

MSE-621

Characterization Methods in Materials Science

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Cursus	Sem.	Type
Advanced Manufacturing		Obl.
Materials Science and Engineering		Obl.

Language of teaching	English
Credits	2
Session	
Exam	Multiple
Workload	60h
Hours	28
Courses	14
Exercises	14
Number of positions	

Frequency

Every 2 years

Summary

A survey on surface characterization (XPS, Auger, RBS, SIMS), advanced microscopy (SEM, TEM), bulk chemical analysis (EDX, EELS, atom-probe), optical and X-ray, as well as physical, thermal, and mechanical characterization techniques. Audience: students with other-than-materials science background.

Content**LECTURES:**

How to find, read and comment a scientific paper: what is the message, the motivation, the methods used ?
How to use web of science /scopus etc.

Description of modern experimental techniques:

- what physical principle is it based on, what kind of information can be gained
- what type of samples, preparation
- what are the method's limits, sensitivity, resolution
- typical time, costs etc.

Structural characterization methods: X-ray, electron diffraction, SEM, TEM

Chemical characterization: EDX, EELS

Tomographic methods (X-ray, Electron microscopy, atom-probe)

Surface analysis: Auger, XPS, RBS, SIMS

Electrical properties: measurement of conductivity and mobility, photocurrent spectroscopy thermal

Optical techniques: micro/macro photoluminescence, photoluminescence excitation spectroscopy, Raman spectroscopy

Scanning probe techniques. AFM, STM, MFM, SNOM

Mechanical and thermal properties: Elastic resonance, speed of sound, Dilatometry, DSC, fracture energy, Laser flash, steady state conductivity

RECITATION/EXERCISES:

Presentation of a scientific paper: summarizing the findings, are the methods used adequate, comment on the results, what is the context, rating (quality, importance). Answering questions.

Keywords

Characterization methods

Assessment methods

Oral

Oral Presentation