Thematic Actions

Coordinating Universities for the Proposal: UCM and UPM

Title of Action	**Creation of a Centre Supporting Research into Photovoltaic Device Technology**		
Participating partners	UPM, CIEMAT	**Other participants**	
Personnel involved (indicate institution)	UPM (Solar Energy Institute, Laser Centre) CIEMAT (Photovoltaic Solar Energy Unit)		
Start date	1-1-2010	**End date**	31-12-2013
Cluster	Global Change and New Energies	**Other clusters**	
Areas of action	Teaching Improvement and EHEA Deployment / Research / Knowledge Transfer		
Location	Moncloa Campus		
Infrastructures involved			
Keywords			

Objectives:

There are presently two research groups devoted to photovoltaic technology in the Community of Madrid with more than 25 years of experience: the UPM's Solar Energy Institute (IES) and CIEMAT's Photovoltaic Solar Energy Unit. The former develops wafer-based solar cells, cells based on III-V semiconductors, concentrating optical systems and intermediate-band cells among other technologies. The latter is focused on thin-film silicon cell and module technology, thin-film polycrystalline materials for photovoltaic applications and silicon heterojunction solar cells. These groups therefore carry out parallel research into photovoltaics without any overlap. In the case of the CIEMAT group, there is close cooperation with a third group: the Laser Centre of the UPM. The proposal aims to substantially improve the research capacity of these groups by creating a Centre Supporting Research into Photovoltaic Device Technology in which:

1. The following capacities would be made available to all three groups:
   - Material and device characterisation techniques.
   - Material and device processing techniques, including laser-processing facilities run by the Laser Centre.

   This will be a facility useful for all three groups and will provide resources that are usually not available for a single research group.
2. A meeting point would be available for the organisation of teaching or research events, such as
   - International Master's degrees.
   - International workshops or conferences.

The present initiative is designed as a support centre with shared facilities, without duplicating research that has already been conducted by existing research groups.

Description of the action:

Creation of a centre with the following lab facilities:

- 100,000 class clean room with 10,000-class access room.
- Photolithography facility.
- Laser processing facility (laser scribing, edge isolation, laser firing, etc.).
- Rapid Thermal Annealing facility.
- Characterisation lab (SIMS, XPS, Raman, grazing-incidence XRD, Sinton, PDS, CPM).
- Room for teaching activities (Master's degrees and workshops).

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Planned key results:

The initiative must:

- Substantially enhance the experimental capacity of the groups involved, notably improving both their potential to obtain diagnostics of material and device properties and their ability to apply processing techniques for developing new technologies. In these conditions the probabilities of these groups obtaining international importance (i.e., to achieve excellence) are increased.
- To foster the exchange of ideas among the groups involved through a forum for organising joint events.

Rationale for the action:

The correct distribution of research work into photovoltaic solar energy among the participating groups in the last 25 years has prevented overlaps or interferences that would have been quite negative in a country, such as Spain, in which resources devoted to R&D are not overly abundant. For the same reason only a few interactions have so far arisen in spite of the large advantages for science and technology. The Laser Centre/CIEMAT collaboration, on the one hand, and the CONSOLIDER project (IES and CIEMAT) are two exceptions.

The creation of a Centre Supporting Research into Photovoltaic Device Technology aims to fill in the gaps currently existing in this scheme, i.e. to provide the characterisation and processing techniques that any of the groups would consider to be a great added-value but which are financially unviable for any of them, as well as to favour the organisation of international teaching and research events.

International aspects:

As already stated, the proposal has a twofold research and teaching aim. From a research standpoint the initiative has a strong international scope derived from a foreseeable increase in the international competitiveness of the groups involved in photovoltaics and from the organisation of international conferences. With respect to education, international workshops and Master's degree will be organised, which are key factors in the success of the Campus.

Planned impact:

Over the years, the Solar Energy Institute has earned prestige among the international photovoltaic solar energy research community. CIEMAT's Photovoltaic Unit and the Laser Centre have also gained wide recognition both in Europe and overseas. Based on these solid foundations, the proposal is an initiative to achieve true excellence and to significantly improve the position of the participating groups in order to compete with the large prestigious laboratories worldwide. It aims to do so through improved coordination of activities and good access to non-conventional facilities, which would be difficult to finance without such a project.

There is also no doubt that this initiative would make a very important contribution to the cohesion of the research and educational community of the Moncloa Campus, particularly in the field of photovoltaic solar energy.