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A pressure actuated microfluidic system with real time feedback control of droplet length in a T junction microfluidic channel WEN ZENG, Princeton University, FLUID AND FLOW GROUP TEAM — A pressure actuated microfluidic system using microvalves is designed for droplet generation in a T junction microfluidic channel. Here, we mainly focus on the influence flow rates of continuous and dispersed phase has on the droplet formation. By using pressure actuation for droplet generation in a T junction microfluidic channel, uniform production of monodisperse droplet is achieved. By using the curve fitting, linearized equation which describes the linear relationship of droplet length and flow rate ratio is obtained. With real time feedback, a closed-loop control system of droplet generation is constructed. The mathematical model between pressure and flow rates of continuous and dispersed phase is built, and the control accuracy of droplet length is analyzed. Compared with syringe pump actuation, the droplet formation can be much steadier and the length of individual droplet can be controlled more precisely by pressure actuation, especially at lower flow rates. Based on pressure actuation, monodisperse droplet formation with volume range from microliter to nanoliter scale can be achieved.

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