Appendix A: Supplemental Table and Figures

Table A1: Data for Young's Modulus Calculations in Equation 1. For all experiments the membrane radius was 0.87 mm, the membrane deflection was 0.02 mm, and the Poisson's ratio was 0.35.

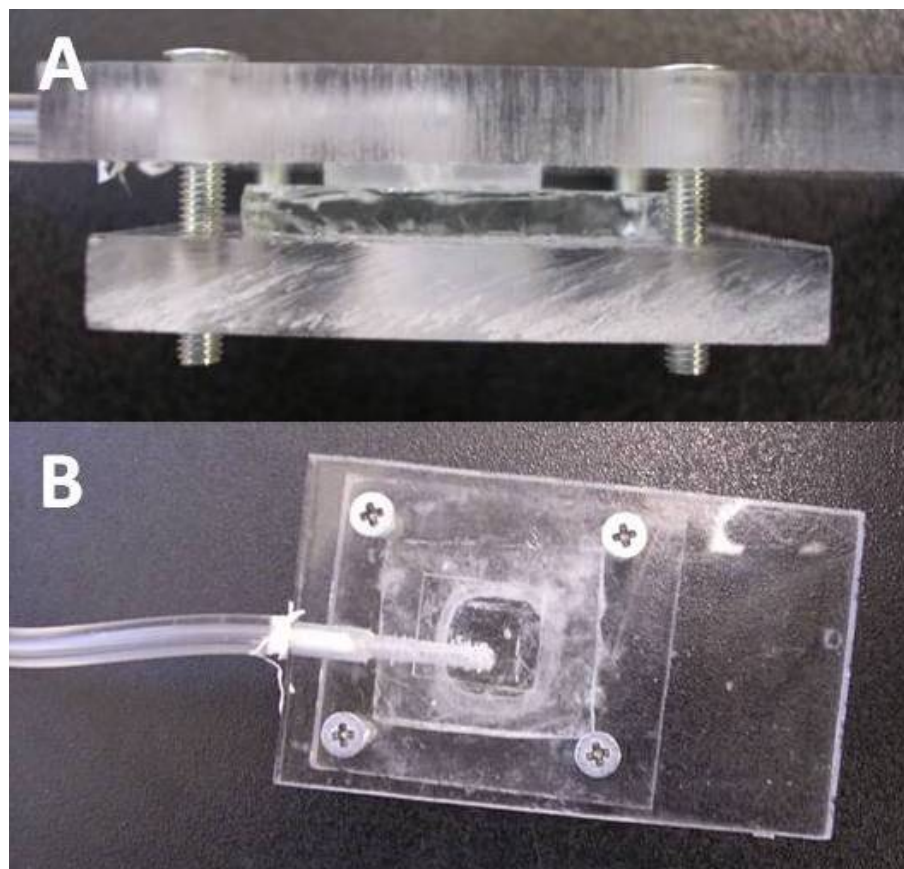| Membrane thickness (h, mm)	Pressure to achieve 0.02 mm deflection (P, Pa)	Young's Modulus (E, Pa)
0.19	1.65E+05	1.13E+08
0.19	1.59E+05	1.08E+08
0.19	1.59E+05	1.08E+08
0.18	2.07E+05	1.66E+08
0.19	1.45E+05	9.89E+07
0.19	2.41E+05	1.65E+08

Figure A1: Vacuum clamp for bonding. (A) Side-view image of vacuum clamp, which is made up of four layers (PMMA, PDMS, glass, PMMA). The poly-PEGDA layers to be bonded are placed in between the PDMS and the glass. (B) Top-view photograph of vacuum clamp. Vacuum from the tubing at left is routed through a drilled hole in the PMMA and a hole through the PDMS.
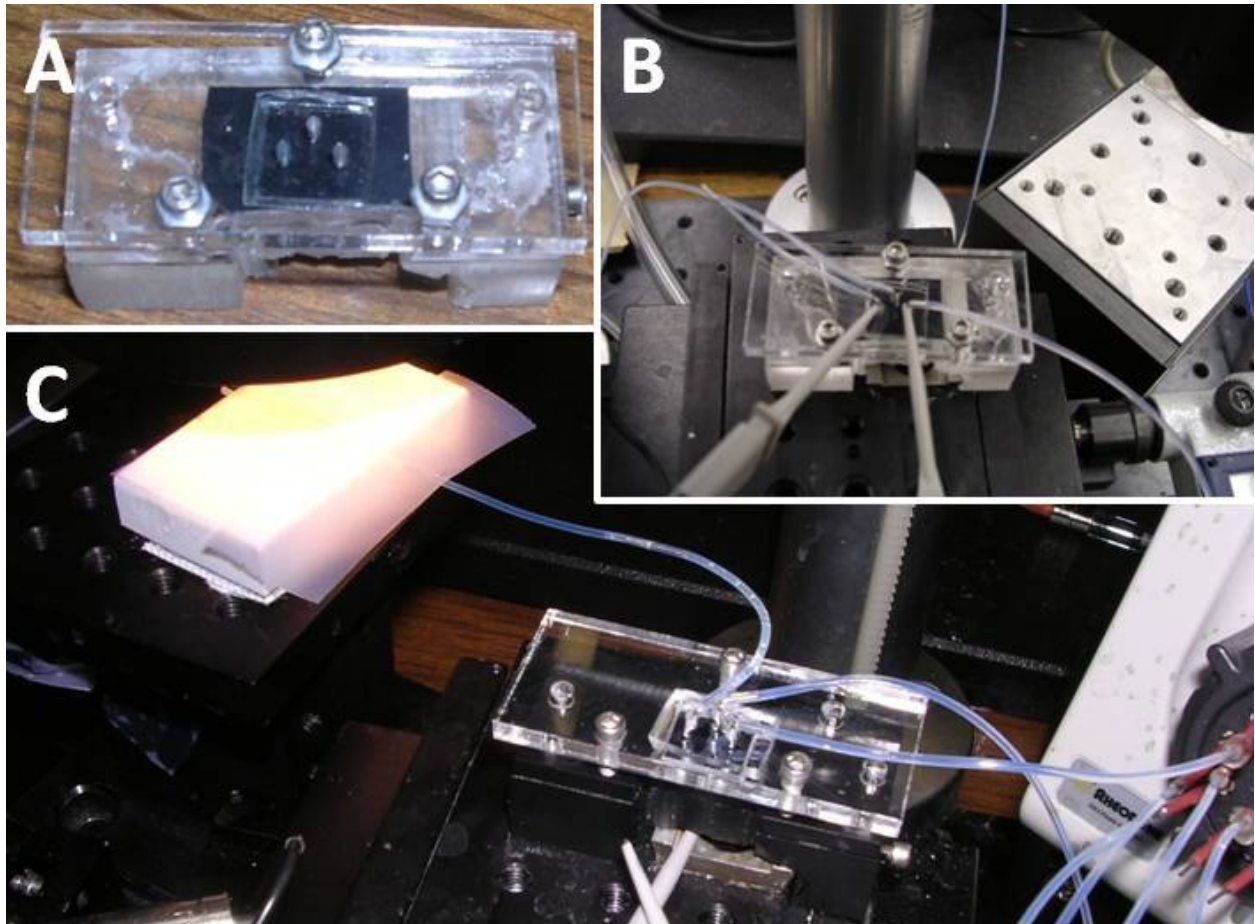
Figure A2: Images of experimental setup. (A) Top-view photograph of device holder. A thin layer of PDMS with metal pins was clamped down by a PMMA cover piece to interface fluid and control lines to the poly-PEGDA device. (B) Top-view photograph of a device in the holder with inserted pins and tubing for pneumatic control and fluid interfacing. The right pin is the fluid input, the center pin is for pneumatic control, and the left pin is the fluid output. (C) Angled-view photograph of the experimental setup. The selector valve on the right was used to release in-line fluid pressure. The output tubing (to the left) was imaged for meniscus tracking and flow measurement.
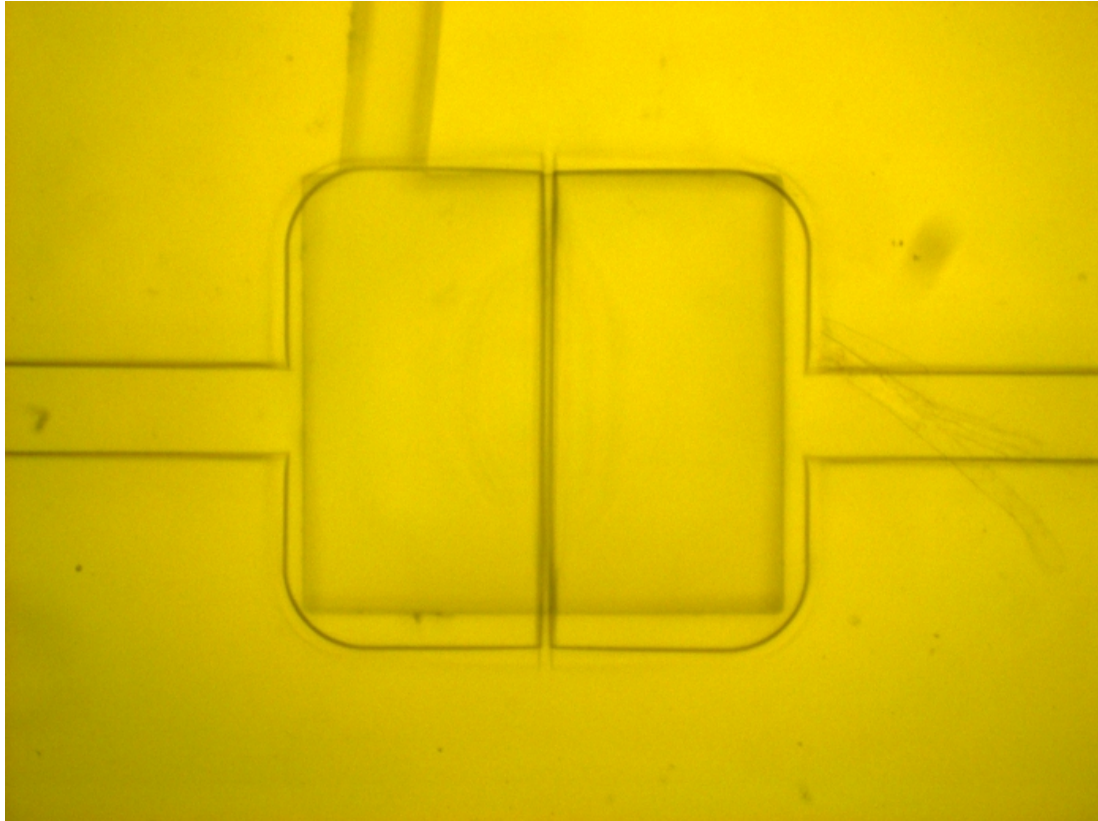
Figure A3: Photomicrograph of a square valve with a 15 μm pedestal width, a 600 x 640 μm^2 control layer, a 550 x 600 μm^2 fluid channel in the valve region, and a 100 μm wide fluid channel leading into and out from the valve.