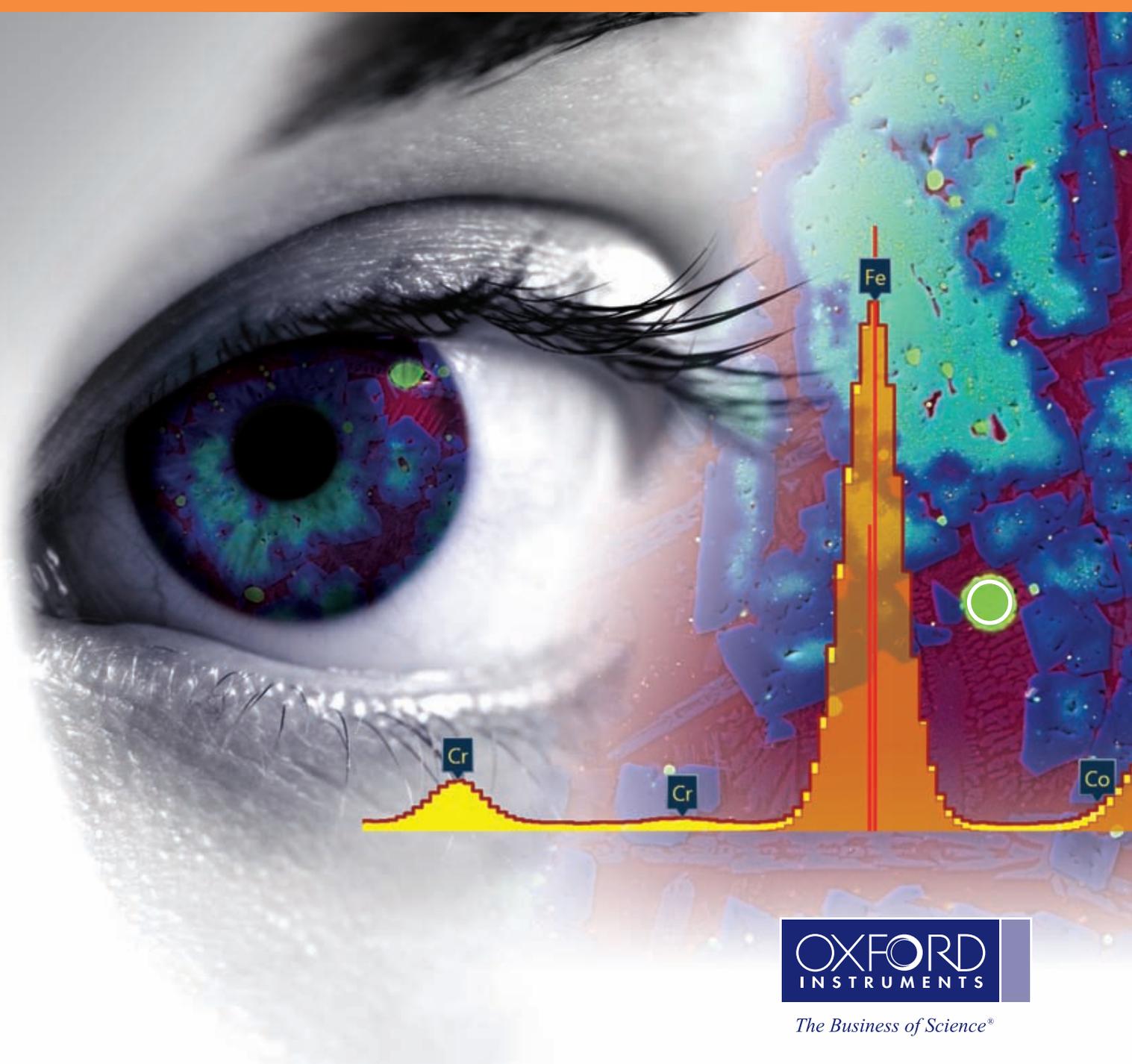


# EDS

## AZtecEnergy

### EDS Acquisition and Analysis

...the ultimate EDS System



**OXFORD**  
INSTRUMENTS

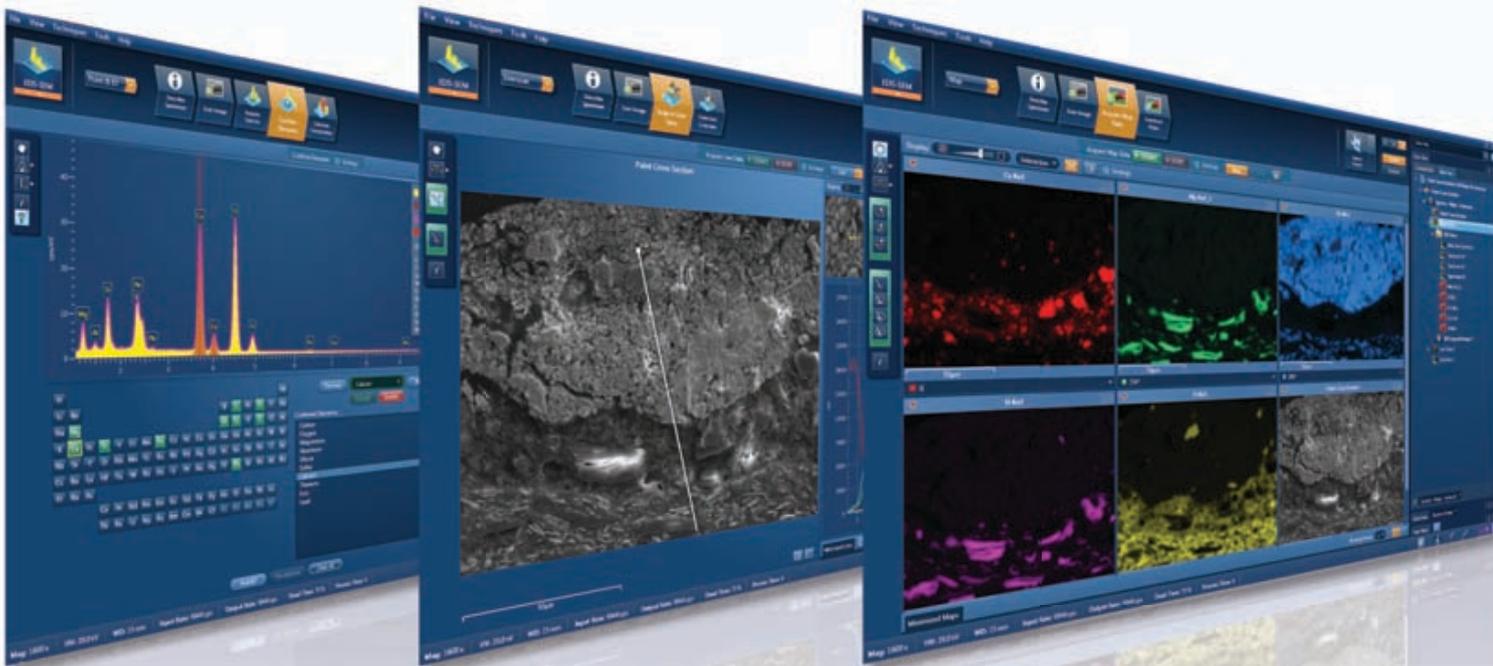
*The Business of Science®*



# AZtecEnergy

The most powerful, the most flexible EDS system you'll ever see

# EDS



**AZtec** integrates **AZtecEnergy** acquisition and analysis software with Oxford Instruments' **X-Max<sup>N</sup>** and **x-act** ranges of SDD detectors to create the ultimate materials characterisation system.

**AZtec** combines unrivalled speed and accuracy of results for routine analysis, with the flexibility and power required for applications that push the frontiers of the EDS technique.

Developed by the market leader with global customer support and over 40 years experience in nanoanalysis, **AZtec** meets the ever more challenging requirements of analysis at the nanoscale.

Acquire data and report results in seconds using

**AZtec** and **X-Max<sup>N</sup>**

**A-Z** technology for nanoanalysis



## AZtecEnergy

At a glance...



### Powerful

- **AZtec** has a host of new tools and technologies that will transform the way you get results and enable everyone to see 'The Real Picture'

### Flexible

- Whatever your level of expertise, **AZtec** will be there to guide you from start to finish or give you the tools to explore in your own way

### Fast

- Every feature of **AZtec** has been optimised with speed and productivity in mind, for consistently accurate real-time results

### Accurate

- New Tru-Q technology takes standardless analysis to the next level and ensures that **AZtec** gives you the best 'out of the box' results

### Innovative

- A host of brand new features and novel visualisations deliver useful information to help you make decisions

### Structured

- Whatever your level of expertise, **AZtec** will assist you from start to finish with Step Notes and editable Standard Operating Procedures (SOP)

# Point&ID

## Real-time analysis for high count rate (SDD) detectors

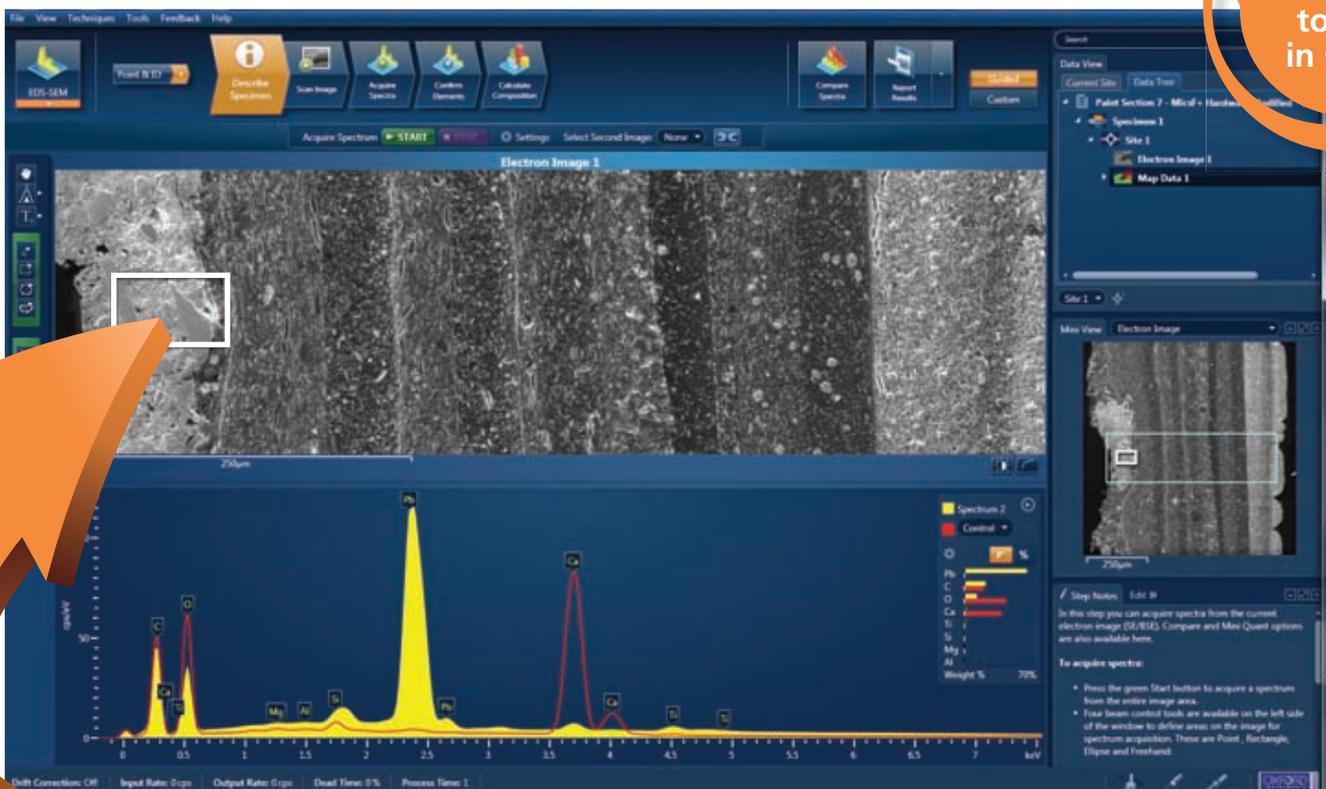
Point&ID has been designed to take advantage of the high count rates generated by the latest SDD detectors to deliver accurate specimen information in real-time.

### See the elements in a specimen and its composition instantly

- Simply select the area to analyse, then, in the few seconds required to acquire a spectrum:
  - Elements are identified using an improved version of our field-proven automatic PeakID routine
  - Composition is displayed in the unique MiniQuant using the accuracy of new Tru-Q technology
  - Annotate and e-mail results directly from the software

Acquisition starts, elements are automatically identified in real-time...

From 'Beam on' to report in seconds



Acquire spectra from point, rectangle, ellipse or freehand regions...

# ACCURATE

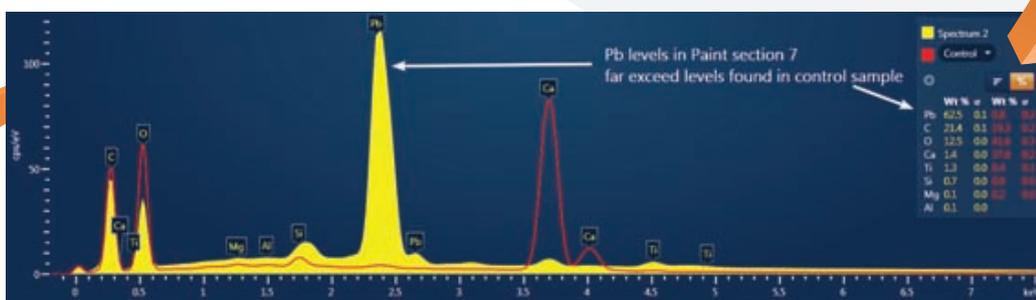
Review with  
MiniQuant...



MiniQuant shows comparison data in numerical and pictorial formats.

Everything  
in real-time

Annotate  
on screen...



...one click reporting  
to print or email direct  
from the interface.

# ACCURATE

## Tru-Q

### Providing the accuracy required for automatic real-time ElementID and Concentration Measurement

Tru-Q provides high accuracy AutoID and quantitative analysis using a unique combination of technologies.

**Only AZtec offers high quality results without the need to standardise using:**

#### QCAL

- Complete detector and hardware characterisation for true standardless analysis

#### FLS

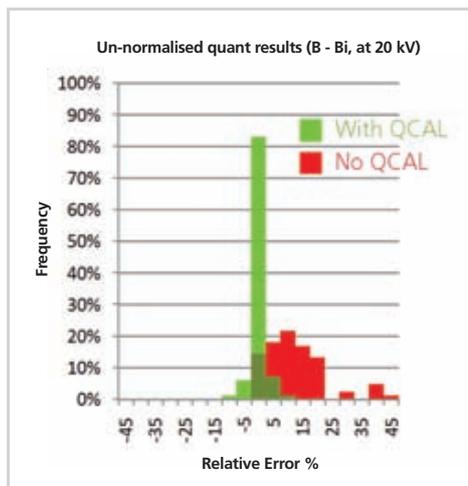
- Robust spectrum processing that works in all situations with no need for any background fitting adjustment

#### XPP

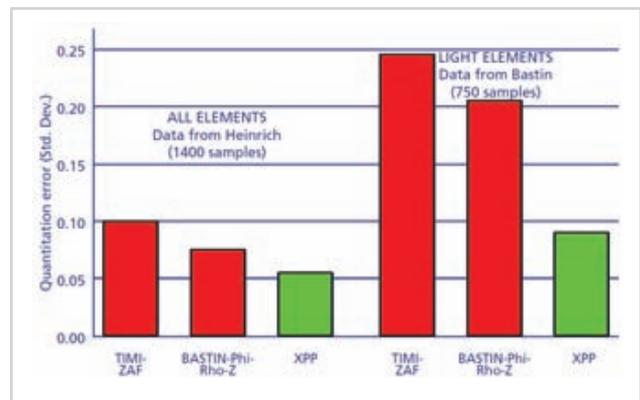
- Matrix correction with proven accuracy beyond that possible with ZAF or Phi-Rho-Z

#### Pulse Pile-up Correction (PPC)

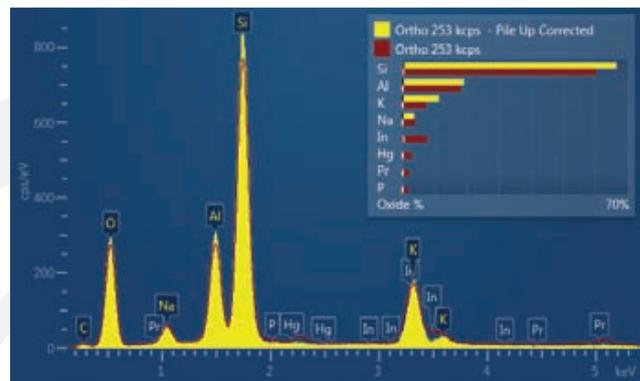
- Automatic correction for pulse pile-up at high count making accurate quant at 200,000cps a reality



Tests of un-normalised quant shows that, with QCAL, errors are reduced to less than 5% relative...a level of accuracy only previously possible using standards-based analysis.



Tests on published data show that XPP results are more accurate than older methods, particularly for light elements.



Pulse pile-up corrected spectrum collected at 250,000cps (in yellow) gives correct AutoID and composition. In comparison, the uncorrected spectrum (in red) shows misidentified peaks and quant errors.



# SmartMap and AutoLayer

Brings new levels of certainty and detail to specimen investigation

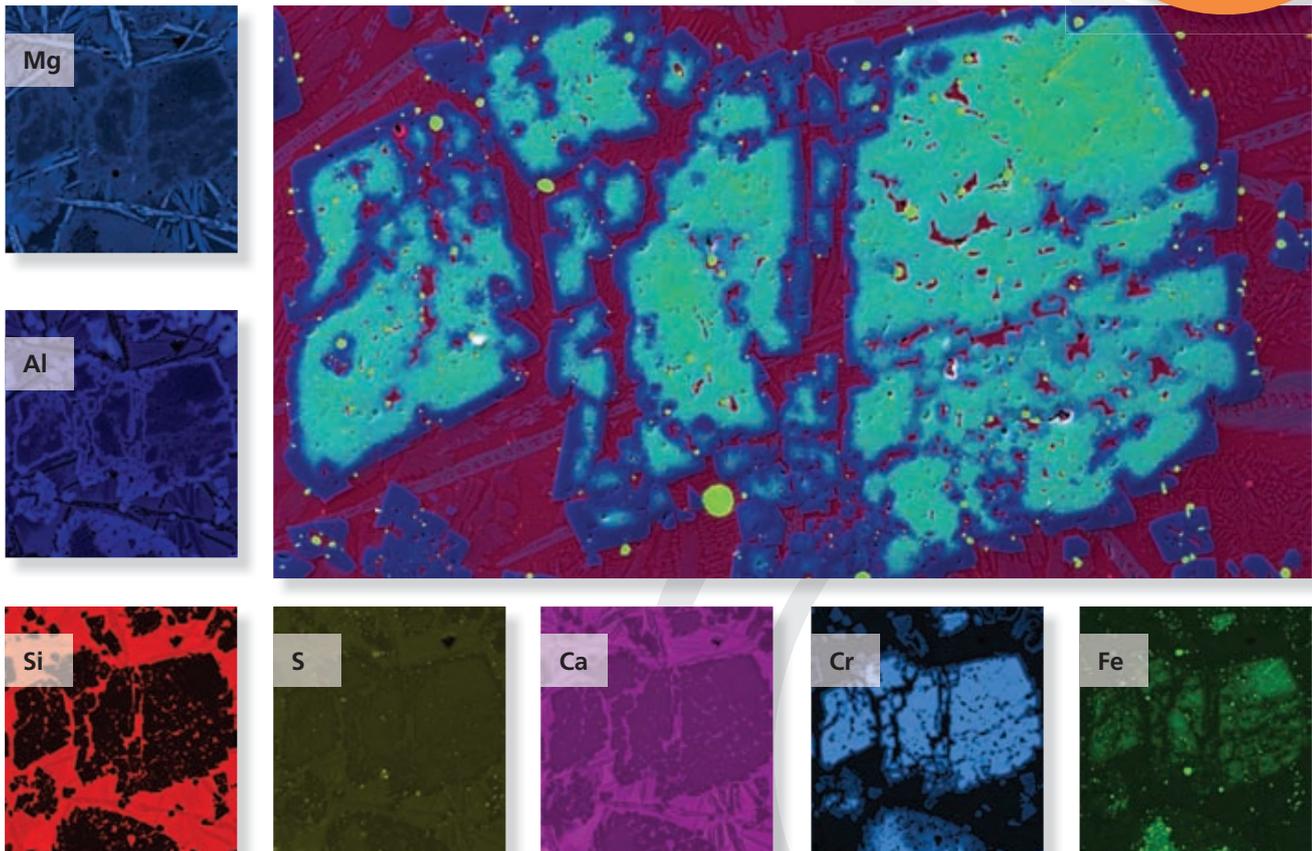
SmartMap spectral mapping brings the benefits of automatic qualitative analysis into two dimensions to identify elements and show their distributions.

## Now see how all elements are distributed in a specimen

- No specimen pre-knowledge required
- Maps for all elements identified and generated automatically
- Single Layered Image highlights chemistry and phase distribution in seconds
- Up to 4K SmartMap resolution to combine wide area and high resolution studies

Spectral Mapping should be a central tool of every EDS system, it is with AZtec

## Layered Image of a slag sample, a 4K electron image is overlaid by 4K X-ray maps



Layered Image gives complete picture of composition and phase distribution. Or view individual X-ray maps for more detailed information.



## TruMap™

Makes a complex story... Accurate

TruMap: Unique Real-time Mapping solution takes advantage of the increased counts acquired by the latest SDD detectors.

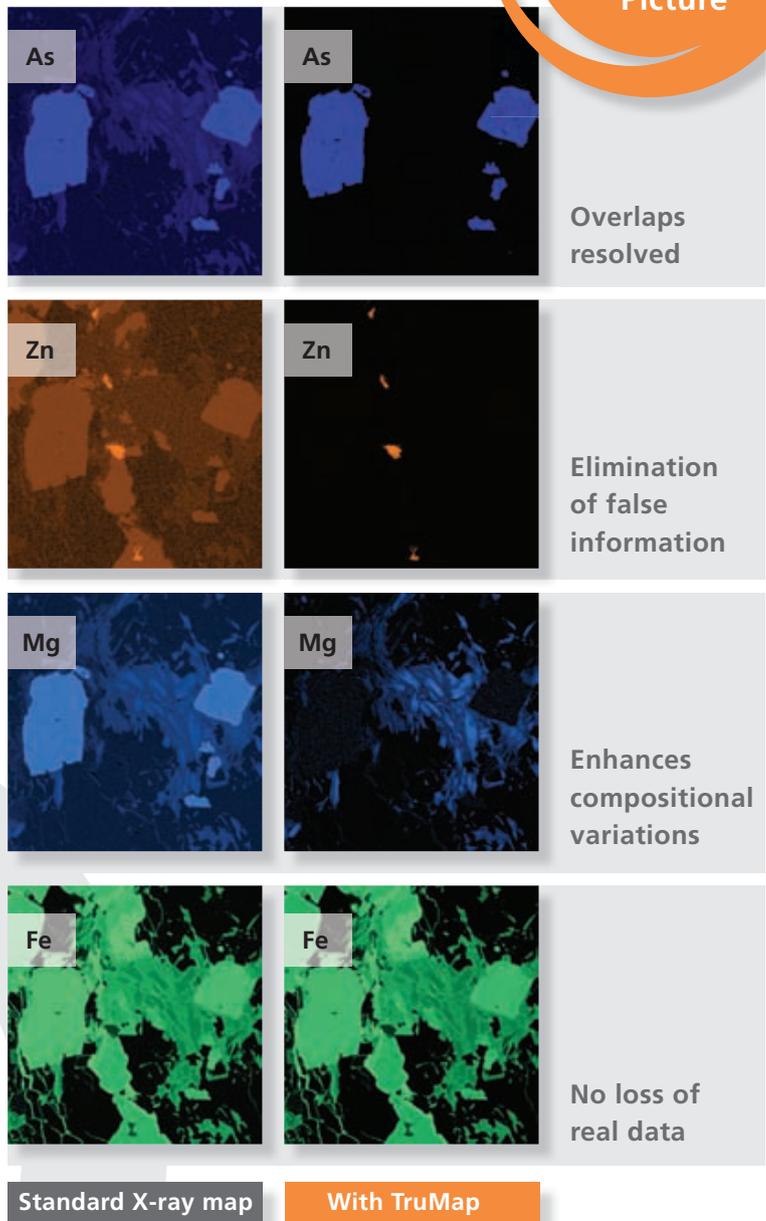
Choose the  
Right Picture  
NOT the Bright  
Picture

TruMap has been designed to really take advantage of high counts generated by latest SDD detectors offering a new level of data integrity

Now see the real element variation

- Eliminates artifacts
- Corrects element overlaps
- Removes false variations due to X-ray background
- Everything is in real-time

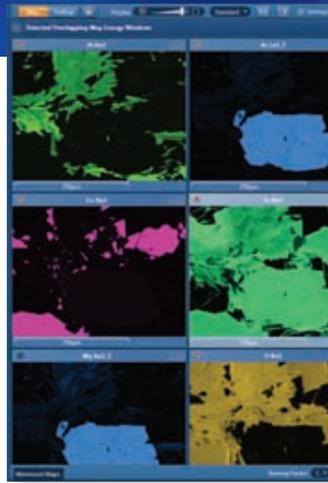
Why map any other way?



TruMap reveals real element variations in this ore specimen. Overlaps such as AsL/MgK are resolved, and variations in X-ray background seen in the Zn map are removed.

# WE FAST

## Resolves a Complex Story... Quickly



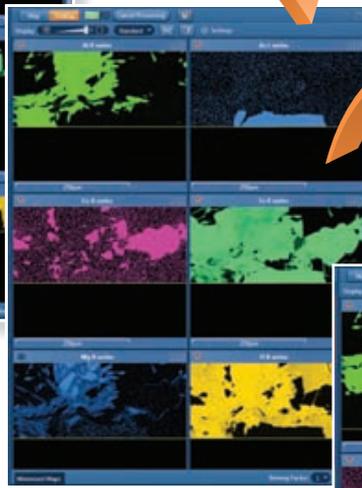
Standard mapping apparently shows identical distribution of magnesium (bottom left) and arsenic (top right).

TruMapping starts...

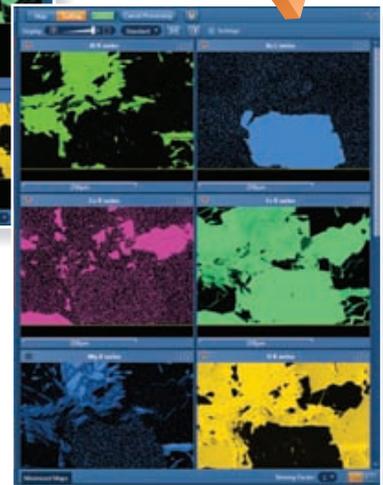
After 5 seconds...



After 10 seconds...

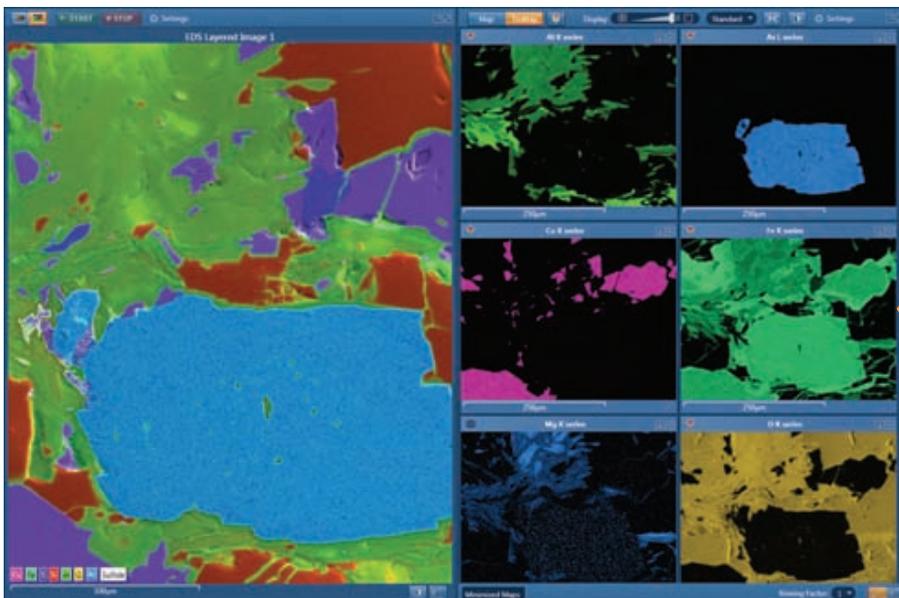


After 15 seconds...



TruMap works in real-time or can re-process stored data.

TruMap now shows the correct distribution.



Finished after 17 seconds, overlaps resolved

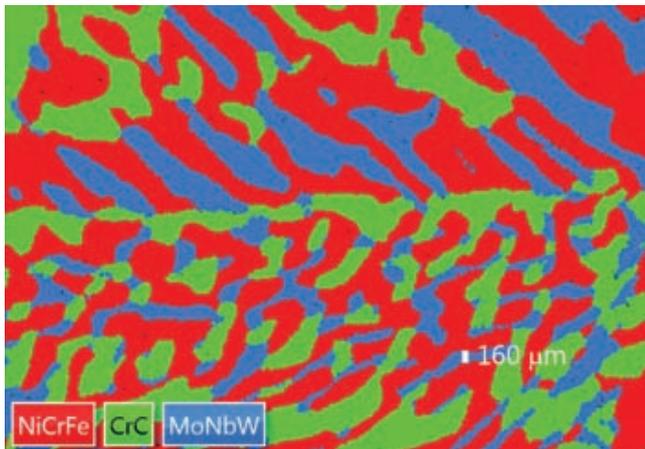
## AutoPhaseMap

### Makes a Complex Story... Complete

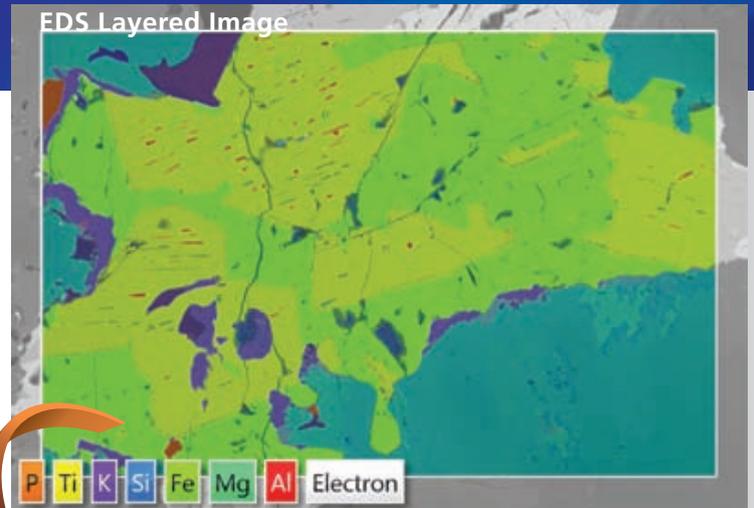
AutoPhaseMap is a new way to automatically create a phase distribution map of a specimen.

During or after acquisition, AutoPhaseMap automatically:

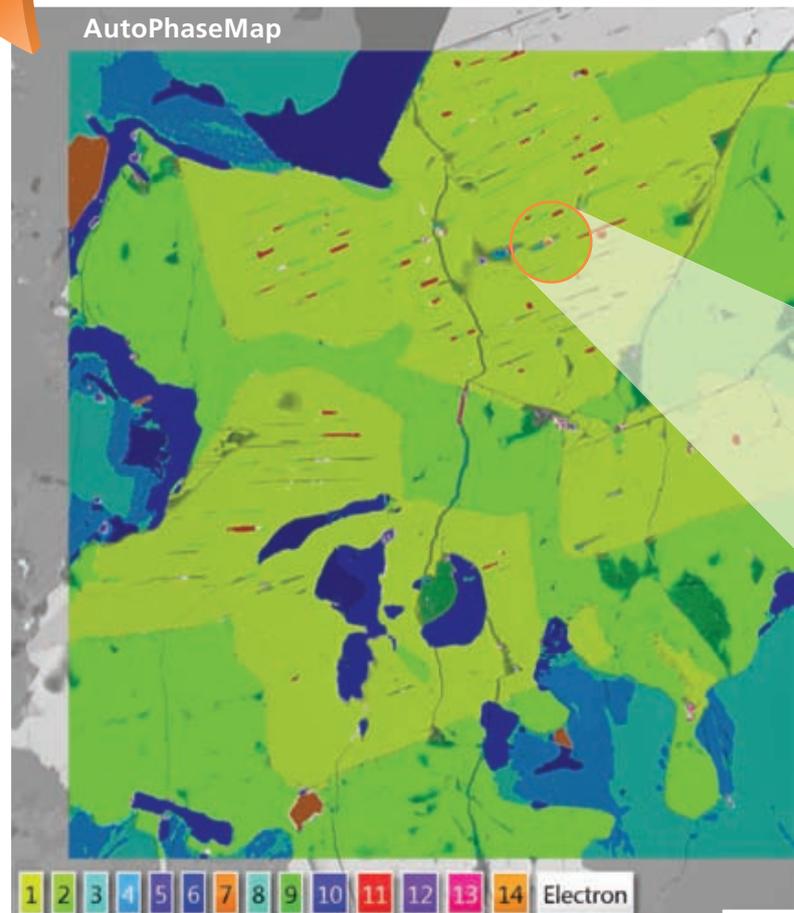
- Turns X-ray map data into Phase Map data in seconds
- Calculates and displays:
  - distribution of each phase
  - spectrum and composition for each phase
  - area fraction for each phase
- Finds phases for all size ranges, including nanomaterials
- Finds hidden phases, highlighting missing elements which are present in trace amounts



AutoPhaseMap separates phases at the nano-scale - for example, in this complex nano-structure of inter-metallics in a nickel based super-alloy.

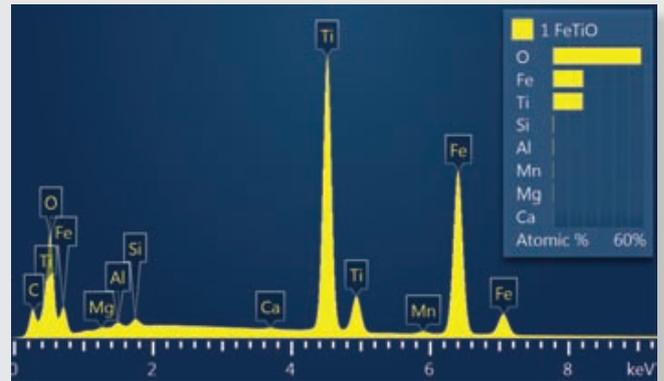


In real-time, AutoPhaseMap automatically converts element maps into Phase Maps

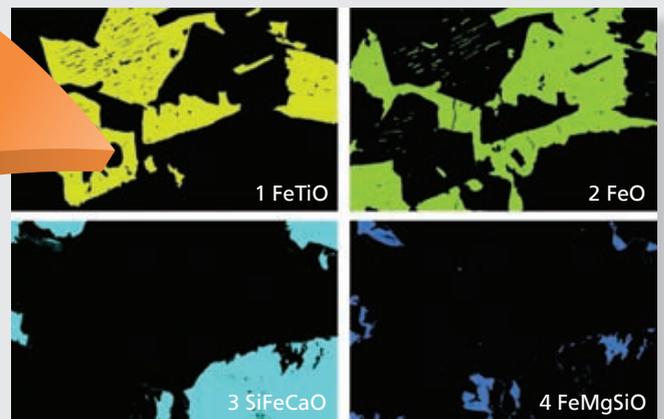


Phase Details			
Phase	Color	Fraction (%)	Pixel Count
1 FeTiO	Yellow	31.9	737,463
2 FeO	Green	32.1	740,832
3 SiFeCaO	Cyan	22.0	508,146
4 FeMgSiO	Blue	4.4	100,475
5 SiAlO	Purple	1.9	44,383
6 FeKSIO	Dark Purple	2.6	60,466
7 CaPO	Orange	0.3	7,293
8 FeCaAlSiO	Light Cyan	1.4	33,104
9 FeCaO	Light Green	1.5	33,841
10 SiAlKO	Dark Purple	0.1	2,140
11 AlO	Red	0.1	3,283
12 FeSCu	Dark Purple	0.0	408
13 FeZnS	Pink	0.0	554
14 ZrO	Orange	0.0	36

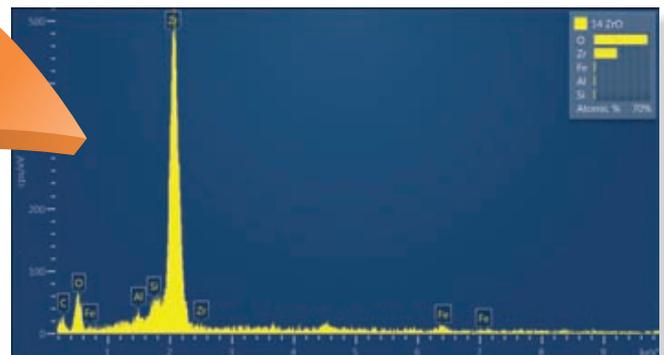
Area fraction of each phase



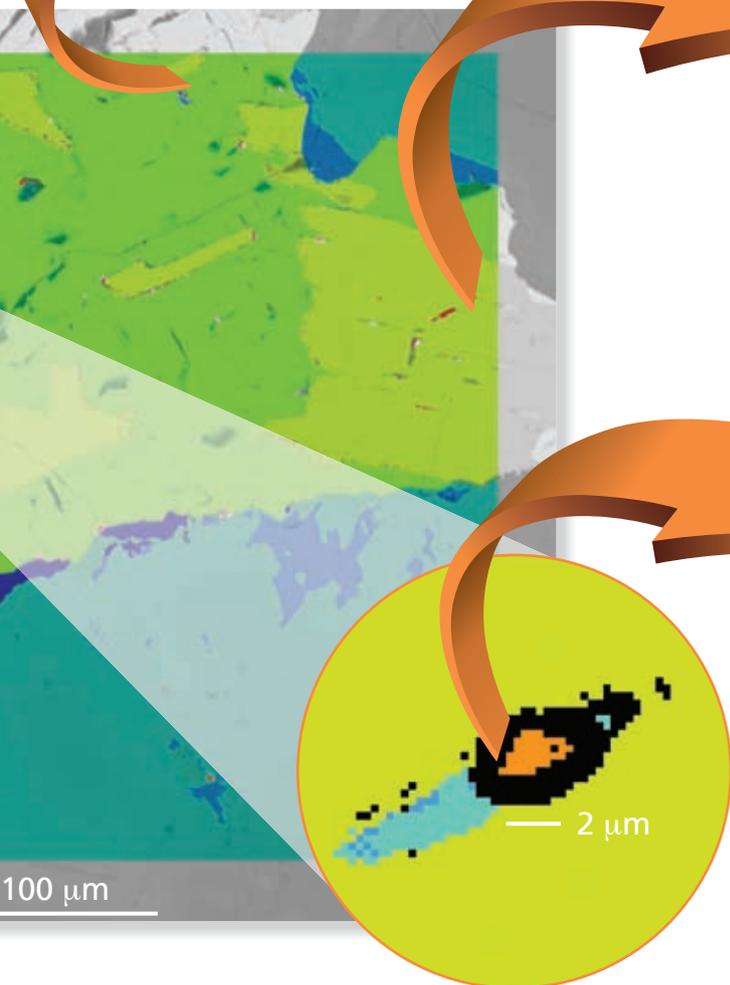
Spectrum and quant result for each phase...



Trace phases characterised...



**AZtec** finds phases present in trace amounts even when their constituent elements have not been identified during X-ray mapping. In this example, tiny inclusions of the  $ZrO_2$  mineral Baddelyite, making up less than 0.005% of the map, have been found by AutoPhaseMap even without the Zr map being present.



# LineScan, QuantLine and TruLine™

See the right line every time

LineScan:  
Visualise composition along a line.

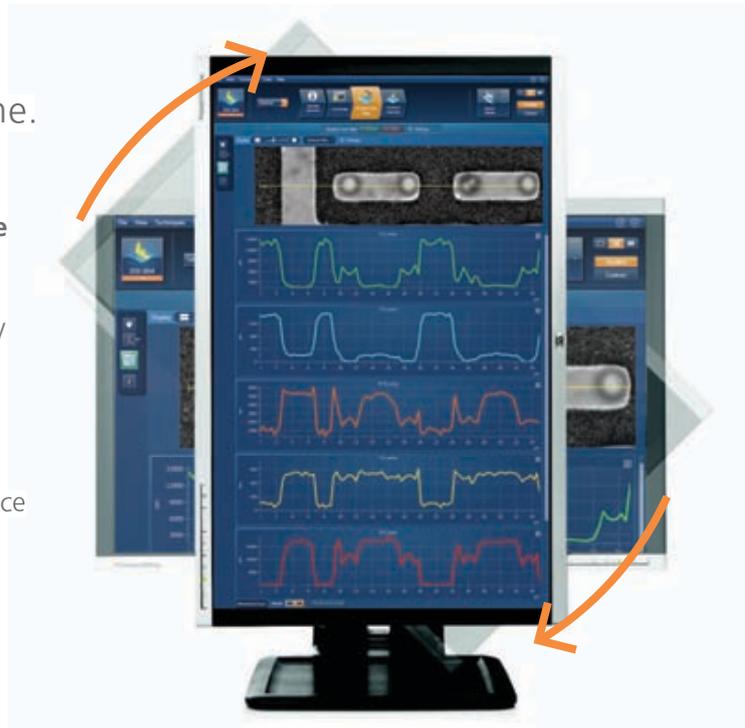
**LineScan brings the concepts of AZtec real-time acquisition and reporting to the study of linear variations**

- Visualise LineScans clearly, quickly and easily
- Flexible views make interpretation easy
- View LineScans in stacked or titled format
- Normalise display to compare major and trace element variations easily

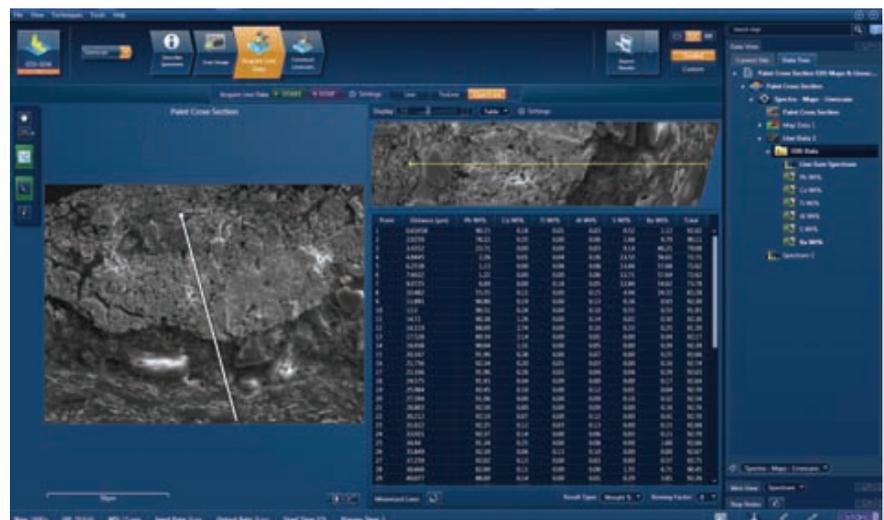
QuantLine:

**Utilise the accuracy and repeatability of Tru-Q to see quantitative element variations**

- No need to wait for lengthy data processing....see quantitative linescans live!
- View data in graphic form or as a table, with quantitative results shown in Wt% or At%
- Table of results can be exported to Excel
- Point spectra can be extracted for further, more detailed, analysis



*Rotatable monitors show LineScan information at its best – in profile rather than landscape format.*

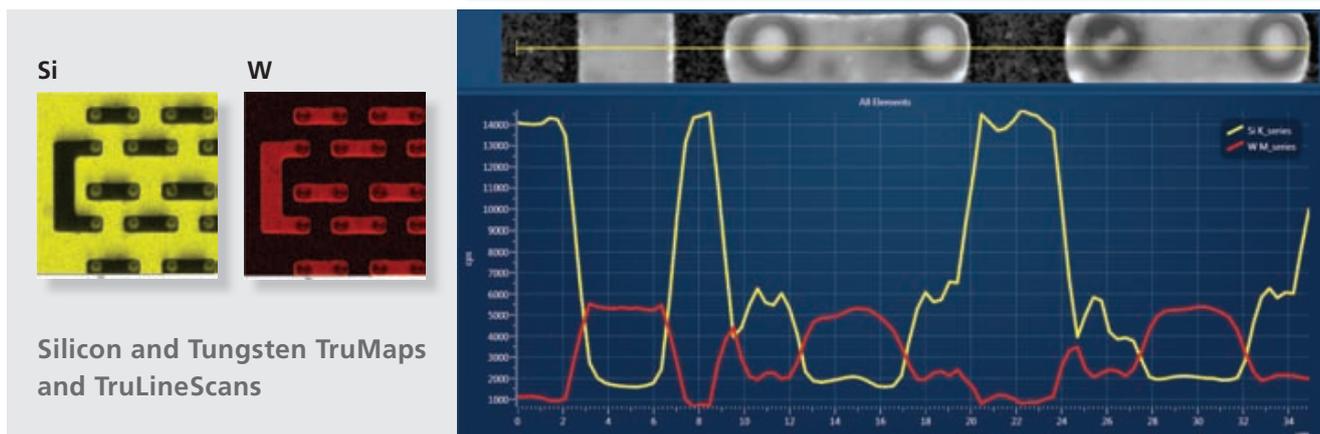
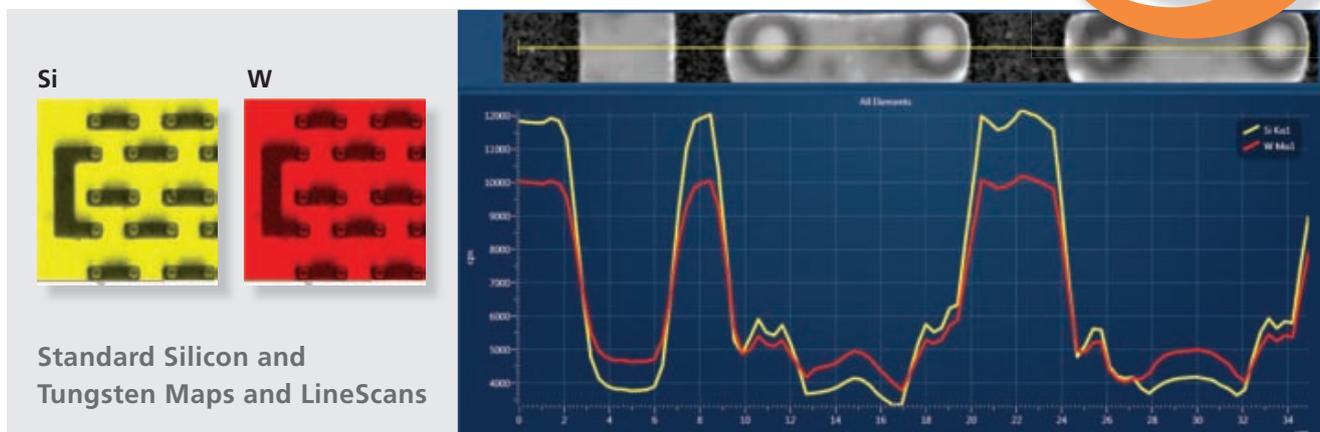


## TruLine:

**Incorporates TruMap technology ensuring that you will see real element distribution**

- Corrects for peak overlaps automatically
- Enhances real elemental differences by removing X-ray background variation
- Aligns image and LineScan for clear visual comparison
- Normalised intensity scales make comparison of major and minor elements simple

So quick,  
you will want  
to use it all  
the time



Standard X-ray Maps and LineScans indicate that Tungsten and Silicon are concentrated in similar regions of the structure, however, with TruMap technology the real positions of these elements are revealed.

## Autolock™

### Let AZtec do the hardwork

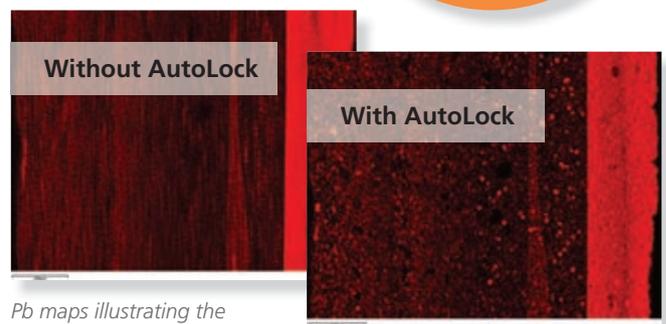
AZtec automatically corrects specimen drift so you don't have to

AutoLock provides a seamlessly integrated and powerful solution for collecting useful data when specimens drift.

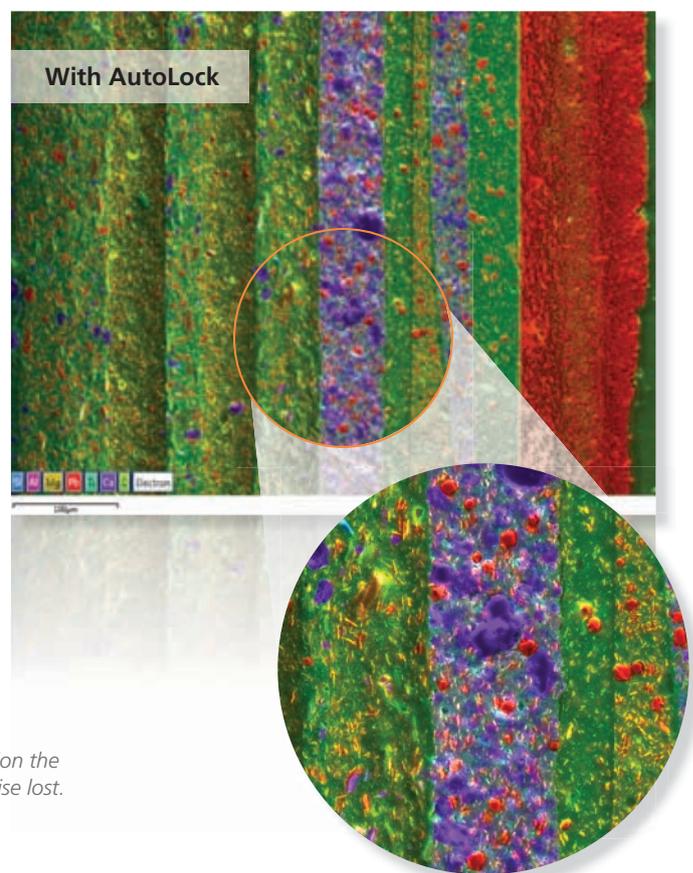
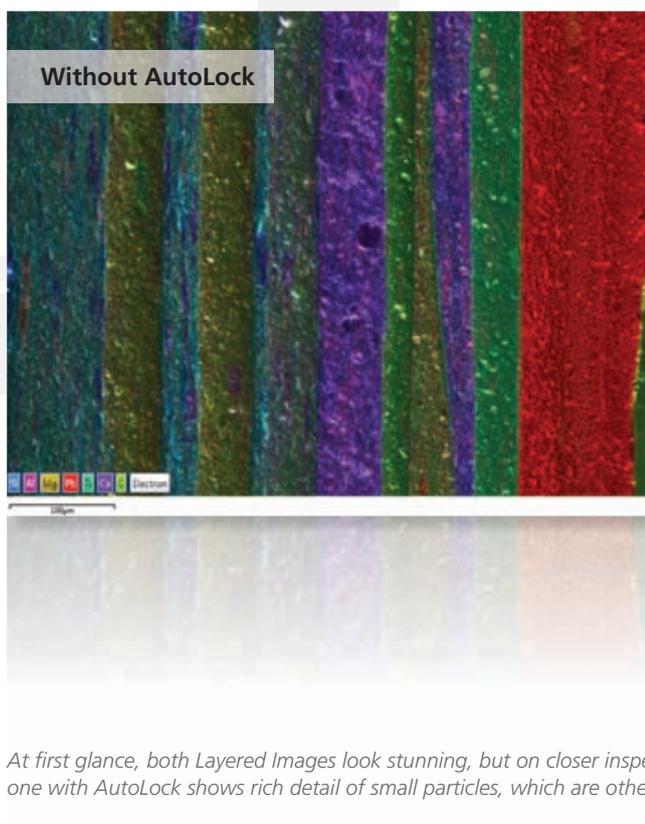
- Works in extreme situations, even on the nanoscale
- Keeps you informed about specimen drift
- Provides live updates of corrective action taken

#### Innovative

- Unique blend of predictive and reactive drift correction routines cope with different types of specimen drift



Pb maps illustrating the power of AutoLock.



At first glance, both Layered Images look stunning, but on closer inspection the one with AutoLock shows rich detail of small particles, which are otherwise lost.

# LayerProbe®

## Layer thickness and composition analysis

Seamlessly integrated into **AZtecEnergy**, **LayerProbe** complements the element and phase information gained from conventional EDS analysis by calculating the composition and thicknesses of the individual layers beneath the surface.

### Non-destructive

- Multi-layered structures are characterised from an X-ray measurement, without the need to cross-section the specimen

### High spatial resolution

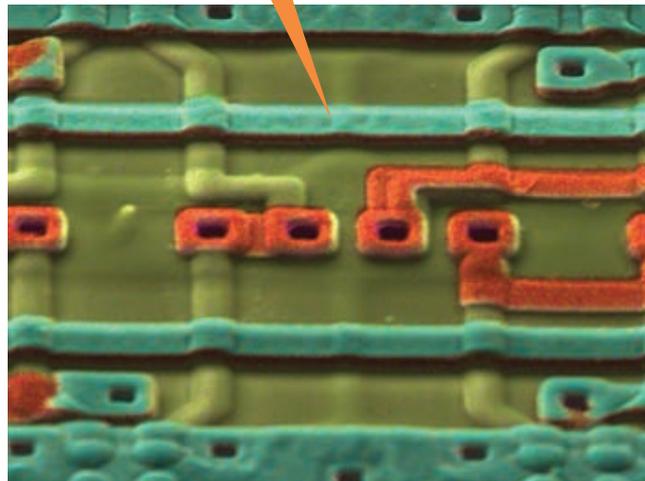
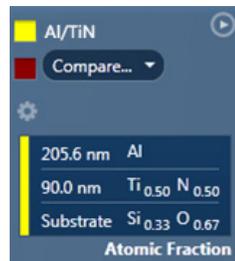
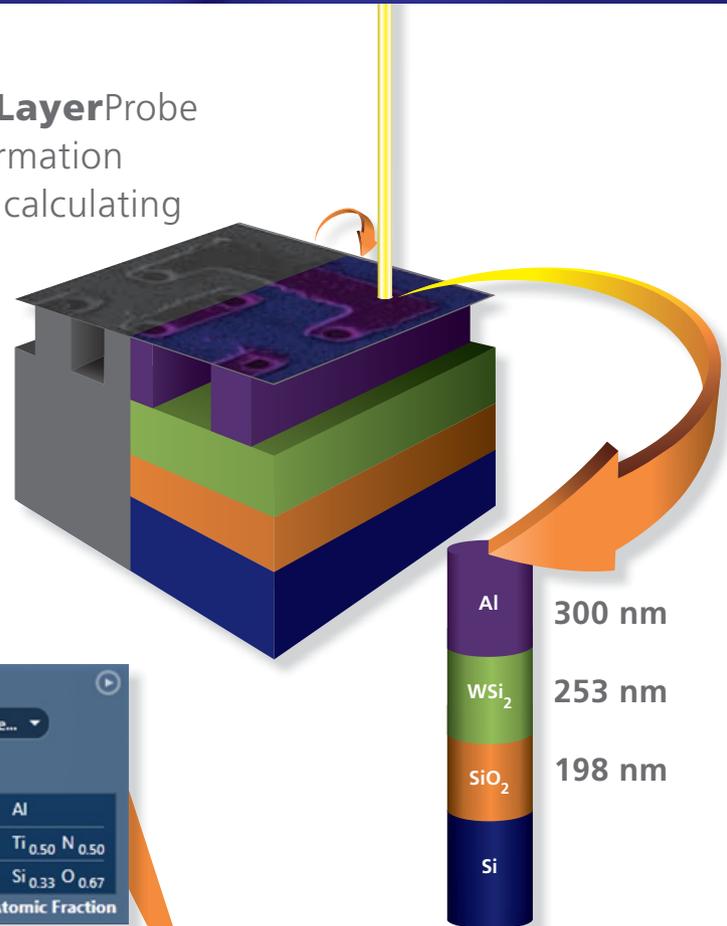
- Accurately characterises features down to 200nm wide
- Layer thickness down to the nanometre scale can be measured quickly and accurately

### Cost effective

- Cost-effective: Use your SEM as a high-performance thin film and coating analyser

### Suitable for metallic layers:

- Metallic films can be measured at thicknesses far beyond their optical transparency



Visit [www.oxinst.com/layerprobe](http://www.oxinst.com/layerprobe) to download the brochure

# STRUCTURE

## Guidance and Structure

Choose the way you want to work

**AZtec** is designed for all types of users and offers many different ways of working.

### Guided Mode

- Ideal for those who prefer a 'step by step' approach to analysis
- Each step of the Navigator has a clear purpose
- You can always see what is happening and what to do next

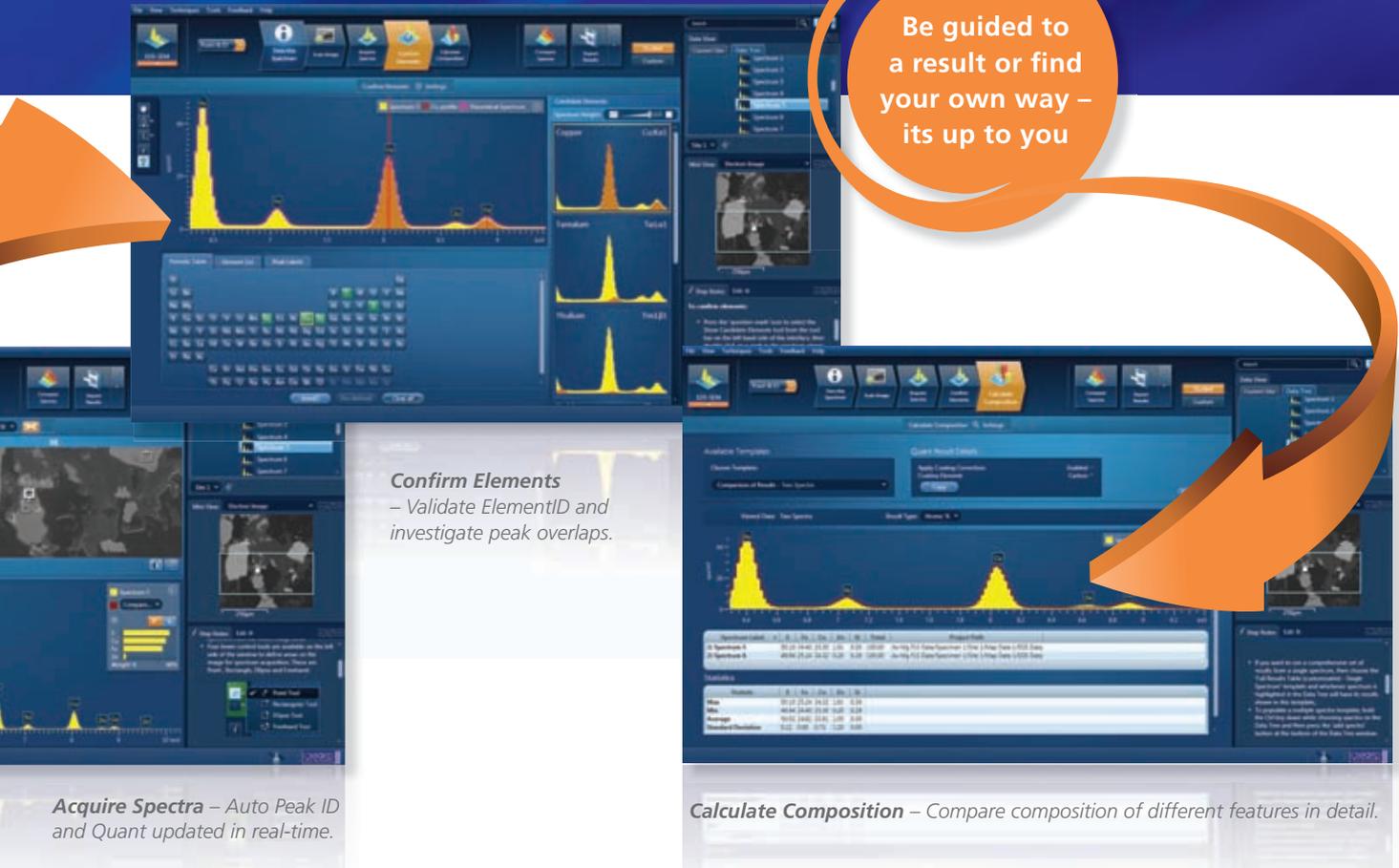


*Describe Specimen* – Record important experimental information.

*Scan Image* – Acquire electron images.



Be guided to a result or find your own way – its up to you



**Confirm Elements**  
– Validate ElementID and investigate peak overlaps.

**Acquire Spectra** – Auto Peak ID and Quant updated in real-time.

**Calculate Composition** – Compare composition of different features in detail.



## Custom Mode

- Ideal for those who prefer the freedom and flexibility to do what they want, when they want
- You decide what functionality you want to see and where you want to see it
- Choose the visualisations that suit your task and expand them over as many monitors as you need

In Custom Mode, you can expand your work over more than one display, still with widescreen resolution.

# INNOVATION

## Guidance and Structure

### Ensuring that everyone gets the job done correctly

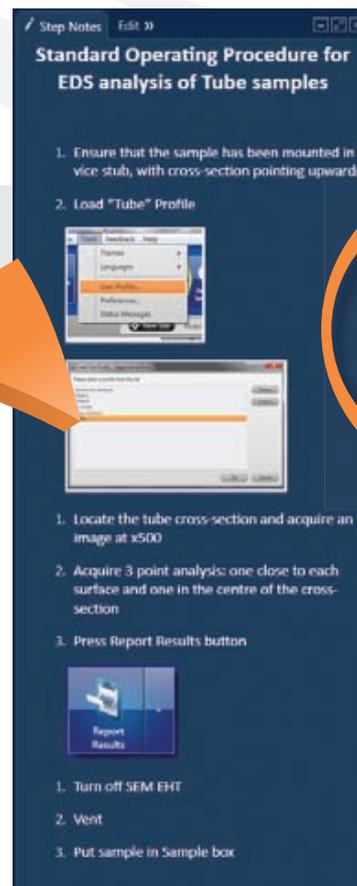
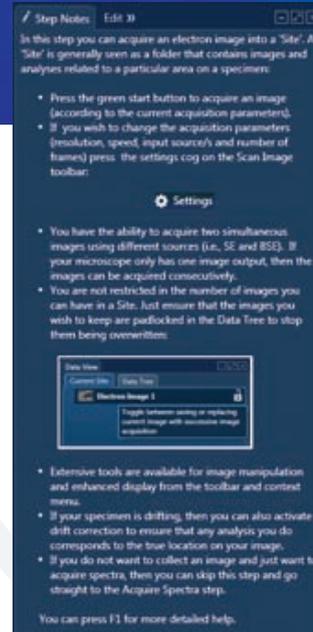
Step Notes and Standard Operating Procedures.

Step Notes are available on every Navigator step to help you get the most from AZtec in the quickest time possible

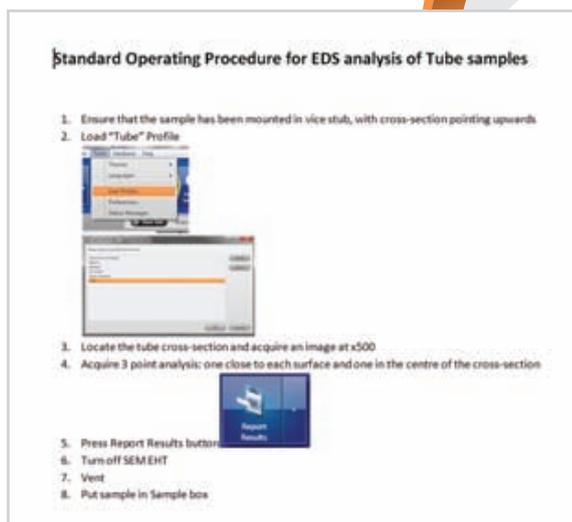
- Help precisely where you need it
- Easy to follow text and images ensure that you know exactly what to do next

Step Notes can be easily turned into Standard Operating Procedures (SOPs)

- Define on-screen SOPs using text and images
- By following an SOP, novice staff can be productive from the start, and achieve repeatable and reliable results every time



Turn your system into an integrated SOP



Copy from Word and paste into AZtec

# VE

## Productivity

### Making EDS analysis faster, easier, better

**Multi-tasking:** Change the way you work forever.

AZtec has true multi-tasking capability, meaning that every second of data acquisition can also be used for processing and reporting

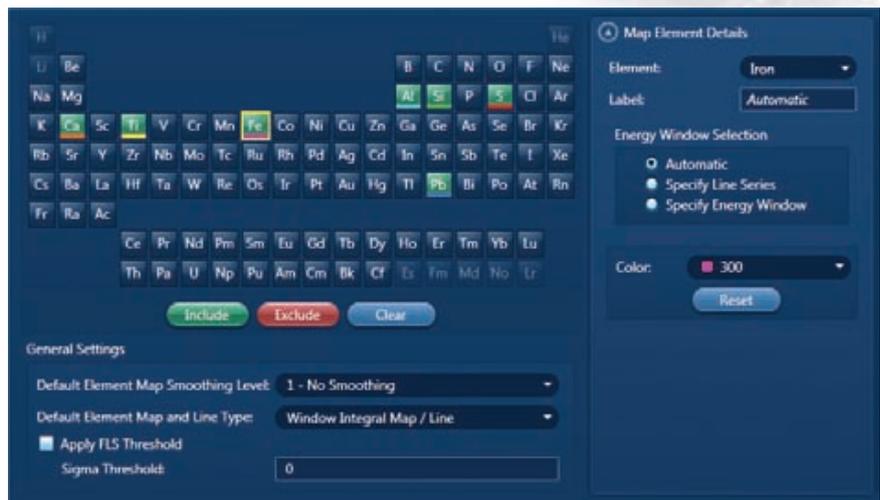
- Interrogate and report on data from one project while acquiring data for a new project
- Interrogate data even during acquisition
- Unleashes the potential of the latest high-speed detectors
- Many tasks that used to take minutes now take seconds
- Revolutionise productivity

Acquire, process and report all at the same time.

**User Profiles:** Managing a multi-user environment is now straightforward.

User Profiles take the hassle out of setting up the system for different users

- Set-up your system once for a user, then save all the relevant settings into a user profile
- Next time simply load the profile and you are ready to go



EDS Element Settings page, showing selected elements along with associated X-ray map colours.

# Integrated Reporting

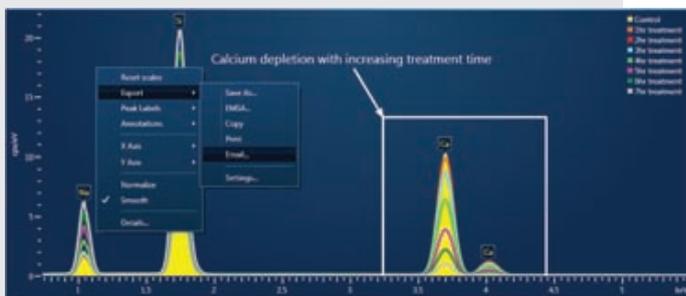
Flexible or structured, always fast

**Integrated Reporting:** You talked...We listened.

- **Three** ways to report your data...
- **Three** ways to save time...
- **Three** ways to take the hassle out of reporting

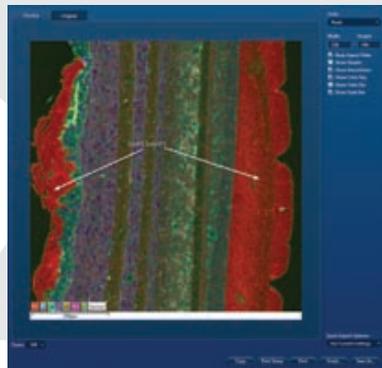
## Fast

- Reporting direct from the interface
- A simple right click and data can be e-mailed direct to your customer



## Flexible

- Dedicated export application
- Export your data in the format and resolution you want



## Structured

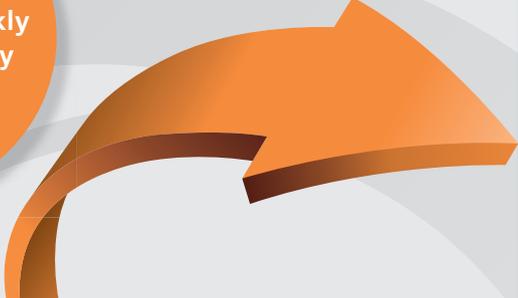
- Print a professional report with a single button press
- Comprehensive list of report templates tailored to each application
- A dedicated 'Site Report' will print out all data acquired during a specimen investigation
- Customise reports to incorporate your company logo

Want to create your own templates? **AZtec's** integrated report template generator allows you to do just that!

- Simple easy to use interface
- Create templates for use across multiple techniques
- Create multiple page templates
- Create templates for single or multiple users

# REPORT

Report your data quickly and in the way you want



Report Template Generator

Title: Image and Spectrum

Properties

Techniques: EDS, EBSD

Categories: Maps, Image, Spectrum, Line scans, Quant, Project, SiteReport

Paper Size: A4

Orientation: Portrait

Components: General, Spectra, Current Spectrum, Color Spectrum, Spectrum Details, Spectrum And MiniQuant

Page 1 of 1

Document Type: Word

Orientation: A4

Paper Size: A4

Directory: All

Category: All

Technique: EDS

File	Directory	File
Electron Image - Multiple Spectra	System	Electron Image - Multiple Spectra A4.docx
Electron Image - Spectrum - Quant	System	Electron Image - Spectrum - Quant A4.docx
Electron Image - Spectrum	System	Electron Image - Spectrum A4.docx
FLS Maps (I)	System	FLS Maps A4 (I).docx
FLS Maps (P)	System	FLS Maps A4 (P).docx

Print Section 2 3/14/2011

Electron Image 1

Wavelength (nm)

OXFORD INSTRUMENTS

Save As... Print Email... Set As Default Clear



# OISERVICE

## Global Customer Support

Accredited, experienced, responsive, dedicated

Oxford Instruments recognises that your success requires not just only world-class products, but also world-class service and support. Our global service team is renowned for delivering outstanding service to customers and microscope vendors:

- Hands-on and theory classroom training
- On-site training tailored to your specific needs
- Web-based courses and training videos
- Consultancy and application support
- Multi-layered maintenance and service contracts



visit [www.oxford-instruments.com/AZtec](http://www.oxford-instruments.com/AZtec)

The materials presented here are summary in nature, subject to change, and intended for general information only. Additional details are available. Oxford Instruments NanoAnalysis is certified to ISO9001, ISO14001 and OHSAS 18001. AZtec, Tru-Q and LayerProbe are Registered Trademarks of Oxford Instruments plc, all other trademarks acknowledged. Patent applications are applicable to LayerProbe: publication numbers JP 2009-537811, US 2010-0017172, EP 2024734.  
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