

DINAMIC

Dilute Nitride Based Concentrator Multijunction Solar Cells, With Efficiencies Over 47%

Project Duration: 12.2015 to 06.2019

Initial report submitted: 02.2017

Summary

This proposal will significantly advance the state of the art in multi-junction cell technology for High Concentration Photovoltaics (HCPV) through the implementation of a novel lattice-matched 4 junction (4J) device architecture utilising ~1eV bandgap dilute nitride technology as the 4th sub-cell, and at the same time operating at high concentrations. To this end it is expected that >47% multi-sun efficiency 4J solar cells will be developed during the lifetime of the project. The development of extremely high efficiency cells is a key requirement for the deployment of HCPV as it will significantly reduce the cost of this technology (€/kWh and €/Wp), thereby addressing one of the major obstacles to the widespread adoption of this technology. If the goals of the project are achieved, the impact of these solar cells on the overall CPV system cost would be to bring it below €c15/Wp (for operation at 1000 suns) instead of the current levels of around €c35/Wp (for operation at 500 suns). A special emphasis will be devoted to dilute nitride material characterization since there are scarce data available for these alloys which will be used in the HCPV cells. In this case, they will be produced, initially, by Molecular Beam Epitaxy (MBE) to provide the highest efficiency cells in the shortest time, and then these materials will be compared directly with those grown by Metal Organic Vapour Phase Epitaxy (MOVPE), which provide the lowest cost manufacturing solution. Finally, accelerated ageing tests will be accomplished on the resulting cells in order to quantify their long term reliability, and initial estimates of manufacturing yields will be obtained.

Project consortium

Coordinator and contact details:

Full name of organisation:	IQE plc
First and family name of coordinator:	Iwan Davies
Full address:	Pascal Close, Cardiff CF3 0LW, UK
E-mail:	idavies@iqep.com

Participating countries and financing:

Country	Number of organisations involved	Project costs in EUR	Public funding in EUR
United Kingdom	1	500'000	250'000
Spain	2	315'000	315'000
<i>Total</i>	3	<i>815'000</i>	<i>565'000</i>

Funding agencies involved and contracts

Funding Agency	Contract N° and Title
Innovate UK	Technology Strategy Board File Reference: 620124 SOLAR-ERA.NET [Call 3] 2015 for proposals. Project Title: DINAMIC Date: 8th April 2016
Ministerio de Economía y Competitividad	PCIN-2015-181-C02-02 Title: Células solares multiunión de nitruros diluidos de concentración con eficiencias superiores al 47%
Ministerio de Economía y Competitividad	PCIN-2015-181-C02-01 Title: Células solares multiunión de nitruros diluidos de concentración con eficiencias superiores al 47%