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 photocoltaics (CPV). Specifically, this product represents one of the first commercial examples of micro-CPV (µCPV), wherein the cells are 1mm^2 in size or less. µCPV 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 µCPV 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 µCPV is the need to use massive cell interconnection processes due to the large number of micro-cells involved, 5000 cells/m^2 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 µCPV.

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:

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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
Total	*3*	*757'722*	*518'265*

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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