

ALCHEMI

A Low Cost, High Efficiency, Optoelectronic HCPV Module for 1000 Sun Operation

Project Duration: 02.2017 – 07.2019

Initial report submitted: 07.2018

Summary

Project ALCHEMI will demonstrate a new type of low cost, high concentration photovoltaic (HCPV) module which has a DC module efficiency (η) >37% (at Concentrator Standard Test Conditions (CSTC) of 25°C cell temperature and a DNI of 1000W/m²), which operates at a concentration factor of ~1000x. This module efficiency value will be achievable in manufacturing volumes, and not just as a hero result. The module will use small III-V multijunction solar cells (~1mm x 1mm), no external heat-sinking, and refractive optics – Fresnel Primary Optical Element (POE) and a Silicone Secondary Optical Element (SOE). The receiver element of the module will be a surface mount device (SMD), and the module will take full advantage of cost reductions associated to the LED industry by only using surface mount devices and components, using pick and place assembly. In this respect, this project will demonstrate a low cost route to high concentration photovoltaics, by exploiting existing assembly equipment and processes of the well-established optoelectronic industry. Modules will be extensively tested, both on-sun for around six months to establish performance and reliability, and using environmental testing in-line with the CPV module standard IEC62108. In testing, the performance of these modules will be compared with conventional flat plate c-Si modules and other lower concentration HCPV modules geographically situated at the same location, to demonstrate the performance and energy yield advantage of the modules that will be developed.

Project consortium

Coordinator and contact details:

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Participating countries and financing:

Country	Number of organisations involved	Project costs in EUR	Public funding in EUR
UK	1	567'183	283'592
Spain	1	192'000	192'000
Germany	1	250'000	250'000
Cyprus	1	100'000	0
<i>Total</i>	<i>4</i>	<i>1'109'183</i>	<i>725'592</i>

Funding agencies involved and contracts

Funding Agency	Contract N° and Title
Innovate UK	Reference: 620125 Project Title: ALCHEMI - A Low Cost, High Efficiency, Optoelectronic HCPV Module for 1000 Sun Operation Date: 18th January 2017
Ministerio de Economía y Competitividad	Contract No. PCIN-2015-246 "Modulo Optoelectronico HCPV para operacion a 1000 soles con Alta Eficiencia y bajo coste"
Federal Ministry for Economic Affairs and Energy	Contract: 0324127. Project Title: "ALCHEMI - Kostengünstiges, hoch effizientes optoelektronisches Modul der konzentrierenden Photovoltaik für 1000-Sonnen-Betrieb"