



# Top quality control



Albrecht Krüger

Dr. Albrecht Krüger, CEO, SENTECH Instruments GmbH talks to PES about non-contact, non-invasive optical characterization using ellipsometry and reflectometry, and their new quality control system SENperc PV ...

**PES: Welcome to PES Solar/PV magazine. Thanks for talking with us. Would you like to begin by explaining a little about the background of your organization and how you currently serve the solar industry?**

**Albrecht Krüger:** In 1990, SENTECH was founded in Adlershof, Berlin and is part of the business campus Adlershof, Berlin. SENTECH Instruments develops, manufactures, and globally sells innovative capital equipment centered on thin films such as in semiconductor technology, microsystems, photovoltaics, nanotechnology and materials research.

Plasma process technology and thin film metrology are the business areas of SENTECH. Both market segments have some connection to photovoltaics. SENTECH provides innovative solutions for non-contact, non-invasive optical characterization using ellipsometry and reflectometry.

Due to special measuring solutions for the development and production of crystalline silicon and thin film solar cells, SENTECH is very successful in the field of photovoltaics.

SENTECH is market leader in quality control of anti-reflective coatings for silicon



solar cells. Leading edge equipment, global sales and local service support make us a reliable partner to industry and scientific institutions. SENTECH provides quality control equipment for layer thicknesses and refractive index, in line as well as off line.

Our latest development, the SENperc PV, is the solution for quality control of the backside coatings of PERC cells.

In addition we offer worldwide measurement tools for minority carrier lifetime for silicon, which are manufactured by Freiberg Instruments and which are distributed by our sales and marketing company SENTECH Gesellschaft für Sensortechnik mbH in Krailling, Germany.

**PES: You are active in a number of industry sectors. How important is the solar business to SENTECH?**

**AK:** SENTECH Instruments operates in different business areas. About 10 years ago we sold the first standard ellipsometer for measuring anti-reflective coatings for photovoltaic applications. Today we offer a full product range for quality control in crystalline Si solar cells, thin film solar cells and R&D.

In 2010/2011 the solar branch had a share of nearly 30% of SENTECH Instruments overall turnover. More than 400 quality control systems for single layer AR coatings have been sold. Lately, we clearly recognize a renewed growth in the solar market. With the introduction of PERC technology, SENTECH releases the SENperc PV for quality control of double layers.

**PES: Is solar/PV a growing business area for you? How are you capitalizing on this growth?**

**AK:** We expect the PV products to contribute an even increasing amount of our turnover.

By the renewed increase in demand for PV metrology, the solar market is an important and growing business for us. In the past and today, we have a whole development department focused on this market in order to meet the needs of customers quickly and specifically.

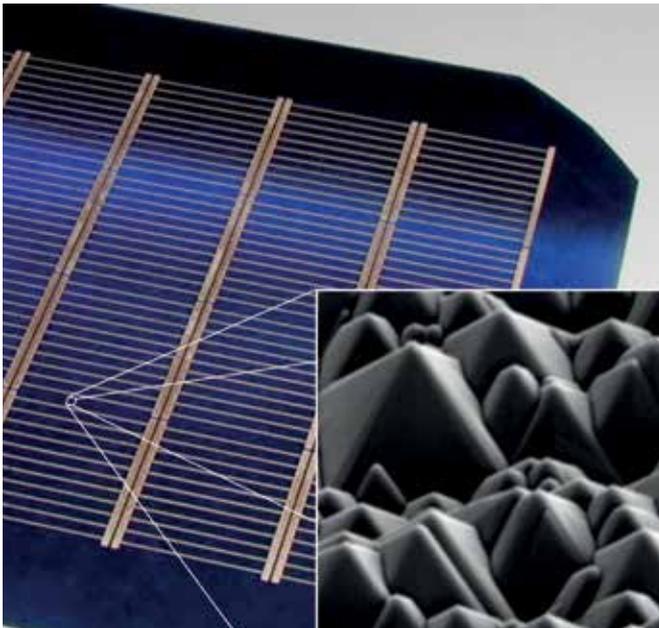
**PES: We see that you have announced the release of a new quality control system for PERC, the SENperc PV at the Intersolar 2016 in Munich. What are the benefits for the end user?**

**AK:** The SENperc PV is designed for quality control in PERC cell manufacturing.  $Al_2O_3/SiN_x$  layer stacks and single films for passivation of PERC cells are measured and the stability of the deposition process is monitored over a long time. Thereby, maintenance intervals are optimized.

The SENperc PV comes with recipe based push-button operation and industrial user interface. The easy workflow is as follows: The solar cell is placed with the side to be measured upside down on the sample table. No sample alignment is required. The wafer ID is entered and the measurement is started. Thickness and refractive index are measured and saved to the SQL database.

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Statistical process control is applied to evaluate the cell wafers. Preset ranges are applied for yield analysis. Direct feedback is provided to the operator. The SQL database can be accessed locally and via LAN.

The compact design of the SENperc PV combined with push-button operation and data access via LAN make the SENperc PV the ideal solution for quality control of PERC cells.

**PES: SENTECH has a growing reputation for organizing seminars, is collaboration and informing part of your company policy? What are the benefits of the seminars to SENTECH?**

**AK:** The seminars serve to introduce our latest developments and product solutions. The seminars are an ideal solution for building high quality customer relation. To be closer to our foreign user, we organize seminars for thin film metrology, photovoltaic and plasma process technology even in China. The numbers of

subscribers are continuously growing. SENTECH seminars are a key part of our marketing and sales strategy.

**PES: Speaking about measurement tools for PV, can you tell us about SENTECH's current products for Crystalline Silicon & Thin Film Solar cells?**

**AK:** We currently offer several products in the PV market, centred on thin film analysis: The spectroscopic ellipsometer SE 800 PV is used in the development of new coatings and coating systems for crystalline Si cells. The SE 400adv PV represents a world standard in quality control of anti-reflection layers (AR layers) in manufacturing of crystalline Si cells. SENTECH reflectometers are used for in line and off line measurements of absorbing or TCO layers on thin film solar cells.

Just recently we released the SENperc PV. The SENperc PV is the worldwide first quality control system dedicated to PERC cell production.

**PES: Geographically speaking, where are the key markets for SENTECH and do you have any plans for expansion into other areas?**

**AK:** In recent years China and Taiwan have focused on the production of solar cells and therefore our key markets are in this area. For that reason SENTECH introduced the new SENperc PV at the SNEC 2016 show in Shanghai. Southeast Asian countries are an evolving market. India decided to manufacture cells on its own; so it also became an interesting new market for us. Germany is a very important market for the development of new solar cells, which is why we are presenting the SENpercPV for the first time at Intersolar Europe. The US is also another market we want to develop over the coming years.

**PES: What are your thoughts about prospects for 2016 with regard to your organization, and the solar industry in general?**

**AK:** In general, we see development of the solar industry worldwide on a promising course, we want to benefit from it. Quality control using the SENperc PV for PERC cells will be our biggest market in the future. However, there are already new developments, which will produce more efficient cells. ■

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