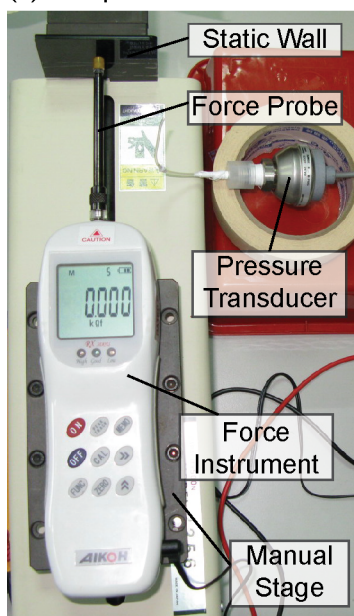


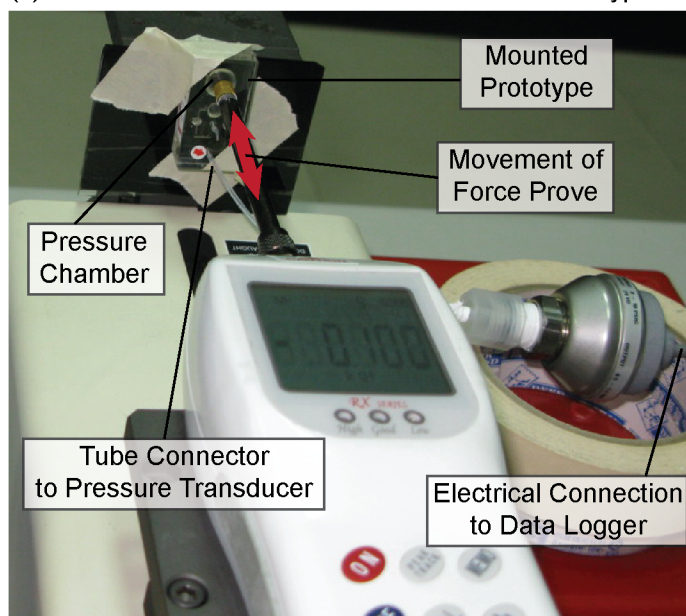
## Electronic Supplementary Information (ESI)

### ESI Figures

(a) Setup Overview

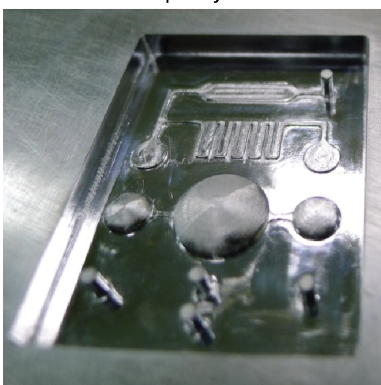


(b) Pressure and Force Measurement with a Prototype

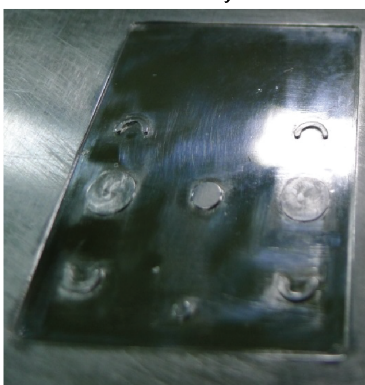


**Supplemental Figure 1.** Setup for measurements of pressure and required force. (a) Applied force from a force probe and a force instrument mounted on a manual stage. (b) The prototype microfluidic system is mounted on a static wall during the measurements with a pressure transducer and a data logger.

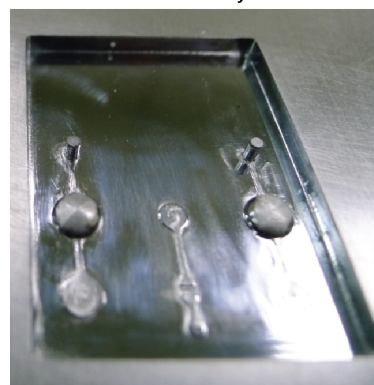
Top Layer



Middle Layer

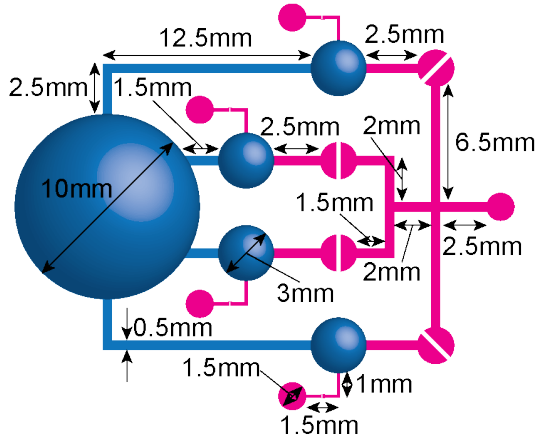


Bottom Layer

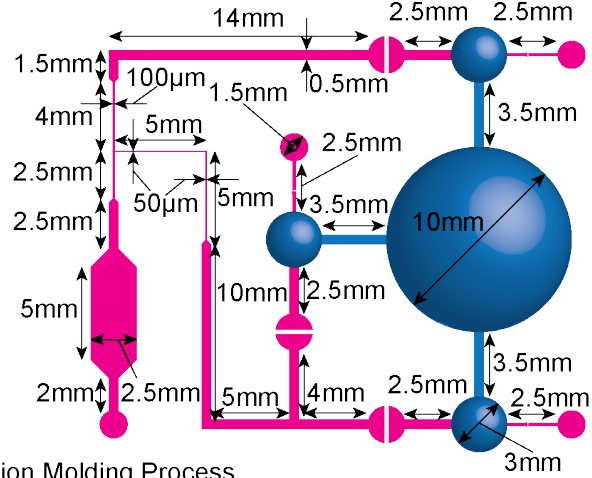


**Supplemental Figure 2.** Metal molds for the injection molding process. The structures are constructed and machined on medium carbon steel with a CNC milling machine and electrical discharge machine. Bottom surface of the molds is polished to get glossy surface and chrome is electroplated to prevent corrosion.

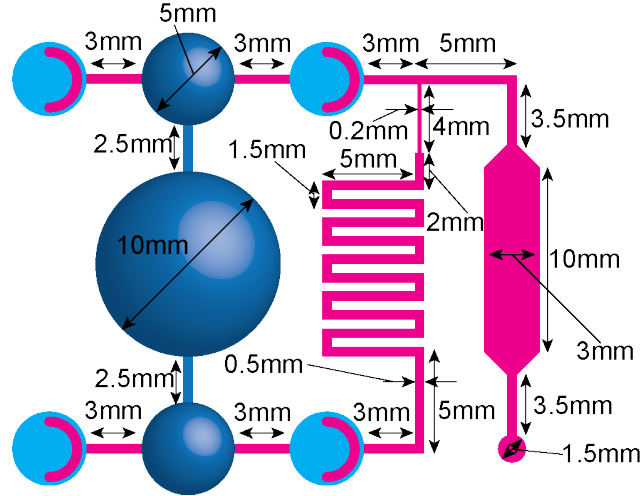
(a) Design of PDMS Prototype



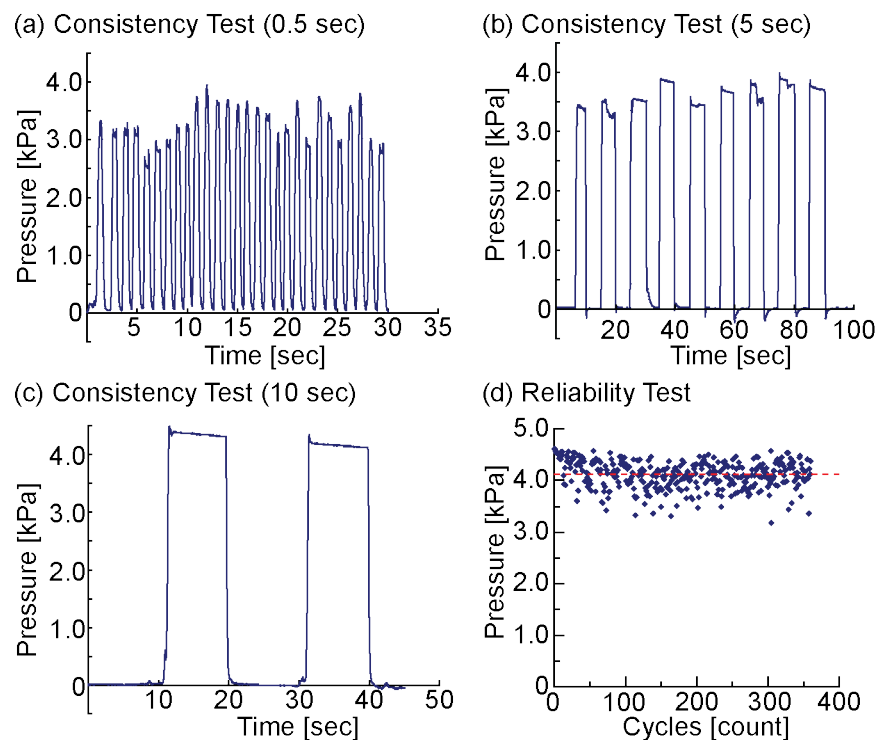
(b) Design of PDMS Prototype for Droplet Generation



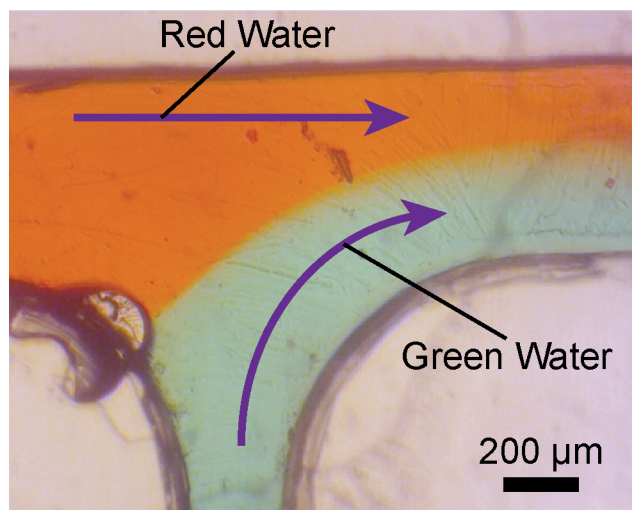
(c) Modified Design for Injection Molding Process



**Supplemental Figure 3.** Detailed design dimensions of the fabricated prototype microfluidic systems. (a) A basic PDMS prototype system with four inlet ports (microfluidic components are 100  $\mu\text{m}$  in thickness). (b) A PDMS droplet generator (microfluidic components are 100  $\mu\text{m}$  in thickness). (c) The basic dimensions of the injection molded prototype microfluidic system (microfluidic components are 300  $\mu\text{m}$  in thickness).

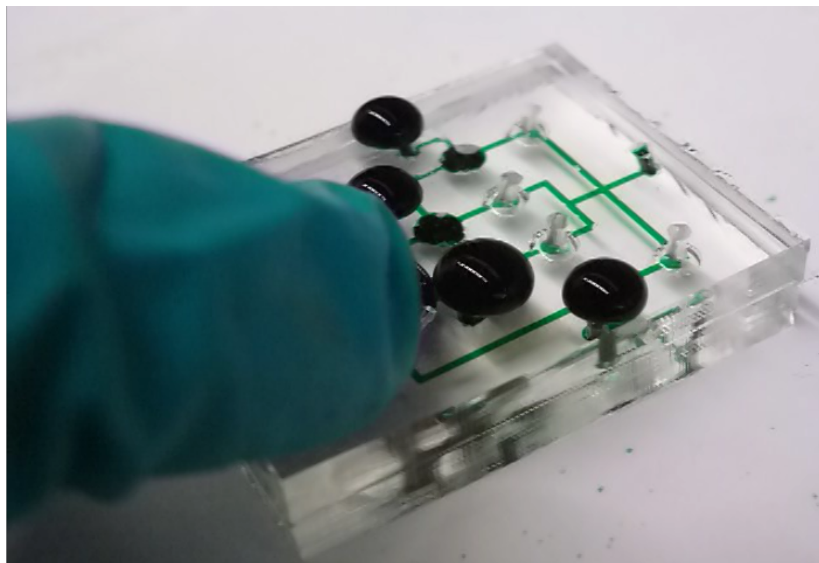


**Supplemental Figure 4.** Experimental results for the operation of a PDMS-based finger-powered microfluidic system. (a-c) Real-time measurement of pressure increment of the pressure chamber during repeated push-and-release by a human finger with duty cycle of (a) 0.5 seconds, (b) 5 seconds, and (c) 10 seconds. (d) Pressure increment from continuous operations of 10 seconds in duty cycle for 1 hour.

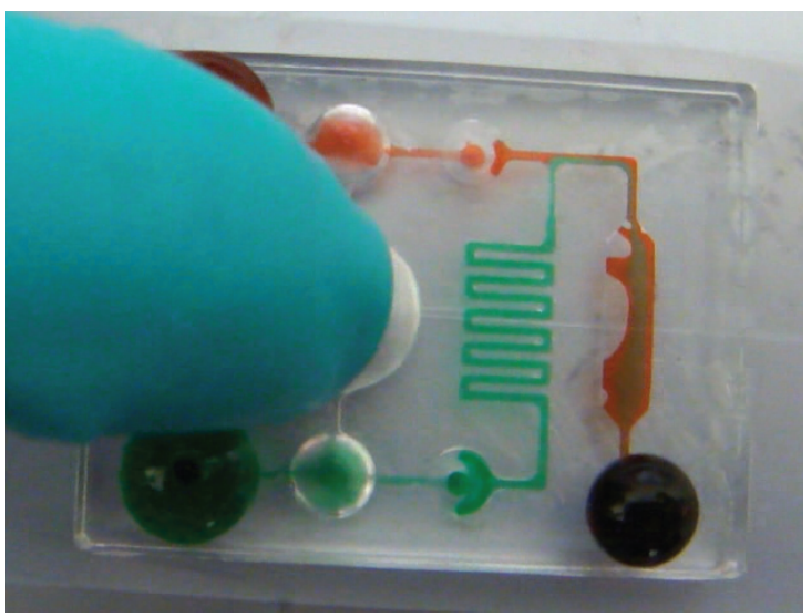


**Supplemental Figure 5.** Demonstrations of a laminar flow in an injection-molded prototype. Clear boundary of the red dyed water and the green dyed water is observed during 0.5 seconds of push-and-release procedure.

## ESI Movie Captions



**Supplemental Movie 1.** We demonstrated pumping fluids from four inlet ports to one outlet port with a PDMS-based, finger-powered microfluidic system. The entire pumping operation was conducted by a single human finger.



**Supplemental Movie 2.** Demonstration of pumping fluids in a silicon rubber-based microfluidic system fabricated via an injection molding process. The entire pumping operation was conducted by a single human finger.