# Perfil (FD) Codi projecte: PID2023-148538OB-I00

El projecte amb codi PID2023-148538OB-I00 (finançat per l'Agència Estatal d'Investigació) del Centre / Departament de Ciència i Enginyeria de Materials (CEM) de la Universitat Politècnica de Catalunya (UPC) convoca la sol·licitud d'un doctorand en el projecte anomenat: *"Dynamic and stimuli-responsive multifunctional biomaterials: addressing cell instructive and antibacterial properties for bone tissue engineering"* (DYNAMIC).

**Descripció del lloc de Treball / Job description**

We are looking for a motivated PhD student to join our team in the field of smart antibacterial biomaterials. The project focuses on designing and developing novel stimuli-responsive metallic and hydrogel materials, embedded with antibacterial peptides. These biomaterials will not only offer improved mechanical and physical properties but also provide effective protection against bacterial infections.

This is a highly interdisciplinary project that integrates key principles from chemistry, materials science, and microbiology. The successful candidate will have the opportunity to collaborate with researchers from a variety of scientific disciplines, gaining comprehensive experience across multiple fields. Throughout the project, the student will develop expertise in peptide synthesis, material functionalization and hydrogel formulation. Additionally, the research will involve advanced training in microscopy, rheology, microbiology and cell culture techniques.

This position offers an excellent opportunity to acquire a wide range of skills and work at the cutting edge of antibacterial biomaterials research.

Detailed Tasks:

- Lead the design, synthesis, and characterization of responsive antibacterial peptides.
- Functionalize and characterize metallic biomaterials.
- Develop and optimize the formulation of hydrogels.
- Conduct experiments to test the antibacterial and cell instructive properties of the developed biomaterials.
- Prepare detailed technical reports, presentations, and publications to disseminate research findings.
- Collaborate with interdisciplinary teams, including materials scientists, microbiologists, and engineers, to integrate the various aspects of the project.

**Perfil candidat/a / Candidate profile**

The successful applicant should be motivated by academic research and have a background in materials science, engineering, biotechnology, or chemistry. The candidate should demonstrate the ability to devise, review, and deliver complex procedures, and work independently towards pre-defined goals, maintaining accuracy and precision in all areas of work. Proficiency in English is required.

- **Required Qualifications:** Background in materials science, chemistry, engineering, biotechnology, biomedical sciences, or related fields.
- **Preferred Experience:** Peptide synthesis, biomaterials fabrication and characterization, cell culture and microbiology. Previous experience in these topics is advantageous, but not mandatory. However, a strong willingness and motivation to broaden your expertise by engaging with interdisciplinary fields is essential.

**Breu descripció del projecte / Short description of the project**

This project aims to develop stimuli-responsive multifunctional biomaterials capable of simultaneously improving bone regeneration while mitigating bacterial infections. In particular, we ambition three major goals, generating knowledge beyond the current state of the art:

1. To design bacteria-specific sensitive linkers capable of releasing in a temporal controlled manner antibacterial peptides only in the context of bacterial infections.

2. To combine these systems with cell instructive cues to produce multifunctional biomaterials (titanium and hydrogels) addressing cell instructive and antibacterial properties in a dynamic, stimuli-responsive manner.

3. To exploit these materials as advanced platforms to study cell-bacteria interactions in real time, and to produce novel biomaterials for improving bone regeneration under challenging infected settings.

We propose an unprecedented and innovative approach to produce stimuli-responsive multifunctional biomaterials, capable of promoting bone growth and delivering antibacterial agents in a time-controlled manner in the context of an infection. This strategy provides a novel solution in bone tissue regeneration and would mark a substantial advancement in the field.