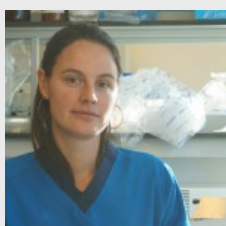




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Under the supervision of Céline Vallot and Leïla Perié, the Single Cell platform was created in June 2018. It uses the droplet-based-microfluidic technology to study cancer cells at the single cell level.

Activities

Single cell platform activities are based on droplet-based-microfluidics. This technology consists in compartmentalizing a sample in droplets at less than a cell per compartment/droplet. Biological analyses are thus individual at the single cell level. Water-in-oil droplets allow the rapid production of an emulsion with the sample: until 20 000



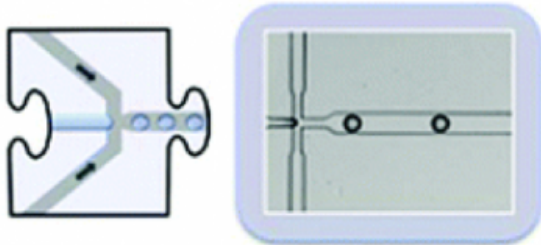
Single Cell platform Platforms

droplets/s. After production, the droplets can undergo a serie of manipulations (see figure below) also at ultra high throughput. It's an ultra high throughput screening system. This technology dramatically reduces assay trials time, reactions volume (up to a million times compared to conventional tubes or plates assays) and costs. Another advantage of individualizing reactions at the single cell level is to take cell diversity into account. Indeed, the very high sensitivity of the analyses in droplets allows analysing both the cells majority and the few rare cells of the sample.

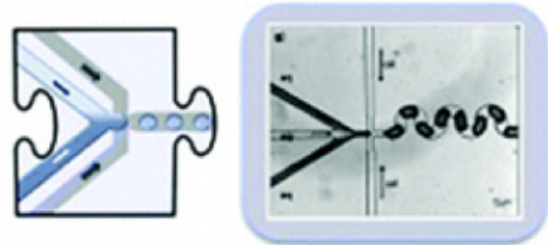
Facilities

- 10X Genomics Chromium 10X for ready for use Single Cell RNA Sequencing experiments
- The inDrop System instrument of 1cellBio to do Single Cell RNA sequencing experiments
- An evolutionary microfluidic station

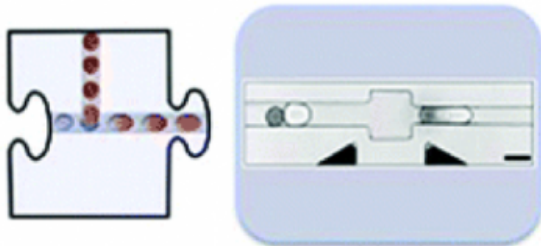
(a) Droplet generation



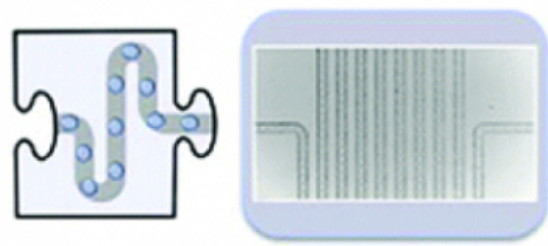
(b) Mixing and generation



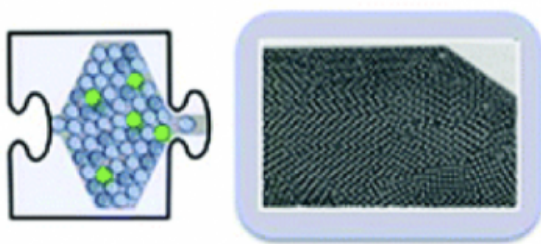
(c) Fusion



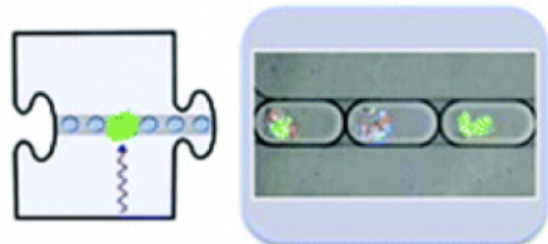
(d) Short-term incubation



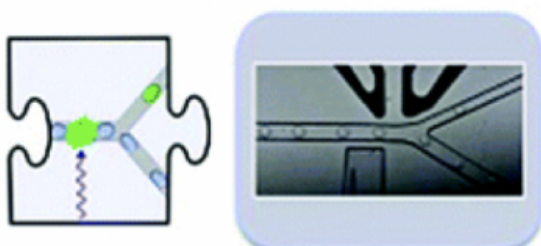
(e) Stationary storage



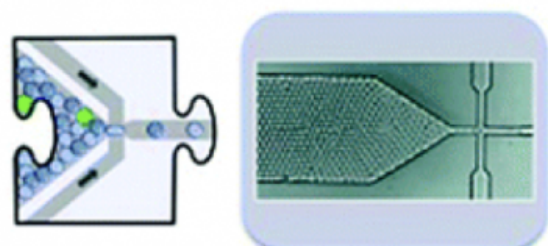
(f) Detection



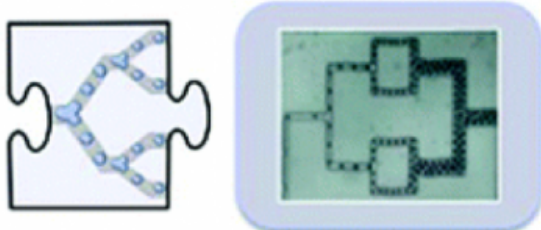
(g) Sorting



(h) Re-injection



(i) Splitting



(j) Off-chip incubation

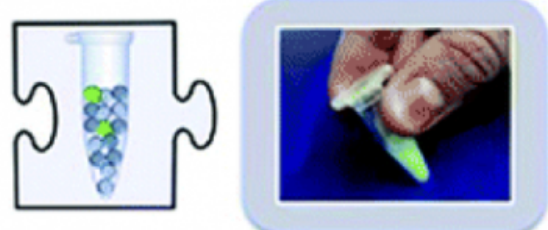


Figure: Modules can be assembled and integrated into a microfluidic platform as needed. (a) generation of droplets, (b) generation and mixing of droplets, (c) fusion, (d) short-term incubation, (e) stationary incubation, (f) fluorescence detection, (g) sorting, (h) reinjection, (i) droplet division, (j) off-chip incubation. Figure from article Kintses B., Van Vliet LD., Devenish S.R., Hollfelder F., "Microfluidic droplets: new integrated workflows for biological experiments" Curr Opin Chem Biol 2010 Oct, 14 548-555 (2010)

Collaboration

The Single Cell platform works in close collaboration with the Pierre-Gilles de Gennes Institute via the Curie laboratories of UMR 168 and the Biochemistry laboratory of ESPCI ParisTech.