Generation of droplets by autonomous fluid derived from the gas permeability of PDMS

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Conventional droplet based microfluidic systems require bulky experimental apparatuses, such as syringe pump and power supply to generate fluid. As an alternative method to generate the droplets, this study demonstrates autonomous fluid derived from the gas permeability of PDMS. Here, this study present novel method that only need simple 2-step (device degassing, solution loading) for operation. Furthermore, we control the direction of the micro-fluid in microfluidic device. We can generate droplets in flow-focusing device by simple loading of the oil and water solution into the inlet reservoirs. As a quantitative result, we analyzed a volumetric flow rate, droplet generation rate and a distribution of generated droplet size during the operation of the microfluidic device. This alternative droplet based microfluidic approach is designed to improve the availability of droplets for bioanalytical applications, in situ synthesis of materials, and on site sample preparation tools.