Electronic Supplementary Material (ESI) for Lab on a Chip.

Versatile, cell and chip friendly method to gel alginate in microfluidic devices

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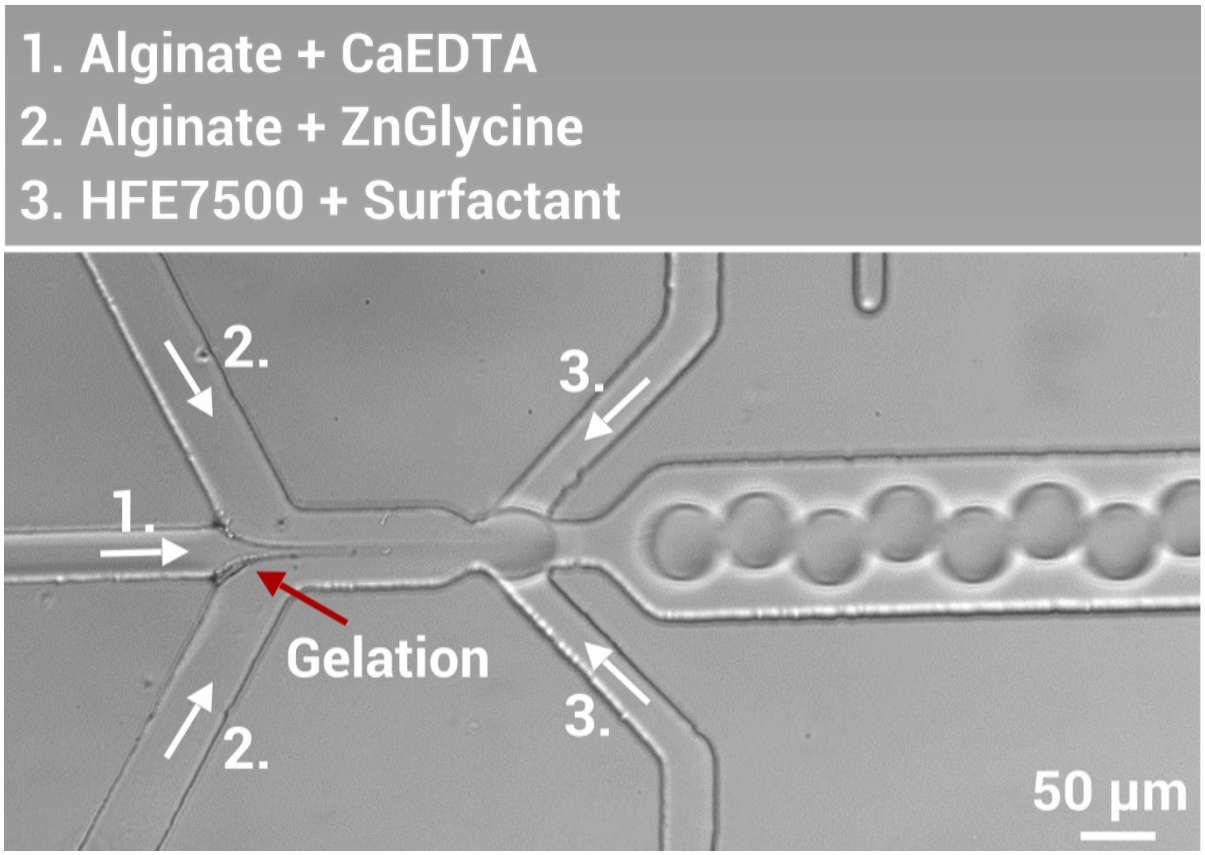
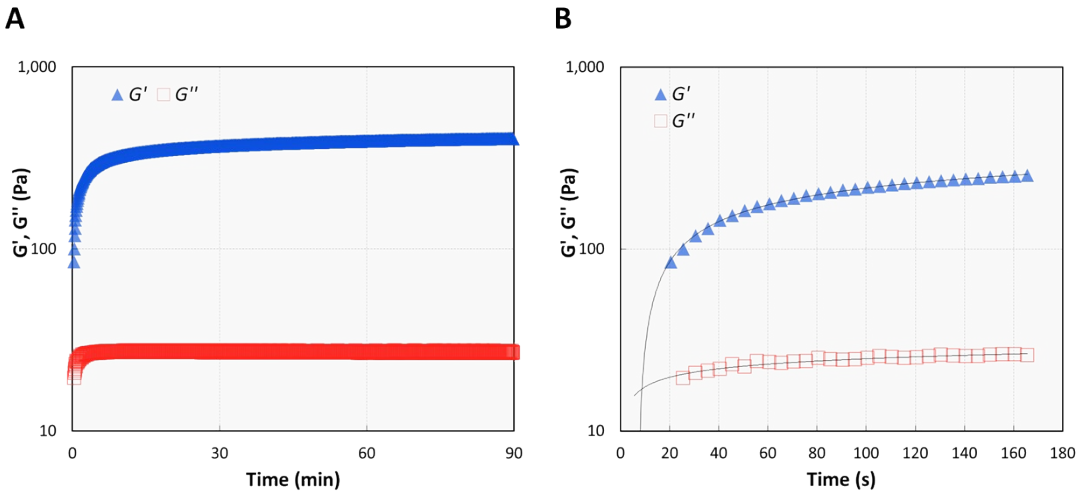
Electronic Supplementary Information



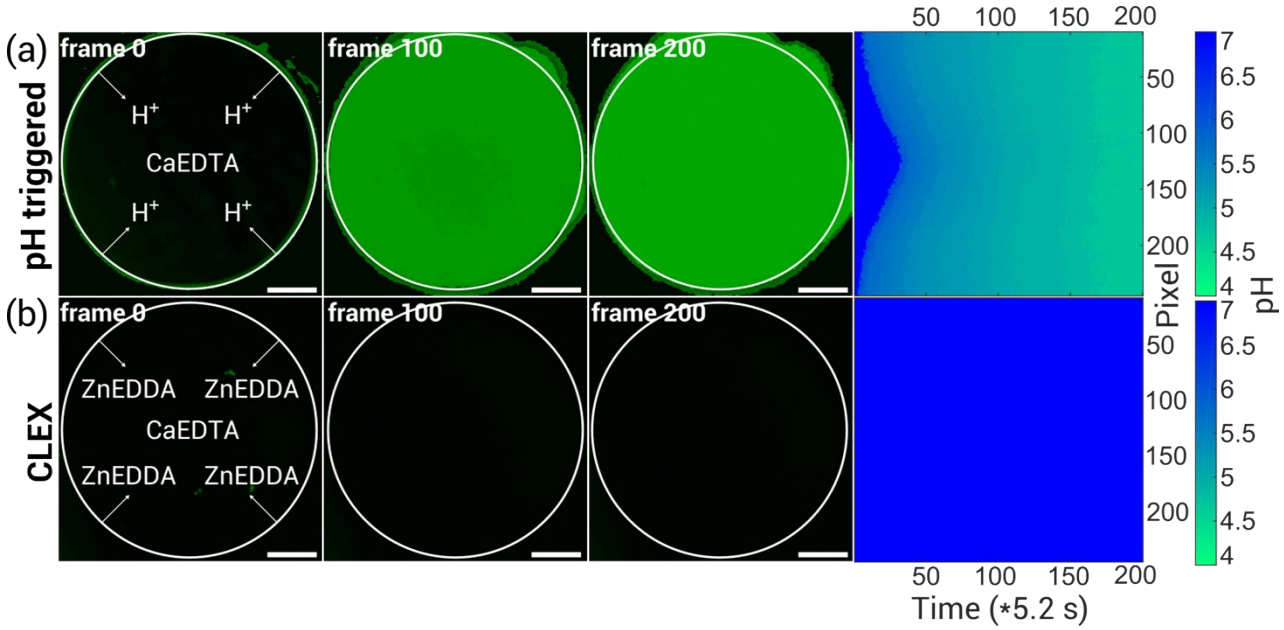
ESI Fig. 1: Micrographs of stagnation point gelling (red arrow) with CLEX in microchannels within a droplet device.



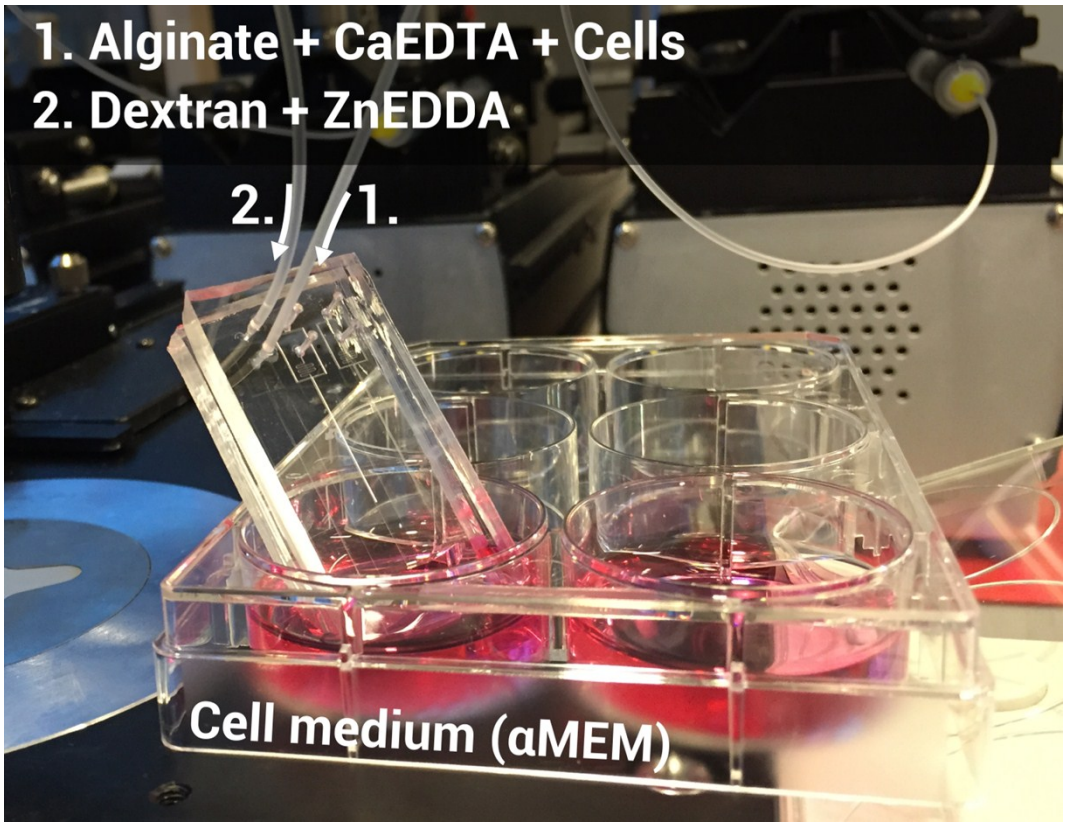
ESI Fig 2: A: Rheological characterisation of the change in mechanical properties with time for 0.6% alginate undergoing gelation via CLEX. B: Detail of initial data points shown in A, showing extrapolation used to calculate the point of gel formation.

Monitoring of pH variations

A flow-cell was applied[1] to monitor the pH variations during the gelling upon mixing of the two precursor alginate phases containing the ion chelates CaEDTA and ZnEDDA. A pH sensitive fluorescent dye (N-(rhodamine 6G)-lactam-ethylenediamine (R6G-EDA)) was added to the alginate phase containing CaEDTA. The relationship between the sample pH and fluorescence intensity is described elsewhere[1]. A droplet of the CaEDTA-alginate containing the dye was placed between two cover slips following an injection of either ZnEDDA-alginate without dye or HFE7500 with 2µL/mL acetic acid without dye in-between the cover slips. The pH variations during the gelling of the CaEDTA containing alginate droplet was monitored over a duration of ~20 min and sampled every 5.2 seconds with a Leica SP5 confocal microscope.



ESI Fig. 3: A comparison between the ionic exchange and pH triggered release mechanisms in terms of pH stability. A droplet of alginate containing CaEDTA was placed between two cover slips and gelled either by addition of (a) acetic acid or (b) ZnEDDA. The pH variations were monitored using a pH sensitive fluorescent dye (N-(rhodamine 6G)-lactam-ethylenediamine (R6G-EDA)) where increasing intensity relates to decreasing pH. Each frame was recorded with a time difference of 5.2 second. Scale bars: 100µm.



ESI Fig. 4: Image of the collection procedure of alginate microfibers directly from a 3D microfluidic PDMS device, without intermediate rinsing steps.

ESI References

1. S. Bjørnøy, S. Mandaric, D. Bassett, A. Åslund, S. Ucar, J. Andreassen, B. Strand and P. Sikorski, *Acta Biomaterialia*, 2016.