Supporting Information

Multi-Target Dielectrophoresis Activated Cell Sorter

Unyoung Kim, Jiangrong Qian, Sophia A. Kenrick, Patrick S. Daugherty, and H.Tom. Soh

This section provides supporting information on detailed fabrication process of the MT-DACS and experimental data on the effect of the electric field generated by the MT-DACS on cell viability.

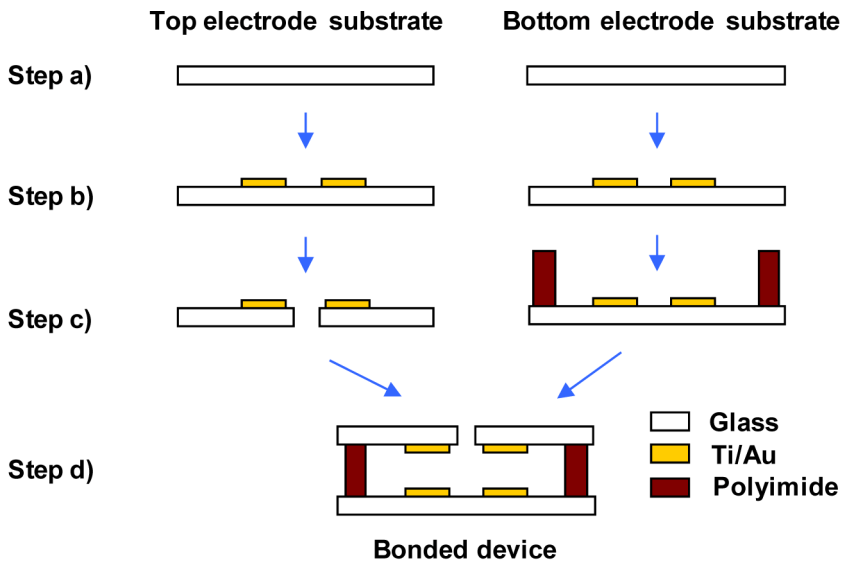

Figure S-1. Schematics of the fabrication process. Step a) 4-inch glass wafers (Pyrex 7740 borosilicate glass; Corning) were used as the substrates for the top and bottom electrodes. Step b) top and bottom electrodes were patterned with 20 nm of titanium and 200 nm of gold via a standard lift-off process. Step c) The microchannels were formed with photosensitive polyimide (HD4010; HD MicroSystems, Parlin, NJ), which served as the spacer between the two glass substrates. It was spun on the top and bottom substrates at 1,500 rpm for 45 sec, which results in a 40-μm-thick film after curing and bonding. Channels were defined on this layer by photolithography using a standard photolithographic tool (SUSS MicroTec, Garching, Germany; 350-nm wavelength, 1-min exposure) and development process (2 min in 100% developer, 2 min in 50% developer and 50% rinser, and 30 sec in 100% rinser). Microfluidic vias on the top substrate were drilled with a computer-controlled milling machine (Flashcut CNC, Menlo Park, CA), and both

substrates were diced. Step d) the two substrates were aligned and bonded at 300 °C for 2 min using a Flip-Chip aligner bonder (Research Devices, Piscataway, NJ). To complete the bonding process, a wafer bonder (SB-6; SUSS MicroTec) was used to cure the polyimide layer at 375 °C for 40 min and bond the for 10 min. Microfluidic inlets and outlets were manually fixed on the drilled vias of the device using epoxy.

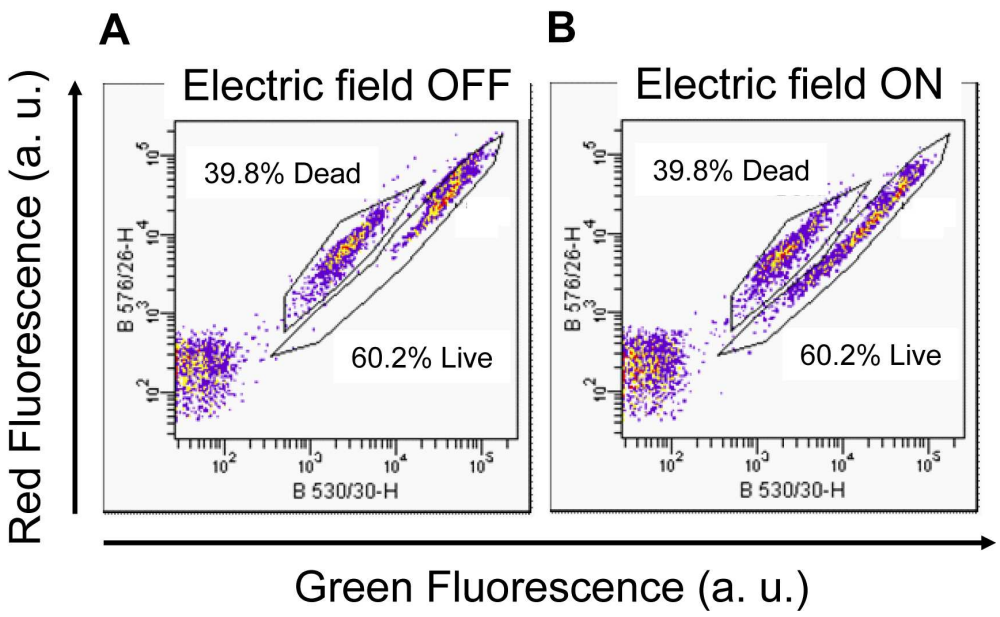

Figure S-2. Effect of the electric field on cell viability. The LIVE/DEAD BacLight bacterial viability and counting kit (Invitrogen, Carlsbad, CA) was used to measure the influence of electric fields on cell viability. The kit contained two nucleic acid stains (SYTO 9 nucleic acid stain, and propidium iodide). Using this kit, cells with intact cell membranes show a high green fluorescence, whereas bacteria with damaged membranes exhibit significantly higher red fluorescence. The initial mixture contained a live cell : dead cell ratio of 60.2 : 39.8. Flow cytometry data of the eluted fraction A) without the electric field and B) with the electric field in the MT-DACS show negligible change in cell viability.