Introduction of OIM™ 6.0 Software

TECHNICAL BULLETIN-EBSD

Introduction

Orientation Imaging Microscopy (OIM) is a technique used to obtain crystallographic orientation, grain boundary character, and phase distribution information from single and polyphase crystalline materials through the collection of Scanning Electron Microscope (SEM) based Electron Backscatter Diffraction (EBSD) patterns. The OIM™ 6.0 system consists of the Data Collection and Analysis software packages. OIM™ Data Collection software is used, in conjunction with an EBSD detector and SEM, to automatically capture and analyze EBSD patterns to compile OIM™ datasets. OIM™ Analysis is the standalone application used for the creation of maps, plots, and charts detailing the sampled microstructure as well as highlighting and partitioning of data for advanced analysis. Delphi is the dedicated Phase Identification application using combined EBSD and Energy Dispersive Spectroscopy (EDS).

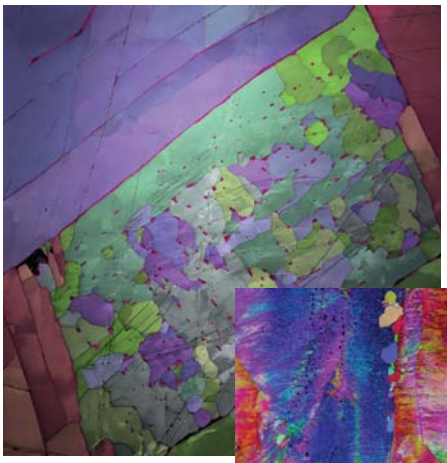
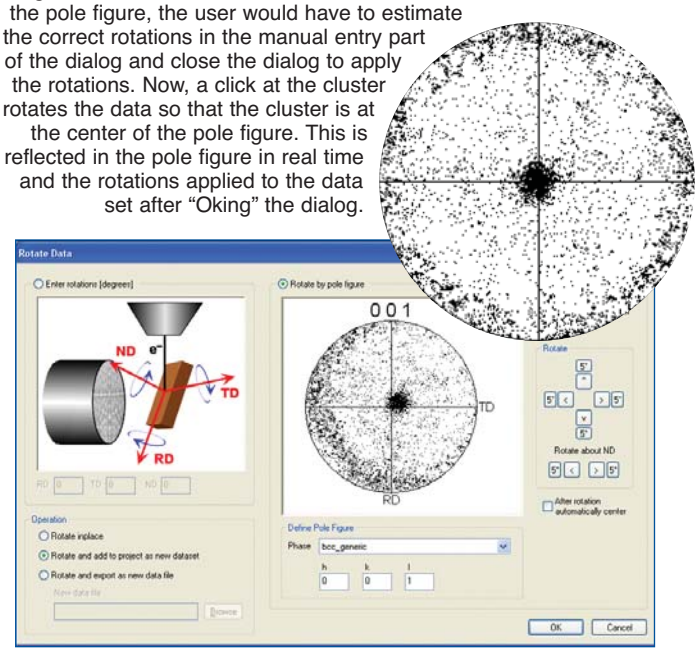


Figure 1. A combined image quality and orientation map from the Gibeon meteorite.

Figure 2. A combined image quality and orientation map from a partially recrystallized steel.

OIM™ 6.0 software is the first microanalysis package to be written for 64-bit processor and Microsoft® Windows 7 compatibility. OIM™ Analysis software allows for very large scan files to be handled on systems with a 64-bit processor and operating system. Some recent examples of analysis include datasets that are an order of magnitude larger than current systems (>40 million data points).

Figure 3. To center the cluster near the center of the pole figure, the user would have to estimate the correct rotations in the manual entry part of the dialog and close the dialog to apply the rotations. Now, a click at the cluster rotates the data so that the cluster is at the center of the pole figure. This is reflected in the pole figure in real time and the rotations applied to the data set after "Oking" the dialog.



OIM™ Software is Easier to Use

- Expanded QuickGen and Template Functionality: Easier initial access to the most commonly used functions in OIM™ Analysis software and "one-button" complete analysis using template files with a comprehensive template library
- Full Image Area Mapping: Map full image area with scan resolution selected automatically by the number of points desired in the map, resulting in quicker time-to-mapping
- Easier Data Rotations: Fast data rotation based on manual selection using pole figures for easy alignment of data (see Fig. 3)
- Interactive page colors make quick measurements easier to understand and utilize
- The system level settings are password protected, though the improved user interface allows users access to options needed for data collection without changing critical system settings (see Fig. 4)

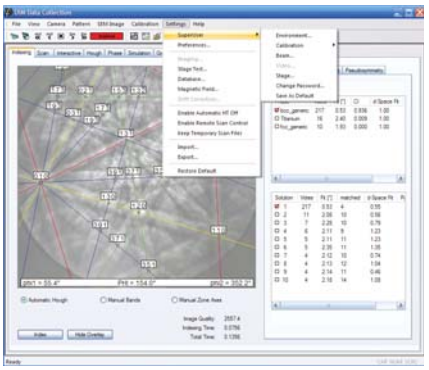


Figure 4. Improved user interface.

Results with Confidence

EDAX®

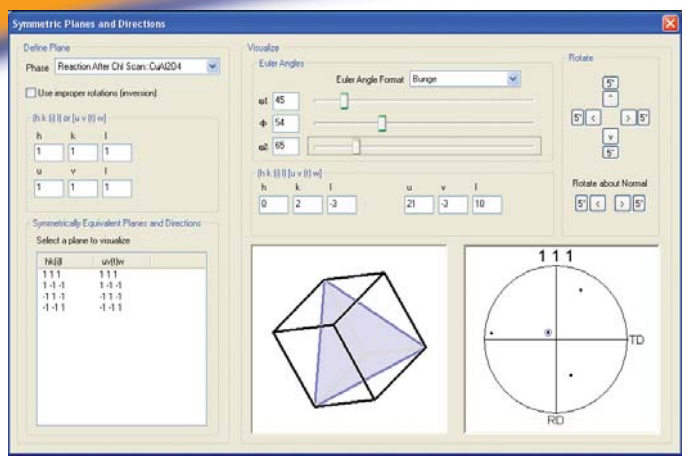


Figure 5. Improved access to information about crystal planes with advanced visualization tools for understanding the underlying crystallography used by the OIM™ system.

Improved Access to the Information You Need Most

- Improved advanced visualization tools to easily understand the underlying crystallography such as crystal planes and misorientation axes (see Fig. 5)
- Interactive status bar displays useful information at each datapoint
- Data Processing Log automatically records post processing performed on datasets

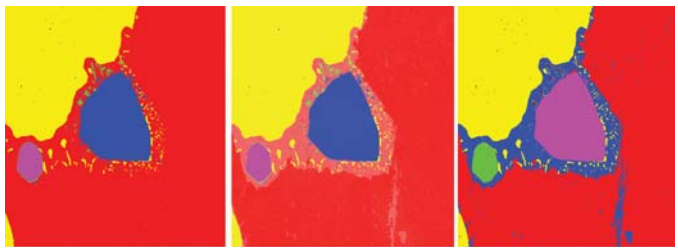


Figure 6. Enhanced functionality with Chi-Scan PCA Component Variation. 70% tolerance map is shown on left - notice the red phase. When the component variation map is shown (middle), the red phase divides into two shades of red. When the tolerance is increased to 75% (right), the initial red phase is divided into two unique phases.

The Enhanced Functionality Provides the User with:

- Improved Chi-Scan technology, EDAX's patented combined EBSD-EDS tool for multiphase analysis: Component deviation mapping, EDS spatial shifting, and EDS kernel averaging have all been implemented to improve phase differentiation, especially for nanoscale measurements (see Fig. 6)
- Enhanced Batch Processor: More comprehensive automated analysis of multiple datasets using a range of template types. Useful for both routine analysis, 3D, or in-situ measurements for faster, repeatable, and consistent data analysis
- Crystallographic Plane Matching: Identify and visualize specified planes aligned across a boundary and aligned with 2D grain boundary trace. Useful for investigating phase transformations and orientation relationships
- Fast Fourier Transform (FFT) Image Processing: Improved EBSD pattern quality with an FFT-based image processing routine that can be combined with other algorithms and saved as a recipe for later use (see Fig. 7)
- Non-Cubic Coincidence Site Lattice (CSL) Boundary Analysis: Extends CSL boundary analysis to hexagonal, trigonal, and tetragonal unit cells for materials such as magnesium, zirconium, and alumina

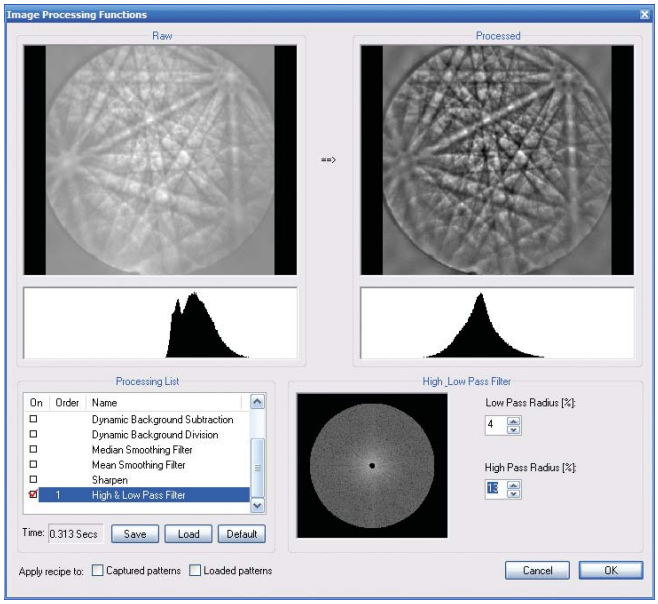


Figure 7. Enhanced functionality with additional image processing routine based on Fast Fourier Transform (FFT). Can be combined with other processing routines and saved as a recipe for later use.

With the addition of these new features, the OIM™ system continues to lead the way with the most advanced EBSD tools in the industry. OIM™ software still implements its unique triplet indexing algorithms and patented Confidence Index for superior EBSD pattern analysis and subsequent data quality.

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