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"Integrated EPMA" with New Multifunction Technology

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JEOL has developed a new "Integrated EPMA (Electron Probe Micro Analyzer)", with new multifunction technology of the future. With "Ultimate Performance with Usability & Expandability" as its concept, "Integrated EPMA" (see Figure 1) is envisioned as the X-ray elemental analysis equipment for anyone who wants to easily acquire good data.

Major new developed characteristics of "Integrated EPMA" are as follows.

1) The in-lens Schottky Plus FEG, which combines the electron gun and condenser lens, delivers a stable**,** small probe with large probe current. The system can provide a maximum beam current of 3 µA at the sample, assuring sufficient beam currents at lower kV for fast, high spatial resolution microanalysis as compared with conventional system [1].

2) An integrated and automatic aperture angle control lens (ACL) provides the optimum beam size, reducing Cs of the objective lens therefore reducing the analytical region from which the X-rays are being generated.

3) By combining the use of the “Auto” buttons of the optical microscope and the SEM, high quality SEM images can easily be obtained at the analytical WD.

4) Sample loading is quick and easy with the development of a new Auto Loading system with an integrated sample navigation system. With a single click, the airlock chamber is evacuated, a stage navigation image is automatically acquired and the sample is inserted with all 3 steps performed.

5) JEOL's WDS X-ray spectrometers, the key technology of the EPMA, solve many analytical needs. A wide range of spectrometers, including a high-resolution type, a high X-ray intensity type, and a four-crystal type, can meet a variety of research requirements. To analyze light elements, layered synthetic superlattice analyzing crystals are available with higher intensities than conventional ones.

6) Ease of use is further enhanced with the integration of SEM, EDS, WDS and XRF. For simple elemental analysis, you can control the SEM, EDS, and WDS from one screen. The EPMA can set the WDS crystal by transferred XRF analysis data that can be analyzed in ppm order and wide range.

7) To improve flexibility and expandability, the EPMA supports various analyses with a wealth of attachments, tailored to the users' applications, including the following:

- SXES/ SXES-ER (high energy-resolution and chemical state analysis of soft X-rays)
- Panchromatic CL
- Electron backscatter diffraction detector
- miXcroscopy™ (OM-EPMA stage linkage system)

Detectable element range	WDS: Be*1 / B to U. EDS: Be to U
Detectable X-ray range	Detectable wavelength range with WDS: 0.087 to 9.3 nm Detectable energy range with EDS: 20 keV
Number of spectrometers	WDS: Up to 5 selectable. EDS: 1
Maximum specimen size	100 mm × 100 mm × 50 mm (H)
Accelerating voltage	1 to 30 kV (0.1 kV steps)
Probe current range	1 pA to 3 μA
Probe current stability	± 0.3% / h, ± 1.0% / 12 h*2
Secondary electron image	2.5 nm
Analytical conditions Secondary electron image resolution	20 nm (10 kV, 10 nA) 50 nm (10 kV, 100 nA)
Scanning magnification	×40 to 300,000 (W.D. 11 mm)
Scanning image resolution	Maxium 5,120 × 3,840

Detectable element range	WDS: Be*1 / B to U. EDS: Be to U
Detectable X-ray range	Detectable wavelength range with WDS: 0.087 to 9.3 nm Detectable energy range with EDS: 20 keV
Number of spectrometers	WDS: Up to 5 selectable. EDS: 1
Maximum specimen size	100 mm × 100 mm × 50 mm (H)
Accelerating voltage	0.2 to 30 kV (0.1 kV steps)
Probe current range	1 pA to 10 μA
Probe current stability	± 0.05% / h, ± 0.3% / 12 h(W)
Secondary electron image	6 nm(W), 5 nm(LaB_6)*3
Scanning magnification	×40 to 300,000 (W.D. 11 mm)
Scanning image resolution	Maxium 5,120 × 3,840

*1 With analyzing crystal for Be analysis
*2 Room temperature variation: less than ± 3 °C
*3 LaB_6 in option

Figure 1. External appearance and principal specifications of the JXA-iHP200F and JXA-iSP100.

References

[1] H.Yamada, T Okumura, T Kimura and W. Knoll,Proc. ICEM 15th DURBAN(2002)343.

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