

# RTSE

## Real Time Spectroscopic Ellipsometer





## REAL TIME SPECTROSCOPIC ELLIPSOMETER

The RTSE is the most advanced Spectroscopic Ellipsometer worldwide, dedicated to In-Situ process characterization and monitoring. Based on the well proven technology of the SOPRA model GESP5 for Ex-Situ application, the RTSE includes all the components enabling immediate experiments : optics, mechanics, electronics, detection and control unit. It is composed with the following items :

### **SOURCE MODULE:**

- Xenon arc lamp (75 W) (Ozone free)
  - Covers 185nm to 2500nm
  - Integrated in an air cooled module
  - Directly adapted on Polarizer arm.
- Stabilized power supply, cumulative time counter.*

### **POLARIZER AND ANALYSER ARMS:**

The two arms can be adapted on UHV flanges. Both arms require UHV windows type CF35/NW38/NW64 or other to be specified, (not included). The two arms are basically composed with :

- Focalisation optics
- Polarizer and analyzer (selected Rochon separators)
- Stepper motors coupling for polarizer & analyzer.
- Polarizer and analyzer angle can be selected through software (Repeatability of P and A :  $\pm 0.02^\circ$ )

Polarizer arm : - Focalization optics to provide a parallel beam  
- Beam diameter : 6 mm maximum.  
- Typical rotation speed of Polarizer : 10 t/sec.  
- Shutter & attenuator automated positioning system.

Analyzer arm : - A removable auto-collimating microscope mounted directly on the arm uses the measurement beam itself for ease of sample alignment.  
- A Mirror focalizes the beam on the entrance of an optical fiber that links the analyzer arm to the spectrograph (SOPRA patented).



## **SPECTROGRAPH :**

- Simple prism monochromator
- Quasi linear dispersion on the detector in eV
- Optical fiber (SOPRA patented) at the entrance
- Variable entrance slit 0 to 1000  $\mu\text{m}$  ( $\pm 2\mu\text{m}$  reading accuracy)
- Focal length : 380 mm
- Spectral range : 240 nm – 840 nm

## **DETECTOR :**

The detector used to perform Real Time Spectroscopic Ellipsometry enables the simultaneous acquisition of 1024 wavelengths in the spectral range of : 240nm - 840nm.

- Multichannel type : CCD detector
- Array : 25 mm wide, 2.5 mm high, with 1024 detectors.

*Stabilized Power supply of detector, low voltage and high voltage for Intensifier included.*

## **ELECTRONICS :**

Power and stepper motor control for the complete instrument :

- Polarizer and analyzer prism rotation and positioning.
- Detection control
- High speed serial interface
- One Digital Signal Processor board (DSP) is included for fast acquisition and calculation.

## **COMPUTER :**

The Personal Computer is a compatible PC Pentium III working under Windows™ NT.

The main characteristics are :

- > 600 MHz
- 3.5" floppy, CD ROM, ZIP
- > 10 GB Hard Disk,
- 64 MB DRAM
- 17" High resolution colour screen
- Colour inkjet printer included

## SOFTWARE :

The RTSE includes a user friendly Windows™ NT based software for a real-time analysis of your process. It enables :

- Acquisition of the signal at different integration times (selectable from 0.1sec to 10 sec)
- Maximum measurement rate : 8 meas/sec with graphic display and saving
- Maximum measurement and analysis : 5 meas + analysis/sec with graphic display and saving.
- Possibility to average the signals for better SNR
- Calibration of wavelengths or energies & starting angles  $A_0$  and  $P_0$  for each pixel.
- Calculation and Display of  $\tan\Psi$  and  $\cos\Delta$
- Possibility to integrate the signal and acquire the data during the data reduction
- Recording of  $\tan\Psi$  and  $\cos\Delta$
- Calculation of pseudo N and k or  $\epsilon_1$  and  $\epsilon_2$
- Real time analysis of measurement and display /saving of thickness / composition /...
- The time corresponding to the measurement is indexed with results
- Possibility to control process in real time (under requirement)

## WINDOWS :

Mechanical adaptation enabling to adapt the polarizer and analyzer arms on the vacuum chamber. This adaptation includes UHV flanges and Silica windows. The windows are not birefringent and stressless to eliminate errors. Angle of incidence to be specified at time of purchase.

*This RTSE can be implemented on a goniometer ( $\Rightarrow$ GESP5) to be used as multichannel table bench SE.*

## TYPICAL SPECIFICATIONS :

- Beam diameter at windows: 5 mm
- Divergence :  $\pm 5$  mrad
- Typical angle of incidence required for semiconductors  $75^\circ$ .
- Minimum spot size on sample 1mm x 4 mm
- Useful Spectral range: 240 to 840 nm,
- Repeatability for 1 seconde integration time at 500 nm (2.5 eV) 30 measures :
  - for  $\tan\Psi = 1 \pm 0.002$  for 1 sigma
  - for  $\cos\Delta = 0.5 \pm 0.003$  for one sigma
  - Stability = 2 x Repeatability (during 2 hours)
- No Vacuum or pressure required



***FURTHER INFORMATION***

*In order to bring you the best possible product, all specifications are subject to change without notice.*

*For a firm specification and price quotation please contact :*

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