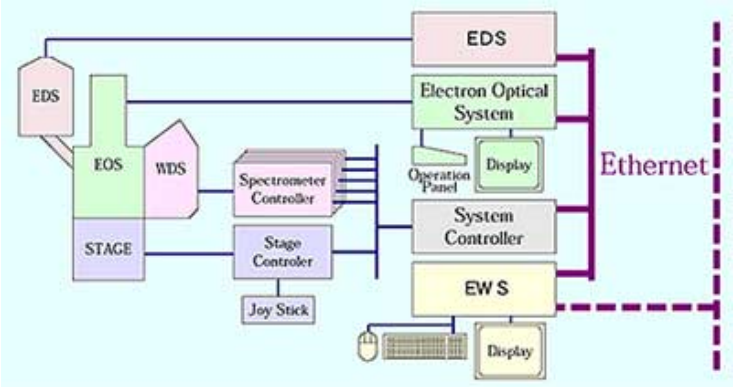
技術情報 Technical Information

Features of Electron Probe Micro Analyzers, JXA-8100 and JXA-8200

JXA-8100: External view



JXA-8200: Block diagram

Electron optic system with enhanced reliability and stability

The proven high performance of JEOL's existing EPMA systems has been further enhanced with the JXA-8100/8200 in the following advancements:

- New electron gun for higher reliability
- Alignment linked to analyzing conditions
- Digital beam stabilizer

These features combine to contribute to a probe current stability of $\pm 0.5\times10^{-3}$/h and $\pm 3\times10^{-3}$/12h in the JXA-8100 and the JXA-8200.

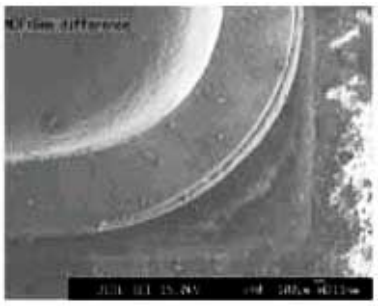
The systems incorporate a number of automated functions, including auto alignment of the electron optic system, resulting in even greater analytical reliability.

Imaging modes for samples with varied heights

EPMA is increasingly used for analyzing samples with rough surfaces such as mechanical parts.
The JXA-8100/8200 supports the MDF (Maximum Depth of Focus) imaging mode, ideal for scanning rough surfaces at low magnification, in addition to the LDF (Large Depth of Focus) mode first introduced in the JXA-8800/8900 series.
The MDF mode is especially designed for preliminary surface morphological imaging and EDS analysis.

Normal

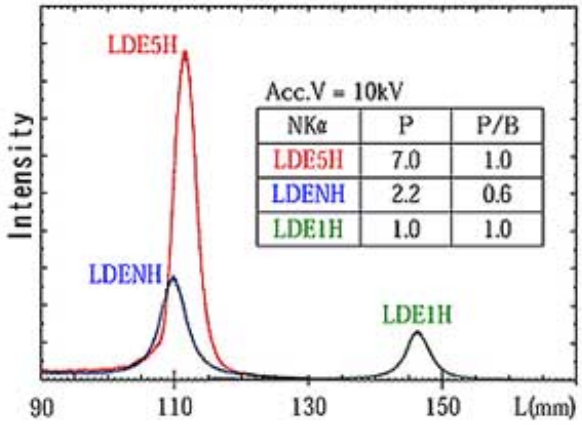
LDF



MDF

WDS light element analysis

JEOL is a pioneer in the field of advanced light element analysis using synthetic, ultra-lattice, multilayer analyzing crystals, which has been the major force in the evolution of EPMA analytical performance.



NKα	P	P/B
LDE5H	7.0	1.0
LDENH	2.2	0.6
LDE1H	1.0	1.0

Crystal performance in NKα (sample: Si_3N_4)

High resolution EDS detectors

The unequaled JEOL's WD/ED combined system controls both the WDS and EDS detectors from a single mouse and keyboard through an integrated user interface, and by using a computer controlled EDS X-ray aperture allows for combined analyses at the same accelerating voltage and probe current.The JXA-8200 supports the following high resolution EDS detectors:

High resolution EDS detectors

Type	Abbreviation	Resolution*1	Elements	Location	Dewar capacity
EX-84023MH	(EHT)	133 eV or less	B to U	WDS port	1.0 liter
EX-84053MH	(EHF)	133 eV or less	B to U	EDS port	1.0 liter

*1: FWHM ($_{55}$Fe:5.9 eV, 1000 cps)

Other EDS detectors are also available to support different applications of individual users.

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Detailed real-time scanning images

The JXA-8100/8200 displays in real time secondary electron, backscattered electron, or X-ray images in 1280x1024 (approximately 1.3 million) pixels (file images: maximum 2048x2048 pixels).Before doing any analyses, an operator can select between different modes, including surface morphological imaging, compositional mapping by atomic number contrast, and elemental mapping, for a quick and intuitive understanding of the nature of their sample.

Analytical tools for live images

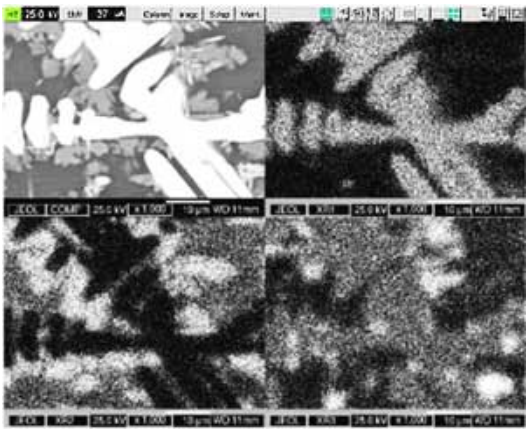
There are many tools available to the operator, allowing them to interact with the live images. Simply dragging the crosshairs will reposition the beam for an immediate analysis of that spot on the sample. Double clicking on a point in the live image will move the stage to center that point in the field of view.

Display modes

An array of display modes is available, including split frame imaging, pseudo color display, and real time measurements.

Real time multiple views

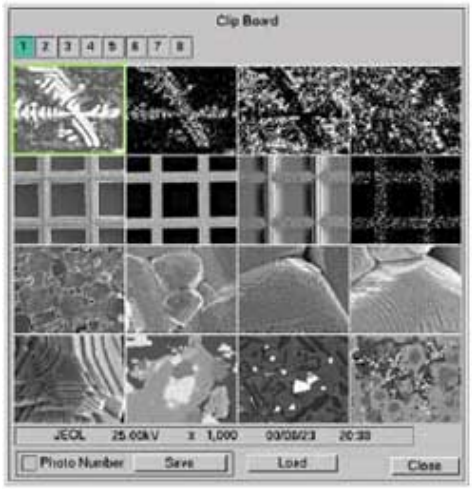
Up to 5 different electron, X-ray, and light signals, including color OM imaging, can be simultaneously observed in real time.



Simultaneous display of 4 images (BE and X-ray)

Stored images

The Clipboard allows the operator to save and load scanned images for further analysis.These image files can be printed or compiled into documents using the optional SmileView program, an effective tool commonly used in JEOL SEM systems.



Clipboard

A complete range of automated functions

The JXA-8100/8200 features the following auto functions,providing users with greater control and ease of use.

- Auto saturation of electron gun
- Auto alignment of electron optic system
- Auto focus of scanning images
- Auto stigmator for scanning images
- Auto contrast/brightness control
- Auto current selection at the start of an analysis
- OM auto focus (optional)

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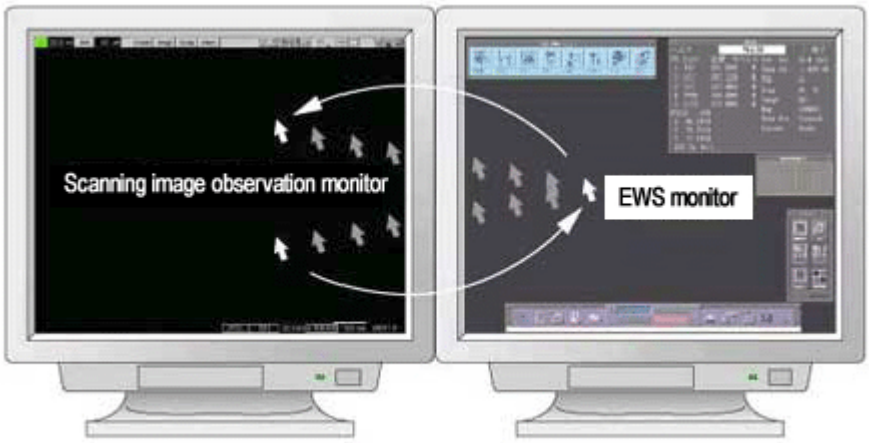
Swing Mouse

The JXA-8100/8200 features Swing Mouse, which allows the user to move the mouse pointer between two monitors, each controlled by a different computer systems.This enables seamless control of various functions of the JXA-8100/8200 from a single mouse and keyboard.



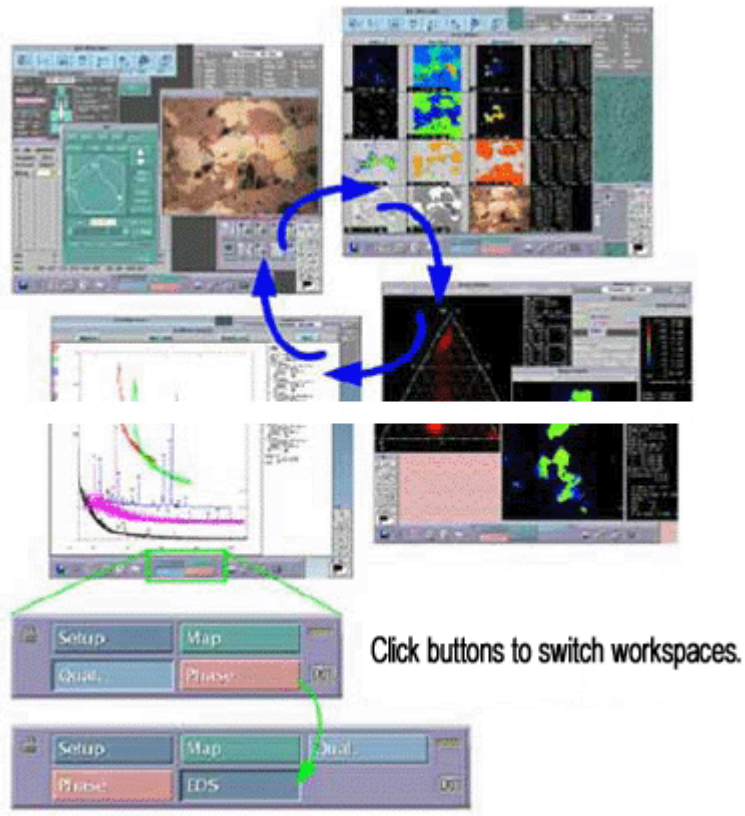
Swing Mouse operation

Compact operation panel

Knobs are provided on the operation panel for control of imaging conditions that require quick response, including scanning magnification, focus, probe current, and brightness/contrast, allowing the operator to fine tune the settings while monitoring the scanning image or X-ray signal intensity.

Workspace display control

This feature allows the operator to customize workspaces for easier use when multiple tasks are being performed; e.g., defining quantitative analysis conditions based on qualitative results or processing phase analysis data while referring to line analysis results.



Click buttons to switch workspaces.

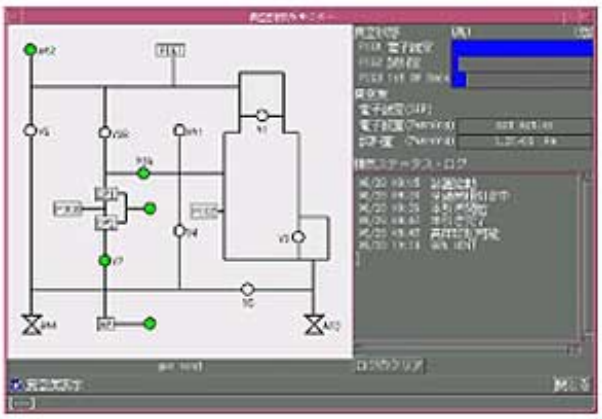
Workspaces may be renamed, edited, added, or deleted.
The figure above shows the addition of a workspace for displaying the EDS.

Advanced digital control

The JXA-8100/8200 has increased the number of digitally controlled functions, including:

- Color OM image display
- Vacuum status and pressure level indicators
- Rotation/shift of scanning images
- Backscattered electron detector

The digital vacuum gauges for the chambers allow the operator to monitor the pressure levels or status changes of the evacuation system, or to check the status of the filament..The digital vacuum system also enables simple system diagnostics from a remote location.



Evacuation system monitor

Some of the more popular accessories are also digital, including:

- Rotation, tilt, and tilt/rotation sample holders
- LaB_6 gun (LBG)
- Transmitted light illuminator (OMT)
- OM auto focus (TAF, CAF)

Most advanced workstation

The engineering workstation (EWS) for system control and data processing supports color graphic display of 1280x1024x24 bits.Digitized controls, including real time display of color OM images, facilitate area analysis.

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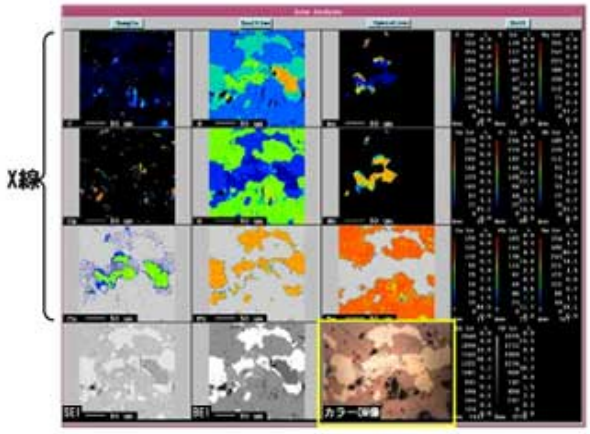
Digital real time display of color OM images

The JXA-8100/8200 displays the color OM image on the EWS display in real time.This allows for simultaneous observation of high resolution scanning images.
Images from an external video signal output device (optional CCD microscope) can also be displayed.These images are stored in files and can be displayed by the area analysis program.

Color OM image on EWS display

Color OM image on EWS display



Results of area analysis including color OM image

High brightness LaB_6 gun

Compared to the W filament, the LaB_6 gun has a higher SEI resolution at low probe currents, and produces a smaller probe diameter at the high probe currents typically used for WDS analysis. It is also effective in microarea analysis that is increasingly in demand.

LaB_6 gun on JXA-8200

Cathodeluminescence system

Cathodeluminescence has a wide range of applications in the field of information technology, including large volume storage, high speed optical devices, illumination/display LED, memory media, and fluorescent materials.
The JXA-8100/8200 supports cathodeluminescence systemto enhance its total analyzing performance.

Cathodeluminescence system

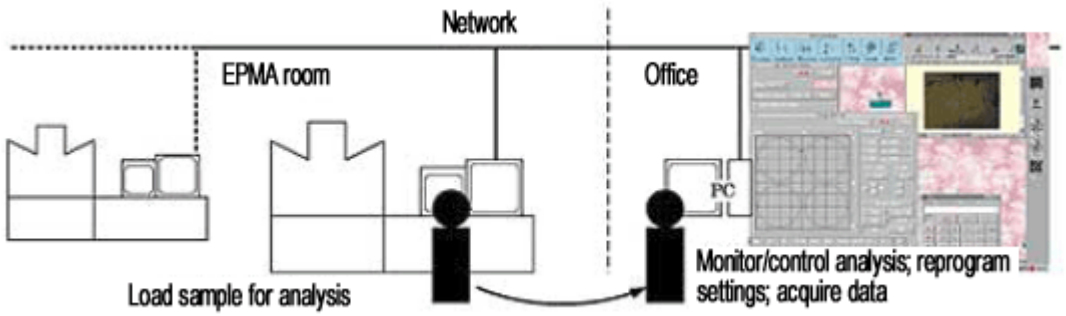
Networking (SPNet)

The JXA-8100/8200 has a LAN port (10BASE-T/100BAS E-T) as standard, allowing for easy networking access.
Image files can be transferred over a network, and downloaded to a PC where they can be incorporated into a document using SMileView.This is a great advantage over using photographs in terms of both cost and convenience.

High resolution images transferred into documents by SMile View

Using the PC-X server, the entire EPMA system including WDS and EDS can be remotely controlled. From a distant PC, the operator can monitor real time imaging and analysis, create and modify the operational settings while observing the OM image, or paste data from the EPMA applications to any other program for further manipulation.

Electron Probe Micro Analyzer



Remote control through PC-X server

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