Electronic Supplementary Material (ESI) for Lab on a Chip

Supplementary Information

Novel technologies for the formation of 2-D and 3-D Droplet Interface Bilayer Networks

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Junction network device – repositioning droplets using pressure bursts

The vast majority of droplets positioned themselves down whichever branch was under suction, occasionally incoming droplets were pushed along 'wrong' channel. To counteract such occurrences, short bursts of pressure were applied to direct the droplets towards to desired branch. These pressure bursts were generated by setting the syringe pump to infuse at 20µL/min for a short duration (1-2 seconds). The infusion rate was high enough to induce almost immediate motion of the droplets, but short enough so that pressure did not build up and push subsequent droplets down that path. Fig.S1 demonstrates this burst method.

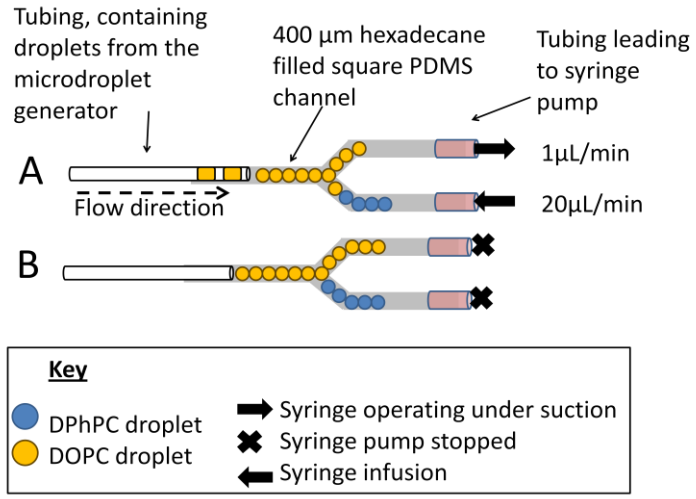

Fig.S1 Illustration of the different stages involved the formation of a branched DIB network. **(A)** Droplets are generated with one syringe operating under suction the other being stationary. **(B)** Droplets enter the channel and make contact with one another resulting in a linear DIB sequence. When this sequence reaches the junction-point, the droplets travel down the path that is under suction. **(C)**To change the path down which droplets travel down, the flow-settings of the two syringe pumps are reversed: the previously stationary syringe is changed to operate under suction and vice versa. **(D)** If a droplet is pushed down the 'wrong' path, a short (~1s), fast (20µL/min) infusion of the syringe pushes it back towards the desired path ('burst' phase). **(E)** Once the desired network is created, the all pumps are stopped