



Course unit English denomination	Semiconducting materials and their integration into transistors
SSD	CHEM-03/A
Teacher in charge (if defined)	CASALINI Stefano
Teaching Hours	24
Number of ECTS credits allocated	3
Course period	06-07/2026
Course delivery method	<input type="checkbox"/> In presence <input type="checkbox"/> Remotely <input checked="" type="checkbox"/> Blended
Language of instruction	English
Mandatory attendance	<input checked="" type="checkbox"/> Yes (70% minimum of presence) <input type="checkbox"/> No

Course unit contents 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)

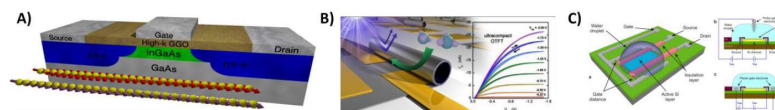


Figure 1 Examples of different types of transistors: (A) MOSFETs, (B) OTFTs and (C) EGOFETs.

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.

Learning goals	<p>Knowledge: the students will learn the principles of operation of MOSFET as benchmark, and they will learn the main discrepancies with electrolyte-gated organic transistors.</p> <p>Skills: the students will get the hands-on some standard protocols of photolithography and electrical measurement. As a consequence, the student will have the basic skills on manufacturing and measuring a transistor.</p> <p>Competencies: the students will acquire a sufficient knowledge to identify and eventually solve specific issues related to a transistor.</p>
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Teaching methods Frontal teaching

Course on
transversal,
interdisciplinary,
transdisciplinary
skills

☒ Yes
☐ No

Available for PhD
students from other
courses

☒ Yes
☐ No

Students external to the PhD Course admitted upon evaluation of the CV by the
teachers

Prerequisites
(not mandatory)

Examination
methods

According to the research papers provided by the professor and the personal interest, the
student will prepare an oral presentation (20-25 minutes maximum) on some basic aspects
of electrolyte-gated transistors and their applications.

Suggested readings

Slides/articles provided by the teacher

Additional
information
(not mandatory)

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