



## **Manz AG: Research Partner NICE Solar Energy reaches new efficiency world record for CIGS thin-film modules with 17.6 percent**

- **Joint venture NICE Solar Energy based in Beijing and Schwäbisch-Hall has focused on further development of CIGS technology since its foundation in 2017**
- **World record was achieved on production equipment of Manz AG**
- **World record has been confirmed by TÜV Rheinland**

**Reutlingen, December 04, 2019** - NICE Solar Energy has increased the efficiency of CIGS thin-film solar modules and set a new world record of 17.6 percent. This efficiency record, now confirmed by TÜV Rheinland on a module surface area of 120 x 60 centimeters, was achieved on production equipment of Manz at the R&D site of NICE Solar Energy in Schwäbisch-Hall. NICE Solar Energy was founded in April 2017 by the shareholders China Energy Investment Corporation Limited, Shanghai Electric Group and Manz AG as a Chinese-German joint venture. With around 80 specialists in Beijing and 160 employees in Schwäbisch-Hall, the joint venture has the world's largest research and development capacity for CIGS thin-film solar technology.

The current efficiency world record is based on a long-term technology roadmap, which was drawn up already in 2011 by high-tech equipment manufacturer Manz AG with the support of the Stuttgart Centre for Solar Energy and Hydrogen Research Baden-Württemberg (ZSW). Since then, the efficiency of the CIGS thin-film technology has been repeatedly increased on the CIGS/lab innovation line in Schwäbisch-Hall, which belonged to Manz at the time, and the laboratory efficiencies of the ZSW have thus been put into practice. With the establishment of NICE Solar Energy in April 2017 and thus the building up of capacities, the partners have been able to significantly accelerate the further development of the CIGS technology.

Martin Drasch, CEO of Manz AG, comments: "The world record of our R&D partner NICE Solar Energy was made possible by a combination of several factors: decades of experience in the development and manufacture of CIGS modules, a process-safe production line with production equipment continuously developed by Manz at the site in Schwäbisch Hall, and last but not least the outstanding development efforts of the colleagues in Schwäbisch Hall and in

Beijing, and thus the unprecedented intercontinental cooperation of our Chinese-German team in the industry".

Even with the now achieved world record efficiency of 17.6 percent on module size, CIGS thin-film technology continues to have great potential for further increases in efficiency: The highest efficiency achieved so far on cell surface is 23.35 percent and marks the limit of what is currently feasible. Increases in efficiency on the module surface, in conjunction with even more efficient production processes, will enable to produce even more cost-efficient CIGS thin-film solar modules in the future. The specific advantages of the CIGS technology include a short energy recovery time, a favorable temperature coefficient for use in hot climates and a wide range of applications for building-integrated photovoltaic applications.

China's largest production site for CIGS thin-film solar modules - the so-called CIGS*fab* - is currently being built in Chongqing in central China. This has an annual production capacity of 306 megawatts and is equipped with production equipment from Manz.

**Figure 1:**





## Company profiles:

### Manz AG – passion for efficiency

Founded in 1987, Manz AG is a global high-tech equipment manufacturing company. Its business activities cover the areas of Solar, Electronics, Energy Storage, Contract Manufacturing and Service.

With many years of expertise in automation, laser processing, vision and metrology, wet chemistry and roll-to-roll processes, the company offers manufacturers and their suppliers innovative production solutions in the areas of photovoltaics, electronics, and lithium-ion battery technology. The company's product portfolio includes both customer-specific developments and standardized single machines and modules, which can be linked to create complete custom systems. Manz AG offers high-quality, needs-based solutions that can be integrated early into customer projects to contribute significantly to customer success.

The company, listed on the stock exchange in Germany since 2006, develops and produces in Germany, Slovakia, Hungary, Italy, China and Taiwan. It also has sales and service branches in the USA and India. Manz AG currently employs roughly 1,600 workers worldwide, around half of whom work in the Asia region, which is key to the company's target industries. Manz Group revenue in the 2018 financial year totaled around 297 million euros.

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