BRUKER

Bruker AXS Microanalysis

QUANTAX

- X-ray Microanalysis on SEM and TEM

think forward

EDS

QUANTAX EDS systems - ultimate analytical performance in microanalysis

The 5000 series LN_2-free XFlash® Silicon Drift Detectors (SDD) and the latest generation ESPRIT software provide unrivaled performance in qualitative and quantitative energy dispersive microanalysis.

The XFlash® 5000 series

Bruker's 5000 series XFlash® Detectors display high pulse load capability combined with excellent and stable energy resolution. Their optimized electron trap allows interference-free analysis even at low excitation energies.

XFlash® 5010, the light element specialist

This detector´s excellent energy resolution, a ≤123 eV-version is available, makes it the instrument of choice for analyses in the low energy range below 1 keV. The detection range spans the elements from beryllium to americium.

XFlash® 5030, the ideal detector for low beam current applications and transmission electron microscopy

Operating an environmental or field emission SEM, working with low accelerating voltages or with a TEM? The XFlash® 5030 with its 30 mm^2 active area provides highest X-ray detection efficiency.

XFlash® QUAD 5040, the maximum performer in energy resolution and count rate

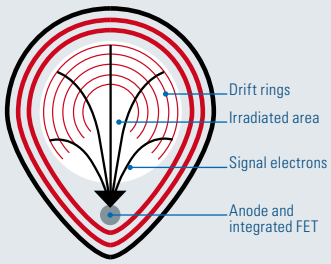
The XFlash® QUAD 5040 consists of a chip with four independent 10 mm^2 sensors. Its unrivaled combined output count rate of 1,100,000 cps permits applications that require immediate results or high speed mapping.

Hybrid pulse processor for high throughput and excellent spectrometry

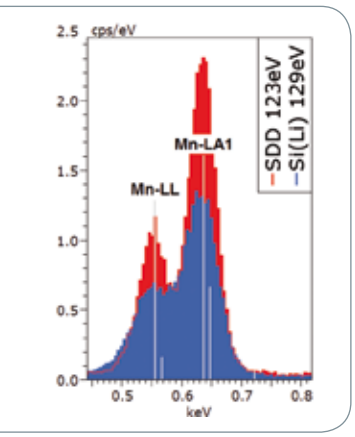
A unique combination of analog and digital signal processing, specially designed for SDDs.

SDD

All XFlash® models rely on Bruker's proven Silicon Drift Detector (SDD) technology. The detector's silicon chip is equipped with round or droplet shaped drift rings to which a voltage is applied. The ensuing electric field forces the signal electrons towards the anode with integrated FET. The fact that the anode is reduced to a spot and the signal is amplified on chip, is responsible for our detectors' excellent energy resolution and high speed.



Performance under all conditions!



This spectra overlay shows the superior performance of the XFlash® SDD compared to state-of-the-art Si(Li)s. The SDD displays better energy resolution (peak width and line separation) and improved efficiency (greater peak height) under the same measurement conditions.

Combining best energy resolution and highest detector efficiency

The XFlash® Detector family offers you the capability to analyze samples at any beam current. The detection systems' efficiency significantly reduce acquisition times even at low count rates. Compared to conventional Si(Li) detectors you can save 30% acquisition time at 1,000 cps and 50% at 5,000 cps. At higher count rates the detector can operate more than 10 times faster than Si(Li)s.
Energy resolution remains at its optimum at 100,000 cps and beyond. This permits maximum accuracy also for fast mapping and other high-speed applications. The peak position stays stable throughout the whole operating range.

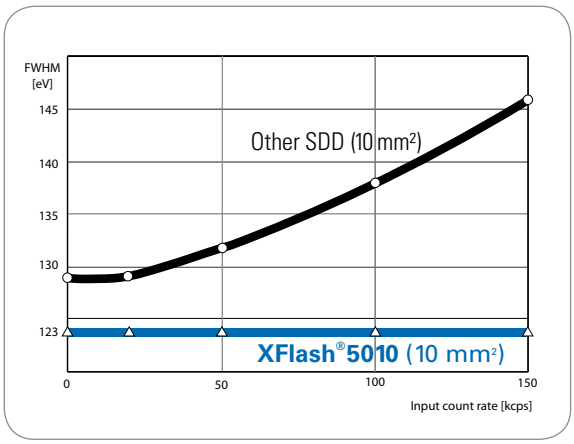
Low cost of ownership

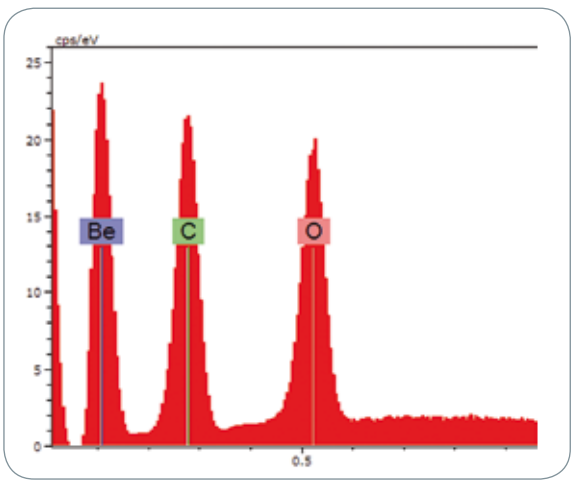
The XFlash® Detectors' optimum energy resolution is already attained at -25°C. This temperature can be comfortably maintained using a simple low power fan-less Peltier cooling system, which avoids any vibration. Working temperature is reached in less than 30s after switching the power on.
Our XFlash® Detector based QUANTAX microanalysis systems are virtually maintenance-free with unmatched economic life-time.

Flexibility and adaptability to your needs

Size and weight of our detectors allow for mounting also on small columns and in situations where there is little space available. This makes the XFlash® the perfect choice for any application. The detector geometry is custom-tailored to your system to ensure optimum measurement conditions.

A comparison of energy resolutions at various input count rates. Note the stabilty of the XFlash® 5010's energy resolution.

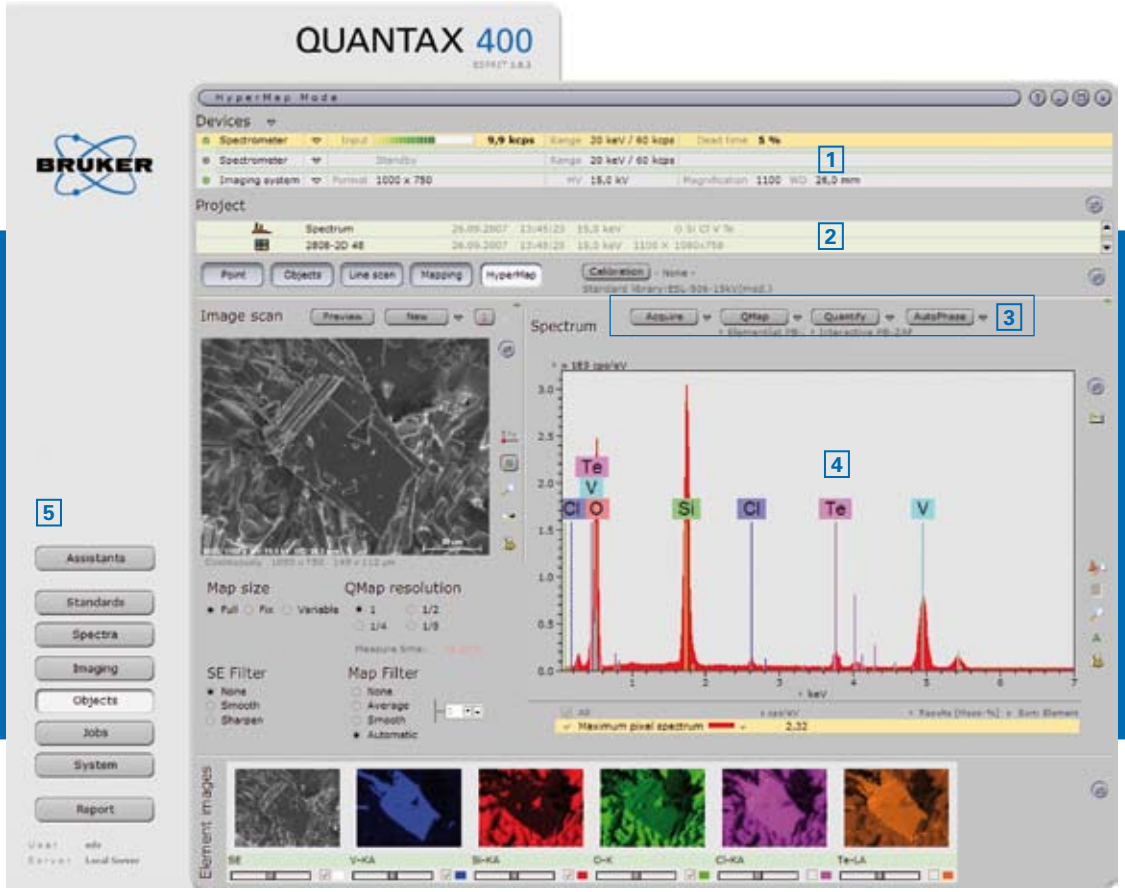




Original spectrum of a beryllium sample (Be), as acquired with a XFlash® 5010 (123 eV), measurement time 52 s, approx 7,000 cps.

ESPRIT user interface

1. Hardware section
2. Project section
3. Acquisition and evaluation
4. Function-specific section, selected function is highlighted
5. Main menu



ESPRIT analysis software

Design beyond Windows

ESPRIT's unique design and operating philosophy reflect the analyst's requirements – direct access to important functions, speed and versatility. The software concept consequently avoids endless menu and sub-menu structures as well as difficult-to-interpret icons.

Everything at a glance

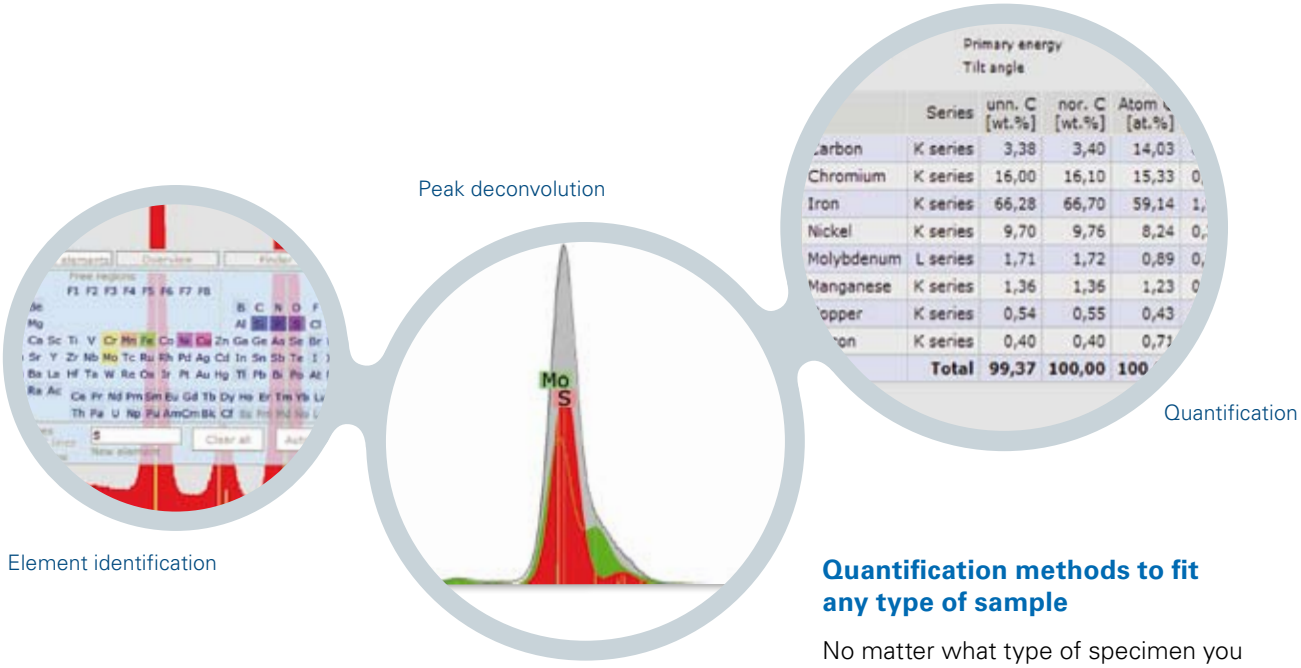
The main program window is subdivided into three sections: The top section refers to the system hardware, the second section contains the project structure.
The third and largest section changes according to the selected main function. This enables you to see all parameters simultaneously, whether you are viewing your results or performing spectra acquisition, analysis, mapping, line scan or any other function.
Functions that have settings are easily recognizable by a down-pointing arrow.

The input/output functions for each section can be reached through a double-arrow button (I/O button). Important sub-functions and display options are accessible through icons on the right edge of the third section – that's all.

Analytical power at your service

ESPRIT implements the full range of analytical functions for X-ray microanalysis at the SEM or TEM. This includes multi-point analysis, line scan and mapping with element intensity or element concentration.
The analytical functions are complemented by modules for maintenance, image acquisition and processing, as well as a powerful report generation tool with Word export. Also available are versatile automation features to run series of stand-alone analyses (including mappings and line scans) with the option of controlling the SEM stage.

Maximum versatility in analysis and presentation



Accurate automatic element identification

ESPRIT uses the world's most comprehensive atomic data library. It contains newly discovered L, M, and N-lines and revised line intensities, especially in the critical low energy range. This warrants that all elements can be securely identified by the automatic routine. To ensure maximum flexibility, identification can also be performed interactively and in a guided mode. Furthermore, a list of forbidden elements can be specified.

Powerful deconvolution routines

Overlapping element lines are no longer an annoyance for the analyst. You have the choice of different methods for deconvolution. In most cases series deconvolution will work well, but you also have the option of using Bayes or line profile deconvolution with standards. Alternatively you can also do a series or a profile fit with standards.

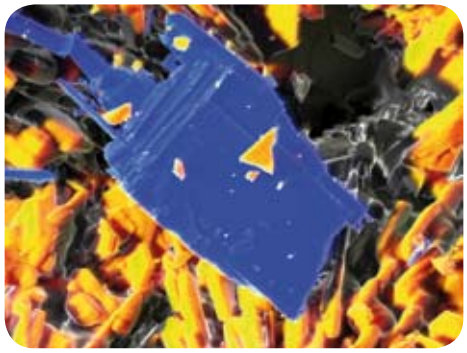
Quantification methods to fit any type of sample

No matter what type of specimen you wish to analyze quantitatively, ESPRIT provides the right algorithm for your purpose. Element composition concentrations of rough samples and particles can be determined through a genuinely standardless analysis based on the P/B-ZAF method with very good accuracy. Ultimate precision in analyzing polished specimens can be attained using the standard-based $\Phi(\rho,z)$ routine. Our ESPRIT HSQuant module has the unique ability to combine both standard-based $\Phi(\rho,z)$ and standardless P/B-ZAF analysis. Additionally, you may also choose thin film analysis or Cliff-Lorimer for TEM and thin film.

Individual result presentation with the ESPRIT Report Editor

Simply add spectra, line scans, mappings, images or analysis results to your report with the according function of the I/O menu. When you activate the Report Function, you will find a pre-formatted document containing everything you have added. Change the formatting, print it, send it to Word for additional processing or inclusion in other documents – you have the choice and also the according functions at hand.

Impressive analytical functions



HyperMap of a vanadium oxide crystal (blue) deposited on quartz, sample courtesy of Paul Drude Institute, Berlin, Germany.

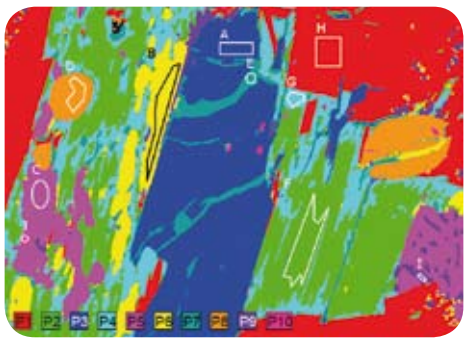
The exceptional performance of our detectors and signal processing units has made a whole range of new applications possible.

Enhanced HyperMap with new extensions

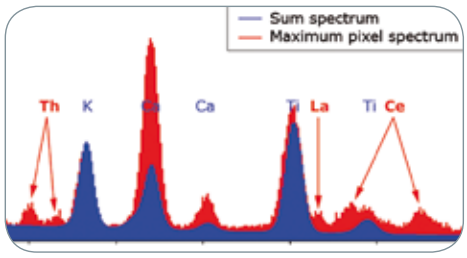
HyperMap is Bruker's version of PTS. While it already sets standards through its impressive speed and energy resolution, this function now includes additional features to gain further valuable information on sample composition.

PTS

This is the abbreviation for position-tagged spectrometry, a method developed by our predecessor company Princeton Gamma-Tech. It functions similarly to mapping, with one important difference: a complete spectrum is acquired and stored for each pixel of the mapping. This allows offline analysis from the database, even long after the specimen has been archived.



Autophase image of a polished granite section, sample courtesy of Musuem of Natural History, Berlin, Germany.



Maximum pixel spectrum (red) of the above sample, showing traces of thorium, lanthanum, cerium not visible in the sum spectrum (blue).

Effortless phase determination with Autophase

Autophase is a very efficient feature for obtaining phase information from HyperMaps: It lets you see, which phases are present in your sample at a glance.

Maximum Pixel Spectrum, the method to find element traces

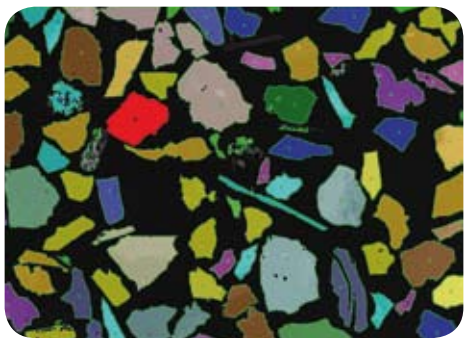
This method was originally developed by NIST (USA). It synthesizes a spectrum by determining the highest count value in each channel of all spectra in the HyperMap. This way you can find trace elements, even if they are contained in only one single pixel.

Fast feature analysis

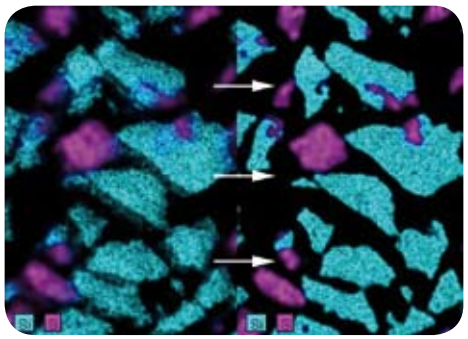
Our new integrated feature (particle) analysis determines geometric and compositional data of particles within a field of view. It includes color-coding for easy visualization.

Drift correction

Especially at high magnifications images tend to move. This leads to distorted images and mappings. ESPRIT's powerful drift correction removes the shift and produces clear images and maps.



Feature analysis of ground and embedded ore particles: Measured objects are color-coded with respect to classification results.



The effect of drift correction on the quality of a mapping.

QUANTAX systems

QUANTAX model	200	400	800	QUAD
Short description	Entry level modular EDS system	Universally applicable modular EDS system	High-end modular EDS system	Top of the range 4-channel EDS system
Available detectors	XFlash® 5010 XFlash® 5030	XFlash® 5010 XFlash® 5030	XFlash® 5010 XFlash® 5030	XFlash® QUAD 5040

ESPRIT software

Module	Description
Spectrum	Spectra acquisition, element identification
Quant	Automatic standardless quantification
EQuant	Extended spectrum analysis options
UQuant	User defined quantification strategies
HSQuant	Combined Φ(ρ,z) and standardless analysis
CLQuant	Cliff-Lorimer quantification
SpecMatch	Spectrum matching, search similar spectra
Scan	Image acquisition
ColorScan	Colored element images
SEMLink	Data communication with microscope
Vision	Digital image processing and enhancement
MultiPoint	Automatic multi-point and object analysis
Line	Spectrum data based line scan
QLine	Quantitative line scan

Module	Description
Map	Ultra high speed digital X-ray mapping
QMap	Quantitative mapping
HyperMap	Mapping with hyper spectral database
MaxSpec	Element trace determination for HyperMap
DriftCorr	Correction of specimen drift
Project	Data management and filing system
Report	Result presentation and report generation
User	Multi-user operation and administration
LAN	Client/server architecture
Support	Application support and remote diagnosis
StageControl	Motorized stage control
JobControl	Automatic task processing
AutoPhase	Automatic phase analysis
Feature	Feature analysis (optionally automatic)

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