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# PhD-Development of spectro-electrochemical methods for the determination of antibiotic residues in milk

**DI-6 PhD – Development of spectro-electrochemical methods for the determination of antibiotic residues in milk**

**Contract: Full Time/Fixed Term**

Antibiotics are widely used as a medicinal drug to treat numerous bacterial infections both in human beings and animals. In cattle, the administration practice of these synthetic compounds is prophylactic to prevent diseases or therapeutic mainly to combat the mammalian glandular infection. As a matter of fact, the presence of antibiotic residues in milk is common and the risks to human exposure could cause several consequences such as bacterial resistance and allergic side effects.

The goal of this work is the development a simple and fast method to identify and quantify antibiotics from different classes in milk, including b-lactams, sulfonamides, tetracyclines, macrolide and cephalosporin, using a spectro-electrochemical method. The method will combine electrochemical readouts (cyclic voltammetry) with spectral readouts generated by Surface Enhanced Raman Scattering (SERS). The SERS phenomenon is based on the amplification of Raman signals of analytes adsorbed on the surface of metal nanostructured surfaces. SERS has shown sensitivities down to single molecule detection and high selectivity, due to its fingerprinting abilities. However, SERS is usually a qualitative technique. On the other hand electrochemical methods are quantitative but show lower sensitivity of detection. The aim of the project is to fabricate an analytical platform combining electrochemical and SERS readout thus offering high sensitivity, selectivity and quantitative measuring capabilities.

Tyndall National Institute at University College Cork invites applications for a PhD opportunity as part of the [Science Foundation Ireland](#) funded SFI centre [VistaMilk](#). The [Nanotechnology Group - Tyndall National Institute](#) at University College Cork, is focusing its research in Nano- design and -fabrication with the aim of making smart sensors for multiple applications. We now wish to recruit a PhD fellow to develop the generation of novel sensors for milk quality applications. Key research themes will include development, fabrication and characterisation of novel spectro-electrochemical sensors.

## **Key Responsibilities**

This is a PhD position of 48-month duration. The responsibilities will include:

- The synthesis and characterization of SERS probes.
- Design and fabrication of electrochemical sensors.
- Incorporation of electrochemical and spectroscopic units in single platforms.
- Demonstration of antibiotic residue detection in milk substances.

## **Essential Criteria**

- The successful candidate for this position will have a BSc or an MSc in a relevant field e.g. materials science, nanotechnology, nanoscience or chemistry.

- The candidate should be able to work independently, and have excellent theoretical and experimental skills.
- Fluent command of English is required.
- Knowledge or experience in micro- and nanofabrication is considered as a key advantage.
- Moreover, knowledge of electrochemistry and electrochemical characterisation techniques is also greatly appreciated.
- Most importantly, the Nanotechnology group in general, and this project in particular are very challenging multidisciplinary environments. It is therefore essential to show willingness to look beyond disciplinary boundaries, to learn new techniques and skills required for this project.

### **Desirable Criteria**

- Ability to work in a team environment.
- High motivation with excellent organizational and communications skills.
- Experience with materials science characterization tools (e.g., optical and electron microscopy, infrared/Raman spectroscopy, electrical characterisation methods)
- Willingness to work on a variety of projects and learn new techniques.
- Demonstrated fundamental verbal and written communication skills necessary to work in a multidisciplinary team environment, author technical and scientific reports and publications, and deliver scientific presentations.

An annual student stipend of €18,500 applies for this successful candidate for this position. Yearly University academic fees will be paid by the Tyndall National Institute.

### **Application Instructions**

**Step 1 - click [here](#) to download the Application form and indicate the Job reference DI-6**

**Step 2 - return the completed Application form, together with your CV and motivation letter to [careers@tyndall.ie](mailto:careers@tyndall.ie).**

*Postgraduate applicants whose first language is not English must provide evidence of English language proficiency as per UCC regulations*

(<https://www.ucc.ie/en/study/comparison/english/postgraduate/>). Certificates should be valid (usually less than 2 years old) and should be uploaded with their application. In special circumstances the panel may consider a prior degree in English (e.g. Master thesis written in English) as evidence of English language proficiency.

Please note that Garda vetting and/or an international police clearance check may form part of the selection process.

The University, at its discretion, may undertake to make an additional appointment(s) from this competition following the conclusion of the process.

At this time, Tyndall National Institute does not require the assistance of recruitment agencies.

Tyndall National Institute at University College, Cork is an Equal Opportunities Employer.