

UE Integrated technologies & process of fabrication

 ECTS
3 crédits

 Composante
UFR Physique,
Ingénierie,
Terre,
Environnement,
Mécanique
(PhITEM)

 Période de
l'année
Automne (sept.
à dec./janv.)

Diplômes intégrant cet élément

- Master Electronique, énergie électrique, automatique

- Langue(s) d'enseignement: Anglais
- Forme d'enseignement : Cours magistral
- Ouvert aux étudiants en échange: Non
- Code d'export Apogée: PAX9ICAE

Présentation

Description

The goal of this course is to give a general view on the fabrication processes that exist in microelectronics.

This teaching module will be divided into 2 parts

- **Standard and alternative microelectronics technologies – 20 hours**

Focus is made on integrated silicon applications. Various standard technologies will be presented in CMOS bulk, BiCMOS, FD SOI, interposers. Special attention will be paid on RF and millimeter waves constraints. Weighing between the pros and cons will enable to enface a specific technology for a specific application, digital and/or analog, RF and/or millimeter waves. An overview of potentially future trends will be drawn also with alternative technologies: MEMS vs varactors for tunability, graphene for very high mobility channels.

- Clean room based fabrication – 8 hours

An 8-hour tutorial in the cleanroom of the CIME-Nanotech will illustrate this class. It will be dedicated to the clean-room presentation and the fabrication of diodes or MOM capacitors.

In the framework of these courses, the following topics will be presented: Fabrication process in clean-room. From sand to silicon wafer. Cleaning techniques. Material deposition: epitaxy, sputtering, chemical vapor deposition. Material transformation: wet and dry oxidation. Doping: diffusion, ionic implantation. Lithography. Chemical etching, physical etching, chemical mechanical polishing. Standard technologies front-end and back-end, CMOS for digitals and low-frequencies, FD SOI for low consumption, BiCMOS for high frequencies and millimeter waves analogs, silicon interposers for taking advantage of various technologies. Specific constraints for RF and millimeter waves consideration: dummies, coupling, back-end thickness. Alternative technologies: MEMS vs varactors. Alternative technologies: graphene and high mobility channels

Heures d'enseignement

CMTD	Cours magistral - Travaux dirigés	20h
TP	TP	8h

Période : Semestre 9

Bibliographie

- R. Levy, "Microelectronic Materials and Processes.
- C. Grovenor, "Microelectronic materials".
- G. Rebeiz, "RF MEMS, theory, Design , and Technologies, Wiley.
- Mohamed Gad-el-Hak, "MEMS Introduction and Fundamentals", The MEMS Handbook 2nd Ed.
- J. Ramsden, "Nanotechnology, an introduction", Elsevier.

Infos pratiques

Lieu(x) ville

➤ Grenoble



Campus

➤ Grenoble - Polygone scientifique