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## FilmTek 2000 PAR

### Micro-spot DUV Spectroscopic Reflectometry

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The FilmTek™ 2000 PAR is a low-cost solution for high-throughput, fully-automated mapping of patterned wafers for development and production environments. This system combines patented DUV-NIR reflectometry with wafer auto-loader and pattern recognition to deliver unmatched metrology performance at this price point.



The FilmTek™ 2000 PAR utilizes SCI's patented parabolic mirror technology to measure wavelengths from the deep ultra-violet to the near infrared with a spot size as small as 13µm.

This system comes with advanced material modeling software to make even the most rigorous of measurement tasks reliable and intuitive. FilmTek™ software includes fully user-customizable wafer mapping capabilities to rapidly generate 2D and 3D data maps of any measured parameter. In addition to user-defined patterns, standard map patterns include polar, X-Y, rθ, or linear.

FilmTek™ 2000 PAR incorporates SCI's generalized material model with advanced global optimization algorithms for simultaneous determination of multiple film characteristics within a fraction of 1 second per site.

#### Key Features:

- Automated stage with autofocus
- Automated wafer handling
- Camera for imaging measurement location
- Pattern recognition
- 50 micron spot size

#### Measurement Capabilities:

Simultaneous determination of:

- Multiple layer thicknesses
- Indices of refraction [  $n(\lambda)$  ]
- Extinction (absorption) coefficients [  $k(\lambda)$  ]
- Energy band gap [  $E_g$  ]
- Composition (e.g., %Ge in  $\text{SiGe}_x$ , % Ga in  $\text{Ga}_x\text{In}_{1-x}\text{As}$ , %Al in  $\text{Al}_x\text{Ga}_{1-x}\text{As}$ , etc.)
- Surface roughness
- Constituent, void fraction
- Crystallinity/Amorphization (e.g., degree of crystallinity of Poly-Si or GeSbTe films)
- Film gradient

#### Optional Features:

- Small spot size (13 µm)
- Pattern recognition (Cognex)
- Cassette to cassette wafer handling
- SECS/GEM

#### Applications

Virtually all translucent films ranging in thickness from less than 100 angstroms to approximately 150 microns can be measured with high precision. Typical applications include:

- Semiconductor and Dielectric materials
- Multilayer optical coatings
- Optical antireflection coatings
- Electro-optical materials
- Solar cells
- Computer disks
- Coated glass
- Laser mirrors
- Thin metals
- Biomedical

#### Example Films

- $\text{SiO}_x$
- $\text{SiN}_x$
- DLC
- SOG
- Photoresist
- Thin metals
- a-Si
- a-C:H
- ITO
- Polysilicon
- Polyimide
- Low k dielectric films

**Example Substrates**

- Silicon
- SOI
- SOS
- GaAs
- PET
- Aluminum
- Copper
- Glass

<b>Technical Specifications</b>	
Film thickness range:	3nm to 150µm
Film thickness accuracy:	±1.5Å for NIST traceable standard oxide 1000Å to 1µm
Spectral range:	190nm to 1700nm (240nm to 1000nm is standard)
Measurement spot size:	13µm to 300µm (50µm is standard)
Wafer size:	50mm to 300mm (150mm standard)
Spectral resolution:	0.3-2nm
Light source:	Regulated deuterium-halogen lamp (2,000 hrs lifetime)
Detector type:	2048 pixel Sony linear CCD array / 512 pixel cooled Hamamatsu InGaAs CCD array (NIR)
Computer:	Multi-core processor with Windows™ 10 Operating System
Measurement time:	<1 sec per site (e.g., oxide film)
Data acquisition time:	0.2 sec

<b>Performance Specifications</b>			
Film(s)	Thickness	Measured Parameters	Precision (1σ)
Oxide / Si	200-500 Å	t	0.5 Å
	500-10,000 Å	t	0.25 Å
	1000 Å	t, n	0.25 Å / 0.001
Nitride / Si	200-10,000 Å	t	0.25 Å
Photoresist / Si	200-10,000 Å	t	0.5 Å
a-Si / Oxide / Si	200-10,000 Å	t	0.5 Å