MSE-704

3D Electron Microscopy and FIB-Nanotomography

Cantoni Marco

Cursus	Sem.	Type
Materials Science and Engineering		Obl.

Language of teaching	English
Credits	1
Session	
Exam	Project report
Workload	30h
Hours	**14**
Lecture	11
Practical work	3
Number of positions	

Frequency

Every year

Summary

The principles of 3D surface (SEM) reconstruction and its limitations will be explained. 3D volume reconstruction and tomography methods by electron microscopy (SEM/FIB and TEM) will be explained and compared with x-ray tomography.

Content

Physics of the different signals generated by electron beams and focused ion beams.

- Underlying physical principles for the acquisition of data sets for 3D reconstruction: interaction volumes, voxel (3 dimensional "pixel") size, mechanical stability issues for successful recon-struction.
- surface reconstruction (SEM), serial (parallel) sectioning (SEM/FIB and TEM), tilt series tomo-graphy (TEM)
- introduction to the use of software packages for 3D surface and volume reconstruction
- practical session about the 3D surface reconstruction by SEM
- practical session about 3D volume reconstruction by FIB nano-tomography
- practical session TEM tomography

Keywords

3D reconstruction, serial sectioning, electron tomography, FIB Nano-tomography, scanning electron microscopy, transmission electron microscopy

Learning Prerequisites

Recommended courses

background in electron microscopy: electron microscopy lecture 5 sem. Bachelor level or doctoral school SEM&TEM or equivalent

Assessment methods

Project Report