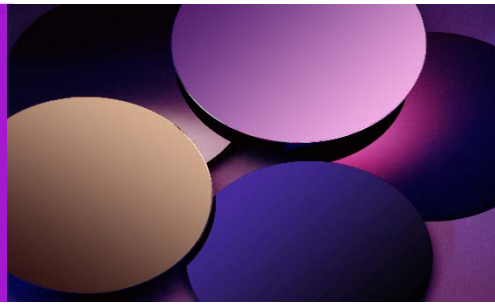
KLA INSTRUMENTS

Filmetrics® F50

Thin Film Mapping Analyzer



Automated Thin-Film Thickness Mapping System

Thin-film thickness of samples up to 450mm in diameter are mapped quickly and easily with the F50 advanced spectral reflectance system. The motorized r-theta stage moves automatically to selected measurement points and provides thickness measurements as fast as two points per second. The F50 has the same precision high-lifetime stage that performs millions of measurements in our production systems.

Choose one of dozens of predefined polar, rectangular, or linear map patterns, or create your own with no limit on the number of measurement points. The entire desktop system is set up in minutes and includes easy- to-use, intuitive software.

Example Layers

Virtually any smooth, non-metallic film may be measured. Examples include:

SiO_2	SiN_X	DLC	Polysilicon
Photoresist	Polymer layers	Polyimide	Amorphous Silicon

Example Applications

Semiconductor Fabrication	LCD
Photoresist	Cell Gaps
Oxides/Nitrides/SOI	Polyimide
Wafer Backgrinding	ITO
MEMS	**Optical Coatings**
Photoresist	Hardness Coatings
Silicon Membranes	Anti-Reflection Coating

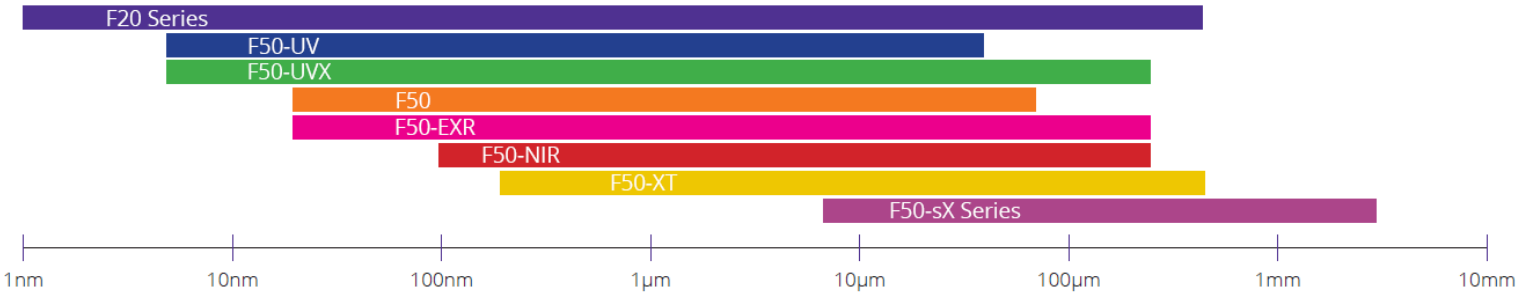
The Filmetrics Advantage

- World's leader in tabletop thin-film measurement
- 24-hour phone, e-mail, and online support
- Intuitive analysis software standard with every system

Additional Features

- Built-in online diagnostics
- Standalone analysis software included
- Sophisticated history function for saving, reproducing, and plotting results

Thickness Measurement Range



Measurement Specifications	F50-UV	F50-UVX	F50	F50-EXR	F50-NIR	F50-XT	F50-sX
Thickness Measurement Range*	5nm – 40µm	5nm – 250µm	20nm – 70µm	20nm – 250µm	100nm – 250µm	0.2µm – 450µm	7µm – 3mm
Min. Thickness to Measure n&k*	50nm	50nm	100nm	100nm	500nm	2µm	100µm
Spectrometer Wavelength Range	190-1100nm	190-1700nm	380-1050nm	380-1700nm	950-1700nm	1440-1690nm	1280-1580nm
Accuracy*: the greater of	1nm or 0.2%	1nm or 0.2%	2nm or 0.2%	2nm or 0.2%	3nm or 0.4%	4nm or 0.4%	50nm or 0.4%
Precision	0.02nm[1]				0.1nm[1]	1nm[1]	5nm[2]
Stability	0.05nm[2]				0.12nm[3]	1nm[3]	5nm[4]
Spot Size	Standard 1.5mm, Optional down to 150µm					60µm	10µm
Light Source Lamp MTBF	D_2: 2000 hours, Halogen: 1200 hours		Halogen: 1200 hours				SLED: > 10 years

General Requirements	
Power	100-240VAC, 50 - 60Hz, 100W
Dimensions	14W x 19D x 11H (in) 35.5W x 48.3D x 28H (cm)
Weight	35lbs (16kg)

Computer Requirements	
Processor Clock Speed	1.4GHz minimum
Interface	USB 2.0

Operating System	
PC[5]	Windows 10 – Latest Windows (64-bit)
MAC	OS X Catalina – Latest MAC OS Running Parallels

	200mm Chuck	300mm Chuck
Sample Size	≤ 200mm diameter	≤ 200mm diameter
Speed (Typical with Vacuum Chuck)	5 points – 5s 25 points – 14s 56 points – 29s	5 points – 8s 25 points – 21s 56 points – 43s

* Material dependent

[1] 1σ of 100 measurements of 500nm SiO_2-on-Si. Average of 1σ over 20 successive days.

[2] 1σ of 100 measurements of 100µm SiO_2-on-Si. Average of 1σ over 20 successive days.

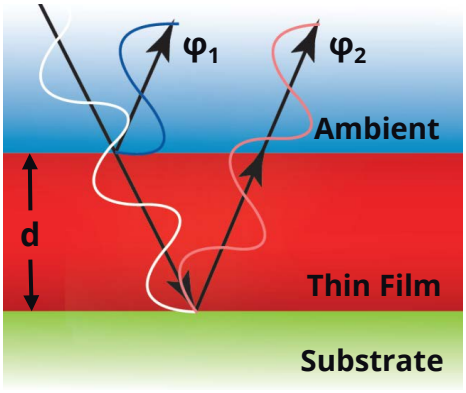
[3] 2σ of daily average of 100 measurements of 500nm SiO_2-on-Si over 20 successive days.

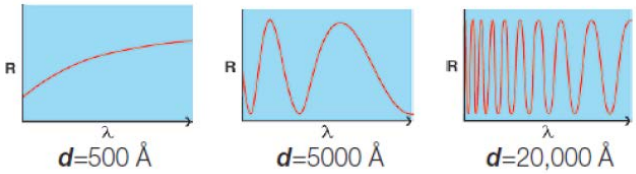
[4] 2σ of daily average of 100 measurements of 100µm SiO_2-on-Si over 20 successive days.

[5] Windows 10 – Latest Windows (64-bit) and a DirectX 10 graphics card required to render 3D wafer maps.

How Does it Work?

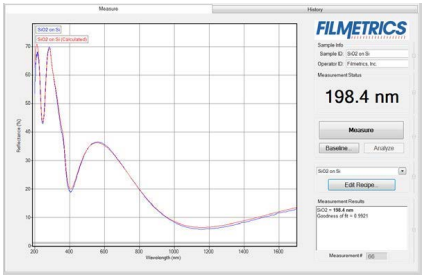
When light encounters an interface between two materials, it is partially reflected. The wave-like nature of light causes reflections from multiple interfaces (*φ1*, *φ2*) to interfere with each other, resulting in oscillations in the wavelength spectrum of the reflected light (see examples in the figures below).



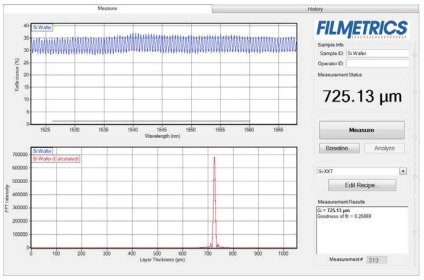


From the frequency of these oscillations, the distance between the different interfaces can be determined and thus, the thickness *d* of the thin film (with a larger number of oscillations corresponding to a greater thickness). Other material characteristics can also be measured, such as refractive index and roughness.

For the analysis of the spectra, our FILMeasure/FILMapper software uses two analysis modes: Spectrum-Matching and FFT. In Spectrum-Matching mode, you can analyze thickness, as well as refractive index, whereas FFT mode is only for thickness but is often more robust for thicker films.

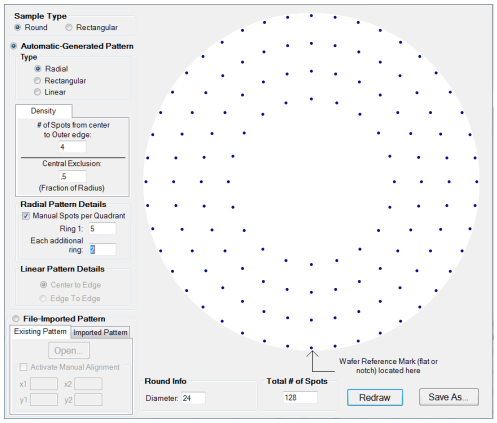


Spectrum-Matching Mode



FFT Analysis

FILMapper Software – Measurement Automation

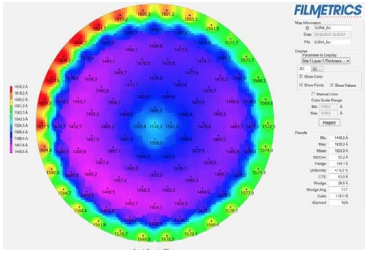


The Map Pattern Generator

The built-in map pattern generator lets you easily generate the spot patterns needed to measure the relevant area of your samples, thus saving time during data acquisition.

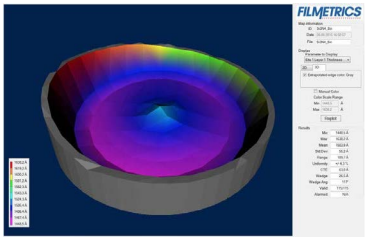
Here are only some of the parameters you can adjust to customize your map's properties:

- Round or square maps
- Radial or rectangular patterns
- Center or edge exclusion
- Spot density



Measurement Results Visualization in 2D and 3D

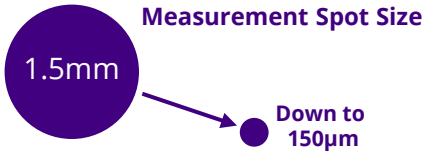
Whether you are measuring reflectance, film thickness, or refractive index, FILMapper lets you display the resulting measurement maps in either 2D or 3D. Switch easily between the maps for the individual measurement parameters and freely rotate 3D profiles to get an optimal view of the results.



Optional Accessories

Overcoming High Surface Roughness

For samples with a high roughness, spot sizes of 300µm or 150µm are available. If an even smaller spot size is needed (e.g., to measure on lateral structures), take a closer look at the Filmetrics F54.



Staying Focused

You'll benefit from our optional autofocus if you're measuring absolute reflectance with high accuracy or if your samples have a significant height variance. It is also important to maintain the small spot size of the sX versions.

Available Chuck Sizes

Select one of our standard chuck sizes of 100mm, 200mm, 300mm, or 450mm diameter or ask for a custom-made chuck.

Looking to do More?
Extend your capabilities even further with these related products:

F3 Series for layers as thin as 1nm

F54-XY Series for automated mapping of patterned samples

F54 Series for micro-spot measurements

KLA SUPPORT
Maintaining system productivity is an integral part of KLA's yield optimization solution. Efforts in this area include system maintenance, global supply chain management, cost reduction and obsolescence mitigation, system relocation, performance and productivity enhancements, and certified tool resale.

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