

Knowledge and skills transfer for the application of nanotechnology in biosensors for foodborne pathogens

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The Know4Nano project aims to unlock synergetic research and innovation potential between EU-partner institutions and Biosense Institute (BIOS) to enhance the research and management capacity of BIOS staff in the field of bionanotechnology (BnT), project management and technology transfer to perform research activities toward the development of innovative and user-friendly personalized point-of-care diagnostic tests for food safety applications along the farm-to-fork food chain. Good practice, innovation, and scientific excellence from the leading European research institutions in the field of BnT: Catalan Institute of Nanoscience and Nanotechnology, Barcelona, Spain, with expertise in nanotechnology and nanoscience-based biosensors, and microfluidics, National Research Council, Rome, Italy, an expert in molecular biology, optical biosensors, biosensors testing and validation, and food safety, University of Chemistry and Technology, Prague, Czech Republic, an expert in materials science, materials synthesis, functionalization, and characterization of materials, will be transferred to BIOS by establishing a knowledge transfer platform based on carefully designed mobilities, trainings and mutual collaboration. Know4Nano will enable researchers from BIOS to acquire essential expertise, competencies, and skills in the field of nanomaterials, biosensors, microfluidics, and food safety, and enhance BIOS research management capacities and administrative skills for further commercialization, exploitation.

The complementary expertise of the team members will be combined with the purpose of developing highly sensitive portable biosensors for rapid quantitative detection of the most common foodborne pathogenic bacteria. The R&I activities will be focused on developing, testing and validation of low-cost sensing device comprised of an area of a field-effect transistor (FET)-based biosensors integrated inside the MF disposable cartridges for in-field PoC diagnostic of multiple pathogens. Certain novelties rely on the following: 1) Synthesis of various types of nanomaterials with superior charge transfer and high specific surface properties as A) metaloxide semiconductor (MOS) nanostructures, and B) 2D nanostructures (transition metal dichalcogenides (TMDs) and MXenes) and their composites. 2) Designing complex material heterostructures to explore their synergistic effects in devising innovative highly sensitive, selective, and reliable FET-based biosensors. 3) Design and fabrication of low-cost biosensors for PoC testing, 4) Developing novel protocols for biomolecules immobilization (enzymes, aptamers, and antibodies) on new nanomaterials; 5) Development of the procedures for biosensors testing and validation; 6) Integration of the biosensors into MF platform for multiple pathogens detection simultaneously.

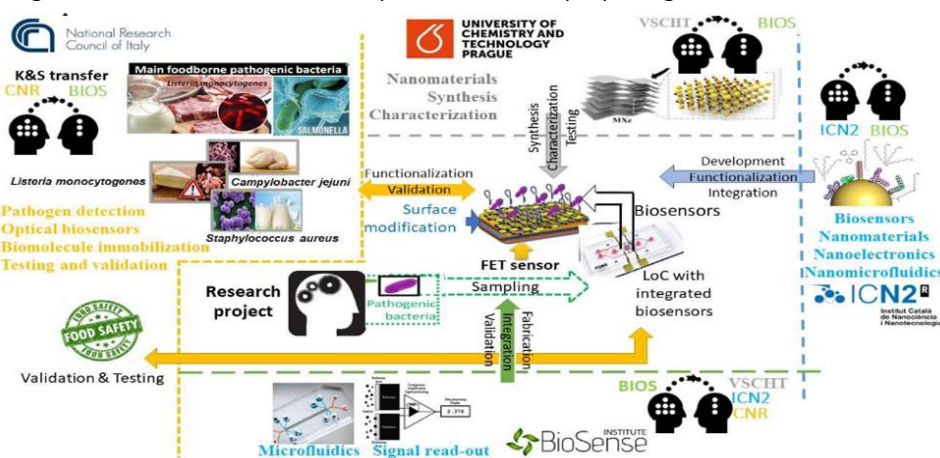


Fig. 1. The overall concept of Know4Nano project

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