

MM-16

Liquid Crystal Modulation Spectroscopic Ellipsometer

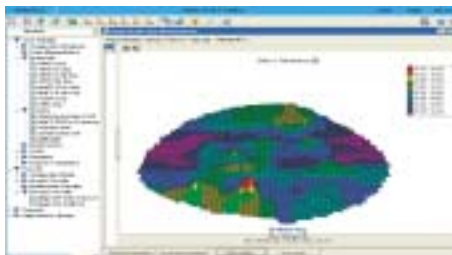
MM-16 Measures

- Film thickness and optical constants
- Multilayer and patterned structures
- Anisotropy and depolarization



DeltaPsi2 - Spectroscopic Ellipsometry Software

The MM-16 is controlled using the integrated DeltaPsi2 software package, shared by all HORIBA Jobin Yvon spectroscopic ellipsometers.



Automated sample analysis and mapping

DeltaPsi2 software controls the MM-16 using a simple interface for data acquisition, with an integrated package providing a d v a n c e d

modelling functions for accurate thin film characterization. Routine tasks are performed using recipe procedures that automate data acquisition and analysis.

Rapid Characterization of Thin Film Structures for Research and Quality Control

• Simple to Operate

The MM-16 is easy to set up and operate. The software includes automatic calibration with powerful self diagnostic indicators to provide quality control of the ellipsometer.

• Fast, Accurate and Precise

The liquid crystal modulation technology delivers high accuracy for the ellipsometric angles (Ψ , Δ) across their full range in one measurement, without any dead spots. The full spectral range is acquired in <2 seconds, at very high resolution.

• Modular Design

The compact MM-16 can be used either ex-situ or in-situ and includes a large variety of accessories. It integrates the capability of a 200 μm microspot optics for the characterization of small feature sizes often found in biological and semiconductor applications.

• Innovative Technology

The MM-16 uses liquid crystal modulators to detect small polarization shifts without any mechanical movement.

• Enhanced Application Capability

The MM-16 simultaneously measures the full polarization matrix of a sample, to derive the classical ellipsometric angles. This unique feature provides the most accurate method to determine the angles Ψ and Δ and, when necessary, simplifies the characterization of complex birefringent materials.

Extensive Application Capabilities

Optical Coatings

Photovoltaic cells, wave guides, AR, mirrors.

Display Structures

TFT-LCD, OLED, flexible displays, liquid crystal structures.

Semiconductors

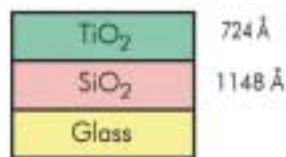
Dielectrics, silicon, metals, photoresist, polymers, nanomaterials.

Biological and Chemical Engineering

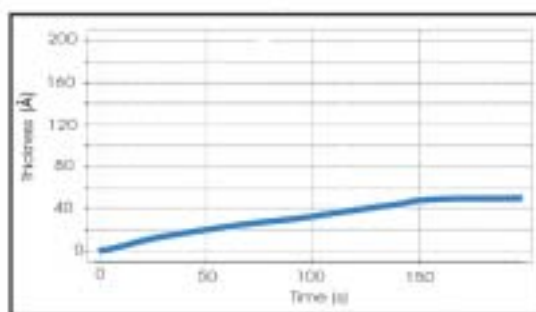
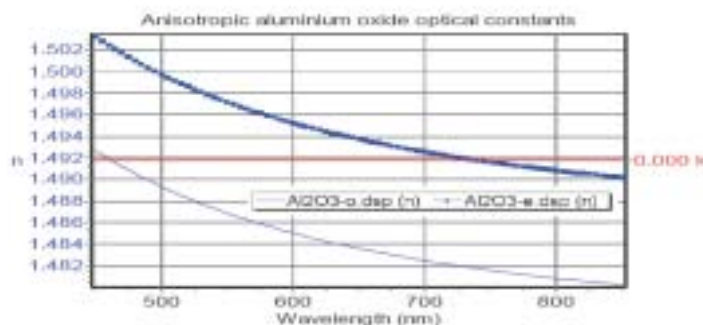
Liquid ambient and interfaces, organic materials, biomedical devices.

In-situ Real-time Process Control

Thickness monitoring, etch/growth rates, endpoint detection.



Film thickness characterization for AR coating



Real-time thickness deposition monitoring

MM-16 Specifications

Standard Configuration

Measurement time: adjustable from 2 to 15 s

Light source: combination halogen & LED lamp

Spectral range: 430 - 850 nm

Spot size: 1 x 3 mm

Detector: CCD - Resolution: 2 nm

Sample stage: 150 mm, manual height (20 mm), tilt, theta adjustment

Goniometer: manually adjustable angle from 55° to 90° by step of 5°

System Performance Guarantee

Accuracy

. NIST 1000 Å SiO₂/Si: $d \pm 4 \text{ Å} - n(632.8 \text{ nm}) \pm 0.002$

. Fused silica: $n \pm 0.004$

. Straight-through air measurement:

$$\Psi = 45^\circ \pm 0.05^\circ - \Delta = 0^\circ \pm 0.2^\circ$$

Repeatability: $\pm 0.2 \text{ Å}$ - Tested on NIST 150 Å SiO₂/Si

Options

Automatic XY sample stage: 200 mm, manual height (4 mm) and tilt adjustment - Optional CCD camera

Automatic goniometer: automatically adjustable angle from 40° to 90° in steps of 0.01°

Microspot: 200 μm

Other stages: temperature controlled stage, 360° rotating stage

Spectroscopic reflectometer: 450 - 850 nm

Facility Requirements

Dimensions (wxdxh):

. Ellipsometer: 650 x 470 x 600 mm

. Control Unit: 520 x 500 x 220 mm

Weight:

. Ellipsometer: 24 kg

. Control Unit: 35 kg

Voltage: 110/220 VAC - 50/60 Hz

HORIBA JOBIN YVON

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