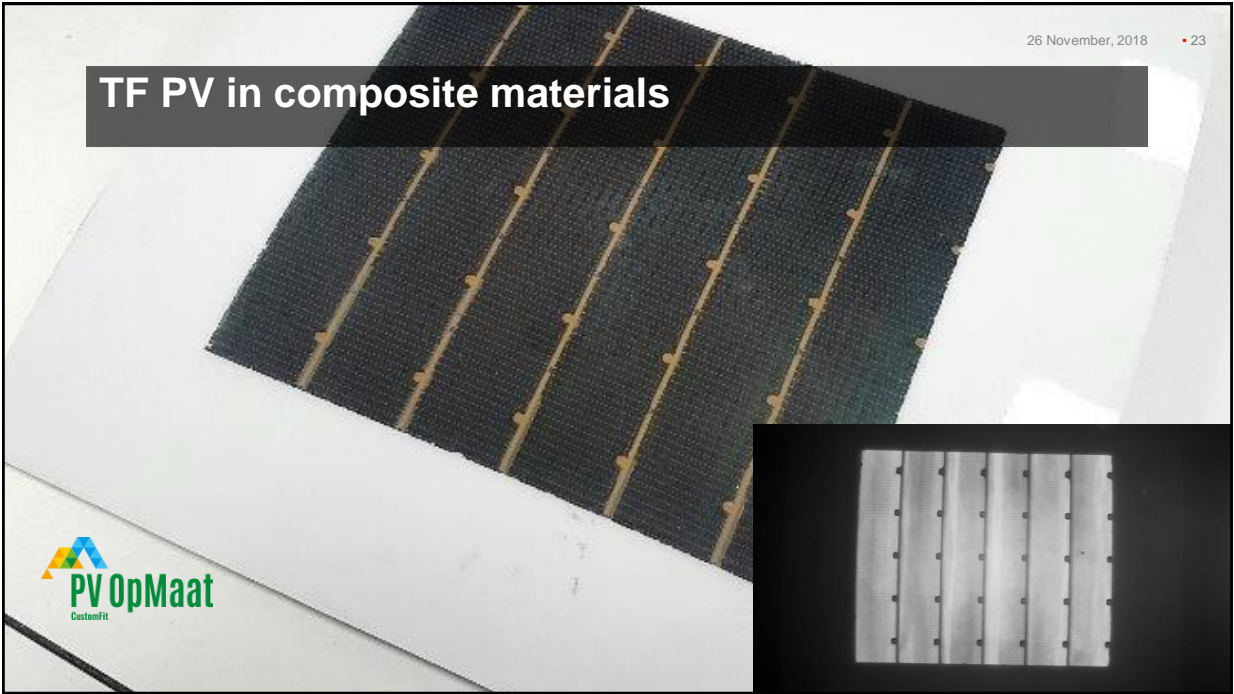
Colored front glass (ceramic printing)



New concepts and design

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Concluding remarks

- Coating and surface technologies are an integral part of PV manufacturing
 - Cell level
 - Module level
- Thin Film solar cells are very well suited for customized and integrated applications.
- PV as functionality in façade panels is “hot”.
- New methods for coating/printing colors with a minimum efficiency loss are being developed.
- Feasibility of integration of TF PV in classic façade panels is shown

A photograph of a person riding a bicycle on a paved path. The person is wearing blue jeans and a dark shirt. A flexible PV panel is mounted on the back of the bicycle. The background shows a modern building with large glass windows and some greenery. The text 'Bespoke flexible PV is our daily business!' is overlaid on the image in a large, white, sans-serif font.

**Bespoke flexible PV
is our daily business!**