BRUKER

Bruker Nano

M4 TORNADO

- High performance micro XRF spectrometer

think forward

µ-XRF

M4 TORNADO – setting standards in µ-XRF

25 µm SpotSize	High spatial resolution through X-ray optics for smallest spot sizes
Turbo Speed Stage	TurboSpeed X-Y-Z stage for distribution analysis „on the fly", aided by high quality sample imaging with variable magnifications
DuoTube Excitation	Flexible excitation by optional use of two X-ray tubes and up to 6 filters
XFlash® Technology / Multi Detector	Ultra fast spectrum acquisition with XFlash® Detector Technology, additional speed improvement through use of multiple detectors
M-Quant / M-Coat	Precise quantification of bulk material using standardless models, accurate analysis of multi-layer coatings
EasyLoad Chamber	Evacuable sample chamber with EasyLoad function

µ-XRF is the method of choice for non-destructive elemental analysis of inhomogeneous, irregular shaped samples or even of small pieces or inclusions with high sensitivity. The concentration of excitation radiation on smallest sample areas using capillary X-ray optics permits analysis with excellent spatial resolution at a high speed. All types of materials can be analysed with minimum or even without any preparation at all.
The M4 TORNADO is a combination of new technologies to offer the best analytical performance and easy control for users of all levels.

Sample handling

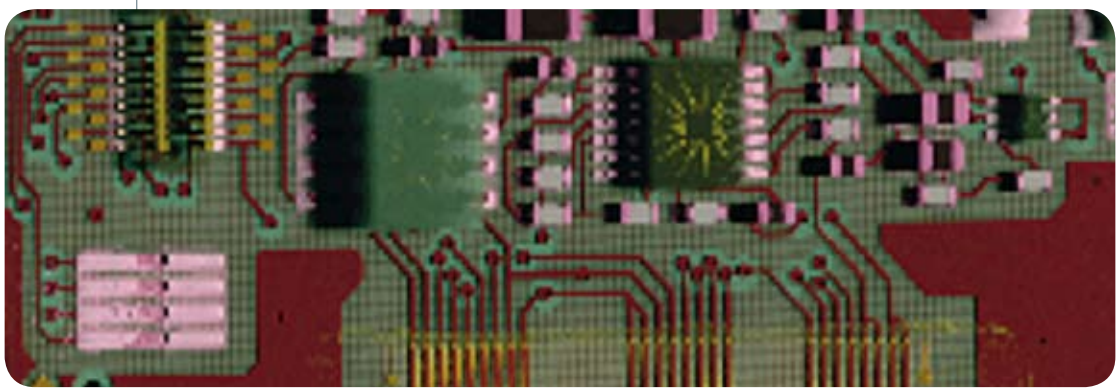
The evacuable chamber with motorized door, EasyLoad function and autofocus allows fast and exact sample positioning. This is aided through a simultaneous sample view in two variable optical magnifications (overview and details of analysis area). The large sample chamber accommodates a wide range of sample sizes. Repetitive measurements are possible with user generated X-Y-Z stage programs.

Excitation

X-ray tubes with highest brilliance in combination with capillary X-ray optics warrant highest excitation intensity in very small spots. The excitation spectrum can be optimised for the analytical task using tube filters and simultaneous application of two X-ray tubes with different target materials.

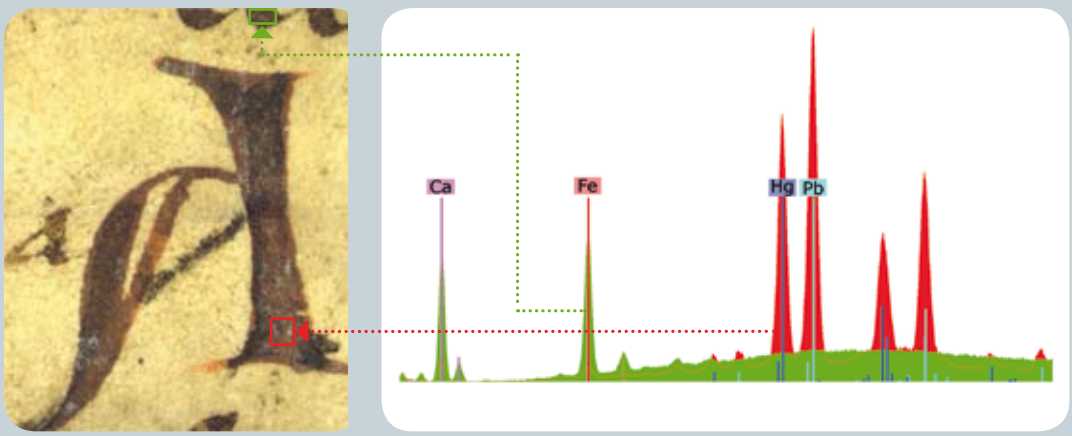
Detection

Latest model XFlash® Detectors with large sensitive area and best energy resolution allow detection of fluorescence radiation with highest count rate capability and without liquid nitrogen cooling.



RoHS compliance measurement

performed on a PCB. The mixed element map displays the elements Br (green), Cu (red), Au (yellow), Pb (white) and Sn (pink). Original size of the map: 250 x 75 pixels, measurement time: 0.15 s per pixel.



Writing on a piece of medieval parchment

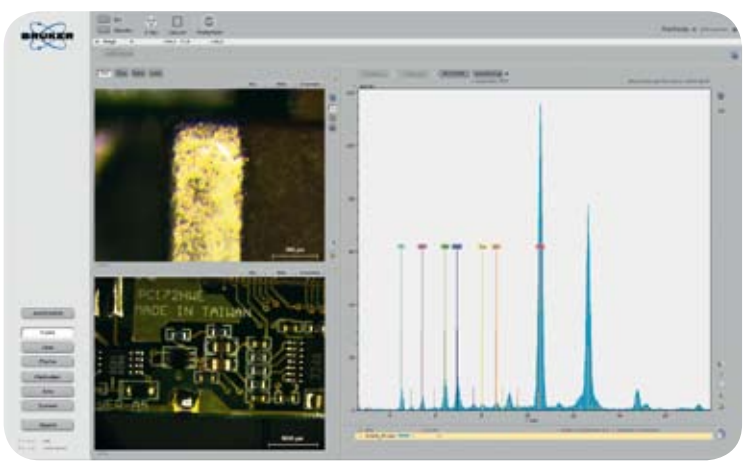
The video image shows a section of 11 x 14 mm. Analyses were performed on the two highlighted areas. The spectra show that different types of ink were used. The green spectrum represents an iron gall ink, the red spectrum relates to a reddish Indian ink.

Distribution analysis

The TurboSpeed X-Y-Z stage in combination with measurement „on the fly" provides fast distribution analysis. The HyperMap software saves complete spectra from every measuring point for later data evaluation.

Quantification

Quantification of every sample type using standardless or standard-based quantification models.



Technical data

M4 TORNADO

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Sample types	solids, particles, liquids, layer systems
Sample chamber size	W x D x H: 600 x 350 x 260 mm
Stage size	W x D: 330 x 170 mm
Measurement media	Air / oil free vacuum, ready for measurement within 100 s
Sample travel	
Max. travel	W x D x H: 270 x 240 x 120 mm
Travel speed	up to 100 mm/s due to the TurboSpeed stage
Excitation	High brilliance X-ray tube with capillary X-ray optics, optional: Simultaneous use of two tubes
X-Ray tube parameters	
Target material	Rh, optionally: Mo, Ag, Cu, W
Voltage	50 kV, 800 µA
Spot size	Less than 30 µm for Mo-K
Filter	Up to 6 filters, according to customer requirements
Detection	XFlash® Silicon Drift Detector, optionally simultaneous use of up to 3 detectors
Detector parameters	
Sensitive area	10 mm², optionally 30 mm²
Energy resolution	better than 125 eV, 135 eV (respectively) for 250,000 cps
Instrument control	State-of-the-art PC, operating system Windows XP or Vista
Instrument control functions	Complete control of tube parameters, filter, optical microscopes and sample illumination, sample positioning
Spectra evaluation	Peak identification, artifact and background correction, peak area calculation, quantification by standard-based and standardless models for bulk samples and layers systems
Distribution analysis	Measurement „on the fly", HyperMap capability
Result presentation	Quantification results, statistical evaluation, element distribution (line scan, mapping)
Power requirements	10 – 240 V (1P), 50/60 Hz
Dimensions	W x D x H: 815 x 680 x 580 mm, 130 kg
Quality & safety	DIN EN ISO 9001:2000, CE certified, Fully radiation protected system; radiation < 1 µSv/h

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