May 2025 Technical Information

Semiconductor Device Manufacturing & Inspection Equipment

Connective Industries

#Productivity Improvement #IoT/Data Utilization #Digital Solutions #Measurement & Analytical Systems

1. CV7300 High-acceleration CD-SEM System Supporting Next-generation Device Measurement

As semiconductors advance in performance and density, the manufacturing process continues to evolve with further miniaturization and increased layering. To meet the emerging measurement demands associated with these advancements, Hitachi High-Tech Corporation has developed the CV7300 Hitachi High-Acceleration Critical Dimension-Scanning Electron Microscope (CD-SEM) system.

Main features are as follows:

(1) High Acceleration Voltage

As the number of 3D-NAND layers increases, higher acceleration voltage is required for pattern measurement. The maximum acceleration voltage has been increased to 60 kV, enabling application to deep hole and groove measurements exceeding 200 layers.

(2) Further Acceleration of Multi-Point Measurement

As dynamic random access memory (DRAM) continues to become more miniaturized and the application of extreme ultraviolet (EUV) is anticipated in the future, there is a growing demand for the high-precision correction of exposure conditions through multi-point overlay measurement. Hitachi High-Tech Corporation has implemented new features such as improved autofocus, artificial intelligence (AI) integration, a high-sensitivity back-scattered electron (BSE) detector, and a high-speed drive stage to achieve faster multi-point measurement, thereby enhancing throughput.

[01] CV7300 System Supporting Next-generation Device Measurement

By reducing measurement value differences between devices and further enhancing the reliability of the equipment, this contributes to improvements in the yield and quality of cutting-edge semiconductor device manufacturing.

(Hitachi High-Tech Corporation)

2. Next-generation Plasma Control Technology Supporting Semiconductor Manufacturing

Due to the employment of three-dimensional (3D) structures and the increasing complexity in advanced semiconductor devices, semiconductor manufacturing equipment must have high processing performance. Hitachi High-Tech Corporation has developed next-generation plasma control technology for etching equipment to meet this demand.

This newly developed plasma control system with high-precision pulses significantly enhances the flexibility of plasma adjustment settings, thereby achieving uniform shape control between isolated and dense patterns. Hitachi High-Tech has also developed a wafer surface charge removal technology using low-frequency voltage in the tens of hertz range. By suppressing the disturbance of ion trajectories caused by surface charges, it is now possible to improve etching precision even for narrow aperture patterns below 10 nm.

The latest pulse control technology is currently being evaluated at customer sites, while the charge removal technology has already been adopted for use in customers' mass production processes. Hitachi High-Tech will continue working on product development that contributes to the manufacturing of cutting-edge semiconductor devices by its customers.

(Hitachi High-Tech Corporation)

［02］ Conductor Etch System 9000 Series with Next-generation Plasma Control Technology

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