

microValidator™

A package for validating the operation of SEM/EDS systems, especially for automated particle and phase search applications, such as GSR (gunshot residue) and MLA (Mineral Liberation Analysis)

In forensic science, GSR analysis by Scanning Electron Microscope (SEM) and X-ray Microanalysis (EDS) plays an important role in determining whether a suspect fired a gun or was close to a fired gun. Analysis is performed automatically by dedicated software, providing reliable, fast and comprehensive results. Other forms of automatic particle/phase analysis, such as Mineral Liberation Analysis, also produce large amounts of analytical data automatically.

To ensure reliable analysis, the systems need to be validated. This can be carried out fully and automatically using microValidator. The microValidator package includes s/w, integrated beam current meter, special substage mount with several standards such as the SIRA grid and Tin ball sample. The integrated beam current meter and video level monitoring allow the software to automatically check EDS and BSD detector efficiency, column alignment (from analytical point of view), and EDS imaging calibration.

The special standards block contains several standards for fully automatic diagnosis of several SEM/EDS functions, such as testing for field stitching errors and EDS classification. After each testing stage is completed, a report is generated that shows that the system functions have been validated or that some function or functions have failed. microValidator differentiates between user-correctable errors and service-related errors. If all selected tests pass, the user can show that system performance has been validated objectively. All microValidator samples are certified and each one serialized, fully characterized and documented.

microValidator also allows for measuring beam current as a function of time. Optionally, the standard block can be fitted with the customer's own GSR Proficiency Test sample (Synthetic Particle Specimen for SEM/EDX Calibration SPS-5P-2# (Plano GmbH)) which can be launched automatically to validate GSR performance. The built-in validation procedure in the GSR software can be used to check for accuracy of measurement.

Key benefits

- Validating the operation of your SEM/EDS and automated particle analysis using dedicated software
- Use your own GSR Proficiency Test sample for automatic validation of GSR analysis
- Optimize the accuracy of your GSR and MLA analysis by monitoring standards supplied using built-in validation procedures

Essential specifications

microValidator offers the user three levels of testing:

SEM Checks (Inspect™, Quanta™ and XL)

When the SEM checks are run, the software:

- Checks SEM communications
- Checks stage has been homed and FWD-Stage Z coupled
- Checks SEM alignment by testing if beam current in the Faraday cup varies correctly with changing spot size
- Checks that the BSD contrast and brightness can be regulated correctly
- Checks absolute magnification by using the integrated test standard
- Checks that SEM scan and stage are correctly aligned

EDS Checks

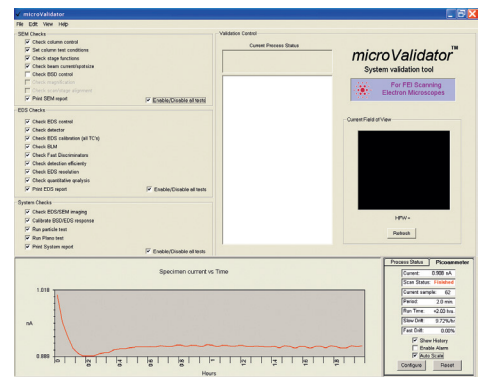
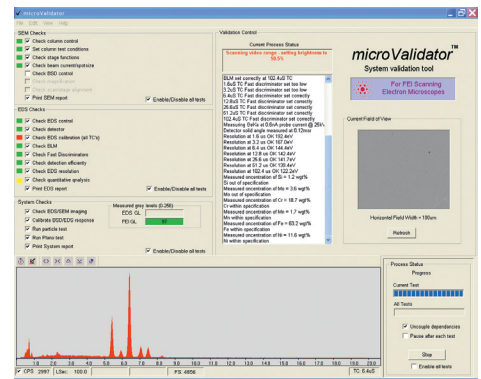
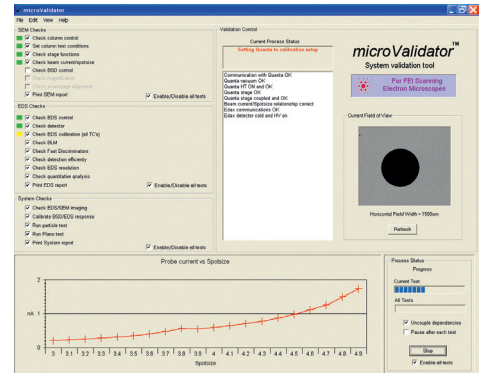
- Checks EDS communications
- Checks calibration at each EDS processor time constant
- Measures detector collection efficiency (solid angle) on Germanium standard and reports if detector is positioned too far back from sample
- Performs peak ID
- Performs full quantitative analysis on certified standard

System Checks

- Checks EDS/SEM imaging. The image acquired using the EDS scan generator is compared with the SEM image. Both brightness/contrast and aspect ratios of the two images are compared and differences outside specification reported
- Runs BSD calibration function to check calibration
- In the case of a forensic system, the microValidator can run the optional Plano test sample by launching the FEI GSR software automatically

Compatibility with EDS

- microValidator is compatible with EDAX and Bruker X-ray microanalysis systems



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