Press Release

A Long-Standing Cooperation Partner of SINGULUS TECHNOLOGIES, PTiP, Officially Launches Its CIGS Photovoltaic Pilot Production Facility in South Africa

- **SINGULUS supplied systems for the key process steps**
- **PTiP continues to improve and scale-up CIGS technology**
- **CIGS modules with high local content and efficiency levels manufactured**
- **Goal to implement a large-scale commercial production line with PTiP's process**

Stellenbosch/Kahl am Main, February 3, 2014 – In the presence of numerous honorary guests from Germany and South Africa including high-ranking politicians, business and technical partners, Photovoltaic Technology Intellectual Property (Pty) Limited (PTiP) will officially launch the successful commissioning of its pilot production line for the manufacturing of CIGS thin-film solar modules. SINGULUS TECHNOLOGIES (SINGULUS) supplied the engineering technology and support for the key production processes.

PTiP, a spin-off from the University of Johannesburg (UJ), has already been working on the development of CIGS solar modules for the past 20 years. The demonstration plant in the Techno Park near Stellenbosch was established on the back of the critical success demonstrated in the UJ research laboratories. This facility will serve as a state-of-the-art research and development facility for commercial-scale and market ready 1200 mm x 600 mm CIGS modules. The commercial development of the PTiP process is in the limelight of the South African government. The Industrial Development Corporation (IDC) is a strategic shareholder and financially support of the expansion by PTiP in Techno Park. PTiP received additional financial support from the “Technology Innovation Agency” (TIA), an initiative of Department of Science and Technology. With the new CIGS line, the development of modules can

be improved with particular regard to the efficiency and the special demands of the African market.

The project also attained particular interest in the course of the German-South African Science Initiative.

Prof. Vivian Alberts, CEO of PTiP, comments: “The commissioning and official opening of this CIGS pilot facility in South Africa confirms the goals of the South African government to support and promote alternative and renewable energies, based on locally developed IP and skills. It is an important step for a successful energy policy in our country.” Prof. Alberts adds: “The immediate goal is to set-up a commercially viable production plant for CIGS thin-film modules in South Africa in order to supply products with high local content to existing and future PV projects in South Africa. The European Investment Bank already announced its support for the establishment of a PTiP production plant and the mass production of PV modules. With the core production equipment and support from our partner, SINGULUS, we are able to industrially and efficiently implement our developed process.”

SINGULUS has been working with the scientists from the University of Johannesburg for the past 3 years and in the course of the cooperation already delivered the first laboratory systems in 2011. Dr.-Ing. Stefan Rinck, CEO of the SINGULUS TECHNOLOGIES AG, remarks: “With the vacuum coating, the selenization as well as two work steps in the wet-chemical area, in total we supplied four key process steps for a CIGS line. With our partner PTiP, we intend to continue to successfully implement the additional expansion stages as well.”

Information CIGS Thin-film Solar Technology

Solar cells and modules can be categorized in terms of the specific production processes and used materials, for example, crystalline silicon solar cells and CIGS thin-film modules.

The CIGS thin-film solar technology utilizes large glass substrates as the basic

substrate material, on which a very thin photo-active layer with a thickness of approx. 1.5 to 2.5 µm is applied. This absorber layer consists of a compound semiconductor including the elements copper, gallium and indium with selenium and sulfur in a so-called chalkcpyrite structure.

In contrast to monocrystalline or polycrystalline solar cells, thin-film modules only marginally lose performance amid low light or very high temperatures. This results in the fact that thin-film solar cells produce electricity earlier in the morning hours and later in the evening hours. Furthermore, thin-film solar modules can be used as a design feature for the front or the roof of buildings due to its homogenous surface and better visual appearance.

SINGULUS TECHNOLOGIES focuses on the market of CIGS solar cells with photoactive layers made of compound semiconductors. These thin-film cells have achieved laboratory efficiency levels of around 20% so far. The efficiency of modules is in a range from 13% to 15%, depending on the module size.

If you wish you can receive photos of the event under contact@go-metacom.de.





Profile SINGULUS TECHNOLOGIES:

SINGULUS TECHNOLOGIES develops innovative technologies for efficient production processes, which only make use of resources conservatively. New production technology combined with sustainable processes and the use of novel materials can decouple the use of resources from economic growth in the long-term.

SINGULUS TECHNOLOGIES' innovative power and competitiveness are strengthened by these new technologic developments.

With its Optical Disc segment SINGULUS TECHNOLOGIES is the market leader for CD, DVD and Blu-ray Disc production equipment. As the only engineering company worldwide SINGULUS TECHNOLOGIES today already provides the machine technology for three-layer Blu-ray Discs with a storage volume of about 100 GB.

In the Solar division SINGULUS TECHNOLOGIES is a recognized supplier for new machines concepts and production processes for crystalline and thin-film solar cells, which increase the efficiency of solar cells and reduce their production costs. SINGULUS TECHNOLOGIES establishes itself as a development partner and machine supplier for technologies enabling a sustainable energy provision on the basis of renewable energies.

In the Semiconductor segment SINGULUS TECHNOLOGIES focuses its activities on the vacuum coating of wafers with ultra thin layers for the production of MRAM memory, thin-film write/read heads and other semiconductor applications.

SINGULUS TECHNOLOGIES continues to expand its know-how in vacuum coating, the automation and process technology as well as the integration of manufacturing lines in order to develop new work areas. To strengthen the existing business activities SINGULUS TECHNOLOGIES is currently reviewing concrete acquisition opportunities.

New application areas for vacuum deposition technology are the focus of the further development.

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