Supplementary Information

Spontaneous droplet generation via surface wetting

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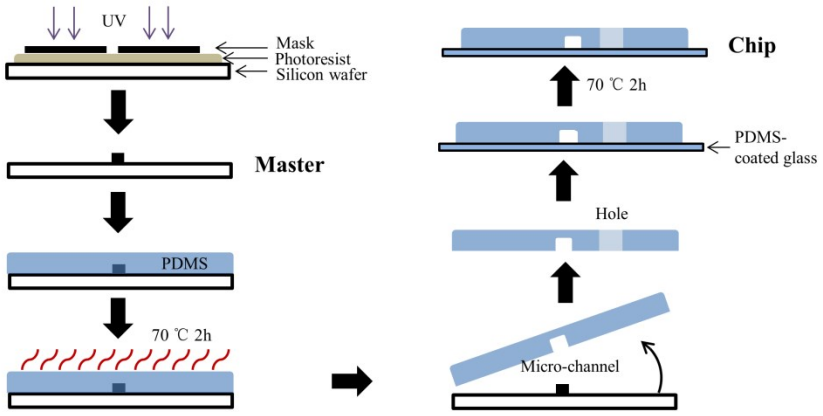

Fig. S1 Workflow of the chip fabrication. The process of chip fabrication was soft lithography.

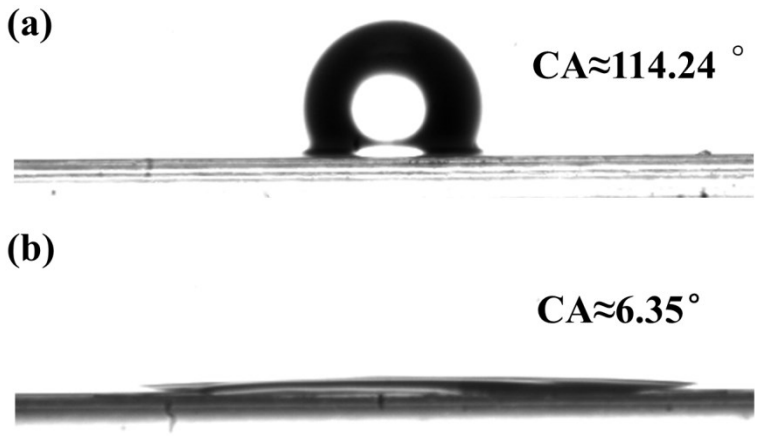

Fig. S2 Images of 5μL sessile water and fluorocarbon oil droplets on PDMS surface. (a) Water contact-angle image of the PDMS surface, showing intrinsic hydrophobicity (the water contact-angle is about 114.24°). (b) Fluorocarbon oil contact-angle image of the PDMS surface, exhibiting oleophilicity (the fluorocarbon oil contact-angle is about 6.35°).

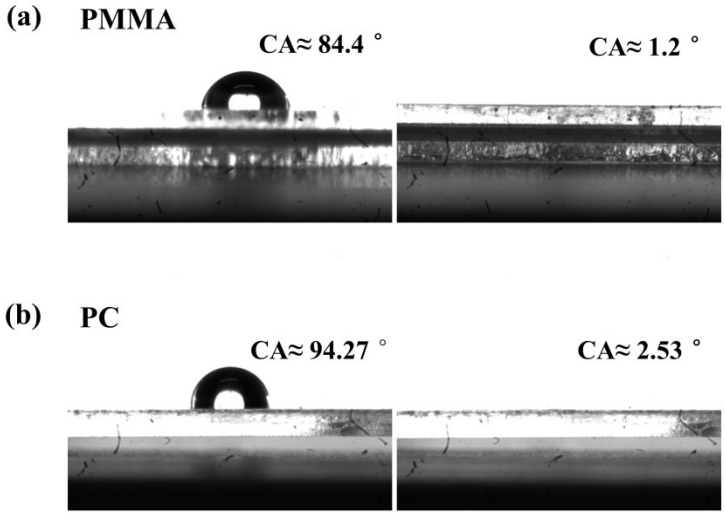

Fig. S3 Images of 5μL sessile water and oil droplets on PMMA and PC surface, respectively. (a) Water contact-angle is about 84.42°(left), and fluorocarbon oil contact-angle is about 1.2°(right) on the PMMA surface. (b) Water contact-angle is about 94.27°(left), and fluorocarbon oil contact-angle is about 2.53°(right) on the PC surface.

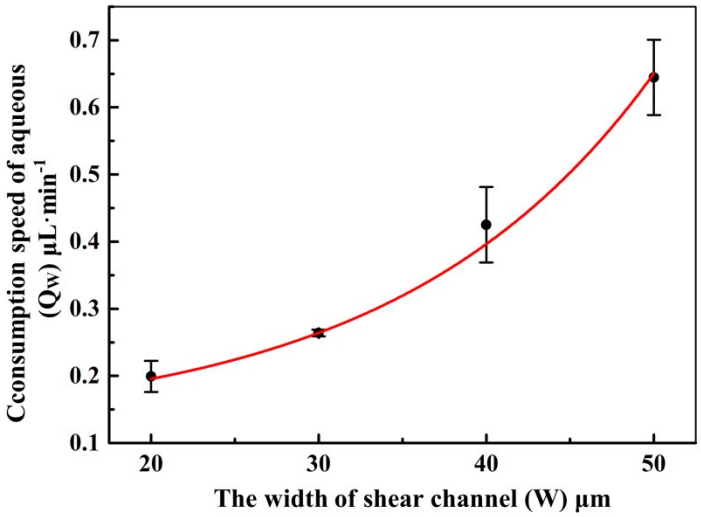

Figure S4 Curve of the water phase consumed rate (Q_w) versus the width of shear channel (W) when the vertical height of tubing (H) at 20 cm. $y = 0.121 + 0.019*e^{0.065x}$, $R^2 = 0.985$.

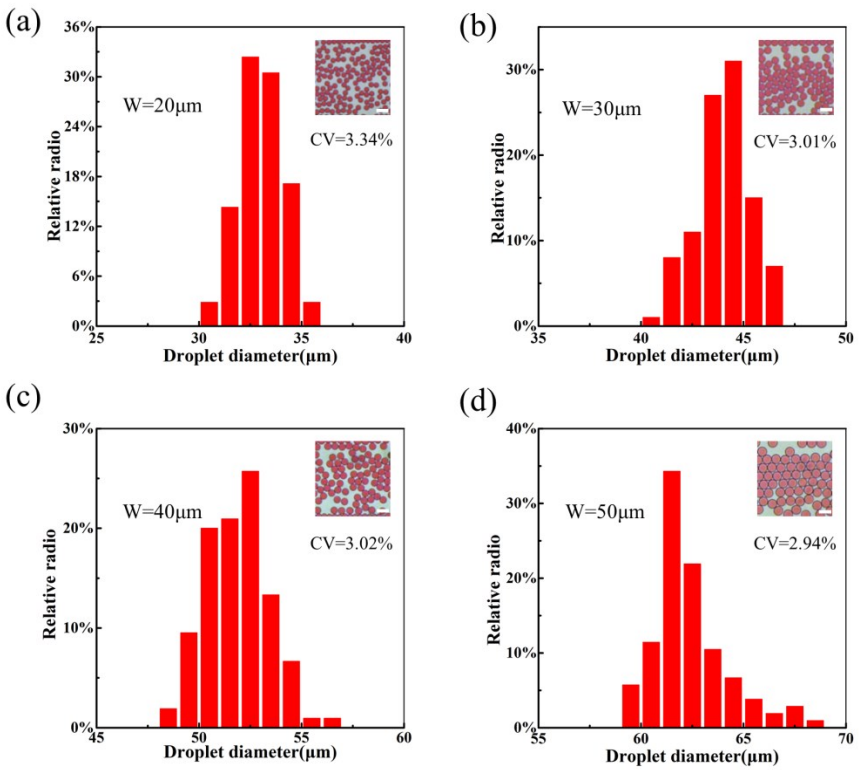

Figure S5 Consistency of the diameters of droplets with different width of shear channel (W) of (a) 20, (b) 30, (c) 40, and (d) 50 μm at the vertical height of tubing (H) of 20 cm. Scale bars = 100 μm.

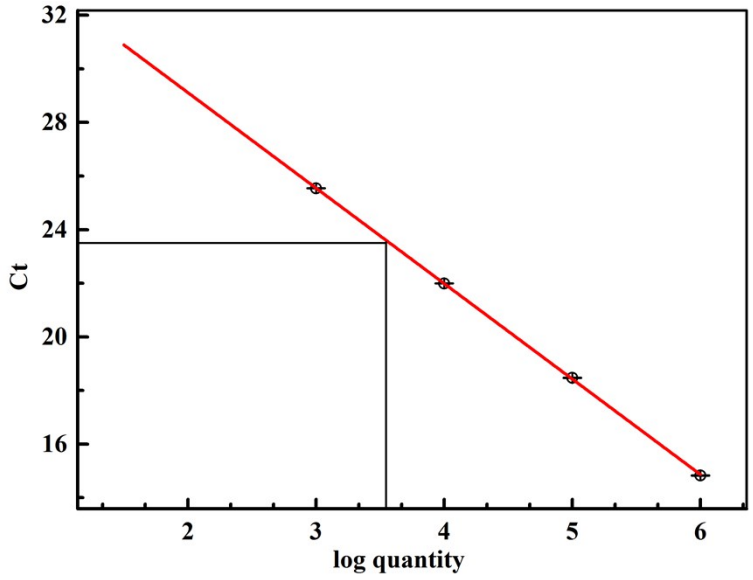

Figure S6 The linear correlation between the Ct and log quantity of *S.mutans* DNA templates based on QPCR (R^2 = 0.999). The concentrations of the measured *S.mutans* DNA was $6.12\times10^{3.6}$ copies per μL.

The *S.mutans* DNA was diluted to 24, 162, 487, 975, 1462 and 2436 copies per μL as the templates of ddPCR. These Seven premixed reactions including the no-template negative control were prepared for ddPCR reaction and the result was shown in Fig. 6(b-c).

Description of movies for droplet generation

Movie S1, S2 The simulations of oil wetting and droplet generation.

Movie S3 Downstream the droplet shear channel is the suction chamber. The duration of droplet generation depends on the volume of suction chamber. In chips with large suction chambers, droplets are more continuously produced.

Movie S4 The process of dynamic adjustment of H from 0 cm to 30 cm then back to the initial situation at W = 50 μm.

Movie S5 The process of the aqueous solution in water inlet is continuously consumed. The water phase first ruptures from the intermediate portion to form a ring shape, and then the rest water phase is consumed gradually. The process of changing the shape of the whole water phase has no obvious effect on droplets.

Movie S6 The movie of high throughput droplet generation process of four water inlets integrated on one chip at H = 30 cm and W = 20 μm.

Movie S7 The movie of multi-sample emulsion process in four channels integrated on one chip at H = 30 cm and W = 20 μm.