



## Identificación del proyecto

Biosensores nanofotónicos para el diagnóstico y gestión clínica de infecciones bacterianas en el punto de atención (PLEC2021-007739)

## Descripción del proyecto

Infections produced by **multidrug-resistant bacteria** are foreseen to cause the upcoming worldwide pandemic, already being today a major healthcare emergency with thousands of deaths every year. It is an evidence that the implementation of novel and more efficient diagnostics in clinics can drastically change the course of disease spread and greatly aid in clinical management of the patients. New diagnostic tools for infectious diseases are required to provide reliable on- site testing, reaching or improving the sensitivity and specificity of current techniques, and circumventing some of their limitations, such as the long turnaround assay time or the need of centralized and laboratories. But simple infection detection is not enough when available antibiotic therapies are starting to fail against resistant bacteria and more specialized therapies are needed. Therefore, diagnostic systems must certainly evolve to become integrated multifunctional analysis solutions for efficient disease identification and personalized medicine administration and follow up.

**PHITBAC** aims to significantly contribute to these next-generation diagnostics by introducing a new, disruptive, and versatile **point-of-care nanobiosensor technology** for the **whole diagnosis and clinical management of bacterial infectious diseases**. Designed with a rational and holistic approach, the groundbreaking diagnostic device will provide rapid detection of most relevant pathogenic bacteria, including an on-site identification of antibiotic resistance, and a personalized monitoring and evaluation of antimicrobial therapy effectivity. The **PHITBAC** technology is based on nanophotonic biosensors, which offer outstanding sensitivities for multiplexed label- free analysis, in a few minutes (15-30 min sample-to-result), using a minimum volume of patient samples (e.g., 10  $\mu$ L of plasma), and a unique potential for integration in miniaturized and portable devices that deliver simple and easy understandable analysis results. Furthermore, this project seeks the complete implementation of novel in-vitro diagnostic (IVD) technology with a clear vision on technology transfer and exploitation. For that, we will manufacture our own high- quality bioreceptors (**bioengineered nanobodies and aptamers**), especially designed for rapid and cost-efficient mass production, and the device will be fully validated for **real clinical settings**, like Hospital emergency and intensive care units.

The **PHITBAC** consortium is composed by renowned scientists from two research centers of excellence, the Catalan Institute of Nanoscience and Nanotechnology (ICN2, Barcelona) and the National Biotechnology Center (CNB-CSIC, Madrid), prestigious clinicians from two reference Hospitals in infectious diseases (i.e., Vall d'Hebron Hospital – VHIR – and Hospital del Mar – IMIM –, Barcelona), and two fully-established Spanish companies with demonstrated success and prosperity (i.e., Biomedal S.L., Sevilla, and Aptus Biotech S.L., Madrid) that will be key for attaining a high-quality, reliable, and robust IVD device. The project is coordinated by CSIC Prof. Laura M. Lechuga (ICN2), a world leader in photonics nanotechnology for biosensing applications.

## Financiación

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## Importe

156.216,00 euros