

LUMINOSITY

Large area uniform industry compatible perovskite solar cell technology

Introduction:

LUMINOSITY is an industry driven project aimed at leveraging the flexible perovskite solar cells (PSC) technology to commercially relevant production scales, using established industrial processes.

Project description:

The objective of the project is to demonstrate roll-to-roll (R2R) processed photovoltaic (PV) module with power conversion efficiency (PCE) of $>20\%$ at an area of $>900\text{ cm}^2$, and thus overcome the efficiency gap between lab-scale and fab-scale processed devices, elevating the TRL up to 7. One of the unique selling points of this work is the commercial substrate foil based on aluminum with fluorinated-tin-oxide (FTO) electrode layer, which is an intellectual property of HyET Solar, the end user in the consortium. By using this substrate foil, LUMINOSITY will alleviate the bottlenecks related to limited process window of typical polymer substrate foils – such as high-quality nickel oxide charge transport layer deposition (requires 300°C thermal process) – to reach high stability, efficiency, and lower environmental impact, while keeping the flexibility. The consortium encompasses the full value chain from research and technology developers, equipment manufacturers, suppliers, and industrial end-users.



Project facts:

Start date: 01/06/2024
End date: 31/05/2028

Duration in months: 48

Project EU funding: € 6.99M

Research & Innovation Action:
HORIZON Innovation Actions

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Photovoltaics, perovskite solar cells, roll-to-roll processing, metal-halide perovskite.



Figure 1 Principal advantages of LUMINOSITY technology and the prototype R2R coated layers on flexible FTO foil (top-right) to produce the envisioned product (bottom-right).

Together, we are well-equipped to surmount the existing challenges that have hindered the widespread adoption of PSC technology. Specifically, LUMINOSITY will achieve operational stability exceeding 20 years that rivals the lifetime of current commercial thin film PV technologies, while ensuring economic (0.14 USD/W at R2R production scale) and environmental feasibility (50% lower CO₂ footprint in comparison to c-Si PV), substantiated by comprehensive Life Cycle and Techno-economic Analysis. LUMINOSITY will fast track the market uptake of flexible perovskite PV technology and thus enable rapid increase of PV installation capacity in EU to reach the goals set by REPowerEU plan.

Expected impact:

1. Increase the lifetime, efficiency and minimize the environmental impact of Perovskite PV.
2. Enlarge with novel perovskite device architectures the integration and application possibilities of PV technology.
3. Increase the potential for industrial production and commercialisation of perovskite PV creating a competitive technological know-how for the European PV industrial base.
4. More effective market uptake of sustainable renewable energy and fuel technologies to support their commercialisation and provide inputs to policy making.
5. Enhanced security and autonomy of energy supply in the EU.

Project team:

To achieve the objectives of LUMINOSITY, a multidisciplinary and complementary consortium has been gathered with members who have proven a strong innovation and/or industrial experience and the capacity to achieve the objectives and milestones set out in the project.



Consortium:

TNO	NL
HZB	DE
FhG	DE
CNR	IT
HyET	NL
TU/e	NL
LU	SE
TUD	NL
ABIMI	CZ
IPV	DK
VA	DE
UH	BE
LPFK	DE
CUT	CY

Contacts:

Project Coordinator:

Ilker Dogan
TNO (Netherlands)
ilker.dogan@tno.nl

Project Manager:

Anastasia Grozdanova
AMIRES, The Business
Innovation Management
Institute (Czech Republic)
grozdanova@amires.eu

Website:

<https://luminosity-project.eu/>



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