

DROPLET-BASED MICROFLUIDICS: EXPERIMENTS AND NUMERICAL SIMULATION

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We used thermal control to actively manipulate aqueous droplets in microchannels. Control of droplet size during the formation process and splitting process was demonstrated. Furthermore, droplet switching can be achieved with the same concept. Numerical simulation using a two-dimensional model agrees qualitatively with the experimental results, Figures 1 and 2. The used control temperature of less than 55°C shows that this active control concept is suitable for biochemical applications. Thermal control promises to be a simple and effective manipulation method for droplet-based lab on a chip. The presentation will also highlight the use of temperature for control of droplet formation process. The size of droplets can be adjusted with a heater integrated to the droplet injection position.

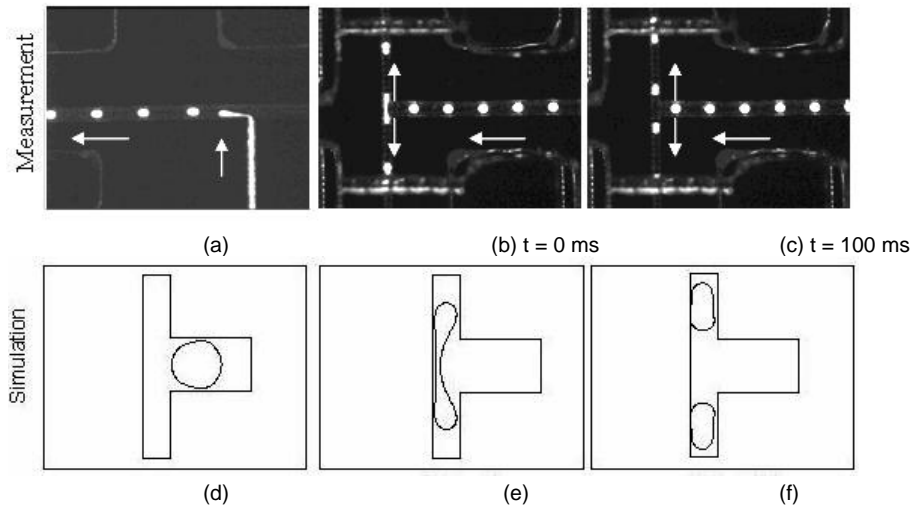


Fig. 1. Passive splitting of droplets at the T-junction.

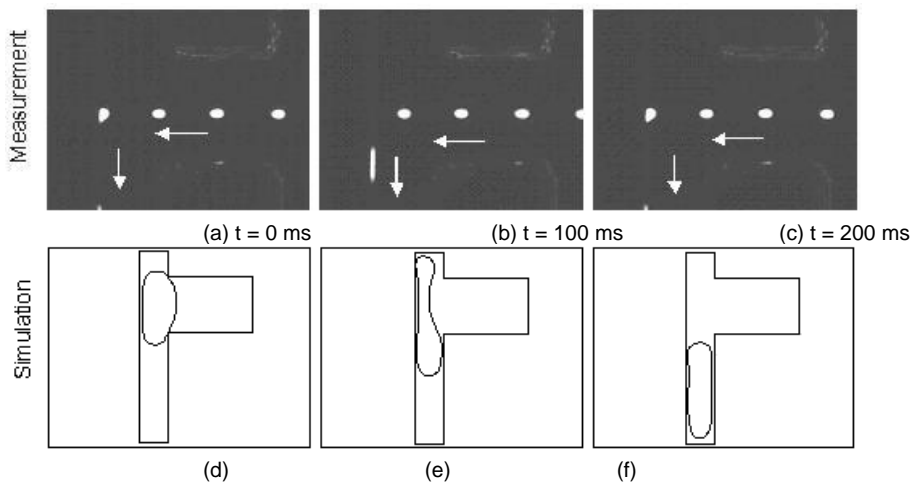


Fig. 2. Droplet switching at 40°C.



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Biography/Research Areas

Dr. NGUYEN, Nam-Trung received his Dip -Ing, Dr. Ing. and Dr. Ing. habil. degrees from Chemnitz University of Technology, Germany, in 1993, 1997, and 2004, respectively. From 1997 to 1998, he worked as a postdoctoral research engineer in the Berkeley Sensor and Actuator Center (UC Berkeley, USA). Currently, he is an Associate Professor with the School of Mechanical and Aerospace Engineering of the Nanyang Technological University in Singapore. His research is focused on polymeric micromachining of nanochannels, micro/nanofluidics and instrumentation for biomedical applications. He published over 70 research papers on microfluidics and had 7 granted and pending patents. The second edition of his book "Fundamentals and Applications of Microfluidics" co-authored with S. Wereley was published in 2006. More details on his current works can be found on <http://www.ntu.edu.sg/home/mntnguyen>.

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Recent Representative Publications

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