Dispensing needle-based simple microfluidic device for generation of monodisperse droplets

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Droplet-based microfluidics, such as PDMS (polydimethylsiloxane) chips and glass capillary devices, are used widely in chemistry, biology, and polymers because of capability to generate monodisperse droplet of tens to hundreds of micrometers. These devices require expensive equipment or proficiency, thus researchers in various fields have difficulty in preparing the devices.

Herein, we introduce a dispensing needle-based microfluidic device simply assembled with commercially available parts. This simple device does not require proficiency because it is assembled by hand without any additional equipment. Devices were tested by generating droplet of PEGDA(polyethyleneglycoldiacrylate), adjustment of droplet size by varying the flow rate and needle diameter, and polymerization of droplets through in situ photopolymerizaton.

In conclusion, monodisperse droplets were generated in dispensing needle-based device and size of droplet was controlled by needle diameter and flow rate. This device is expected to be widely used because it is a simple way to generate monodisperse droplets of a desired size.