# **ThetaMetrisis**

Catalog

ThetaMetrisis – 2022.1



# θ metrisis Film Metrology & More...

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# θ metrisis Film Metrology & More...

# FR-pRo: Build2Order film characterization tool

**FR-pRo** is a modular & expandable platform for the characterization of coatings in the **1nm-3mm** thickness range.

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FR-pRo tools are tailored to the user needs for a wide range of diverse applications, such as: Film thickness, Refractive Index. Color, Transmittance. Reflectance. Film Characterization under temperature or ambient controlled environment or in liquid environment and many more ...

## **Applications**

- Univ. & Research labs
- Semiconductors
- Polymer & Resist characterization
- Chemical measurements
- Dielectric characterizations
- Biomedical
- Hardcoats, Anodization, Metal parts process
- Optical Coating
- non-metal Films
- And many more...

(Contact us with your requirements)



The **FR-pRo** tool is assembled by user selected modules. The Core Unit accommodates the light source, the spectrometer (for any spectral regime in the 190nm-2500nm range) and the control & communication electronics. Then, there is a wide range of Accessories, such as:

- Film Thickness kit for characterization of coatings,
- FR-Mic for measurements at very small areas,
- Manual & Motorized stages,
- Film/Cuvette Holder for Absorbance / Transmittance and chemical concentration measurements,
- **Thermal** or **Liquid kits** for measurements under controlled Temperature or in Liquid environment,
- Integration Spheres for diffuse & total reflectance

# By the combination of different modules, the final set-up meets any end-user needs

#### **Features**

- Single-click analysis (no need for initial guess)
- Dynamic measurements

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- o Measurement of n & k, color
- Save images & videos for presentations
- Multiple installations for off-line analysis
- Free of-charge Software update



## FR-pRo Specifications (standard configurations)

Model	UV/Vis	UV/NIR -EXT	UV/NIR-HR	D UV/NIR	VIS/NIR	D Vis/NIR	NIR	NIR-N1	NIR-N2	NIR-N3	NIR-N4
WL Range -nm	200 - 850	200 –1020	200-1100	200 - 1700	370 –1020	370 – 1700	900 - 1700	850-1050	900 - 1050	1280-1350	1520-1580
Pixels	3648	3648	3648	3648 & 512	3648	3648 & 512	512	3648	3648	512	512
Min Thick -SiO <sub>2</sub>	1nm	1nm	1nm	1nm	12nm	12nm	50nm	1um	4um	12um	20um
Max Thick SiO <sub>2</sub>	80um	90um	120um	250um	100um	250um	250um	500um	1.2mm	2mm	3mm
Max Thick -Si								300um	500um	1mm	1.3mm
n&k -MinThick	50nm	50nm	50nm	50nm	100nm	100nm	500nm		-	-	-
Thick. Accuracy **	1nm / 0.2%	1nm / 0.2%	1nm / 0.2%	1nm / 0.2%	1nm / 0.2%	2nm / 0.2%	3nm / 0.4%	50nm / 0.2%	50nm / 0.2%	50nm / 0.2%	50nm / 0.2%
Thick. Precision**	0.05nm	0.05nm	0.05nm	0.05nm	0.05nm	0.05nm	0.1nm		5nm	5nm	5nm
Thick. stability **	0.05nm	0.05nm	0.05nm	0.05nm	0.05nm	0.05nm	0.15nm		5nm	5nm	5nm
Light Source	Internal Balanced Deuterium & Halogen, 2000h			jen, 2000h	Halogen (internal), 10000h (MTBF)					SLED, 2000	00h (MTBF)
Integration Time		5msec (min)			20msec (min)				20mse	c (min)	
Spot size	Diameter of 350um (smaller spot size options are available upon request)										

Material Database

> 700 different materials

## Accessories

Computer Focusing module Film/Cuvette kit Contact probe Microscope Scanner (motorized) Integrating sphere Manual X-Y stage Thermal Module And many more...... Laptop / Touch Panel PC with 19inch screen Optical module attached on the reflection probe for <100µm diameter spot size Transmission measurements of films or liquids in standard cuvettes Thickness & optical measurements of coatings in the field. Ideal for curved surfaces Microscope-based reflectance and thickness measurements with high lateral resolution Polar (R-0) or Cartesian (X-Y) automated stage with wafer chuck. Reflectance& transmittance For the characterization of specular and diffuse reflectance of coatings and surfaces Manual X-Y stage for measurements over an area of 100mm x 100mm or 200mm x 200mm Computer controlled Hot plate embedded in the FR-tool (Room temperature - 200°C, 0.1°C acc.)







# **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; \*\* Thickness range depends on the spectral range and refers to a single layer with refractive index ~1.5 over Si or similar substrate \*\* Measurements compared with a calibrated spectroscopic ellipsometer and XRD, Average of standard deviation of mean value over 15 days. Sample: 1micron SiO<sub>2</sub> on Si wafer, Standard deviation of 100 thickness measurements. Sample: 1micron SiO<sub>2</sub> on Si wafer, 2\*Standard-Deviation of daily average over 15 days. Sample: 1micron SiO<sub>2</sub> on Si wafer.

FR-pOrtable: USB-powered, film characterization tool at the Point-of-Need

FR-pOrtable is a unique handy solution for accurate & precise non-destructive characterization of transparent and semitransparent single films or stack of films. It is powered through the same USB port used for data transfer and can be easily used at the field (the tool comes over the sample). With **FR-pOrtable** the user can perform reflectance and transmittance measurements in the 380-1050nm spectral range.

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## **Applications**

- Univ. & Research labs
- Semiconductors (Oxides, Nitrides, Si, Resists, etc.)
- MEMS devices
   (Photoresists, Si membranes, etc.)
- o LED
- Data Storage
- Hard/Soft coatings on curved substrates
- Polymer coatings, adhesives, etc.
- Biomedical (parylene, balloon wall thickness, etc.)
- And more...

(Contact us with your requirements)



The compact size of **FR-pOrtable** along with the custom designed reflection probe, and the long lifetime (20.000h) broad-band light source guarantee highly accurate and repeatable measurements.

FR-pOrtable, can be either mounted on the supplied base/stage or can be easily transformed to a handheld thickness measurement tool to be placed over the sample under characterization.

FR-pOrtable is the robust & accurate thickness gauge for real-time characterization of coatings in industrial environment (e.g. R2R, belt conveyor...).

# FR-pOrtable is the only USB-powered optical characterization tool for in-field applications.

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# Film Metrology & More...

#### Features

- Single-click analysis (no need for initial guess)
- Dynamic measurements
- Measurement of n & k, color
- Save images & videos for presentations
- 700+ non-identical materials
- Multiple installations for off-line analysis
- Free of-charge Software update



## **Specifications\***

Thickness range	12nm – 90μm
Refractive Index calculation	✓ (100nm min. thickness)
Thickness Accuracy <sup>1</sup>	0.2% or 1nm
Thickness Precision <sup>2,3</sup>	0.02nm
Thickness stability <sup>4</sup>	0.05nm
Sample size	1mm to 180mm and up
Spectral Range	380nm – 1050nm
Working distance	3mm-20mm
Spot size	360um (diameter)
Light Source	Hybrid (LEDs and incandescence lamp) 20000h
Wavelength resolution	0.8nm
Number of Layers Measured	Max. 5 layers
Measurement time	10ms
A/D converter	16 bit
Power	USB – supplied
Dimensions	300mm x 110mm x 40mm <sup>5</sup>

## **Accessories**

At-the-Field adaptor: For measurements at the Point-of-Need. Transmittance module: For the measurement of transmittance & absorbance spectra of coatings, coating thickness etc.

Manual X-Y stage:

For the characterization of coatings at multiple positions (manual movement)

## **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, <sup>1</sup>Measurements compared with a calibrated spectroscopic ellipsometer and XRD, <sup>2</sup>Average of standard deviation of mean value over 15 days. Sample: 1micron SiO<sub>2</sub> on Si wafer, <sup>3</sup>Standard deviation of 100 thickness measurements. Sample: 1micron SiO<sub>2</sub> on Si wafer, <sup>4</sup>2\*Standard-Deviation of daily average over 15 days. Sample: 1micron SiO<sub>2</sub> on Si wafer, <sup>5</sup>Without the stage

# FR-ES: Compact entry system for film characterization

**FR-ES** a compact and lightweighted unit for the characterization of coatings. With FR-ES the user can perform reflectance and transmittance measurements in the 370-1020nm spectral range.

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## **Applications**

- Univ. & Research labs
- Semiconductors
- Polymer & Resist characterization
- Chemical measurements
- Dielectric characterizations
- Biomedical
- Hardcoat, Anodization, Metal parts process
- Optical Coating
- o non-metal Films
- And many more...
   (contact us with your requirements)



**FR-ES** platform is designed to provide an excellent performance in terms of characterization of coatings. It can be employed in a wide range of diverse applications, such as: Film thickness, Refractive Index, Color, Transmittance, Reflectance, and many more.

There are three configurations available: VIS/NIR (370-1020nm, NIR-N1 (850-1050nm), NIR (900-1700nm).

Then, there is a wide range of Accessories, such as:

- Filters to block light at certain spectral regimes
- FR-Mic for measurements at very small areas,
- Manual stage, either 100x100mm or 200x200mm
- Film/Cuvette Holder for Absorbance / Transmittance and chemical concentration measurements,
- Integration Spheres for diffuse & total reflectance

By the combination of different modules, the final set-up meets any end-user needs

#### **Features**

- Single-click analysis (no need for initial guess)
- Dynamic measurements

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- o Measurement of n & k, color
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- Multiple installations for off-line analysis
- Free of-charge Software update



## **FR-ES Specifications (standard configurations)**

Model	<b>VIS/NIR</b>	NIR	NIR-N1			
WL Range -nm	370 –1020	900 - 1700	850-1050			
Pixels	3648	512	3648			
Min Thick -SiO <sub>2</sub>	12nm	50nm	1um			
Max Thick SiO <sub>2</sub>	100um	250um	500um			
Max Thick -Si			300um			
n&k -Min. Thickness	100nm	500nm				
Thick. Accuracy *,**	1nm / 0.2%	3nm / 0.4%	50nm / 0.2%			
Thick. Precision <sup>*,**</sup>	0.05nm	0.1nm				
Thick. stability <sup>*,**</sup>	0.05nm	0.15nm				
Light Source	Halogen (internal), 10000h (MTBF)					
Integration Time	5msec (min)					
Spot size	Diameter of 350um (smaller spot size as option)					
Material Database	> 700 different materials					
<b>Dimensions/Weight</b>	20x22x6cm (LxWxH), 1.8Kg (stage excluded)					
Power	110V/230V, 50-60Hz, 10W					

#### Accessories

Computer Focusing module Film/Cuvette kit Contact probe Microscope Integrating sphere Manual X-Y stage Laptop / Touch Panel PC with 19inch screen Optical module attached on the reflection probe for <100µm diameter spot size Transmission measurements of films or liquids in standard cuvettes Thickness & optical measurements of coatings in the field. Ideal for curved surfaces Microscope-based reflectance and thickness measurements with high lateral resolution For the characterization of specular and diffuse reflectance of coatings and surfaces Manual X-Y stage for measurements over an area of 100mm x 100mm or 200mm x 200mm







# **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; \*\* Thickness range depends on the spectral range and refers to a single layer with refractive index ~1.5 over Si or similar substrate

# FR-Scanner: Modular unit for automated, Ultra-fast & Accurate wafer mapping

**FR-Scanner** is coupled with any FR-pRo unit for the automatic characterization of films and coatings on wafers, masks or other substrates.

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FR-Scanner is the ideal tool for the fast and accurate mapping of film properties: thickness, refractive index, uniformity, color etc.

Wafers of any diameter (300mm max) and shape can be accommodated on the vacuum chuck.

## **Applications**

Semiconductor
 Manufacturing

(photoresists, dielectrics, poly- Si, a-Si, DLC, photonic multilayer structures)

- PV Industry
- Univ. & Research labs
- Liquid Crystal Display
- Optical Coatings
- Polymers
- MEMS and MOEMS
- Substrates: transparent
   (glass, quartz, etc.) and
   semi-transparent



**FR-Scanner** scans the wafers by rotating the wafer and by moving it linearly (Polar Coordinates) with unparalleled speed and accuracy in both radius and angle. This way, accurate reflectance data with high repeatability are recorded, making FR-Scanner the ideal tool for at-line and on-line characterization of coatings on wafers or other substrates at processing facilities.

It is offered in a wide range of configurations for the characterization of films as thin as few nanometers and thick as several hundreds of microns and is accompanied with a dedicated S/W for daily routine use. FR-Scanner provides excellent performance in terms of accuracy, precision, reproducibility and long-term stability.



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# Film Metrology & More...

#### **Features**

- o Single-click analysis (no need for initial guess)
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- Save videos for presentations
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# Specifications\*

Model	UV/Vis	UV/NIR -EXT	UV/NIR-HR	D UV/NIR	VIS/NIR	D Vis/NIR	NIR	NIR-N1	NIR-N2	NIR-N3	NIR-N4
WL Range -nm	200 - 850	200 –1020	200-1100	200 – 1700	370 –1020	370 – 1700	900 - 1700	850-1050	900 - 1050	1280-1350	1520-1580
Pixels	3648	3648	3648	3648 & 512	3648	3648 & 512	512	3648	3648	512	512
Min Thick -SiO <sub>2</sub>	3nm	3nm	3nm	3nm	15nm	15nm	50nm	1um	4um	12um	20um
Max Thick SiO <sub>2</sub>	80um	90um	120um	250um	100um	250um	250um	500um	1.2mm	2mm	3mm
Max Thick -Si								300um	500um	1mm	1.3mm
n&k -MinThick	50nm	50nm	50nm	50nm	100nm	100nm	500nm		-	-	-
Thick. Accuracy **	1nm / 0.2%	1nm / 0.2%	1nm / 0.2%	1nm / 0.2%	1nm / 0.2%	2nm / 0.2%	3nm / 0.4%	50nm / 0.2%	50nm / 0.2%	50nm / 0.2%	50nm / 0.2%
Thick. Precision**	0.05nm	0.05nm	0.05nm	0.05nm	0.05nm	0.05nm	0.1nm		5nm	5nm	5nm
Thick. stability **	0.05nm	0.05nm	0.05nm	0.05nm	0.05nm	0.05nm	0.15nm		5nm	5nm	5nm
Light Source	Internal Ba	alanced Deute	rium & Halog	en, 2000h		Halogen (	internal), 5000	)h (MTBF)		SLED, 2000	00h (MTBF)
Wafer size					Wafer	s: 2in-3in-4in-	6in-8in-300m	m***			
Scanning Speed					20	00meas/min (8	3" wafer size)				
Spot size				Diameter o	f 350um (sma	aller spot size	options are av	vailable upon	request)		
Material Database						> 700 differer	nt materials				
R/Angle resolution	5 μ m/0.1°										
Dimensions -mm					600W x 7	50L x 500H &	450W x 320L	x 250H			
Power		110V/230V, 50-60Hz, 300W									

#### \*It needs to be coupled with the appropriate FR-pRo unit

#### **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.



<sup>1</sup> 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 SiO<sub>2</sub> on Si wafer, Standard deviation of 100 thickness measurements. Sample: 1micron SiO<sub>2</sub> on Si wafer, 2\*Standard-Deviation of daily average over 15 days. Sample: 1micron SiO<sub>2</sub> on Si wafer. \*\*Stage for 450mm wafers is also available upon request.

FR-Scanner AllInOne: Single tool for automated, Ultra-fast & Accurate wafer mapping

**FR-Scanner** AllInOne is a stand-alone tool for the automatic characterization of films and coatings on wafers, masks or other substrates.

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It is the ideal tool for the fast and accurate mapping of film properties: thickness, refractive index, uniformity, color etc.

Wafers of any diameter (300mm max) and shape can be accommodated on the vacuum chuck.

## **Applications**

Semiconductor
 Manufacturing

(photoresists, dielectrics, poly- Si, a-Si, DLC, photonic multilayer structures)

- PV Industry
- Univ. & Research labs
- Liquid Crystal Display
- Optical Coatings
- Polymers
- MEMS and MOEMS
- Substrates: transparent
   (glass, quartz, etc.) and
   semi-transparent



**FR-Scanner AllinOne** scans the wafers by rotating the wafer and by moving it linearly (Polar Coordinates) with unparalleled speed and accuracy in both radius and angle. This way, accurate reflectance data with high repeatability are recorded, making FR-Scanner the ideal tool for at-line and on-line characterization of coatings on wafers or other substrates at processing facilities.

It is offered in a wide range of configurations for the characterization of films as thin as few nanometers and thick as several hundreds of microns and is accompanied with a dedicated S/W for daily routine use. FR-Scanner provides excellent performance in terms of accuracy, precision, reproducibility and long-term stability.



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# Film Metrology & More...

#### **Features**

- Single-click analysis (no need for initial guess)
- Dynamic measurements
- Measurement of n & k, color
- Save videos for presentations
- o Multiple installations for off-line analysis
- Free of-charge Software update



## **Specifications**

Model	UV/Vis	UV/NIR -EXT	UV/NIR-HR	D UV/NIR	VIS/NIR	D Vis/NIR	NIR	NIR-N1	NIR-N2	NIR-N3	NIR-N4
WL Range -nm	200 – 850	200 –1020	200-1100	200 – 1700	370 –1020	370 – 1700	900 – 1700	850-1050	900 - 1050	1280-1350	1520-1580
Pixels	3648	3648	3648	3648 & 512	3648	3648 & 512	512	3648	3648	512	512
Min Thick -SiO <sub>2</sub>	3nm	3nm	3nm	3nm	15nm	15nm	50nm	1um	4um	12um	20um
Max Thick SiO <sub>2</sub>	80um	90um	120um	250um	100um	250um	250um	500um	1.2mm	2mm	3mm
Max Thick -Si								300um	500um	1mm	1.3mm
n&k -MinThick	50nm	50nm	50nm	50nm	100nm	100nm	500nm		-	-	-
Thick. Accuracy **	1nm / 0.2%	1nm / 0.2%	1nm / 0.2%	1nm / 0.2%	1nm / 0.2%	2nm / 0.2%	3nm / 0.4%	50nm / 0.2%	50nm / 0.2%	50nm / 0.2%	50nm / 0.2%
Thick. Precision**	0.05nm	0.05nm	0.05nm	0.05nm	0.05nm	0.05nm	0.1nm		5nm	5nm	5nm
Thick. stability **	0.05nm	0.05nm	0.05nm	0.05nm	0.05nm	0.05nm	0.15nm		5nm	5nm	5nm
Light Source	Internal Ba	alanced Deute	rium & Halog	en, 2000h	Halogen (internal), 5000h (MTBF)					SLED, 2000	00h (MTBF)
Wafer size					Wafers	s: 2in-3in-4in-	6in-8in-300m	m***			
Scanning Speed					20	00meas/min (8	3" wafer size)				
Spot size				Diameter o	of 350um (sma	aller spot size	options are av	vailable upon	request)		
Material Database						> 700 differer	nt materials				
R/Angle resolution						5 µ m/	0.1°				
Dimensions -mm					600W x 7	50L x 500H &	450W x 320L	x 250H			
Power		110V/230V, 50-60Hz, 300W									

# Accessories

Computer Focusing module Contact probe FR-Mic module  $\label{eq:label} Laptop \ / \ Touch \ Panel \ PC \ with \ 19inch \ screen \\ Optical \ module \ attached \ on \ the \ reflection \ probe \ for \ <100 \mu m \ diameter \ spot \ size \\ Thickness \ \& \ optical \ measurements \ of \ coatings \ in \ the \ field. \ Ideal \ for \ curved \ surfaces \\ Microscope-module \ for \ measurement \ with \ small \ spot, \ ideal \ for \ patterned \ wafers \\ \end{array}$ 

# **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.



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FR-uProbe: Extend your microscope in a powerful film thickness measurement tool

**FR-uProbe** is a stand-alone tool for applications that require spot size as small as very few microns, e.g. micropatterned surfaces, samples that exhibit a high level of scattering light and numerous others.

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With **FR-uProbe**, local film thickness, optical constants, reflectance, transmission, and absorbance measurements in Vis/NIR, is just a matter of a click.

## **Applications**

- Univ. & Research labs
- Semiconductors (Oxides, Nitrides, Si, Resists, etc.)
- MEMS devices
   (Photoresists, Si membranes, etc.)
- o LED
- Data Storage
- Anodization
- Hard/Soft coatings on curved substrates
- **Polymer coatings,** adhesives, etc.
- Biomedical (parylene, balloon wall thickness, etc.)

And many more...



**FR-uProbe**, simply attaches to the C-mount adapter of most commercially available optical microscopes (reflectance and / or transmittance) and provides:

- Real-time spectroscopic measurements at the wavelength range supported by the microscope
- Film thickness, optical properties, non-uniformity measurements
- Imaging with an integrated, USB connected and high-resolution & quality color camera
- $\circ~$  Unaffected performance of the microscope itself

#### **Features**

- Single-click analysis (no need for initial guess)
- Dynamic measurements

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- o Measurement of n & k, color
- 700+ materials in the database
- Save videos for presentations
- Multiple installations for off-line analysis
- Free of-charge Software update



## **Specifications**

Microscope	Reflectance/Transmittance trinocular
Spectral Range	400nm – 1000nm
Thickness range (5X obj. lens)	15nm – 90μm
Thickness range (10X obj. lens)	15nm – 80μm
Thickness range (20X obj. lens)	15nm – 40μm
Thickness range (40X obj. lens)	15nm – 10μm
Refractive Index calculation	✓ /min. thickness: 100nm
Thickness Accuracy <sup>1</sup>	0.2% or 2nm
Thickness Precision <sup>2,3</sup>	0.02nm
Thickness stability <sup>4</sup>	0.05nm
Camera	2 or 5Mpixel high resolution
Working distance	Defined by obj. lens
Spot size	100-2µm (see below)
Light source	Microscope's light source (tungsten / LED)
Wavelength resolution	0.8nm
Number of Layers Measured	Max. 5 layers
A/D converter	16 bit
Power	USB – supplied
Dimensions	300mm x 110mm x 40mm <sup>5</sup>

The measurement area (the area from which the reflectance or transmittance signal is collected) is relative to the microscope's objective lens and the FR-uProbe's aperture size

<b>Objective Lens</b>	Spot Size (µm)						
	500 μm Aperture	250 μm Aperture	100 µm Aperture				
5x	100 μm	50 μm	20 µm				
10x	50 µm	25 μm	10 µm				
20x	25 μm	17 μm	5 μm				
50x	10 µm	5 µm	2 μm				

# **Principle of Operation**

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# Hetrisis Film Metrology & More...

FR-Mic: Local characterization of coatings in the micron lateral scale

With **FR-Mic**, local measurement of film thickness, optical constants, reflectance, transmission, and absorbance across any spectral regime within UV / VIS / NIR spectral range, is just a matter of a click.

FR-Mic can be either mounted on FR-pRo or next to FR-pRo when large surfaces need to be characterized.

## **Applications**

- Univ. & Research labs
- Semiconductors (Oxides, Nitrides, Si, Resists, etc.)
- MEMS devices
   (Photoresists, Si membranes, etc.)
- o LEDs, VCSELs
- Data Storage
- Anodization
- Hard/Soft coatings on curved substrates
- **Polymer coatings,** adhesives, etc.
- Biomedical (parylene, balloon wall thickness, etc.
- And many more...
   (contact us with your requirements)



**FR-Mic** is the modular optical column for **fast & accurate** coating characterization applications that require **spot size as small as few micrometers**, Typical examples include (but not limited to): micro-patterned surfaces, rough surfaces and numerous others. It can be combined with a dedicated computer controlled XY stage, allowing the automated thickness & optical properties mapping of samples fast, easily and accurately.

FR-Mic provides:

- Real-time spectroscopic measurements
- Film thickness, optical properties, non-uniformity measurements, thickness mapping
- Imaging with an integrated, USB connected and highquality color camera

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#### **Features**

- Single-click analysis (no need for initial guess)
- o Dynamic measurements
- Optical parameters (n & k, color)
- Save videos for presentations
- Multiple installations for off-line analysis
- Free of-charge Software update



#### **FR-Mic Specifications**

	Model		UV/NIR -EXT	UV/NIR-HR	D UV/NIR	VIS/NIR	D VIS/NIR	NIR	NIR-N2	
Spectra	al Range (nm)	200 - 850	200-1020	200-1100	200 - 1700	370 - 1020	370 - 1700	900 - 1700	900 - 1050	
Spectro	ometer Pixels	3648	3648	3648	3648 & 512	3648	3648 & 512	512	3648	
	5X- VIS/NIR	4nm – 60μm	4nm – 70μm	4nm – 100μm	4nm – 150μm	15nm – 90μm	15nm–150µm	100nm-150μm	4um – 1mm(SiO <sub>2</sub> ) 400um max(Si)	
Thickness	10X-VIS/NIR 10X-UV/NIR*	4nm – 50µm	4nm – 60µm	4nm – 80µm	4nm – 130µm	15nm – 80µm	15nm–130µm	100nm–130µm	-	
range	15X- UV/NIR *	4nm – 40µm	4nm – 50µm	4nm – 50µm	4nm – 120µm	_	-	100nm-100µm	-	
	20X- VIS/NIR 20X- UV/NIR *	4nm – 25µm	4nm – 30µm	4nm – 30µm	4nm – 50µm	15nm – 30μm	15nm – 50μm	100nm – 50µm	-	
	40X- UV/NIR *	4nm – 4µm	4nm – 4µm	4nm – 5µm	4nm – 6μm	-	-	-	-	
	50X- VIS/NIR	-	-	-	-	15nm – 5µm	15nm – 5µm	100nm – 5µm	-	
Min. Thic	ckness for n & k	50nm	50nm	50nm	50nm	100nm	100nm	500nm	_	
Thickness Accuracy **		0.1% or 1nm				0.2% or 2nm		3nm or 0.3%		
Thickness Precision **			0.02	2nm		0.02nm		<1nm	5nm	
Thickness stability **		0.05nm				0.05nm		<1nm	5nm	
Light Source		Ва	lanced Deuterium	& Halogen (interr	nal)	Halogen (internal), 10000h (MTBF)				
Material Database		> 700 different materials								

The measurement area (the area from which the reflectance or transmittance signal is collected) is relative to the objective lens and the FR-Mic's aperture size

<b>Objective Lens</b>	Spot Size (µm)						
	500 μm Aperture	250 μm Aperture	100 μm Aperture				
5x	100 μm	50 µm	20 µm				
10x	50 µm	25 μm	10 μm				
20x	25 μm	17 μm	5 µm				
50x	10 µm	5 µm	2 μm				

# **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.



<sup>1</sup> Specifications are subject to change without any notice, \* Reflective objective lens \*\* Measurements compared with a calibrated spectroscopic ellipsometer and XRD, Average of standard deviation of mean value over 15 days. Sample: 1micron SiO<sub>2</sub> on Si wafer, Standard deviation of 100 thickness measurements. Sample: 1micron SiO<sub>2</sub> on Si wafer, 2\*Standard-Deviation of daily average over 15 days. Sample: 1micron SiO<sub>2</sub> on Si wafer.

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# Accessories

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# FR-Thermal: Real-time Film Characterization during thermal treatment

**FR-Thermal** kit is an accessory for FR-pRo tools. It consists of a 5inch wide hot-plate fully controlled through FR-Monitor software.

The user can set the temperature, the heating thermal rate, cycle conditions etc. and monitor in real-time the thickness & optical properties (e.g. refractive index) evolution vs. time and temperature of thin/thick films (e.g. polymers, photoresists).

## **Applications**

- Characterization of polymers/photoresists
- Physicochemical properties
- Dynamic film thickness measurements
- Dynamic Reflectance measurements

#### **Features**

- Temp Range: room temp
   150°C\*
- Manual/Auto control
- 5inch heating area



By using FR-Thermal and the especially developed algorithms included in FR-Monitor, **physicochemical properties of the films**, such as:

- glass transition temperature (T<sub>a</sub><sup>film</sup>), and
- thermal degradation temperature of polymer films (T<sub>d</sub><sup>film</sup>)

are measured for any film with thickness > 200nm.



Simultaneous monitoring of film thickness and optical properties changes of a PMMA film during heating. The Glass Transition temperature ( $T_q^{film}$ ) is 105°C.

\*The hot plate can be designed for temperatures up to 350°C. Specifications are subject to change without any notice.

FR-Liquid: In-situ Monitoring and Characterization of coatings immersed on liquids

**FR-Liquid** is an accessory for the real time monitoring, e.g. swelling or dissolution, of thickness and optical constants (n&k) of thin/thick films during processing in liquids (e.g. water, organic solvents).

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FR-Liquid can be used with any FR-pRo tool and at any spectral range thanks to its quartz optical port.

## **Applications**

- o In-Situ Measurements
- Materials Characterization
   Polymers/Photoresists
- Characterization
- HardCoats
- Semiconductor
- o Non Metal films

#### **Features**

- Teflon cell: 110x35x130 mm
- Optical window: 18 mm (diameter)
- Liquid capacity: 30 40 ml
- Sample holder for samples of any shape in the 30x45 mm range.



**FR-Liquid** consists of a PTFE (Teflon) cell and a holder to accommodate the sample under test. PTFE, due to its properties (hydrophobic, chemical and thermal resistant) make suitable the use of FR-Liquid for a wide range of liquids. Optical measurements with the FR-Basic tool are possible due to the optical window design on the cell, which establishes the non-contact between the optical probe and the liquid.

FR-Liquid supports also the use of external micropumps, for the circulation of the liquids.



Thickness evolution during the development step corresponding to all selected exposure doses, and (top-right) only to high development rates. (bottom) The mean dissolution rates expressed as a function of e-beam exposure dose.

# FR-IntSphere: Total & Diffuse Spectral Reflectance Measurements

FR-IntShpere kit is an accessory for FR-pRo tools for: Total, Diffuse, Specular Reflectance / Transmittance measurements. The kit consists of an integrating sphere of 50mm diameter, the appropriate optical fibers and holders. It is fully through FRcontrolled Monitor software for the calculation and analysis of all parameters (reflectance, color, etc.).

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#### **Applications**

- Photovoltaics
- o Diffuse materials
- o Textiles
- o Automotive paints
- Gemology
- o General Lighting

#### **Features**

- Total / Diffuse / Specular Reflectance/Transmittance
- o Haze
- o Irradiance
- Color properties (L\*a\*b\*)
- Wide spectral range
- o Ideal for manufacturing
- Wide range of light sources, optical elements, & other configurations.



**FR-IntSphere** kit along with a FR-pRo tool is a concrete solution for reflectance measurements, without any need of additional components. The integrating sphere is made of a highly reflective, Lambertian surface (PTFE), with a sample port diameter of 10mm, compact, and easy to operate.

The entrance and the exit ports are at **8 degrees** from normal incident to block the specular reflection of the sample by using a light trap and measure the **Diffused reflectance**. By replacing the light trap with a gloss trap (same material as the internal of the sphere), the **Total reflectance** is measured.



Total, Diffuse and Specular Reflectance measurements of a painted aluminum sample, as they were measured using an FR-pRo tool equipped with an integrating sphere.

\*Specifications are subject to change without any notice.

# Film/Cuv Holder: Absorbance & Transmittance of liquids and films

#### Transmittance

measurements of liquids and coatings is a quite standard method for the characterization of the related materials.

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Film/Cuv holder is designed to cover the needs for the characterization of both liquids and solid samples (semi-transparent and transparent samples of supported and un-supported (suspended) films). It is offered either in 2W (two

ports configuration) or in 4W (four ports configuration).



The Film/Cuv Holder is secured on FR-pRo tools and couples to the light source and spectrometer via standard SMA-905 optical fiber. Thanks to its unique design, it can be easily operated, it saves precious lab space and ensures absolute transmittance and absorbance measurements of high repeatability of either liquids or coatings. The holder can accommodate standard 1-cm cuvettes and solid samples with total thickness up to 10mm.



## **Applications**

- o Transmittance
- Absorbance
- Film Thickness

#### **Features**

- Footprint: 130x95x20 mm
- Film/Cuv Holder: 60x50x50mm
- SMA905 Fiber Connectors

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# FR-Mic-Adaptor: Optical microscope adaptor for spot size down to 5µm

FR-Mic-Adaptor is an FRpRo accessory for use with trinocular microscopes with C-mount. It is the ideal accessory for applications that require spot size as small as very few microns. With FR-Mic, local film thickness, optical constants, transmission, reflectance, absorbance and measurements across the spectral range of FR-pRo and microscope, is just a matter of a click.

#### **Applications**

- Universities & Research labs
- Semiconductors (Oxides, Nitrides, Si, Resists, etc.)
- MEMS devices
   (Photoresists, Si membranes, etc.)
- o LED
- Data Storage
- Anodization
- Hard/Soft coatings on curved substrates
- Polymer coatings, adhesives, etc.
- Biomedical (parylene, balloon wall thickness, etc.)
   And many more...



With FR-Mic-Adaptor, any trinocular optical microscope with C-mount is converted into a powerful coating characterization tool capable to measure film thickness down to 20nm.

**FR-Mic-Adaptor** comes with a high-resolution USB camera that allow simultaneous observation of the probed area and local characterization of coatings.

For its operation, FR-Mic-Adaptor, needs to be connected to an appropriate FR-pRo unit.

The installation of the accessory is straight forward and does not affect the specifications and operation of the optical microscope.



\* The FR-pRo should support the spectral range of the microscope. Because of the limitations of the lenses the min. wavelength of operation is usually 400nm.

# FR-Focusing Module: 150µm spot size module

**FR-Focusing Module** is an accessory for optical measurements on coatings where a small (<150μm) spot size is required. The particular module is fully compatible with all FR-pRo tools operating in VIS spectral range and is easily mounted on the reflection probe by the user.

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## **Applications**

- Characterization of areas with small size or patterned areas
- Rough coatings
- Uneven samples
- Scattering samples

#### **Features**

- Type: Triplet Achromatic Lens
- Wavelength range: 400-700nm
- o Diameter: 12mm
- Focal Length: 20mm
- Spot size: < 150um</li>
- Mounting: Secure and precise mounting on the reflection probe



The **FR-Focusing Module** is easily attached on the reflection probe of FR-pRo tool and cover the visible range (380-700nm wavelength). In the standard configuration, the spot size becomes  $<150\mu$ m in diameter and allows for the characterization of coatings with moderate roughness.

Additional configurations can be provided upon request.



Thickness measurement of SiO<sub>2</sub> film on Silicon substrate. Thickness: 1051.4nm.

# XY-M75 / XY-M100: Two-axes Linear Translation stage for FR-tools

**XY-M** linear stage is a dedicated accessory for FR-pOrtable and any FR-pRo tool. It allows the manual thickness & optical properties mapping of samples fast, easily and accurately.

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The linear stage is offered in two travel ranges (75X55mm, 100X100mm) and is suitable for Reflectance, Transmittance measurements through the embedded optical window of up to 4-inch wafers.

# <image>

Both XY-M stages (75X55mm and 100X100mm) are equipped with a knob and rulers to facilitate the movement at certain coordinates. The stage is mounted on the FR-tool and secures the probe at the center of the stage.



Thickness mapping (30mmX30mm) of SU-8 film spin coated on Si wafer with measurement step of 5mm, is illustrated. The thickness (scale bar in  $\mu$ m) varies from 14.09  $\mu$ m to 14.40  $\mu$ m.

#### **Features**

- Manually controlled (knob on the top)
- Travel range: 100X100mm
- Sample: Dia. 100mm (max)
- Spring Clips
- Reflectance & Transmittance
- Stage size: 285x205x330mm

XY-LargePlatform: XY manual platform with 300x200mm traveling distance

**XY-LargePlatform** is an accessory for FR-pOrtable and FR-pRo tools. It allows the manual thickness & optical properties mapping of large samples fast, easily and accurately.

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The platform can be moved manually at any point within an area of 300X200mm and comes with engraved patterns of the standard wafers to facilitate fast characterization of coatings on any wafer or other substrate with dimension up to 300mm.

#### **Features**

- Manually controlled
- Travel range: 300X200mm
- Sample: Dia. 300mm (max)
- Reflectance & Transmittance
- Stage size:
   285x205x330mm



The **XY-LargePlatform** is a cost-effective solution for fast characterization of a small number of points of coatings of substrates with large footprint. The platform moves fast and manually and the user can bring under the probe any point of the substrate. It supports (upon request) reflectance and transmittance measurements.

XY-A100: Motorized stage for fast mapping of coatings at Cartesian coordinates

**XY-A100** linear stage is a dedicated accessory for FRpRo tools. The linear stage which provides a 100mm of travel along X and Y is suitable for Reflectance measurements while the sample is secured through vacuum.

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**XY-A100** linear stage allows for the automatic, through FR-Monitor, thickness & optical properties mapping of samples fast, easily and accurately.

Other scanning ranges are available upon request.



The **XY-A100 stage** is compatible with any FR-pRo tool and can be employed in the characterization of coatings on any substrate (wafer, square, arbitrary shape) up to 100X100mm in size. The sample is hold down through vacuum provided by any standard pump, or vacuum line.



Thickness mapping of a 4inch Si wafer coated with a photoresist film. The statistical results (number of points, mean thickness, standard deviation etc.) are listed in the tab at the top right.

#### **Features**

- Travel range: 100X100mm
- Sample: Dia. 100mm (max)
- Accuracy: 5μm in each axis
- Reflectance
- Stage size: 430x430x300mm

RO-A150: Motorized stage for fast mapping of coatings at Polar coordinates

**Ro-A150** is a powerful motorized stage operating in Polar coordinates. It can accommodate any standard wafer up to 300mm in diameter. It is operated through any FR-pRo unit and it comes along with one vacuum chuck.

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## **Applications**

- Mapping of thickness, refractive index, colour etc of any standard wafer up to 300mm in diameter.
- Characterization of areas with small size or patterned areas
- Rough coatings
- Uneven samples
- Scattering samples

#### **Features**

- 300measurements /min on 8inch wafer
- Accuracy: 5μm / 0.1°
- User Friendly software for fast routine operation.
- FR-Mic module can be further attached for ultrasmall spot size



The **RO-150 stage** is a stable-top unit for the automatic characterization of coatings on wafers. It is operated through any FR-pRo unit and operates either under FR-Monitor or via the independent software that has been especially developed for daily routine use. The maximum scanning speed on 8inch wafers is 300points/min and 625measurements/90sec.



\*Available in RO-200 configuration also

RO-A300-HW: Motorized stage for fast mapping of coatings on Heavy Substrates

**ARO-A300** HW is а powerful motorized stage operating in Polar coordinates. lt can accommodate any standard wafer up to 300mm in diameter. It is operated through any FR-pRo unit and it comes along with one vacuum chuck.

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#### **Applications**

- Mapping of thickness, refractive index, colour etc of any standard wafer up to 300mm in diameter.
- Characterization of areas with small size or patterned areas
- Rough coatings
- Uneven samples
- Scattering samples

#### **Features**

- 300measurements /min on 8inch wafer
- Accuracy: 5μm / 0.1°
- User Friendly software for fast routine operation.
- FR-Mic module can be further attached for ultrasmall spot size



The **RO-150 stage** is a stable-top unit for the automatic characterization of coatings on wafers. It is operated through any FR-pRo unit and operates either under FR-Monitor or via the independent software that has been especially developed for daily routine use. The maximum scanning speed on 8inch wafers is 300points/min and 625measurements/90sec.



\*Available in RO-200 configuration also

# FR-pRo R/T/C: Reflectance, Transmittance and Color characterization

Color science has significant importance in manufacturing industry and research.

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**FR-pRo R/T/C** is a tailored tool for the simultaneous characterization of Reflectance, Transmittance and Color measurements with one-click.

Color spaces available: CIEL\*a\*b\* CIELCh, Hunter Lab

## **Applications**

- AR coatings on glass lenses
- MEMS devices (Si membranes, etc.)
- o LED, OLED
- Hard/Soft coatings on curved substrates
- **Polymer coatings,** adhesives, etc.
- **Biomedical** (parylene, balloon wall thickness, etc.)
- And more...
   (contact us with your requirements)



FR-pRo R/T/C tool relates the reflectance spectra taken upon a sample to color tristimulus values: XYZ, using two established international conventions:

- o 2° standard observer (CIE, 1931)
- o 10° standard observer (CIE, 1964)

#### providing

- chromaticity diagrams, and
- the following list of parameters:

sRGB	R	G	В
CIE L*a*b*	L*	a*	b*
CIE LCH	L	С	Н
Hunter	L	а	b
Chromaticity	х	У	

Depending on the application, different configurations can be implemented in the tool such as:

- Contact probe for curved surfaces such as glass lenses
- Integration Spheres for diffuse & total reflectance (di:8°, de:8° geometry)

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#### **Features**

- Single-click analysis (no need for initial guess)
- o Dynamic measurements
- Optical parameters (n & k, color)
- Save videos for presentations
- 700+ non-identical materials
- Multiple installations for off-line analysis
- Free of-charge Software update



## **Specifications**

Spectral Range (nm)
Pixels
Thick. range (SiO <sub>2</sub> )
Min. Thick. for n&k
Thick. Accuracy *,**
Thick. Precision*,**
Thickness stability *,**
Spot size (diameter)
Material Database

370 –1020
3648
12nm – 100um
100nm
1nm or 0.2%
0.02nm
0.05nm
350um (smaller options upon request)
> 700 different materials

	Optical probe ( <b>standard</b> ) / Contact probe	Integrating sphere (50mm diameter)
Illumination/viewing system	Specular reflectance (0°)	di:8°, de:8° (diffused illumination, 8° viewing
Illumination area	0.3mm (standard)	10 mm (port size)
Observer	2° / 10°	
Illuminant	D65 (standard – others available after request)	
Color matching	CIE 1931, CIE 1964	
Colorimetric Data	L*a*b*, L*C*h*, Hunter Lab, sRGB, xy, Tsr (Total solar reflectance)	
Chromaticity Diagrams	CIE 1931, CIE 1964	

# **Principle of Operation**

or partially/fully reflective substrates) stack of films.

White Light Reflectance Spectroscopy (WLRS) measures the amount of light reflected from a film or a multilayer stack over a range of wavelengths, with the incident light normal (perpendicular) to the sample surface. The measured reflectance spectrum, produced by interference from the interfaces is being used to determine the thickness, optical constants (n & k), etc. of free-standing and supported (on transparent



\*Specifications are subject to change without any notice, <sup>1</sup>Measurements compared with a calibrated spectroscopic ellipsometer and XRD, <sup>2</sup>Average of standard deviation of mean value over 15 days. Sample: 1micron SiO<sub>2</sub> on Si wafer, <sup>3</sup>Standard deviation of 100 thickness measurements. Sample: 1micron SiO<sub>2</sub> on Si wafer, <sup>4</sup>2\*Standard-Deviation of daily average over 15 days. Sample: 1micron SiO<sub>2</sub> on Si wafer, <sup>5</sup>Without the stage

# FR-pRo-FH: Filter holder for FR-pRo units

**FR-pRo-FH** is a filter holder that can be mounted on the light emission port of any FR-pRo unit.

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It can accommodate any light filter (low-pass, highpass, band-pass) and configure the emission spectrum accordingly.



**FR-pRo-FH** can accommodate any commercially available filter of either 1/2inch or 1inch diameter. The filter can be either low-pass, high-pass or band-pass.

#### **Features & Apps**

- Optical and Thickness measurements at selected spectral regimes
- Easily mounting on any FRpRo tool
- Ideal for the evaluation of photoresists films
- Fully configurable by the usage of any commercially available low-pass, bandpass and high-pass filter

# FR-pOrtable-TR: Module for transmission measurements

## Transmittance

measurements of coatings is a quite standard method for the characterization of the related materials. The Transmittance kit for FRpOrtable is а module designed to cover the needs for the characterization of coatings (semi-transparent and transparent samples of supported and unsupported (suspended) films).

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#### **Features**

- Manually controlled (knob on the top)
- Travel range: 100X100mm
- Sample: Dia. 100mm (max)
- Spring Clips
- Reflectance & Transmittance
- Stage size: 285x205x330mm



The Transmittance module is secured below the base of FR-pOrtable and is equipped with a light source similar to the one used for the reflectance measurements. The light from the light source is aligned to the central fiber of the reflection probe. The light source is powered by the FR-pOrtable

through the D-sub connector on the top and is controlled by the same FR-Monitor software.



Transmittance spectrum of a color filter compared with manufacturer's data and a high precision tabletop spectrometer



Thickness measurement of an AZ5214 resist film spin-coated on amicroscope slide. Thickness: 1.1 µm

# **ContactProbe-ST:** Thickness measurements of coatings at the field

**ContactProbe-ST** is a handheld accessory for thickness and optical measurements of coatings in the field. <u>Thanks to its design</u>, the

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ContactProbe-ST can be easily attached on the reflection probe of any ThetaMetrisis' tool, allowing fast, easy and accurate measurements.

Ideal for curved samples and surfaces.

#### **Features & Apps**

- Optical and Thickness measurements in the field
- Easily mounting on any FRtool
- Soft spacer to protect the surface under test
- Blocks any ambient light
- Applicable at any flat and curved surfaces
- Ideal for eye glass industry, Aerospace and Automotive industry



**Contact probe-ST** is a unique accessory for reflectance measurements of curved samples, e.g. lenses. It is equipped with a soft rubber ring to secure the correct distance between the probe and the point under characterization that does not harm the sample. The ContactProbe-St can be mount on any FR-pRo or FRpOrtable tool and is operated by the standard FR-Monitor software.

Accuracy\*: 0.5nm Precision\*: 0.5nm Stability\*: 0.5nm \* in terms of spectrum and depends on material



Characterization of a multi-layer stack on a lens for automotive lamp.

# Biosensing kit: Real-time & label-free monitoring of biomolecular interactions

The Biosensing kit is fully compatible with FR-pRo and FR-pOrtable tools and is used for real-time and labelmonitoring free of immunoreactions. The miniaturized (5X15mm footprint) biochips, after appropriate biofunctionalization meets the needs for measurement of critical for human health biomarkers, as well as for harmful substances in food.

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#### **Applications**

- Label-free Biosensors
- Monitoring of kinetics of bioreactions
- Point-of-Need determinations

#### **Features**

- Ultra-miniaturized footprint
- Single analyte determinations
- Mutli-analyte determinations
- Fully compatible for operation with micropumps



The biosensing kit consists of a docking station especially designed to accommodate the biosensing chips and a number of appropriately fabricated Si chips and the related fluidic cells.

The biosensing kit was been extensively employed in the fast, accurate any with high dynamic range of a) a large variety of critical for human health biomarkers (T-PSA, f-PSA, CRP, d-Dimer, PCT, IL-6 etc.) and b) a large number of harmful substances in food; pesticides, mycotoxins and allergens.



**OptMic-ES:** Standard Optical microscope for R&D needs

**OptiMic-ES** is a standard trinocular microscope operating in reflectance mode. It is used for standard inspection of samples and can be coupled with FRuProbe for reflectance and thickness measurements with a very small spot-size.

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# **Applications**

- Standard inspection of samples
- Measurement of thickness at a very small area

#### **Features**

- Spectral range: 400-1700nm
- Magnification 50X-400X
- 12V50W halogen lamp with brightness control
- Transmittance mode (optional)
- Integrated field diaphragm, aperture diaphragm and puller type polarizer.
   Stage travel range: 63mmX50mm



**OptiMic-ES** is a standard trinocular microscope that can operate both in reflectance and transmittance modes and serves the characterization of coatings on both reflective and transparent substrates. It is ready for mounting of FR-uProbe or FR-MicAdapter modules for the local characterization of coatings in terms of film thickness, reflectance, transmittance, refractive index.

OptiMic-ES is equipped with all standard features of optical microscopes such as:

- Trinocular inclined 30°
- Integrated field diaphragm, aperture diaphragm and puller type polarizer.
- Achromatic lenses: 5X/NA0.12/WD/26.1mm, 10X/NA0.25/WD20.2 mm, 40X/NA0.60/WD3.98 mm
- Ground-glass and yellow, green and blue filters

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# **OptMic-200:** Optical microscope for the inspection of large samples

**OptiMic-200** is a top-class trinocular microscope operating in reflectance mode. It is equipped with large manual stage with large travel range to support the inspection of any wafer size up to 8inch diameter.

# **Applications**

- Standard inspection of samples
- Measurement of thickness at a very small area

## **Features**

- Spectral range: 400-1700nm
- Magnification 50X-500X
- 12V50W halogen lamp with brightness control
- Integrated field diaphragm, aperture diaphragm and puller type polarizer.
- Stage travel range: 204X204mm



**OptiMic-200** is a top-class trinocular microscope that operate in reflectance mode and serves the characterization of coatings on wafers with diameter up to 8inch. It is ready for mounting of the FR-uProbe or FR-MicAdapter modules for the local characterization of coatings in terms of film thickness, reflectance, transmittance, refractive index.

OptiMic is equipped with:

- Coaxial coarse/fine focus system, with tensional adjustable and up stop, minimum division of fine focusing: 0.8µm
- Trinocular inclined 30°
- Integrated field diaphragm, aperture diaphragm and (Y,B,G, ground glass) switching device.
- Push-pull type analyzer and polarizer.
- Achromatic lenses: 5X/NA0.12/WD26.1mm, 10X/NA0.25/WD20.2 mm, 20X/NA/WD8.8mm, 50X/NA0.70/WD3.7mm



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