

UVISEL 2

SCIENTIFIC ELLIPSOMETRIC PLATFORM

The Ultimate Solution to Every Challenge
in Thin Film Measurement

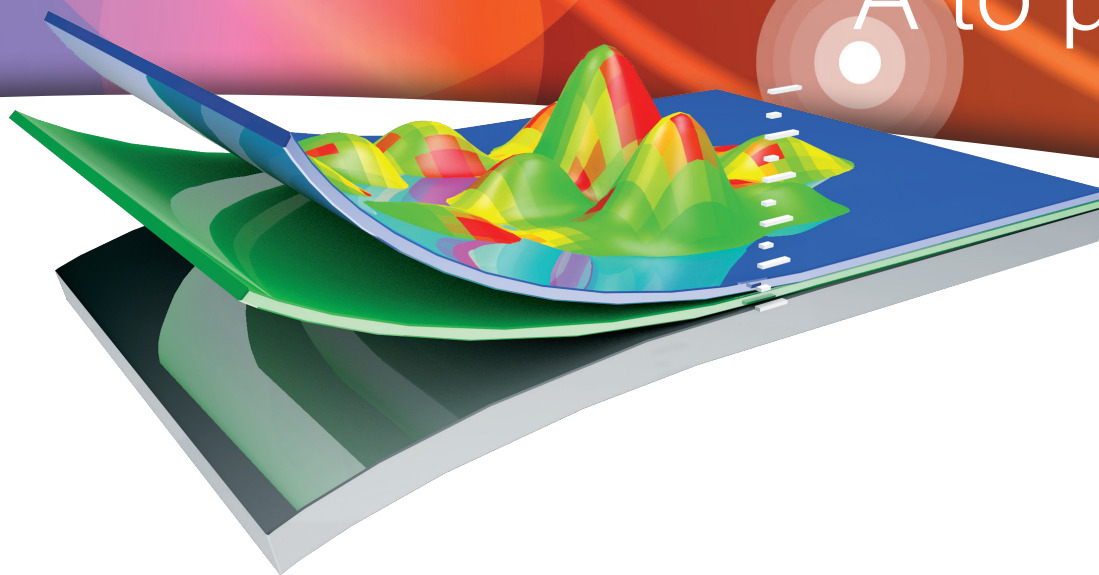
Refractive index

Extinction coefficient

Roughness

Interface

Thickness
Å to μm



A Breakthrough in Thin Film Measurement

Introducing UVISEL 2



HORIBA Scientific has developed the next generation of scientific spectroscopic ellipsometer that delivers the highest level of performance for nano and micro layer characterization.

The UVISEL 2 includes the widest range of automated features for powerful thin film characterization in both established and emerging applications.

The UVISEL 2 features a patented sample vision system. This, combined with automated spot size selection, allows accurate measurement spot positioning on the desired region of the sample.

The UVISEL 2 integrates the world's smallest patented achromatic spot (35 μm at normal incidence), capable of covering a large UV-VIS spectral range, for the measurement of very small sample areas.

Driven by the DeltaPsi2 software platform, the UVISEL 2 scientific ellipsometer is simple to operate and provides optimal working conditions for accurate thin film analysis.

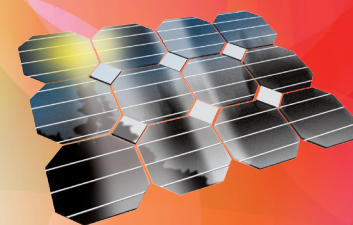
HORIBA Scientific started with our UVISEL, the most accurate and sensitive ellipsometer, and redesigned and improved everything to deliver an instrument with a significantly higher specification than any other instrument.

Tackle the most challenging thin film applications with the next generation ellipsometer:
UVISEL 2

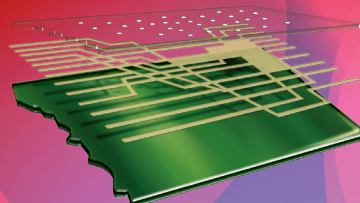
Work Faster & Smarter

UVISEL 2 is a fully integrated system that delivers **fast analysis and world class results** for virtually all ellipsometric analysis requirements and thin film applications.

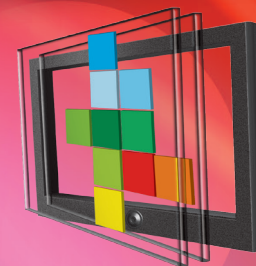
The combination of full automation and powerful software provides deeper insight into thin film structures, and **more confident characterization** analyses.



Photovoltaic



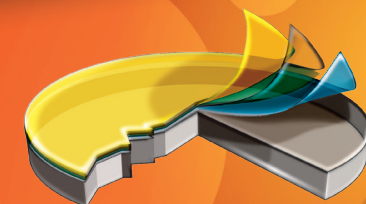
Semiconductor



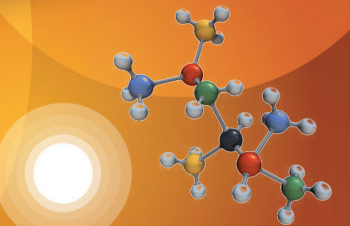
Flat Panel Display



Optoelectronic



Optical & Functional Coatings



Surface Chemistry & Biotechnology

Get the very best quality thin film measurements

Phase modulation technology combined with advanced optical design provide unparalleled accuracy and high resolution ellipsometric measurements for characterizing ultra thin as well as thick films.

Perfect for Established & Emerging Applications

The large spectral range from FUV to NIR allows the user to characterize a **wide range of materials** including dielectrics, semiconductors, polymers, metals, metamaterials and nanostructures.

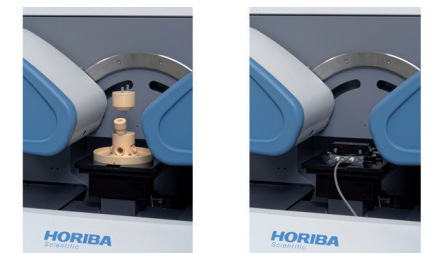
Match the measurement spot to your area with 8 selectable spot sizes, and maximize measurement beam placement accuracy with the vision system.

A **large array of accessories** is available to enhance and expand UVISEL 2 performance and versatility.

The Ultimate in Ellipsometry Reliability

Designed for minimal maintenance, the UVISEL 2 ellipsometer platform delivers **long-term, stable** measurements without the need for regular calibrations.

The fully integrated system ensures robust, reliable operation.



Accessories examples:
Electrochemical cell and temperature controlled cell

Scientific Spectroscopic Ellipsometer Platform

Fully Automated Thin Film Metrology

The UVISEL 2 is a fully automated ellipsometer benefitting both industrial and research-oriented users. Sample alignment, autofocus, spot size selection, variable angle and mapping functions all benefit from computer control.

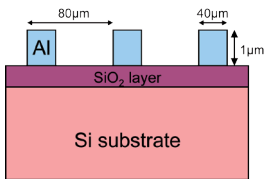
The UVISEL 2 has 8 computer selectable, achromatic spot sizes that use the same fibers and optics so need no realignment or recalibration. This enables high quality measurements in small areas.

- Automatic XYZ mapping stage
- Automatic tilt adjustment and autofocus
- Stage with integrated sample reference for automatic calibration
- Automatic 8 achromatic microspots down to 35 μm
- Automatic variable angle of incidence
- Automatic system performance tracking

Best Vision System

The UVISEL 2 includes an innovative, color imaging vision system with polarization information. This patented imaging system enables clear visualization of the measurement beam spot on all types of film materials including rough, smooth, transparent and reflective surfaces.

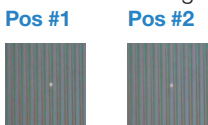
- Exact spot positioning within a small feature, or to find a uniform area
- Assist spot positioning when the sample is placed inside accessories



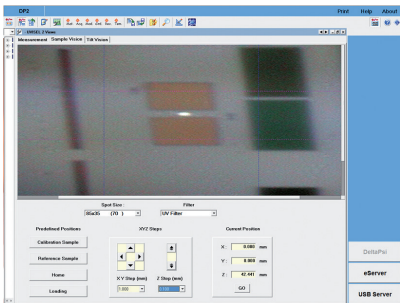
Measurements of patterned microstrip sample with rough and smooth surface

Note that the measurement beam spot is visible whether on rough aluminum strip (pos #1) or smooth SiO₂ layer (pos #2).

Spot size: 35 x 85 μm at 70°



Sample vision interface



Visualization of the actual beam spot

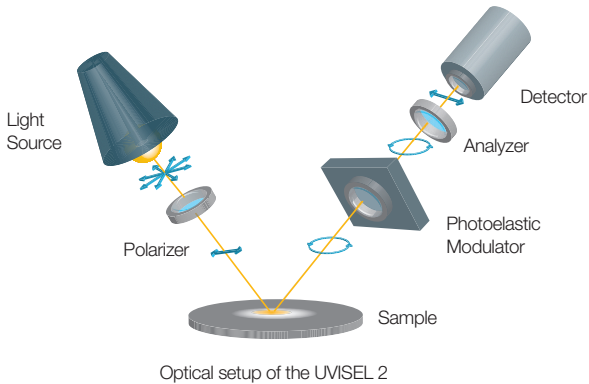
Sensitive Phase Modulation Technology

Phase modulation technology to your application provides:

- Excellent signal to noise ratio from FUV to NIR
- Ultra-fast acquisition for dynamic applications
- Accurate (Ψ, Δ) data over the whole range
- 12 Mueller elements and depolarization coefficient

The polarization modulation is performed without any mechanical movement and at high frequency (50 kHz), without any vibration or beam deviation.

The modulator has an independent internal closed loop temperature control driven by embedded electronics. This guarantees highly reliable measurements over a wide operating temperature range (from 5°C to 40°C).



High Performance Spectroscopic Features

The UVISEL 2 integrates an achromatic optical design along with fast scanning and high resolution monochromators covering a large spectral range from 190 to 2100 nm. The optical design of the monochromators provides high optical throughput and very low stray light.

A monochromator enables the selection of the spectral range and resolution that best suits your measurement needs. Changing resolution in different spectral ranges allows optimization of measurement speed without compromising the quality of results.

- Spectral ranges: 190 - 1000 nm | 190 - 2100 nm
- Achromatic optics to measure the same area over the full wavelength range
- Fastest scanning detection system
- Adjustable resolution over the whole spectral range
- High sensitivity from FUV to NIR

Handle Many New and Exciting

Powerful DeltaPsi2
software from research
to routine



System control, data measurement, simulation, modelling, reporting and automation are seamlessly integrated by the powerful DeltaPsi2 software platform.

The DeltaPsi2's intuitive operation meets the requirements of both experienced SE scientists and newcomers to the technique.

From the laboratory to industry, the UVISEL 2 ellipsometer platform delivers the results required to characterize thin film samples accurately, and optimizes routine process efficiency.

DeltaPsi2 includes a comprehensive range of data acquisition and modelling features to allow efficient and rapid thin film characterization.

Measurement

- Ellipsometric (Ψ, Δ)= $f(\lambda)$ in reflection or transmission
- Kinetic (Ψ, Δ)= $f(\text{time})$
- Intensity (R, T)= $f(\lambda)$
- Mueller matrix
- Variable angle
- Sample mapping
- Depolarization
- Scatterometry

Modelling & Simulation

- Thickness and optical properties = $f(\lambda)$
- Reflectance and transmittance = $f(\lambda)$
- Simple layers
- Graded layers
- Uniaxial and biaxial anisotropy with/without gradient
- Metamaterials
- Composite materials
- Alloys
- Ultra-thin and thick films
- Porous layers
- Periodic structures
- Transparent substrates
- Roughness
- Interfaces
- Material design and optimization

DeltaPsi2 provides practical, reliable recipes for routine thin film measurements. Measurement, modelling and reporting procedures can be pre-defined to automate thin film analysis. Automated import/export package facilitates data exchange.

Automatic Operation

- Automatic recipe: measurement, analysis and mapping
- Advanced recipe setting: acceptance criteria, multiple acquisition and models in a single recipe, multiple groups of points in a single grid
- Easy access to recipe steps and original files for reprocessing
- View results with comprehensive reports, statistics, 2D and 3D graphical displays
- Autofocus and pattern recognition functions

Analysis & Reporting

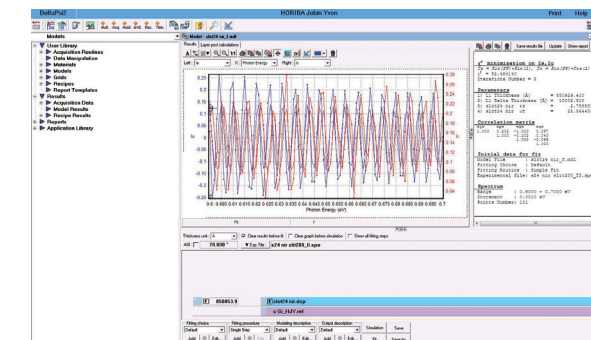
- Advanced fitting algorithms
- Automatic reporting
- Data reprocessing and manipulation
- Windows easy transfer
- Import/export package

User Interface

- DeltaPsi2 for scientists
- Auto Soft for operators

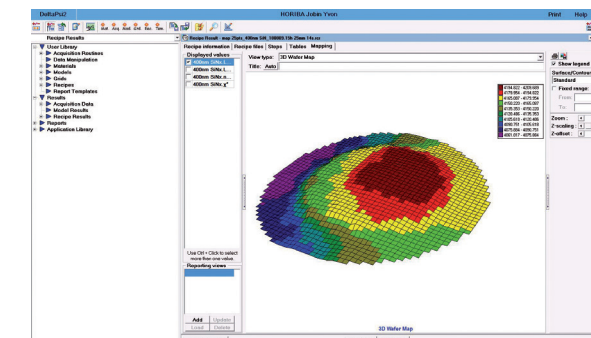
Thin Film Applications

Ultra Thick Film



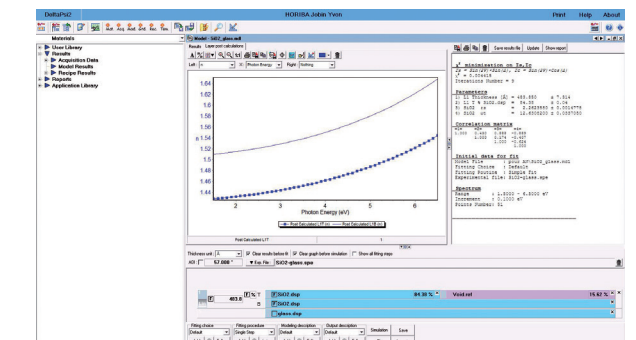
UVISEL 2 is able to characterize ultra-thick layers, such as 85 μm thick photoresist, by simply combining adjustment of the monochromator slits with the software optical settings.

Sample Mapping



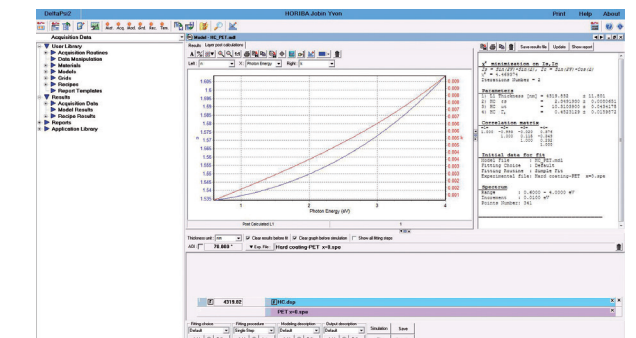
Recipes allow operators to make routine measurements with minimal training, as seen by this 3D view of an automatic mapping recipe of a wafer sample. Note that the combined use of autofocus, vision system and XY stage allows the signal to be adjusted at each mapping point, which is useful for non-uniform samples.

Films with Low Index Contrast



The accuracy of the UVISEL 2 makes it possible to characterize layers with low index contrast such as a SiO_2 layer deposited on glass substrate exhibiting a 0.005 index difference. In addition, it is possible to determine the graded refractive index for SiO_2 layer.

Flexible Films



The UVISEL 2 provides simple sample alignment, making it easy to operate for flexible film measurement exhibiting anisotropy. DeltaPsi2 has a full complement of features, including the ability to model a wide range of materials using dispersion formulas.

Standard Configuration

Light source	150 W Xenon
Spot size	Automated achromatic microspots, 8 sizes down to 35 μm (at normal incidence)
Spectral range	190 - 1000 nm NIR extension up to 2100 nm
Monochromator	Double monochromator For FUV-VIS range: Twin PMT detectors For NIR extension: InGaAs detector
Sample stage	200 mm x 200 mm, automatic XYZ adjustment, vacuum chucks, Z height 35 mm, automated autofocus and tilt alignment
Sample viewing	Vision system using CCD camera Field of view: 6.5 x 3.5 mm at 70°
Goniometer	Automatic variable angle from 35° to 90°

Options

Accessories	Temperature controlled cell, liquid cell Electrochemical cell, sealed cell, rotation stage, Transmission mount, plastic film mount
Ellipsometer table base	Dimension (wxdxh): 1084 x 984 x 802 mm

Performance

Tests performed on NIST 1000Å SiO_2/Si	
Accuracy	d: $\sigma = 0.25 \text{ \AA}$ - $n(632.8 \text{ nm})$: $\sigma = 0.0002$
Repeatability	d $\pm 0.25 \text{ \AA}$ - $n(632.8 \text{ nm}) \pm 0.0002$

Facility Requirements

Operating systems	Windows® XP/7
Power supply	110/220 VAC, 400 W, 50/60 Hz
Dimension (wxdxh)	1084 x 984 x 802 mm
Certificate	CE

The UVISEL 2 ellipsometer includes a class 1 laser.

UVISEL 2

Specifications



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HORIBA

Scientific

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