DC10: Development of bioengineered plasmonic platform for *in vitro* management of chronic wound infections by label-free SERS

Host institution: University of Vigo, Vigo, Spain

Supervisor: Prof. Gustavo Bodelón

Co-supervisors: Prof. Jorge Pérez-Juste (University of Vigo), Prof. Isabel Pastoriza-Santos (University of Vigo), Dr. Natalia Baranova (CIC biomaGUNE)

Project description: Chronic wound infections are difficult to assess due to the lack of non-invasive techniques capable of monitoring biofilm development and infection dynamics within physiologically relevant environments. Current analytical methods are often destructive and provide limited insight into real-time biochemical processes.

This PhD project focuses on the development of bioengineered plasmonic platforms for label-free detection of infection biomarkers using Surface-Enhanced Raman Scattering (SERS). In particular, the project will integrate plasmonic gold nanoparticles into three-dimensional in vitro skin models with increasing structural and biological complexity, progressing towards full-skin human models.

A key objective is to enable non-invasive monitoring of bacterial metabolites directly within the engineered tissue environment. The project will investigate both single- and multi-species biofilms, including clinically relevant pathogens, to better understand infection progression and interspecies interactions.

The doctoral candidate will be trained in plasmonic nanomaterials, SERS-based detection, bioengineered tissue models, and microbiological techniques. The outcomes will contribute to the development of advanced diagnostic platforms for real-time infection monitoring within the broader HEAL-4WARD programme.

Host laboratory: DC10 will be hosted at the University of Vigo within the Functional NanoBioMaterials Group, specialised in the synthesis and application of plasmonic nanomaterials for sensing and biomedical applications. The group has strong expertise in the colloidal synthesis of metal nanoparticles with precise control over size, shape, and composition, enabling the tuning of their optical properties, particularly in the visible and near-infrared range.

Research activities focus on the design of advanced plasmonic nanostructures and their assembly into functional materials through approaches such as layer-by-layer deposition and self-assembly on diverse platforms, including hydrogels and polymer-based systems. A central strength of the group lies in the development of SERS for sensitive, label-free detection of chemical and biological analytes.

The laboratory also explores the integration of nanomaterials with biological systems, including the development of biosensing platforms, imaging tools, and hybrid materials capable of interacting with bacterial processes.

Secondments: This project is carried out in collaboration with the following groups, and visits to their laboratories are expected during the project. A willingness to travel and spend time abroad is therefore essential:

- Dr. Vincenzo Taresco, University of Nottingham, Nottingham, United Kingdom
- Dr. Natalia Baranova, Centro de Investigación Cooperativa en Biomateriales CIC (biomaGUNE), Donostia-San Sebastián, Spain

Eligibility conditions:

- Master's degree in Nanoscience, Chemistry, Materials Science, Biomedical Engineering, Biotechnology, or related fields.
- Applicants must be doctoral candidates, i.e not already in possession of a doctoral degree.
- Mobility rule: researchers must not have resided or carried out their main activity in the country of the recruiting beneficiary for more than 12 months in the 36 months immediately before their recruitment date.

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Required skills:

- Experience in nanomaterials or optical materials research (e.g. synthesis or characterisation of metallic nanoparticles), ideally demonstrated through Master's thesis work or research internships.
- Familiarity with spectroscopy, bioengineered in vitro models, or biomaterials would be beneficial.
- Prior exposure to microbiology, cell culture, or bioanalytical techniques is an advantage.
- Proficiency in the English language is required, as well as good communication skills, both oral and written. Successful candidates will need to provide an English test (e.g. IELTS, TOEFL, Cambridge English). You may be exempt if you are a national of a majority native-English speaking country, or have qualifications / degree that has been taught and assessed in English. The supervisor may also confirm that a candidate has the required level of English.

Remuneration:

The Doctoral Candidate will receive a monthly gross salary of EUR 3411,33 in accordance with the MSCA Doctoral Networks programme, including a living allowance, a mobility allowance and a family allowance (if applicable). This amount corresponds to the contractual gross salary and is indicated before deduction of employee taxes and social security contributions. The net salary will depend on local taxation, social security and employment regulations.

Enquiries:

For general information about the HEAL-4WARD Doctoral Network visit the project website (www.heal-4ward.eu) or send an email to heal4ward@gmail.com. For additional information on this project please contact Prof. Gustavo Bodelón (gbodelon@uvigo.gal).

How to apply

To learn more about the application process, visit the HEAL-4WARD recruitment web page (www.heal4ward.eu/open-positions).

Required documents:

- Statement of interest (limit of 2,500 characters) explaining why you wish to be considered for the fellowship and which qualities and experience you will bring to the role.
- Curriculum vitae et studiorum.
- A certificate of University examinations taken (with marks).
- A final degree certificate translated in English. If, at the time of application, candidates should not be yet in possession of a degree certificate, they can submit it at the time of the examination.

A limited number of applicants will be invited for an interview and will be required to provide contact information of up to two contact person for reference letters.

Application deadline: The closing date for applications is **12 June 2026.**