World Academy of Science, Engineering and Technology
International Journal of Biomedical and Biological Engineering
Vol:9, No:07, 2015

Study on an Integrated Real-Time Sensor in Droplet-Based Microfluidics

Authors : Tien-Li Chang, Huang-Chi Huang, Zhao-Chi Chen, Wun-Yi Chen

Abstract : The droplet-based microfluidic are used as micro-reactors for chemical and biological assays. Hence, the precise addition of reagents into the droplets is essential for this function in the scope of lab-on-a-chip applications. To obtain the characteristics (size, velocity, pressure, and frequency of production) of droplets, this study describes an integrated on-chip method of real-time signal detection. By controlling and manipulating the fluids, the flow behavior can be obtained in the droplet-based microfluidics. The detection method is used a type of infrared sensor. Through the varieties of droplets in the microfluidic devices, the real-time conditions of velocity and pressure are gained from the sensors. Here the microfluidic devices are fabricated by polydimethylsiloxane (PDMS). To measure the droplets, the signal acquisition of sensor and LabVIEW program control must be established in the microchannel devices. The devices can generate the different size droplets where the flow rate of oil phase is fixed 30 µl/hr and the flow rates of water phase range are from 20 µl/hr to 80 µl/hr. The experimental results demonstrate that the sensors are able to measure the time difference of droplets under the different velocity at the voltage from 0 V to 2 V. Consequently, the droplets are measured the fastest speed of 1.6 mm/s and related flow behaviors that can be helpful to develop and integrate the practical microfluidic applications.

Keywords : microfluidic, droplets, sensors, single detection
Conference Title : ICMN 2015 : International Conference on Microfluidics and Nanofluidics
Conference Location : Prague, Czechia
Conference Dates : July 09-10, 2015