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

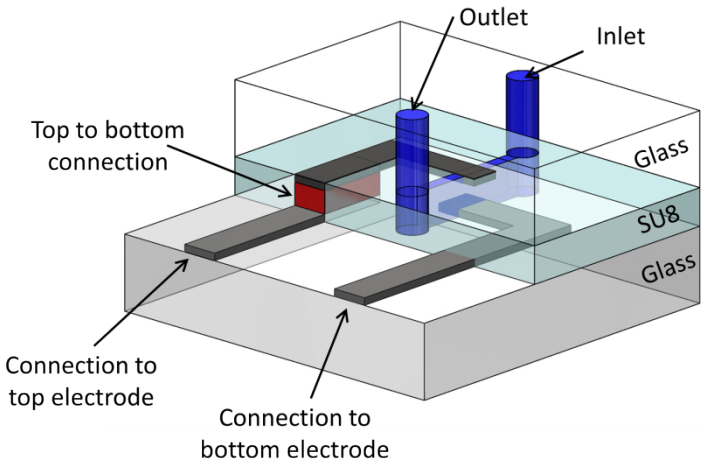

Figure S1. Diagram showing the micro-cytometer chip and the method used to contact the top and bottom electrodes on chip, so that electrical contact can be made on one side only.

Optical setup

Light from a 635nm diode laser (laserGlow LRD-0635-PFR-00100-05) was passed through a bandpass filter (Semrock FF01-632/22-6-D) and coupled into a 50μm core fibre (Thorlabs AFS50/125Y), which was butt coupled to the chip using a positioning stage. The output from the end of this fibre was measured to be 80mW. Fluorescence, side scatter (SSC) and imaging light was collected orthogonal to the excitation axis using a 20x objective (Nikon Plan Fluor), see Figure ESI2. The light passed through an imaging lens (f=250mm) and was split according to wavelength. A dichroic beam splitter (Semrock ff495-dio3) passed light below 495nm to a camera to image the channel. The laser and fluorescence light passed through an iris onto a dichroic so that the 635nm laser light was incident on a PMT (Hammamatsu H10722-01) for side scatter detection. The fluorescence light passed through a 633nm notch filter (Semrock NF01 633U) and a bandpass filter (Chroma HQ675/50M) onto a second PMT (Hammamatsu H10722-01). The imaging lens was set up to focus simultaneously on the camera

and the iris. This made the system less complex and simplified alignment. The objective and imaging lenses produced a maximum deviation from collimation of 4 degrees, which did not impact on the performance of the optical filters.

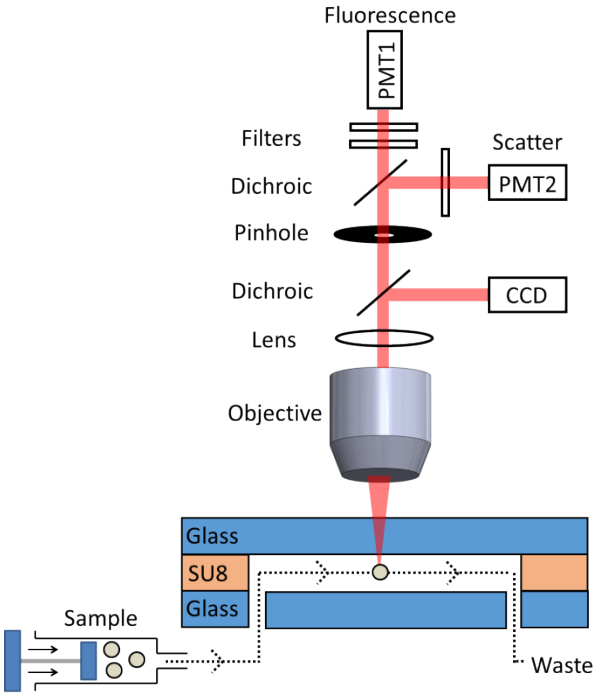

Figure S2. Diagram of the optical system used to collect fluorescence and large angle scattered light from the channel.

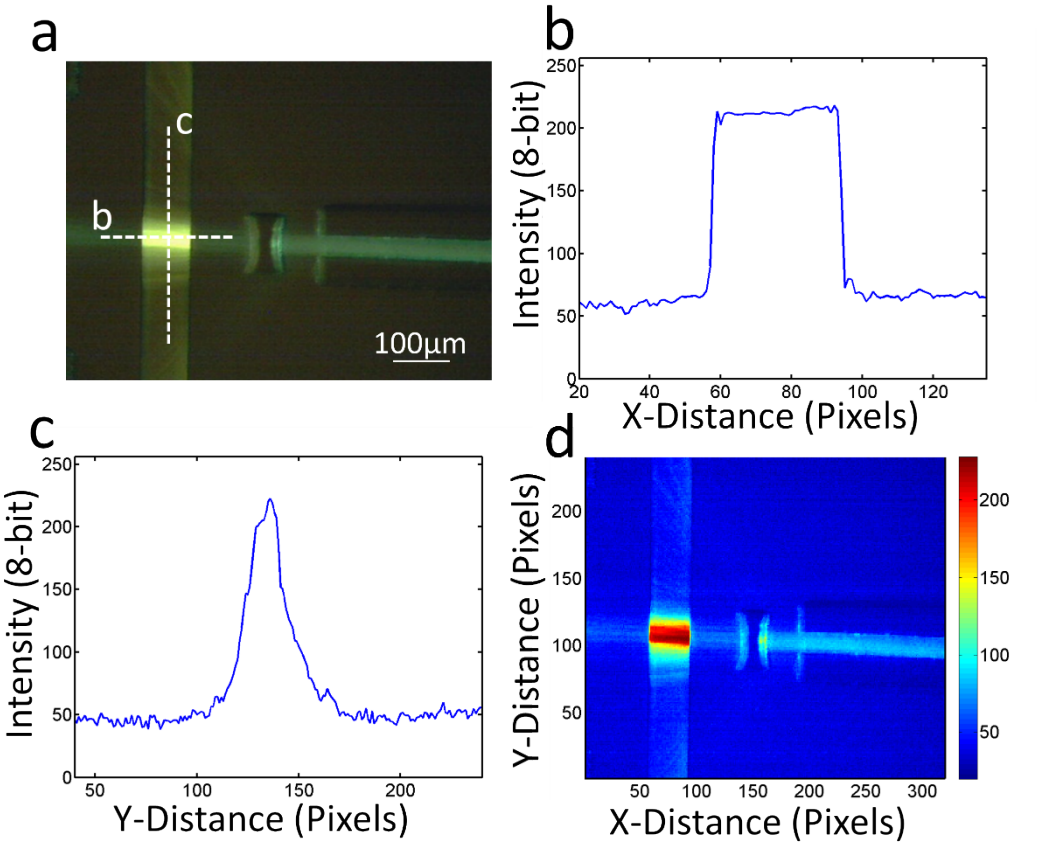

Figure S3. (a) Image of the 635nm beam focused into the microfluidics channel; (b) cross section of the optical profile across the channel and (c) along the length of the channel, i.e. direction of flow; (d) intensity plot of the image from (a).