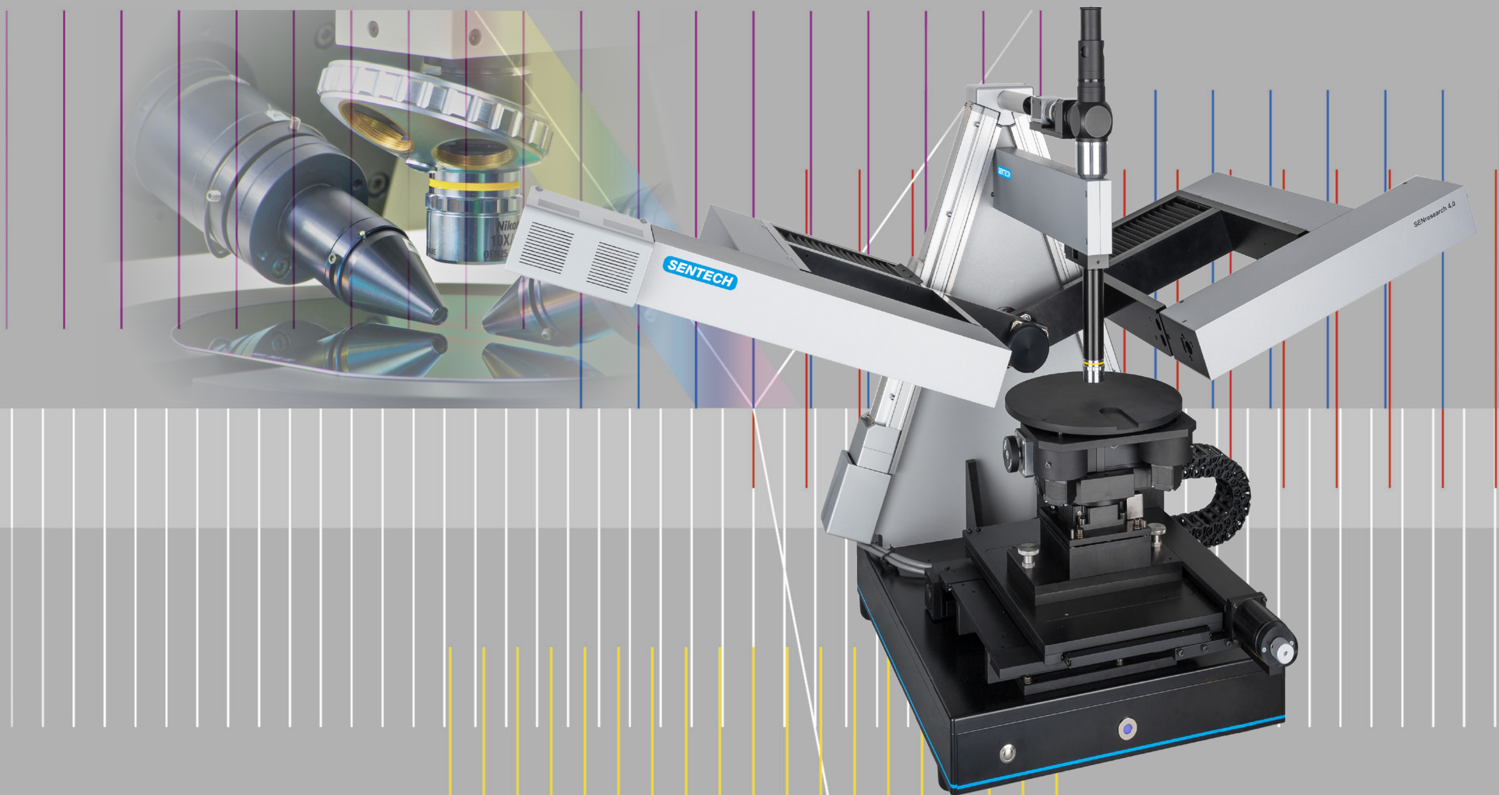
# SENTECH equipment for thin film measurement

- Research & development
- Quality control in production
- Photovoltaics
- LEDs & OLEDs




Spectroscopic ellipsometers
Laser ellipsometers
Automated measurement systems
Reflectometers

SENTECH
Erfolg
durch Leistung

# Spectroscopic ellipsometers

DUV-VIS-NIR
spectroscopic ellipsometer

## SENresearch 4.0

Large variety of options for R&D and routine applications from DUV to NIR

- Widest spectral range 190 nm (deep UV) – 3,500 nm (NIR)
- No moving parts with SSA principle
- Full Mueller matrix by innovative 2 C design
- Comprehensive ellipsometry software **SpectraRay/4**

Cost-effective
ellipsometer

## SENpro

Focused on speed and accuracy for the measurement of thin films (1 nm to 15 µm)

- Spectral range 370 – 1,050 nm
- Goniometer with preset angles of incidence
- Step Scan Analyzer principle for highest measurement accuracy
- Comprehensive ellipsometry software **SpectraRay/4**

Infrared spectroscopic ellipsometer

## SENDIRA

Vibrational spectroscopic analysis of thin layers (dielectric layers, TCOs, semiconductors, organic layers)

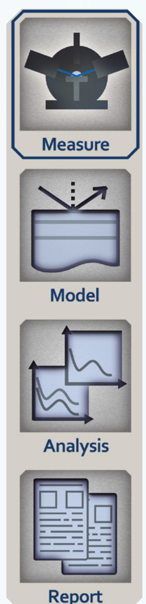
- IR spectral range 1,700 – 25,000 nm
- Fully applicable FTIR spectrometer
- Comprehensive ellipsometry software **SpectraRay/4**

Spectroscopic ellipsometer software

## SpectraRay/4

User-friendly software with recipe oriented mode for operators and advanced mode for interactive measurement and modeling

- Supports variable angle, multi-experiment, and combined photometric measurements
- Ellipsometric, reflection, and transmission data
- Huge library of materials' data, large number of dispersion models
- Sample effects: depolarization, non-uniformity, scattering (Mueller-matrix), backside reflection



# Laser ellipsometers

Multiple angle laser ellipsometer

## SE 400adv

Characterization of single films and substrates in microelectronic, photovoltaic, data storage, display technology, life science, metal processing, etc.

- Application specific angles of incidence
- HeNe laser of 632.8 nm wavelength
- Measurement precision of 0.1 Å
- High measurement speed allows for film growth monitoring and endpoint detection

Combined Ellipsometry Reflectometry

## SE 500adv

Maximum flexibility for the analysis of thick dielectric, organic, photoresist, silicon, or polysilicon films

- Fast and unambiguous determination of the thickness of transparent films up to 25 µm
- Multiple angle manual goniometer for the characterization of single films and layer stacks

# Automated measurement tools

Automated ellipsometer for R & D

## SENDURO

Fast, highly precise, and repeatable measurements in production, process monitoring, and R&D

- Spectral range 290 – 850 nm
- Patented automatic alignment sensors
- Step Scan Analyzer principle for highest measurement accuracy
- Small footprint
- Routine applications
- Comprehensive ellipsometry software **SpectraRay/4**

Ellipsometer for routine applications

## SENDURO® MEMS

Metrology platform for MEMS applications

- Measurement of film thickness and refractive index
- Cassette loading up to 8" wafers
- Edge grip wafer handling
- Pattern recognition
- SECS/GEM interface

# Reflectometers

## Spectroscopic reflectometer

## RM 1000/2000

Accurate measurements of reflectance, film thickness, and optical constants of films between 5nm and 50µm

- Small spot size
- UV to NIR spectral range
- Most accurate measurement by height and tilt adjustment of samples
- Optional high resolution mapping
- Comprehensive, recipe-oriented reflectometer software **FTPadv EXPERT**

## Film Thickness Probe

## FTPadv

Fast and easy measurement of film thickness in production, process monitoring, and R&D

- Thickness range 30 nm – 25 µm
- Recipe oriented software
- Adaptation to a microscope for measurements in small areas

# Summary

| | Thickness of single film | Thickness of films < 5 nm | Thickness of films > 20 µm | Analysis of layer stack | n, k | Dispersion of n, k | Band gap | Composition | Uniformity | Conductivity | Crystallinity (order) | Roughness | Impurities | Epilayers | Anisotropy | Material gradients |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SE 400adv** | ✓ | ✓ | | | ✓ | | | (✓) | ✓ | | | ✓ | | | ✓ | |
| **SE 500adv** | ✓ | ✓ | ✓ | | ✓ | (✓) | | (✓) | ✓ | | | ✓ | | | ✓ | |
| **SENpro** | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | | | ✓ | ✓ |
| **SENresearch 4.0** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ |
| **SENDIRA** | ✓ | (✓) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | (✓) | ✓ |
| **SENDURO** | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | | | | |
| **RM 1000/ RM 2000** | ✓ | | ✓ | (✓) | ✓ | ✓ | (✓) | (✓) | ✓ | | | | | | | |
| **FTPadv** | ✓ | | ✓ | | | | | | (✓) | | | | | | | |

(✓) only in special applications

*Please consult also our brochures about thin film metrology for crystalline silicon and thin film solar cells.*

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Erfolg
durch Leistung