GrainMapper3D *Spotlight*

Titanium Tensile Sample

Sample Description

- Commercially pure titanium, α-phase
- Crystal symmetry: hexagonal close packed (P6$_3$/mmc)
- Lab-based DCT volume: 0.4 mm × 0.6 mm × 4 mm
- EBSD area: 0.6 mm × 1 mm

Sample Courtesy: Clement Ribart, Centre des Matériaux, MINES ParisTech, France

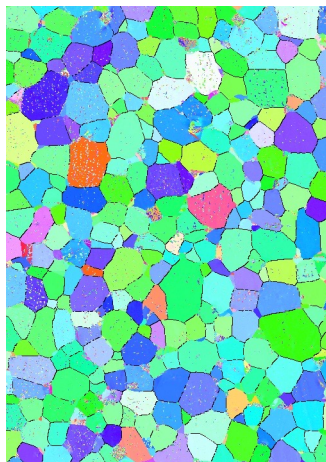*Figure: 0.4 mm × 0.6 mm × 1 mm subvolume of the lab-based DCT grain map with the front face corresponding to the EBSD area.*

Figure: 0.6 mm × 1 mm EBSD map of polished sample surface at the center of the gauge volume*

*Correspondence between Lab-based DCT and EBSD can be affected by multiple factors:, e.g., IPF coloring direction, grain definition misorientation threshold, slice position of 3D dataset and surface grain effects of DCT.
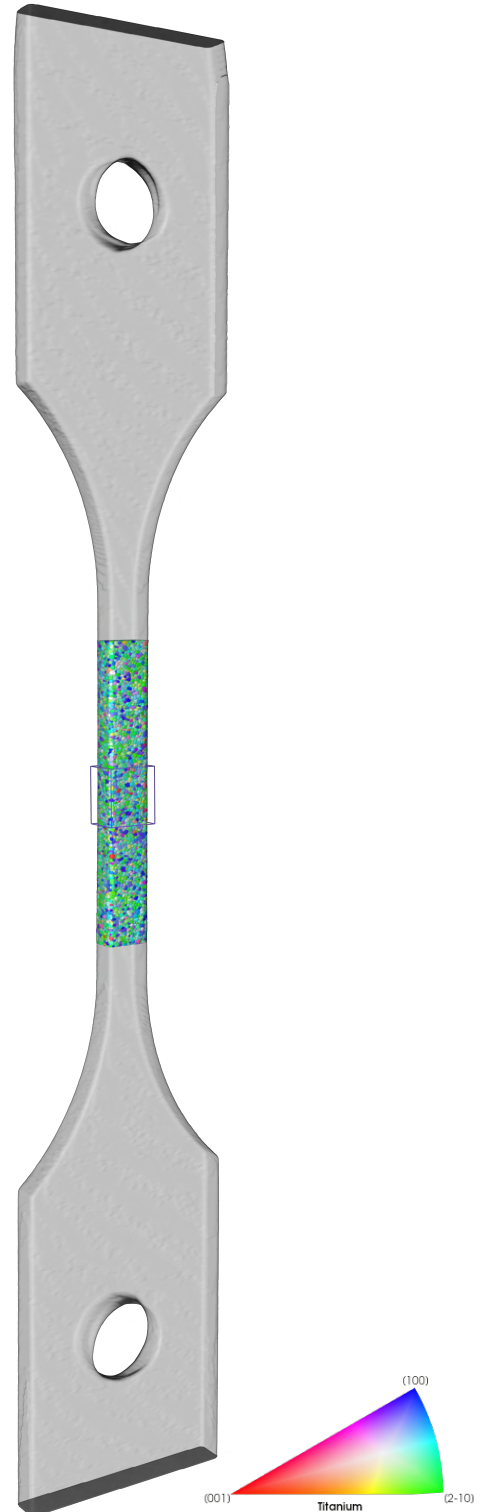

Figure: 3D grain map of the mapped sample volume, colored by IPF with respect to tensile direction. Dimensions: 20 mm, 3 mm and 0.4 mm.
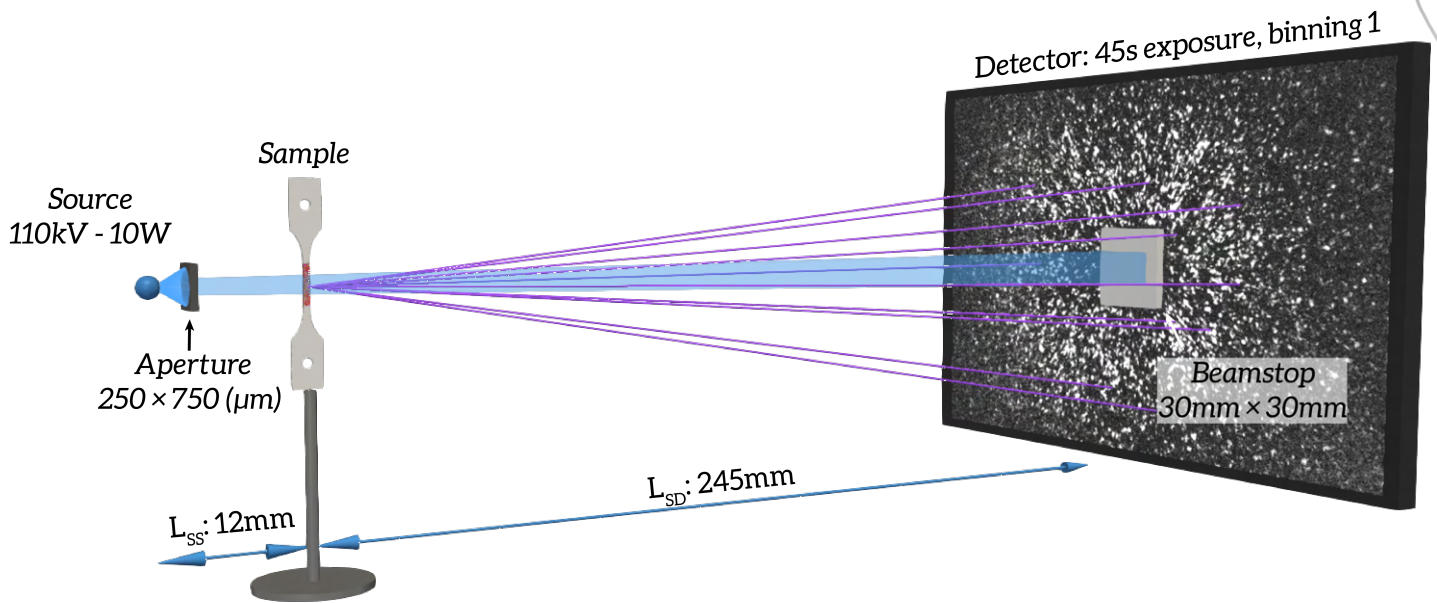
Figure: Schematic illustration of the setup for diffraction contrast tomography data acquisition of the titanium tensile sample. Key acquisition parameters are marked. In this case, projection geometry is used with geometrical magnification factor of 21.4.
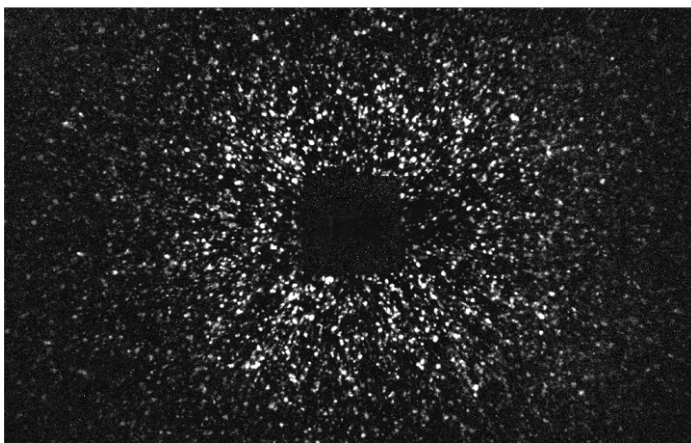

Figure (left): Example diffraction contrast projection at a certain rotation angle. The sample was scanned with projection geometry, with the shape of the diffraction spots representing the shape of the grains.

Data Acquisition Parameters

System: ZEISS Xradia 520 Versa with LabDCT Pro

Absorption Contrast Tomography

- *Voltage*: 110 kV
- *Power*: 10 W
- *Objective*: 0.4× Detector
- *Source – Sample distance*: 35 mm
- *Sample – Detector distance*: 75 mm
- *Exposure*: 1s / binning 1
- *Number of projections*: 1601
- *Voxel size*: 11 μm

Diffraction Contrast Tomography

- *Data acquisition mode: Helical Phyllotaxis*
- *Aperture*: DCT 250 × 750 (μm × μm)
- *Voltage*: 110 kV
- *Power*: 10 W
- *Objective*: Flat Panel Detector
- *Source – Sample distance*: 12 mm
- *Sample – Detector distance*: 245 mm
- *Exposure*: 45s / binning 1
- *Number of projections*: 2403
- *3D Grain Map voxel size*: 4 μm

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