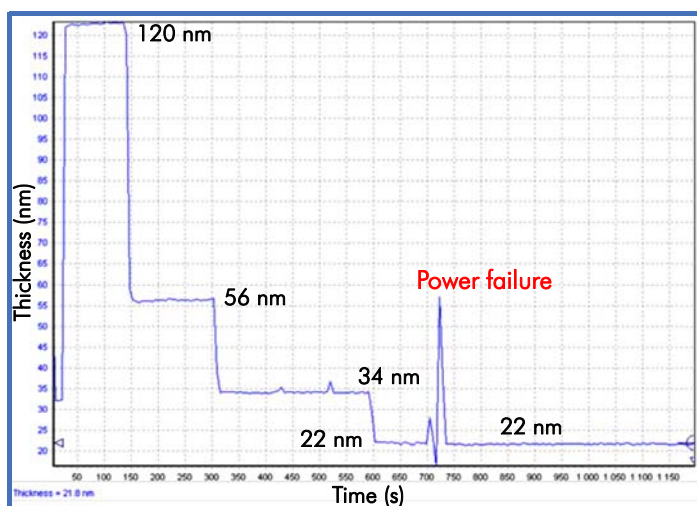


## In-Line Quality Control of Thin Film Coating By UVISEL Spectroscopic Ellipsometer

Turn-key Spectroscopic Ellipsometer for Web Coater and Roll to Roll Systems

### High Quality Thin Film Coating

The UVISEL Spectroscopic Phase Modulated Ellipsometer is a turn-key thin film metrology instrument for in-line measurement of thin film thickness and optical properties. It features rapid measurement capability with data acquired every 50ms for powerful control of thin film uniformity across the entire web.



Real-time monitoring of AlO<sub>x</sub> with different thicknesses deposited on a PET substrate. Before power failure the process consists of the deposition of 22 nm of AlO<sub>x</sub>. After power failure, 22 nm film thickness is accurately remeasured.

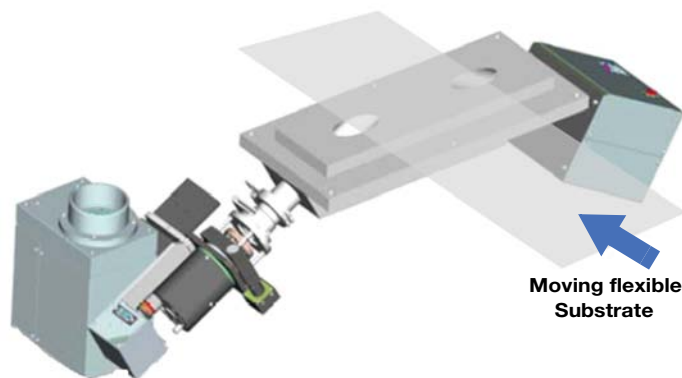
### User Friendly Monitoring

The software has been designed for an easy operator control. Simple recipes are used to control web coatings very easily. Push button operations launch the recipe providing in-line information of film thickness and optical properties along with traceable results.

The software integrates advanced data processing capabilities including: integrated SQL database, real-time data monitoring and comprehensive reprocessing capabilities.

### Robust Data Guaranteed

Special algorithms have been developed to ensure robust data in case of power failure. By using the UVISEL, high productivity and low down time is guaranteed.



Fast measurement speed, user-friendly operation and robust results guarantee superior thin film quality control for roll-to-roll production.

### Simple Integration and Multi Roll to Roll Process Capability

The design of the UVISEL ellipsometric heads allows simple integration into roll-to-roll systems, while the software provides advanced communication capabilities suited to roll-to-roll production.

In production environments the UVISEL communicates via TCP/IP, RS232 protocols. The software is also capable of monitoring several ellipsometer sensors simultaneously, making the instrument for multi-process web coaters. The ellipsometers are positioned after each deposition module to control film quality accurately. Communication between the ellipsometers ensures accurate data transfer at each step of the process.

### Versatile Thin Film Coating Applications for the demanding needs of

- Flexible solar cells
- Flexible display and lighting
- Flexible ultra-high barriers for encapsulation

- Substrate materials: PET, PEN, PI, PC, PA, TAC...
- Thin Film materials
  - Thin metal films: Ag, Al, Cr, Cu
  - Transparent electrodes: ITO, AZO, i:ZnO
  - Polymers, organic LED films
  - Dielectrics: Al<sub>2</sub>O<sub>3</sub>, SiN, SiO<sub>2</sub>, Ta<sub>2</sub>O<sub>5</sub>, TiO<sub>2</sub>, Nb<sub>2</sub>O<sub>5</sub>....

## UVISEL In Line Technical Specifications

Set of 2 mechanical adaptations: CF35 or KF40 Flange and silica windows

Spectral range: 210-830 nm; 190-830 nm

Light source: 150 W Xe lamp

Spot size: 1x3 mm

Multiwavelength detection: 32 or 64 wavelengths in real-time

Acquisition time: minimum 50 ms

Typical cycle time: 2s (measurement and calculation)

Compatible with both slow and fast coating machines

Communication protocol: RS232; IP

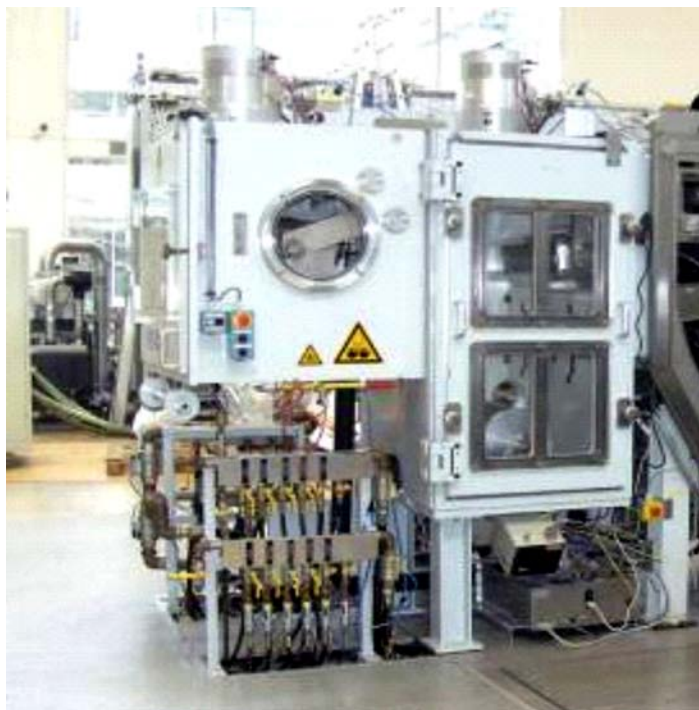
Precision for single layer systems

Thickness < 100 nm  $\pm$  1 nm

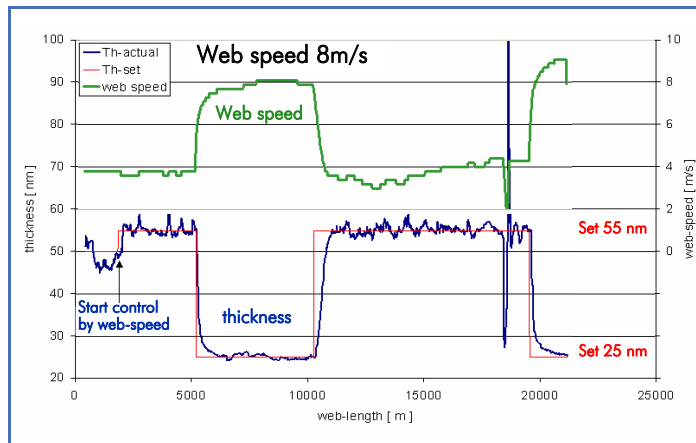
Thickness > 100 nm  $\pm$  1%

Index of refraction  $n(\lambda) \pm 0.005$

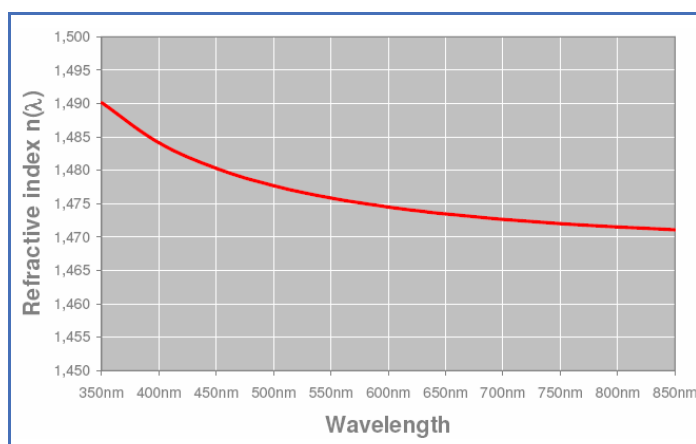
Extinction coefficient  $k(\lambda) \pm 0.01$



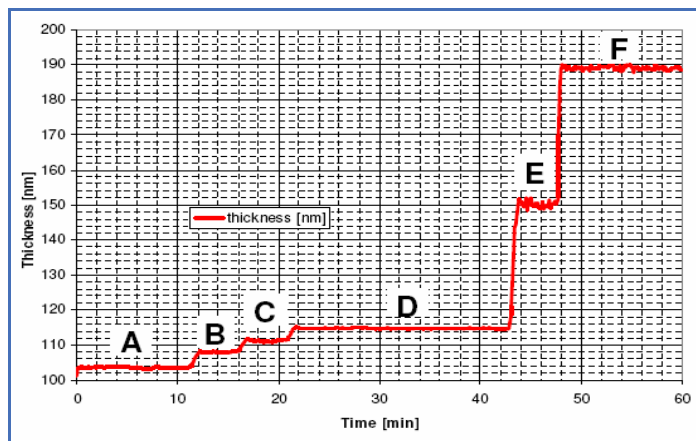
Ellipsometer Installed in a SmartWeb™ Sputter System supported by the European Program Flexonics FP6



In-line thickness control of SiO<sub>x</sub> barrier layer on PET film



Measurement of refractive index of evaporated SiO<sub>2</sub> layer



Layer Thickness Versus Speed Variation; Sputtered Al<sub>2</sub>O<sub>3</sub> film by DC sputtering

**Acknowledgements:**

In-line UVISEL has been developed through Flexonics project with the collaboration of Applied Materials, Aristotle University of Thessaloniki and HORIBA Jobin Yvon.

Reference: Flexonics project n°NMP3-CT-2005-013883: «Ultra-high barrier films for r2r encapsulation of flexible electronics» under FP6 of European Community.