Electronic Supplementary Information

Plug and Measure - a chip-to-world interface for photonic lab-on-a-chip applications†

Tobias Nils Ackermann,*‡ Pablo Giménez-Gómez,* Xavier Muñoz-Berbel* and Andreu Llobera*

Plug-optics and CWI: Schemes

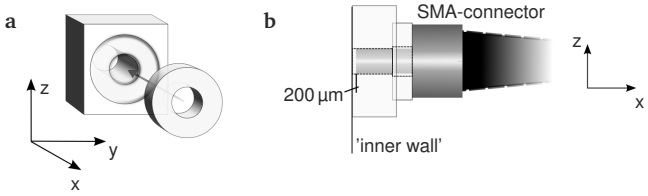

Fig. S1 **a** Detail of plug-optics assembly. To fabricate the plug-optics connector, a cylindrical socket with a design-diameter of 3 mm is laser-cut into 5 mm thick PMMA applying the optimized conditions $P = 100, S = 5$ and $F = 5000$ at 1200 dpi using the Epilog Mini 24 laser writer. Subsequently, the thickness of the block is reduced in a concentric circular area by laser engraving applying 'raster' conditions of $P = 35, S = 12$ and $F = 5000$ at 1200 dpi. A 3 mm thick PMMA disk comprising a cylindrical socket with 3.5 mm design-diameter cut applying $P = 100, S = 5$ and $F = 5000$ and equally reduced in thickness by laser-engraving. The disk is glued into the pre-structured area on the 5 mm thick PMMA. **b** A SMA fiber-connector plugged into the described unit is firmly clamped, leaving the end-facet at a distance of approximately 200 µmfrom the 'inner wall'.

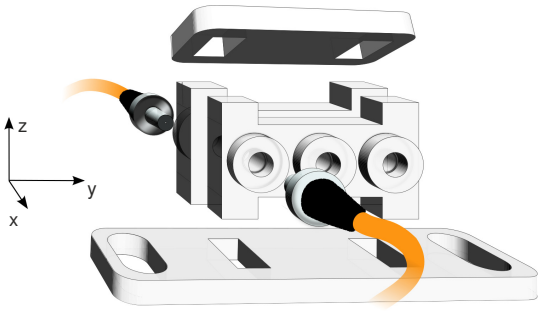

Fig. S2 Schematic detail of triple plug-optics fiber-connector.

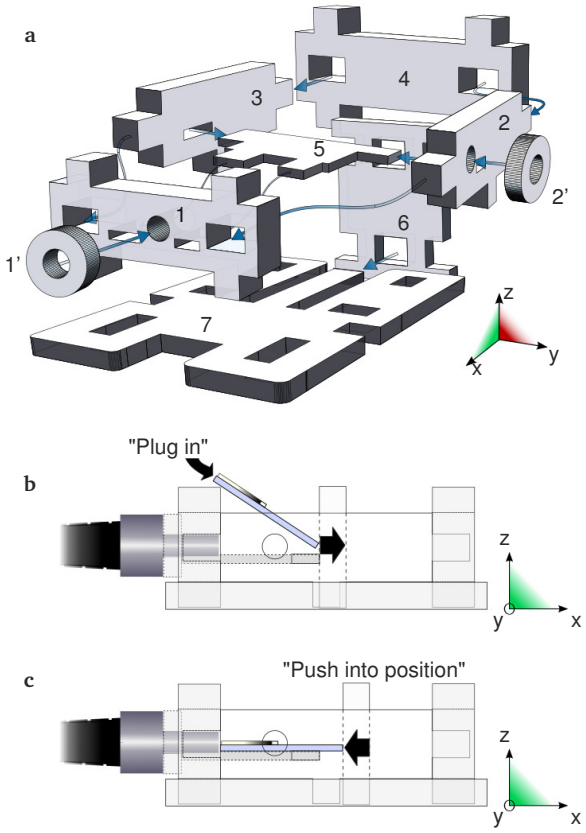

Fig. S3 **a** Model of the individual building blocks and their assembly. $1, 2$: Primary building blocks defining the input and output plane comprising sockets for SMA-connectors and platform 5; $1', 2'$: Spacer disks adjusting the distance from fiber-optics to edge of PhLoC; 3: Side-wall comprising socket to sustain 5; 4: Back-piece completing the outer frame; Blocks $1-4$ are anchored in the base to assure right angles and provide additional stability; 5: Platform to sustain the PhLoC at the corresponding height relative to the fiber-optics; 6: Base of CWI comprising track to guide movement of unit 6; 6: Mobile unit anchored to tracks in the base in order to be moved back and forth clamping the PhLoC in place or releasing it. **b-c** Schematic illustration of how the PhLoC is plugged into the CWI and pushed in position (aligned with the SMA fiber-connector)

* *Institut de microelectrónica (IMB-CNM), Campus UAB, E-08193 Cerdanyola del Vallès, Spain. Fax:(+34) 93 580 1496; Tel:(+34) 93 594 7700*
‡ corresponding Author; Tel:(+34) 93 594 7700 (ext. 2431); E-mail: tobias.ackermann@imb-cnm.csic.es

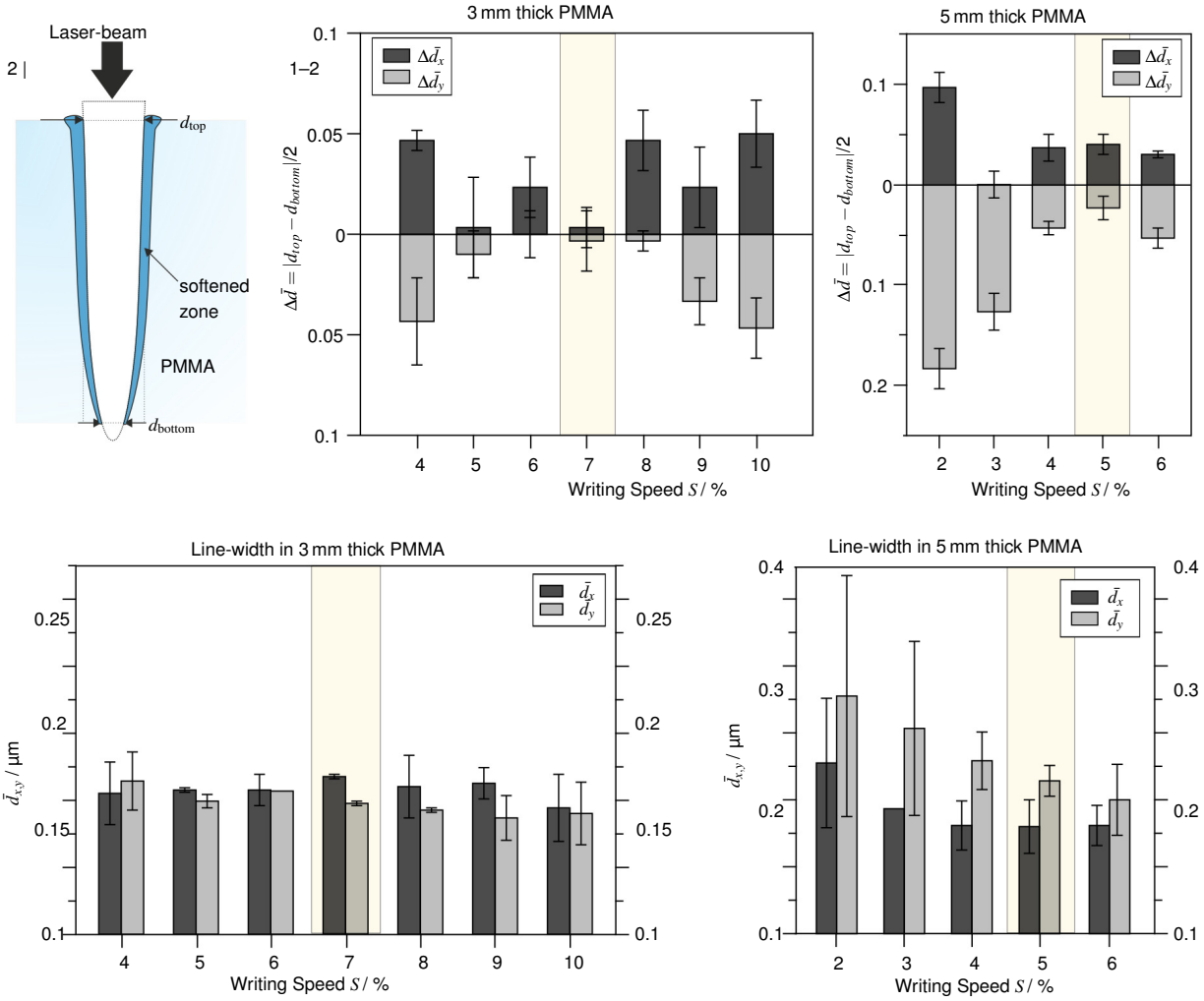

Fig. S4 CO_2 laser fabrication Differences of d_{top} and d_{bottom} for a series of cutting speeds in 5 mm and 3 mm thick PMMA respectively, keeping $P = 100$ and $F = 5000$ constant. The condition in which this difference was smallest and less dependent on the writing direction is highlighted and was used to set the design dimensions. The schematic illustration of the cutting profile in the upper left is based on findings of Prakash et al.[?] and own observatons.

Photo-lithography for waveguide fabrication

First, a borosilicate (Pyrex®) wafer was exposed to O_2-plasma during 18 seconds at 480 W to activate the surface. SU-8 2005 was spincoated at 3000 rpm and submitted to a pre-bake for 20 min at 95 °C after an initial temperature ramp from 65 to 95 °C during 15 min. Waveguides were defined by exposing the pre-baked SU-8 through a Film Mask ordered from JD Photo Data in a KS A6 mask aligner (Karl Süss) with a dose of 330 mJ/cm^3. The exposed structures were post-exposure baked for 10 min at 95 °C with ramp as before.

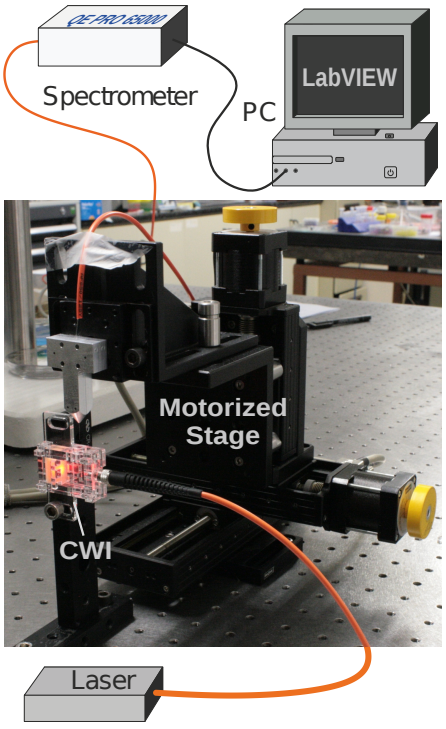

Fig. S5 Setup Experimental setup used for the 2D-mapping of the WG output.