

Used in many applications

Medical Technology

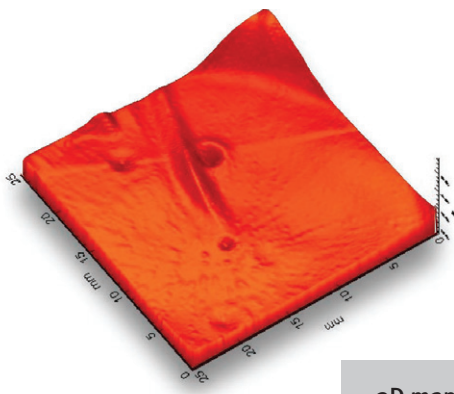
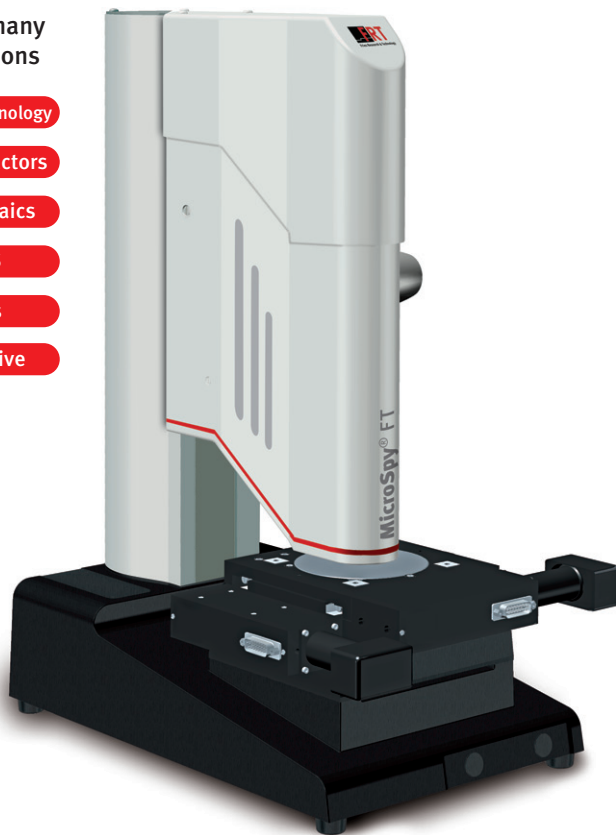
Semiconductors

Photovoltaics

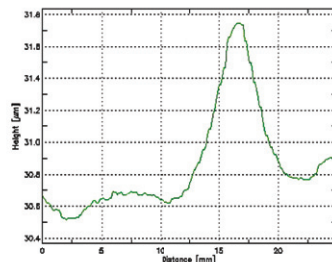
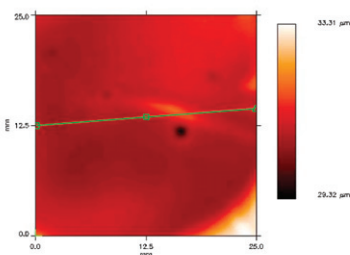
MEMS

Optics

Automotive



3D mapping of film thickness



Left: Mapping of surface coating
Right: 2D profile of film thickness according to mapping

Optical single-sensor tool for 2D and 3D measurements of transparent and semi-transparent films

Application Versatility

- For coatings that are transparent or semi-transparent in the visible or near-infrared spectrum of light
- For self-supported films (e.g. foils), single coatings or stacked films on a substrate
- For films as thin as 10 nanometers
- 2D point and profile measurements, 3D mapping mode
- Sensors with different light sources, spot sizes and thickness measurement ranges available
- Basic automation functionalities

Fast and Intuitive Operation

- Integrated CCD-camera with illumination
- Live camera picture of measuring area in software
- Selection of measuring area with mouse
- Easy to use evaluation software
- Various functions for visualization, analysis and reporting

Powerful Hardware

- Fast, non-contact optical sensor
- Motorized x,y-measuring area of 50 mm x 50 mm
- Manual sensor approach through precise z-axis
- Depending on selected sensor, non-destructive film measurements of a few mm down to 10 nm

Cost-effective Investment

The FRT MicroSpy® FT is designed to be cost-effective and powerful at the same time.

- Attractive purchase price
- Low follow-up costs for training, service and spare parts
- Small footprint

Reflectometric Measuring Principle

The optical reflectometric measurement principle bases on a superimposition of light beams reflected at the boundaries of a thin film.

In contrast to the interferometric measurement, the measured reflectance spectrum is compared with a calculated one, where the unknown thickness is systematically varied until both spectra match. This allows to determine the thickness of very thin films of a few nanometers.

Interferometric Measuring Principle

Light from a whitelight source (white LED, IR-LED) is focused onto the film. The incident light is partially reflected at each boundary of a transparent film. The recorded spectrum of the reflected light is evaluated to determine film thickness.

Due to the interference of the light reflected at the boundaries of the layer, the spectrum shows a typical waviness from which the sensor calculates the film thickness. As the evaluated spectrum depends not only on the thickness, but also on the refractive index of the material, the parameter is included in the calculation of the thickness value.

Specifications for Measuring System MicroSpy® FT

Measuring Principle	interferometry/reflectometry
System Design	microscope stand with x,y-table, interferometric or reflectometric sensor, CCD-camera with illumination
Sample Positioning	motorized precision table 145 mm x 145 mm, travel range 50 mm x 50 mm (x,y)
Sensor Approach	manual axis with coarse and fine adjustment, travel range 80 mm
Footprint	58 cm x 25 cm x 40 cm (h,w,d)
Weight Measuring System	20 kg
Power Supply	100-240V, 50-60 Hz, 220 W

Thin Film Thickness Sensors	FTR VIS	FTR NIR	FTR VIS/NIR	FTR UV/VIS	FTR UV/VIS/NIR
Measuring Range ¹	50 nm – 20 µm	70 nm – 70 µm	50 nm – 100 µm ²	10 nm – 20 µm	10 nm – 70 µm
Film Thickness Resolution	1 nm				
Lateral Resolution	200 µm - 800 µm without extra optics (better than 10 µm with extra optics)				
Measuring Angle	90° ± 5°				
Working Distance	approx. 5 mm				
Wavelength Range	400 nm – 850 nm	650 nm – 1100 nm	400 nm – 1100 nm	250 nm – 850 nm	250 nm – 1100 nm
Light Source	Halogen			Deuterium Halogen	

Standard Film Thickness Sensors	CWL FT 10 µm ³	CWL FT 40 µm ³	CWL IR 500	CWL IR 1000
Measuring Range ¹	3 µm – 180 µm		34 µm - 1900 µm	60 µm - 3500 µm
Film Thickness Resolution	10 nm		100 nm	200 nm
Lateral Resolution	5 µm	20 µm	6.5 µm	
Measuring Angle	90° ± 10°	90° ± 5°	90° ± 7°	
Working Distance	9.5 mm	27 mm	19.4 mm	
Light Source	LED (white)		IR-LED (1300 nm)	

- ¹ for refractive index of n=1
² optional 1 µm - 20 µm
³ diameter of measuring spot
⁵ Export file formats: ASCII, Autocad DXF, CSV, BMP, JPG, PNG, TIF

Software Package

Data Acquisition Software	easy to use, live camera picture from sample surface, basic automation
Data Analysis Software ⁵	analysis film thickness as well as many 2D and 3D filter and evaluation functions
Reporting	customizable reports, customizable input fields for adding additional information from user input
Languages	German/English

Further Information: <http://www.frt-gmbh.com/film-thickness>

EUROPE FRT, Fries Research & Technology GmbH, Tel.: +49 (0)2204-84 2430, Fax +49 (0)2204-84 2431, Email: info@frt-gmbh.com
 ASIA/PACIFIC FRT Shanghai Co., Ltd., Tel.: +86 (0)21-5138-6260, Fax: +86 (0)21-5138-6280, Email: info@frt-china.cn
 AMERICA FRT of America, LLC, Tel.: +1 408-261-2632, Fax +1 408-261-1173, Email: info@frtofamerica.com

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