Geometrical Based Unequal Droplet Splitting Using Microfluidic Y-Junction

Authors : Bahram Talebjedi, Amirmohammad Sattari, Ahmed Zoher Sihorwala, Mina Hoorfar

Abstract : Among different droplet manipulations, controlled droplet-splitting is of great significance due to its ability to increase throughput and operational capability. Furthermore, unequal droplet-splitting can provide greater flexibility and a wider range of dilution factors. In this study, we developed two-dimensional, time-dependent complex fluid dynamics simulations to model droplet formation in a flow focusing device, followed by splitting in a Y-shaped junction with sub-channels of unequal widths. From the results obtained from the numerical study, we correlated the diameters of the droplets in the sub-channels to the Weber number, thereby demarcating the droplet splitting and non-splitting regimes.

Keywords : microfluidics, unequal droplet splitting, two phase flow, flow focusing device

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