MICRO-614 **Electrochemical nano-bio-sensing and bio/CMOS interfaces**

Carrara Sandro

Cursus	Sem.	Type
Electrical Engineering		Opt.
Microsystems and Microelectronics		Opt.

Language of teaching	English
Credits	1
Session	
Exam	Project report
Workload	30h
Hours	**15**
Courses	15
Number of positions	**20**

Frequency

Every year

Remark

Postponed to June 2022

Summary

Main aim of the course is to introduce, in designing of modern wearable and implantable devices, the new concept of co-design three system' layers: Bio for Specificity, Nano for Sensitivity, and CMOS for autonomy. Recent examples of devices realised for m-Health are presented and deeply discussed.

Content

1. Bio for Probes/Targets building blocks: Proteins and DNA
2. Bio for Probes/Targets interactions with DNA and Antibodies
3. Bio for Probes/Targets interactions with Oxidases and Cytochromes
4. Bio for Detection principles: Dna, Antobodies, Enzimes
5. Bio for Detection principles: Redox Reactions
6. Nano for Probes immobilization: Methods and Mechanisms
7. Nano for Probes layer quality: SPR, SEM, and AFM
8. Nano for Memristive Biosensors
9. Nano to prevent the Electron Transfer
10. Nano to enhance the Electron Transfer
11. CMOS for metabolite in fixed voltage
12. CMOS for metabolite in scanning voltage
13. CMOS for multi-metabolites monitoring
14. CMOS for DNA detection
15. CMOS for Applications in Animals and Humans Remote Telemetry

Keywords

Wearable Devices; Implantable Chips; mHealth; Nano-Bio-Technology; Carbon Nanotubes; Metallic Nanoparticles; Op Amp; Analog Design; Electrochemical Sensing; CMOS

Learning Prerequisites

Recommended courses

Classical mechanics; Geometrical optics; Electro-magnetism; ohm law on steady current and some theorems on alternate current; Laplace transforms

Assessment methods

by home-works

Resources

Bibliography

Bio/CMOS Interfaces and Co-Design, Sandro Carrara (author), Springer (Editor), 2011

Ressources en bibliothèque

- Bio/CMOS Interfaces and Co-Design / S. CARRARA