TNT2021 SCHOOL OF NANOBIOSENSORS, TIRANA, ALBANIA

Organized by Catalan Institute of Nanotechnology and Paperdrop Diagnostics, Barcelona, Spain

Objectives: Organized within the framework of TNT2021 (Trends in Nanoscience and Nanotechnology) this School of Nanobiosensors aims to give to young scientists and other TNT participants some important and practical hints on the design and application of nanobiosensors. These represent small devices based on the use of nanomaterials with interest to be applied in health diagnostics, environment monitoring, safety security and other industries. Practical lectures and demonstrations by experts in the field are previewed followed by roundtable discussions and brainstorming related to R&D development in this field.

Venue: TNT2021 Venue (Tirana International Hotel & Conference Centre)

Participation: based on inscription

Coordinated by:

Prof. Arben Merkoçi, ICN2, Barcelona, Spain

Dr. Daniel Quesada, Paperdrop Diagnostics, Barcelona, Spain

Dr. Claudio Parolo, ICN2, Barcelona, Spain

Dr. Ruslán Álvarez, ICN2, Barcelona, Spain

Dr. Giulio Rosati, ICN2, Barcelona, Spain

October 5th – School on Nanobiosensors

9:00 – 9:15: Arben Merkoçi – Welcome to the School on Nanobiosensors

9:15 – 9:50: Daniel Quesada – A look through Rapid Diagnostics Tests (lateral flow tests)

What are rapid diagnostic tests? How do they work? For what are rapid diagnostic tests being applied (e.g. SARS-CoV2).

9:50 – 10:25: Claudio Parolo – The Collaboration Between Developers and Clinicians

How to optimize collaborations between developers and clinicians? What is missing?

10:25 – 11:00: Stefano Cinti (virtual) – Paper-based electrochemical (bio)sensors: how?

The talk is aimed to provide general basis regarding the development of paper-based electrochemical strips for multiple applications. The pros and cons of each paper-based

substrate will be provided, including the most diverse possibilities in merging different substrates for obtaining smart 2D and 3D platforms with improved performance.

11:00-11:30 *– Coffee Break* + Special session for young students

Part 1 – Introduction to Nanotechnology. *What is a nanomaterial? Nanobiosensors? Experiment: gold aggregation test.* Daniel Quesada and Ruslán Álvarez.

11:30 – 12:30: Fabiana Arduini (virtual) – Carbon black as an outstanding and affordable nanomaterial for electrochemical (bio)sensor design

Carbon is present in several allotropic forms ranging from graphite to diamond, till the most recently discovered fullerene, nanotubes, and graphene. In recent years, another interesting carbonaceous nanomaterial is becoming utterly interesting, due to its excellent conductive and electrocatalytic properties: Carbon Black.

12:30 – 13:05: Ruslán Álvarez – Demonstration of different portable nanosensing platforms with optical and electrochemical readout.

Inexpensive, fast and easy-to-use point-of-care detection systems are in demand for application in different fields. We will demonstrate that graphene and other nanomaterials can be used in combination with a smartphone to develop this kind of devices. Different sensing platforms will be shown during this tutorial session.

13:05 – 13:40: Giulio Rosati – Inkjet printing for ubiquitous ultra-fast and low cost electrochemical biosensors fabrication

Biosensors fabrication should guarantee high performances and reliability, low variable costs and possibly low investment. Furthermore, the recent pandemic showed us the increasing need of decentralized (virtually ubiquitous) production. Inkjet printing with nanofunctional inks and office-like equipment have these characteristics, as will be showed in this tutorial.

13:40 – 15:30 *– Lunch and roundtable session* + Special session for young students (30 min)

Part 2 – Demonstration of different portable nanosensing platforms with optical and electrochemical readout. *We will demonstrate that graphene and other nanomaterials can be used in combination with a smartphone to develop nanosensing devices. Different sensing platforms will be shown during this tutorial session*. Ruslán Álvarez and Daniel Quesada.

15:30 – 16:05: Mary Zeng – Business Development Manager for European Market

Common equipments for the later flow production at different stages and operations to maximise the business success

16:05 – 16:40: Baojun Wang (virtual) - Synthetic cell-based and cell-free biosensors for toxins and pathogens in resource limited settings

The tutorial will introduce the principles, latest progress and challenges in developing synthetic biology enabled cell-based and cell-free biosensors for environmental toxins and pathogens.

16:40 – 17:15: Andrea Idili (virtual) - Real-time, continuous monitoring of clinically relevant molecules via electrochemical aptamer-based sensors

The tutorial will describe the general concepts behind the fabrication and the characterization of electrochemical aptamer-based (EAB) sensors, and their next use to achieve real-time measurements of clinically relevant targets directly in living animals.

17:15 – 17:50: Joseph Wang, Plenary Speaker (virtual) - Wearable Electrochemical Sensors for Improved Management of Diabetes

This presentation will describe various wearable electrochemical sensing platforms for monitoring glucose and other key diabetes biomarkers in different biofluids towards improved management of diabetes.