

PO2064

**Towards high-volume production of ultra-moisture barrier films**

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Increasing number of commercial electronic products with integrated flexible components is setting a clear trend towards flexibility and wearability of electronics. Devices with integrated flexible Organic Light Emitting Diodes (OLEDs) and/or Organic Photovoltaic (OPV) are becoming reality and since both are known to be sensitive to moisture, access to an affordable flexible encapsulation becomes a must for producers of consumer electronics.

Holst Centre has long history in development of technologies for transparent ultra-moisture barrier encapsulation of OLEDs and OPVs, utilizing sheet-to-sheet (S2S) processing approach. Our partners successfully commercialized Holst Centre S2S encapsulation technology, but to further reduce cost and to make a major step towards mass produced moisture-barrier, in 2012 Holst Centre setup a unique roll-to-roll tool with capability to deposit a multilayer moisture barrier coating on foil. The tool combines PECVD deposition of inorganic coatings with possibility to slot-die coat organic coatings.

In our contribution, we will report on development of a moisture barrier foil in the above mentioned tool, based on a single PECVD deposited SiNx coating. We optimized intrinsic WVTR of the SiNx coating and significantly reduced number of imperfections, so called pinholes, in the barrier film. We have performed 2.5km long barrier foil production run and analyzed the barrier performance. Entire run shows extremely low overall WVTR of  $2-5 \cdot 10^{-6}$  g/m<sup>2</sup>/day, i.e. performance suitable with use in OPV applications and being promising for encapsulation of small OLED devices. Moreover, we will demonstrate suitability of the barrier foil to be integrated to an end product by lamination without being damaged. By end of our contribution we will report on challenges accompanying roll-to-roll production of moisture barrier film.

**Keywords**

ultra-moisture barrier

roll-to-roll

SiNx

OLED

OPV