

# News Release

FOR IMMEDIATE RELEASE

## **Launch of Advanced High Voltage CD-SEM CV5000 Series -Overlay Measurements of Semi-conductor Device Patterns Using Electron Beam-**

Tokyo, Japan, October 13, 2016 – Hitachi High-Technologies Corporation (TSE:8036, Hitachi High-Tech) announced a sales launch of Advanced High Voltage CD-SEM\*<sup>1</sup> - CV5000 Series, which is capable of measuring High Aspect Ratio (HAR) trenches and contact holes, and to perform overlay measurements of device patterns to help customers increase productivity in semiconductor device manufacturing.

Recent efforts to enhance performance of advanced semiconductor devices include not only miniaturization, but also advances in three-dimensional reconstruction. The mainstream architecture of a semiconductor device now is a stack of multiple elements arranged vertically, especially in 3D-NAND\*<sup>2</sup> flash-memory chips, Fin-FET\*<sup>3</sup> logic transistors and VIT\*<sup>4</sup> interconnects.

During the manufacturing process of these devices, there is a greater need than before for high precision measurement of the bottom dimensions of deep trenches and contact holes. Moreover, the overlay alignment precision of each layer has also become very important.

The newly launched CV5000 series is fitted with a 30 kV electron gun and a detection system that is capable of detecting secondary electrons (SE\*<sup>5</sup>) and backscattered electrons (BSE\*<sup>6</sup>) emitted from a sample based on the electrons' emission angle and energy. This detection system enables the tool to measure at the bottom of deep trenches and contact holes with aspect ratios of more than 40 on advanced devices, and to perform high precision overlay measurements of the device patterns.

The special mark which is necessary for conventional optical overlay measurement is not used, although Hitachi High-Tech enables the products to measure device patterns directly with a high acceleration electron beam. This measurement method improves the overlay alignment precision of the device patterns, either on the same layers or different layers.

CV5000 series will be introduced at SEMICON JAPAN 2016 at Tokyo Big Sight from December 14 to 16, 2016.

The Hitachi High-Tech Group will continue aiming to lead the world in the high-tech solutions business, and will respond swiftly to the needs of customers and the market from the customer's perspective as a business creating company working at the cutting edge on the front-line.

- \*1 CD-SEM (Critical Dimension-Scanning Electron Microscope): A scanning electron microscope (SEM) for measuring the semiconductor circuit patterns on semiconductor wafers.
- \*2 3D-NAND (3 Dimensional NAND): A 3D NAND flash memory.
- \*3 Fin-FET (Fin-shaped Field Effect Transistor): A field effect transistor with a 3D-type construction.
- \*4 VIT (Via In Trench): A structure whereby a hole is provided at the bottom of a trench in the BEOL process, creating a higher aspect ratio than conventional structures.
- \*5 SE (Secondary Electron): An electron that is emitted from a material upon being irradiated by an electron beam.
- \*6 BSE (Back Scattering Electron): A beam electron that is reflected backward.



Advanced High Voltage CD-SEM CV5000 Series

### **【Main Specifications】**

Wafer size	300mm
Acceleration voltage of electron beam	30 kV (Maximum)
Measurement function	Overlay measurement
Auto-loader	3 FOUP <sup>*7</sup> -compatible random access
Power supply	Single-phase AC200 V, 208 V, 230 V, 12 kVA (50/60 Hz)

- \*7 FOUP (Front-Opening Unified Pod): A standard front-opening cassette integrated transport and storage container used in semiconductor plants.

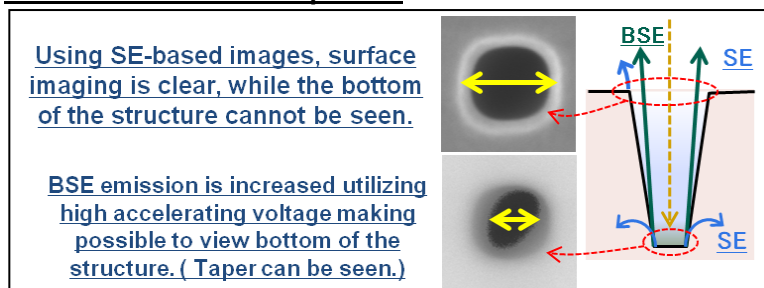
## 【Main Features】

- Measurements and review of patterns in deep holes and trenches
  - (1) High acceleration voltage and ability to select SE or BSE electrons based on emission angle and energy.
- Device Pattern Overlay Measurements
  - (2) CV5000 can perform e-beam based overlay measurements inside the chip utilizing high acceleration voltage
- Common Platform with Existing CG Series
  - (3) A proven platform that allows stable operation and provides low CoO\*<sup>8</sup>

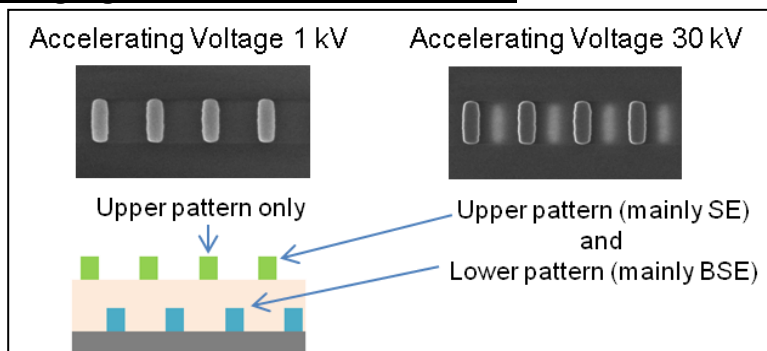
\*8 CoO (Cost of Ownership): The total cost necessary for installation, operation and management of facilities, equipment, and other hardware.

## 【Figures】

### ■ CD measurement of deep holes



### ■ Overlay measurements between upper and lower layers using high acceleration of electron beam



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