

Practical workshops - 29th of June, 2017

The following practical workshops have been designed in collaboration between representatives of companies specialized in microfluidics and researchers from the organization committee. They have been designed to introduce you to the potential of up-to-date microfluidics systems, while using them in practical cases. Each participant will follow to one of the three technical workshop but will be able to browse around freely during the last hour of the dedicated time slot, in order to discuss with the various researchers/representatives involved.

1 Practical workshop 1: Microfabrication and photo-patterning with PRIMO (Alveole Lab).

This workshop is built around the illumination system PRIMO, here used in the framework of applications for microfluidics. First, to create a SU8 mother-mould that can be used for PDMS chips replications. Then, to select some regions of interest in the microfluidic device where proteins will be grafted, after a localized surface activation by a photo-activated reactant. These two applications of PRIMO will be presented by Pierre-Olivier Strale and Nadia Ziane from Alveole Lab, from the microfluidic chip design (using a dedicated software) to the visualization by microscopy of the protein-functionalized areas.

2 Practical workshop 2: Diffusive mixing in a microchannel. Microfabrication, experiments and numerical simulations with Comsol.

This practical workshop is composed of three sub-parts.

- S. Cargou from BlackHole Lab will present an up-to-date review of microfabrication techniques, before turning to the use of dry-film lamination (e.g. to fabricate a mother mold).
- Mixing by diffusion will be studied experimentally in a classical flow configuration (co-current flow following a Y-shaped inlet). Flow control will be ensured by pressure controllers from Elveflow. Direct visualizations by fluorescence microscopy will allow to quantify the impact of the experimental control parameters on mixing and measurements of transverse concentration profiles will be performed.
- The computational software Comsol Multiphysics will be applied to simulate the experimental configuration. After a short introduction about the concept of numerical simulations, a global overview of Comsol capabilities and use will be exposed.

The experimental configuration will be simulated. Note that the participants to his workshop will be able to download and instal a full version of Comsol on their personal computers (just check: <https://www.comsol.fr/system-requirements>).

3 Practical workshop 3: Protein concentration measurements in flowing micro-droplets

Proposed and supervised by S. Teychené from LGC (Chemical Engineering Lab, Toulouse), together with Isaac Rodriguez-Ruiz, a post-doc student.

Lysozym concentration within droplets generated in a microfluidic chip will be measured online by UV spectrometry. Flow control within the microsystems will be performed by flow controllers presented by Thibaut Thupnot from Fluigent.