

EU Scientific Projects, Pillar Participated

■ 1999-2001 –Joule-Thermie Project (Bifacial Solar Cells)

Project full name: Static Concentrator Module with Bifacial Cells

Project number: JOR3-CT98-0252

Project Goals: The main goal of this project was to reduce the cost of the photovoltaic electricity. The way to do so is based on two activity lines: One is to improve the efficiency of bifacial photovoltaic cells and the other activity line is to develop an stationary concentrator for these cells which take the advantage of the bifaciality of the cells while keeping the installation and maintenance requirements of the module as simple as are the ones of a conventional module.

From the application point of view, the objective of the project was to combine existing technologies for achieving a PV static concentrator with the economic potential to penetrate into the market of building integrated PV modules. This mean, in economic terms, to reduce the cost to 2 EUR/Wp at the first generation of the product.

■ 2002-2004 – Twingo Project (Gallium Doped Solar Cells)

Project full name: Fabrication of 20% Efficient Silicon Solar Cells by a Cost-Effective Industrial Process

Project number: ENK5-CT-2001-00513

Project Coordinator: Instituto Energia Solar – Universidad Politecnica de Madrid ETSI Telecomunicacion. Ciudad Universitaria

Project Goals:

- Develop monocrystalline silicon solar cells of 20% efficiency by methods which lead to an overall reduction in module cost towards the 1€/Wp target.
- Develop new monocrystalline Si materials that do not suffer light induced degradation
- Apply laboratory concepts to industrial production to improve LGBC technology
- Evaluate economical and environmental aspects

■ 2006-2008 – FoXy Project (Solar Grade Feedstock)

Project full name: Development of solar-grade silicon feedstock for crystalline wafers and cells by purification and crystallization

Project number: 019811

Project Coordinator: SINTEF – Stiftelsen For Industriell Og Teknisk Forskning Ved Norges Tekniske Hoegskole AS

Project Goals: FoXy is a R&D project which aimed at developing refining and crystallization processes for metallurgical SoG-Si feedstock, optimize associated cell and module processes, and set parameters for these types of feedstock.

Under the realistic assumption that Si-wafer based PV modules will dominate the market in the coming decade, the FoXy partnership answered the need of the PV market for low price (~€ 15/kg) and high quality solar grade (SoG) Si feedstock by:

1. Further developing and optimizing refining, purification, and crystallization processes for metallurgical SoG-Si feedstock, as well as for recycled n-type electronic grade Si.
2. Optimizing associated cell and module processes.
3. Setting input criteria for metallurgical and electronic n-type silicon to be used as raw materials for SoG-Si feedstock.
4. Transferring the technology from laboratory to industrial pilot tests.

The main results of FoXy Project:

- A. The new technology of purification of metallurgical silicon shortens the payback period of electricity needed for Cells production from 2 years to 6 months;
- B. The new technology of Cells passivation is developed which ensures the efficiency of and the new scheme of Solar modules is proposed which ensures high efficiency and low time degradation of modules;
- C. The new approaches are dealt with the investigations which have the aim to make thin wafers of silicon of order 100 microns of thickness using the developed silicon feedstock.

International R&D Projects

■ Development of production of wafers with thickness 120 µm/180 µm

The only way of reduction of consumption rate of polysilicon per Wp is to produce thinner wafers. In other hand, reduction of thickness has a disadvantage: significant increase of wafers and solar cells breakage. During 2007 Pillar JSC had created and introduced new technology of bricks treatment before wafering (160 µm/180 µm). This technology permitted to increase bending strength of wafers on 30% and reduce cells breakage for two times. Obtaining good results in breakage of solar cell allowed shifting of the production to thin wafers. In 2008 production of thin wafers (160 µm or 180 µm) increases to 60% of total volume in Pillar JSC. In the present time existed technology of bricks treatment before wafering is updating for production even thinner wafers (120 µm/160 µm).

■ From begging of 2006 Pillar JSC participated in testing of different samples of UMG-Si (upgrade metallurgical silicon).

Due to good organization of job in technological group, activity in R&D, close connection with technological teams of producers of solar cell, Pillar JSC fact proceed from R&D to industrial using of UMG-Si. In 2008 year Pillar JSC already produced more than 1.5 million wafers. Due to this work Pillar JSC really is first company in Europe who start industrial production of wafers from UMG-Si.

At 23rd European Photovoltaic Solar Energy Conference and Exhibition (September 2008, Valencia), paper FIRST RESULTS ON INDUSTRIALIZATION OF ELKEM SOLAR SILICON AT PILLAR JSC AND Q-CELLS AG was presented. In paper result of production of 150 000 solar cells was presented.

In the present time Pillar JSC is working in direction of further quality improvements of UMG-Si wafers and development of technology for using broader specter of UMG-Si.