Masters thesis project available on dry reagent reconstitution in capillary microfluidics

Project Description
One of the main bottlenecks in microfluidics point-of-care diagnostics devices is the storage and release of reagent sequences upon contact with a clinical sample. Recently, we have proposed a general solution to this problem by creating a versatile architecture for the reconstitution of dried reagents on-chip using self-coalescence flows, by using self-coalescence flows, a fluidic analog of the zipper fastener motion (Gökçe et al, Nature, 2019). They enable the creation of complex reagent patterns with minimal dispersion to shape pulses of chemical with high precision. We are now interested in developing a next-generation test infrastructure to demonstrate further the versatility of the method not only for point-of-care diagnostics, but also for combinatorial chemistry in general.

Student profile required
We seek a talented student who wishes to perform his/her Master's Thesis on this experimental project at IBM Research - Zurich, with the following desired skills or interests:

- Background in engineering, chemistry, physics or the life sciences;
- Skills and interest in automatic liquid handling and microsystems engineering;
- Skills and interest in fluid mechanics, transport, and reaction engineering.

Work will be supervised by Dr. Emmanuel Delamarche (IBM Research) and Prof. Thomas Gervais (École Polytechnique de Montréal (Canada)/IBM Research). Starting date can be as early as February 2020.

Please send CV and a short letter of motivation to E. Delamarche or Thomas Gervais

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ADDITIONAL FIGURES:

Fig. 1. Self-Coalescence (right) preserves the spatial concentration profile upon reconstitution of dried reagents as opposed to straight flow (left) which disrupts it.

Fig. 2 Modeling self-coalescence (a.k.a. Zipper flows) in silicon microstructures.

Fig. 3 Illustration of the proposed project. To create complex spatial arrangement of reagents by controlling transport in large self-coalescence module for applications in combinatorial chemistry.