

**Course:** Semiconducting materials and their integration into transistors

**Duration:** 24 hours

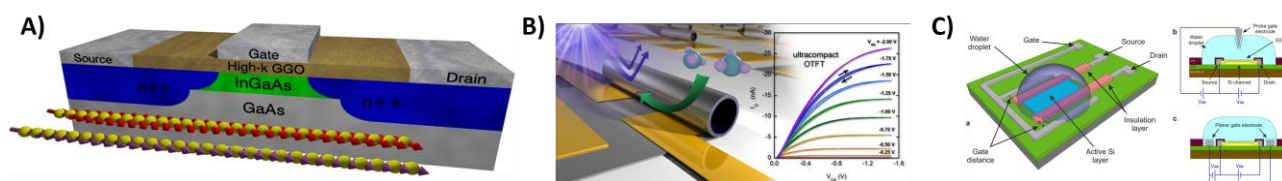
**Teacher(s):** Casalini Stefano

**Curriculum:** Chemical Sciences

**Description:**

Nowadays, the modern lifestyle is largely supported by hi-tech devices (laptops, e-watch, smart TVs, foldable devices, etc.), whose functionalities make either our personal and/or working place more comfortable or our actions more efficient.

The field of electronics is extremely wide, hence these lectures are focused on different aspects of the working principles related to transistors based on both inorganic and organic materials. Metal oxide semiconductor field-effect transistors (MOSFETs) are one of the leading devices in modern technology. Special attention will be given to some types of organic transistors such as organic thin-film transistors (OTFTs), electrolyte-gated organic field-effect transistors (EGOFETs), organic electrochemical transistors (OECT) etc. (figure 1)



**Figure 1** Examples of different types of transistors: **(A)** MOSFETs, **(B)** OTFTs and **(C)** EGOFETs.

The main objective of this course is to offer a wide overview of the hot topics connected to the research and development of this technology, such as synthesis, models of charge transport, manufacturing, characterization, etc.

**Additional information:**

- a) Different micro-electrodes patterns will be shown in the laboratory by means of the optical microscope.
- b) The course offers the opportunity for the students to learn some of the practical steps related to photolithography in a clean environment (i.e. it is located in our Department). In particular, the students will cast a thin film of photoresist onto silicon substrates.
- c) The course offers the possibility to the student to put their hands on some of the standard types of equipment to characterize electrically an electrolyte-gated transistor (EGT). This lab. activity will be performed at the Department of Information Engineering (DEI).
- d) Apart from the slides, further online materials will be used and given to the students.
- e) Active learning strategies will be adopted throughout the course (e.g. wooclap, padlet, group works etc.).