

Biosensors and Green Immobilization Techniques

10-24 June 2025

*Progetto Ecosistemi dell'Innovazione - Rome Technopole – Spoke 3
(CUP B83C22002890005) - Piano Nazionale di Ripresa e Resilienza - Missione 4 Istruzione e Ricerca
finanziato dall'Unione Europea - Next Generation EU*



*The course aims to introduce and understand the operating principles of a biosensor, the methodologies for its development, its fields of application, and "green" production strategies for a more eco-friendly manufacturing of the device. The course also includes seminars with experts in the field and a day visit to **DepEST lab**, the green immobilization laboratory which uses the ElectroSpray Deposition technique at CNR-ISM Research Area in Rome 1, Montelibretti (RM).*

PROGRAMME

10 June 2025 (h 10:00-12:00) online

Lesson 1

Dr. Mattea Carmen Castrovilli

- **What is a biosensor**
- Development of a biosensor and its characteristics.
- Biosensor components: bioreceptors (DNA, aptamers, proteins, enzymes, antibodies, cells) transducer (amperometric, potentiometric, calorimetric, optical, gravimetric)
- Applications: healthcare, environmental monitoring and food quality control

13 June 2025 (h 10:00-12:00) online

Lesson 2

Dr. Mattea Carmen Castrovilli

- **Types of biosensors: electrochemical and optical**
 - Electrochemical processes
 - Enzymatic biosensors: I, II, III generation
 - Biocatalytic sensors
 - Affinity biosensors
 - Optical (PC, lateral flow, NP)

17 June 2025 (h 10:00-12:00) online

Lesson 3

Dr. Mattea Carmen Castrovilli

- **The green aspects of bioreceptor immobilization**
 - physical methods (absorption)
 - chemical methods (covalent bonding, cross-linking, electropolymerization...)
 - working principle of the electrospray deposition method (ESD)
 - The application of ESD: beyond the laccase and lactate oxidase cases.

20 June 2025 (h 10:00-12:00) online

Lesson 4

Dr. Francesco Mattioli (h 10:00-11:00)

- **From micro and nano-fabrication to detectors**
 - Manufacturing
 - Micro and nanofabrication techniques
 - Introduction: motivations and historical notes (Moore's law)

- Lithography: Optics and electronics
- Thin film deposition techniques
- Etching techniques
- Applications: nanofabrication and material properties
 - SNSPDs superconducting nanowire single photon detectors

Dr. Noemi Colozza (h 11:00-12:00)

- **Designing of Point-of-care biosensors and application to cancer biomarkers**

24 June 2025 (h 10:00-12:00)

Lesson 5

Dr. Mattea Carmen Castrovilli

Visit to the to [DepEST lab](#), the green immobilization laboratory which uses the ElectroSpray Deposition technique at

CNR-ISM

Area della Ricerca di Roma 1,

Via Salaria, Km. 29,300

00016 Monterotondo RM Lazio



**Consiglio Nazionale
delle Ricerche**