FR-ES: Compact entry level system for film characterization

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

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 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).

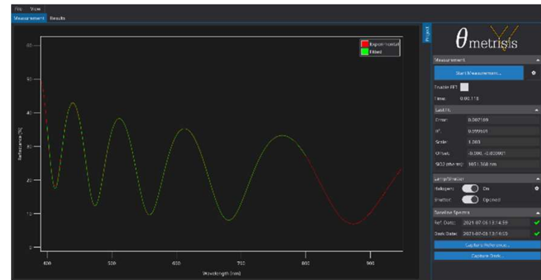
Then, there is a wide range of Accessories, such as:

- **Filters** to block light at certain spectral regimes
- **FR-Mic** for measurements at very small areas,
- **Manual stage**, either 25x25mm or 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
- Save images & videos for presentations
- Multiple installations for off-line analysis
- Free of-charge Software update

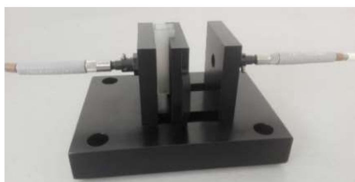


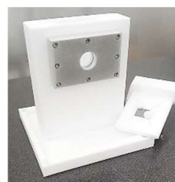
FR-ES Specifications (standard configurations)

Model	VIS/NIR	NIR	NIR-N1
WL Range -nm	370 –1020	900 – 1700	850-1050
Pixels	3648	512	3648
Min Thick -SiO_2	12nm	50nm	1um
Max Thick SiO_2	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*,**	0.05nm	0.1nm	
Thick. stability *,**	0.05nm	0.15nm	
API support	YES	-	YES
Light Source	Halogen (internal), 3000h (MTBF)		
Integration Time	5msec (min)		
Spot size	Diameter of 350um (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

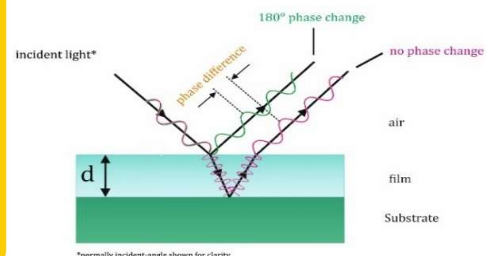
Focusing module	Optical module attached on the reflection probe for <100μm diameter spot size
Transmittance module	Optical module for transmittance/absorbance measurements
Film/Cuvette kit	Transmission measurements of films or liquids in standard cuvettes
Contact probe	Thickness & optical measurements 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 or 100x100mm or 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 over Si or similar substrate