

MSE-704

3D Electron Microscopy and FIB-Nanotomography

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Cursus	Sem.	Type
Materials Science and Engineering		Opt.

Language of teaching	English
Credits	1
Session	
Exam	Project report
Workload	30h
Hours	14
Lecture	8
Exercises	4
Practical work	2
Number of positions	15

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 reconstruction.
- surface reconstruction (SEM), serial (parallel) sectioning (SEM/FIB and TEM), tilt series tomography (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

Resources

Moodle Link

- <https://go.epfl.ch/MSE-704>