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

**Problem Statement**

Micro and nano scale defects that occur during the deposition process of PV barrier films not only degrade the PV module performance over time but lead to the scrapping of high value products. The overall aim of this study is to develop in process metrology systems to detect the PV barrier films defects.

**Thin Film PV Modules**

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.

**Experimental work**

Two representative Al₂O₃ ALD samples processed by the Centre for Process Innovations (CPI). These samples have an 80 mm diameter area that has been ALD coated with 40nm Al₂O₃.

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

**WVTR test results**

- 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.

**References**


**Acknowledgement**

To EPSRC via EU FP7 programme for NanoMend project NMP4 LA-2011-280581 and Libyan Cultural Attaché in London