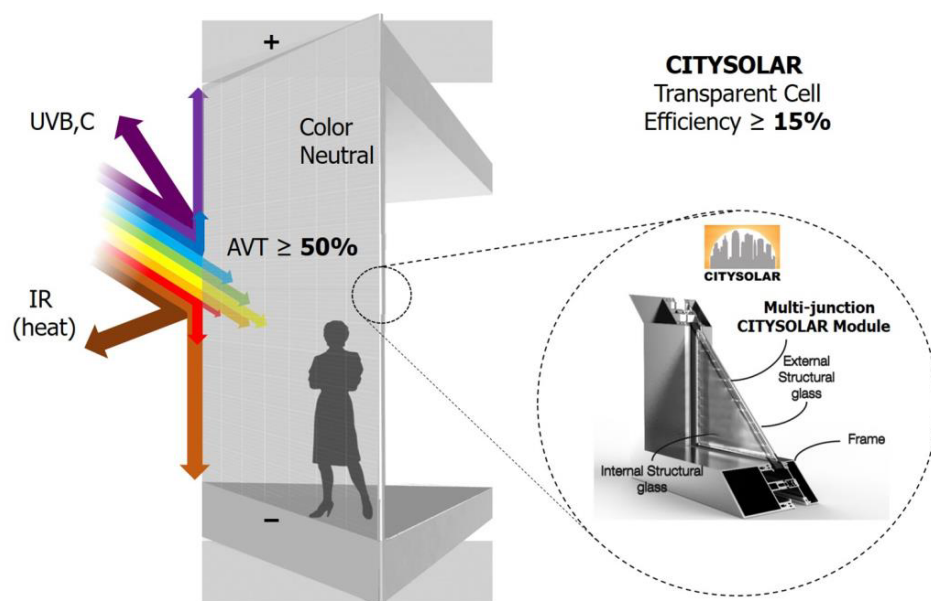


CITY SOLAR

ENERGY HARVESTING IN CITIES WITH
TRANSPARENT AND HIGHLY EFFICIENT WINDOW
INTEGRATED MULTI-JUNCTION SOLAR CELLS



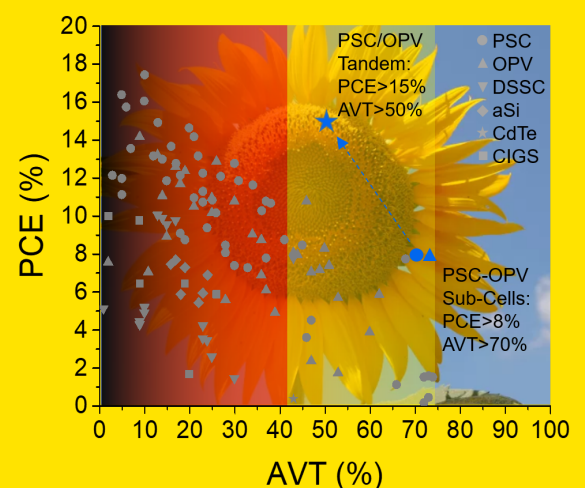
Welcome to the first CITYSOLAR Newsletter. It includes information about the Project progress, results and main activities and represents an important tool for on-going dissemination. Newsletters will be drawn up every 6 months for knowledge dissemination and to increase major interest in the CITYSOLAR solutions.



AIM OF THE PROJECT

CITYSOLAR will develop highly efficient and transparent devices for BIPV (Building Integrated PhotoVoltaic). CITYSOLAR's main objective is to develop lightweight transparent photovoltaic cells and modules with high average visible transparency ($AVT \geq 50$), a well beyond state-of-art efficiency $\geq 15\%$, and colour neutrality control by combining, in a multijunction fashion, a top Near Ultra Violet (NUV) halide perovskite and a bottom Near InfraRed (NIR) polymeric photovoltaic cell, exploiting advanced concepts of light management such as photonic crystals, nanophotonics and photon recycling. The CITYSOLAR breakthrough focuses on a unique combination of innovative concepts with the aim of enhancing the efficiency and transparency of the integrated solar cell well beyond the state of art of Transparent Photovoltaics allowing a real exploitation of emergent photovoltaic windows.

Beyond the State of Art for TPV



PEROVSKITE/OPV SEMI-TRANSPARENT TANDEM: NOVEL CONCEPTS AND ARCHITECTURES

The main concept of CITYSOLAR is to provide a new perspective to the problem of generating electricity via the photovoltaic process keeping at the same time the system as transparent as possible. CITYSOLAR will make use of a multi-junction concept, where different cells with different absorption profiles will be combined together, to realize the final transparent photovoltaic system.

Ideally the two absorbing regions should be: 1) Near-UV region for wavelengths < 450 nm and 2) Near-IR region with wavelength > 750 nm. While Near-UV can be achieved with high bandgap semiconductors that absorb photon energies above the bandgap, the Near-IR absorption could only be realized with specific material, in particular with organic materials, that possesses a limited bandwidth of absorption that can be tuned choosing the proper molecular structure. In CITYSOLAR we will make use of a high bandgap halide perovskite top Near-UV absorber and a Near-IR organic solar cell tuned in molecular structure for the N-IR absorption. This innovation will be supported by advanced light management techniques and novel connection architecture that will bring the CITYSOLAR cell to efficiency equal or larger than 15% with a transparency (AVT) of 50% or above. This represent a breakthrough in TPV, corresponding to an increment of more than +50% with respect to the actual record of TPV published in literature

NEW CONCEPTS

Selective Near-UV top absorber

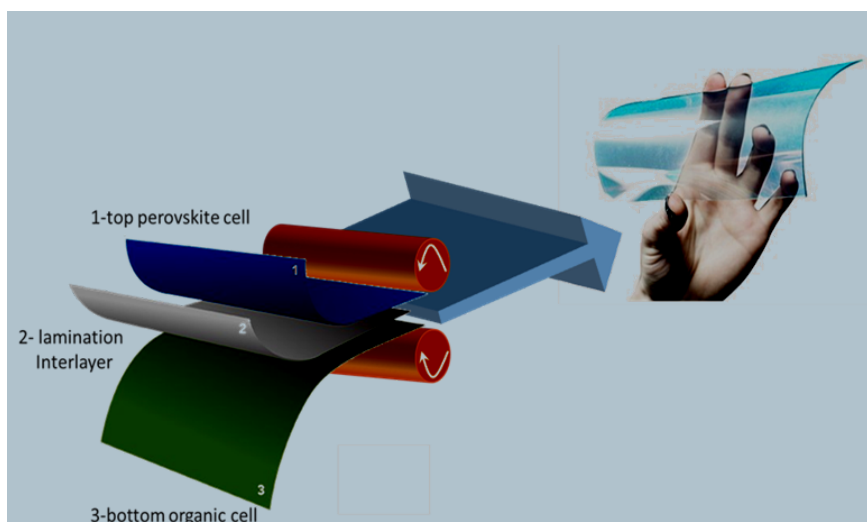
Selective Near-IR bottom absorber

Morpho-designed Distributed Bragg Reflector (M-DBR)

Photonic Crystal Up-Converter

Module level bus-bar connection (MOLBAC)

BIPV prototype



The photovoltaic modules will be fabricated independently on rigid or flexible substrates and then laminated together with proper interlayers to fabricate a 2 terminal tandem structure

THE CITY SOLAR CONSORTIUM

9 PARTNERS IN 6 COUNTRIES:

A MISSION INNOVATION INITIATIVE

CitySolar Partners

- CNR-ISM - Consiglio Nazionale delle Ricerche, Istituto Di Struttura Della Materia, Italy
- KAUST - King Abdullah University of Science, Saudi Arabia
- CNRS-IPVF - Centre National De La Recherche Scientifique, France
- UNITOV - University Of Rome Tor Vergata, Italy
- FAU - Friederich-Alexander University, Germany
- SDU - University Of Southern Denmark, Denmark
- EDF - Électricité de France, France
- ENI - Centro Donegani, Italy
- BM - Brilliant Matters, Canada



CITY SOLAR PROJECT: THE KICKOFF MEETING

The kickoff meeting of the CitySolar project was held on 15th December 2020 with a virtual call due to the COVID pandemic crisis. The meeting started with the welcome of the project coordinator Aldo Di Carlo which introduced the Citysolar project goals. The meeting agenda continued with the participation of the EU Project Manager Maider Machado and the EU Policy Officer Maria Getsiou which showed how Citysolar consortium can meet the goals expected from the EU commission thanks to the synergies between each WP involved in the project. Then, the WP leaders introduced the WP organization, the main objectives and the Key Performance Indicators (KPIs) for each WP. Conclusion remarks and next step were discussed inside the consortium.



EXTERNAL ADVISORY BOARD

The CitySolar Consortium selected an External Advisory Board (EAB) composed of experts from Academics and Industry working in Building Integrated Photovoltaics (BIPV) field. The EAB will provide advice on scientific and technological matters, as well as on dissemination, and exploitation related aspects, including standardization.

EAB members

- Marko Topic - University of Ljubljana
- Silke Krawietz - CEO and scientific director of the SETA Network
- Francesco Fintini - SUPSI
- Jonas Bergqvist - EPISHINE
- Yakov Sarif - RACELL

MEDIA COVERAGE OF CITYSOLAR

During the first 6 months of the project life cycle, Citysolar has appeared in several newspaper articles, tv and radio shows in different countries. Relying on the international experience of Citysolar Partners the project has been able to disseminate results and activities through media in the most appropriate way. CNR, in its role of Coordinator, can count on the support of its own WebTV (<https://www.cnrweb.tv/>) for communication and dissemination of the project activities.

Citysolar has been presented on Italian national TV (RAI) by Dr. Valerio Rossi Albertini (CNR) reaching 1.024.000 persons with 14.7% of share (<https://vimeo.com/513120176>) and on Italian national broadcast RADIO 24 by Prof. Aldo Di Carlo (<https://www.radio24.ilsole24ore.com/programmi/paese-migliore/puntata/si-puo-fare-rete-090744-AD4JdsKB>).

Below two examples of newspapers articles talking about CITYSOLAR.

8 | **L'Espresso** | venerdì 19 febbraio 2021

CITYSOLAR. I PANNELLI DI NUOVA GENERAZIONE DEL CNR

Finestre green salva Pianeta la rivoluzione Ue parla italiano



Valerio Rossi Albertini

A differenza di quella che molti pensano, la ricerca non è un'attività di sempre un dispendio del tesoro. Invece, può essere un'attività di risparmio. È il caso di un'attività di ricerca che si svolge in un po' di stanze del centro storico di un palazzo storico, in un po' di stanze del centro storico di un palazzo storico, in un po' di stanze del centro storico di un palazzo storico.



La ricerca è un'attività di risparmio. È il caso di un'attività di ricerca che si svolge in un po' di stanze del centro storico di un palazzo storico, in un po' di stanze del centro storico di un palazzo storico, in un po' di stanze del centro storico di un palazzo storico.

La ricerca è un'attività di risparmio. È il caso di un'attività di ricerca che si svolge in un po' di stanze del centro storico di un palazzo storico, in un po' di stanze del centro storico di un palazzo storico, in un po' di stanze del centro storico di un palazzo storico.

La ricerca è un'attività di risparmio. È il caso di un'attività di ricerca che si svolge in un po' di stanze del centro storico di un palazzo storico, in un po' di stanze del centro storico di un palazzo storico, in un po' di stanze del centro storico di un palazzo storico.

La ricerca è un'attività di risparmio. È il caso di un'attività di ricerca che si svolge in un po' di stanze del centro storico di un palazzo storico, in un po' di stanze del centro storico di un palazzo storico, in un po' di stanze del centro storico di un palazzo storico.

TECHNOLOGY.ORG

SCIENCE & TECHNOLOGY NEWS DEVELOPMENTS COMPETITIONS IDEAS ABOUT SUBMIT

New EU project will make your windows generate solar energy

Posted February 2, 2021

4 M place 2 4 Share

Transparent solar cells can be used in windows. But until now, they have either not been particularly effective or very transparent. A project that also includes a group of Danish researchers from the Mads Clausen Institute at SDU in Sønderborg will change that. With a revolutionary concept, the EU project CITYSOLAR will make energy-producing, transparent windows, mainstream.



Image credit: Pixabay (Free Pixabay license)

The EU project CITYSOLAR aims to revolutionise the market for transparent solar cells in windows. Project partners consist of some of the world's leading researchers in the field and some of the strongest industrial players in the market, and they have set themselves the ambitious goal of making the most efficient and transparent, power-producing windows, the world has ever seen.

"We develop new innovative concepts within light management and solar module integration that are specifically targeted new promising organic and hybrid thin film PV technologies, and by that we go significantly beyond state-of-the-art in terms of efficiency for transparent photovoltaics. It's a revolutionary new concept," says Professor Aldo Di Carlo, CNR-ISM, who is coordinator of the new project and is thrilled about the support of "CITYSOLAR" from the H2020 framework.

The project can become a real game-changer in the green transition. In big cities, there are lots of buildings and high-rise buildings with large facades that have sun-shielding glass that prevents overheating and reflects the glare from the sun. The idea is that, instead of reflecting the sunlight back, it should be used to produce electricity. The windows will become small power plants and make the buildings energy-neutral.

The electrical power producing windows are simply called 'photovoltaic windows', and they are already on the market. However, the concept of transparent solar windows is not yet at a stage where they are mass produced.

The problem is the two opposing forces: efficiency and transparency. The transparent PV windows have not been able to absorb enough energy to generate electricity in high enough quantities. Conversely, the productive windows have not been transparent enough. But, the CITYSOLAR project will change that.

With our unique concept of tandem solar cells we can exceed the limits for efficiency in PV windows, says professor wsr at SDU, Morten Madsen.

CITY SOLAR

ENERGY HARVESTING IN CITIES WITH
TRANSPARENT AND HIGHLY EFFICIENT WINDOW
INTEGRATED MULTI-JUNCTION SOLAR CELLS



Project coordinator
Prof. Aldo Di Carlo
aldo.dicarlo@ism.cnr.it



Institute of structure of matter (ISM))
c/o Area della Ricerca di Roma - Tor Vergata
Via del Fosso del Cavaliere, 100 - 00133 Roma (RM)

Project website: <https://www.citysolar-h2020.eu/>



The City Solar project has received funding from the European Union's Horizon 2020 Research and Innovation Program under Grant Agreement No 101007084