



Postdoctoral Research Associate

Development of magneto-microsensors for bacteria detection

Key words: Bacteria, Peptide-functionalized magnetic nanoparticles, Microfluidic, Biosensors.

The Galien institute of Paris-Sud and the Institute of Fundamental Electronic are seeking for a postdoctoral candidate at the interface between biochemical, electrical engineering, microfluidic and nanotechnology research fields. The position is open for 12 months (possibility for 6 months extension) and will start as soon as the position will be filled.

General context:

The project aims at developing a biosensors based on, electromagnetic and highly specific detection relying on the use of innovative microcoils integrated into a microfluidic channel. The principle of the sensing technique consists on the detection of magnetic nanoparticles bio-fonctionnalized with antibodies by combining a selective extraction of the bacteria from a complex medium and its quantification by the biosensor in a single step. The biosensor will be applied first to the detection of Escherichia coli (E.coli). For this purpose microcoils will be embedded in a microfluidic device made of PDMS. Magnetic nanoparticles (NP) will be injected and immobilized in the microsystem by microcoils of trapping in order to control their bio-functionalization with specific antibodies. Two functions will be targeted (i) highly specific biological recognition using antibodies directed against the E. Coli (ii) sensitive detection and quantification of the bacteria with the magnetic signal from the NP. This signal will be detected by the integrated micro-coils, with specific dimensions for detection, underlying the fluid microchannels. In this context, the activities of the post-doctoral research will combine several microfabrication technologies (cleaning room at CTU-MINERVE IEF) with different materials composed the micro-sensor (magnetic alloy, copper ...) and biological protocols performed in suitable materials (glass, flexible polymer (PDMS, PARYLENE ...)). The objectives are to validate the integration of all features on a single microfluidic lab-on-chip. Then, a simultaneous detection of bacteria by parallelization of micro-coils along the microfluidic channel will be probably investigated. The work will be also conducted in collaboration with the team of bacteriologists (EA 4043, Bacteria, pathogens and health, Faculty of Pharmacy, University of Paris-Sud).

This postdoctoral position offers a strong interdisciplinary experience between engineering, nanotechnologies and biology. The project "Integrated Multi-Modal Analysis for Biodefence" (AMMIB) has been recently founded by the French National Agency of Research (ANR).

Environment:

The candidate will work in close collaboration between Institut Galien Paris Sud and Fundamental Institute of Electronic.

Candidate profile:

Experience in bacteriology is mandatory. Skills among the following research fields: micro-nanofabrication processes, magnetic and microfluidic engineering (design of microfluidic chamber for immunoassays). In addition, experience and strong interest in biology, and environment will be appreciate .

Contact : claire.smadja@u-psud.fr, mehdi.ammar@u-psud.fr

Salary : 2100 euros/month after taxes.

