theta-SE

Capabilities

The theta-SE is a push-button spectroscopic ellipsometer for characterizing thin film uniformity. It features advanced ellipsometry instrumentation in a compact package at an affordable price.

Why a theta-SE?

Fully Integrated

The theta-SE comes equipped with 300 mm sample mapping, small-spot measurement beam, fast sample alignment, look-down camera and our latest Dual-Rotation ellipsometer technology. The theta-SE has everything you need to measure the spatial uniformity of your film thickness and optical properties.

High Speed

Sample throughput is optimized by using fast point-to-point translation, high-speed sample alignment and Dual-Rotation ellipsometer technology for continuous data collection.

Compact

The patent-pending, Dual-Theta rotation stage enables full, 300 mm mapping in a small, table-top instrument. The instrument footprint is only slightly larger than a 300 mm wafer.

User Friendly

Automated data analysis and built-in reporting enables push-button operation and quick access to measurement results.

Affordable

The theta-SE delivers the power of spectroscopic ellipsometry and 300 mm uniformity mapping at a reasonable price.

Features

The theta-SE combines many of the latest advancements in ellipsometry instrumentation to provide uniformity maps of your thin films. Spectroscopic ellipsometry is perfect for measuring film thickness and optical constants. The theta-SE scans the uniformity of these film properties over your entire wafer.

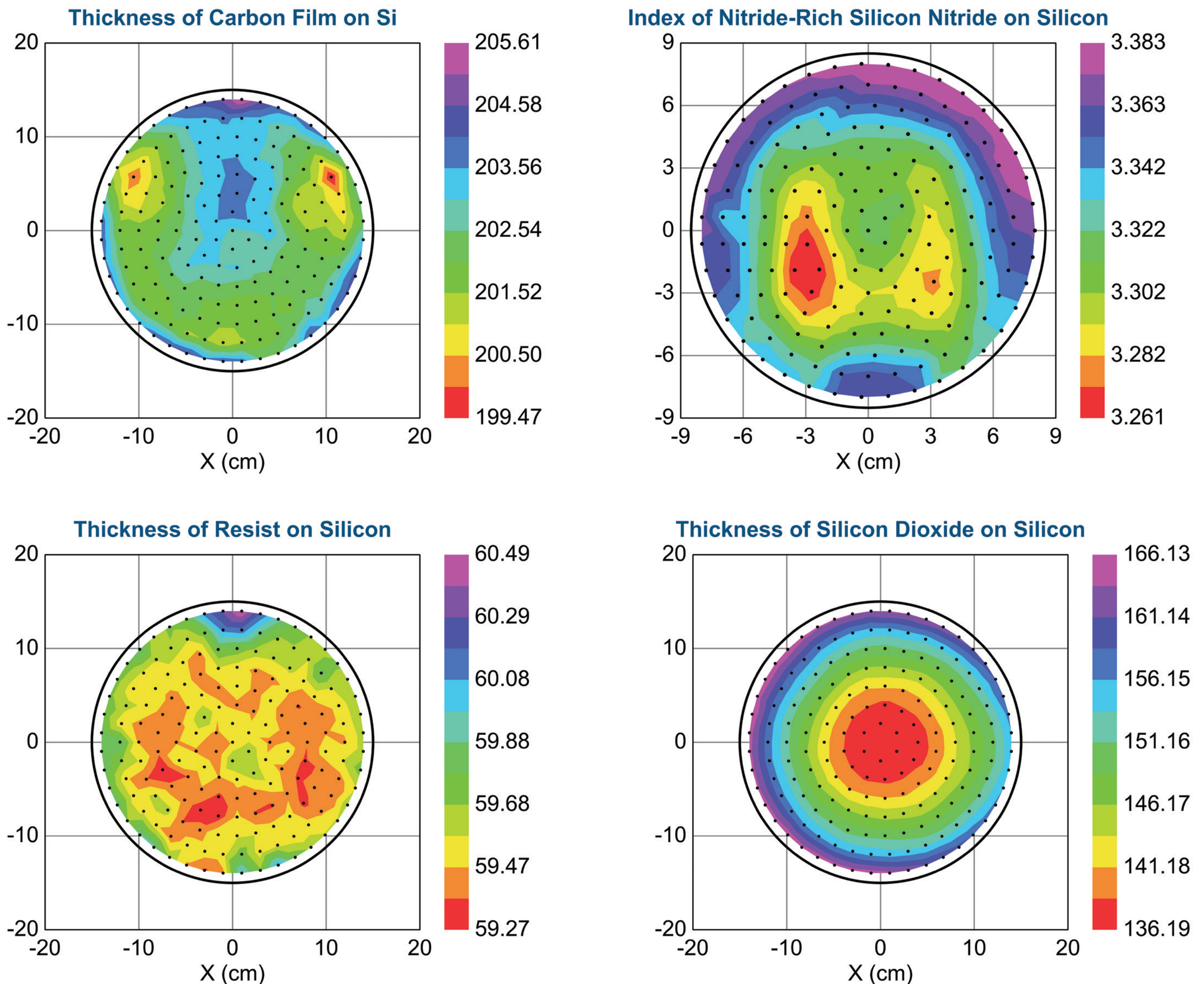


Figure 1. Thickness and refractive index uniformity maps

Ellipsometry Advantages

Sensitivity: Spectroscopic ellipsometry measurements 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. The theta-SE leverages the sensitivity of ellipsometric measurements in combination with high-speed mapping functionality to provide non-destructive sample characterization across a sample.

Accuracy: Spectroscopic ellipsometry measurements calculate the change in polarization of light reflecting off a sample. This change in polarization is traditionally described with two measured parameters, Psi and Delta. In addition to providing two measured parameters at each wavelength, this self-referencing technique provides excellent measurement accuracy.

Dual-Theta Mapping Translation: Our patent-pending translation stage enables ellipsometry measurements across samples up to 300 mm diameter with a small, table-top instrument. The compact ellipsometer heads and integrated electronics all result in a significantly reduced instrument footprint.

Focused Spot: A focused measurement beam parallel to the wafer edge produces excellent edge exclusion.

Fast Camera Alignment: The fast camera alignment uses machine vision and image recognition to precisely align the sample in a fraction of the time compared to traditional alignment techniques. The camera also provides sample visualization to locate specific areas of interest for measurement.

Dual-Rotation Technology: Measurement times for multi-point maps are minimized by reducing the translation time between points, using our fast camera alignment and taking advantage of Dual-Rotation technology that captures high-accuracy measurements in half the time.

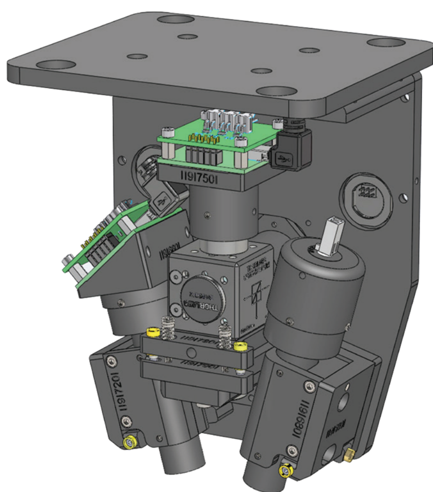


Figure 2. Patented camera-based alignment

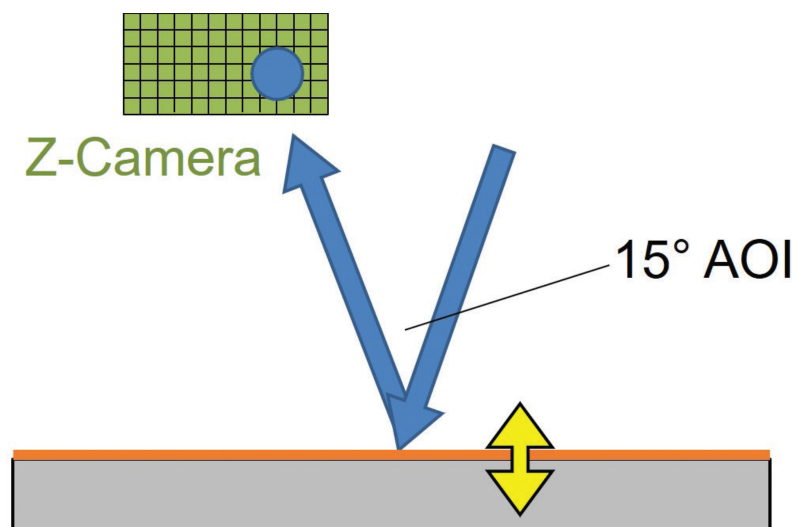


Figure 3. Schematic demonstrating the camera-based-alignment principle

Automated Data Analysis in CompleteEASE: CompleteEASE is equipped with user-friendly features for surface uniformity measurements. Recipes that describe the data acquisition, measurement location and data analysis allow push-button operation.

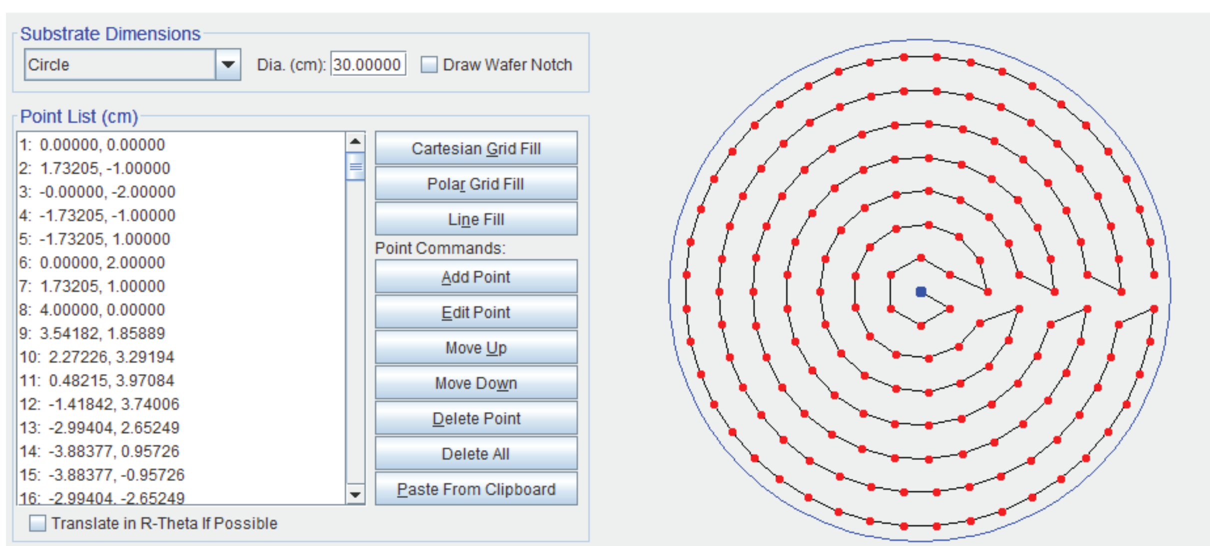


Figure 4. Software interface for creating uniformity map routines

Specifications

Spectral Range

400 nm to 1000 nm, 190 wavelengths

System Overview

- Dual-Rotation optical design
- CCD detection
- Fast sample alignment
- Focused beam
- 300 mm mapping stage

Mapping Overview

Wafers up to 300 mm diameter

Data Acquisition Rate

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

Spot Size

Nominal: 250 x 600 µm on sample

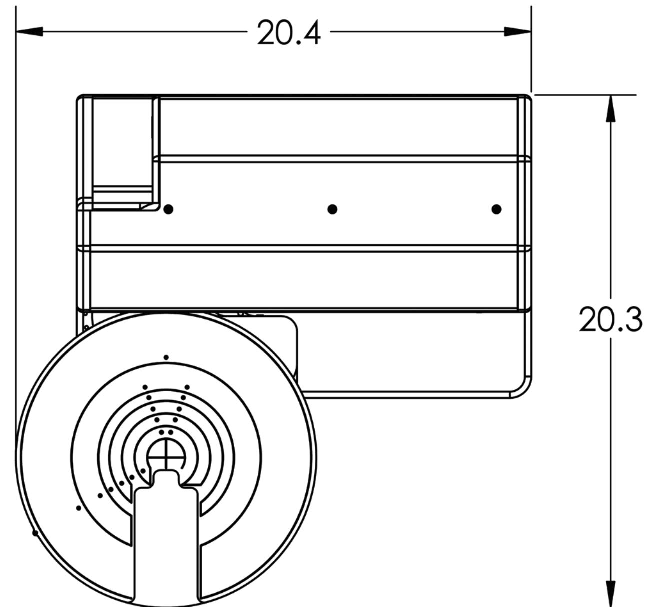
Data Types

Spectroscopic ellipsometry and advanced g-SE or MM-SE

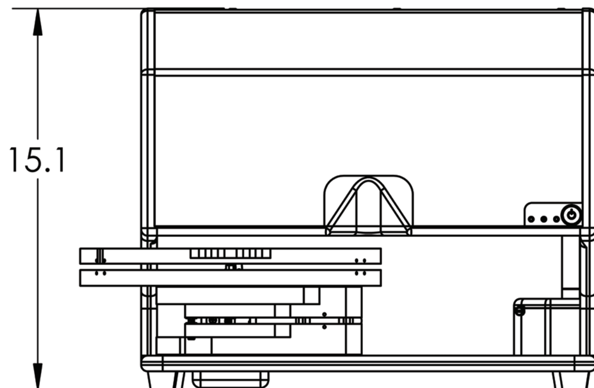
Angle of Incidence

65° fixed for all measurements

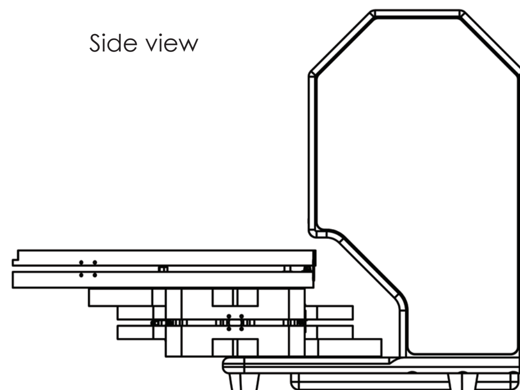
Top view



Front view



Side view



*CAD dimensions shown in inches.