



Accurate

Overview



The iSE is a new in-situ spectroscopic ellipsometer developed for real-time monitoring of thin film processing. Using our proven technology, the iSE enables users to optimize optical properties of deposited films, control film growth with sub-angstrom sensitivity, and monitor growth kinetics.

Why iSE

+Powerful

With the power of spectroscopic ellipsometry (SE), the iSE is capable of measuring thickness and optical properties with much higher certainty than other techniques.

+Compact

New compact design enables easy integration onto any chamber.

+Versatile

Accurately determines thickness and optical properties for a wide variety of thin films including metals, semiconductors, oxides, nitrides, and more.

+Affordable

The power of spectroscopic ellipsometry at a reasonable price.

+Easy-to-Use

User-friendly interface for real-time analysis of thin film growth and etch.



Advantages

Fast, Wide-Spectrum Measurements

The iSE utilizes a new optical design with Dual-Rotation in combination with modern CCD detection to provide hundreds of wavelengths in a fraction of a second. Dual-Rotation enables continuous, multi-zone measurements with unparalleled accuracy and capability.

DYNAMIC SPECTROSCOPIC ELLIPSOMETRY DATA



Figure 1. Dynamic spectroscopic ellipsometry data is graphed at four representative wavelengths. Each measurement versus time actually consists of 190 wavelengths from ultraviolet to near infrared. A few time points are graphed above, showing the SE data before, during, and after film growth.



High Sensitivity:

Ellipsometry measurements over a wide spectral range provide sensitivity to a variety of material properties such as composition, conductivity, surface conditions, etc. In addition, ellipsometry is sensitive to thickness changes at the sub-angstrom level.

Real-Time:

Monitors changes in film thickness and optical properties during deposition. Use these measurements for feedback control.

Non-Destructive:

In-situ SE uses light to probe the thin film in a noninvasive manner. The ellipsometer is outside the process chamber and light is allowed to enter through windows and interact with the sample. The light beam directly measures surface of interest without any damage or need for special sample preparation.

Accurate:

SE measurements calculate the change in polarization of light. For realtime measurements, this has significant advantages over intensity-based measurements:

- Data accuracy is not affected by coated windows
- Collects accurate data even without collecting the entire beam
- Polarization contains phase measurements which are highly sensitive to very thin films

Applications

Common Real-Time Ellipsometry Measurements

- Thin film thickness from single or multiple layers (Figure 2)
- Growth or etch rates
- Process kinetics
- Optical constants (Figure 3)
- Surface quality before and after processing
- Film nucleation behavior
- Process conditions that affect optical constants (deposition rate, temperature, pressure, etc.)
- Real-time end-point detection



THICKNESS & DELTA VS. TIME

Figure 2. ALD film growth increasing in the first 25 cycles of deposition shown alongside changes in the raw ellipsometry data.

OPTICAL CONSTANTS OF PLATINUM VS. THICKNESS



Figure 3. Optical properties and thickness of a metallic film changing as a function of deposition time.

Efficient Process Characterization

A common application of real-time SE involves monitoring an entire series of thin films during a single process. Each film is produced with varying conditions, which enables a quick understanding of the deposition process. Optical constants and growth rate are determined from each layer to characterize the process.



Specifications

Spectral Range

400 nm to 1000 nm, 190 wavelengths

System Overview

Dual-Rotation optical design with CCD detection

Package Includes

- Source and Receiver
- Control Box
- Tilt Stage Mounts
- Calibration Base
- 2.75" Optical Viewports
- CompleteEASE Software

Chamber Requirements

Port Size: 1.33" or 2.75" Typical Port Angle: 60°-75°*

*measured from sample normal

Data Acquisition Rate

0.3 sec. [Fastest] 1-2 sec. [Typical]

Beam Diameter

Collimated: ~3 mm

Data Types

Spectroscopic ellipsometry and advanced g-SE or MM-SE

Dimensions

Receiver unit shown, including chamber mount and tilt stage







Versatile

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For more information:



