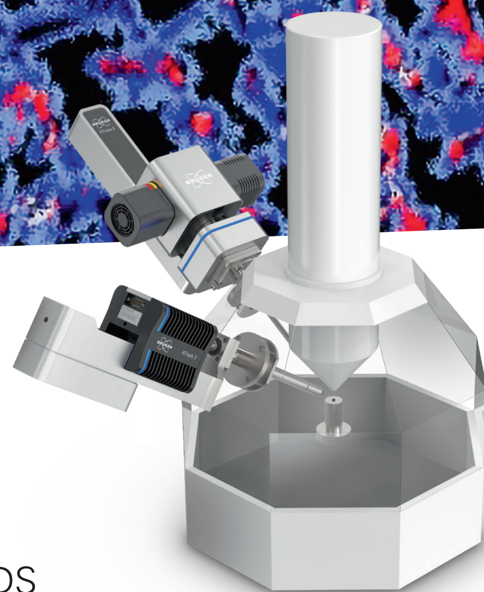


EDS & MICRO-XRF ON SEM

Full Range EDS

Increasing the energy range and sensitivity of EDS

Full Range EDS is Bruker's analysis system consisting of two different excitation sources and an EDS detector. The addition of the XTrace 2 micro-XRF source to a conventional EDS setup on an electron microscope creates a dual-beam system, where samples interact with either the electron beam of the SEM or the X-ray photons from the micro-XRF source, or both.

The combination of the two excitation sources delivers unique additional analytical capabilities with no modification of the EDS detector required. The energy range is extended and therefore higher-energy excitation lines of up to 40 keV can be detected.

Using Full Range EDS enables the user to now measure trace element concentrations down to approximately 10 ppm (element and matrix dependent).

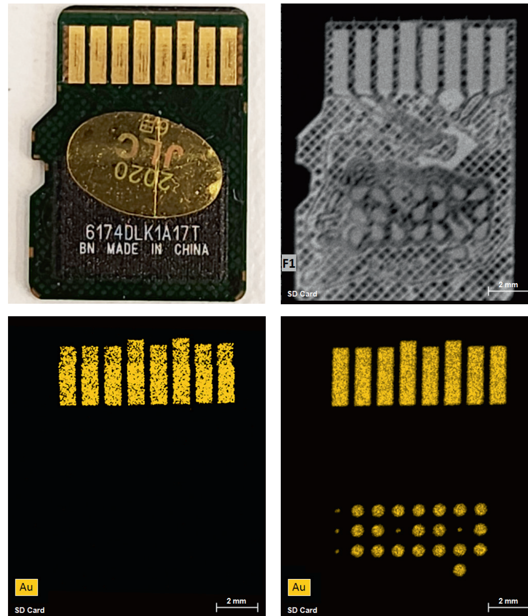
Discover more about your sample with Full Range EDS

- See high energy transitions including the ability to detect additional elemental line series that are not seen with conventional EDS, especially above 20 kV
- Detect and quantify elements at trace level concentrations
- Analyze beam-sensitive, non-conductive samples as well as culture heritage and valuable samples that cannot be modified
- Visualize topographic samples at high resolution
- Gather elemental maps over large areas at micrometer resolution
- Detect the element distribution below the sample surface
- Analyze multi-layered systems by Bruker's unique XMethod layer analysis software

Element detection below the sample surface

Full Range EDS can be used for elemental analysis both on and below the surface of a sample. The additional excitation of a sample with high-energy X-ray photons makes it possible to reveal elements below the sample surface that cannot be detected by conventional EDS. The depth of information is element and matrix dependent and can range from micrometers to even centimeters.

In the example shown on the right, not only the outer gold wires but also the gold connections within an SD card can be resolved without having to remove its plastic coating.

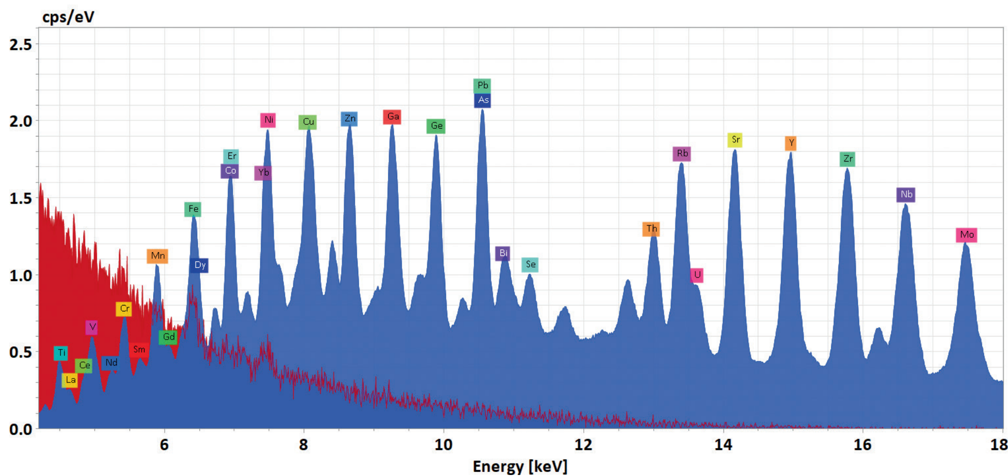


Analysis of an SD card
a) optical image,
b) compositional map,
elemental maps taken with c) conventional EDS and d) full range EDS.

Detection of trace elements

Many elements are not detectable at low concentrations with conventional EDS as their X-ray signal is typically lost in the background. In contrast to that the X-ray excitation using Bruker's Full Range EDS analysis results in a spectrum that has a much lower spectral background.

The various trace elements in the spectrum shown below are doped at around 500 ppm and can be clearly detected using micro-XRF excitation, while these elements are below the detection limit for conventional EDS with electron excitation.



Comparison of spectra
collected on NIST 610 using conventional SEM EDS at 30 kV (red) and Full Range EDS at 50 kV (blue).

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All configurations and specifications are subject to change without notice.
Order No. DOC-H82-EXS032 © 2024 Bruker Nano GmbH, Am Studio 2D, 12489 Berlin, Germany.