

## Microtechnologies

Number of ECTS credits: 3

Coefficient: 3

### Description:

Technological steps:

- Si substrate generation: czochralski growth, SOI, orientation, basic Miller index
- Basic principle of the deposition methods: CVD (APCVD, LPCVD), PVD (spray, reactive spray, evaporation), electroplating
- Layer modification: oxidation, diffusion, implantation
- Positive photolithography and lift off, presentation of resin characteristics
- Mask making: mask drawing, design rules
- Different methods of etching carried out in a gaseous medium (RIE, DRIE, Bosch process) and in liquid medium

Manufacturing process: LIGA, molding, lithography PDMS

Geometric characterization: SEM, profilometry, AFM, optical microscopy Advanced manufacturing: e-beam, FIB, plasma etching, soft lithography, welding) Lab1: Layout Cadence mask drawing (design rules)

Lab2: Clean room microfabrication on PDMS (microfluidic device)

### Pedagogical objectives:

Understand the principle of microfabrication methods commonly used in a clean room

To be able to choose, among the methods seen in progress, the manufacturing conditions adapted to the specific materials and shapes sought

Know how to create a lithography mask

To know the basic (topographic) methods of characterizations used during the manufacture of microsystems

### Bibliography: Prerequisite:

Lectures Hours: 13

Tutorials Hours: 8

Labs Hours: 8

Knowledge monitoring modalities: 100% continuous assessment

Assessment: 1 final exam, 1 home exam on design with flow-chart, lab report

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