Integrated Photovoltaic Conference
25 – 26 November 2025
Chamber of Commerce
Florence, Italy

TNO innovation for life

KameleonSolar

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TNO Solar Energy, The Netherlands

Cassette PV: An easy mounting solution for PV façades

MC2.0

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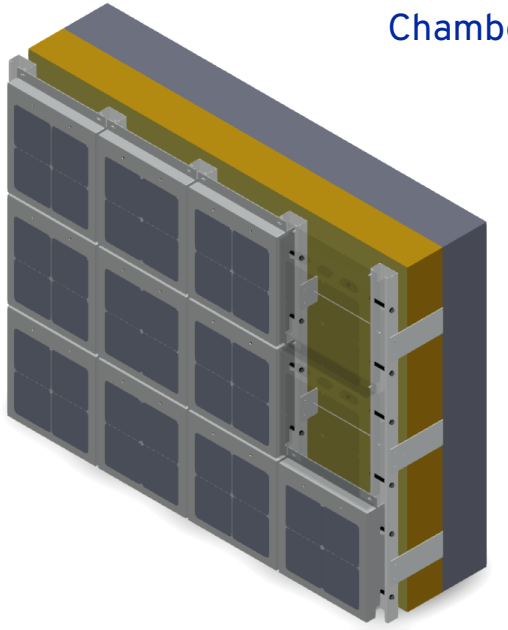
Introduction

In façade construction, cassette systems are often used as it enables quick and easy installation of façades.

Combining this concept with PV offers a solution for quick adoption by the building sector.

It has the potential to reduce installation costs, installation time, and material usage.



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Concept

First approach

Module stack

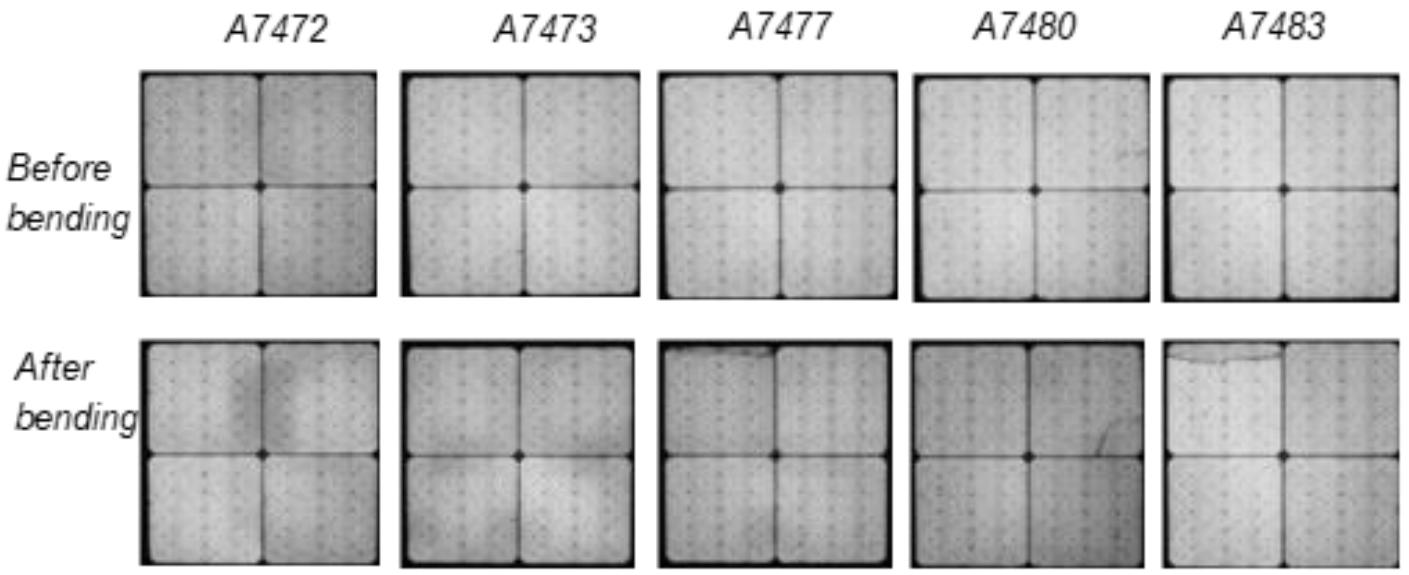
ETFE Front sheet
Encapsulant POE
Clear Film with print
Encapsulant POE
Solar Cells
Encapsulant POE
Fire resistant Aluminum composite



Results: EL before and after bending

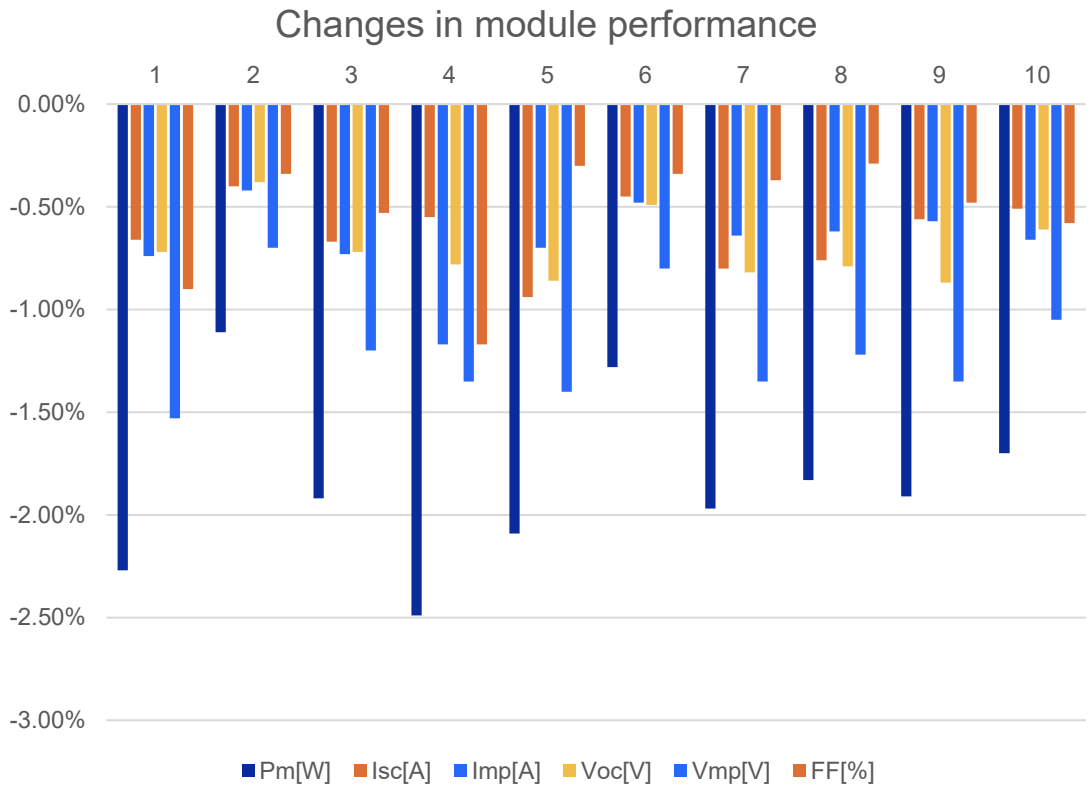
First approach

- 5 out of 12 modules suffering from the mechanical forces due to milling and bending the PV modules into the cassette shape
- new cracks in solar cells in module A7477 & A7483.
- Parts of the interconnection in modules A7472 & A7473 suffering from increased serial resistance.
- A7480 shows one crack grew.



Results: Performance

- 10 samples have been tested
- IV-measurements show:
  - Difference in cell parameters before and after bending less than 2.5%



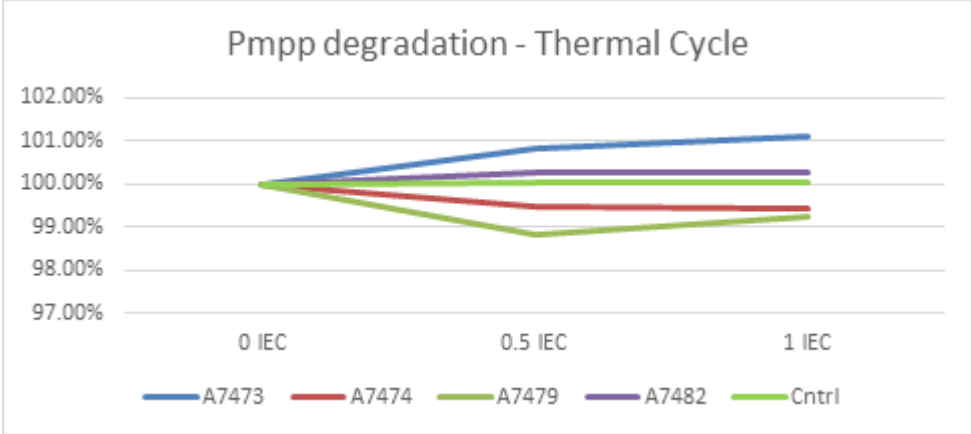
Results: Damp Heat and Thermal Cycle

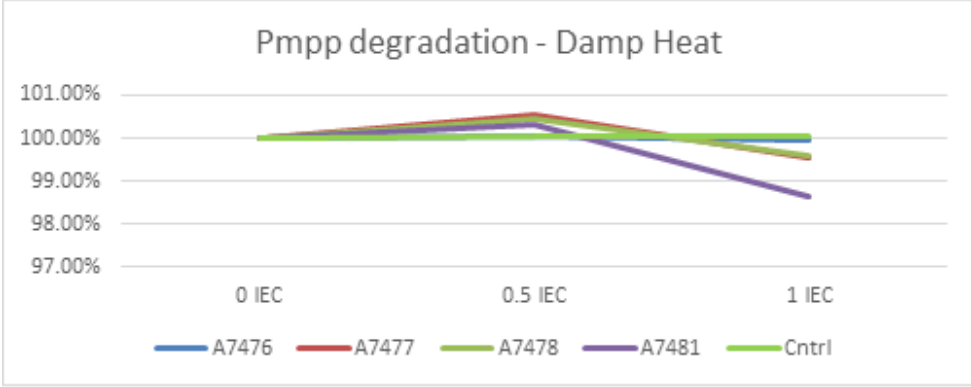
First approach

Maximum allowed degradation limit is 5% in power after 1x IEC test according IEC61215.

- Tested samples passed 200 cycles Thermal Cycle
- And 1000 hour Damp Heat test.

No visual changes after to Damp Heat and Thermal Cycle.

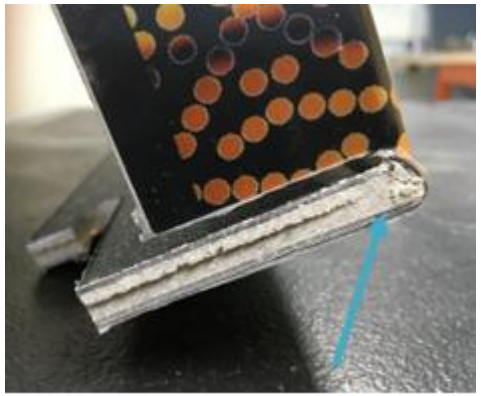




Results: Adhesion properties

👍 Visualy very good looking

👎 Core of sandwich is broken after bending



Concept

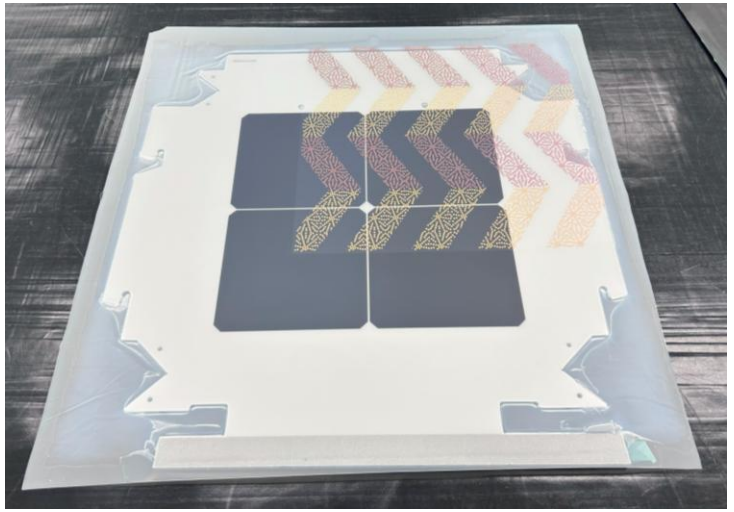
New approach (TSE PVGoCassette)

- Replace front material by a non-fluorine material: PET
- Use alternative encapsulants as they might give better resistance against fire
- Tune the processing conditions

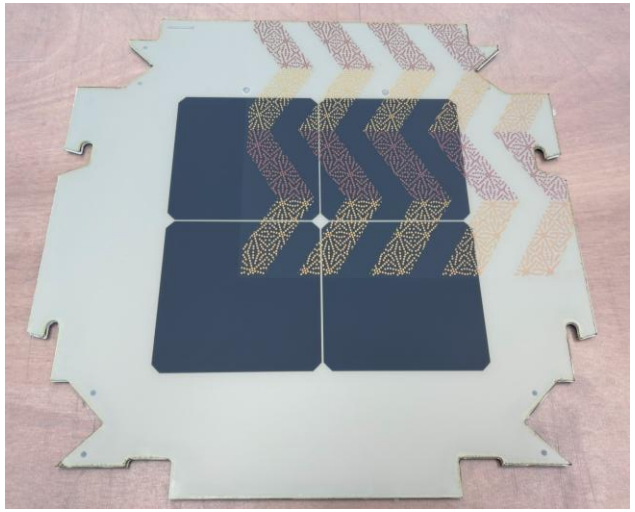
Module stack

PET (or similar alternative) Front sheet
Encapsulant
Clear Film with print
Encapsulant
Solar Cells
Encapsulant
Fire resistant Aluminum composite

Sample 1 – after lamination



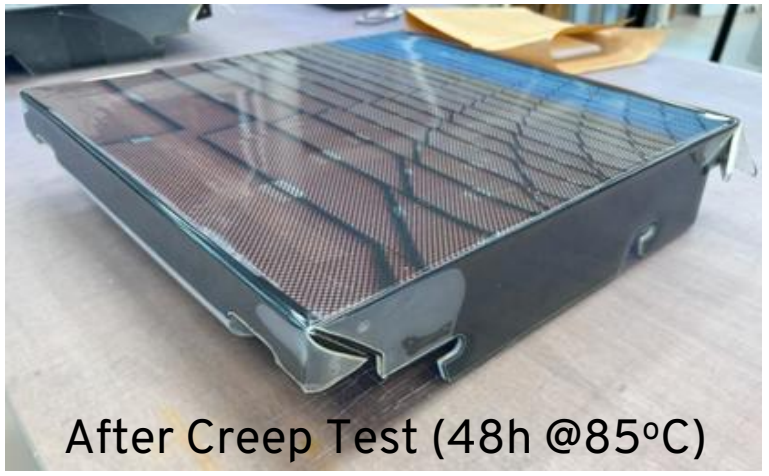
Sample 1 – after LASER trimming the edges



Results: Adhesion Properties

- Visually good looking and good adhesion
- Delamination after bending or creep tests
- Poor adhesion between TPO and clear film
- No impact of primer application on the Al surface
- Bending at different temperatures makes the process easier however delamination occurs at all instances

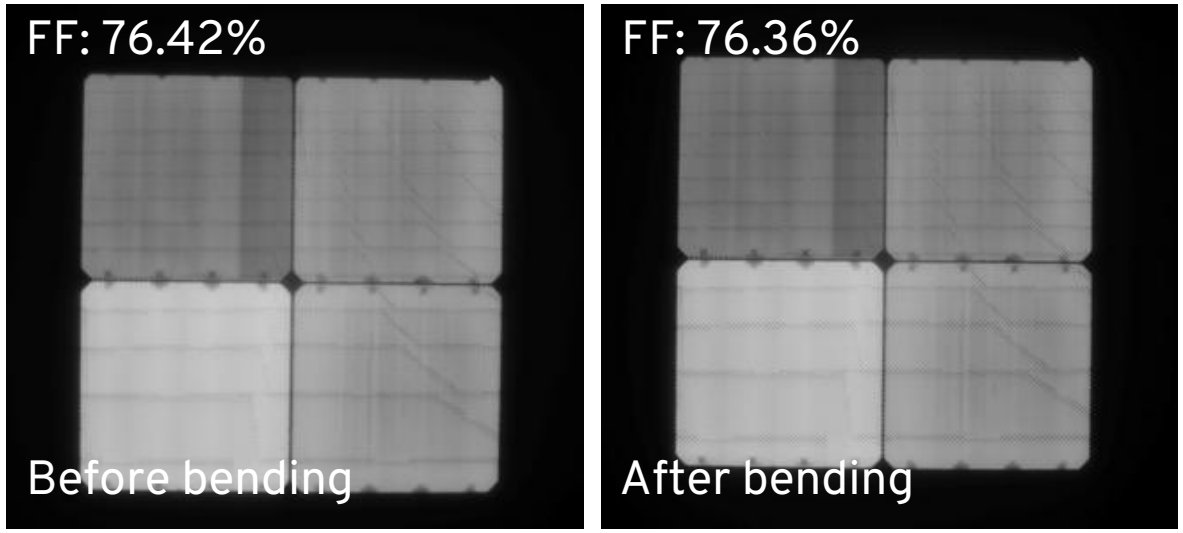
Before Creep Test (48h @85°C)



After Creep Test (48h @85°C)

Results: Performance and EL measurements

- Bending does not have an impact on the electrical properties



Next Steps:

- Thick PET front sheet will be replaced with a thin version or alternative (i.e. ETFE/PET sandwich)
- POE usage will be revisited.

- Fire class determination tests are planned with the final BoM
- Qtrack color stability tests are planned with the final BoM

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Acknowledgement

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Thank you!

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