

FR-ES: Compact entry level system

FR-ES is a compact and light-weighted unit for the non-destructive characterization of transparent and semi-transparent coatings in a wide thickness range and of thin metallic layers.

With FR-ES the user can perform reflectance and transmittance measurements in various spectral ranges.

APPLICATIONS

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

(contact us with your requirements)



FR-ES platform is designed to provide excellent performance in terms of characterization of coatings. It is employed in a wide range of diverse measurement applications: Film thickness, Refractive Index, Color, Transmittance, Reflectance, and many more. There are four configurations available:

VIS/NIR (370-1020nm),

UV/NIR-EXT (200-1000nm),

NIR-N1 (850-1050nm),

NIR (900-1700nm).

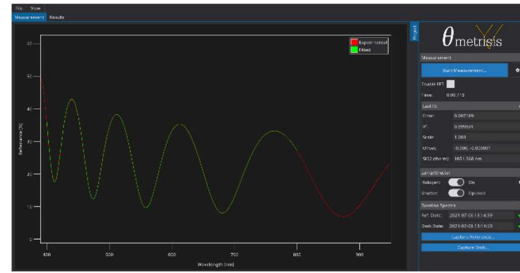
Then, there is a wide range of Accessories, such as:

- **Filters** to block light at certain spectral regimes
- **FR-Mic** for measurements at very small areas,
- **Manual stage**, 25x25mm, 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
- Measurement of n & k, color
- 700+ non-identical materials
- Multiple installations for off-line analysis
- Free of-charge Software update



FR-ES SPECIFICATIONS (STANDARD CONFIGURATIONS)

Model	VIS/NIR	NIR	NIR-N1	UV/NIR-EXT
WL Range -nm	370 –1020	900 – 1700	850-1050	200-1000
Pixels	3648	512	3648	3648
Min Thick -SiO₂	12nm	50nm	1µm	1nm
Max Thick SiO₂	100µm	250µm	500µm	90µm
n&k -Min. Thickness	100nm	500nm		50nm
Thick. Accuracy *,**	1nm / 0.2%	3nm / 0.4%	50nm / 0.2%	1nm / 0.2%
Thick. Precision*,**	0.05nm	0.1nm		0.05nm
Thick. stability *,**	0.05nm	0.15nm		0.05nm
API support	YES	YES	YES	YES
Light Source	Halogen (internal), 3000h (MTBF)			Deuterium -Halogen (External), 2000h (MTBF)
Integration Time	5msec (min)	0.5msec (min)	5msec (min)	5msec (min)
Spot size	Diameter of ~350-400µm (smaller spot size as option)			
Material Database	> 700 different materials			
Dimensions/Weight	20x22x6cm (LxWxH), 1.8Kg (stage excluded)			
Power	110V/230V, 50-60Hz, 10W			

ACCESSORIES

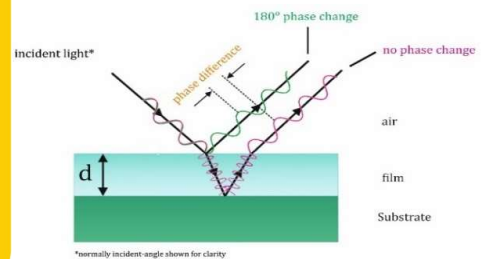
Focusing module	Optical module attached on the reflection probe for <100µm diameter spot size
Transmittance module	Optical module for transmittance/absorbance measurements
Film/Cuvette kit	Transmission measurements of films or liquids in standard cuvettes
Contact probe	Thickness & optical measurements of coatings in the field. Ideal for curved surfaces
Microscope	Microscope-based reflectance and thickness measurements with high lateral resolution
Manual X-Y stage	Manual X-Y stage for measurements over an area of 25x25mm /100x100mm / 200x200mm



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 on Si substrate ** Measurements compared with a calibrated spectroscopic ellipsometer and XRD, Average of standard deviation of mean value over 15 days. Sample: 1µm SiO₂ on Si, Standard deviation of 100 thickness measurements. Sample: 1µm SiO₂ on Si, 2*Standard-Deviation of daily average over 15 days. Sample: 1µmicron SiO₂ on Si.