

Semi-conductor materials and devices

Materials Technology and Semiconductor Components & MEMS

IDENTIFICATION

CODE : SGM-4-S1-TELEMS
ECTS : 2.0

HOURS

Lectures : 22.0 h
Seminars : 4.0 h
Laboratory : 0.0 h
Project : 0.0 h
Teacher-student
contact : 26.0 h
Personal work : 15.0 h
Total : 41.0 h

ASSESSMENT METHOD

A 2 hour written exam

TEACHING AIDS

A4 sheet of double-sided personal
notes on the course

TEACHING LANGUAGE

French

CONTACT

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AIMS

SKILLS:

Contribution to the development skills 1 and 2 of the RNCP sheet of the department.
Mastery of materials technology and semiconductor devices.

OBJECTIVES:

Acquire the basic knowledge of the physical properties of semiconductors, materials technology and semiconductor devices and elementary components.
After the course, the students should: know different semiconductor, dielectric and metallic materials and their main properties, know the different techniques of elaboration of these materials, their advantages and disadvantages,
And to be able to choose between different technological approaches of materials and semiconductor components for their realization.
Acquire basic multi-physics knowledge for modeling, design, fabrication and characterization of micro-nanosystems components [MEMS and MOEMS].

CONTENT

- Semiconductor technology and devices:
General introduction - Elaboration of semiconductor substrates [Method CZ, FZ, Bridgman]
- Elaboration of active layers [epitaxies, CVD deposition, thermal diffusion, ion implantation]
- Growth and deposition of dielectric layers - Photolithography techniques - Realization of elementary components [MOS transistor, CMOS inverter].
- Silicon micro-nanotechnology for MEMS: technology and architecture:
Introduction - MEMS Development Context - Transduction Phenomena Implemented in MEMS - Micro-machining and Silicon Micro-technologies - Examples of MEMS - Towards nanotechnologies.

BIBLIOGRAPHY

- . Semiconductor Devices: Physics and Technology, 3rd Edition Simon M. Sze, Ming-Kwei Lee & Ed. Wiley [2012]
- . Dispositifs et circuits semi-conducteurs : Physique et Technologie ; A.VAPAILLE, R.CASTAGNE Ed. Dunod [1990]
- . Silicon Microsensors, S.M. Sze, Wiley, 1993
- . Dispositifs et physique des microsystèmes sur silicium, S. Mir, Lavoisier, 2002