MICRO-332

Microfabrication practicals

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Cursus	Sem.	Type
Microtechnics	BA5	Obl.

Language of teaching	English
Credits	2
Withdrawal	Unauthorized
Session	Winter
Semester	Fall
Exam	During the semester
Workload	60h
Weeks	14
Hours	**2 weekly**
Practical work	2 weekly
Number of positions	

It is not allowed to withdraw from this subject after the registration deadline.

Summary

The goal of this course is to introduce students to the practical aspects of some basic micro-fabrication techniques.

Content

This course is reserved for students registered in the Bachelor of Micro-engineering.
During this practical course, different experiments in CMI cleanroom as well as research laboratories are conducted by students under guidance from experience scientists/engineers to get familiar with the basic techniques in microfabrication as seen in the Micro-331 MOOC and course. Through these experiments, students get the opportunity to hands-on some basic experiments associated with IC or MEMS fabrication. The main topics include:

- Introduction to the general cleanroom techniques and safety training
- Use of CAD tools to design a simple mask layout
- Photolithography techniques to pattern positive and negative tone resists
- Wet Etching of aluminium thin film
- Lift-off process
- Alignment of two photomask levels
- Fabrication of a simple resistor component in aluminium thin film
- Inspection and metrology: optical microscopy, four-point probe method, mechanical stylus-based step profiler (Tencor alpha-step), optical thickness measurement (Filmetrics), contact angle measurement

Keywords

photoresist, photolithography, lift-off, wet etching, photomask, sheet resistance, under etching, mask alignment, contact angle, film thickness, adhesion, run card, process flow, cleanroom, spin-coating, UV-exposure

Learning Prerequisites

Recommended courses

Micro-331

Learning Outcomes

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

- Produce a run card
- Conduct experiments of photolithography and etching
- Sketch a process flow
- Interpret experimental data from measurements
- Coordinate tasks within a group
- Justify the need of cleanroom environment for micro- and nano-fabrications

Transversal skills

- Write a scientific or technical report.
- Evaluate one's own performance in the team, receive and respond appropriately to feedback.
- Give feedback (critique) in an appropriate fashion.

Teaching methods

Practical laboratory work in groups (4 students/group)
Series of experiments: some experiments will be done in CMI cleanroom, others in BM research laboratory and DLL
Lecture on introduction of cleanroom and some basic micofabrication methods related to the TP

Expected student activities

- Conduct experiments
- Use a lab notebook
- Explore lab facilities

1. Operate advanced equipments

Assessment methods

Individual: Class attendance, participation to all experiments, execution of specific work
Group: quality of scientific/technical report writing by the group related to each experiment.

Supervision

Office hours	No
Assistants	Yes
Forum	Yes

Resources

Moodle Link

- https://go.epfl.ch/MICRO-332