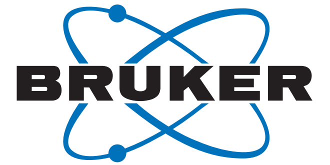


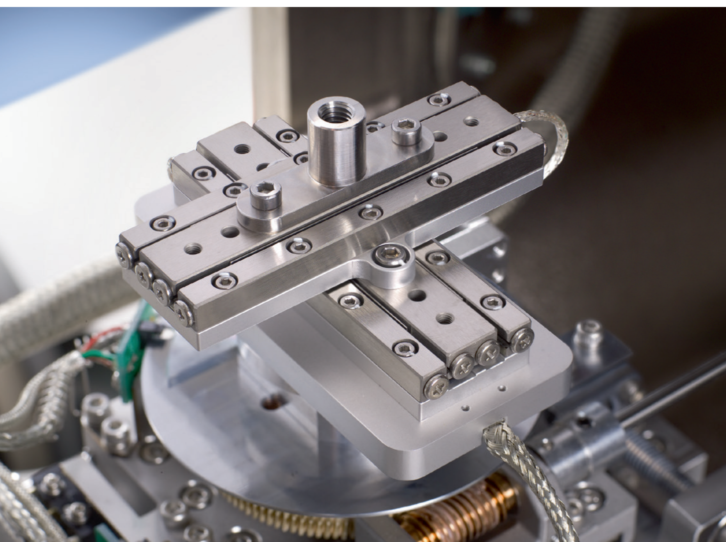
Rapid Stage

High-speed Elemental Mapping with Micro-XRF on SEM

Innovation with Integrity

Micro-XRF on SEM

Ideal Tool for High-speed Elemental Mapping with Micro-XRF on SEM



Micro-XRF on SEM works with a fixed X-ray beam and hence it cannot be controlled to scan the sample in the same way as a standard e-beam. Consequently, elemental maps have to be acquired via stage movement. The Rapid Stage has been developed to enable high-speed mapping over large areas. It is mounted on top of an existing SEM stage, including stage adaption and sample holder. The Rapid Stage is controlled independently from the SEM stage and can operate up to a maximum travel speed of 4 mm/s.

The new Rapid Stage...

The Rapid Stage is a modular piezo-based stage designed to be mounted on top of standard SEM stages by means of an included stage adaptation for the specific microscope.

Each Rapid Stage comes with the specific SEM sample holder and is optimized for a working area of 50 x 50 mm², but even larger elemental maps can be obtained by combining the Rapid Stage and SEM stage movements and mosaicking the results.

Seamlessly integrated into the ESPRIT software suite, the Rapid Stage allows for simultaneous acquisition of electron beam- and micro-XRF maps incorporating light element information as well as trace element and/or higher X-ray energy element analysis.

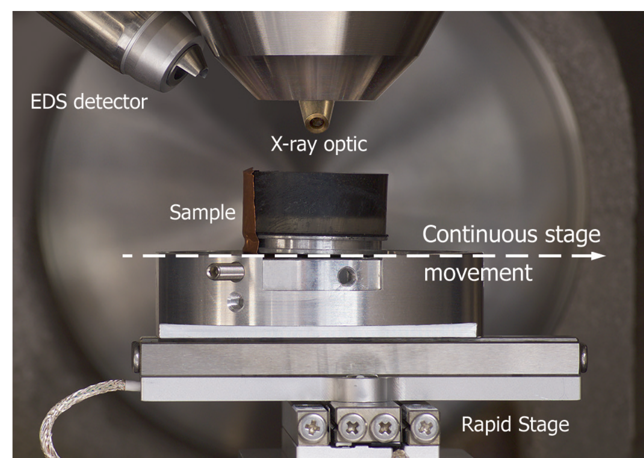
... and its advantages for Micro-XRF on SEM measurements

Micro- XRF on SEM is an efficient analytical solution to determine the presence of elements down to low ppm concentrations. Compared to traditional electron beam analysis, micro-XRF offers lower detection limits, higher energy X-ray line excitations, and a larger information depth that opens for SEM users new possibilities for a more complete sample characterization.

Bruker's XTrace, the high performance micro-spot X-ray source for SEM, is equipped with a focusing X-ray optic which enables an X-ray spot size as small as 35 µm. This small X-ray probe not only allows the analysis of small sample areas but also the examination of elemental distributions.

Since the X-ray beam that interacts with the sample is in a fixed position, micro-XRF elemental maps have to be acquired via stage movement.

Example of SEM setup



Key Facts and Benefits

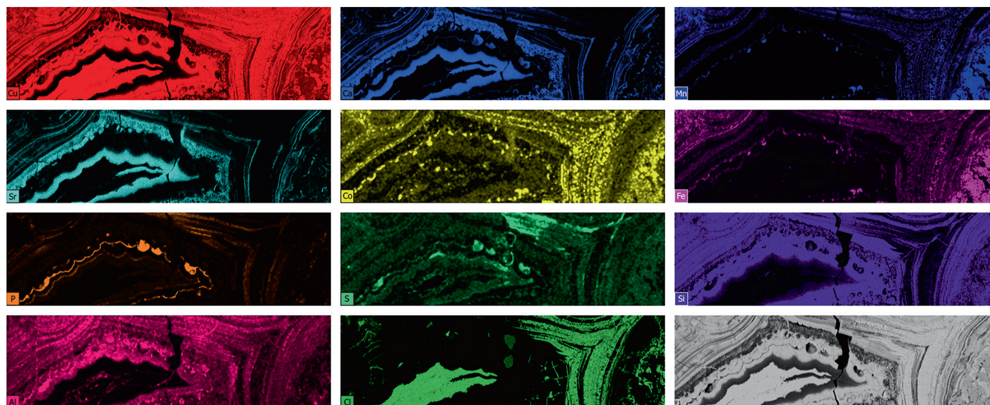
- Most effective for large area maps
- Uses the high sensitivity of XRF to pick up low levels of trace elements in samples (e.g. grain mounts, rock slabs, thin sections, etc.) in a short time
- Can be used simultaneously with e-beam excitation (for low energy elements)
- Can scan samples of up to 50 mm directly and samples > 50 mm in combination with the SEM stage
- Works in VP/ LV mode
- Seamless integration in Bruker ESPRIT 2.2 software suite
- Works for all modes of operation (point, line scan, mapping)
- Can be adapted to most common SEM stages
- Every Rapid Stage comes with a SEM stage adapter (dovetail) and sample holder
- Quick stage change (can be easily removed when not needed)

Application Fields

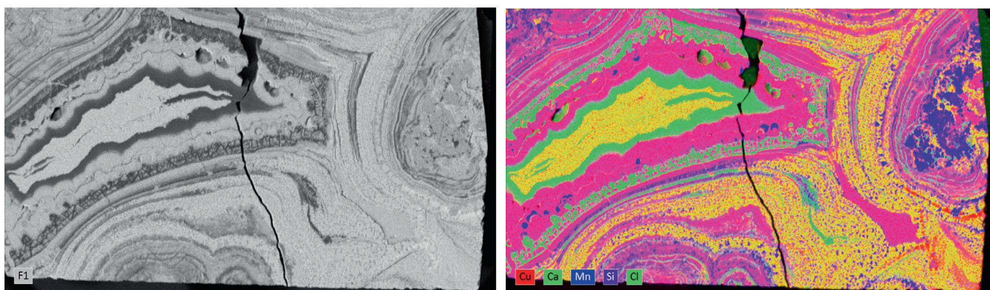
The Rapid Stage is suitable for large area analysis in general as well as for specific application fields, such as:

- Analysis of coatings
- Environmental analyses
- Non-destructive testing of PCBs
- Analysis of concrete.

Large area maps of a copper deposit sample



a)



b) c)

Application example: Determination of major and trace elemental and mineral distribution in an exotic copper deposit sample from El Tesoro, Chile.
a) Individual elemental maps
b) X-ray intensity map
c) Element distribution map.

Analytical parameters: Tube voltage: Rh at 50 kV, Anode current: 600 µA, **Sample size: 45 mm x 30 mm** (polished section), Pixel spacing: 25 µm, **Analytical time: 101 min.** Note the short analytical time and the large mapped area.

Technical Specifications

Parameter	Description
Height	27 mm (without sample holder and SEM stage adaption)
Weight	300 g (without sample holder and SEM stage adaption)
Maximum sample load	3 kg
Repeatability	75 nm
Stage travel speed	~ 4 mm/s
Travel distance	Direct scan: 50 mm (for areas > 50 mm in conjunction with SEM stage)
Acquisition mode	On the fly
Backlash correction	Backlash-free
Vacuum resistance	10^{-7} mbar (higher vacuum resistance on request)
Power requirements	12 VDC, 60 W

For more information scan the QR code or visit www.bruker.com/quantax-micro-xrf

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