MSE-461

Micro and nanostructuration of materials

Muralt Paul

Cursus	Sem.	Type
Materials Science and Engineering	MA2, MA4	Opt.

Language of teaching	English
Credits	2
Session	Summer
Semester	Spring
Exam	Oral
Workload	60h
Weeks	14
Hours	**2 weekly**
Courses	2 weekly
Number of positions	

Summary

This course gives an introduction to micro and nano structuration of materials, mainly of thin films. The mastering of patterning techniques is a core competence to establish technology for communication and informatics. The fast advancement in this field requires an almost annual update.

Content

1. Introduction
2. Photolithography down to 20 nm's
3. Electron beam lithography
4. Wet etching - anisotropic wet etching of silicon
5. Dry etching techniques
6. Nano imprint techniques
7. Approaches to self assembly

Keywords

Principles of photo lithography, limits of optical resolution, photo resists, cold plasmas for dry etching, electrochemical processes in wet etching, interaction of e-beams with matter, self assembled monolayers, nucleation phenomena,

Learning Prerequisites

Required courses

basics in physics and chemistry

Recommended courses

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Learning Outcomes

By the end of the course, the student must be able to:

- Explain the main patterning techniques
- Discuss photoresists and patterning techniques
- Justify the choice of methods

Transversal skills

- Use a work methodology appropriate to the task.
- Assess one's own level of skill acquisition, and plan their on-going learning goals.

Teaching methods

ex-cathedra with exercises and demonstrations

Expected student activities

learn, read, and make exercices

Assessment methods

Oral exam at the end

Supervision

Office hours	Yes
Assistants	Yes

Resources

Bibliography

Notes/Handbook

Printed foils handed out and available as pdf

Websites

- http://my.epfl.ch