

Biosensors and Green Immobilization Techniques

11-25 June 2024

*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

11 June 2024 (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



14 June 2024 (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)

18 June 2024 (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 : the laccase and lactate oxidase cases

21 June 2024 (h 10:00-12:00) online

Lesson 4

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

- **Micro and Nano Manufacturing Techniques and Applications**
- 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)

- **(Bio)sensors: from the design to the application field**

25 June 2024 (h 10:00-12:00)

Lesson 5

Dr. Matteo 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,

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delle Ricerche**