Hitachi High-Tech

News Release

FOR IMMEDIATE RELEASE

Hitachi High-Technologies develops “ETHOS” High-Performance Composite FIB-SEM System

—Analytical and Processing Platform for the Development of Advanced Materials and Devices—

Tokyo, Japan, August 1, 2017—Hitachi High-Technologies Corporation (TSE: 8036, Hitachi High-Tech) announced the development of an all-new high-performance “ETHOS” Focused Ion Beam-Scanning Electron Microscope (FIB-SEM). A newly developed magnetic/electrostatic compound lens enables ETHOS to deliver advanced imaging performance resolving sub-nanometer features in high contrast for low-voltage SEM applications.

“ETHOS” High-Performance Composite FIB-SEM

Ion and electron combined instruments must diversify as an essential tool for wide-ranging fields such as semiconductors, nanotechnology, materials science, medicine, and biology for the study of sub-surface structures and the preparation of thin-film samples for Transmission Electron Microscopy (TEM) analysis.

The ETHOS FIB-SEM system incorporates a FIB column used in sample preparation along with the newest SEM concept for high-magnification observation enabling the analysis of microscopic surface structure and topography at micron scale. The ETHOS system is designed to play an important role especially in the fields of high-performance devices and nanomaterials, where miniaturization has been advancing recently, for the preparation of uniformly thin, high-grade TEM samples for observation and analysis of fine structure at atomic resolution levels, as well as for defect analysis and evaluation.

ETHOS incorporates world-class Hitachi High-Tech core technologies in the form of a high-intensity cold-cathode field emission electron gun combined with the newly developed magnetic/electrostatic compound lens for high-resolution imaging at low acceleration voltages, along with real-time FIB process observation capabilities. Combined with Anti-Curtaining Effect (ACE) technologies that suppress curtaining effects or striations during cross-section sample preparation. In addition, ETHOS is capable of preparing high-grade, quality TEM samples uniformly in its triple-beam configuration. The electron system is also equipped with multiple detectors to separate selective high-contrast or topographic electrons from secondary electrons, ensuring no structural details at the nanometer scale are missed.

The ETHOS FIB-SEM system is designed with an innovative large-volume sample chamber equipped with ports for Energy Dispersive x-ray Spectrometer (EDS) and Electron Backscatter Diffraction (EBSD), along with a multitude of additional analytical detection configurations possible with optimum detector positioning. The sample chamber is designed for users who are prepared for customization and upgradeability in the future. Samples can be processed and observed from all angles with a large 155-mm X-Y stage. Design considerations for the modern scientists in every field delivers ETHOS for looking at not only the latest semiconductors, but also everything from biological samples to magnetic materials such as steel.

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Similar to Hitachi's FIB-SEM lineup such as the NX2000 which launched in September 2014 and the NX9000 which launched in June 2015, ETHOS has been co-developed by Hitachi High-Tech with its wholly owned subsidiary Hitachi High-Tech Science Corporation. Sales are due to commence in fall 2017.

Hitachi High-Technologies will continue to promote development and sales expansion of highly sophisticated solutions and technologies by responding swiftly to the needs of customers and markets, working from the customer's perspective as a fast-moving creator of cutting-edge businesses.

【Main Features】

1. High-resolution observation realized by high-intensity cold-cathode field emission electron gun and newly developed magnetic/electrostatic compound lens system.
2. SEM column fitted with three detectors to enable multiple contrast observation, such as topographic contrast from secondary electrons as well as compositional contrast from electron backscatter.
3. Rapid processing due to FIB with high current density.
4. High-volume sample chamber for varied applications also fitted with stage offering high stability and precision.
5. High-grade TEM sample preparation possible with Micro Sampling* and Triple Beam system*.
   *optional

【Main Specifications】

SEM optical system	
Power supply	Cold-cathode field emission type
Accelerating voltage	0.1～30 kV
Resolution	1.5 nm (1kV), 0.7 nm (15 kV)
FIB optical system	
Accelerating voltage	0.5～30 kV
Maximum beam current	100 nA
Resolution	4.0 nm (30 kV)
Stage	
Drive range	X: 0～155 mm、Y: 0～155 mm、Z: 0～16.5 mm、T: -10～59°、R: 360° *Stroke may be restricted by the sample holder.
Sample size	150 mm diameter max.

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