



POLITÉCNICA



POLITÉCNICA

UNIVERSIDAD  
POLITÉCNICA  
DE MADRID

R&D&i INSTITUTES

## SOLAR ENERGY INSTITUTE (IES)



### SOLAR ENERGY INSTITUTE (IES)

#### Contact Data

Universidad Politécnica de Madrid

ETS de Ingenieros de Telecomunicación

Avda. de la Complutense, s/n

E-28040 Madrid-SPAIN

Telephone number: +34 91 544 1060 Fax number: +34 91 544 6341

info@ies-defupm.es

[www.ies.upm.es](http://www.ies.upm.es)

#### Organizations collaborating with IES

Currently, IES is collaborating in R&D activities with more than 50 partners around the world.

They are mainly:

Universities

Technology centres

First level companies

Public entities

The Solar Energy Institute (IES), at the Universidad Politécnica de Madrid is a research centre devoted to the conversion of solar energy. The Institute was founded in 1978 and it is worth saying that it is probably the oldest research centre worldwide devoted primarily to this topic.

The Institute is managed by Prof. Antonio Luque and comprises five R&D groups: Photovoltaic Systems, Silicon Technology, III-V Semiconductors and Systems, Instruments Integration and Fundamental Studies.

IES forward-looking approach focuses on enabling, by means of research and development, photovoltaic conversion of solar energy to become the most important source of electricity and on solving the problems that will allow Spain to continue being in the leading group of this ambitious task.

# SOLAR ENERGY INSTITUTE

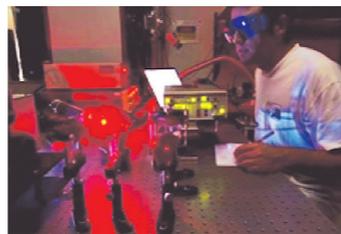
## RESEARCH LINES



### FUNDAMENTAL STUDIES

In 1997, the group invented and patented the intermediate band solar cell. In these cells there is a new band between the valence band and the conduction band of the semiconductor. Thus, two photons with energy lower than that of the forbidden band, are able to promote electron transitions from valence band to conduction band.

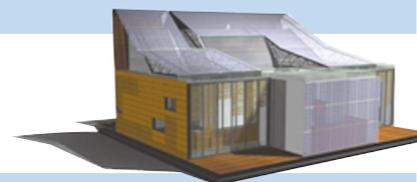
Since then, this group has been carrying out a key research in this field in order to find out intermediate band materials and to develop their manufacture.



### SYSTEMS AND INSTRUMENTS INTEGRATION

Concentrating systems are the alternative to flat panels, where mainly those high efficiency solar cells can be used in a more profitable way.

It can be said that IES has been the source of growth in a market that a decade ago was empty. It has inspired the installation for the first time in the world of 3 MW of triple junction Concentrator Photovoltaic plants with contribution of 7 companies for three continents. Once this market is running, the concentration technology's progress involves the development of measurement systems and instruments for characterizing the concentration modules, whereon this institute now focuses its efforts.



### PHOTOVOLTAIC SYSTEMS

This line aims to carry out the technology transfer required to apply the photovoltaic technology to current social needs. In this way, this activity line takes part in several projects that pursue the application of solar energy by means of building solar architectural elements and houses, electrification of isolated villages, etc.



### III-V SEMICONDUCTORS

Research and development of multijunction solar cells for working at concentration (1000 suns) probably is, in a medium term, the most important effort for reducing costs and making solar energy more efficient. IES-UPM was the place where a solar cell able to operate in an efficient way (> 26%) over 1000 suns was first created, reaching the highest output for that concentration. Today, the Institute has reached a World Record output of 32.6% with double junction cells at that concentration and the objective will be to focus efforts to reach efficiencies up to 41% with triple junction cells by 2010.

### SILICON TECHNOLOGY

In the past, this activity was one of the main cores of the Institute, enabling the creation of the company ISOFOTON. Today, one of the most relevant actions undertaken by this line to reach the vertical integration of photovoltaic technology in Spain has been the creation of CENTESIL, first research centre for silicon purification.



### DATA OF IES ACTIVITY

30 Publications per year. 50 Participations in congresses per year. 20 Invited conferences per year. Participation in international committees. Congress' organization. Participation in scientific diffusion events. Doctorate Programmes (PhD) and master in solar energy. Launching spin off centres and companies.