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.
FR-ES is the ideal configuration for research labs.
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…

FR-ES platform is designed to provide excellent performance in terms of characterization of coatings at a small footprint. It is employed in a wide range of diverse measurement applications: Film thickness, Refractive Index, Color, Transmittance, Reflectance, and many more.
There are five FR-ES configurations available:
VIS/NIR (380-1020nm),
UV/VIS (200-850nm),
UV/NIR-EXT (200-1000nm),
UV/NIR-HR (190-1100nm)
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

Specifications

Model	VIS/NIR	NIR	NIR-N1	D	UV/VIS	UV/NIR-	UV/NIR-HR
WL Range -nm	380 –1020	900 – 1700	850-1050	380-1700	200-850	200-1000	190-1100
Pixels	3648	512	3648	3748 & 512	3648	3648	2048
Min Thick -SiO_2	12nm	50nm	1µm	12nm	1nm	1nm	1nm
Max Thick SiO_2	120µm	250µm	500µm	250µm	80µm	90µm	100µm
n&k -Min.	100nm	500nm		100nm	50nm	50nm	50nm
Thick. Accuracy	2nm / 0.2%	3nm / 0.4%	50nm / 0.2%	2nm / 0.2%	1nm / 0.2%	1nm / 0.2%	1nm / 0.2%
Thick. Precision*,**	0.05nm	0.1nm	0.1nm	0.05nm	0.05nm		
Thick. stability *,**	0.05nm	0.15nm	0.15nm	0.05nm	0.05nm		
API support	YES						
Light Source	Halogen (internal), 3000h (MTBF)				VIS/NIR operation: Halogen (internal), 3000h (MTBF) UV/NIR operation: LS-2, Deuterium -Halogen, 2000h (MTBF)		
Integration Time	5msec (min)	0.5msec	5msec (min)	5msec (min)	5msec (min)		1msec (min)
Spot size	Diameter of ~350-400µm (smaller spot size as option)						
Material Database	> 850 different materials						
Dimensions/Weigh	FR-ES: 20x22x6cm (LxWxH), 1.8Kg (stage excluded), FR-ES D: 20x27x12cm (LxWxH), 3.3Kg (stage excluded)						
Power	110V/230V, 50-60Hz, 20-50W (LS-2, external light source is excluded)						
SW Characteristics	FR-Monitor v4.0 (free of charge updates) Full S/W details are listed at the related catalog's page						

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

* 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 SiO_2 on Si, Standard deviation of 100 thickness measurements. Sample: 1µm SiO_2 on Si, 2*Standard-Deviation of daily average over 15 days. Sample: 1µmicron SiO_2 on Si.