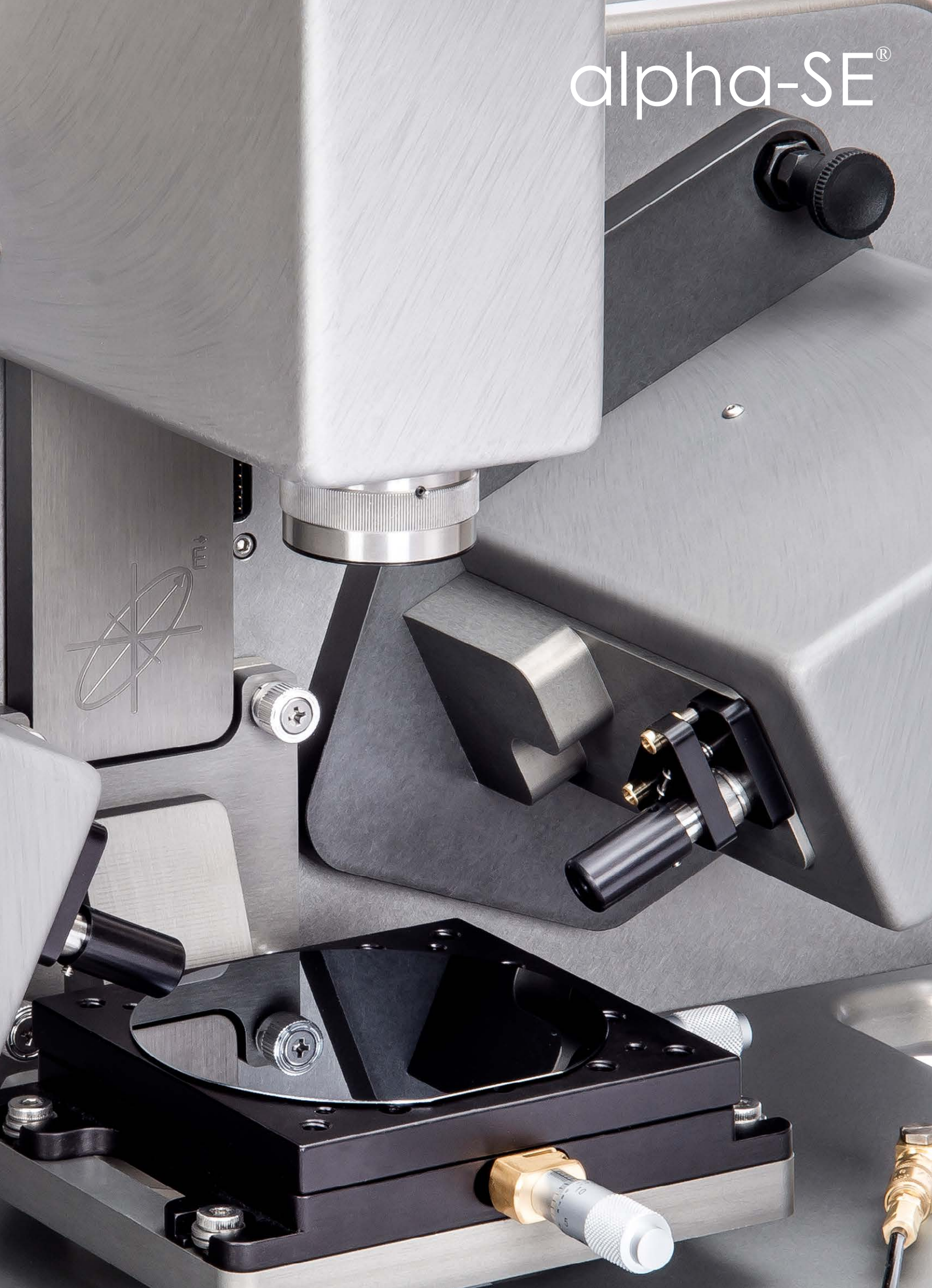


alpha-SE[®]



Capabilities

For routine measurements of thin film thickness and refractive index, the alpha-SE[®] is a great solution. Designed for ease-of-use: simply place the sample on the stage, choose the model that matches your film, and press measure. You have results within seconds.

Why an alpha-SE?

Easy-to-Use

Simple push-button operation with advanced software with built in models that does the work for you.

Powerful

Proven spectroscopic ellipsometer technology gives you both thickness and index with much higher certainty than other techniques.

Flexible

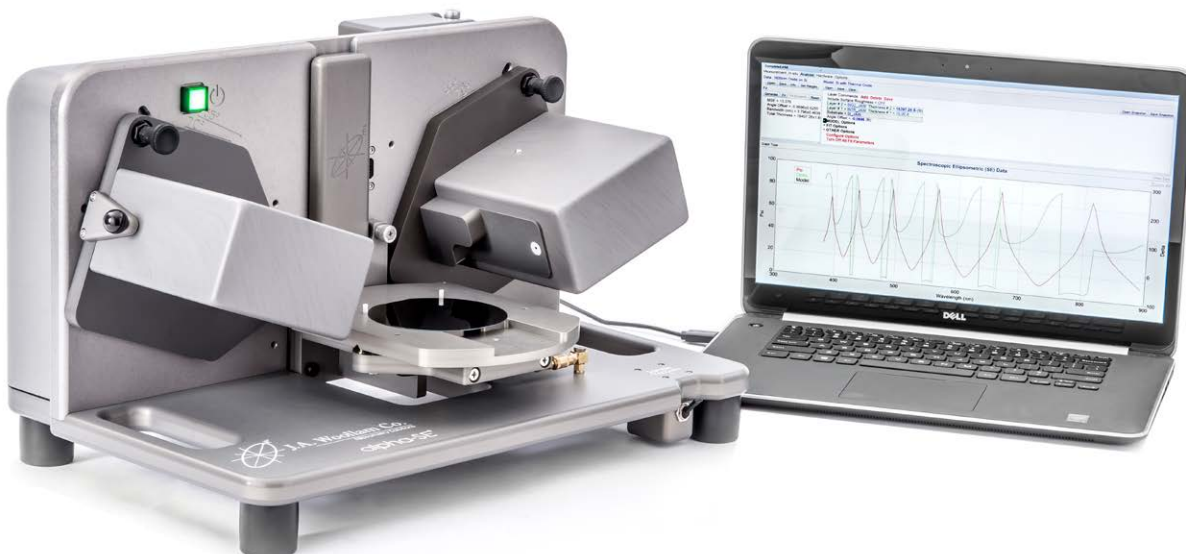
Measure any kind of material - dielectrics, semiconductors, organics, and more.

Affordable

The power of spectroscopic ellipsometry at a reasonable price.

Fast

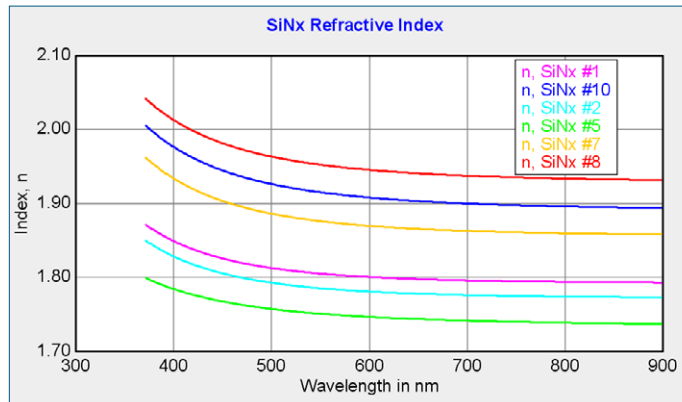
Hundreds of wavelengths simultaneously collected in seconds - immediate results.



Applications

For Transparent Films

With fast measurement speed and push-button operation, the alpha-SE[®] is ideal for qualifying thin films. Single-layer dielectrics on silicon or glass substrates can be measured in seconds. Log results for easy-to-use comparisons in both graphical and tabular formats.



Comparison

Entry Comparison Table

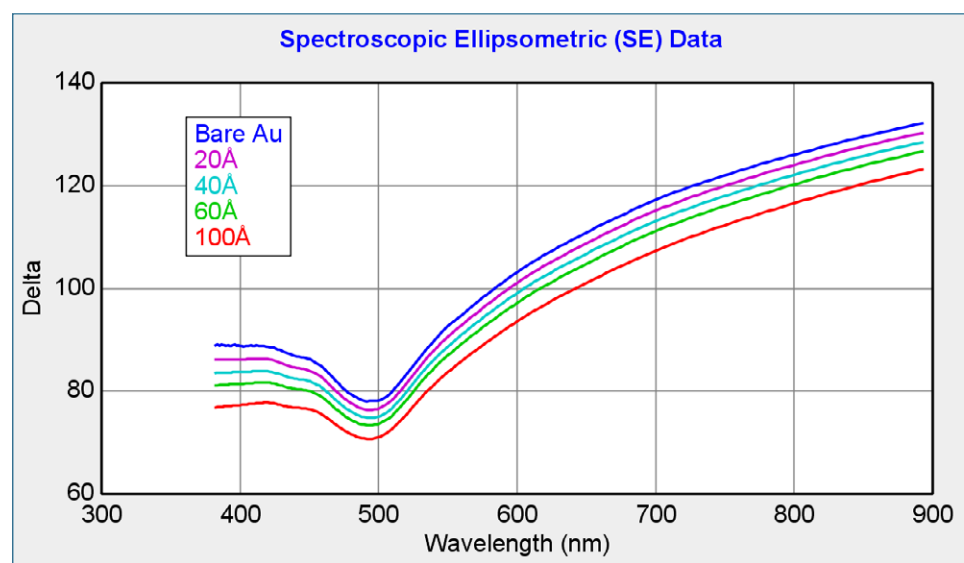
	MSE	Roughness (nm)	Thickness # 1 (nm)	Index @ 632.8 nm
SiNx #1	4.343	2.65	93.19	1.799
SiNx #10	4.432	1.59	93.02	1.905
SiNx #2	4.356	2.05	96.33	1.779
SiNx #3	6.244	1.47	91.84	1.799
SiNx #4	5.872	1.02	94.20	1.775
SiNx #5	3.122	3.29	101.37	1.745
SiNx #6	5.845	1.29	92.71	1.802
SiNx #7	4.975	2.16	96.72	1.867
SiNx #8	3.581	2.90	87.54	1.942
SiNx #9	3.804	2.34	88.37	1.941
Average	4.65733	2.077	93.529	1.83540
Std. Dev.	1.05345	0.737	4.033	0.07233

Reverse Columns/Rows Add Statistics

A series of silicon nitride thin films is quickly compared to study variation in the thickness and refractive index with process conditions.

Self-Assembled Monolayers

Phase information of a spectroscopic ellipsometry measurement is highly sensitive to very thin films (<10 nm). For example, self-assembled monolayers can be measured and quickly compared using the alpha-SE.



For thin organic layers on gold, the phase parameter (Δ) shifts downward with increasing thickness.

For Absorbing Films

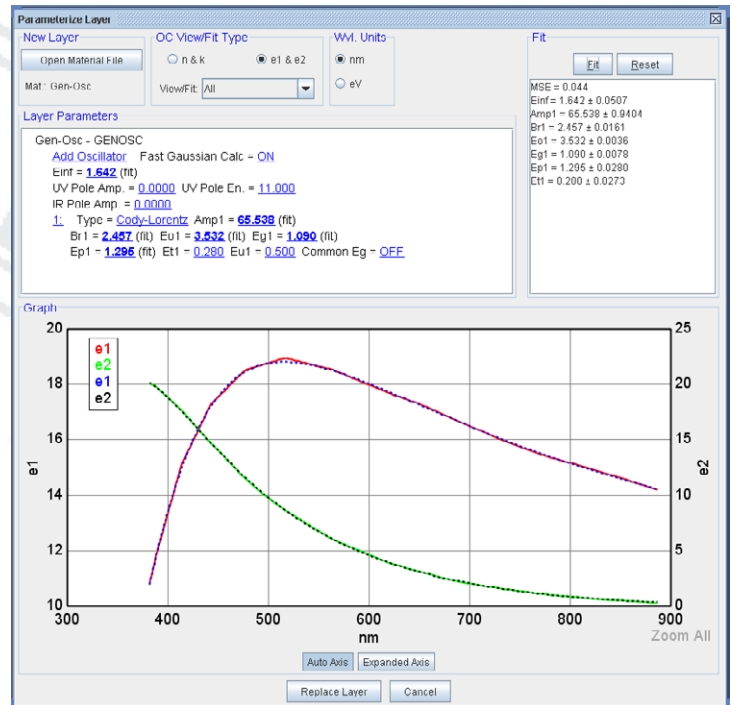
Advanced models allow quick and efficient fits for a wide variety of absorbing materials you may encounter.

Materials

- a-Si
- poly-Si
- Diamond-like carbon
- Organic materials
- Organic LED films
- SiC
- Photoresist
- Display color filters
- Metals

Models

- Lorentz
- Gaussian
- Drude
- Tauc-Lorentz
- Cody-Lorentz
- B spline



Coatings on Glass

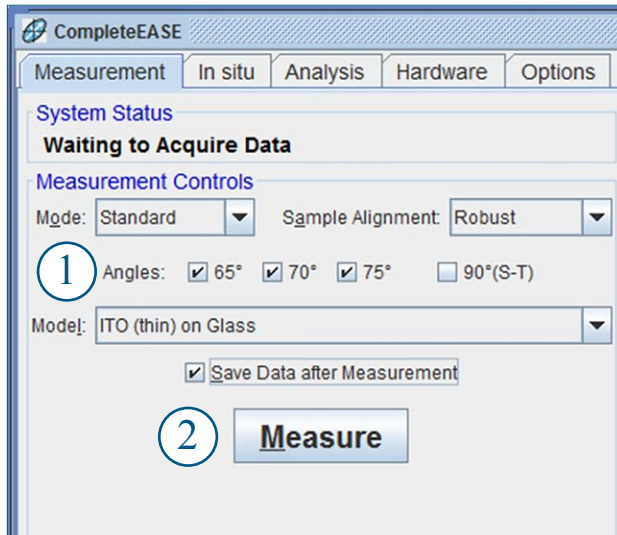
Patented technology allows accurate measurements on any substrate: metal, semiconductor, or glass. For transparent substrates, the alpha-SE[®] simultaneously measures depolarization to correct for light returning from the backside of the substrate. This unwanted light can confuse other ellipsometers, but the alpha-SE ensures accurate thickness and optical constants.

Parameter	Ideal	Roughness	Grading	Roughness & Grading
MSE	33.598	1.175	2.100	0.780
Roughness	N/A	11.17 ± 0.040 nm	N/A	8.64 ± 0.173 nm
A	1.752 ± 0.0248	1.873 ± 0.00082480	1.840 ± 0.0014	1.866 ± 0.00074629
B	0.08507 ± 0.015419	0.00934 ± 0.00048968	0.02420 ± 0.00086051	0.01388 ± 0.00042965
C	-0.00632 ± 0.002129	0.00104 ± 6.5930E-05	-0.00285 ± 0.00011423	-2.3533E-05 ± 8.1498E-05
% Inhomogeneity	N/A	N/A	-17.30 ± 0.161	-4.41 ± 0.292
Thickness # 1	91.26 ± 0.473 nm	88.81 ± 0.025 nm	83.07 ± 0.075 nm	86.89 ± 0.118 nm
n of Cauchy Film @ 632.8 nm	1.925	1.903	1.882	1.901

The high sensitivity of alpha-SE technology provides microstructural details that you cannot get from Reflectance measurements. A thin film of Zirconium Oxide is measured with the alpha-SE and its index is found to vary between the substrate and surface. A graded model with rough surface best describes this sample.

Easy Measurements

Measurements as easy as 1-2-3, with results in a matter of seconds!

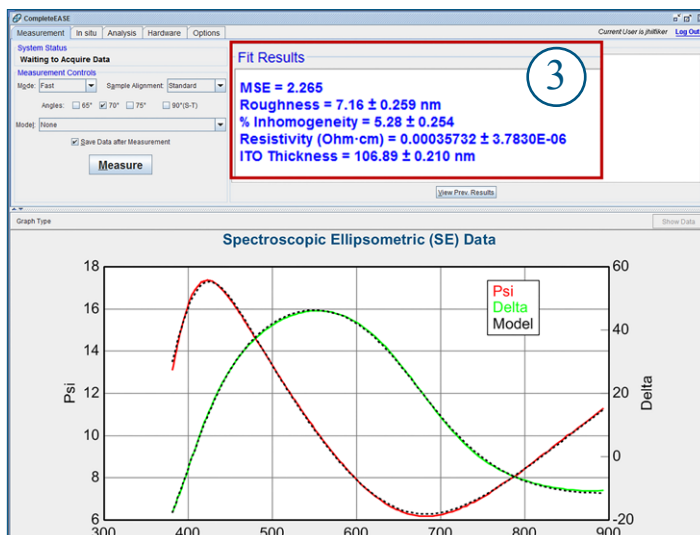


1. Mount your sample and choose your measurement settings:

- Angles
- Sample alignment
- Model that describes your sample

2. Press 'Measure'

- Sample is automatically aligned, measured and the data is analyzed

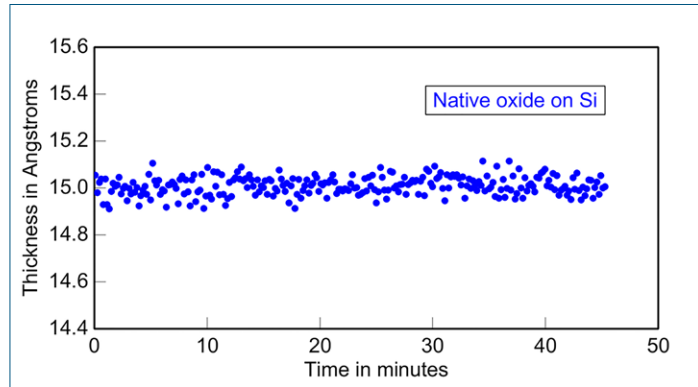


3. Your results are reported: film thickness, refractive index,

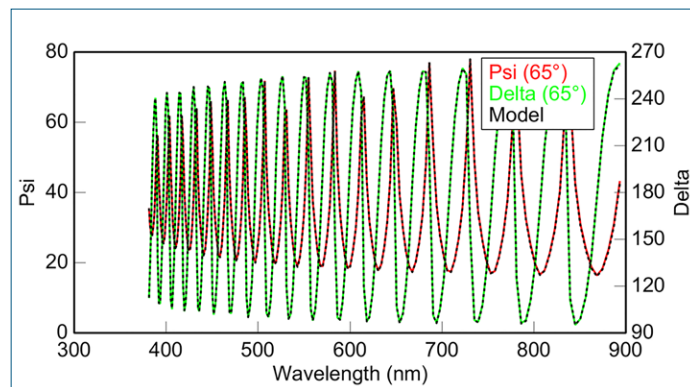
Thickness and Refractive Index

Spectroscopic ellipsometry is perfect for characterizing thin film thickness and refractive index. The alpha-SE measures films from just a monolayer to a few microns.

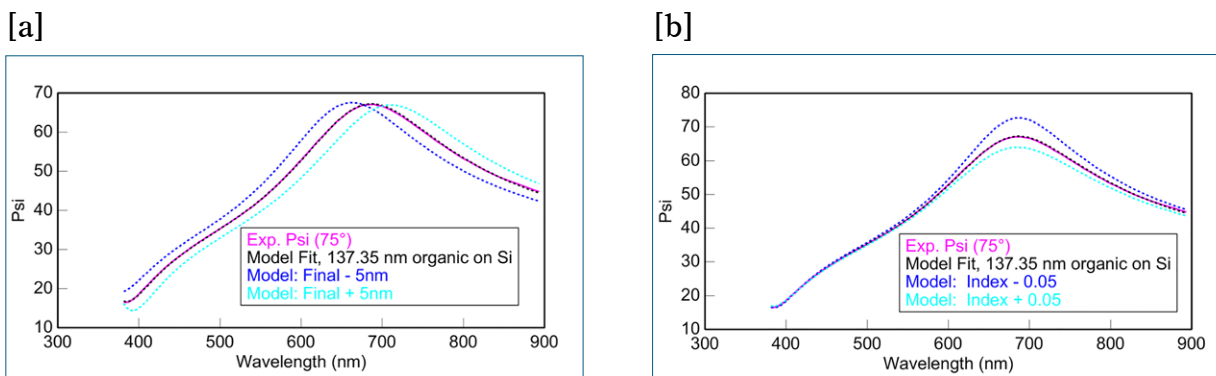
Dynamic measurements of a native oxide on silicon show very stable, sub-Angstrom precision.



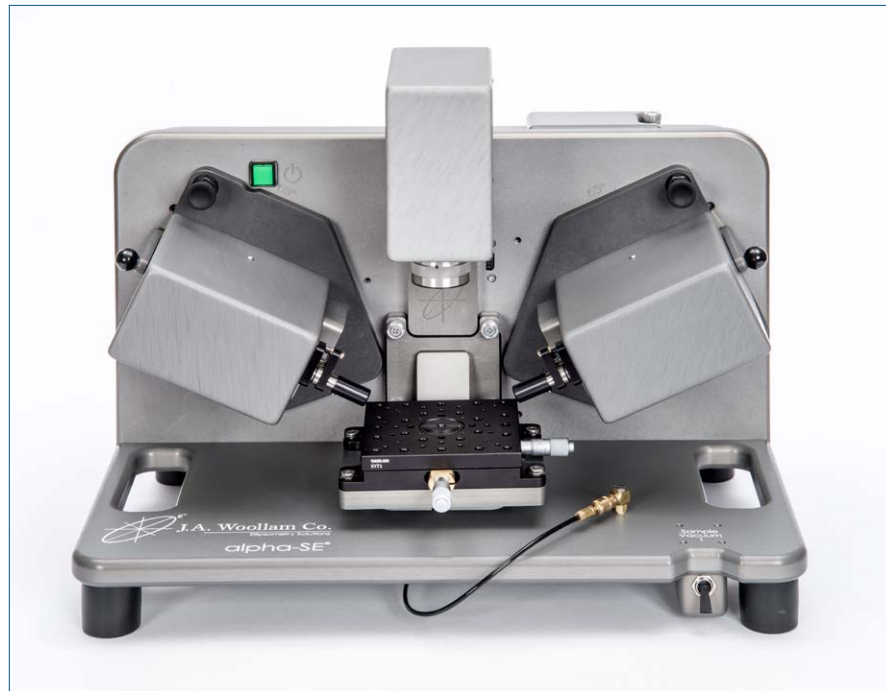
This 5-micron thick oxide has a large number of interference features that are well-resolved by 180 wavelengths measured by the alpha-SE.



An organic layer on silicon is easily characterized by the alpha-SE to determine thickness and refractive index. Simulated values with (a) varied thickness and (b) varied index show the distinct changes that give ellipsometry unique results for both film properties.



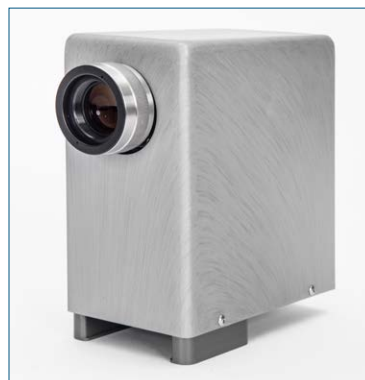
Accessories



Focusing

Perfect for non-uniform or small samples.

- Reduce beam diameter to ~0.3mm
- Quick and easy magnetic attachment- optics snap into position
- No alignment or calibration required



Camera

View the focused beam measurement location.

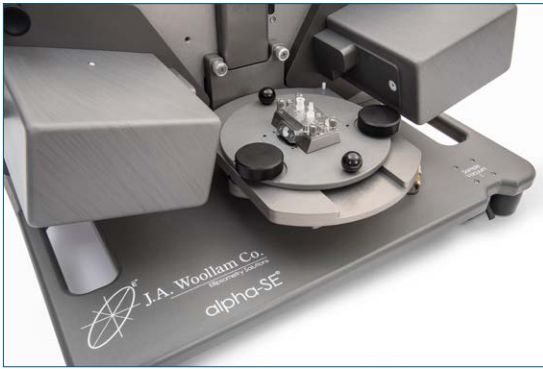
- 10mm by 7mm field of view
- Integrated image within CompleteEASE software



Translation

Fine-adjustment of the measurement location.

- Manually adjust 12mm XY range with .025mm resolution
- Integrated vacuum stage holds sample in place
- Position the focused beam spot anywhere on the sample



Liquid Cell

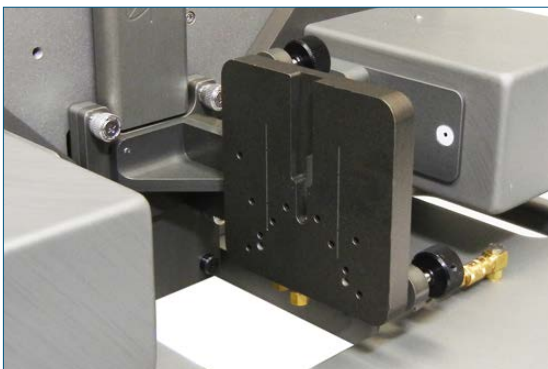
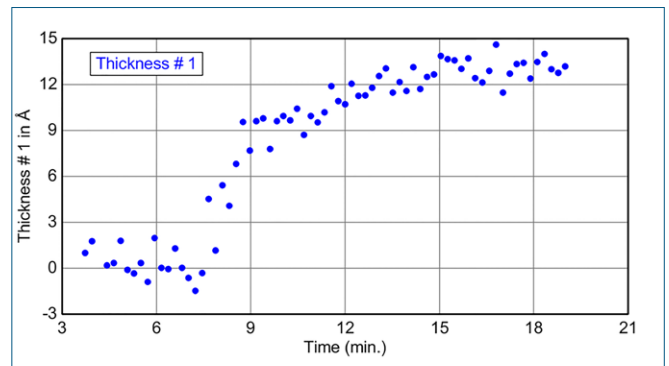
- Study samples in liquid ambients
- 500 μ L liquid capacity
- 70° angle of incidence
- Designed for glass slides & 1" or 2" wafers

Software accounts for window effects and index of ambient fluid.



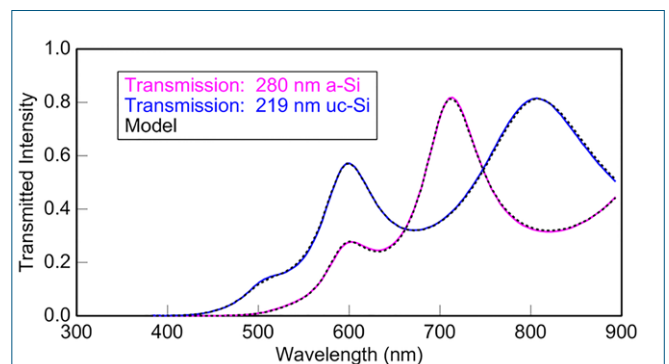
QCM Cell

- Allows study of mechanical properties in liquid ambients
- Tilt stage designed to hold Q-Sense QCM-D (E-Series with E1 Chamber)
- Woollam provides mount only



Transmission Stage

- Holds sample vertically in the path of light beam to allow normal incidence transmission measurements
- Tip-tilt stage for easy sample alignment
- Integrated vacuum stage holds sample in place



Specifications

Spectral Range

380 nm to 900 nm, 180 wavelengths

Angle of Incidence

65°, 70°, 75° or 90° (straight-through)

System Overview

Patented rotating compensator technology with CCD detection

Data Acquisition Rate

3 sec. (Fast mode)
10 sec. (Standard mode)
30 sec. (High-precision mode)

Weight

18 kilograms excluding computer

Beam Diameter

Collimated: ~3 mm
Focused: ~0.3 mm

