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Automatic Microscopic Film Thickness Mapper SM280

Feature

- Wide film thickness range（10nm ~ 100μm）
- Wide wavelength range （200-1700nm）
- Non-contact,non-destructive testing system
- Fine spot, better spatial resolution
- Ultra-long life light source, higher luminous efficiency
- Compact and affordable without compromising high precision
- High-resolution,high-sensitivityspectrometer,the measurement results are more accurate and reliable
- The software interface is intuitive, and the operation is convenient and time-saving
- Integrated real-time camera to monitor measurement points;
- Equipped with a microscope objective lens to support the detection of small-sized samples;
- The surveying and mapping speed is fast, and it supports multi-point surveying and mapping point map drawing
- Support drawing 2D/3D thickness distribution map of samples
- High-precision, long-life 3-axis rotary platform
- Optical constant analysis (n: Refractive index, k: Extinction coefficient) with Non-linear Least-Squares Method
- Analytical algorisms are Peak-Valley Method, Fast Fourier Transformation (FFT) Method, Non-linear Least-Squares Method and Optimization Method

Description

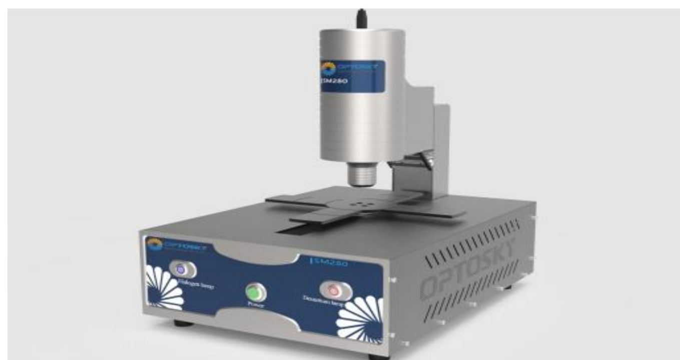
SM280 is a micro film thickness mapper developed by utilizing the principle of reflection light interference of films. It uses the light with the widest wavelength range of 200-1700nm to be vertically incident on the surface of the film. As long as the film has a certain degree of transmission, the SM280 can calculate the thickness of the film according to the reflected interference spectrum, and other optical constants such as Reflectivity, refractive index and extinction coefficient, etc., the thickness of the maximum mapping range can reach 10nm ~ 100um.

The SM280 automatic microscopic film thickness mapper adopts a microscopic system, which can further reduce the spot size, thereby achieving very good spatial resolution. At the same time, the SM280 adopts an integrated design. The core components use a high-resolution, high-sensitivity spectrometer and a high-precision 3-axis mobile platform. Combined with Optronics' unique algorithm technology, it provides users with a new generation of leading automatic microscopy film thickness Surveyor.

Application

Virtually all smooth, translucent or low absorption coefficient films can be mapped, which includes almost all dielectric and semiconductor materials, including silicon dioxide,nitriding layer,diamond-like carbon,polycrystalline silicon,polycrystalline silicon,photoresist,macromolecule,polyimide,amorphous silicon,etc.

- Biomedical: medical equipment, Parylene
- Optical coating: hard coating, anti-reflection layer
- Semiconductor coating: photoresist, oxide, desalination layer, silicon-on-insulator, wafer back grinding
- Microelectronic system: photoresist, silicon film, printed circuit board
- Liquid crystal display: gap thickness, polyimide, ITO transparent conductive film;



1. Work Principle

When the incident light penetrates the interface of different materials, part of the light will be reflected. Due to the fluctuation of light, the reflected light from multiple interfaces interferes with each other, so that the multi-wavelength spectrum of the reflected light oscillates. From the oscillation frequency of the spectrum, we can judge the distance of different interfaces and then obtain the thickness of the material (more oscillations represent larger thickness), and other material properties such as refractive index and roughness can also be measured at the same time, as shown on the Figure 1.

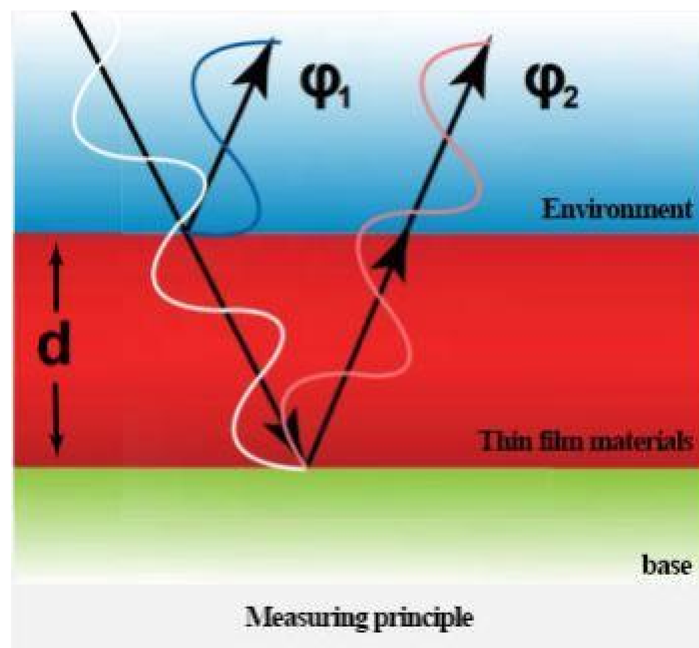


Figure 1 Measurement principle

Optosky fully absorbs the pain points of the industry, digs deep into the needs of customers, and is committed to building the leading automatic film thickness mapping instrument in China - SM230, which emits light from the host light source and illuminates the surface of the sample to be measured through a Y-type optical fiber. The Y-type fiber is composed of 7 thin fibers in a plum blossom shape. The outer 6 fibers emit light. The middle fiber guides the reflected interference light back to the spectrometer inside the host for measurement and calculation. The principle of the SM230 system is shown in the figure on the Figure 2.

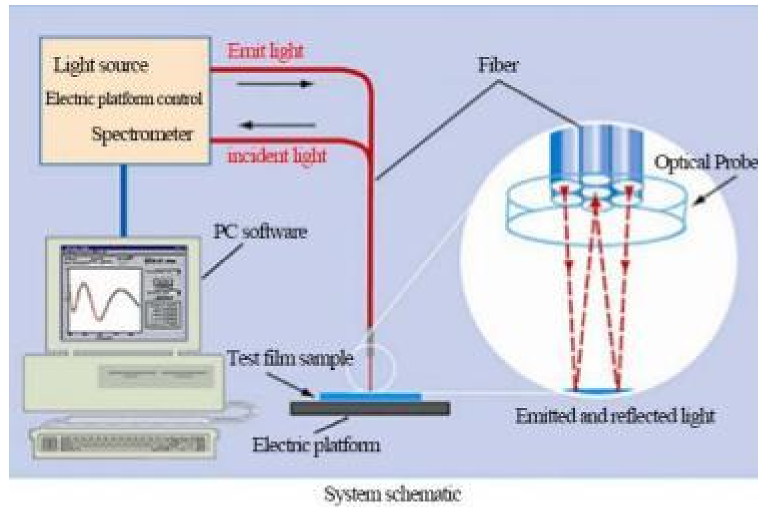


Figure 1 System principle

The surveying and mapping methods of SM230 can be polar, rectangular or linear. The built-in high-performance motion controller in the host enables the rotatable platform to support a variety of predefined surveying and mapping methods. The equipped host computer software supports users to create their own surveying and mapping methods without measuring The number of points is limited, the measurement results support 2D and 3D presentation, and the supported forms of the point map:

*Round/square

*Radial

*Center or edge exclusion

*Spot density

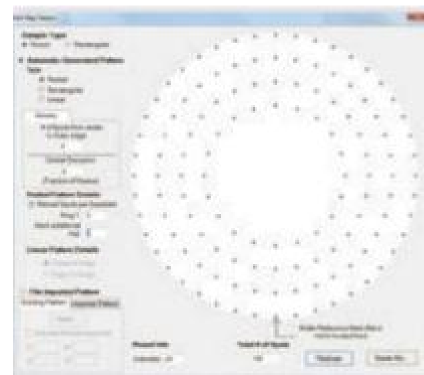


Figure 3 PC software point map drawing

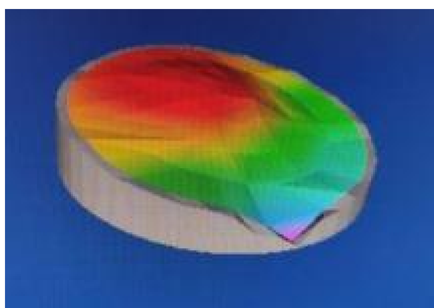


Figure 4 3D display of the film thickness value of PC software

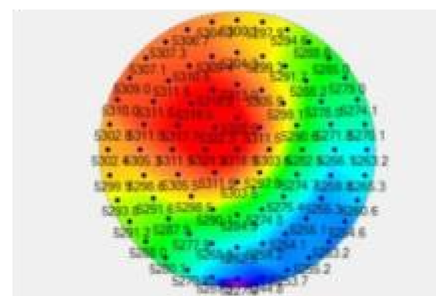


Figure 5 2D display of the film thickness value of PC software

2. Parameters

SM280 Automatic Microscopic Film Thickness Mapper					
Model		SM280-UV	SM280-UVX	SM280	SM280-EXR
General specifications					
Spectral range		200nm-1000nm	200nm-1700nm	400nm-1000nm	400nm-1700nm
Light source		Deuterium halogen Lamp		Tungsten halogen lamp	
Measurement specifications					
Thickness range[1]	5X objective lens	/	/	20nm-40um	20nm-100um
	10X objective lens	/	/	20nm-30um	20nm-70um
	15X objective lens	10nm-30um	10nm-100um	20nm-40um	20nm-80um
	50X objective lens	/	/	20nm-1um	20nm-2um
Accuracy[2]		±2nm or 0.2%			
Incidence angle		90°			
Film thickness layers		1~3			
Sample material		Transparent or translucent film			
Measurement mode		Single-point/ multi-point/ automated measurements			
Spot size[3]	objective lens	Standard 500um aperture	Optional 250um aperture	Optional 100um aperture	Optional 50um aperture
	5X objective lens	100um	50um	20um	10um
	10X objective lens	50um	20um	10um	5um
	15X objective lens	30um	15um	5um	3um
	50X objective lens	10um	5um	2um	1um
Sample size		Diameters from 1mm to 300mm or larger			
Basic requirements					
Operating system		Windows10/ 11			
Indicator light		Deuterium lamp indication, halogen lamp indication		Halogen lamp indication	
Button		Power buttons, deuterium lamps, halogen lamps		Power button, halogen power	
External interface		Power outlet, USB 2.0, RJ45			
Scanning platform		Rotate + X axis movement			
Movable stroke		150mm*360°			
Material		Aluminum alloy			
Power supply		100~240VAC, 50~60Hz			
Packing list		Mainframe, measuring platform, power cord, communication cable, optical probe, Y-fiber			
Remarks: 1. Depends on the material; 2. Whichever is larger, and depends on the material; 3. Clear aperture;					