Electronic Supplementary Material (ESI) for RSC Advances.

Supplementary Information

Bonding of thermoplastic microfluidics by using dry adhesive tape

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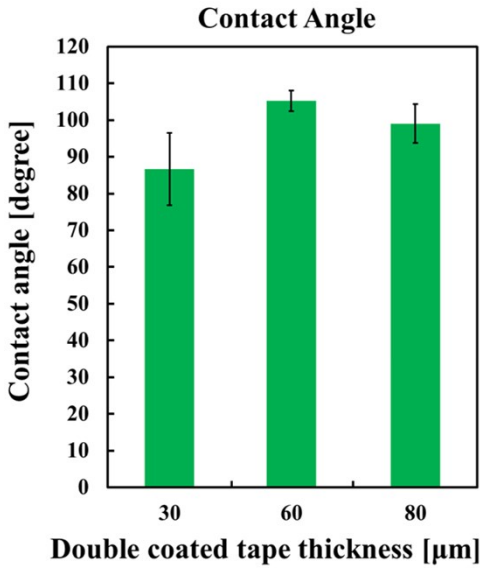
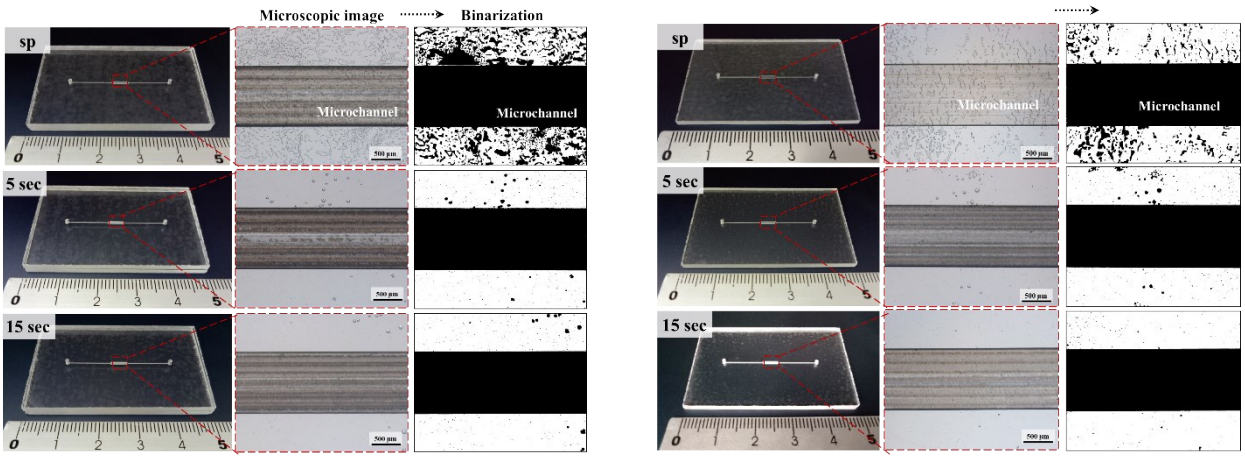
S1.1 Water Contact Angle Measurement

The surface contact angles were measured by contact angle measurement system (OCA 15EC, DataPhysics Instruments GmbH, Filderstadt, Germany). A 3µL droplet (dosing rate 1µl/sec) was auto-pipetted on the thermoplastic substrate to obtained the contact angle data. The water contact angle of 30, 60, and 80 µm 8000 series 3M double-side tapes were measured 86.59±9.85, 105.23±2.79, and 99.02±5.28, based on 8 individual measurements (Fig. S1).



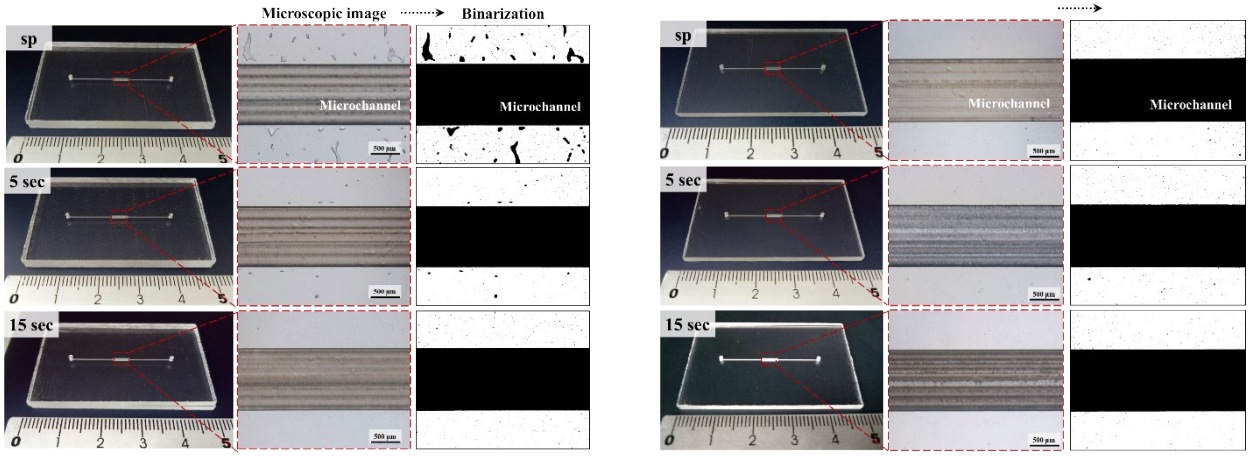
	30	60	80
No.	Water contact angle		
1	86.52	105.58	93.50
2	71.60	108.77	98.15
3	76.11	103.34	99.50
4	87.61	104.79	110.90
5	96.20	104.59	96.36
6	102.43	108.89	99.42
7	86.16	105.57	95.15
8	86.12	100.31	99.14
mean	86.59	105.23	99.02
std.dev.	9.85	2.79	5.28

Fig. S1 The water contact angle of 30, 60, and 80 µm 8000 series 3M double-side tapes. Error bars obtained from 8 individual measurements



(a) (b)

Fig. S2 Images of microchannel bonding interface on a (a) 2 mm thick inflexible and (b) 0.25 flexible substrate cover substrate with scraper-press (sp), 5 and 15 seconds. Dry adhesive tape thickness: 30 µm, Pressure:1.05 kg/cm^2



(a) (b)

Fig S3 Images of microchannel bonding interface on a (a) 2 mm thick inflexible and (b) 0.25 flexible substrate cover substrate with scraper-press (sp), 5 and 15 seconds. Dry adhesive tape thickness: 80 µm, Pressure:1.05 kg/cm^2

Table 1.1 Summarized of the bubble ratio and leak pressure of the dry adhesive bonded microfluidic device under different process conditions

		Inflexible Substrate		Flexible substrate	
Thickness	Bonding conditions	Bubble ratio [%]	Leak pressure [bar]	Bubble ratio [%]	Leak pressure [bar]
30 µm	sp	28.75 ± 6.77	8.14 ± 0.12	14.74 ± 2.65	3.64 ± 0.27
	5s	2.15 ± 0.70	10.34 ± 1.00	1.59 ± 0.87	4.59 ± 0.39
	15s	1.72 ± 1.09	10.96 ± 1.16	0.55 ± 0.12	4.98 ± 0.09
60 µm	sp	8.44 ± 3.27	9.19 ± 0.76	2.36 ± 0.95	2.96 ± 0.20
	5s	0.70 ± 0.11	10.45 ± 0.89	0.36 ± 0.06	3.58 ± 0.40
	15s	0.47 ± 0.18	11.26 ± 1.49	0.25 ± 0.06	3.93 ± 0.36
80 µm	sp	4.84 ± 1.46	5.85 ± 0.53	0.47 ± 0.07	2.07 ± 0.22
	5s	0.89 ± 0.39	7.53 ± 0.36	0.27 ± 0.07	2.40 ± 0.28
	15s	0.76 ± 0.41	7.39 ± 0.98	0.19 ± 0.02	2.39 ± 0.11