

Position description

Development of an innovative microfluidic instrument.

Academic partnership

ESPCI (<http://www.lcmd.espci.fr>) and TWB (<http://www.toulouse-white-biotechnology.com>).

In the **Laboratoire de Colloïdes et Matériaux Divisés** at **ESPCI** we develop microfluidics tools for the control of droplets dispersed in an oil phase (water/oil emulsion) inside glass and PDMS chips. Each microorganism is randomly encapsulated within a growth medium droplet that acts as an individual micro-bioreactor.

In this project, subpopulations of growing cells will be differentially submitted to metabolic perturbations resulting either from light or temperature-induced recombinant gene expression, changes in oxygen or carbon dioxide concentrations, or chemical stresses and their physiological response dynamically analyzed. Based on real time windowed multi-parametric analysis, individual droplets will be selected and recovered to allow complementary genomic and transcriptomic analyses down to single cell level.

Goals of the project

Project aims to develop a microfluidic platform allowing real time monitoring of metabolic and energetic balance shifts in engineered microbes within controllable and adjustable microenvironments.

The main objectives will be to develop:

1. A microfluidic platform to evaluate in real-time growth and metabolism as a function of perturbations. This platform will include image analysis of the acquired data.
2. A collection device to select for individual clones to be sent for metabolomics and genomics analysis. This will include the development of a robotic system and real-time image analysis.

Role of the candidate

The candidate will take part in various steps of the development of a microfluidics system dedicated to the screening of bioengineered micro-organisms, in collaboration with the members of the laboratory already involved in the project. The candidate will develop the instrument and the programs to run the full protocols

1. First development will be the acquisition and image analysis of the clones
2. Second development will include clone selection by programming valves and robotic as well as real-time data analysis

Desired skills and qualifications

The candidate should be an engineer or hold a PhD with expertise in one or more of the following fields: electrical engineering, robotics and instrumentation. Candidate should also be proficient in Labview programming or any other language for industrial applications programming. The project is highly multidisciplinary so the candidate should be ready to work and interact with chemists and biologists from both academia and industry. Additional experience or interest in instrument development, or microfluidics would be advantageous but not essential.

About LCMD

The Laboratory of Colloids and Divided Materials (LCMD) possess a deep experience in designing and developing novel colloidal particles as well as being one of the lab leaders in colloidal science. Digital Microfluidics and High-throughput Screening has become one of the most challenging topics throughout these last 5 years. We are currently exploring questions related to diversity in biology and biochemistry. The ability of water droplets to be treated as independent reservoirs allows following millions of independent micro-organism cultures and to identify for each of them their growth curve and their relative difference. Colloidal Materials and novel colloids have been for long one of the major source of innovation of LCMD. This includes monodisperse Brownian droplets, magnetic iridescent emulsion, double wax emulsion and magnetic dumbbells.

Start date and duration of contract

The expected start date is 5th of January 2014. The salary will be up to 2,500 Eur/month depending on experience. The project will be for 12 months with possibility of recruitment in a start-up company.

Application procedure

Applications, including a CV and the names of at least 2 referees, should be sent to Dr. Laurent Boitard
[\[laurent.boitard@espci.fr\]](mailto:laurent.boitard@espci.fr)