

# Relate

## Combining Electron Microscope Analytics & Atomic Force Microscopy

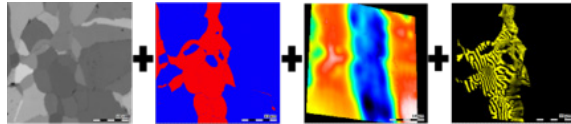
Relate helps you to increase your understanding of each sample by allowing quick and easy correlation of data from both SEM and AFM imaging and analytical techniques. Combining powerful visualisation and analysis tools, Relate optimises your qualitative and quantitative data output.

EM, EBSD & EDS	AFM
Structure	Topography
Composition	Modulus
Chemical Distribution	Current
Phase Composition	Dopant Concentration
Phase Distribution	Friction
Grain Size	Piezoelectric Respose
Grain Orientation	Magnetic Domain

Import and correlate data from Oxford Instruments EDS & EBSD detectors and AFMs.



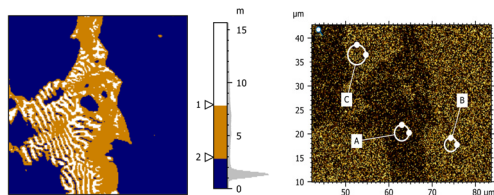
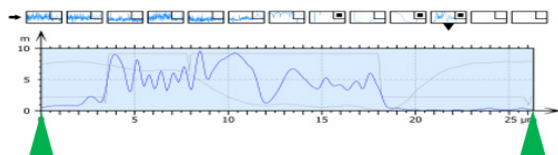
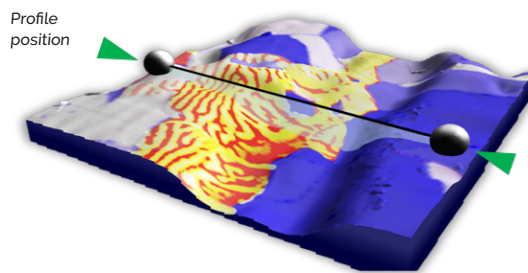
- Correlation of multiple data layers
- Semiautomatic point to point positioning
- Position, resize, orientate & adjust skew



Combine multiple types of data into a single dataset for 2D and 3D visualisation.

- Switch between & turn on/off different layers
- Adjust colour palettes and optimise data display
- Export images and movies

Duplex steel showing SEM EBSD phase maps combined with AFM topography and magnetic force microscopy.



Information			
1st threshold	7.817 m		
2nd threshold	2.837 m		
Parameters			
	Unit	■	□
Projected area	%	66.62	24.56
Volume of void	%	33.44	77.84
Volume of material	%	66.56	22.16

Information			
Layer	Ni Kα1 (5 / 13)		
Shapes			
	Unit	A	B
Projected area	µm <sup>2</sup>	8.778	6.450
Z-min	counts	0.000	0.000
Z-max	counts	8.000	11.00
Z-mean	counts	2.487	3.652
Perimeter	µm	10.50	9.003

- Generate correlated profiles
- Optically slice images to measure area and volume.
- Measure points, areas or lines and extract quantitative values for each layer (e.g. x-ray counts, height measurements, electrical field strength)
- Export quantitative data

Correlate  
Visualise  
Analyse

## Composition and Structure with EM Analytics

When an electron beam interacts with a sample, the surface emits x-rays which are characteristic of the sample composition. If the sample has a crystal structure, it is also possible to observe the electron diffraction through the sample and generate an understanding of that structure. The measured composition and structure of the sample directly relate to the material properties that can be seen with AFM.

## Topography and Material properties with AFM

When an AFM tip interacts with a sample, it can map both the 3D topography and nanomechanical, nanoelectrical, and functional properties, depending on the AFM imaging mode used. The measured material properties may be related to the composition and microstructure of the material measured by EDS and EBSD.

Features	Relate	Stereoscopy Option*	Image Analysis Option*
Import HDF5 data stacks, IBW (Asylum Research AFM) files and common image formats (e.g.) .tiff, .png, .jpeg)	Included	n/a	n/a
Correlation of data stacks and images	Included	n/a	n/a
Multiple layer 2D and 3D data visualisation	Included	n/a	n/a
Display optimisation (e.g. editable palettes, lighting, rescaling, rotation, rendering options)	Included	n/a	n/a
Image rendering, 3D animation and video export	Included	n/a	n/a
Profile extraction from 2D and 3D data	Included	n/a	n/a
Quantification of threshold-based ROI selection	Included	n/a	n/a
Select and export quantitative correlated data from ROI	Included	n/a	n/a
Document workflows and construct template	Included	n/a	n/a
3D reconstruction from stereoscopic SEM images	-	Included	-
3D Reconstruction from single EM and 4-quadrant BSE images	-	Included	-
EM image colourisation	-	Included	-
Import custom scripting from MATLAB	-	Included	-
Texture analysis	-	-	Included
Image segmentation by threshold or morphological filters	-	-	Included
Statistical analysis of morphology	-	-	Included

\*Additional software purchased seperately

Visit [nano.oxinst.com](http://nano.oxinst.com)

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