

# ESPRIT QUBE

- Advanced 3D analysis of EBSD/EDS data

ESPRIT QUBE is the most advanced analytical software platform for processing and visualizing 3D EBSD and EDS data cubes. The core of its state-of-the-art algorithm is based on quaternion units that offer the best solution for interpolating intermediate steps in rotations about arbitrary axes in a 3D space.

## Quaternion based core

- All calculations are true 3D

## Dataset editing and filtering

- Slice alignment, cropping and deletion
- Gauss, median and Kuwahara filters

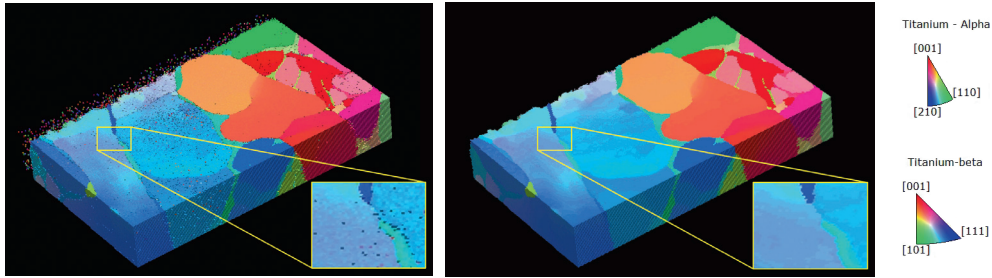
## Voxel based data analysis

- Grain reconstruction and orientation mean
- Local average disorientation (LAD)
- Geometrically necessary dislocations (GNDs) density
- Orientation distribution (IPF and Euler coloring)
- Schmid factor
- Phases and pattern quality
- EDS counts, normalized intensities and wt%

## Surface meshing (triangular surface mesh method)

- Mesh quality, mesh curvature
- Mesh normal (IPF, Deviation)
- Phases, grain orientation mean (Euler)
- Disorientation angle

## Dataset filtering – Optimized data quality for advanced 3D analysis



Left: Raw data cube acquired from a TA6V sample. Right: Filtered data cube. Misindexed and isolated voxels can be removed using the “despeckle” filter while linear (Gaussian) and non-linear (Kuwahara and median) filters offer advanced orientation averaging capabilities.

### Extensive data subsetting options

- Phase and grain “metrics” subsetting, e.g. neighbors, volume, area, shape
- Texture component subsetting
- LAD, GND based subsetting

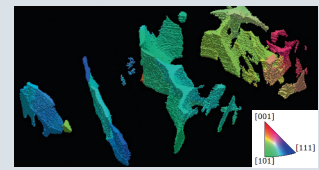
### Multiple 3D visualization and exploration capabilities

- Simulation of EBSD/EDS data cubes
- 3D cursor and multiple slice & dice options for advanced data interactivity
- Multiple data cube visualization and scaling options
- Grain list for easy access to single or multiple grains

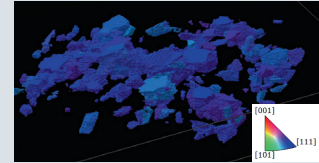
### Dataset formats and data handling options

- Supported import file formats: \*.bcf, \*.ctf, \*.cpr, and \*.ang for EBSD, \*.bcf and \*.txt for EDS
- “Project” style workspace for easy data handling
- “Event log” workspace for easy access to all processing steps
- QUBE project file option for saving current data cube with all processing steps

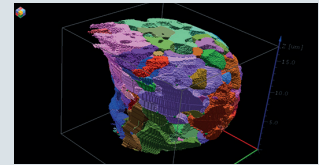
## Data subsettings



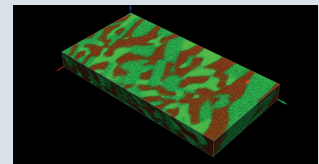
Phase based subset showing the Ti-beta grains in IPF coloring.



Ni subset based on {111} fiber along the normal to the sample surface.

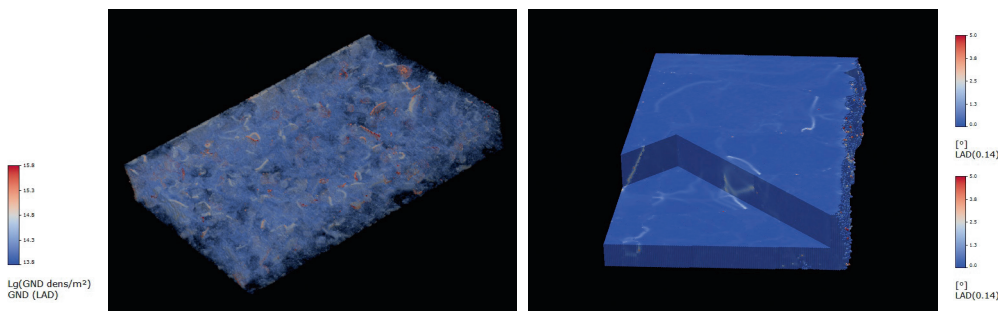


Grain boundaries meshing of Sn and Pb solder balls 3D EBSD dataset. Displayed as grain mean orientation Euler coloring.



3D distribution of Al (red) and Cr (green) in a high entropy alloy of Fe bcc and fcc phases. Data cube extracted from a 3D EDS/EBSD data set (Sample courtesy: Dr. Nima Haghdadi, UNSW Sydney, Australia, Data: MPlE, Düsseldorf, Germany).

## 3D EBSD insights into the deformation mechanisms of materials



Left: GND density distribution in Ni alloy. Right: LAD distribution in dual phase TA6V alloy. ESPRIT QUBE is the perfect tool for voxel based investigation of plastic deformation phenomena in materials using 3D EBSD data.

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