Flexible OLEDs monitored by LayTec

In the last 2.5 years, a group of leading German companies and research institutions collaborated in a joint project on the production of highly efficient organic devices on flexible substrates used in a novel roll-to-roll process technology. LayTec in-line GmbH was part of this R2flex consortium, which was co-funded by the German government, and contributed to its work with metrology expertise. Recently, the results were officially announced at www.printedelectronicsworld.com. Within this collaboration, LayTec developed optical methods for in-line characterization of complex organic layer structures regarding layer thickness and homogeneity. Direct optical measurements can now overcome the shortcomings of standard quartz measurements. According to Tobias Schenk, the president of LayTec in-line GmbH, "This cooperation paved the way for LayTec's competence in OLED applications. The newly developed methods and algorithms can now be transferred into production of organic structures and are already applied in other LayTec systems used for roll-to-roll processes. We are proud to be a part of the organic revolution on the LED market."

PearL qualified for CIGS monitoring in high-volume PV production

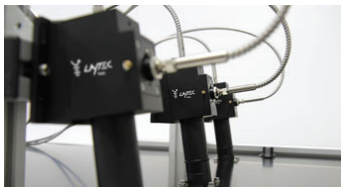

Fig. 1: Three measurement heads of PearL installed over a module.

To improve the production process of $Cu(In,Ga)Se_2$ thin film modules, it is essential to ensure the quality of the absorber. For this purpose, LayTec's spectroscopic photoluminescence (PL) system PearL has been evaluated by the German solar equipment and module manufacturer Manz CIGS Technology GmbH. Measurements on more than 2000 production and test modules proved that PearL has numerous advantages under production conditions:

- PearL provides reliable CIGS characterization across the full module length at different points;
- It gives spatially resolved information about band gap, material composition and quality of the CIGS absorber material;
- PearL analyzes the absorber directly after its deposition and, therefore, feeds back important absorber parameters without interference of other layers;
- Faulty substrates are identified before the cost-intensive back-end processing;
- Compared to X-ray fluorescence (XRF), which needs approx. 90 s for one measurement point, the measurement time of PearL is only 0.1 s, which makes the tool much more appropriate for high volume production.

To monitor the CIGS coating process and to optimize the module performance, an exact identification of Ga/(Ga+In) ratio (GGI) is of high importance. Since the GGI is directly correlated to the band gap of the absorber, this parameter has an influence on the open circuit voltage Voc and external quantum efficiency EQE(λ) of the device.

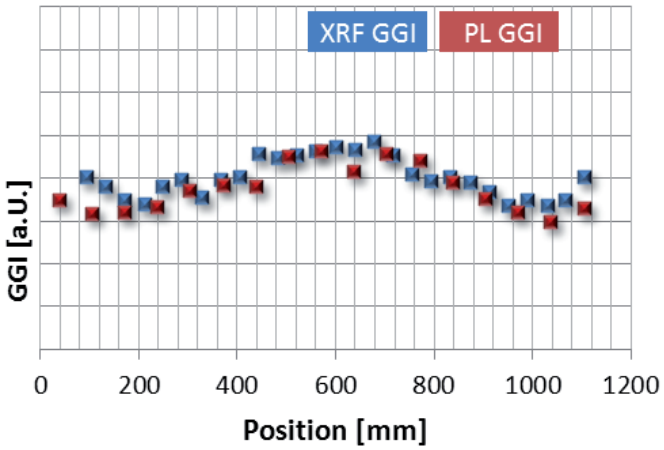

Fig. 2: Direct comparison of the GGI results measured by XRF (blue) and PearL (red) across a substrate.

A line scan across the length of a CIGS coated substrate was performed by both PearL and XRF. With the XRF method, the element composition of the absorber is determined and the GGI can be computed. The agreement of both measurement methods to determine the Ga/In ratio is very good (see Fig. 2), which proves that the spectrally resolved PL is a reliable and fast method to obtain in-line GGI line scans.
These results were presented by Manz and LayTec at the last EUPVSEC conference (www.photovoltaic-conference.com). For further information please ask for the conference abstract via mail@laytec.de or visit www.laytec.de/pearl

You can meet us at the following workshops, conferences and trade fairs:

12 – 15 November 2013 | Intersolar India - Booth 1618 of our distribution partner Bergen | Mumbai, India | www.intersolar.in

20 – 22 May 2014 | SNEC PV Power Expo - booth E3-550 | Shanghai, China | www.snec.org.cn