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Droplet Microfluidics for High Throughput Screening - Fundamentals and Applications

Tuesday 30 May 2017 15:30 (30 minutes)

Droplet-based two-phase microfluidics enables high throughput screening analysis by utilizing monodispersed nanoliter-sized droplets as mobilized test tubes. Other advantages of droplet microfluidics over traditional high throughput technology include continuous flow offering continuous processing, minimized cross contamination benefiting from well encapsulated droplets, and rapid mixing due to three-dimensional flow occurring in droplets. Both gas-liquid and two immiscible liquids (water and oil) systems have been employed to make liquid droplets in microfluidic platforms. This talk only focuses on the system employing two immiscible liquids to generate droplets.

The first half of the talk will discuss fundamentals and physical modelling of droplet generation in T-junctions1-3 and flow focusing geometries4-5 and droplet trafficking and sorting through a channel network6. The second half will focus on electrical sensing and manipulation and imaging assisted manipulation of droplets. In particular, capacitance sensing7, microwave sensing/heating8-9, and imaging assisted manipulation10 of droplets will be discussed and then followed with microwave heating and mixing of droplets11.

References

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