

Development of a novel detection system for high resolution analytical FE-SEM

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The Scanning Electron Microscope (SEM) is an essential for observing and analyzing a fine structure of specimen in the various fields from the leading-edge materials or semiconductor devices to the medical and biology. Recently, the needs of SEM with the various observation conditions, such as element analysis on the high spatial resolution and the dynamic observation of fine structure have increased for elucidating the advanced material property.

The newly Field Emission Scanning Electron Microscope (FE-SEM) offers for a solution of research, especially for the material analysis by equipping the newly designed electron optics column and detector system is developed.

The new objective lens system achieved combining the system of reducing aberration and magnetic-field-free of specimen.

In addition, the In-Column SE and BSE detectors, which are equipped inside of the column, to lower the dependency of the WD and accelerating voltage on the detector signals, and capable of optimizing contrast steadily in WD for the highest resolution observation or WD for the analysis of high resolution.

Moreover, the sensor surface of In-Column BSE detector which is circular shape is consisted of four segments. Component image of specimen and specimen topographic information are enabled to obtain by selecting a segment.

The detectors are possible to observe a fine structures and phenomenon in the versatility way by simultaneously obtaining various specimen information of specimen surface structure contrast in In-Column SE detector, channeling contrast in IN-Column BSE detector, topographic information in Chamber detector.

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Dynamic observation, which is growing in the field of materials recently, requires not only shape change but also tissue change and compound generation / disappearance of the specimen. The newly developed retractable BSE detector is realized image signal to noise ratio and bandwidth improvement by optimizing the applied bias voltage and circuit configuration.

Observation in the fast scan mode which the pixel dwell time is short is enabled and the dynamic observation with less streak effect is possible.

This system is designed for functioning on every detectors and EDS at the same WD which is shorter than previous model and the newly developed FE-SEM has characterized that High resolution observation and analysis of specimen can be performed without changing the specimen position and realized seamless workflow.