

## **Latest results of full reactive ITO deposition from InSn rotatable target**

**P. Sauer, A.Reus, H.-G. Lotz,  
Applied Materials GmbH & Co. KG, Alzenau, Germany**

Flexible Display, PDAs, Touch screens and Mobile phones of the latest generation need TCO as a reliable functional layer. TCO is commonly made by sputtering ITO. The market requires low specific resistance and higher target utilisation. The development of an ITO coating using a full metal InSn alloy rotatable cathode is described. The description starts with cathode design and several coating results. Further discussed is the comparison of DC planar ITO coating using high efficiency cathode against InSn metallic rotatable magnetron using oxygen partial pressure measurement for process control. Resulting data about target utilisation, specific resistance, process parameter and optical properties are discussed as well as SEM micrograph pictures.

The selected rotatable source is designed for low particle generation due to less redeposition, high coating rate and high target utilization. Multiple Materials can be used as well as different power supplies like RF, MF, and DC. New target manufacturing technologies and tools for sputtering with rotatable cathode applications leads in the possibility to develop new processes. The selected source is installed in a sputter roll coater for flexible electronic applications. The used target material is In Sn alloy 90:10, thickness 5mm and race track length 600 mm. The substrate materials were PET, Glass\* and Si wafer \*peaces (\* fixed on PET). The process trials are recorded using the machine dedicated data logging. The oxygen partial pressure measurement is used for closed loop process control to stabilize the working point. The regulation parameter power or oxygen flow chose able. In-line pre-treatment processes and surface treatment were not used.

Within the presentation are diagrams of process characteristic of O<sub>2</sub> flow, Ar flow, with electrical parameter P,U,I, resistance versus working point, rate versus working point, thickness distribution, resistance distribution ,optical data n, k, target erosion profiles , estimated target life time as well as machine parameters shown.

Summarised results:

Results for TCO layers sputtered from InSn Target are comparable with layers sputtered from ceramic ITO targets.

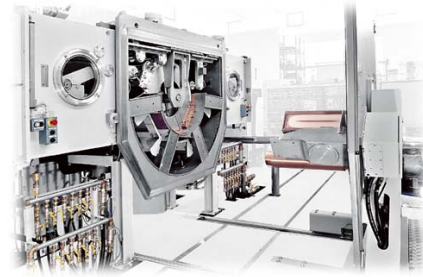
Sophisticated oxygen partial pressure control is essential for process stabilization of InSn sputtered in a fully reactive mode.

Deposition rate using rotatable InSn targets is higher than for planar ceramic ITO targets.

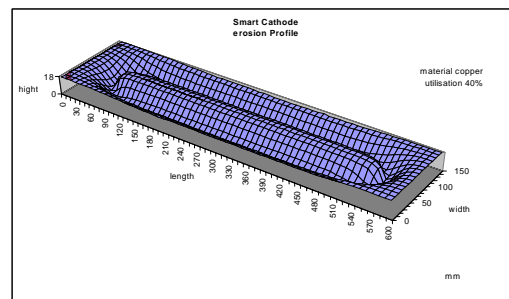
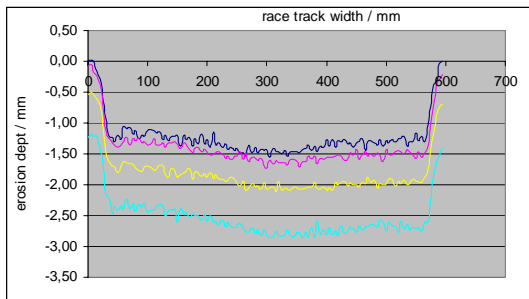
No nodule growth is observed on the InSn target surface during trials.



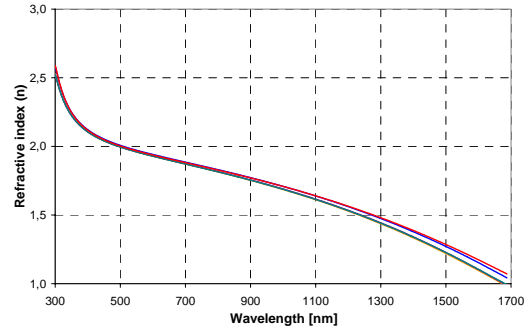
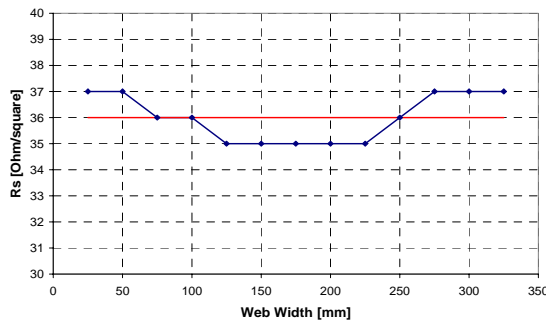
Rotatable cathode



SmartWeb™ R2R coater

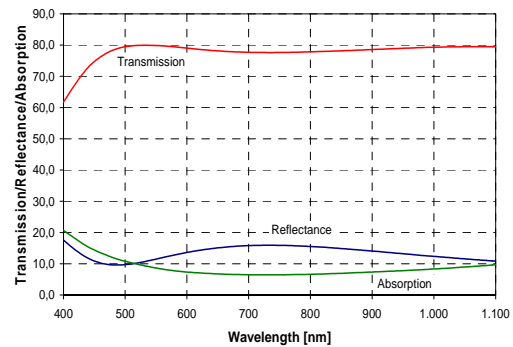
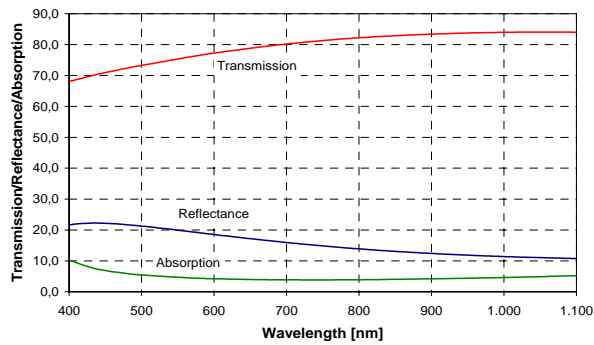


Erosion profiles



Resistance distribution

n,k



transmission, réflexion, absorption @ 60

transmission, réflexion, absorption @ 120