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Wavelength Scanning Interferometry for PV Production In-line Metrology

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Flexible PV modules are manufactured using roll to roll (R2R) technology. These modules require a flexible barrier material to prevent water vapor ingress.

Flexible solar modules comprise four functional layer groupings. The main focus of the investigation in this work is the barrier layer, this layer is typically formed from a planarised Polyethylene Naphthalate (PEN) sheet with an amorphous Al₂O₃ barrier coating <50 nm thick.

Thin layers of Al₂O₃ of deposited via the atomic layer deposition technique (ALD) using R2R technology, have been introduced to allow PV modules transparency, flexibility and to provide an effective barrier layer. The process uses Trimethyl Aluminium (TMA) and water precursors and the tuned process temperature is 105 °C.

The WVTRs of the study were carried out at the National Physical Laboratory (NPL) using a traceable instrument.

The analysis of the results appears to indicate that sample with higher density of large defects exhibit inferior barrier properties.

WSI results compare favorably with Coherence Correlation Interferometry (CCI) results.

The results provide basis for development of a proof of concept system.