

MasterPV

Innovative manufacturing solutions for cost-efficient semitransparent BIPV

Project duration: from 09.2018 to 07.2021

Report submitted: 07.2019

Publishable Summary

MasterPV proposes the development and demonstration of low cost innovative processes for cost efficient semi-transparent $\text{Cu}(\text{In,Ga})(\text{S,Se})_2$ (CIGS) BIPV solutions. The project involves the replacement of the Mo back contact in the traditional CIGS device architecture by chemical vacuum-free based TCO (Transparent Conductive Oxide) electrodes. This will allow achieving a significant improvement in the aesthetic quality of the semi-transparent devices, with the elimination of the back mirror effect that is determined by the remaining Mo regions in the semi-transparent modules.

Improvement of the aesthetic quality of CIGS semi-transparent devices is strongly relevant to ensure a higher level of acceptance of these solutions in the BIPV market. The proposed solutions will contribute to a more efficient exploitation of the potential of CIGS technologies for lowering of manufacturing costs, with the replacement of the vacuum-based Mo sputtering deposition processes by lower cost approaches that are based in low CAPEX vacuum-free chemical strategies.

The main scientific challenge of the project is related to the development of optimal transparent contacts allowing for device efficiencies comparable to the high efficiency values that have already been achieved in CIGS technologies with standard Mo based back contacts. This will imply a special effort in the optimization of TCO based contacts suitable for high efficiency devices, which will be based in the development of surface contact configurations including nanometric transition metal oxides (TMO) that have already been demonstrated as efficient hole transport layers in organic based technologies and are strongly promising for optimization of the valence band alignment at the back contact/CIGS interface. The main technological challenge is related to the implementation of low cost vacuum-free processes for the growth of the optimal transparent back contact configurations and to the adaptation of these processes for the fabrication of efficient semi-transparent CIGS modules. At commercial level, the improvement of the aesthetic quality of the semi-transparent modules and the decrease of their cost will contribute to the consolidation of CIGS as one of the main commercial technologies able to answer to the increasing demand of cost-efficient and reliable semi-transparent products in the BIPV market. The project will contribute in a relevant way to the enhancement of the innovation capacity and integration of new knowledge in the European PV industry, with the development of innovative processes that are also relevant for other advanced PV applications as bifacial solar cells and very high efficiency thin film tandem devices.

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	2	394'172	290'836
Germany	1	217'598	217'598
<i>Total</i>	3	611'770	508'434

Funding agencies involved and contracts

Funding Agency	Contract N° and Title
Agencia Estatal de Investigación	PCI2018-092945, Innovative manufacturing solutions for cost-efficient semitransparent BIPV
CDTI	EXP-00108913/SERA-20181028
BMW/PTJ	0324230