

Orientation Imaging Microscopy

Raising the
Standard
for Electron
Backscatter
Diffraction
Software

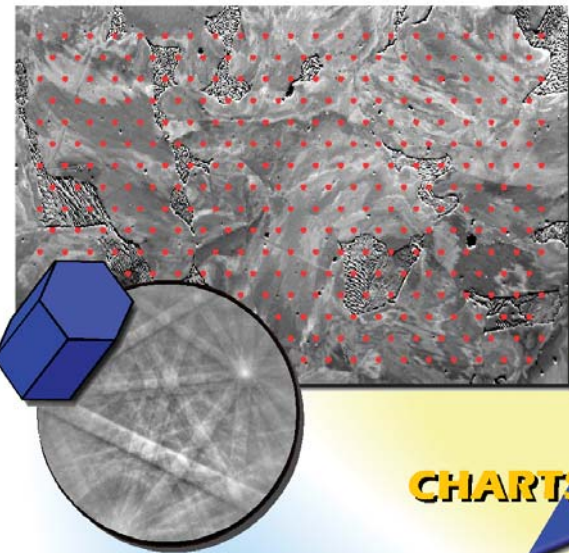
EDAX


OIM: The Standard

Orientation Imaging Microscopy (OIM)

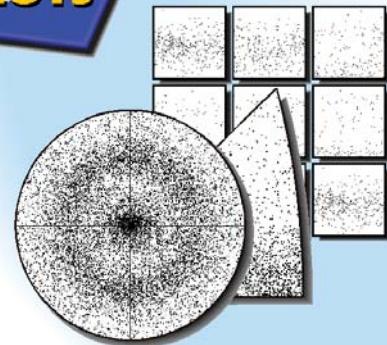
OIM is a technique based on Electron Backscatter Diffraction (EBSD) in the Scanning Electron Microscope (SEM). As OIM has evolved it has promoted EBSD into a mature analytical tool, not just used by a select few specialists, but used worldwide as a standard tool for microcharacterization. OIM is an invaluable tool for quality control applications and materials problem solving including the following applications:

- Structural materials: aluminum and steel
- Advanced ceramic composites: phase content and transformation
- Complex multi-phase analysis of materials and minerals
- Geological
- Semiconductor devices
- Aerospace
- Microelectronics



CHARTS

ORIENTATION PLOTS



Application for EBSD

MAPS



What is a diffraction pattern?

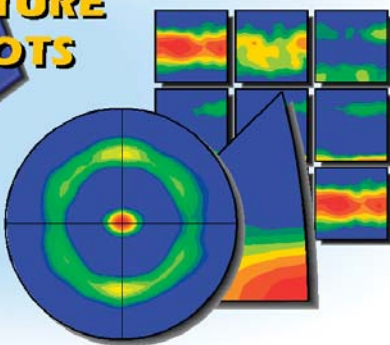
EBSD patterns, consisting of Kikuchi bands, are formed when a stationary electron beam interacts with a crystalline lattice in a highly tilted sample, while mounted in the SEM. The geometrical relationships of the bands hold information about the crystal lattice in the diffracting volume. Sophisticated image analysis routines analyze these relationships to automatically determine the orientation of the lattice.

Why Automated EBSD?

OIM™ data is collected by moving the electron beam to points on a regular grid, defining an area of interest for the sample. At each point an EBSD pattern is acquired and automatically indexed to obtain the orientation information. The orientation, position of the beam within the grid, and quantitative values for both pattern quality and indexing results are recorded.

The data can be used to form a wide variety of maps and plots giving insight to the microstructure. OIM can also be used to visualize the orientation aspects of microstructures and gather statistical information on preferred orientation or texture in the material.

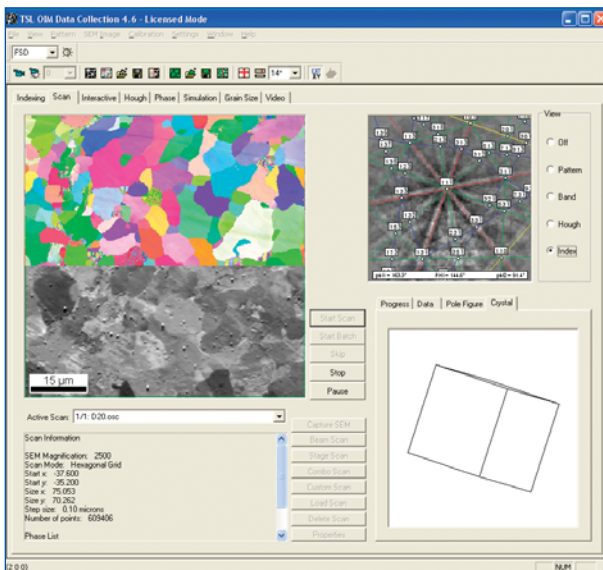
TEXTURE
PLOTS



A single scan can provide a wealth of very detailed and complex information on material microstructures. OIM's suite of easy to use tools enables an analyst, engineer or scientist, without specific diffraction or crystallography expertise, to fully mine that data and characterize his or her materials. As users progress from novice to well-versed in the technique, they will find the breadth of OIM's functions, and its flexibility, extend to meet their evolving needs and more advanced analyses.

Powerful, Flexible

OIM consists of two complimentary parts: the online data collection environment and the offline analysis application. The combination provides the most comprehensive solution available for analyzing all orientation related aspects of crystalline microstructures by EBSD. OIM's design provides a platform for ease of use without sacrificing the power and flexibility needed by advanced users.



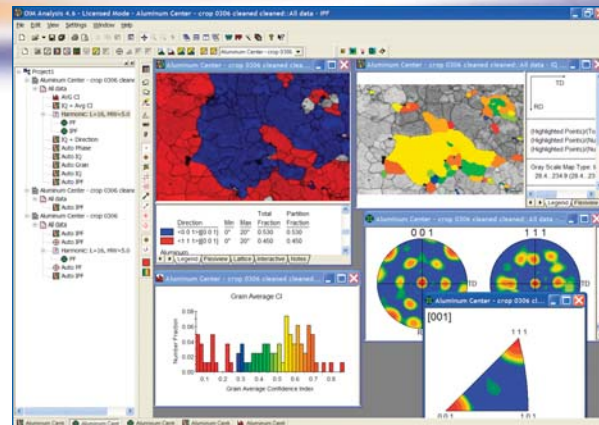
OIM scan progress and data review.

OIM™ Data Collection

Powerful, easy to use environment for acquiring EBSD data in the SEM.

Features Include:

- Interactive and automated collection and indexing
- Embedded camera and forward scatter imaging controls
- Collection speed adjustable without significantly sacrificing accuracy
- Precise Hough transforms
- Unique indexing algorithms
- Confidence Index (CI): patented verification of indexing accuracy



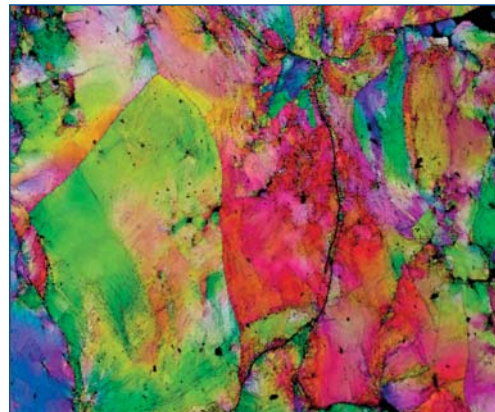
Maps, plots, and charts easily created and viewed in OIM Analysis.

OIM™ Analysis

Virtually unlimited potential for interrogating the wealth of information contained in OIM™ scans.

Features Include:

- Complete integration of analysis tools for easy cross-correlation of results from multiple analyses
- Easy access to most frequently used EBSD functionality using QuickGen Tool Bar
- Customizable push-button solutions for commonly used analyses
- Extensive array of maps, charts and plots
- Texture analysis using advanced statistical tools
- Sophisticated data filtering and partitioning mechanisms



IPF map of grain orientation gradients in sintered iron.

and Easy to Use

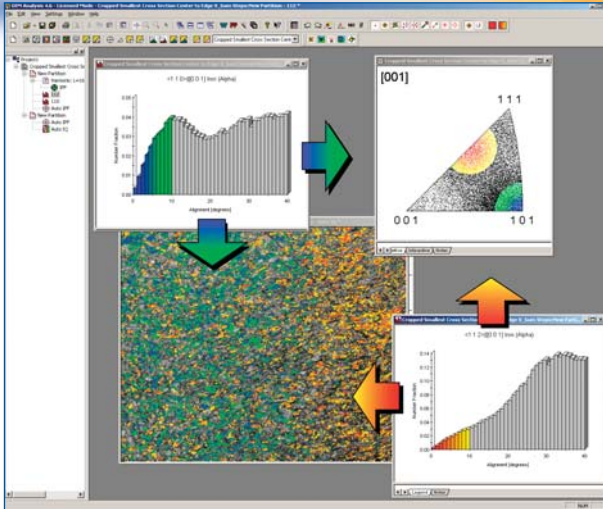


Illustration of interactive highlighting.

Interactive Data Analysis

Immediate cross-correlation of charted or plotted data with features or textures in OIM™ maps.

- Easy yet powerful tool for microstructural analysis
- Association of data with mapped structures
- Embedded capability within OIM™ Analysis
- Simple “click and drag” operation
- Highlighted data can be filtered into a partitioned data set for separate analysis



EBSD detector.

OIM™ Hardware

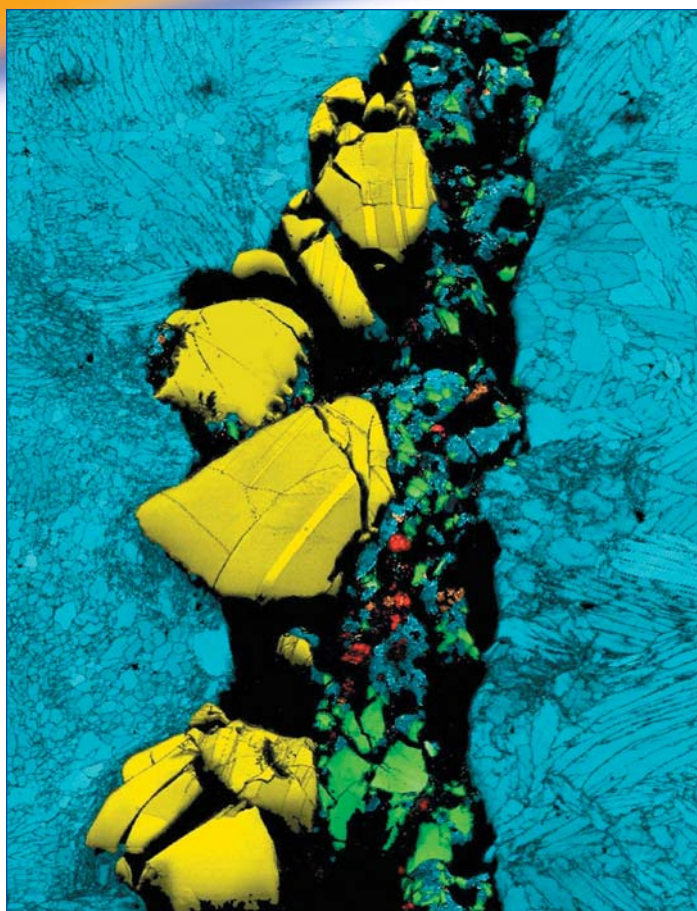
Continuous innovation and unsurpassed quality provide a unique mix of speed, sensitivity and resolution.

- Camera control fully embedded within OIM™ Data Collection
- Integrated Forward Scatter Detector
- Electronics designed for simultaneous EBSD-EDS operation
- Motorized, sealed bellows for reliable operation
- Detectors interface with any SEM chamber



Schematic of EBSD detector, sample and electron beam geometries in SEM chamber.

Seamless Integration for EDS, EBSD and WDS



CHI-Scan map of multiphase complex material.

Trident

Complete materials characterization system combining the trio of analytical tools; EDS, EBSD and WDS.

- Integrates the superior performance of EDAX's technologically advanced tools
- No analytical performance compromised
- Obtain the ultimate Results with Confidence for all your materials characterization requirements

Pegasus

Simultaneous data acquisitions optimized for EDS (chemistry) and EBSD (crystallography).

- Combines the power of EDAX's Energy Dispersive Spectroscopy (EDS) and Electron Backscatter Diffraction (EBSD) for superior materials characterization
- Patented CHI-Scan for superior multiphase analysis
 - Improved indexing accuracy and phase differentiation
 - EDS chemical information to differentiate between crystallographic similar phases

Neptune

Complimentary union of EDS and WDS for accurate X-ray microanalysis.

- Combines simultaneous data acquisition of EDS with the superior energy resolution and precision of Wavelength Dispersive Spectroscopy (WDS)
- Improves quantification, especially for low level concentrations



Integrated Trident system provides simultaneous EDS, EBSD and WDS data collection.

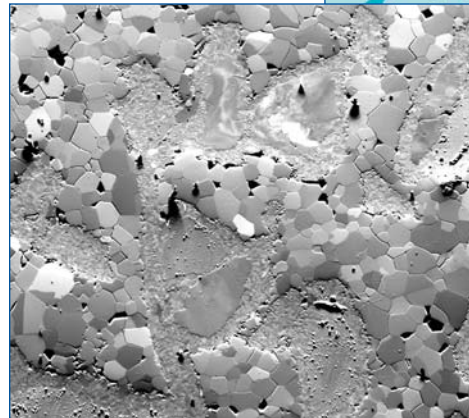
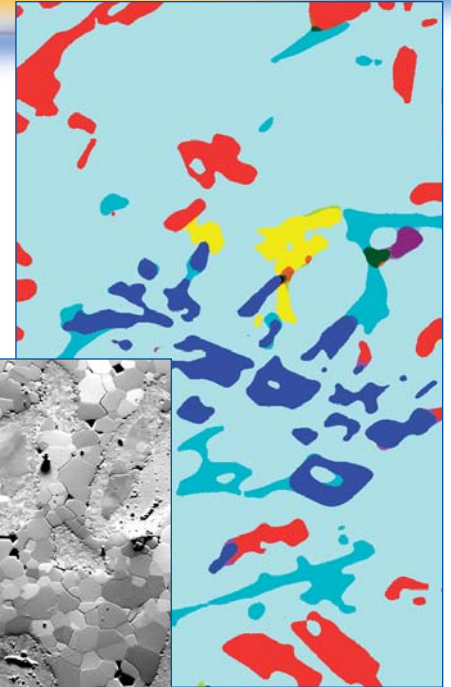
EBSD Results with Confidence

Applications

OIM bridges the gap between microstructure and macroscopic properties for crystalline material:

- Texture analysis: pole figures and relationship to microstructure
- Weld, braze, solder, and diffusion bond analysis
- Grain flow studies: forging, rolling, extrusion and drawing
- Semiconductor research
- Simultaneous EBSD-EDS for multiphase and polyphase analysis
- Analysis of sub-grain structure and strain gradients
- Characterization and identification of geological ores
- Optimization of mineralogical additives to molten metal processing
- Failure Analysis
 - Local texturing
 - Defect and inclusion characterization and sourcing
 - Differential strain gradients leading to cracking
 - Determination of inter-granular or intra-granular cracking
- Phase content

Multiphase ChI-Scan map of Al-Si alloy, courtesy of Rachel Thomson, Loughborough University.



FSD image illustrating orientation and compositional contrast of quartz-enstatite sample courtesy of Dr. Karsten Kunze, Geologisches Institut, Zurich, Switzerland.



Training and Support

EDAX is the world's leading supplier of micro-characterization tools. Our analytical equipment is fully supported by a worldwide service network with over 45 years of experience.

EDAX offers a wide range of service and training options through a knowledgeable and experienced support staff. Support is available for all user levels.

Service options include:

- Field service and repairs
- Multiple Maintenance Agreements to fit customer needs
- Worldwide technical support to diagnosis and troubleshoot hardware problems
- Application support to resolve software questions

Our goal is to train customers to efficiently manage their materials analysis requirements and achieve superior results.

User training programs include:

- User schools throughout the world
- Webinars on the latest features and applications
- Software movies to guide users through a step-by-step process

EDAX ISO 9001 certification assures customers that quality is of the utmost importance. EDAX is committed to operational excellence and process improvement to provide customers the very best in products and support.



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