



Screening & Fluidics



Georges E. Gaudriault, CEO

Why Screening&Fluidics ?

■ The context

- Screening new biological agents is time-consuming and costly
- How to reduce its cost and duration ?

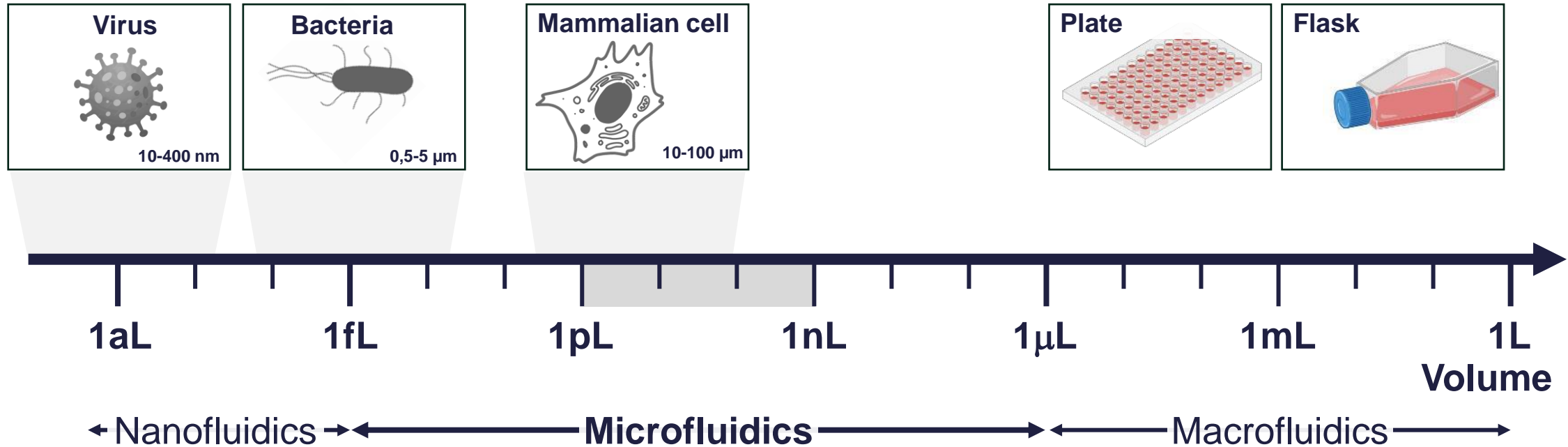
■ The solution ?

- Using droplet microfluidics
- Limitations
 - Major investment (>0.5 M€+Expertise)
 - Almost no service solution

■ Our business model

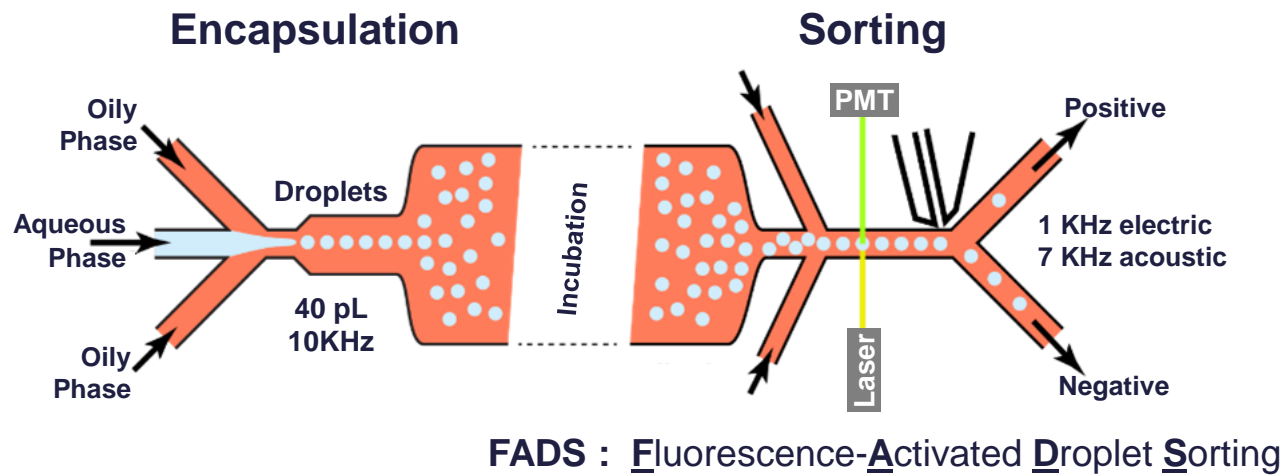
- A custom service in compliance with industrial quality standards
- Feed this service with next generation of droplet microfluidics technology

What is microfluidics ?

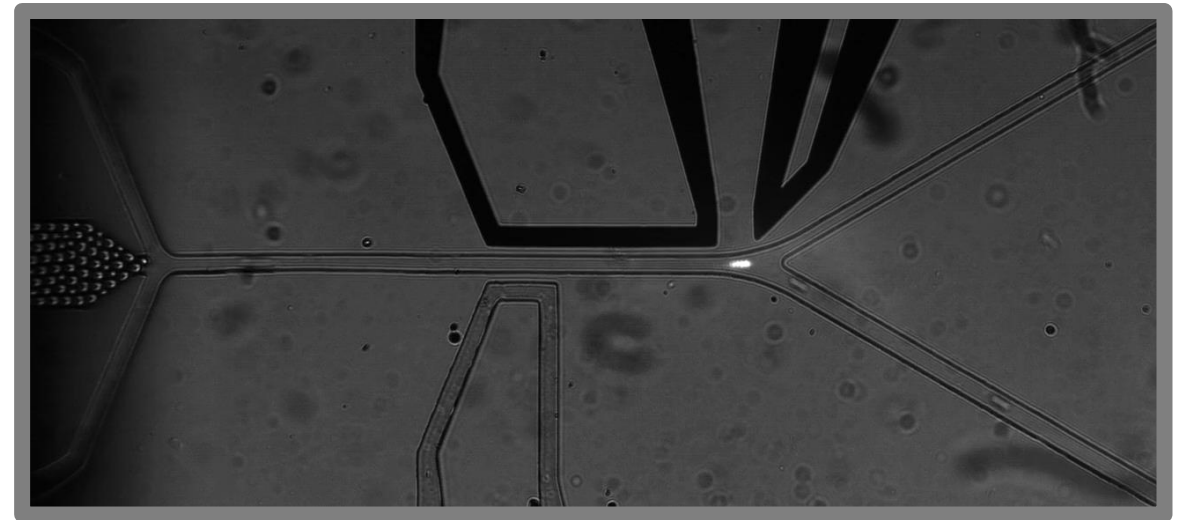


The technology

Droplet microfluidics



500X slow-motion video

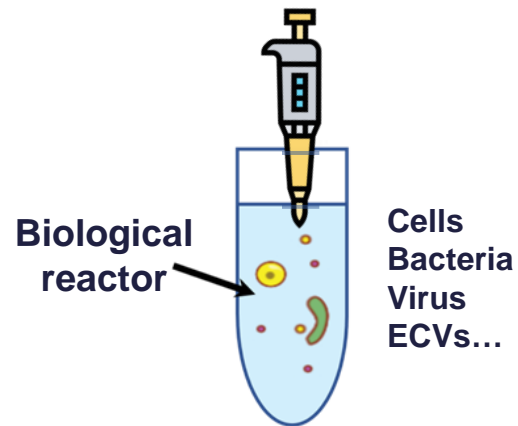


- Drastically reduced experimental volumes (<1nl)
- Versatile operating and analysis methods
- Ultra-high-throughput (>1000 events/sec)

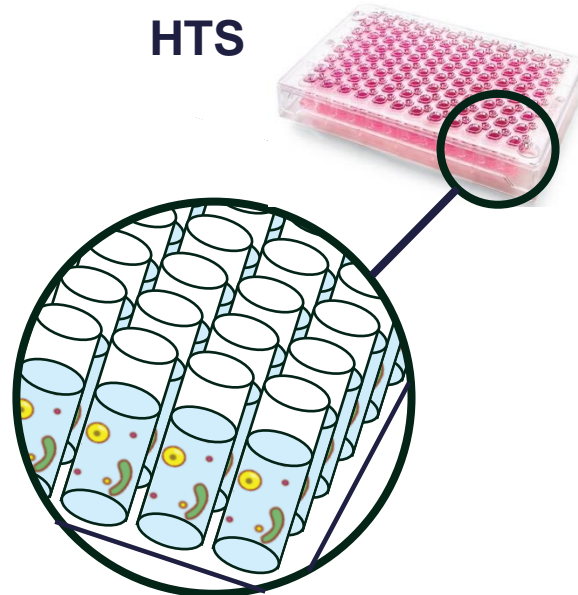
The competing technologies

Technologies	Sorting	Volume	Consumables	Screening	Sorting frequency	CAPEX	Cost of sorting
HTS <small>H<u>igh</u>-<u>T</u>hroughput <u>S</u>creening</small>	Biological reactor	1 000 000 pL	Plastic microplates	Fluorescence, colorimetry, luminescence	2 Hz	+++++	++
FACS <small>F<u>luorescence</u>-<u>A</u>ctivated <u>C</u>ell <u>S</u>orting</small>	Cell	0,5 pL	Capillaries	Fluorescence, diffusion	10 000-25 000 Hz	+++	+
FADS <small>F<u>luorescence</u>-<u>A</u>ctivated <u>D</u>roplet <u>S</u>orting</small>	Biological reactor	40 pL	PDMS devices	Fluorescence, diffusion	5000-7000 Hz	+++	+

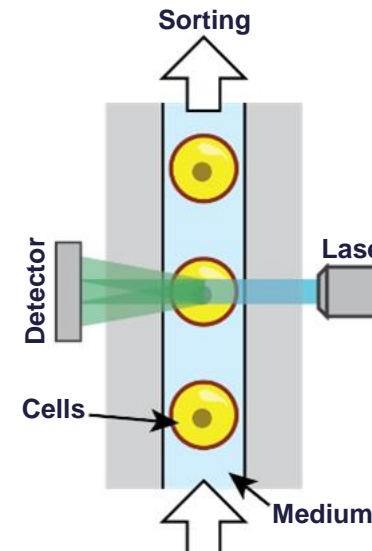
Laboratory



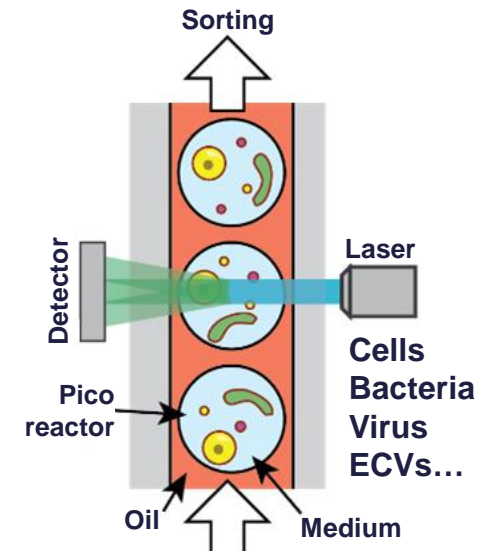
HTS



FACS



FADS



Screening synthetic library of bispecific T cell engagers

HEK293_LPCD19/Blin cells

- express human CD19
- secrete a CD19xCD3 bispecific T cell engager (BiTE) antibody.
- labeled with Red CellTracking Dye

Jurkat-ZsG cells

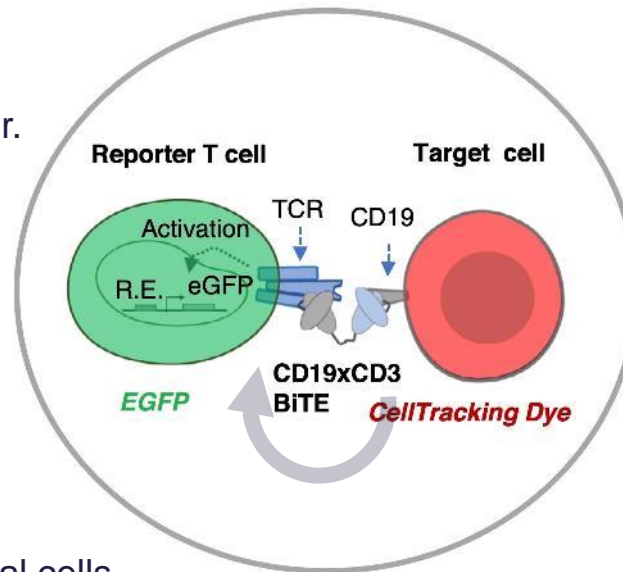
- express eGFP under NFAT promoter.

Droplets sorted for

- GFP signal
- Red fluorescent label

Analytical performance:

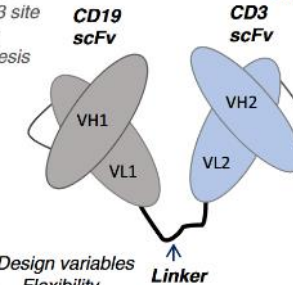
- HEK293_LPCD19/Blin spiked parenteral cells
- Recovery with 95% confidence when diluted 1/12500.



BiTE variant library

1710 variants

Design variables
- Binding affinity
- Epitope location
- VH-VL
Orientation
- CDRH3 site
scanning
mutagenesis



Design variables
- Binding affinity
- Epitope location
- VH-VL
Orientation

7 variants

Total: 47880 variants

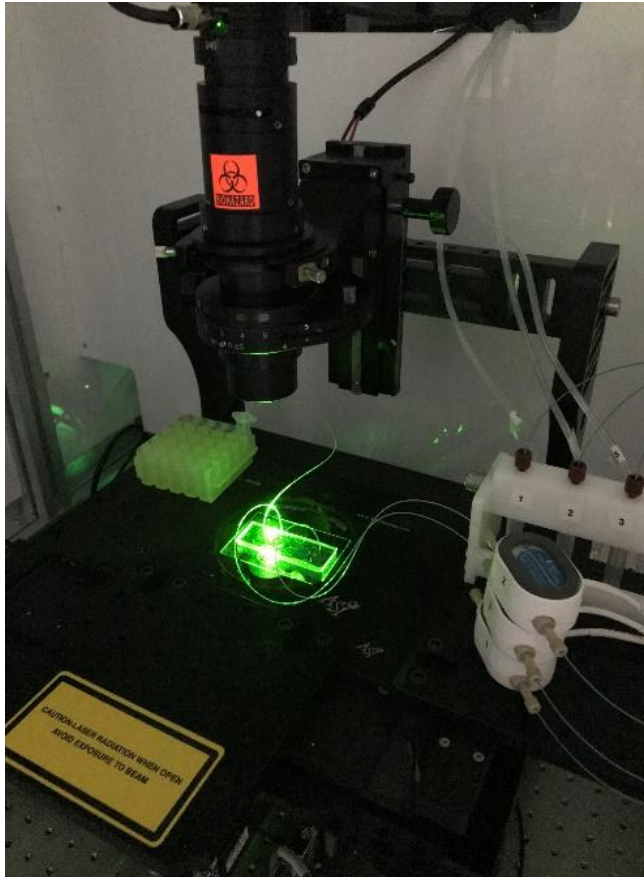
Design variables
- Flexibility
- Length

4 variants

BiTE variant library screening:

- 1.5 millions cells were screened
- 265 clones were isolated
- 213 were true positives
- 98 unique functional clones
- Some were extremely rare clones (~0.001% abundance)

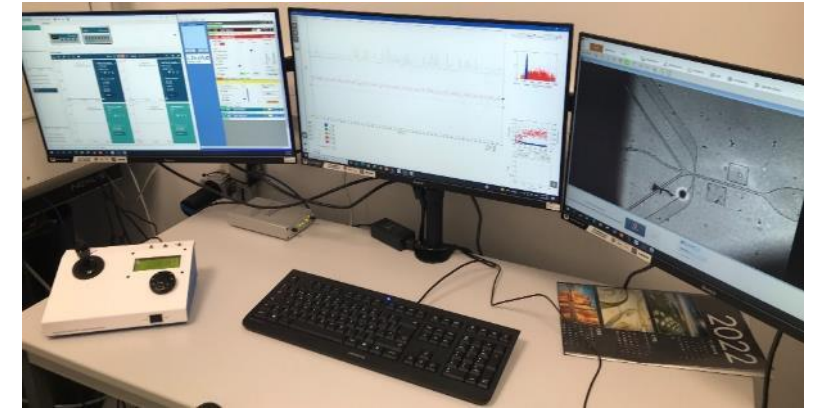
GotaHit: Lab-on-a-chip platform



Droplet microfluidics

Very high flow rate (10 kHz) droplet generation

- Controlled conditions of incubation
- Injection of the drops
- Screening
 - Laser Excitation: 5 Excitation Wavelengths
 - Detection: 8 photomultipliers
- Very high-speed sorting (from 1 to 7 kHz)
- Transfer of selected droplets in 384-well plates



GotaSoft: Real-time control software

Drop Detection & Size Measurement

- Cell encapsulation
- Display of populations according to their marking
- Selection of populations to be sorted
- Recording of raw data for reprocessing

Lab-on-a-chip unit



Technical Specifications

- **Micro-scale electro-fluidic operation**
 - Fluidic system
 - Optical system
 - Mechanical system
 - Electro-acoustic system
- **Optical Microscopy (4x, 20x, 40x and 100x)**
- **PDMS Vacuum Molding**
- **Electronic**
 - Oscilloscope
 - Optical Power Meter
 - Multimeter
 - Signal Generator
 - HV Amplifier
- **Pneumatic system (N2 and air)**
- **L2 laboratory maintained at negative pressure (-15 Pa)**

The founding team



George GAUDRIAULT - CEO

R&D manager of several biotech companies (MedinCell, Deinove...)

Expert in drug discovery and development.



Evelio RAMIREZ MIQUET - CTO

Technical manager at HiFiBio Therapeutics and Deinove

Responsible for the design and development of our microfluidic instruments

Expert in droplet microfluidics for biotechnology screening applications



Benoit CHARLOT : Technology expert

CNRS Research Director – Institute of Electronics and Systems (IES)

Head of the Biomicrofluidics and Biophotonics team (IES, University of Montpellier)

Specialist in the design and manufacturing of microfluidic devices for biology

Screening & Fluidics ◀ ● ●

Thank you for your attention

We look forward to discussing your projects with you

contact@snfluidics.com