AZtecWave Software

WDS detection and EDS speed with AZtec accuracy and accessibility

AZtecWave Combines the high spectral resolution of WDS using the Wave Spectrometer, to **resolve X-ray peaks** and **quantify minor and trace elements**, with the speed and flexibility of EDS. EDS and WDS are fully integrated in the AZtec software, guaranteeing maximum accessibility to users with all experience levels.
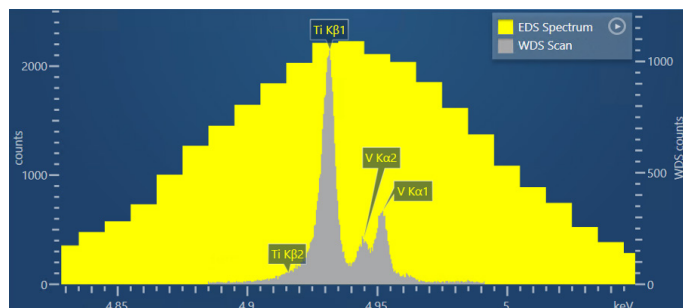
When microanalysis is at its most challenging, AZtecWave provides accurate answers, fast - solving testing applications in metallurgy, geology, electronics, ceramics, semiconductors, batteries, and many other fields.

WDS Scan of Ti and V X-ray peaks that overlap in the EDS spectrum (Ti Kβ = 4.931 keV, V Kα = 4.949 keV)

Wave WD spectrometer and Ultim Max EDS detector

New levels of accuracy and sensitivity

- Harness the high spectral resolution of the fully focussing Rowland circle Wave Spectrometer to extend the capability of the SEM beyond the limits of EDS

- Be certain of element identification, particularly where elements overlap in the EDS spectrum

- Detect and quantify trace elements, with WDS detection limits down to tens of ppm (e.g. Si Kα = 9 ppm, Fe Kα = 15 ppm)

- Determine accurate composition of all elements (Be-Pu) at all concentration levels (major-trace)

- Combine accurate measurement of major elements using EDS (powered by Tru-Q®) with measurement of trace elements and/or heavily overlapped elements using WDS

Accessible to all users

- Fully integrated workflows designed to optimise combined EDS and WDS acquisition

- Ease of use features include inbuilt Wave spectrometer performance checks, step-by-step instructions and embedded help videos

- Unique technology automatically optimises WDS (+EDS) setup and analysis, guaranteeing fast and accurate results for all levels of user

- Controls to evaluate and optimise beam current, count time and predicted precision before quantitative analysis
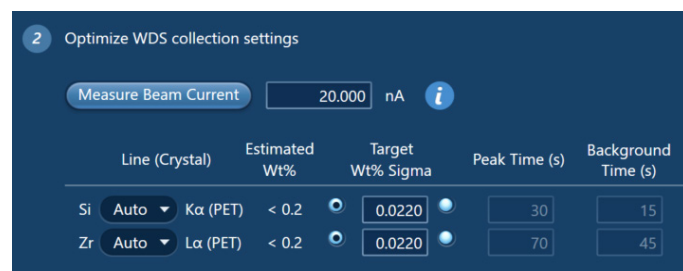
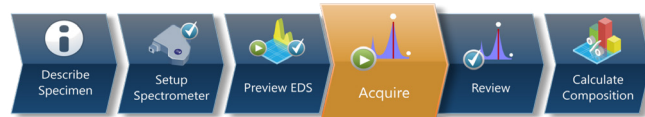Optimisation of WDS collection settings for quantitative analysis

- Review and assess potential WDS scan quality with the selected settings prior to analysis

- Flexible, manual control for experienced users
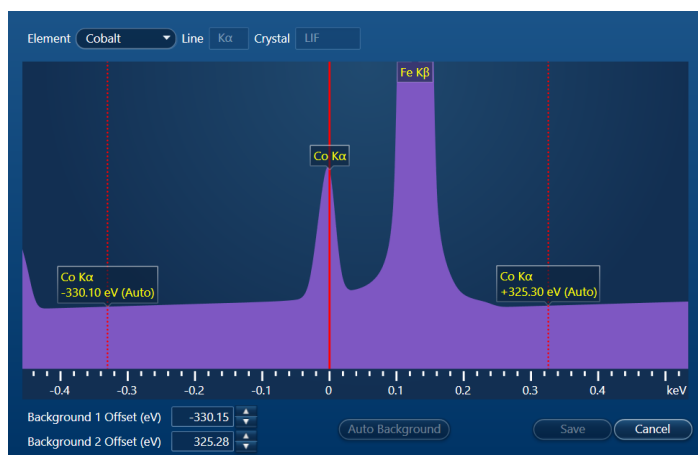
Wizard for checking or manually selecting WDS background positions

Quantitative X-ray Analysis

- Integrated WDS and EDS quantitative analysis in a dedicated navigator with a guided workflow

- AZtecWave technology uses EDS and SEM system information to generate a simulated WDS spectrum and automatically select/optimise:

  o Peak and background counting times

  o X-ray line (WDS) and line series (EDS)

  o Diffracting crystal

  o WDS background positions

  o EDS detector position

  o EDS acquisition settings

- Acquisition timeline estimates the WDS analysis time and shows the status of the Wave spectrometer as the analysis proceeds

- Flexible options allow additional WDS acquisitions or EDS spectra to be added to an existing analysis point

- Includes a dedicated step for viewing and interrogating WDS – EDS quantitative data for single or multiple acquisitions

Accurate for all elements

- All common overlapping element lines are separated (e.g. transition metal K lines) due to the high spectral resolution provided by the Rowland circle Wave spectrometer (EPMA-type)

- The optimum X-ray lines are always available for analysis (Wave max. energy range = 0.07 – 15.33 keV)

- AZtecWave WDS integrates seamlessly with EDS and the AZtecLive Tru-Q spectrum processing technology that delivers high quantitative accuracy at high EDS count rates of up to 400,000 cps

- Brings electron microprobe (EPMA) - like performance to the SEM

Quant Results View

Powered by Tru-Q®

| Element	Signal Type	Line	Apparent Concentration	k Ratio	Wt%	Wt% Sigma	Factory Standard	Crystal
Al	WDS	Kα	0.01	0.00005	0.0149	0.0094	No	TAP
Si	WDS	Kα	0.25	0.00251	0.4957	0.0139	No	PET
Ti	WDS	Kα	0.45	0.00448	0.4214	0.0141	No	PET
Cr	EDS	K series	21.26	0.21261	18.8430	0.0521	Yes	
Mn	WDS	Kα	0.98	0.00980	0.9974	0.0304	No	LiF
Fe	EDS	K series	67.96	0.67958	70.0146	0.1148	Yes	
Co	WDS	Kα	0.01	0.00009	0.0095	0.0183	No	LiF
Ni	EDS	K series	7.81	0.07809	8.7443	0.0611	Yes	
Total					99.5407			

Un-normalised quantitative result for a steel determined by a combination of EDS and WDS
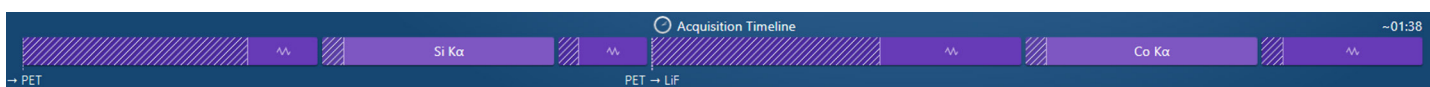
Acquisition timeline for quantitative WDS analysis

Qualitative Spectrum Scanning

- A dedicated workflow for acquiring high spectral resolution WDS scans – providing positive visual identification of the elements present in a sample

- The scan range for can be easily entered using the spectrum swipe tool, or element X-ray line(s) of interest can be chosen

- Based on the selected energy range, AZtecWave technology automatically selects the optimal crystal(s), slit size(s), slit position(s) and dwell time

- A theoretical WDS scan is shown prior to acquisition, enabling settings to be assessed and adjusted before pressing start

- Dwell times can be set between 0.005 and 50 s allowing major through to trace elements to be identified

- Multiple WDS scans and EDS spectra can be reviewed and compared in a dedicated window
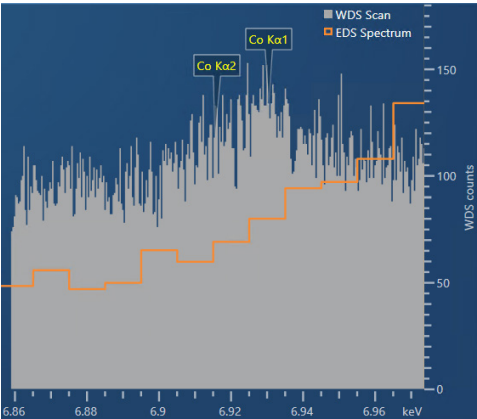
Comparison of EDS spectrum and WDS scan of Co K peaks obtained from a superalloy sample containing 0.1 wt% Co

| AZtecWave	
Quantitative X-ray Analysis	✓
Qualitative Spectrum Scanning	✓
X-ray Mapping	✓
Point Automation of WDS and EDS Acquisition	✓ (option)
WDS Standardisation	✓
Guided Spectrometer Setup	✓
Image Registration	✓ (option with software upgrades)
SEM Beam Stability Monitoring	✓
Association of WDS and EDS	✓
WDS Spectrum Simulation	✓
Guided Sample Exchange	✓
Guided Spectrometer Shutdown	✓
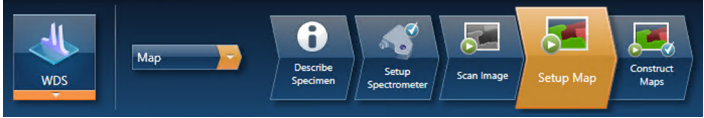
Guided workflow for X-ray mapping

X-ray Mapping

- A guided workflow for collecting elemental X-ray maps using a combination of WDS and EDS

- One or more elements can be mapped using WDS and simultaneously acquired/combined with element maps collected using EDS

- The optimal WDS diffracting crystal(s) and X-ray line(s) are automatically selected for the map acquisition

- Multiple frame mapping can be conducted with pixel dwell times ranging between 100 and 65,000 µs - for effective mapping of major through to trace elements

- WDS and EDS elemental maps can be overlain with associated electron images

- Includes a flexible option to add additional X-ray map(s) to an existing map set

WDS Standardisation

- Guided workflow for calibrating on standard reference materials to ensure accurate quantitative elemental analysis

- Optimised acquisition conditions calculated automatically by the AZtecWave technology

- Details of blocks* containing 37 and 55 standard reference materials are pre-loaded for simple setup and analysis

- Association of beam current measurement with EDS count rate for calculation of un-normalised combined EDS-WDS results

*option
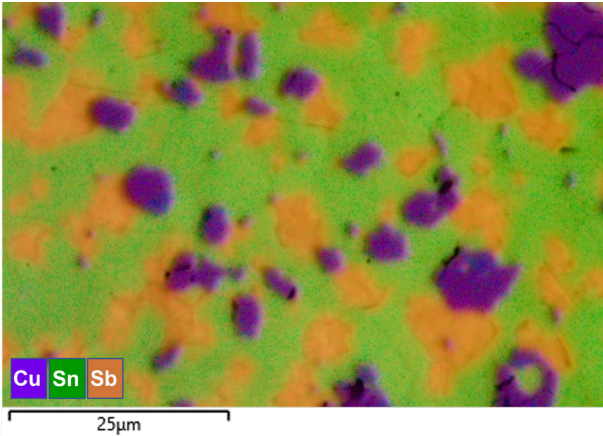
WDS element maps acquired from a babbitt alloy overlaid on a secondary electron image
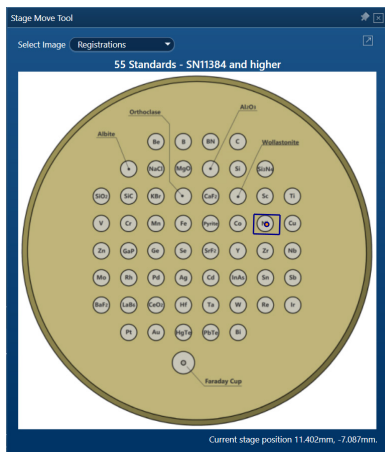
Registered image of 55 standard block for easy navigation

Guided Spectrometer Setup

Setup Spectrometer

- Step by step workflow for Wave spectrometer setup and performance check

- Designed for inexperienced operators

- Ensures safe operation

Step by step instructions for setting up the gas supply to the Wave spectrometer

- Enables rapid system setup

- Guarantees optimal spectrometer performance

- A performance test report can be generated if required (e.g. for accredited facilities)

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