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In-situ defect detection systems for R2R flexible PV barrier films

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ABSTRACT

Film processing procedures by means of Roll-to-Roll (R2R) for barrier coatings can often result in PV barrier films being manufactured with significant quantities of defects, which resulting in lower efficiency and a short life span. In order to improve the process yield and product efficiency it is desirable to develop an inspection system that can detect transparent barrier film defects in the production line during the film processing. Off-line detection of defect in transparent PV barrier films is difficult and time consuming. Consequently implementing an accurate in-situ defects inspection system in the production environment is even more challenging, since the requirements on positioning, fast measurement, long term stability and robustness against environmental disturbance are demanding. This paper reports on the development and deployment of two in-situ PV barrier films defect detection systems, one of them is based on wavelength scanning interferometry (WSI) and the other one is based on White Light Channeled Spectral Interferometry (WLCSI), and the integration into an R2R film processing line in the Centre for Process Innovation (CPI). The paper outlines the environmental vibration strategy for both systems and the developed auto-focussing methodology for WSI. The systems have been tested and characterised and initial results compared to laboratory-based instrumentation are presented.

Keywords: Surface inspection, Defects, Photovoltaic, Thin-film and Aluminum Oxide

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