Electronic Supplementary Material (ESI) for Lab on a Chip.

Supplemental Figure 1

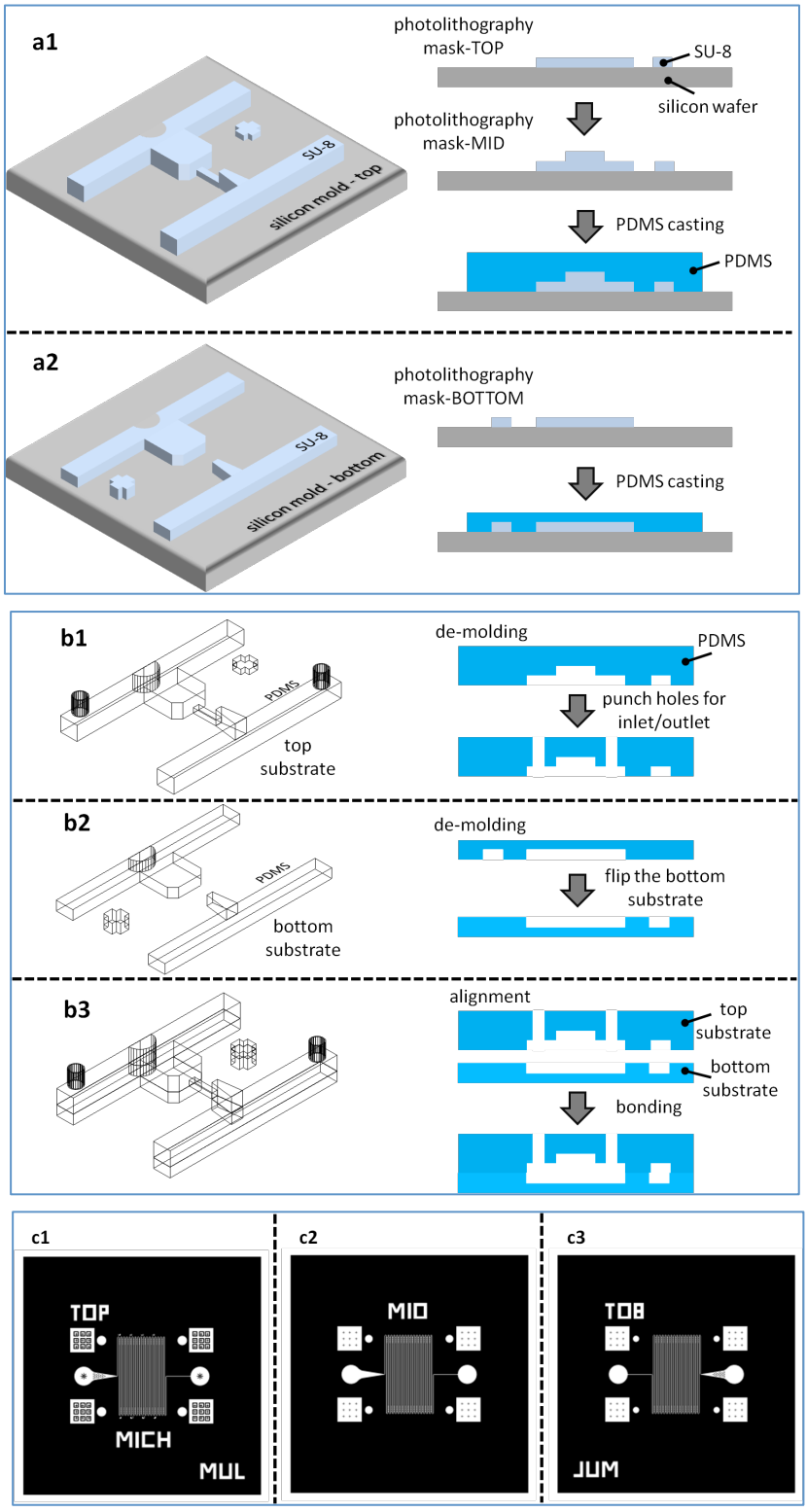
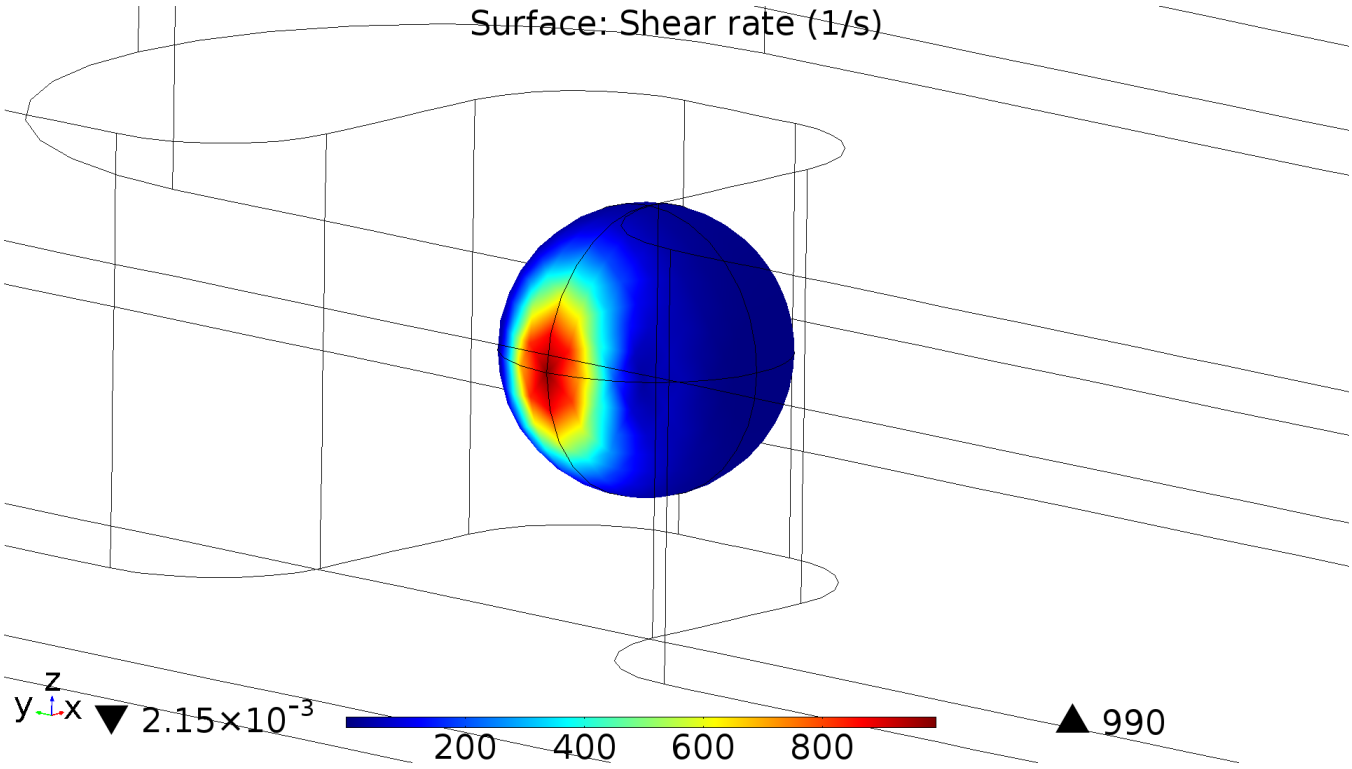


Figure S1. Fabrication process flow. (a) Fabrication of the SU-8 mold on silicon wafers, (b) PDMS casting, alignment, and bonding for the formation of the microfluidic device. (c) Transparent mask layouts of the μFPA device

Supplemental Figure 2



average shear stress on trapped cell under maximum flow rate in our µFPA device	0.072 dyn cm^{-2}
shear stress required to activate mechanically activated ion channel, PIEZO1, ref [31], [32]	20-40 dyn cm^{-2}

Figure S2. Shear stress exerted on the cells under aspiration with maximum operation flow rate (0.75 µl/min) by numerical simulations.

Supplemental Figure 3

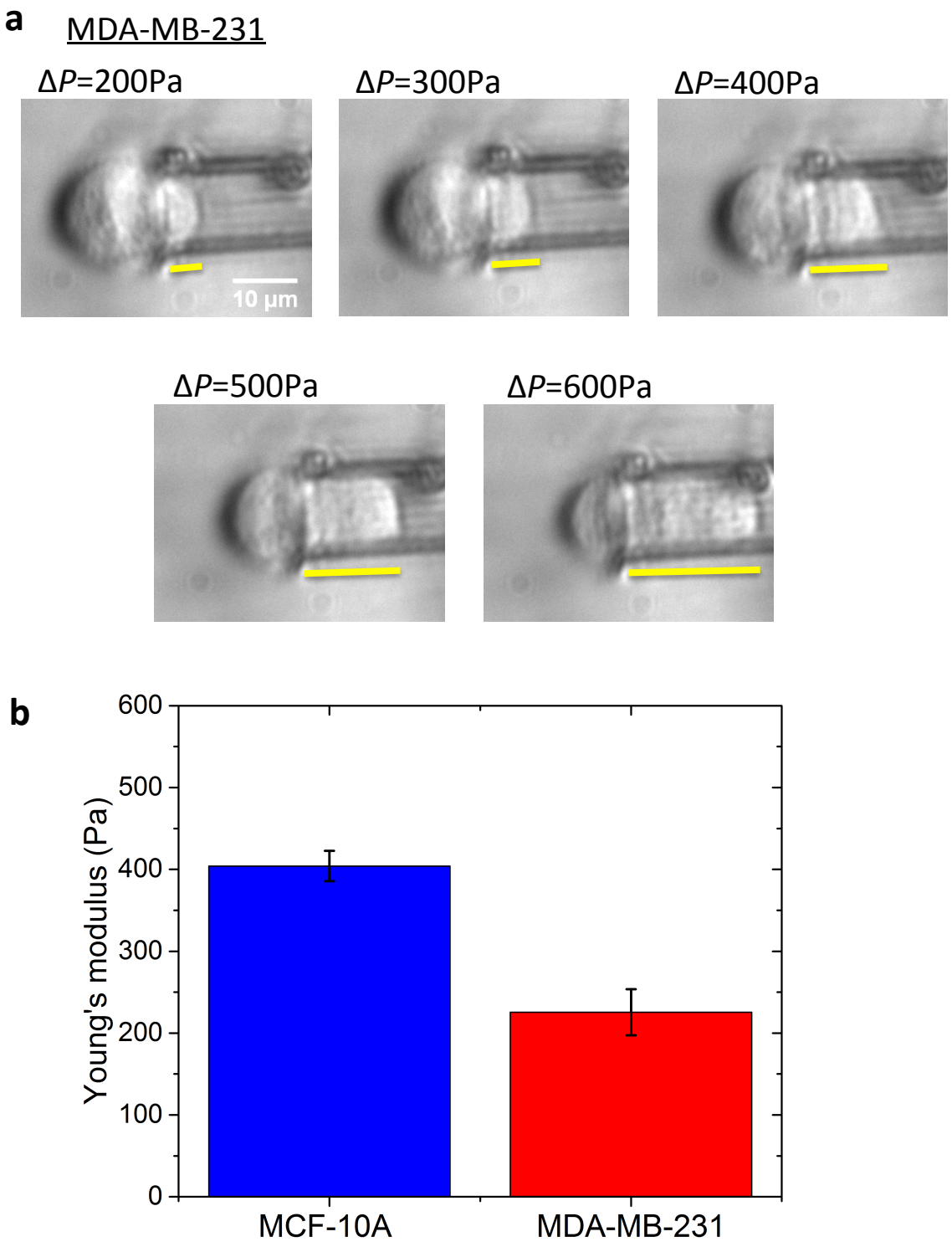


Figure S3. Traditional micropipette aspiration. (a) Breast cancer cell (MDA-MB-231) under aspiration, pressure increment for 100Pa for every 10s interval, yellow line indicates the protrusion length (b) Young's modulus of breast healthy (MCF-10A) versus cancer (MDA-MB-231) cell. (MCF-10A: 404.1 ± 18.4 Pa, n = 10 and MDA-MB-231: 225.5 ± 28.0 Pa, n = 14. Error bars represent standard error of the mean