Supplemental Information

Rapid and direct patterning of 'tunable' hydrophobic valves on disposable microchips by laser printer lithography

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Material Cost of the PeT Microchip: The inexpensive nature of the PET and toner presents the possibility for cost-effective mass production, although the details on up-scaling manufacturing of such a material have not been defined. However, below we present some calculations for the cost as best we can judge at this time.

Supplemental Table 1. The cost estimation for a three-layer PeT microchip (12 cm × 12 cm; width × length).

Material	Cost
Commercial PET sheet	$ 1.5
Toner layers as adhesive for bonding	$ 0.33
Toner as hydrophobic patches	$ 0.007 for 100 valves (100% gray-scale toner valves)
Total cost	~$1.837

Influence of Laser Parameters on the Effective Contact Angle of Side Walls. The effective contact angles on the side walls of the laser-ablated microchannel were measured for five replicate devices fabricated using ablation with varied combinations of laser power and translation speed. The number of laser pulses per inch (PPI) was set to 1000 for all the experiments, and 'vector' mode was used to cut rectangular channels. The fabrication procedure of the three-layer PeT microdevices used in this experiment was kept the same as the procedure detailed in the paper, but using different laser power and translation speed. The detailed experimental procedure for determining the effective contact angle of the side wall can be found in the *Material and Experiment* section of this paper. **Supplemental Table 1** shows the effective contact angles on the side walls ablated with different combination of laser power and translation speed. The final result is given as an average of five replications created in one day (to minimize the error from calibration of the laser optic focusing) within one standard deviation. Figure S1 shows the surface of the sidewall cut with different laser parameters, which were magnified by 10-fold using the same microscope and camera described in *Material and Method* section.

Supplemental Table 2. Contact angle of DI water on the side wall that was laser ablated with different setting of parameters (n=5).

Power	Speed	Power to Speed ratio	Effective contact angle of deionized water
0.2%	0.7%	1:3.5	119 ± 2
0.4%	1.4%	1:3.5	120 ± 3
0.8%	2.4%	1:3.5	122 ± 2
1.6%	5.4%	1:3.5	121 ± 2
0.4%	1.2%	1:3	121 ± 2
0.4%	0.8%	1:2	123 ± 2
0.4%	0.4%	1:1	126 ± 3

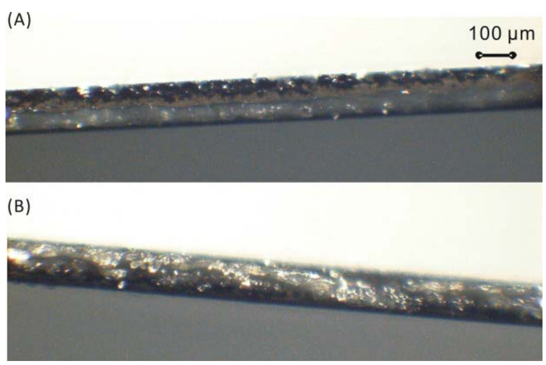

Figure S1: Images of the sidewall surface laser ablated with settings of: (A) 0.2% power and 0.7% speed and (B) 0.4% power and 0.4% speed.