FR-pRo film characterization tool

FR-pRo is a modular and expandable platform for the characterization of coatings in the 1 nm - 3 mm thickness range. FR-pRo tools are tailored to the customer needs and are used in a wide range of diverse applications such as: Absorbance / transmittance / reflectance measurements, film characterization under temperature and ambient controlled environment or even in liquid environment and many more.

FR-pRo is assembled by user selected modules. The Core Unit accommodate the light source, the spectrometer (for any spectral regime in the 200 nm - 2500 nm range) and the control & communication electronics. Then, there is a wide range of accessories, such as:

· Film/Cuvette Holder for Absorbance/ Transmittance and chemical concentration measurements

· Film Thickness kit for characterization of coatings
· 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.

Applications
· Universities & Research labs
· Semiconductors
· Polymer & Resist characterization
· Chemical measurements
· Dielectric characterizations
· Biomedical
· Hardcoat, Anodization, Metal parts process
· Optical Coating
· Non-metal Films
· And more...

Features
· Single-click analysis (no need for initial guess)
· Dynamic measurements
· Reflectance, transmittance, absorption and color parameters
· Save videos for presentations
· 350+ non-identical materials
· 3-years free of-charge Software update
· Running on Windows 7/8/10

Type*	Spectral Range	Thickness range**
FR-pRo UV/VIS	200 nm - 850 nm	1 nm - 80 μm
FR-pRo VIS/NIR	380 nm - 1000 nm	12 nm - 100 μm
FR-pRo RED/NIR	600 nm - 1040 nm	200 nm - 250 μm
FR-pRo UV/NIR-HR	190 nm - 1100 nm	1 nm - 120 μm
FR-pRo UV/NIR-EXT	190 nm - 1000 nm	3 nm - 80 μm
FR-pRo-D UV/NIR	190 nm - 1700 nm	1 nm - 250 μm

* Specifications are subject to change without any notice;
** Thickness measurements range is representative of the spectra range and refers to a single film layer with refractive index ~1.5 over a high reflective substrate

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Accessories	
Computer	Touch Panel PC with 19" screen
Focusing module	Optical module attached on the reflection probe for <100 µm diameter spot size
Film/cuvette kit	Transmission measurements of films or liquids in standard cuvettes
External base	To accommodate samples up to 300 mm in diameter (reflectance & transmission)
Scanner (motorized)	Polar (R-) or Cartesian (X-Y) automated stage with wafer chuck. The polar option support reflectance and the Cartesian support reflectance & transmittance
Integrating sphere	For the characterization of specular and diffuse reflectance of coatings and surfaces
Manual X-Y stage	Manual X-Y stage for positioning measurements over an area of 100 mm x 100 mm
Thermal module	Hot plate embedded in the FR-tool operating in the room temperature - 200 °C range. Programmable temperature controller (0.1 °C accuracy) operated through FR-Monitor
Liquid module	Teflon® cell for measurements in liquids with optical window (quartz). Sample holder for insertion of the sample into the liquid capable to handle up to 30 mm x 30 mm samples
Flow cells	Measurement of minute values of absorbance, fluorescence in liquids

Principle of Operation

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 or partially/fully reflective substrates) stack of films.