09 | 2010

BEAM

Newsletter from Sulfurcell Solartechnik GmbH

SULFURCELL UNVEILS FIRST CIGSe PROTOTYPES

Milestone in the production development

After only four months of development, Sulfurcell completed the first prototypes of its new product line in July 2010 and is now producing large-scale solar modules with efficiencies greater than 10%. In terms of the format and appearance, the modules match the existing Product Line 1. Sulfurcell is also maintaining the compact size (0.65 m x 1.25 m) with Product Line 2, which facilitates installation and is preferred in solar construction. The efficiency, which has been confirmed by TÜV-Rheinland, is 10.7%, with a module power output of 86.8 watt peak.

Sulfurcell is currently preparing the market launch of Product Line 2 and is subjecting the new module types to comprehensive quality and aging tests. The company expects that small volumes will already be commercially available by the end of the year. In 2011, Sulfurcell is planning to move part of the production over to the manufacture of the CIGSe modules in order to market this premium product on a megawatt scale. With Product Line 2, Sulfurcell is principally targeting the private sector. With residential buildings, a higher efficiency provides an enormous advantage because of the limited surface area available. The first choice for commercial roof surfaces remains the tried and tested Product Line 1.

Technology with potential

Instead of using sulphur in the CIS absorbers of its new product line, Sulfurcell is relying on selenium and is using "CIGSe" instead of "CIGS" (copper-indium-gallium-selenide or sulphide). Both semiconductors belong to the CIS family (chalcopyrite semiconductors). The efficiency potential of CIGSe modules is considerably greater than for CIGS modules. This has already been impressively demonstrated with record-breaking CIGSe cells whose efficiencies exceed 20%. Sulfurcell is basing part of its own production on co-evaporation processes with which record efficiencies have been achieved in various scientific institutes. A major advantage of this process is that the CIGSe layer properties can be precisely configured, which enables the efficiencies to be continually improved.

Product Line 2

The prototype, which has a module efficiency of 10.7%, represents the first milestone on route to achieving Sulfurcell's ambitious goals. The company is pursuing a clearly defined development plan that initially focuses on gradually improving the material properties of the CIGSe layer, the peripheral process steps and the module design. The company is already aiming to overcome the 11% threshold by 2011 and the 12% threshold by 2012 at the latest. Sulfurcell believes that module efficiencies of 14% can be realistically achieved by 2015.

PRODUCT LINE 1

Sulfurcell's established CIGS process based on sulfides

- 2006 – today: 100 000 modules manufactured & sold
- Modules highly suited for BIPV
- Ramping up to 30 MW/a
- Current module efficiency: 8%

PRODUCT LINE 2

Most advanced CIS technology based on selenides ("CIGSe")

- Machine in operation since March 2010, prototype milestone achieved in April 2010 (9% efficiency)
- 5 MW/a manufacture scheduled for 2H10
- Module efficiency schedule: >10% (2010), >11% (2011), >14% (2015)

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Company headquarters

Production plant

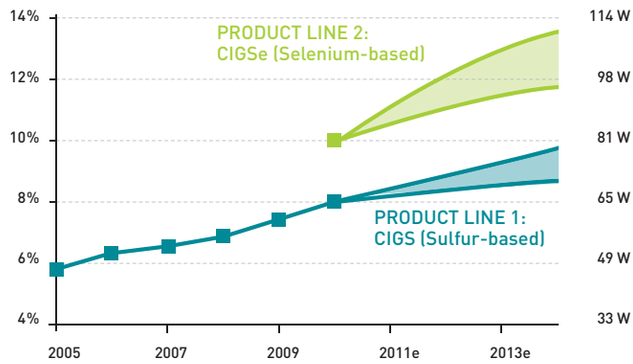
Research and development

Besides the production, the most important factor for Sulfurcell is research and development. In the company's own innovation centre, 30 highly qualified research and development engineers work on new products and on continually improving the manufacturing processes. In addition, Sulfurcell is evaluating completely new machines that are initially being operated parallel to the production and, on being successfully tested, will be integrated in the production process. For their work, the Sulfurcell developers use an analysis laboratory equipped with state-of-the-art measurement technology and the company's own module test centre, which contains climate chambers and loading test rigs. Here the modules are tested to ensure compliance with the IEC standard and in terms of their long-term stability.

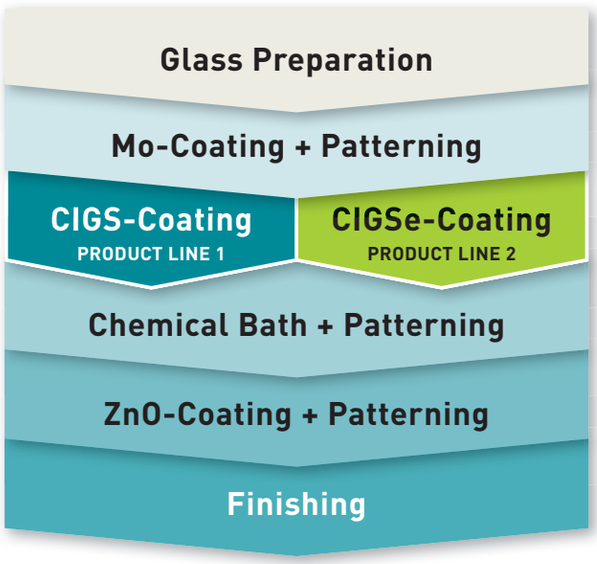
Research breakthrough and successful cooperation

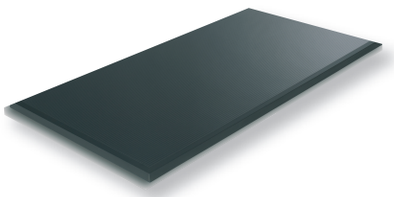
Very few manufacturers of thin-film solar modules are currently capable of supplying high-quality modules with efficiencies in double figures. Sulfurcell succeeded in achieving a rapid breakthrough because its new technology is based on longstanding experience and Sulfurcell's optimised production process, which has been tried and tested for years. A substantial contribution, however, was also provided by Sulfurcell's cooperation partners: not just the Helmholtz Centre Berlin, from which Sulfurcell was once a spin-off and with whom the company continually shares expertise, but also in particular the 44solar company from Nantes in France. 44solar and Sulfurcell have concluded a cooperation agreement and are working exclusively together on developing and optimising innovative production processes for CIS solar modules. John Kessler, the renowned CIS specialist, is the head of 44solar and, together with his colleagues, constructed Sulfurcell's machine. Together, the companies will attain maximum efficiencies with the CIS technology and build unique, highly productive production systems.

Average Efficiency of Sold Modules



Manufacturing process





SOLAR CONSTRUCTION
SUSTAINABILITY
TECHNOLOGY

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