

Corporate News

Success in the thin film division: centrotherm photovoltaics achieves 13 percent efficiency for mass production

- **Patented production process translates to competitive advantages**
- **Pilot plant enables efficient technology transfer to production**

Blaubeuren, August 10, 2009 – centrotherm photovoltaics AG has succeeded in raising its cell efficiency to 13 percent based on its own equipment and process know-how in its thin film division. The company obtained this outcome using a process that can be implemented for mass production, and consequently expects efficiencies of up to 12 percent for its turnkey lines for industrial manufacturing of 1.5 m² thin film modules.

As a result, the technology equipment provider for the production of solar silicon, crystalline solar cells and CIGS (copper indium gallium diselenide) thin film modules is pursuing its corporate goal of cutting costs per watt peak in its thin film division too. The company is advancing highly efficient CIGS thin film technology because this enables centrotherm to offer its customers the highest efficiencies currently available, accompanied by low production costs at the same time. In addition – by comparison with other manufacturing technologies - the new CIGS module manufacturing process does not entail toxic process gases.

"The efficiencies for thin film modules already achieved in laboratories demonstrate the potentials this technology holds. The challenge, however, is to make the leap from laboratory to mass production," explained Dr. Peter Fath, CTO of centrotherm photovoltaics. "Our advantage in CIGS technology lies in simple and robust process management, and selection process steps that can be transferred easily from small areas to larger ones." The centrotherm photovoltaics Group maintains its own thin film research and development laboratory in Blaubeuren, where a complete CIGS pilot production plant for 0.1 m² thin film modules has been in operation since 2008.

The photovoltaics experts from Blaubeuren use 1.5 m² modules in the thin film area because these offer optimal production and assembly costs at the targeted efficiencies, thereby enabling customers to achieve competitive production conditions over the longer term. The modules, which are constructed as glass-glass sandwiches, are produced on the

basis of a patented two-step process. In the first step, the metallic films are removed in sputtering plants. Conversion to the CIGS crystal phase occurs in a second, thermal step. This process management makes a significant contribution to efficient manufacturing that is accompanied by low production costs and high efficiencies at the same time. "The success of our division, which is still in its infancy, shows that we are on the right path with our research and development investments, and the expansion of this area," Fath went on to comment.

The first turnkey CIGS production line with an annual capacity of more than 30 MW is currently being commissioned and ramped up at an Asian customer. With an area of 1.5 m², the intention is that, by 2009, this will be the first, and to date largest, CIGS module to be manufactured on a mass production basis.

About centrotherm photovoltaics AG

Headquartered in Blaubeuren, Germany, centrotherm photovoltaics AG is one of the world's leading technology and equipment providers for the manufacturing of solar silicon, crystalline solar cells and CIGS thin film modules. The broad product spectrum comprises key equipment and turnkey production lines for crystalline and thin-film solar cells. The product range is supplemented by reactors and converters for the manufacturing of solar silicon. centrotherm photovoltaics guarantees its customers important performance parameters such as production capacity, degree of efficiency, and completion deadlines for turnkey lines. The Group employs around 1,100 staff members, and operates in Europe, Asia and the USA. centrotherm photovoltaics achieved revenue in the 2008 financial year of EUR 375 million, EBIT of EUR 56 million*, and is listed in the TecDax of the Frankfurt Securities Exchange.

(*before purchase price allocations)

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