

Supplementary Information

Size-based sorting of hydrogel droplets using inertial microfluidics

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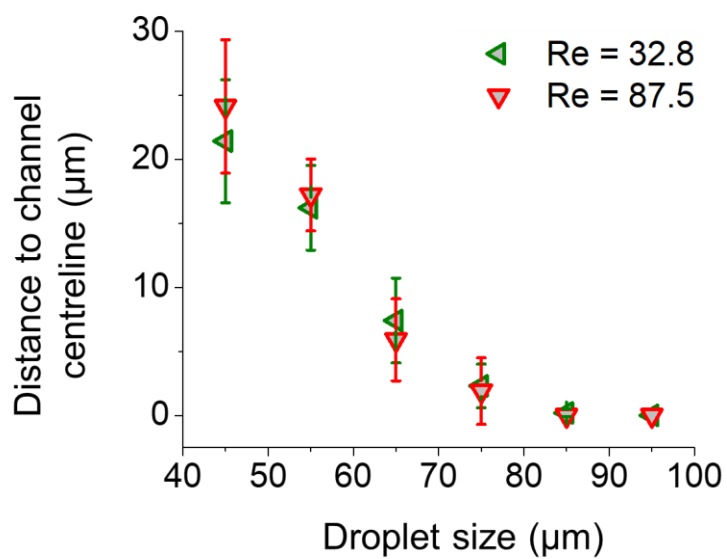
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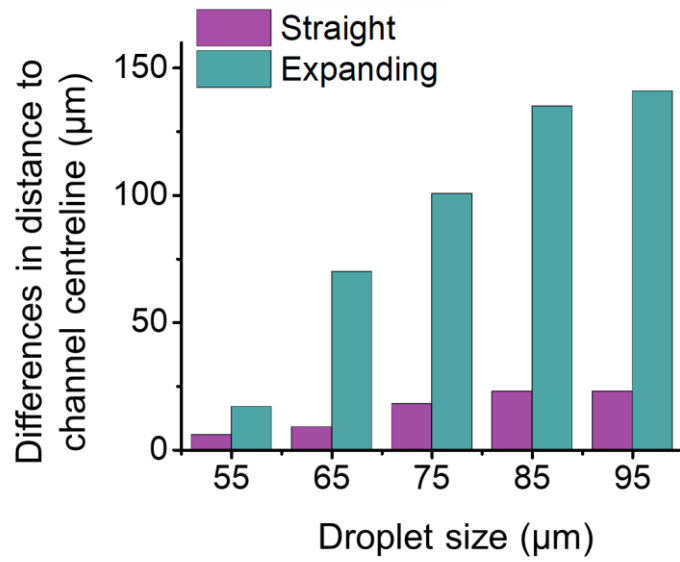
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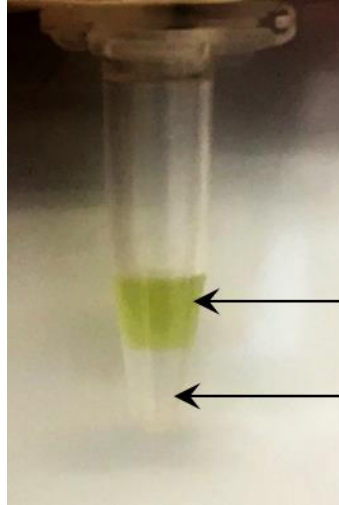
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Supplementary Figure S1. Hydrogel droplets migrate to equilibrium positions depending on size in a straight rectangular microchannel. The average distance to the channel centreline decreases with increasing size at $Re = 32.8$ and 87.5 at the end of the straight rectangular microchannel.



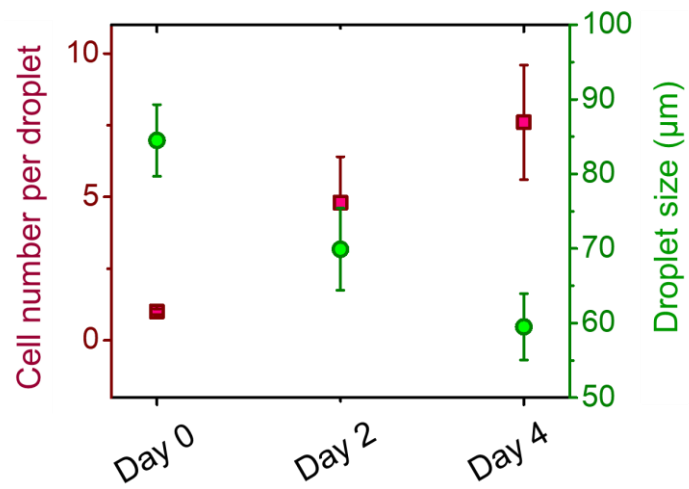
Supplementary Figure S2. Differences in average distance to the channel centreline between hydrogel droplets with a diameter of 45 μm and larger diameter drops (i.e. diameter = 55-95 μm) at Re= 55.7.



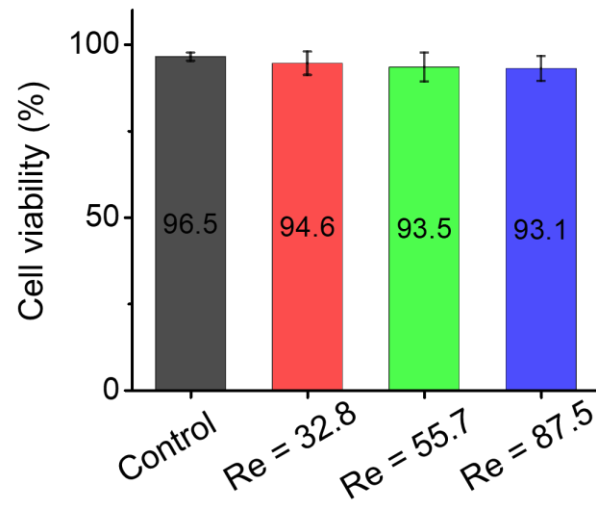
Gel (Hydrogel droplets encapsulated with *E. gracilis*)

Oil (Novec™ 7500 with 0.1% Pico-Surf™)

Supplementary Figure S3. A photograph of hydrogel droplets encapsulated with *E. gracilis* in an oil solution collected and incubated in a 1.5 mL centrifuge tube.



Supplementary Figure S4. Variations of cell number per droplet and average diameter of cell-laden hydrogel droplets with respect to incubation time.



Supplementary Figure S5. The viability of *E. gracilis* cells was not significantly affected by either encapsulation within hydrogel droplets nor inertial effects.

Supplementary Movie Captions

Supplementary Movie S1. Size-dependent lateral inertial equilibrium positions for hydrogel droplets of different sizes at the downstream expansion region. High-speed microscopic video at a flow rate of 500 $\mu\text{L}/\text{min}$ ($\text{Re} = 55.7$).

Supplementary Movie S2. Separation of cell-laden and empty hydrogel droplets varying in size at the outlets of the inertial microfluidic device. High-speed microscopic video at a flow rate of 500 $\mu\text{L}/\text{min}$ ($\text{Re} = 55.7$).