JXA-iHP200F Field Emission EPMA

JEOL is pleased to announce the next generation of Field Emission EPMA technology. JEOL continues to build on over 50 years of experience in both EPMA and FEG SEM technology to merge the two into a superior imaging and analytical EPMA. This is a state of the art, top of the line, research grade FEG-EPMA that provides both ultrahigh imaging resolution and analytical resolution at both high and low accelerating voltage and very high and stable probe current (without the need for beam stabilization) for optimum imaging and analytical performance with over 300 installed worldwide. The new EPMA has a new SEM and EDS user interface (GUI) based on the FEG SEM's "SEM Center". This includes new algorithms for the auto functions of both the SEM column and the optical microscope. This new GUI provides a simplified work flow called "Easy EPMA" with built-in software for a broad range of user experience (from the novice/occasional user), with graphic driven procedures, to complete flexibility and capabilities for the very experienced EPMA scientist. A full knob-set and stage control module are both standard. The iSP200F features an automated specimen exchange airlock, with an integrated color stage navigation camera mounted on the roof, providing easy access to the areas of interest on the sample with one click. The software also prompts users when routine maintenance is suggested. The EPMA also allows the transfer of JEOL EDS and or JEOL XRF data directly into the EPMA software and will automatically select the appropriate spectrometers and crystals. New standard software includes "Phase Map Maker" and "Phase Analysis" utilizing both AI (Analytical Intelligence) and principle component analysis.

Features that make the iHP200F uniquely suitable for a wide variety of analytical applications: 1) The Field Emission Gun is immersed in the first condenser lens field allowing for higher total probe current deliverable to the sample under normal gun operating conditions (providing long lifetime and without compromising ultimate resolution). The system is capable of delivering a maximum beam current of 3 μAmps at the sample assuring the ability to get sufficient beam currents at low kV for fast, high spatial resolution microanalysis. 2) A very flexible, customizable configuration of spectrometers and crystals that can be optimized based on the required application. 3) The JXA-iHP200F a has an automated aperture angle control lens (ACL) that optimally sets a large convergence angle (smallest probe diameter) for low beam current/high resolution imaging and sets the smallest convergence angle for best microanalysis resolution. This effectively reduces the Cs of the OL for high current, low kV analyses. 4) A 30mm^2 integrated and embedded UTW-SDD-EDS system with high sensitivity including an *in situ* aperture wheel for ultrahigh beam current operation without compromising EDS spectrometer resolution and "Live" survey EDS acquisition to easily help find elements of interest. 5) The specimen chamber supports both a panchromatic, high bandwidth imaging CL and a fully quantitative hyper spectral CL (xCLent V System) with no loss of a WDS or any limitation on image collection. 6) The JXA-iHP200F also supports the installation of JEOL's Soft X-Ray Emission Spectrometers (SXES, SXES-ER) for ultra light elements and chemical state analysis. 7) A fully dry pumped vacuum system to reduce hydrocarbon contamination. 6) Integration with Probe for EPMA (PfE).

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JEOL's WDS spectrometers can have a Rowland circle of either 100mm or 140mm. The XCE or L-type spectrometer, with a Rowland circle of 140mm, offer a broader spectroscopy range and superior P/B ratios (utilizing either standard or large crystals), while the H-type spectrometer, with a Rowland circle of 100mm, features higher X-ray intensity (for trace element mapping).The user can choose the most appropriate ones according to the application and /or budget.

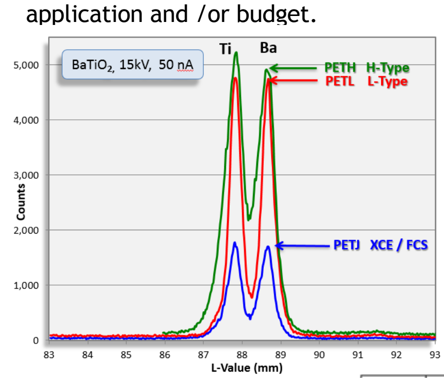


Figure 1: Crystal Comparison: (H-Type, Large Crystal L-Type, Standard Size Crystal XCE or FCS)

Figure 2: Available light element crystals and performance

XTL	2d (nm)	Be	B	C	N	O	F
STE	10.04		Good	Good	Good	Good	
LDE1	6			Possible	Very Good	Very Good	Very Good
LDE1H	6			Possible	Very Good	Best	
LDE1L	6			Possible	Very Good	Best	Best
LDEB	14.5	Very Good	Good	Possible			
LDE2	10		Very Good	Very Good	Very Good	Good	
LDE2H	10		Best	Best			
LDE3H	20	Best	Good				
LDE5H	8			Very Good	Best		
LDE6H	12		Best	Best			
LDE6L	12		Best	Best	Good		

Best	◎
Very Good	○
Good	○
Possible	△

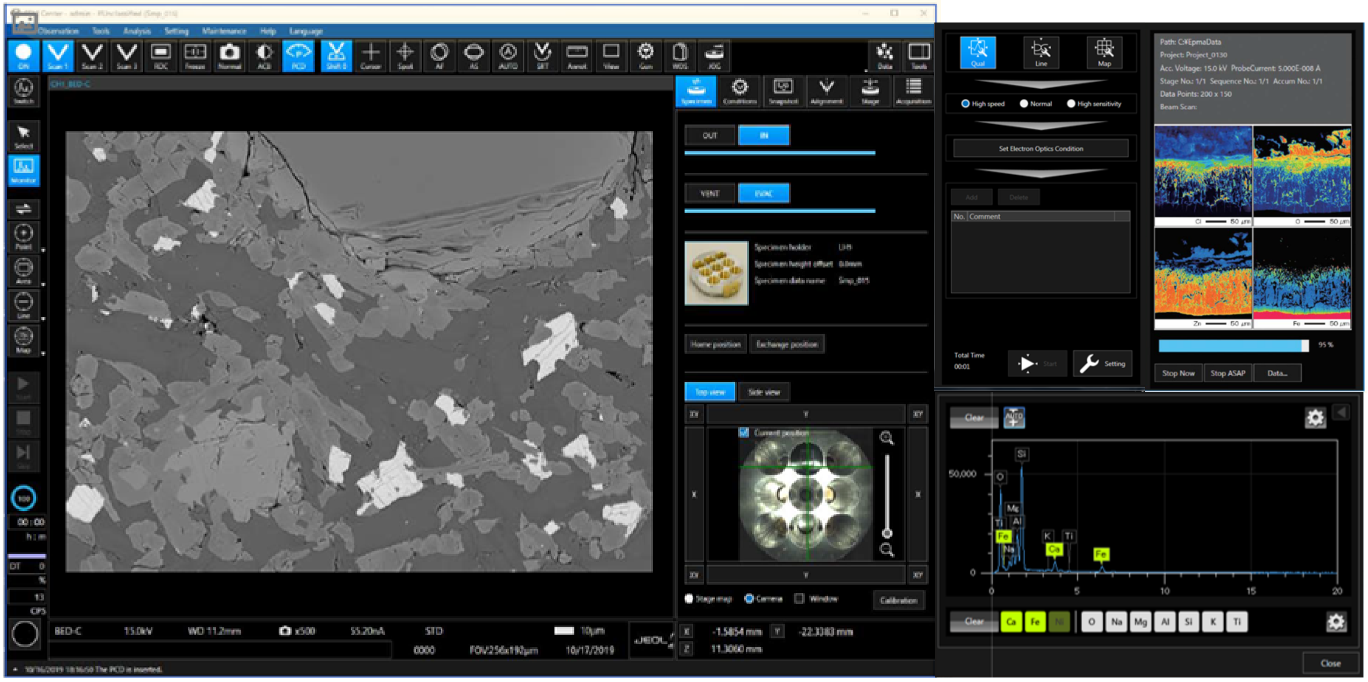


Figure 3: The New GUI "SEM Center", with "Live EDS Analysis" and "Easy EPMA" widows displayed .

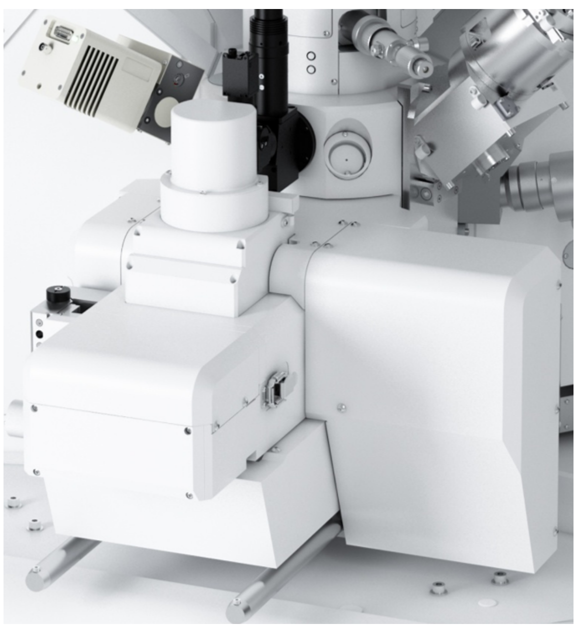
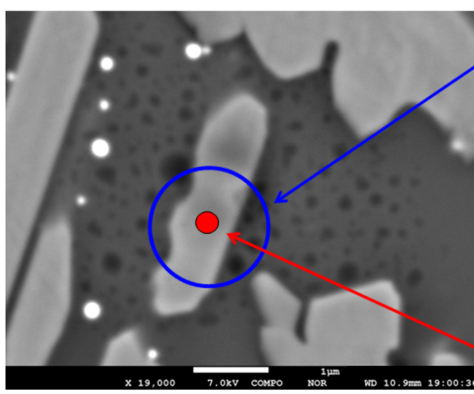


Figure 4: A close up view of the automatic specimen exchange airlock with integrated navigation camera

Applications Examples



Analysis of a 0.6x3.0 micron pyroxene at 7 kV. It is surrounded by K-Al-rich glass. The analysis contained no detectable K from the matrix. and was stoichiometric for a pyroxene with a total of 100.25 weight %. (Armstrong et. al. Microscopy and Analysis)

Figure 5: FEG analysis at low kV shows the dramatic improvement of analytical spatial resolution

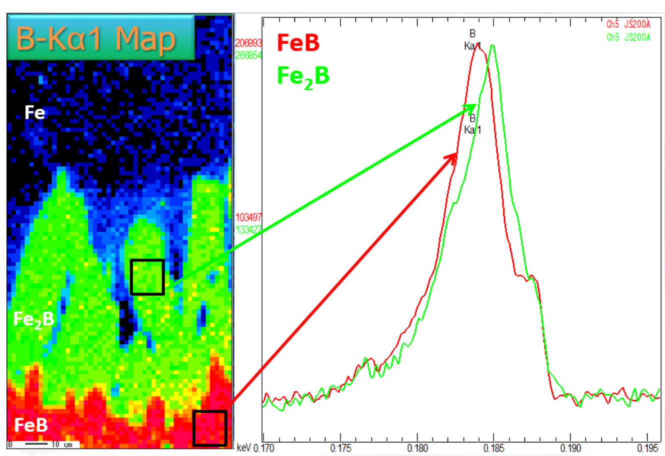


Figure 6: SXES chemical state map of B with a peak shift of ~1eV

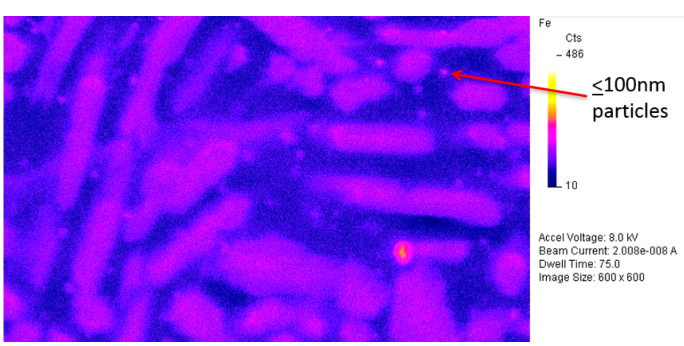


Figure 7: Fe WDS map at 8kV, 20nAmps showing resolution below 100nm