

Project 6

Measurement of grain size and distribution of nano-scale metal using Transmission Kikuchi Diffraction (TKD) technique in SEM

Objectives

- Validate the performance of Transmission Kikuchi Diffraction (TKD) technique in a SEM to measure the grain and distribution of 304 austenite steel and pure nickel
- Validate the performance of TKD method in on-axis mode, off-axis mode and other modes.

wide range of fields, including nanocrystalline and ultra-fine grain materials, corrosion studies, geological samples, nanostructures and functional materials.

In order to make best use of the TKD technique and the data produced, it is desirable that a common procedure of orientation measurement by TKD method is established worldwide.

Background

TKD is a widely used technique for charactering crystallographic orientation and grain size of nanocrystalline and ultra-fine grain materials because of its significantly higher spatial resolution than that of conventional EBSD. This project will consider spatial resolution of TKD method by measuring grain size of nanocrystalline steel and pure nickel. A unique feature of these samples is that the grain distribution and average grain size can be easily and uniquely identified, which enables traceable characterization with TKD.

Standardisation needs

TKD has received significant interest in recent years, already being applied to a

Relevant Standards

ISO 13067 Microbeam analysis - Electron backscatter diffraction - Measurement of average grain size.

Deliverables and dissemination

This interlaboratory study will be disseminated at scientific conferences and in a peer-reviewed scientific journal. Further, the key guidelines for orientation measurement by TKD method will be established by ISO TC 202.

Relevant Committees

- ISO/TC 202 Microbeam analysis
- ISO/TC 229 Nanotechnologies

Call for Participation

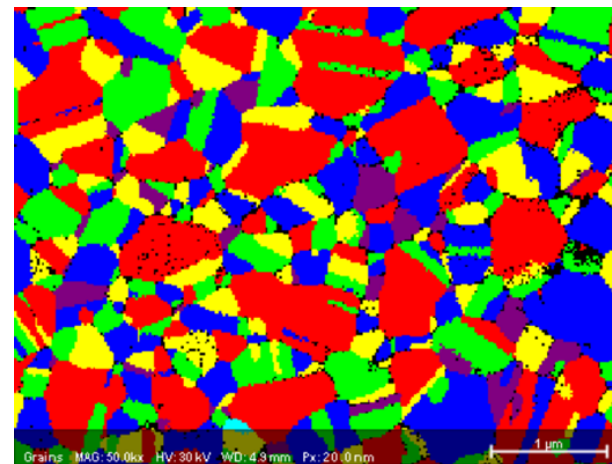


Figure 1: Grain map of pure Ni by on-axis TKD

International Participation

Current participation includes volunteers from countries from multiple continents. Additional participants are welcome.

Work Programme

- Nov 2024: Prepare samples for the interlaboratory comparison (ILC) exercise
- Mar 2025: Measurements by the ILC participants
- Sep 2025: Data analysis, evaluation and reporting
- Mar 2026: Publication in a peer-review journal.

Funding

Participants fund their own involvement in the project.

Project Status

The project is due to start in November 2024 for a duration of 12 months.

For more information:

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