

## Tech4Win demonstrates new proof of concept semi-transparent cells and photovoltaic modules for solar windows

- **Tech4Win has allowed to achieve new proof of concept semi-transparent devices that include first oxide-based UV solar cells and IR-selective organic solar cells and modules**
- **The project has also demonstrated the scalability of the processes with the achievement of 30x30 cm<sup>2</sup> window prototypes including functional IR modules with long term stability, using industrial lamination processes**
- **These results set the basis for a future building-integrated photovoltaics (BIPV) product portfolio by the development of next generation semi-transparent BIPV non-intrusive elements with very high optical quality**

**Barcelona, December 31<sup>st</sup>, 2022.**- Tech4Win began in January 2019 and proposed a highly innovative transparent photovoltaic (PV) window concept that is based on the integration of an ultraviolet (UV) selective coating, working as a UV filter and as a PV device converting the UV light from the sun into electricity, and an infrared (IR) selective PV device that will transform the IR light from the sun into electricity, allowing unhampered transmission of the visible light through the window structure. This window concept maximizes the generation of electricity from the non-visible parts of the solar light, keeping a high level of transparency in the visible region and combining sustainable and industrial compatible technologies. The inclusion of a highly efficient UV filter will prevent from degradation, boosting the robustness and stability of the devices as required for long lifetime windows.

After 4 years of activity, the project has allowed the achievement of relevant results in the development of highly innovative semi-transparent UV and IR selective devices:

- Demonstration of a first proof of concept of UV selective functional solar cells based in the integration of Zn(OS) nanometric layers showing a very high transparency (up to 75%) and optical quality;
- Development of new device architectures based in the integration of a-Si nanometric layers in oxide based heterostructures with the achievement of devices with photovoltaic conversion efficiencies up to 2% and transparency in the range 35% - 60%. Optimisation of the device architecture shows the possibility to increase the efficiency up to 2.5% when combining optimal electron and hole transport layers;
- Demonstration of new IR selective organic solar cells based in the use of stable and industrial compatible polymers with photovoltaic conversion efficiencies up to 5% and transparency in the range 41% - 59%;
- Demonstration of the scalability of the processes up to 30 x 30 cm<sup>2</sup> size, with the development of functional IR modules with transparency 43% and high optical quality (CRI > 70) using Roll to Roll industrial processes;
- Integration of developed modules in first window prototypes adapting industrial lamination processes. Demonstration of the long term stability (projected lifetime ≥ 20 years) of prototypes integrating functional IR modules;
- Development of new software tools for the simulation of the impact of the solar windows and semi-transparent BIPV elements in buildings. Simulations performed in different kind of

buildings (residential and office buildings) located in different climatic regions (corresponding to cold, mild and hot weather conditions) show in all cases an improvement of the building energy balance, which is relevant in the case of hot-mild weather conditions;

- Development of a systematic LCA and LCC analysis, leading to an estimated cost in the range of 225 €/m<sup>2</sup>, with energy payback times down to 1.7 years for optimal weather conditions

These results allow to establish the **basis for a new generation of semi-transparent PV devices using both inorganic and organic based technologies** and compatible with the cost, stability and industrial compatibility requirements that are needed for a successful transfer, in the midterm range, of these processes and products to industrial production, looking towards **new semi-transparent BIPV non-intrusive elements with very high aesthetic quality**.

### More about the Tech4Win project

Tech4Win has been developed in the period between January 2019 and December 2022, and included a well-balanced multi-sectorial consortium comprising reference research centres in the different PV technologies involved in the window concept, together with high-tech European Companies from different sectors, including relevant stakeholders involved in the value chain (Organic materials, Industrial Equipment developers, PV module producers and BIPV system manufacturers). The consortium was composed by 8 partners from 5 different countries, including 4 flagship RTD organizations (IREC, CEA, IMEC and TEKNIKER, with a great knowledge in advanced PV devices and technologies), 3 technology-based SMEs (ONYX, ADVENT and KENOSISTEC, with solid background in material and equipment development and in manufacturing of BIPV products) and a large company (ARMOR Beautiful Light ABL, OPV modules producer with a large experience in developing OPV manufacturing lines). The vast experience of the consortium has been reinforced by the deep commitment of an International Advisory Board (IAB) composed of benchmarking stakeholders of the construction industry.

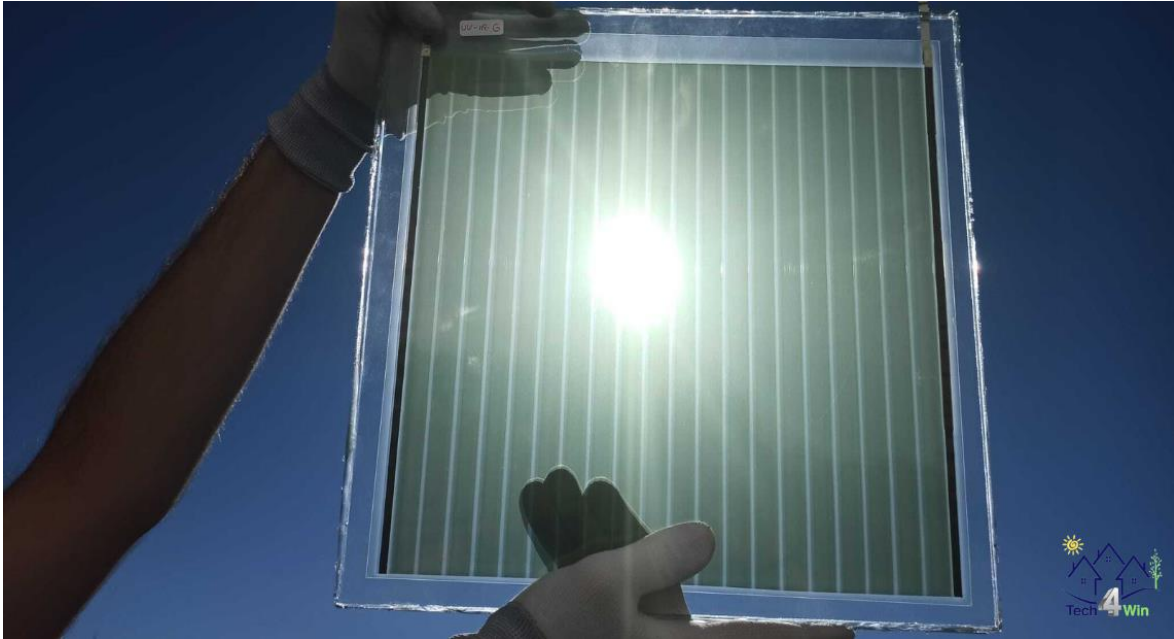
See project video: <https://youtu.be/MV38WcTy6Eg>

Learn more about Tech4Win project in the website <http://www.tech4win.eu/>, and follow the latest updates through the Twitter account: @Tech4Win\_H2020.

*This project has received funding from the European Union H2020 Framework Programme under Grant Agreement no. 826002, project Tech4Win (Disruptive sustainable technologies for next generation PV windows).*



## Images for the News:



**Contact:** *[Please replace this information with the contact name for press office or corporate communication of your institution center and your expert to coordinate, with the journalist and media, regarding matters relating to this press release].*

**Prof. Dr. Alejandro Pérez-Rodríguez**

Tech4Win project coordinator (*Disruptive sustainable technologies for next generation PV windows*)

Head of the Solar Energy Materials and Systems Group of IREC

Catalonia Institute for Energy Research (IREC)

Mailto: [aperezr@irec.cat](mailto:aperezr@irec.cat)

Tel. +34. 93 3562615

**Elisabeth Chulilla**

Corporate Communications Manager of IREC

Catalonia Institute for Energy Research (IREC)

Mailto: [echulilla@irec.cat](mailto:echulilla@irec.cat)

Tel. +34. 93 3562615

**Anna Magrasó**

Communication of projects at IREC

Corporate Development and Knowledge Technology Transfer Area

[amagraso@irec.cat](mailto:amagraso@irec.cat)

IREC- Catalonia Institute for Energy Research

Mb: 690 13 41 47

Tel. 93 3562615 (ext 2901)