Electronic Supplementary Information

Lab-on-a-Disc for Simultaneous Determination of Total Phenolic Content and Antioxidant Activity of Beverage Samples

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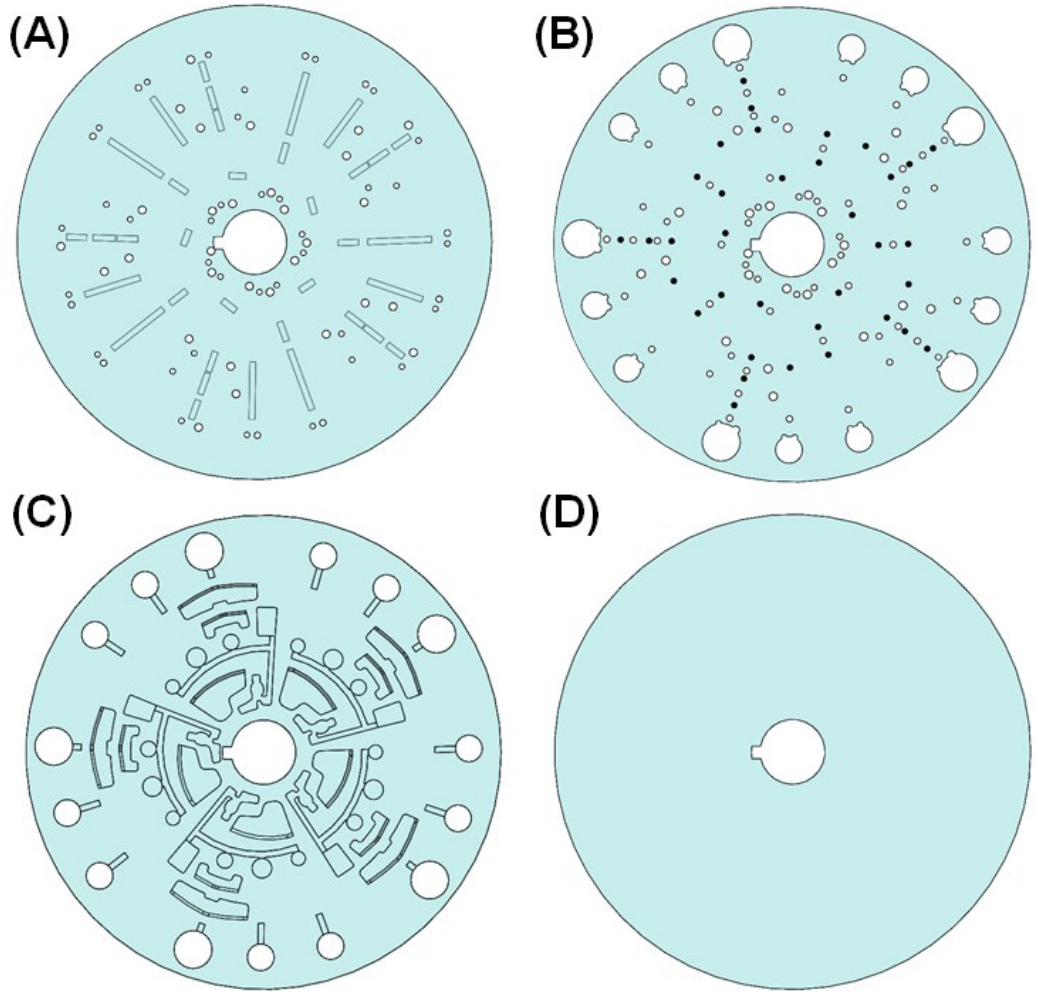
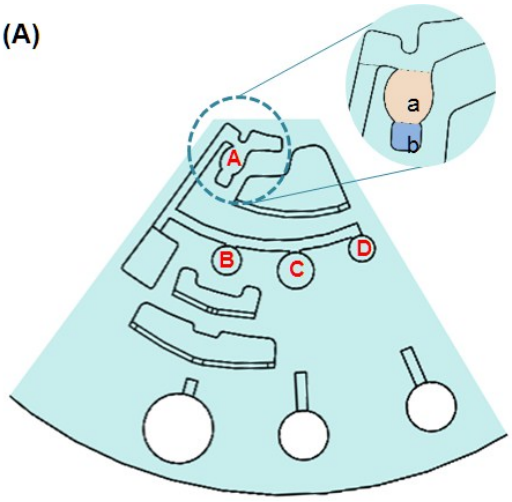


Fig. S1 The lab-on-a-disc is composed of 4 layers of polycarbonate (PC). (A) Top layer containing sample inlet holes, vent holes, and flow channels. (B) Polycarbonate (PC) film (0.125 mm thick) containing carbon dot patterns, inlets, vent hole, and open holes for optical detection. (C) Middle layer disc (5 mm thick) containing sample and reagent chambers. (D) Bottom layer (1 mm thick). The diameter of the disc is 120 mm.

(A)



(B)

Chamber		Area (mm^2)	Height (mm)	Volume (μL)
A	a	10.0	1.5	15.0
	b	3.4	1.5	5.0
B		13.3	2.0	26.6
C		20.0	2.0	40.0
D		10.0	2.0	20.0

Fig. S2 The disc layout with detailed information about the chamber design. (A) the design of the microfluidic layout, and (B) the volume of metering chambers

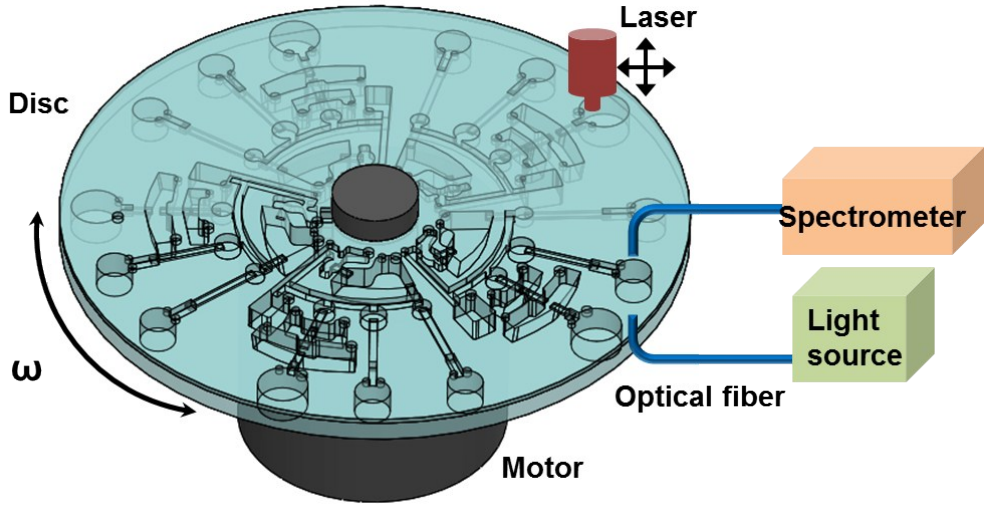


Fig. S3 Experimental set-up for the TPC and AA measurements on a disc. The lab-on-a-disc device was mounted on a PC controlled spinning motor. The laser-irradiated carbon dot valves could be selectively opened by a laser diode (Best-Sources Industry (HK) Co. Ltd., China). Colorimetric detections of the target analytes were conducted using an optical fiber-coupled spectrometer (QE65000 Pro, Ocean Optics, FL, USA).

Table S1. Sample and reagent volumes and mixing times used for the measurement of TPC and AA by manual conventional (original) and lab-on-a-disc methods. Original volume was used in conventional manual method and reduced volume was used in the lab-on-a-disc experiments. To make a direct comparison with conventional methods, the reduced volumes on the disc written in the flowing table are after the dilution for DPPH and FRAP methods and the dilution as well as mixing with H_2O_2 solution for the case of FC measurements.

Colorimetric method	Reagent volume (µL)		Sample volume (µL)		Mixing time (min)
	Original[1-3]	Reduced	Original [1-3]	Reduced	Manual
FC	4500	360	500	40	90
DPPH	800	160	200	40	10
FRAP	900	180	100	20	30

Movie 1. Visualization of lab-on-a-disc detections of TPC and AA by FC, DPPH and FRAP methods. The fluidics on the disc during the spinning was visualized with custom-designed imaging machine equipped with strobe light and camera. The movie was prepared for capturing of representative images at each step. The total playtime is 1 min 11 sec.

References

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2. D.-B. Kim, G.-H. Shin, Y.-J. Lee, J. S. Lee, J.-H. Cho, S.-O. Baik and O.-H. Lee, *Food Chemistry*, 2014, **151**, 58-64.
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