

Supplementary Information

A structure-free digital microfluidic platform for detection of influenza A virus by using magnetic beads and electromagnetic forces

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Table S1. The temperature profile generated by the electromagnets with different current inputs. The brass wire with a diameter of 0.45 mm was used and the number of the electromagnet was 625 turns.

Current	0.8 A	1.0 A	1.2 A	1.4 A	1.6 A	1.8 A
Voltage	1.64 V	2.02 V	2.45 V	2.88 V	3.23 V	3.79 V
Magnetic flux density (mT)	71	84	92	101	110	116
T (t = 0 s)	24.3°C	24.3°C	24.3°C	24.3°C	24.3°C	24.3°C
T (t = 30 s)	26.7°C	28.7°C	30.9°C	34.0°C	37.3°C	40.5°C
T (t = 60 s)	27.8°C	30.6°C	33.1°C	36.5°C	41.5°C	44.7°C

Table S2. Comparison of magnetic flux density generated by the electromagnets with the brass coils of different diameters (0.23 mm and 0.45 mm).

	0.6 A	0.8 A	1.0 A	1.2 A	1.4 A	1.6 A	1.8 A
0.23 mm	4.58 V	6.53 V	--	--	--	--	--
	80 mT	99 mT	--	--	--	--	--
0.45 mm	0.55 V	0.74 V	0.93 V	1.14 V	1.35 V	1.56 V	1.80 V
	42 mT	45 mT	55 mT	63 mT	82 mT	88 mT	95 mT

--: overloaded

Table S3. Comparison of magnetic flux density generated by the electromagnets with different turns. The brass wire with a diameter of 0.45 mm was used.

Turns	0.8 A	1.0 A	1.2 A	1.4 A	1.6 A	1.8 A
350 turns	0.74 V	0.93 V	1.14 V	1.35 V	1.56 V	1.80 V
	45 mT	55 mT	63 mT	82 mT	88 mT	95 mT
490 turns	1.06 V	1.34V	1.63 V	1.92 V	2.26 V	2.86 V
	65 mT	80 mT	87 mT	98 mT	105 mT	115 mT
625 turns	1.64 V	2.02 V	2.45 V	2.88 V	3.23 V	3.79 V
	71 mT	84 mT	92 mT	101 mT	110 mT	116 mT

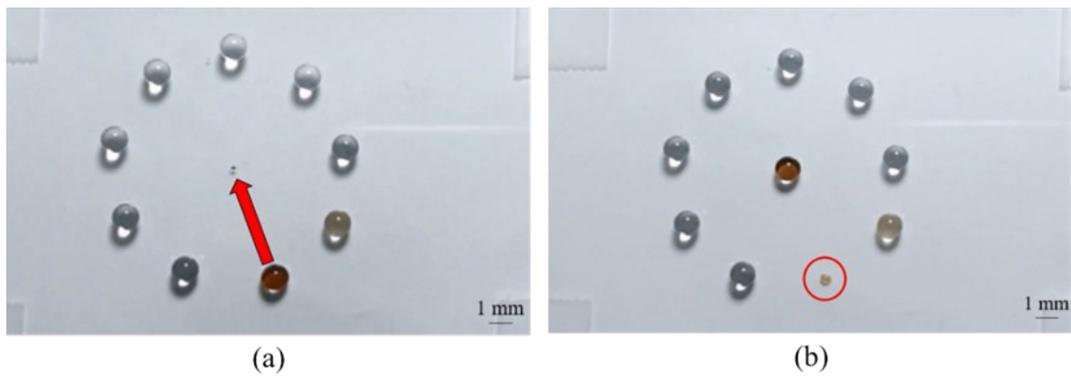


Figure S1. Anti-adhesion test of the PDMS-based SET. The droplet surface energy trap (SET) surface was observed in the process of the detection. (a) The droplet containing beads was attracted to the central mixing area; (b) The SET surface after droplet leaving was observed. Experimental results showed that the magnetic beads may slightly adhered (an ignorable part of the beads) in the PDMS-based SET.

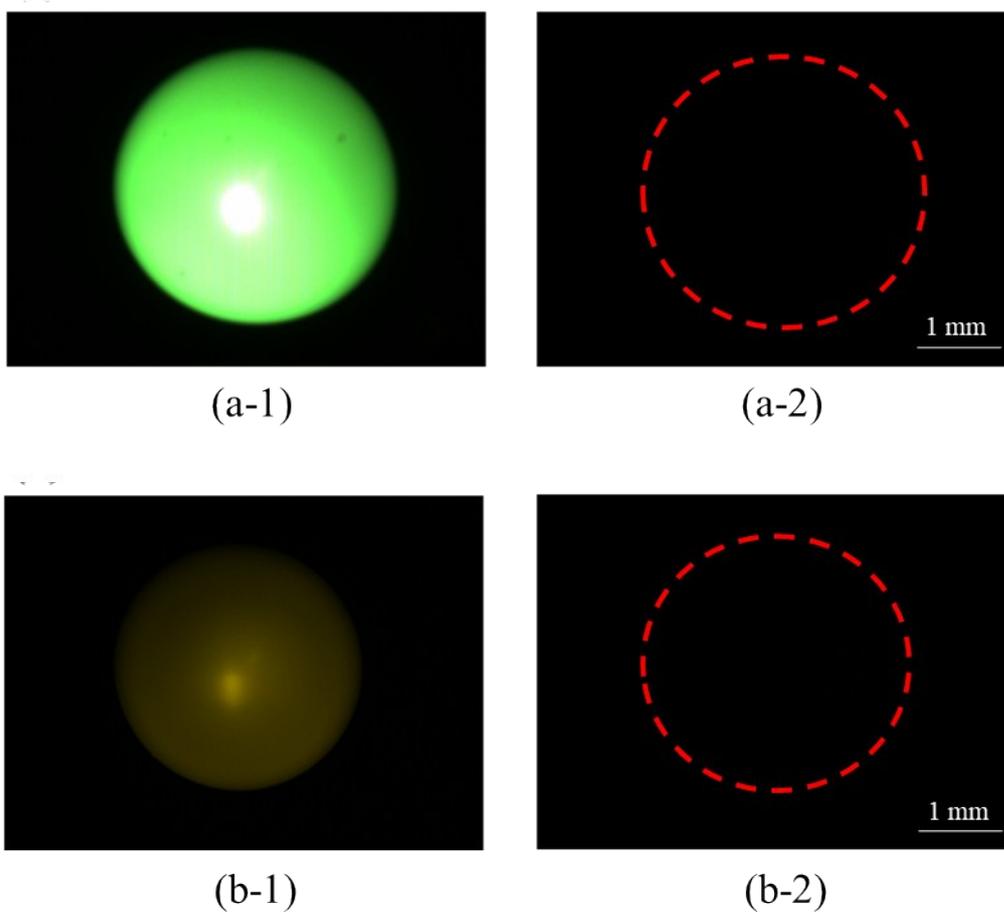


Figure S2. Anti-adhesion test of the super-hydrophobic surface. The super-hydrophobic surface was observed while droplets passed and stopped for 3 min. (a) FAM-conjugated aptamer fluorescent test; (b) PE-conjugated antibody fluorescent test. Experimental results showed that ssDNA and antibody may not be adhered on the droplet trap.