

Disruptive sustainable technologies for next generation PV windows



MOTIVATION:

Exploiting IR efficiency potential of organic based solutions with robustness and stability of inorganic thin film solutions combining sustainable and industrial compatible technologies with demonstrated potential for cost reduction.



INNOVATION:

Capacity of the tandem inspired structure to protect the most active PV layer (IR selective organic cell) through the filtering of the UV radiation by the UV multifunctional coating, extending the lifetime of the PV hybrid device from 10 years at the end of the project until 25 years.



TECHNOLOGY

PRINCIPLES:

UV multifunctional coating (UV filter + UV thin film top solar cell) based in chalcogenide/oxide thin film industrial technologies (sputtering based)

IR selective bottom solar cell based in organic materials and printing technologies (RtR solution based processes)

Light management concepts: Distributed Bragg Internal reflector (multi-stacked layered structures deposited with sputtering based processes)



Photo-conversion efficiency (PCE)

Demonstration (at cell level) of a PCE $\geq 10\%$ (2.5% at UV selective top coating, 7.5% at bottom IR selective device).

PCE $\geq 12\%$ at module level on large size (L, XL) windows.



Average Visible Transparency (AVT)

Demonstration of a medium size (30x30 cm²) window prototype with an Average Visible Transmission (AVT, as defined in the window industry to weight the integration of the transmission spectrum against the photonic response if the human eye) $\geq 60\%$.

Upscaling of AVT $\geq 70\%$ on large size (L, XL) windows.



Lifetime

Demonstration (at prototype medium size window level) of a projected lifetime of ≥ 10 years.

Lifetime ≥ 25 years at large area (L, XL) window level.



Colour Rendering Index (CRI)

Demonstration of a medium size (30x30 cm²) window prototype with a CRI ≥ 70 (defined using AM1.5G as reference light) compatible with a high optical quality window ensuring unhampered transmission of visible light through the window.

Upscaling of CRI ≥ 70 on large size (L, XL) windows.



Size

Demonstration of small size (2x2 cm² at cell level, 5x5 cm² mini-module level) lab scale devices (S format). Demonstration of medium size (30x30 cm²) window prototype (M format).

Upscaling of processes to large size formats: L (1x1m²) XL (3x1.5m²).



Manufacturing Costs

Selection of key materials capable to estimate manufacturing costs around 250-300 €/m².

Manufacturing costs of 160-200 €/m²



Learn more about our Project:

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Tech4Win:

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Tech4Win proposes an innovative **transparent PV window** based on the combination of an inorganic UV selective multifunctional coating (**UV filter + UV selective solar cell**) deposited on the first glass of the window, and an **organic IR selective solar cell** implemented on the second glass of the window.

