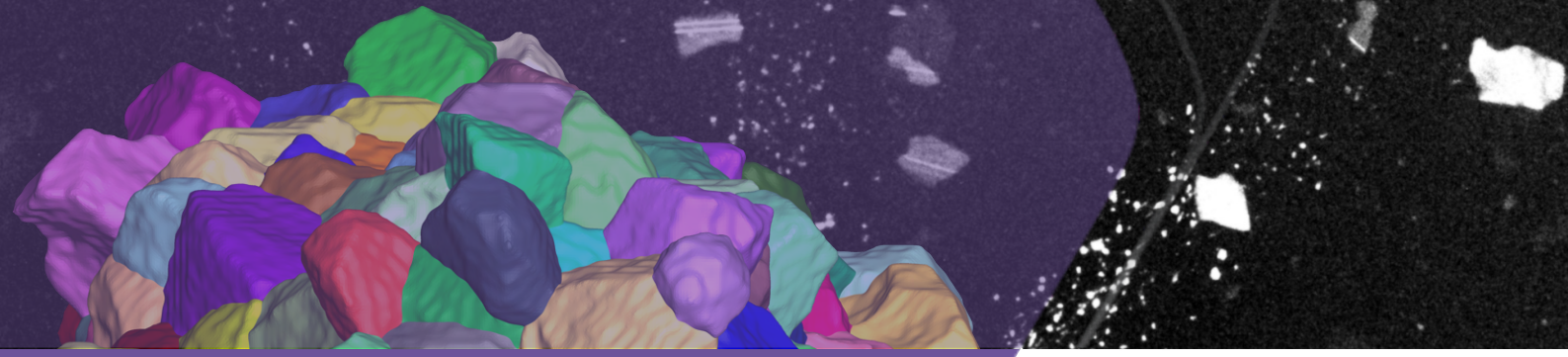


# GrainMapper3D *Spotlight*

## Ultra-thin Grain-oriented Electrical Steels

### Sample Description

- Ultra-thin grain-oriented electrical steel sheets
- Crystal system: body-centered cubic (Im3m)
- Dimension: 4 mm × 2 mm × 0.08 mm
- Original material: commercial 0.27 mm-thick grain-oriented electrical steel
- Colding rolling of 70% to 0.08 mm
- Annealing in the range of 800–850 °C for 10 and 15 min

*Sample Courtesy: Dr. Li Meng, Metallurgical Technology Institute, Central Iron and Steel Research Institute, Beijing, China*

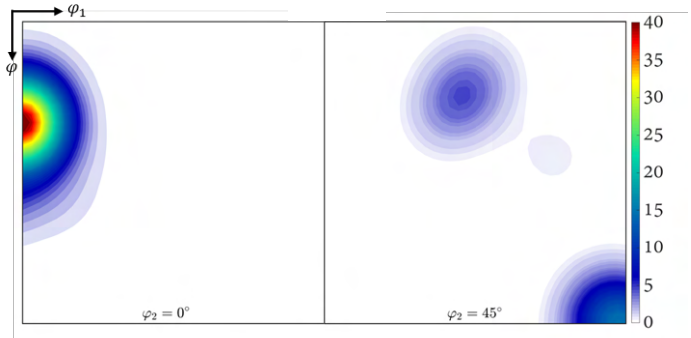



*Figure: orientation distribution function of sample with 10 min annealing.*

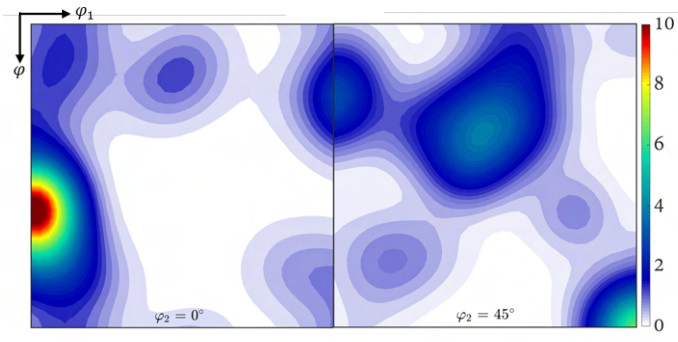
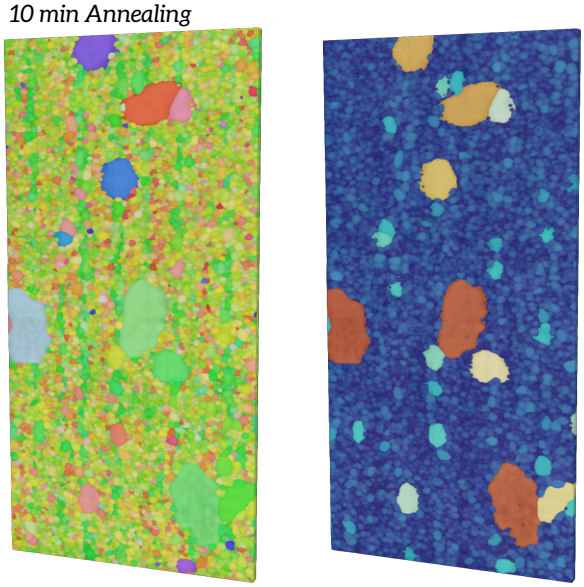
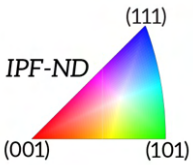



*Figure: Orientation distribution function of sample with 15 min annealing.*

*10 min Annealing*







*15 min Annealing*

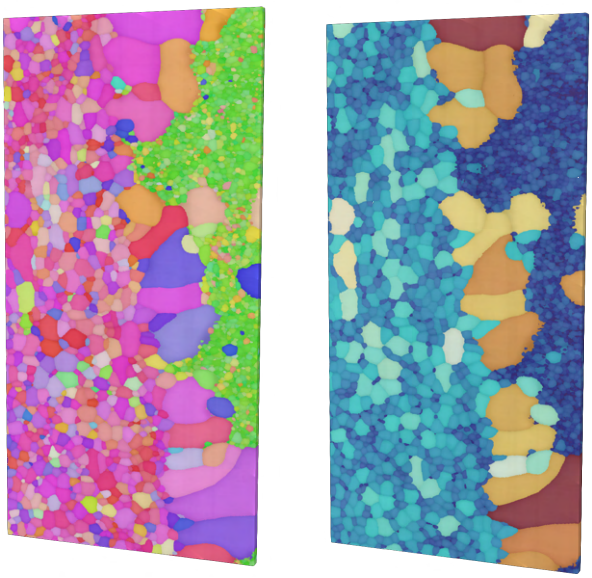


*Figure: 3D grain map of the two samples , colored by IPF with respect to sample normal direction (left) and grain size (right) . Dimensions: 4 mm (RD), 2 mm (TD) and 0.08 mm (ND).*

*Reference: '3D Non-Destructive Characterization of Electrical Steels for Quantitative Texture Analysis with Lab-Based X-ray Diffraction Contrast Tomography ', IMMI 2021, DOI: doi.org/10.1007/s40192-021-00245-0*

xnovotech

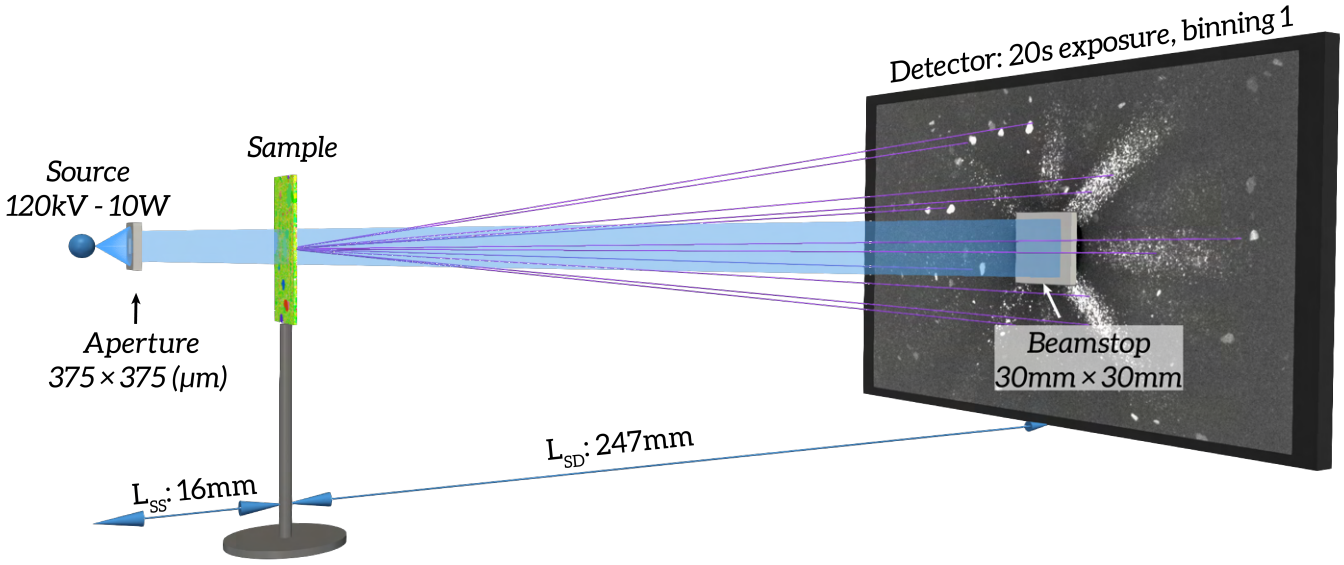



*Figure: Schematic illustration of the setup for diffraction contrast tomography data acquisition of the grain-oriented electrical steel samples. Key acquisition parameters are marked. In this case, projection geometry is used with a geometrical magnification factor of 16.4.*

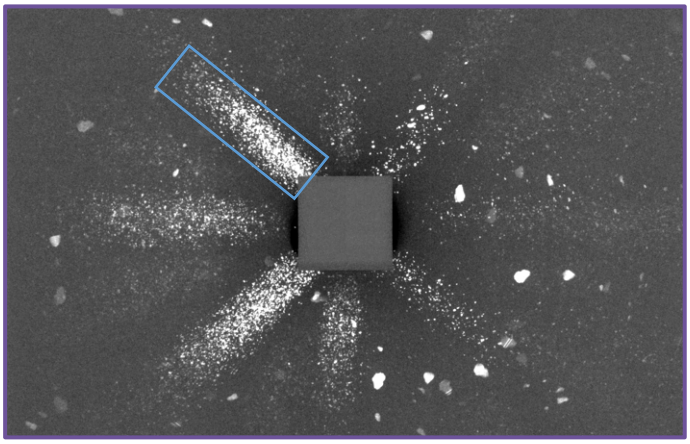


*Figure (left): Example diffraction contrast projection at a certain rotation angle from sample annealed for 10 min. The sample was scanned with projection geometry, with the shape of the diffraction spots representing the shape of the grains. The diffraction spots appear clustered in several bands (as one example marked by the blue box), resulting from the strong texture present in the sample with grains having similar crystallographic orientations.*

## Data Acquisition Parameters

*System*: ZEISS Xradia 520 Versa with LabDCT Pro

### *Absorption Contrast Tomography*

- *Voltage*: 120 kV
- *Power*: 10 W
- *Objective*: 0.4× Detector
- *Source – Sample distance*: 50 mm
- *Sample – Detector distance*: 160 mm
- *Exposure*: 0.5 s / binning 2
- *Number of projections*: 1600
- *Voxel size*: 16.43 μm

### *Diffraction Contrast Tomography*

- *Data acquisition mode:* Helical Phyllotaxis HART
- *Aperture*: DCT 375 × 375 (μm × μm)
- *Voltage*: 120 kV
- *Power*: 10 W
- *Objective*: Flat Panel Detector
- *Source – Sample distance*: 16 mm
- *Sample – Detector distance*: 247 mm
- *Exposure*: 20s / binning 1
- *Number of projections*: 3976
- *3D Grain Map voxel size*: 5 μm

**Xnovo Technology ApS**
Galoche Allé 15, 1.
4600 Køge, Denmark
info@xnovotech.com
www.xnovotech.com

xnovotech