The VASE® is our most accurate and versatile ellipsometer for research on all types of materials: semiconductors, dielectrics, polymers, metals, multi-layers, and more. It combines high accuracy and precision with a wide spectral range - 193 to 2500nm. Variable wavelength and angle of incidence allow flexible measurement capabilities, including:

- Reflection and Transmission Ellipsometry
- Generalized Ellipsometry (Anisotropy, Retardance, Birefringence)
- Reflectance (R) and Transmittance (T) intensity
- Cross-polarized R/T
- Depolarization
- Scatterometry
- Mueller-matrix

**Why a VASE?**

**Maximum Data Accuracy**
The VASE features a rotating analyzer ellipsometer (RAE) combined with our patented AutoRetarder® for unparalleled data accuracy.

**High Precision Wavelength Selection**
The HS-190™ scanning monochromator is designed specifically for spectroscopic ellipsometry. It optimizes speed, wavelength accuracy and light throughput, while automatically controlling selection of wavelengths and spectral resolution.

**Flexible Measurements**
The V-VASE features a vertical sample mount to accommodate a large variety of measurement geometries including reflection, transmission, and scattering.
**AutoRetarder® Technology**

Rotating Analyzer Ellipsometers (RAE) maximize data accuracy near the “Brewster” condition - where $\Psi/\Delta$ data are content-rich. However, this region can be limiting for samples with reduced signal. The patented AutoRetarder is a computer controlled waveplate which modifies the light beam polarization before it reaches the sample. This produces optimum measurement conditions for any sample - under any conditions.

**AutoRetarder accurately measures:**
- $\Psi$ and $\Delta$ over the full range!
- Generalized (anisotropic) Ellipsometry
- Depolarization data
- Mueller-matrix data

### Anisotropy

![Diagram of anisotropy](image)

**Generalized Ellipsometry** is used to successfully measure anisotropy, twist and pre-tilt of a super twisted nematic liquid crystal film.
Applications

Telecommunications - Laser optics
Accurate wavelength selection using monochromator allows measurements at the operating wavelength for optics, e.g. 1550nm, 1310nm, 980nm, 632.8nm, 589nm …

Optical Coatings
The AutoRetarder® measures Δ accurately even when close to 0° or 180° which helps characterize thin films on transparent substrates, such as glass or plastics.

Thick Films
For thicker films (>5 μm), good spectral resolution is needed to resolve the interference oscillation features of Ψ/Δ data. Operator defined monochromator step size and narrow bandwidth help resolve fine spectral features.

Semiconductors
Bandgap, electronic transitions and critical points can be measured for semiconductor materials such as GaN, InP, SiGe, CdTe, etc. Good wavelength resolution and ability to measure depolarization insure accurate optical constants.

Photosensitive Materials
The monochromator is positioned before the sample, so only low intensity monochromatic light strikes the sample. This prevents exposure of photosensitive samples.
Accessories

Temperature Control
Add cryostat or heat stage for variable temperature studies. Measure samples at both low and elevated temperatures: 4.2 Kelvin to 600°C.

Mapping
Provides computer controlled or manual XY mapping of samples of various sizes. Automated sample alignment is also available. Software can automate both acquisition and analysis, as well as plot 3-D graphs.
Liquid Cell
Electrochemical Cell
Add cell with optical windows for measurement through liquid ambient. Allows characterization of liquid/solid interface.

Further Options
Focusing
Camera
Sample Rotator (for anisotropy)
Flip Down Sample Holder
Liquid Prism Cell - LMD™

Organic layer thickness deposited from a solution in a liquid cell.
Specifications

Spectral Range
250-1100nm (single chamber standard)
240-1100nm (double chamber standard)
DUV extension to 193nm
NIR extension to 1700nm
XNIR extension to >2200nm
XXIR extension to 2500nm

Angle of Incidence
Fully Automated
Range: 15°-90° (standard system)
Accuracy: 0.01°

System Configuration
Rotating Analyzer Ellipsometry (RAE)
with patented AutoRetarder®. Automated wavelength selection via monochromator.

Data Acquisition Rate
Typical: 0.1 to 3 seconds per wavelength, depending on reflectivity of sample.
High Accuracy: measurements using full AutoRetarder capability require 20 seconds per wavelength.