

Electronic supplementary information

On-chip electrocoalescence of microdroplets as a function of voltage, frequency and droplet size

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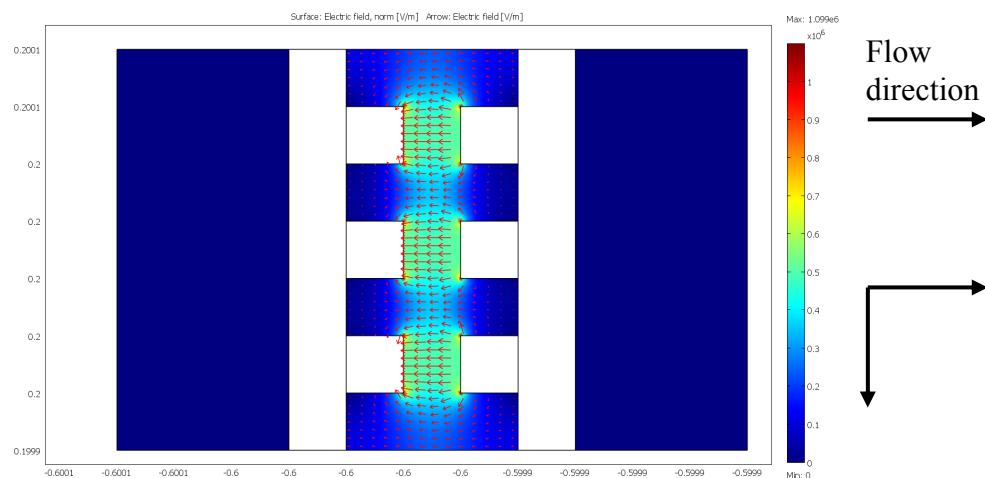


Figure S1. Numerical electrostatic simulation showing electric field magnitude between square-shaped electrodes. High strength field regions are formed at the edges of the squared patterns, having field components both along and across the flow direction. Since the dielectric constant of water is higher than that of oil, positive dielectrophoresis is experienced by the droplet that is attracted over the electrodes.

Oil : Water

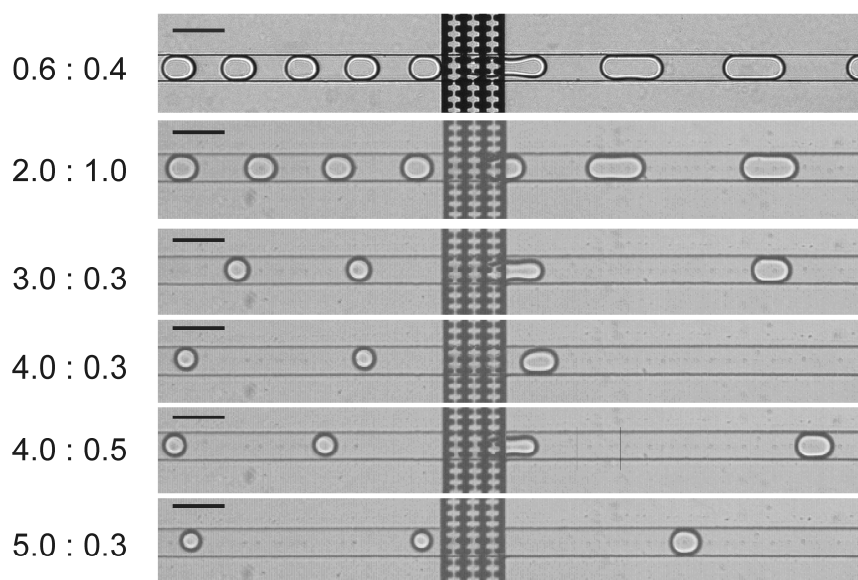


Figure S2. Snapshots of droplet pair coalescence corresponding to the values reported in Table 1. Water and oil flow rate (left) are in $\mu\text{L}/\text{min}$. Scale bar is 200 μm .

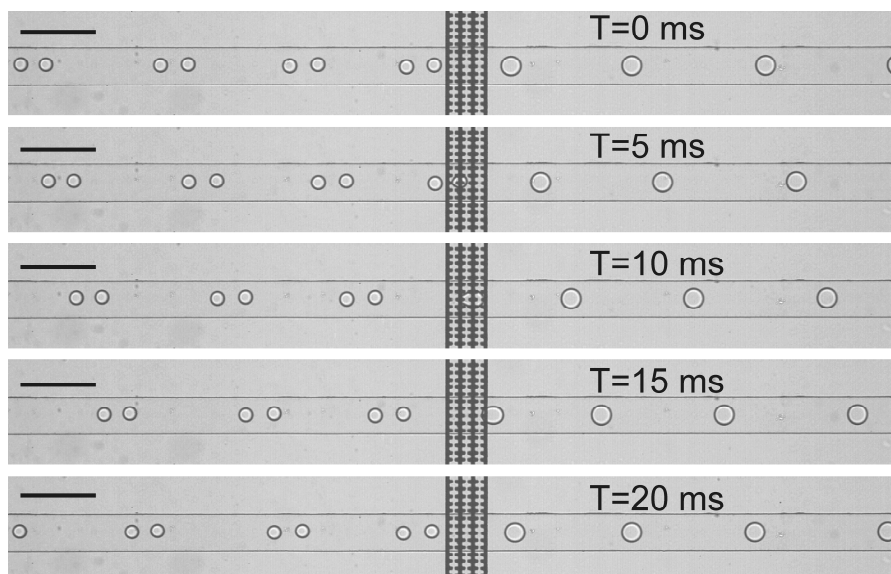


Figure S3. Time sequence showing droplet merging in pairs using a double T-junction. Reliable fusion events were obtained every 20 ms. Scale bar is 400 μm .

Movie1. Regular droplet pair electrocoalescence. Oil flow rate: 0.5 $\mu\text{L}/\text{min}$; water flow rate: 0.5 $\mu\text{L}/\text{min}$.

Movie2. Regular droplet pair electrocoalescence. Oil flow rate: 0.6 $\mu\text{L}/\text{min}$; water flow rate: 0.3 $\mu\text{L}/\text{min}$.

Movie3. Regular droplet pair electrocoalescence. Oil flow rate: 0.9 $\mu\text{L}/\text{min}$; water flow rate: 0.1 $\mu\text{L}/\text{min}$.

Movie4. Irregular droplet electrocoalescence. Oil flow rate: 1 $\mu\text{L}/\text{min}$; water flow rate: 1 $\mu\text{L}/\text{min}$.

Movie5. Continuous electrofusion of droplets. Oil flow rate: 0.1 $\mu\text{L}/\text{min}$; water flow rate: 0.1 $\mu\text{L}/\text{min}$.