FR-Scanner-AIO-Mic-XY200 is a holistic platform for the fully-automated in-depth characterization of patterned single and multilayer coatings on wafers. It provides 200mm of travel along X and Y axes and is suitable for accurate measurements while the sample is secured on the stage through vacuum.
The tool is offered in an endless range of optical configurations within the 200-1700nm spectral range.

APPLICATIONS

- **Univ. & Research labs**
- **Semiconductors** (Oxides, Nitrides, Si, Resists, etc.)
- **MEMS devices** (Photoresists, Si membranes, etc.)
- **LEDs, VCSELs**
- **Data Storage**
- **Polymer coatings,** adhesives, etc.
- And many more…

FR-Scanner-AllInOne-Mic-XY200 integrates under the same roof state-of-the-art optical, electronic, and mechanical modules for the accurate & precise characterization of patterned films. Typical examples include (but are not limited to): micro-patterned surfaces, rough surfaces, and numerous others.

The wafer is placed on a vacuum chuck that supports any wafer size up to 200mm diameter and is equipped with reflectance standards. The characterization is performed by a powerful optical module with a **spot size as small as a few microns.** The motorized XY stage provides travel of 200mm on each axis with unprecedented speed, accuracy & repeatability.

FR-Scanner-AIO-Mic-XY200 provides:

- Real-time spectroscopic reflectance measurements
- Film thickness, optical properties, non-uniformity measurements, thickness mapping
- Imaging with integrated high-quality color camera
- Wide range of statistics for the parameters under characterization
- Semi-automatic pattern alignment capability for mapping of periodic small patterns
- Unique S/W features such as: Click2Move, Scale bar

Specifications

Model		UV/VIS	UV/NIR-HR	D UV/NIR	VIS/NIR	D VIS/NIR	NIR	NIR-N2	NIR-N3
Spectral Range (nm)		200 – 850	190-1100	200 – 1700	380 –1020	370 – 1700	900 – 1700	900 -	1280-1350
Spectrometer Pixels		3648	2048	3648 & 512	3648	3648 & 512	512	3648	512
Thickness range (SiO_2)	5X- VIS/NIR	4nm – 60µm	4nm – 80µm	4nm – 150µm	15nm – 90µm	15nm– 150µm	100nm- 150µm	4µm – 1mm	10µm-2mm
	10X-VIS/NIR 10X-UV/NIR*	4nm – 50µm	4nm – 65µm	4nm – 130µm	15nm – 80µm	15nm– 130µm	100nm– 130µm	–	10µm-2mm
	15X- UV/NIR *	4nm – 40µm	4nm –	4nm –	15nm –	–	100nm-	–	
	20X- VIS/NIR 20X- UV/NIR *	4nm – 25µm	4nm – 30µm	4nm – 50µm	15nm – 50µm	15nm – 60µm	100nm – 60µm	–	10µm-1.9mm
	40X- UV/NIR *	4nm – 4µm	4nm – 5µm	4nm – 6µm	–	–	–	–	
	50X- VIS/NIR	–	–	–	15nm –	15nm –	100nm – 8µm	–	
Min. Thickness for n & k		50nm			100nm	100nm	500nm	–	-
Number of layers		Simultaneous measurement of 4 layers with adequate refractive index contrast							
Thickness Accuracy **		0.2% or 1nm			0.2% or 2nm		3nm or 0.3%		0.4%
Thickness Precision **		0.02nm			0.02nm		<1nm	5nm	
Thickness stability **		0.05nm			0.05nm		<1nm	5nm	
Light Source		Deuterium & Halogen (internal), 2000h			Halogen (internal), 3000h (MTBF)				SLED
Microscope module		Microscope column with 2MP/5MP color image sensor with wide observation area							
Stage resolution		Better than 0.5µm							
Stage repeatability		±3µm (bi-directional)							
Absolute accuracy		±5µm							
Wafer size		2in-3in-4in-6in(150mm)-8in(200mm) and of any shape up to 200mm							
Scanning Speed		49meas/90sec (8'' wafer size)							

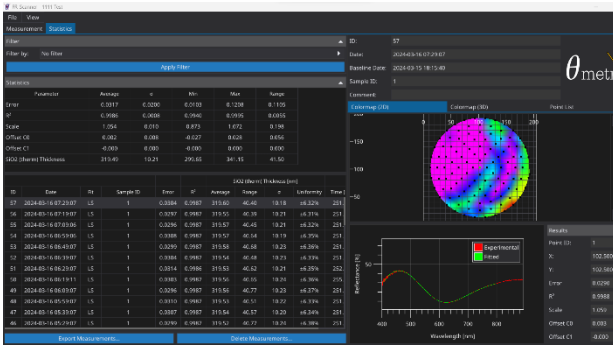
Options

FR-AutoFocus	40mm long linear axis for autofocus with two modes of operation: Image focus (contrast) / Reflectance intensity
FR-FilterWheel	Motorized filter wheel module fully computer controlled with slots for 8 filters: filter dimensions: diameter of 1inch (clear aperture 23mm).
FR-AutoTurret	Motorized and computer-controlled turret that can accommodate 4 objective lenses: typical switching speed between lenses of 2.0-3.0sec.
Lenses	Long Working Distance VIS/NIR lenses: 5X, 10X, 20X, 40X, 50X
Pump	Low-noise vacuum pump with 2.5L/min and degree of vacuum -60kPa.
Chucks	a) Single diameter wafer chucks (4in, 6in, 200mm) b) Photomask chuck (6in) with reference area c) Multiwafer chuck (100mm, 150mm, 200mm and irregular shape pieces) with reference and dark areas for automated baseline

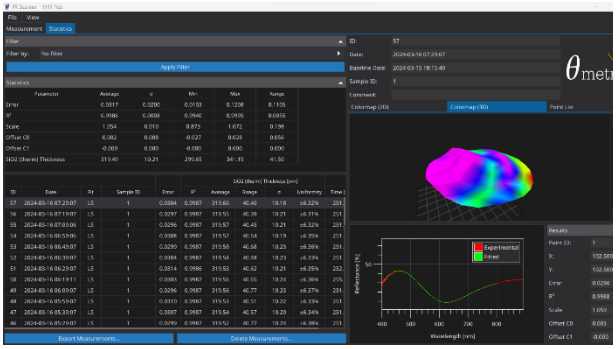
The measurement area (the area from which the reflectance signal is collected) is relative to the objective lens and the aperture size. Standard aperture sizes are: 500µm (square), 250µm (square), 150µm (square), 100µm (square), with the 250µm be the default one.
Additional aperture size upon request is: 50µm (square)

Objective Lens		Spot Size			
Magnification	**WD (mm)**	**500 µm Apertrture**	**250 µm Aperture (std)**	**150 µm**	**100 µm Aperture**
5x	45	100 µm	50 µm	30 µm	20 µm
10x	34	50 µm	25 µm	15 µm	10 µm
15x		33 µm	17 µm	10 µm	7 µm
20x	31	25 µm	14 µm	8 µm	5 µm
50x	20	10 µm	5 µm	3 µm	2 µm

Power Requirements	Single-phase 96-230V, 5A@100V, 2A@220V
Tool dimensions /	800(W) x 600 (D) x 850mm (H) / 90Kg and 390x320x220 (NIR-N3)
Material Database	> 850 different materials
SW Characteristics	FR-Monitor v4.0 (free of charge updates) Full details at the related catalog's page



2D thickness map

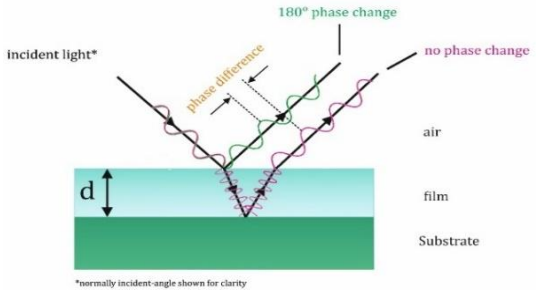


3D thickness map

PRINCIPLE OF OPERATION

White Light Reflectance Spectroscopy (WLRS) measures the amount of light reflected from a film or a multilayer stack over a spectral range, with the incident light normal (perpendicular) to the sample surface.

The measured reflectance spectrum, produced by interference from the individual interfaces is being used to determine the thickness, optical constants (n & k), etc. of free-standing and supported (on transparent or partially/fully reflective substrates) stack of films.



Specifications are subject to change without any notice. True X-Y scanning is also possible through custom-made configuration ** Measurements compared with a calibrated spectroscopic ellipsometer and XRD, Average of standard deviation of mean value over 15 days. Sample: 1micron SiO2 on Si wafer, Standard deviation of 100 thickness measurements. Sample: 1micron SiO2 on Si wafer, 2*Standard-Deviation of daily average over 15 days. Sample: 1micron SiO2 on Si wafer. *** For Double Side Polished Si wafers ***Stage for 450mm wafers is also available upon request.