

News Release

FOR IMMEDIATE RELEASE

Hitachi High-Tech Develops Advanced CD Measurement SEM CG7300

— Contribute to mass production of 5nm generation devices and development of 3nm generation devices for EUV Lithography —

Tokyo, Japan, December 11, 2019 — Hitachi High-Technologies Corporation (TSE: 8036, "Hitachi High-Tech") announced today that it has developed a new advanced CD Measurement SEM (CD-SEM*1), CG7300. The CG7300 provides enhanced high-precision measurement and improved throughput performance. The tool is based on a "common platform concept" that has been extended from previous model CG6300. This latest model is geared toward mass production of 5nm generation devices and development of 3nm generation devices for EUV*2 Lithography.

Hitachi High-Tech launched its first CD-SEM in 1984, earning recognition for its high-precision measurement performance and high-quality images. Hitachi High-Tech's CD-SEMs have become the defacto standard in the field of metrology, creating and leading a market for electron beam metrology and shipping over 5000 units as of 2017.

While ArF*3 Lithography is still a main technology that is being used in the semiconductor manufacturing process, continuous shrinking of semiconductor devices motivated leading device manufacturers to introduce EUV Lithography that enables manufacturing and mass production of 5nm generation devices and beyond. As the devices' dimensions manufactured by EUV Lithography process are around half the size of those using ArF, a new metrology equipment that can meet narrower process window requirement is essential for reliable process control. In addition, high throughput measurements and improved productivity are required in semiconductor manufacturing due to extended sampling needs to match various EUV Lithography demands.

The newly developed CG7300 offers enhanced measurement performance of established conventional CD-SEM measurement techniques along with EPE measurements*4, CD/Roughness*5 measurements, overlay measurements*6, low-damage measurements to produce high precision and accurate measurements of increasingly complex patterns for semiconductor mass production by EUV Lithography process. Furthermore, enhanced electron beam scanning control system and wafer transport system is modified to increase wafer processing throughput by 20% compared to the previous model.

CG7300's "tool to tool matching" concept prioritizes compatibility with the previous model (CG6300). Measurement results variation between CD-SEMs is further minimized, allowing for more flexibility of tool management in the existing mass production lines, and realizing the long-term stability and tools availability.

Hitachi High-Tech has strived to meet customers' needs in dimensions measurements and defect inspection for the development and mass production of semiconductor devices by supplying electron beam based products such as traditional CD-SEM and wafer inspection systems based on optical technologies. Hitachi High-Tech will continue to provide innovative solutions for upcoming technology challenges. Furthermore, Hitachi High-Tech will contribute to the development of cutting-edge technologies by pursuing and creating new value in collaboration with its customers.

- *1 CD-SEM: A scanning electron microscope (SEM) for measuring the circuit patterns on semiconductor wafers. Used for quality control in development and mass-production lines. This metrology equipment is essential for semiconductor manufacturing yield management.
- *2 EUV (Extreme ultraviolet): An extreme ultraviolet light source with a wavelength of 13.5 nm
- *3 ArF: ArF excimer laser (wavelength 193 nm) light source
- *4 EPE (Edge placement error) measurements: Measurement of the difference between the edges of the intended design and the actual printed pattern.
- *5 CD (Critical Dimension)/Roughness: Localized fluctuations in dimensions of pattern edge position
- *6 Overlay measurements: Measuring the deviation between two layered patterns such as lower and upper patterns printed on a wafer, or two patterns printed using double patterning

【Main Features】

- A wide variety of enhanced metrology performance for semiconductor mass production for EUV Lithography, including EPE measurements, CD/roughness measurements, overlay (same layer) measurements, low-damage measurements for EUV resist patterns.
- Ability to mix CG6300/CG7300 fleet, based on "common platform concept".
- Reduced measurement results variation between CD-SEMs aiming to enhance tool-to-tool matching performance by 10% compared to the previous model.
- Enhanced productivity by increasing throughput and improved Edge Exclusion*7
- Metrology solutions with high-speed/wide FOV*8 - CDU*9 measurements for early detection of etch process variation.

*7 Edge Exclusion: The outer area of the wafer designated as a wafer handling area that is excluded from area being measured.

*8 FOV (Field of View): The visible area measurable/observable using SEM

*9 CDU (Critical Dimension Uniformity): The uniformity of pattern dimensions on a wafer pattern

【Main Specifications based on standard conditions】

Resolution	1.65nm/1.35nm (with image processing) @HR 800V Ip: 8pA
Dynamic Measurement Repeatability	0.12 nm (20% improvement compared to the previous model)
Throughput	72 wafers per hour (20% improvement compared to the previous model)

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