DC3: Nanoparticle detection of nucleic acids from pathogens

Host institution: IIS Biogipuzkoa Health Research Centre, Donostia-San Sebastián, Spain

Supervisor: Prof. Charles Lawrie

Co-supervisors: Dr. María Armesto, Biodonostia Research Institute (Academic); Dr. Carlo Vascotto, University of Udine (Academic); Dr. Thomas Frischmuth, baseclick GmbH (Industrial)

Project description: The clinical standard for detecting infectious pathogens is based on the identification of specific nucleic acids (DNA or RNA), with PCR-based technologies, sequencing methods, and virological assays serving as the current gold standards. Despite their accuracy, these approaches are slow, costly, and centralized in reference laboratories, making them insufficiently scalable to meet current and future diagnostic demands. This highlights the need for a rapid, scalable, point-of-care (POC) nucleic acid detection technology.

We have developed a novel platform based on gold colloidal biosensors capable of detecting specific viral nucleic acids directly from biological fluids, without the need for prior purification steps or enzymatic amplification. The aim of this project is to optimise this technology, expand it to detect multiple clinically relevant pathogens, and prepare it for commercialisation and large-scale production. This will include analytical validation, clinical testing, and compliance with current in vitro diagnostic legislation.

This is a multidisciplinary project spanning material sciences, biomedical research, technology development, and commercialisation. We are therefore seeking a candidate with flexibility, strong motivation, and a genuine enthusiasm for advancing healthcare technologies. Prior experience in one or more of the following areas would be advantageous: nanomaterials or biosensors, molecular diagnostics, biomedical device development, or translation of research technologies toward clinical or commercial application.

Host laboratory: IIS Biogipuzkoa is a dedicated biomedical research centre that forms part of the provincial teaching hospital (University Hospital of Donostia) located in the Basque country of Spain. Dr. Lawrie's Molecular Oncology research group uses a multidisciplinary approach to combat cancer, integrating the discovery and validation of clinically relevant biomarkers with the development of novel diagnostic tools, advanced drug delivery systems, and innovative therapeutic technologies.

As part of the provincial teaching hospital our laboratory has enviable access to clinical samples and a very strong connection with oncology medical services. The laboratory itself has full access to laboratories for handling mammalian and human cell cultures; flow cytometry facility; microscopy facility, genomics and histology platforms, clinical trials unit etc.

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:

- Prof. Lei Zhang, Sino-Swiss Institute for Advanced Technology (SSIAT), Shanghai University, China

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Research Executive Agency. Neither the European Union nor the granting authority can be held responsible for them.

Funded by the European Union

Eligibility conditions:

- Candidates should hold a Master's degree in a relevant discipline such as materials science, biomedical engineering, biotechnology, chemistry, or a related field.
- 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.

Required skills:

- Bioinformatics and/or computational biology experience (e.g. through Master thesis work or research internships) with large-scale *omics* datasets would be an advantage.
- Experience in one or more of the following is desirable but not essential: nucleic acid detection methods, nanomaterials or colloidal chemistry, biosensor development, diagnostic assay validation, or regulatory/translation aspects of medical devices.
- Strong interest and/or experience in multidisciplinary research, particularly at the interface of nanomaterials, biosensing, and healthcare technology.
- Good communication and teamwork skills, with the ability to collaborate across disciplines (materials science, biomedical sciences, clinical partners, industry).
- 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 can also confirm that a candidate has the required level of English.

Enquiries

For general information about the INT2ACT Doctoral Network visit the visit the project website (www.int2act.eu) or send an email to int2act@gmail.com. For additional information on this project please contact Dr. Charles Lawrie (Charles.lawrie@bio-gipuzkoa.eus).

How to apply

To learn more about the application process, visit the INT2ACT recruitment web page (https://int2act.eu/open-positions/).

Required documents:

1. 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.
2. Curriculum vitae et studiorum.
3. A certificate of University examinations taken (with marks).
4. 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.

All documents must be merged into a single PDF file, in the order listed above.
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 **January 31 2026.**