FilmTek™ 4000EM-DUV

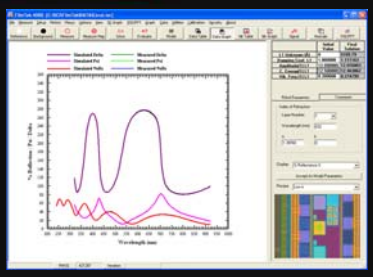
0.03 Å Repeatability on Native Oxide



FilmTek™ 4000 EM-DUV



FilmTek™ Optical Head



FilmTek™ Software

Setting a new standard for thin-film metrology capability and performance, the FilmTek™ 4000 EM-DUV leverages the combination of new proprietary Multi-Angle Differential Polarimetry (MADP) technology with SCI's patented Differential Power Spectral Density (DPSD) technology to provide an optical thin-film metrology tool with the best resolution, accuracy, and repeatability in the industry. By providing superior precision and accuracy, FilmTek™ 4000 EM-DUV enables tighter thin -film process control during production of the latest-generation IC's to increase overall device yield and performance. In addition to providing tighter thin-film process control, FilmTek™ 4000 EM-DUV enables chip manufacturers to accelerate their transition to future technology nodes through characterization and accurate measurement of advanced thin films.

Manufacturing advanced IC devices at sub-130nm design rules requires the use of complex films that must be highly uniform. To maintain tight control over the processes used to build these films requires metrology systems that can monitor extremely thin films that are often within a multi-layer film stack (e.g., high-k and oxide-nitride-oxide films). Additionally, some processes result in gradients through the thickness of the film that must be monitored for optimum device performance (e.g., implant damage and low-k films). Existing metrology tools that rely on conventional ellipsometry or reflectometry techniques are limited in their ability to detect film changes for these applications.

The FilmTek™ 4000 EM-DUV enables high-precision thickness and material characterization measurements for accurately monitoring advanced thin films such as high-k film stacks, oxide-nitride-oxide (ONO), low-k films, 193nm photoresist, 193nm anti-reflective coatings (ARC and BARC), thick and thin silicon-on-insulator (SOI), silicon germanium (SiGe), and amorphous carbon films. In addition to measuring film thickness and index of refraction [$n(\lambda)$], the FilmTek™ 4000 EM-DUV can simultaneously determine extinction coefficients [$k(\lambda)$], surface roughness and damage, porosity, crystallinity, birefringence and stress, and energy band gap [Eg].

Combining proprietary Multi-Angle Differential Polarimetry (MADP) technology with SCI's patented Differential Power Spectral Density (DPSD) technology, the FilmTek™ 4000 EM-DUV utilizes spectroscopic reflection (190nm-1700nm) of polarized light at multiple angles to independently measure film thickness and index of refraction. By independently measuring index and thickness, the FilmTek™ 4000 EM

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-DUV is far more sensitive to changes in films, particularly films within multi-layer stacks, than existing metrology tools that rely on conventional ellipsometry or reflectometry techniques. Additionally, the FilmTek™ 4000 EM-DUV has a small measurement spot size to allow for measurement directly on product wafers (measures within a 50x50 micron feature).

FilmTek™ 4000 EM-DUV Features

- Spectroscopic reflection (190nm-1700nm) of polarized light at multiple angles
- Spectroscopic ellipsometry with rotating compensator design
- Small measurement spot size (measures within a 50x50 μm feature)
- Multi-Angle Differential Polarimetry (MADP) technology with SCI's patented Differential Power Spectral Density (DPSD) technology
- Broad range of applications including diffusion, CVD, etch, CMP, and SOI
- Ideal for measuring advanced thin films

Optional Features

- Cassette to cassette wafer handling
- Pattern recognition (Cognex)
- 300mm, FOUP, and SMIF compatible



FilmTek™ 4000EM-DUV Performance Specifications

Films	Thickness	Measured Parameters	Precision (1σ)
Oxide / Si	0-1000 Å	t	0.03 Å
	1000-500,000 Å	t	0.005%
	1000 Å	t, n	0.2 Å / 0.0001
	15,000 Å	t, n	0.5 Å / 0.0001
	150,000 Å	t, n	1.5 Å / 0.00001
Photoresist / Si	1000-5000 Å	t	0.02%
	1000-5000 Å	t, n	0.05% / 0.0002
Nitride / Si	1000-5000 Å	t	0.02%
	1000-5000 Å	t, n	0.05% / 0.0005
Polysilicon / Oxide / Si	850 Å / 55 Å	t Poly , t Oxide	0.2 Å / 0.1 Å
	850 Å / 55 Å	t Poly , t Oxide	0.2 Å / 0.0005