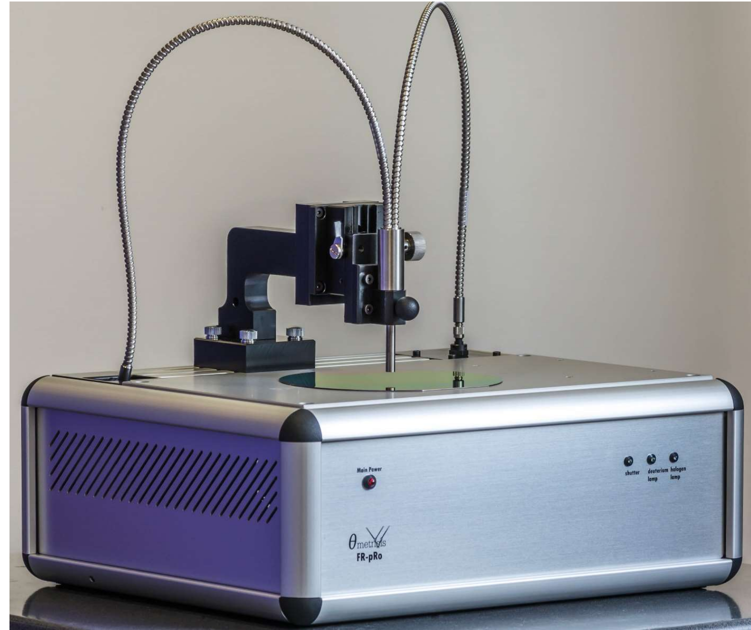
FR-pRo: Build2Order film characterization tool

FR-pRo: the modular & expandable platform for the characterization of coatings in the **1nm-3mm** thickness range.
FR-pRo tools are tailored to meet the user needs for a wide range of diverse non-destructive characterization 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)



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. The tool comes with a set of reference samples (Si reference, SiO_2/Si, Si_3/N_4/SiO_2/Si). Then, there is a wide range of Accessories, such as:

- **Film Thickness kit** for reflectance measurements,
- **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

For further information, please contact us at info@thetametrisis.com or sales@thetametrisis.com
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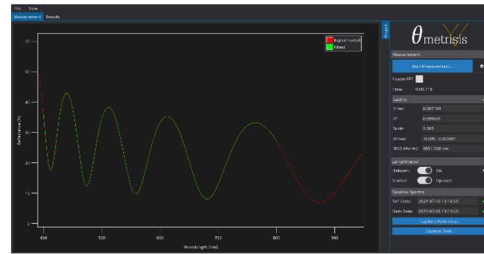
FEATURES

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



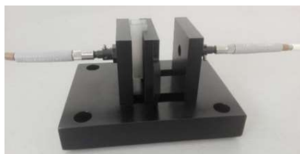
FR-pRo SPECIFICATIONS (STANDARD CONFIGURATIONS)*

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	190-1100	200 – 1700	380 –1020	380 – 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 -SiO2	1nm	1nm	1nm	1nm	12nm	12nm	50nm	1um	4um	12um	20um
Max Thick SiO2	80µm	90µm	120µm	250µm	100µm	250µm	250µm	500µm	1.2mm	2mm	3mm
Max Thick -Si								300µm***	500µm***	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
API support	YES	YES	YES	YES	YES	YES	YES	YES	YES	-	-
Light Source	Internal Deuterium (2000h) & Halogen (3000h)				Halogen (internal), 3000h (MTBF)						
Integration Time	5msec (min)				5msec (min)					20msec (min)	
Size/Weight	FR-pRo: 39x32x17cm (LxWxH) 10Kg, FR-pRo D: 45x32x17cm (LxWxH) 13Kg										
Power	110V/230V, 50-60Hz										
Spot size	Diameter of ~350-400um (smaller spot size options are available upon request)										
Material Database	> 700 different materials										

ACCESSORIES

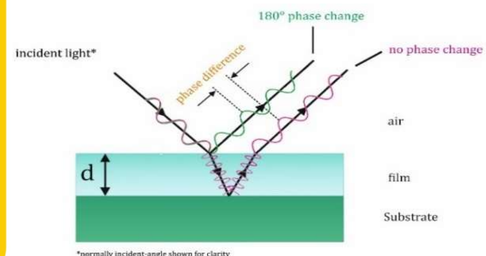
Film/Cuvette kit	Transmission measurements of films or liquids in standard cuvettes
Transmittance stage	Stage upgrade to support transmittance measurements
Lens Module	-Measurements on coatings where a small spot-size is required
Contact probe	Thickness & optical measurements of coatings in the field. Ideal for curved surfaces
Microscope	Microscope-based reflectance / transmittance and thickness measurements with high lateral resolution
Scanner (motorized)	Polar (R-Θ) or Cartesian (X-Y) automated stage with wafer chuck. Reflectance& transmittance
Integration sphere	For the characterization of specular and diffuse reflectance of coatings and surfaces
Manual X-Y stage	Manual X-Y stage for measurements over an area of 100mm x 100mm or 200mm x 200mm
Thermal Module	Computer controlled Hot plate embedded in the FR-tool (Room temperature - 200°C, 0.1°C acc.)

And many more.........



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_2 on Si wafer, Standard deviation of 100 thickness measurements. Sample: 1micron SiO_2 on Si wafer, 2*Standard-Deviation of daily average over 15 days. Sample: 1micron SiO_2 on Si wafer. *** For Double Side Polished Si wafer

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