

# Master 2/PFE internship : Development of functionalization of micro-bubbles in microfluidic chip for an acoustic bio-sensor

## Background

This project is part of a research project BIAcoustic that aims to develop a new biological sensor based on bioanalyte capture at the surface of bubbles and acoustic probing.

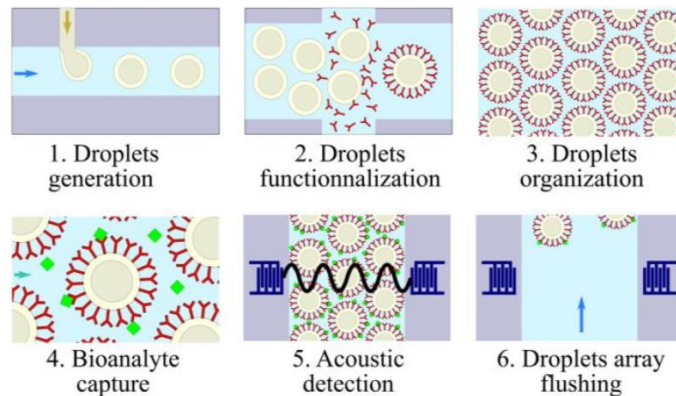


Figure 1 : Principle of bioanalysis based on ligand decorated droplet/bubble capture.

As we have recently shown (<https://aip.scitation.org/doi/10.1063/1.5115494>) with microdroplet of soja oil the interest of using micro-droplet for bioanalysis are high in terms of sensitivity, capture of rare circulating bioanalytes and ability to provide simple regeneration of the sensor sensitive surface. However, the acoustic probing that we have chosen because of its high sensitivity, is facilitated by using air bubbles instead of oil droplets, and we need to develop a strategy for decorating the surface of the bubbles with ligand to capture the bioanalyte of interest.

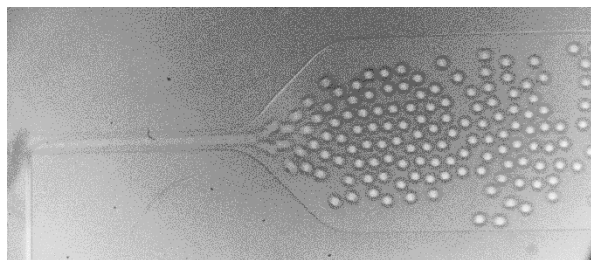


Figure 2 : example of monodisperse micro-bubble generation in microfluidic chip.

The main part of the project is conducted by a PhD student who is more focused on the acoustic and microfluidics aspects, but the work conducted in this project is key for providing meaningful tests and verify the performance of such device.

## Description of the internship

The two main objective for the student recruited in this project will be:

1. Develop a strategy for functionalization at the interface between air and water that could carry a biological ligand for bubble interaction test.
2. Produce functionalized bubbles in a microfluidic chip. The design of the chip and the production of the micro-bubbles will be made in cooperation with a PhD student working on the BIAcoustic project.

## Means

This Master project/ engineer internship will be done at IPGG in Paris in the group of J. Fattaccioli (<https://fattacciolilab.wordpress.com/>) and at FEMTO-ST Institute in Besançon in the BMD team (BioMicroDevices <https://teams.femto-st.fr/BioMicroDevices/en>).

The candidate will be based in Besançon or in Paris during the internship, and occasionally when needed he/she will be visiting the other site to get access to both teams experience and testing equipment in bio-chemistry, microfluidics, microfabrication and characterization for biomedical applications.

The candidate will have access to the IPGG and MIMENTO platform of FEMTO-ST for clean room micro-fabrication, and bio-analytical tool at IPGG.

Exchanges between the candidate and the PhD student working on the BIAcoustic project at FEMTO-ST will be an important part of the project.

## Keywords

Bio-chemistry, Surface functionalization, Bubbles, Microfluidics, Microfabrication, Bio-interactions.

## Minimum Qualifications

Be in a Master degree / last year of engineering school in a relevant field (chemistry, biochemistry, biomedical device, microfluidic systems)

Strong interest in biomedical field and chemistry

Experimentalist with curiosity and adaptability for interdisciplinary projects and environment

## Soft Skills

Passion for science and the ability to multi-task and set priorities

Excellent oral and written communication skills.

## Contact

**Send enquiry, CV and motivation letter before end February 2022 to:**

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