

GrainMapper3D Spotlight

Low Carbon Steel Sample

Sample Description

- Low carbon steel
- Crystal system: body-centered cubic (Im3m)
- Dimension: 0.4 mm × 0.4 mm × 2 mm
- 99.2% cold rolling reduction
- Annealed to 873K with heating rate of 10K/min
- Ar gas quenching to room temperature

Sample Courtesy: Dr. Masao Kimura, Institute of Materials Structure Science, High Energy Accelerator Research Organization, Japan

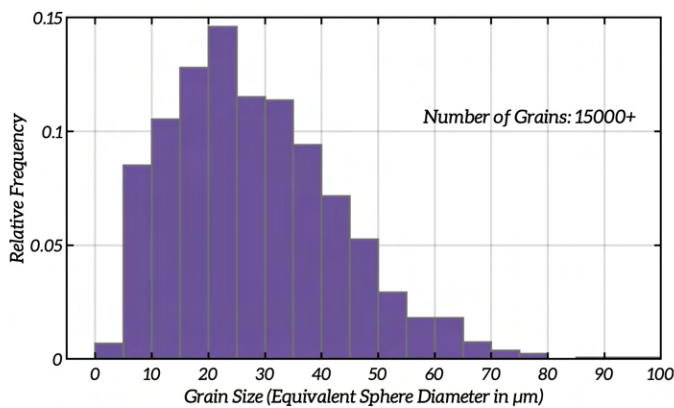


Figure: Grain size distribution of the mapped sample volume represented by equivalent sphere diameter in μm .

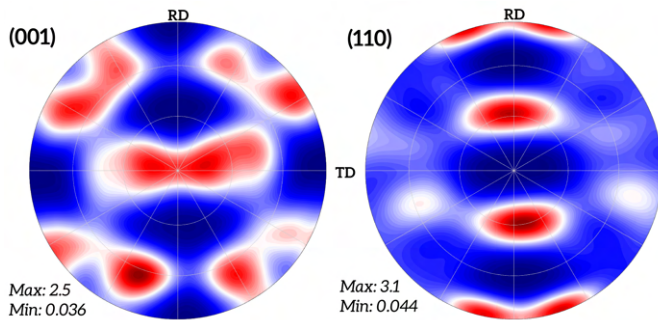


Figure: Orientation distribution function of the mapped sample volume, represented in (001) and (110) pole figure.



Figure: 3D grain map of the mapped sample volume, colored by IPF-ND with respect to sample normal direction. Dimensions: 2 mm (RD), 0.4 mm (TD) and 0.4mm (ND).

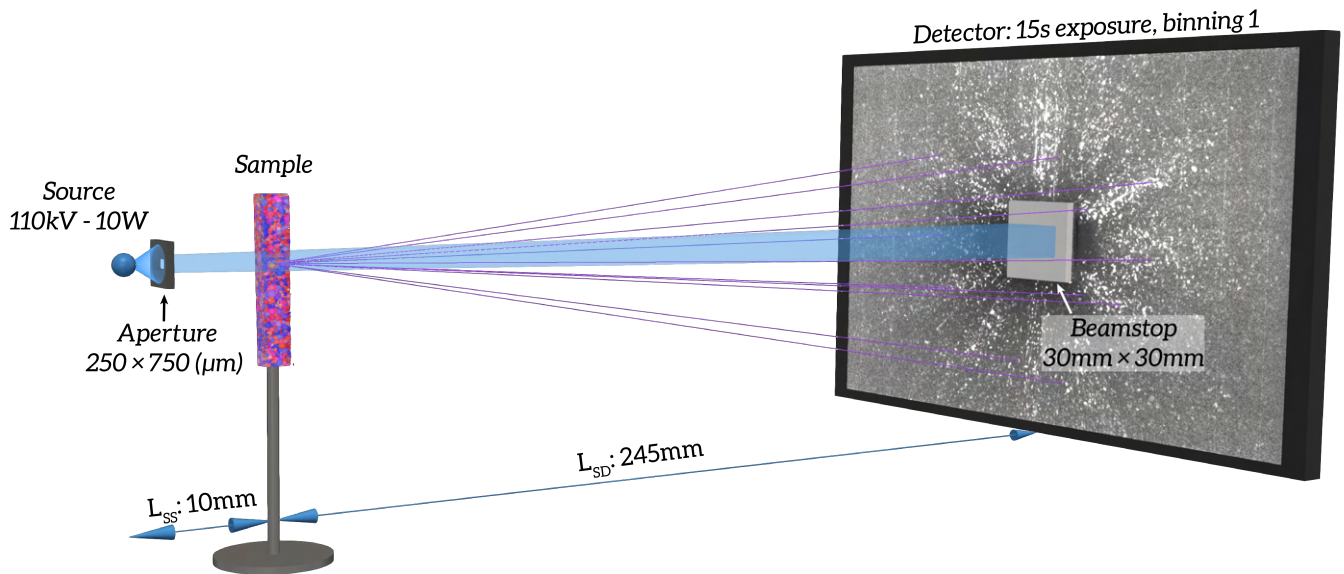


Figure: Schematic illustration of the setup for diffraction contrast tomography data acquisition of the low carbon steel sample. Key acquisition parameters are marked. In this case, projection geometry is used with geometrical magnification factor of 25.5.

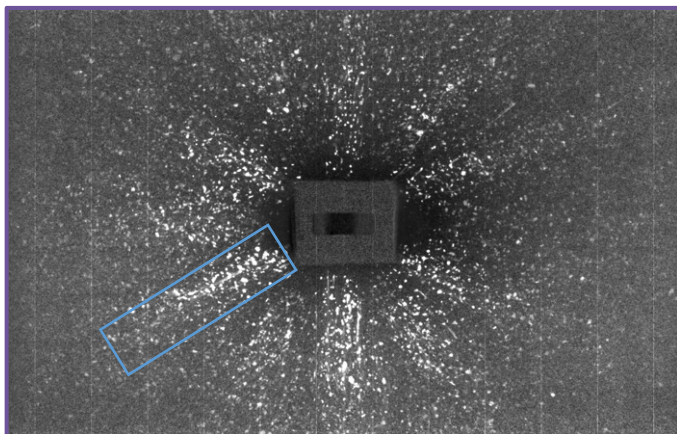


Figure (left): Example diffraction contrast projection at a certain rotation angle. The sample was scanned with projection geometry, with the shape of the diffraction spots representing the shape of the grains. The diffraction spots appear clustered in several bands (as one example marked by the blue box), resulting from the strong texture present in the sample with grains having similar crystallographic orientation.

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: 10 mm
- Sample – Detector distance: 200 mm
- Exposure: 1s / binning 2
- Number of projections: 2000
- Voxel size: 2.7 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: 10 mm
- Sample – Detector distance: 245 mm
- Exposure: 15s / binning 1
- Number of projections: 2919
- 3D Grain Map voxel size: 4 μm

