Texture and Anisotropy – 3-day course in September 2020

Aims of the course

The course aims to provide a good understanding of the nature of crystallographic texture (preferred crystallographic orientation), how it is measured and interpreted, and also how this controls the anisotropy of various properties in materials. It will contain a balance of theory, experimental practice and analysis in the form of lectures and exercises. Examples of concepts that will be covered during the course are given below. Let us know if you have special interest in a certain topic and we will do our best to find suitable material for you.

This course will, compared to previous sessions, have extra focus on modelling techniques for deformation and recrystallization texture as well as the use of neutron and synchrotron techniques for texture analysis.

Who should attend?

The course is aimed at users of electron back-scattered diffraction (EBSD) or x-ray/neutron diffraction techniques, as well as researchers working in physical and mechanical metallurgy and/or product development of metallic materials.

Organisation

The location of the course will be at Swerim in Kista (Isafjordgatan 28) on 22-24th September 2020. Preparatory notes will be supplied before the start of the course and Powerpoint notes in English will be distributed for each session.

The language of presentations will be English.
Course leaders will be Bevis Hutchinson and David Lindell
The course fee of 15 000 SEK includes lecture materials, coffees, lunches and one dinner.

Hope to see you in September!

Bevis and David

SWERIM

Example of concepts that will be covered

Definition and description of texture

- Describing components with Miller indices
- Sample symmetries – rolling, fibre, shear, cylindrical
- Statistics, homogeneity and texture gradients

Representation of textures

- Pole figures and inverse pole figures
- ODFs – Euler angles, ideal orientation locations
- Rotation matrices and quaternions

Measurement by EBSD

- Specimen preparation
- Microscope procedure and optimisation
- Plotting pole figures, inverse pole figures and ODFs
- Misorientations
- Mapping with orientations and misorientations

Measurement by X-ray and neutron diffraction

- General procedures, corrections, normalisation
- ODF calculation
- Texture analysis using synchrotron radiation
- Texture analysis using neutrons

Origins of textures

- Solidification, deposition, additive manufacturing
- Plastic deformation
- Recrystallisation and phase transformation

Important textures and their control

- Low carbon steels – effect of material/process parameters.
- fcc metals – effect of material/process parameters in aluminium and copper
- Coatings
- *Special interest in other class of materials such as hexagonal metals? Please let us know!*

Anisotropy

- r-values and Δr-values for sheet formability
- Strength and ductility
- Fracture
- Young's modulus

Modelling texture evolution

- Deformation texture: mean field and full field methods. Special focus on the viscoplastic self-consistent code (VPSC).
- Recrystallisation textures