

# NanoCalc Thin Film Reflectometry System



The optical properties of thin films arise from reflection and interference. The NanoCalc Thin Film Reflectometry System allows you to analyze the thickness of optical layers from 10 nm to ~250  $\mu\text{m}$ . You can observe a single thickness with a resolution of 0.1 nm. Depending on your software choice, you can analyze single-layer or multilayer films in less than one second and can measure the thickness and removal rates of semiconductor process films or anti-scratch coatings, hard coatings and anti-reflection coatings.

## Features

- Analyze single- or multi-layer films
- Resolution to 0.1 nm
- Ideal for in situ, on-line thickness measurements

## Theory of Operation

The two most common ways to measure thin film characteristics are spectral reflectance/transmission and ellipsometry. NanoCalc utilizes the reflectance method and measures the amount of light reflected from a thin film over a range of wavelengths, with the incident light normal to the sample surface.

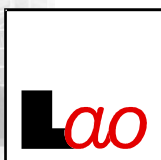
## Search by n and k

As many as three layers can be specified in a film stack. The various films and substrate materials can be metallic, dielectric, amorphous or crystalline semiconductors. The NanoCalc Software includes a large library of n and k values for the most common materials. You can edit and add to this library. Also, you can define material types by equation or dispersion formulas.



## Applications

NanoCalc Thin Film Reflectometry Systems are ideal for in situ, on-line thickness measurements and removal rate applications, and can be used to measure the thickness of oxides,  $\text{SiN}_x$ , photoresist and other semiconductor process films. NanoCalc Systems measure anti-reflection coatings, anti-scratch coatings and rough layers on substrates such as steel, aluminum, brass, copper, ceramics and plastics.



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# NanoCalc Systems

NANOCALC-2000-UV-VIS-NIR	
Wavelength:	250-1100 nm
Thickness:	10 nm-70 µm
Light source:	Deuterium and Tungsten Halogen

NANOCALC-2000-UV-VIS	
Wavelength:	250-850 nm
Thickness:	10 nm-20 µm
Light source:	Deuterium and Tungsten Halogen

NANOCALC-2000-VIS-NIR	
Wavelength:	400-1100 nm
Thickness:	20 nm-100 µm (optional 1 µm-250 µm)
Light source:	Tungsten Halogen

NANOCALC-2000-VIS	
Wavelength:	400-850 nm
Thickness:	50 nm-20 µm
Light source:	Tungsten Halogen

NANOCALC-2000-NIR	
Wavelength:	650-1100 nm
Thickness:	70 nm-70 µm
Light source:	Tungsten Halogen

\* For Reflectometry applications, the following items are required:

NC-2UV-VIS100-2	Bifurcated UV fiber 400 µm x 2m 2x SMA connectors Flexible metal jacketing
NC-STATE	Single point reflection measurement for non transparent samples
Step-Wafer	5 Steps 0-500 mm, calibrated 4"

\* **If using a microscope, the following items are also needed:**

NC-7UV-VIS200-2	Reflection probe for application microscopy with MFA-C-Mount
Step-Wafer	5 Steps 0-500 mm, calibrated 4"

## NanoCalc Specifications

Angle of incidence:	90°
Number of layers:	3 or fewer
Reference measurement needed:	Yes (bare substrate)
Transparent materials:	Yes
Transmission mode:	Yes
Rough materials:	Yes
Measurement speed:	100 milliseconds to 1 second
On-line possibilities:	Yes
Mechanical tolerance (height):	With new reference or collimation
Mechanical tolerance (angle):	Yes, with new reference
Microspot option:	Yes, with microscope
Vision option:	Yes, with microscope
Mapping option:	6" and 12" XYZ mapping tables
Vacuum possibilities:	Yes