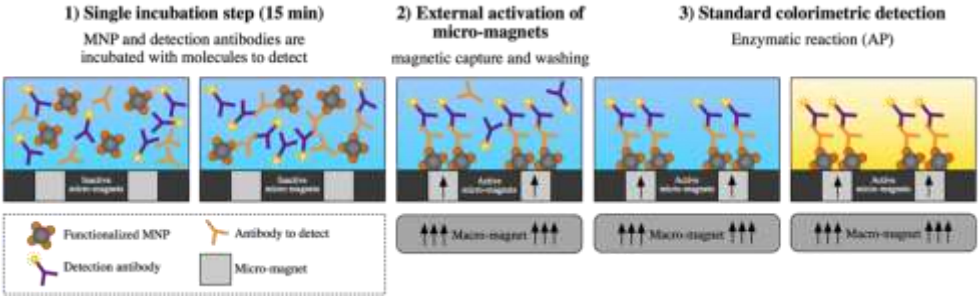
2019-2020

Internship proposal at LMGP-G2ELab.

Development of a portable instrument for molecular diagnostic

Abstract

Magnetic capture of nanometer-sized superparamagnetic particles was developed in Grenoble thanks to the collaboration of four research teams at Néel Institute, G2Lab, LMGP and Institue for Advanced Biosciences. A small company was launched in 2017 MagIA Diagnostics, which is marketing a portable device (left image) to perform fast immunoassays. The different steps of the immunoassay are represented on the right image.



Besides immunoassays, medical in-vitro diagnostics extensively uses end-point or quantitative PCR assays, to measure the concentration of nucleic acids of interest in biological fluids. They can be used to detect pathogens (bacteria, viruses), In end-point PCR, the amplified PCR product is commonly characterized by agarose gel chromatography and fluorescent staining. The detection part is relatively long. In quantitative PCR, the amount of amplified product is quantified by fluorescence at each cycle of the PCR. Quantitative PCR instruments are relatively bulky, and MagIA Diagnostics aims at modifying the instrument developed for immunoassays to perform both end-point and quantitative PCR.

Project description

The feasibility of using MagIA Diagnostics instrument to detect fluorescent PCR product has already been demonstrated last year. The project will therefore concentrate on two aspects: (i) using MagIA Diagnostics technology to extract DNA of interest from biological samples and (ii) using MagIA Diagnostics instrument to perform quantitative PCR. The student will work on one or these two projects.

Methodology: For DNA extraction glass-coated magnetic nanobeads will be used. A separation instrument is already available at MagIA diagnostics (MagWasher), that will be adapted for this purpose. The concentration and the quality of the purified DNA will be analyzed and compared to that obtained by manual extraction procedure.

For quantitative PCR, functionalized magnetic nanobeads will be used. The evolution of the signal measured by MagIA Diagnostics instrument will be recorded as a function of the number of PCR cycles performed and compared to the one measured in a regular qPCR instrument. A MagIA Diagnostics instrument is available at LMGP.

Objectives: The outcome will be to endow MagIA Diagnostics the capacity to address all the needs of in vitro diagnosis.

Scientific environment:

The candidate will work at LMGP, Materials and Physical Engineering Laboratory, and G2ELab, Grenoble Electrical Engineering Laboratory, in close collaboration with Sarah Delshadi, head of Biological Development and Guillaume Blaire, CTO at MagIA Diagnostics. MagIA Diagnostics is located in the suburb of Grenoble and easily accessible by tram. Located in the heart of an exceptional scientific environment, the LMGP and G2ELab offer the applicant a rewarding place to work.

MagIA Diagnostics Web site : http://www.magia-diagnostics.com/

G2ELab Web site : http://www.g2elab.grenoble-inp.fr/en

LMGP Web Site: http://www.lmgp.grenoble-inp.fr/

Profile & requested skills:

We look for a student with a strong knowledge in biochemistry and/or biophysics and a clear interest for technology and innovation. The student should be able to work in a team, have good writing skills (report, presentation…) and a good knowledge of spoken and written English.

The internship will be from February 2020 for a duration of 6 months.

Subject could be continued with a PhD thesis: Possibly

Allowance: Internship allowance will be provided

CONTACT

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