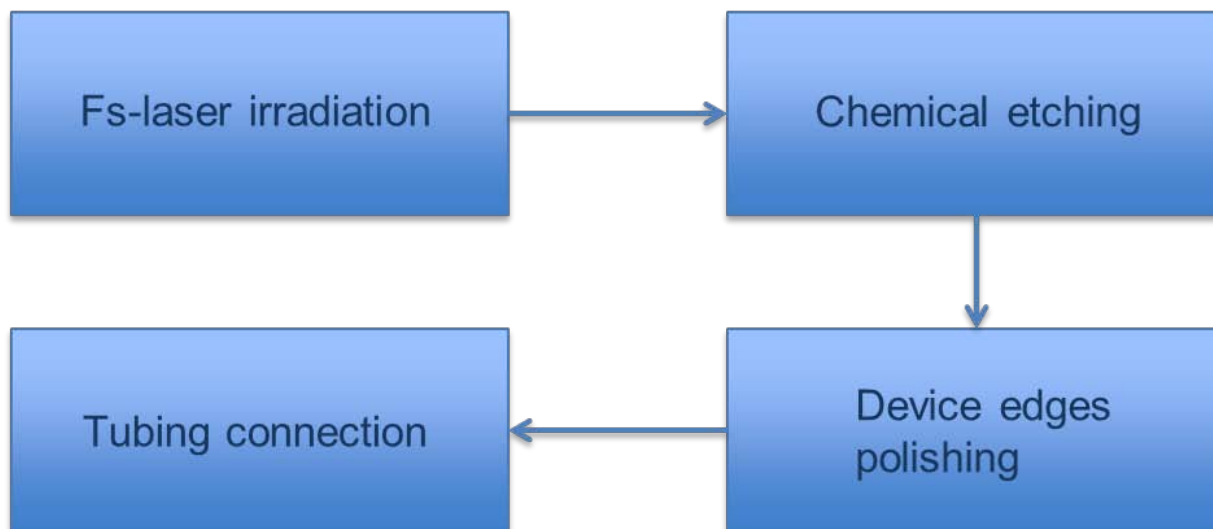
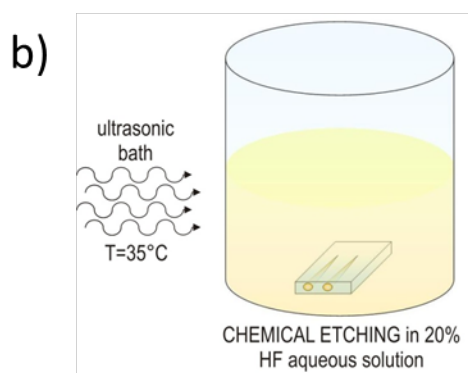
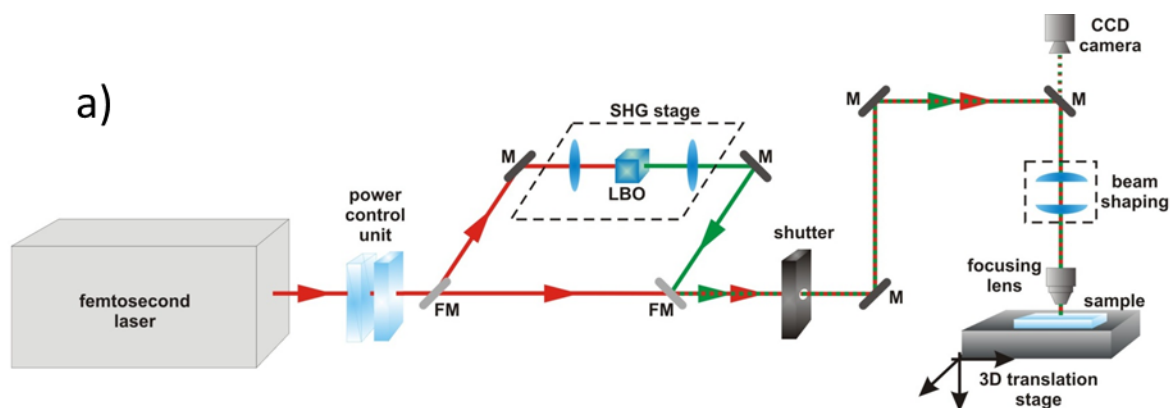


## SUPPLEMENTARY MATERIAL



**Figure 1.** Flowchart of the fabrication process that consists in four subsequent steps: i) femtosecond laser irradiation of the optical waveguides and of the microchannel structure; ii) etching of the microchannels performed by immersion in a 20% HF solution; iii) polishing of the two end-faces in order to expose the waveguide input ends and perform efficient fiber coupling; iv) connection of the chip to external fluidic circuits; using a set-up composed by an optical microscope and accurate translation stages external PEEK capillaries are inserted in the access holes. Once the capillary is firmly inserted it is glued by a drop of UV-curable resin.



**Figure 2.** (a) Typical Experimental setup for femtosecond laser irradiation of transparent substrates; ‘M’ stands for mirror and ‘FM’ for flip mirror. Femtosecond laser pulses, either at the fundamental wavelength in the near-IR or at the second harmonic, are focused by a microscope objective in the volume of a transparent material. By a suitable translation of the substrate, arbitrary 3D waveguides or microchannel pre-etching irradiations can be directly written. A beam-shaping stage may be added to further control the waveguide cross-section (not used for the fabrication of optical waveguides in the cell sorter presented in this paper). (b) Sketch of the chemical etching process. The chip is immersed in an ultrasonic bath with 20% of hydrofluoric acid (HF) in water for 5 hours to obtain the microfluidic X-shaped buried microchannel shown in Fig. 2(b) of the paper.