

## ENMESH

### ENabling Micro-ConcEntrator PhotovoltaicS with Novel Interconnection Methods

*Project duration: from 02.2018 to 12.2020*

*Report submitted: 11.2021*

#### **Publishable Summary**

The Swiss company Insolight is developing a patented PV module which promises a reduction in LCOE for roof-based solar from 0.16€/kWh to 0.011€/kWh. The system uses an array of micro-solar cells with optics and integrated microtracking to produce a low-profile rooftop-compatible solar system with an independently demonstrated efficiency of over 36%, a 100% efficiency gain over cSi. This high efficiency is made possible by the use of advanced multi-junction cells under concentrated light, a technology known as concentrator photovoltaics (CPV). Specifically, this product represents one of the first commercial examples of micro-CPV ( $\mu$ CPV), wherein the cells are 1mm<sup>2</sup> in size or less.  $\mu$ CPV increases performance (due to reduced cell operating temperature, higher optical efficiency and lower series resistance losses) and lowers manufacturing costs. Insolight innovation has further improved the  $\mu$ CPV concept by embedding sun tracking internally in a 50mm-thick panel, enabling roof-top or BIPV installations and avoiding bulky and expensive trackers. An outstanding technological challenge in  $\mu$ CPV is the need to use massive cell interconnection processes due to the large number of micro-cells involved, 5000 cells/m<sup>2</sup> for the Insolight module. The current state of the art is wire bonding, however this inherently serial process is prohibitive for thousands of cells.

The Universidad Politécnica de Madrid, in collaboration with Dycotec Materials Ltd, offer an innovative cell interconnection process involving direct printing of ultra-durable nano-particle coating systems to allow the massively parallel connection of solar cells in a cost-effective high volume roll-to-roll or sheet fed printing process, paving the way for the low-cost manufacture of  $\mu$ CPV.

Under the specifications of the company Insolight solar cell plane and full board prototype containing a total of 143 micro-solar cells was interconnected. The full board is on a glass substrate being semi-transparent for applications with hybrid-PV or agrivoltaics. The final prototype reached equal results as the standard technology using wire-bonding, but with a far cheaper process. TRL6 was achieved for the technology developed in this project.

Finally, the ENMESH project was the transnational team's first collaboration and the seed of the Hiperion project (H2020-LC-SC3-2018-2019-2020).

## Project consortium

Coordinator and all contact details:

Full name of organisation:	Universidad Politécnica de Madrid
First and family name of coordinator:	Ignacio Antón Hernández
Full address:	Avda. Complutense, 30, 28040 Madrid, Spain
E-mail:	i.anton@ies.upm.es

Participating countries and financing:

Country	Number of organisations involved	Project costs in EUR	Public funding in EUR
Spain	1	125'000	125'000
United Kingdom	1	422'947	296'063
Switzerland	1	209'775	97'202
<i>Total</i>	3	<i>757'722</i>	<i>518'265</i>

## Funding agencies involved and contracts

Funding Agency	Contract N° and Title
AEI	PCI2018-093168 "ENabling Micro-ConcEntrator PhotovoltaicS with Novel Interconnection MetHods"
Innovate UK	620137 "ENabling Micro-ConcEntrator PhotovoltaicS with Novel Interconnection MetHods"
SFOE	SI/501620-01 "Enabling Micro-Concentrator Photovoltaics with Novel Interconnection Methods"

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