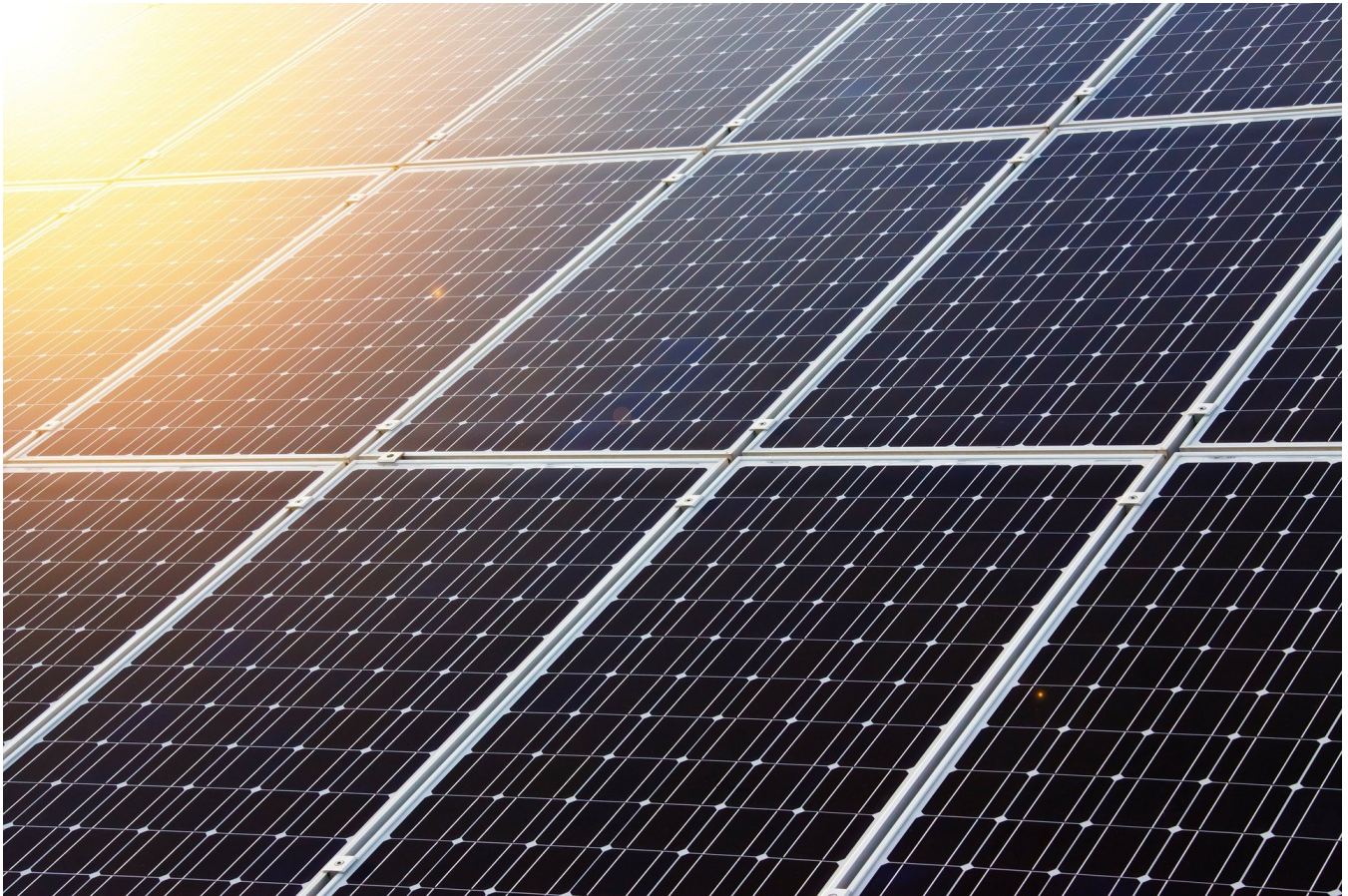


IES CPV Multijunction Solar Cell.

Triple junction concentration solar cells allowing to reach competitive prices for photovoltaic electricity working effectively at high concentration levels.



Contact information

Address: IES, ETSI de Telecomunicación – UPM, Av. Complutense, 30, Ciudad Universitaria, 28040, Madrid

Phone number: 915441060

Website: ies.upm.es

Email: irey@ies-def.upm.es

Technological Offers type

[Technological solutions](#)

Research and innovation areas

- [Climate, Energy and Mobility](#)

ODS



Available from: 2020

Where?

[III-V semiconductors Solar Energy Institute](#)

Keywords: | [energy](#) | [solar](#)

Brief description of the technology solution and the added value it provides

The triple junction concentration solar cell able to reach an efficiency up to 40% has been developed by the III-V Semiconductors Group at the Institute of Solar Energy of the Technical University of Madrid (IES-UPM). These cells allow to reach competitive prices of photovoltaic electricity in an scenario that nowadays shows a progressive increase in the price of energy of the 62% since 2004 (source: Eurostat). Photovoltaic solar energy market is expected to be growing by 66% along the next four years.

Description of the technological base

Multijunction solar cells are currently the most efficient photovoltaic devices. The Institute of Solar Energy has developed a triple junction solar cell with an efficiency close to 40% at a concentration of 1000 suns. This cell is formed by an upper GaInP subcell, an intermediate GaInAs cell and a lower Ge cell.

IES-UPM has devoted its wide experience in the field of high concentration to the design of this device. As a result, its performance has been optimized at irradiances higher than 1000 suns, while the impact of the series resistance and the capacity of optimal response to the lack of uniformity of illumination, produced by real optical concentrators, have been minimized.

This solar cell is still at a laboratory prototype stage. Some improvements have already been identified and it is expected to reach efficiencies up to 42% in the near future.

“Triple junction solar cells for concentrations higher than 1000 suns: better performance, more efficiency and competitive prices of photovoltaic solar electricity”

Market demands

- Global demand of energy is expected to grow by 2.2% per year until 2020, mostly in the developed world.
- The price of energy has been increased by 62% since 2004 [Eurostat].
- According to European Directives in the framework of “Europe 2020 Strategy”, main objectives to increase energy efficiency are: 20% reduction of energy consumption; 20% of the energy demand of a country supplied by renewable energy sources, 20% reduction of greenhouse gas emissions. [Europe 2020].
- The Sunbelt Countries (Africa, Middle East, Southern Asia and South America) has around 75% of the world’s population and 40% global demand of electricity [European Photovoltaic Industry Association – EPIA].

“The demand of electricity is expected to grow by 70% in the coming 15 years, while total demand of primary energy is calculated around 48%”

Competitive advantages

- Efficiency higher than 40% in a triple junction concentration solar cell has been reached: possibility to offer competitive prices of photovoltaic energy. Efficiencies higher than 42% at 1000 suns concentration to be reached in the near future.
- Solar cells prototype manufactured at IES-UPM facilities.
- Reliability analysis of the cell performance by accelerated life tests.

Development stage

- Concept

- Research
- **Lab prototype**
- Industrial prototype
- Production

Contact

Contacto IES CPV-SolarCell

Ignacio Rey-Stolle Prado

e: irey@ies-def.upm.es

Carlos Algora del Valle

e: algora@ies-def.upm.es

Instituto de Energía Solar – UPM

w: <http://www.ies.upm.es/>

Contacto UPM

Área de Innovación, Comercialización y Creación de Empresas

Centro de Apoyo a la Innovación Tecnológica – UPM

e: innovacion.tecnologica@upm.es