SPECTRAFX 100, KLA-TENCOR’S NEXT GENERATION THIN FILM METROLOGY SOLUTION, offers cutting-edge capabilities that meet thin film process control requirements for the 90-nm node, including 193-nm deep ultraviolet (DUV) lithography processes. This fifth-generation spectroscopic ellipsometry system incorporates KLA-Tencor’s newly developed Resolution™ optics, which enables unprecedented tool-to-tool matching, measurement accuracy, stability, and precision for a wide range of transparent films. Resolution optics, with a small resolution spot, enables product wafer monitoring to significantly lower chip-manufacturing costs.

**Product Description**

**Spectroscopic Ellipsometry (SE)** KLA-Tencor’s SE, the industry standard for complex, multi-layer thin film stacks, is used by the world’s top IC manufacturers in production. Pioneered by KLA-Tencor, this powerful and robust optical technology provides amplitude and phase change information across the wavelength spectrum. SE is the only technology that measures thickness and refractive index (RI) independently and simultaneously—without referencing or extrapolating—on single-layer films and complex multi-layer thin film stacks. In addition, because SE measures film properties as a function of wavelength (rather than angle), it offers the sensitivity to measure the optical properties of many next-generation films, including new anti-reflective coatings, and low-k and high-k materials.

**Resolution Optics** Resolution optics extends the measurement capability of the current SE technology by enabling thin film measurements across a continuous wavelength spectrum from 220 nm to 900 nm with the option to extend down to 190 nm—a critical capability for meeting stringent film thickness and index measurement requirements down to 90-nm geometries. This feature, which provides ellipsometric spectra that are free of optical noise and distortion over the entire wavelength range, also enables SpectraFx 100 to achieve unprecedented system matching (0.001-0.003 refractive index).

**190SE Option** The 190SE option extends the Resolution optics measurement capability down to 190 nm. It also offers unprecedented tool-to-tool index of refraction and thickness matching for 193-nm single layer and multi-layer anti-reflective coating (ARC) films and photoresist, and other advanced films such as high-k and thin ONO.

**Enhanced Pattern Recognition Library** This system accelerates and facilitates recipe generation and setup between process tools by providing a library of patterns that scans individual patterns to find the best fit for all process tools involved. The metrology engineer can choose the most robust pattern and use it to create optimum multi-tool alignment. This results in less operator error, greater ease of use, and improved availability of the metrology tool for production.

**Advanced 300 mm Automation** SpectraFx fully supports SEMI E84, E87, E40, E90, and E94 requirements for communication to automation tracks and materials process flow.

**Broadband Dual-Beam Spectrophotometry (DBS)** This versatile patented technology uses a spectrophotometer to measure thin film properties (thickness and RI) by comparing a reflected light spectrum characteristic of the film stack measured to a theoretical spectrum derived from a reflectivity spectrum and known characteristics of the film stack.

**AccuFilm** This feature measures true ultra-thin gate thickness. AccuFilm combines the capability to eliminate the effects of airborne molecular contamination (AMC) on ultra-thin-film measurement with the self-calibrating highly stable and matched SWE measurement sub-system. A key roadblock to achieving control of advanced gate processes below the 100-nm node, AMC grows rapidly on film surfaces degrading the measurement (accuracy and repeatability) of the gate dielectric. AccuFilm enables SpectraFx 100 to remove these contaminants from product wafers in a matter of seconds before taking film measurements at each measurement site without placing product at risk. AccuFilm is a valuable enhancement for measuring extremely thin gate dielectric films (less than 20 angstroms thick), which are essential for the production of high-performance 90-nm and 65-nm devices.

**Offline Spectral Analysis (OLSA) Software** This optional program enables development and optimization of film dispersion models offline without interrupting the system in production. In addition, OLSA offers advanced development algorithms and models, advanced measurement simulation, and batch processing with statistics.

**Film Stress Capability** This optional feature for 300 mm monitor wafers allows for measurement flexibility and improved cost of ownership by adding film stress capability to the SpectraFx platform. Wafer bow and film stress can be determined using the measured film thickness or a thickness entered at run time for opaque films. The combination of film thickness and stress metrology on the same tool improves cost of ownership (CoO) by reducing footprint and eliminating the cost of two separate systems.
KLA-TENCOR: ACCELERATING YIELD

KLA-Tencor’s portfolio of solutions includes the industry’s broadest fleet of advanced inspection and metrology systems, which enables customers to capture yield-critical defect and metrology data. It also includes the sophisticated software to turn that data into quick corrective action. Finally, it includes the expertise to help customers rapidly understand and resolve complex manufacturing problems so they can reap the financial and market rewards associated with faster time to market and increased product yields.

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