

Angstrom Advanced

PhE102-VASE

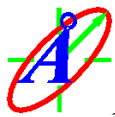
PHE102 Variable Angle Spectroscopic Ellipsometer

Angstrom Advanced

Instruments for Thin Film and Semiconductor Applications

sales@angstromadvanced.com

www.angstromadvanced.com



VARIABLE ANGLE SPECTROSCOPIC ELLIPSOMETERS

PhE102-VASE is the most powerful and versatile ellipsometer for research on a wide range of materials: dielectrics, polymers, semiconductors, metals, multilayers, etc. It covers the widest spectral range with the highest spectral resolution. This system is controlled by a remote computer located in the system control module. This instrument is affordable, high quality, and used widely in both academia and industry.



Nondestructive Characterize of Thin Films and Bulk Materials

- *Film Thickness and Optical Constants*
- *Broad Range of Film Thickness (sub-nm to 30 μm)*
- *A Variety of Substrates: Metals, Semiconductors, Glass, etc.*
- *Multilayer Structures*
- *Surface and Interfacial Roughness*
- *Bandgap and Electronic Transitions*
- *Composition*
- *Crystallinity*

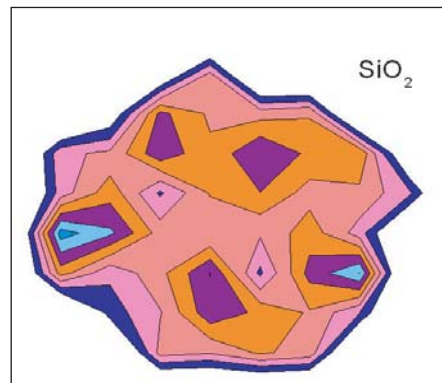
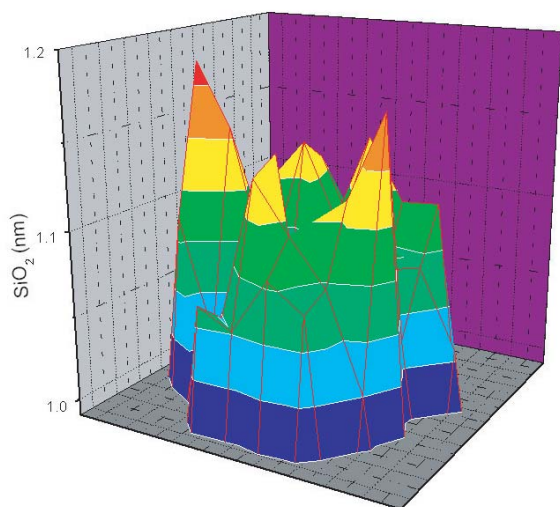
Accessorial Options

- *Micro Spot Focus Optics*
- *Automated Sample Translation*
- *Hardware and software for In-situ mounting*
- *Sample Heater*
- *Liquid/Electrochemical Cells*
- *Mapping*

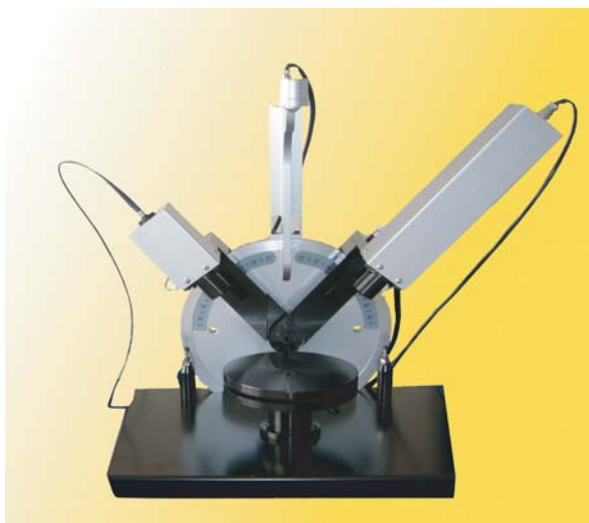
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3D Mapping and Contour



phE-102 Horizontal VASE



PhE-102 is the most versatile and powerful Spectroscopic Ellipsometer. It features a horizontal mounting stage to handle large sample sizes and can incorporate sample mapping.

Rotating polarizer for any polarization state ($\psi: 0^\circ$ to 90° , $\Delta: 0^\circ$ to 360°), the highest accuracy for any sample;

Large angle of incidence range from 20° to 90° ;

Easy sample alignment with vertical laser technology;

Accurate wavelength selection and wide spectral range (up 2500 wavelengths);

Fast operation for multi-angle measurements;

Versatile Integration for in-site, fixed angle, multi-angle or automated angle.

Available Sub-Models

S: 350 nm to 850 nm (1000 wavelengths)

U: 250 nm to 1100 nm (1500 wavelengths)

E: 250 nm to 2300 nm (2300 wavelengths)

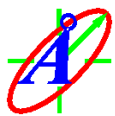
G: 193 nm to 1700 nm (2000 wavelengths)

N: 350 nm to 1700 nm (1800 wavelengths)

V: 250 nm to 1700 nm (1900 wavelengths)

D: 193 nm to 1100 nm (1600 wavelengths)

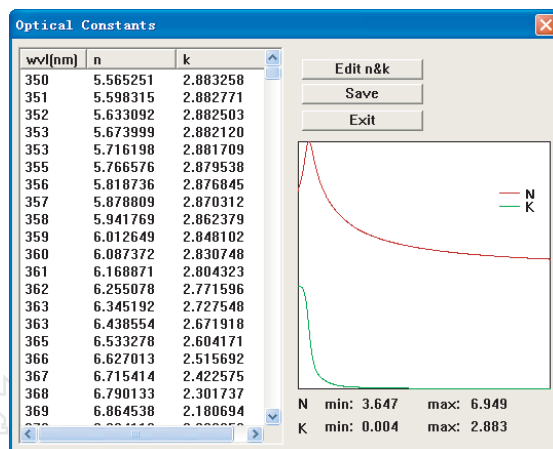
F: 193 nm to 2300 nm (2500 wavelengths)



PhE Acquisition and Analysis Software

PhE is a very comprehensive program for data acquisition and analysis. It utilizes sophisticated mathematical fitting algorithms for accurate and fast data analysis of both simple and complex structures.

- Own large tabulated optical constant database (materials library);
- Push-button procedure for measurement of routine samples;
- Versatile recipes for data acquisition, data analysis and mapping;
- Integrate normal dispersion models to describe material optical constants;
- Automatic backside correction/correlated layers;
- Include surface and interfacial roughness analysis
- Build user-defined models and database
- Generate Psi and Delta with any sample structures
- Give reliability analysis of the fitting parameters



The 'User Programmable Layer' dialog box is used to define a new layer. It includes the following fields and options:

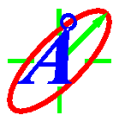
- Layer Number: 1
- Layer Name: My Own Formula
- Comment: Developed by Dr. Smith
- Thickness: 645.16791 nm Fit
- Defined Variable table:

| Variable Name | Value | Fit |
|---------------|----------|-----|
| C | 0.042666 | * |
| B | 1634.17 | * |
| A | 6.34545 | * |

The Equation field contains the following formulas for n and k:

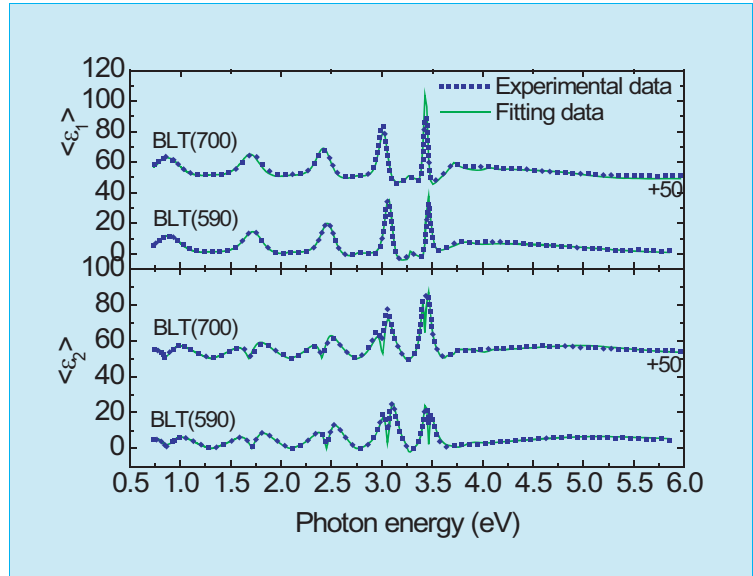
$$n = 0.7071 * \text{SQRT}[\text{SQRT}[(A - B * C * C) / (1 + (10^{-7} / \text{wv})^2 * C * C)]]$$
$$k = 0.7071 * \text{SQRT}[\text{SQRT}[(A - B * C * C) / (1 + (10^{-7} / \text{wv})^2 * C * C)]]$$

Buttons: Insert, Edit, Delete, Cauchy, OK, Cancel.



Example: Multilayer Structure

| | |
|-----------------------|----------|
| 3 Surface Rough Layer | 11.6 nm |
| 2 BLT Films | 321.4 nm |
| 1 SiO ₂ | 21.5 nm |
| 0 Si | 1 mm |



| Example: Thick Film Structure | | Example: Thin Film Structure | |
|-------------------------------|---------|------------------------------|--------|
| 1 SiO ₂ | 10.0 mm | 1 Au | 1.0 nm |
| 0 Si | 1 mm | 0 Si | 1 mm |

