Supporting Information

Hand-powered Centrifugal Microfluidic Platforms Inspired by a Spinning Top for Sample-to-Answer Diagnostics of Nucleic Acids

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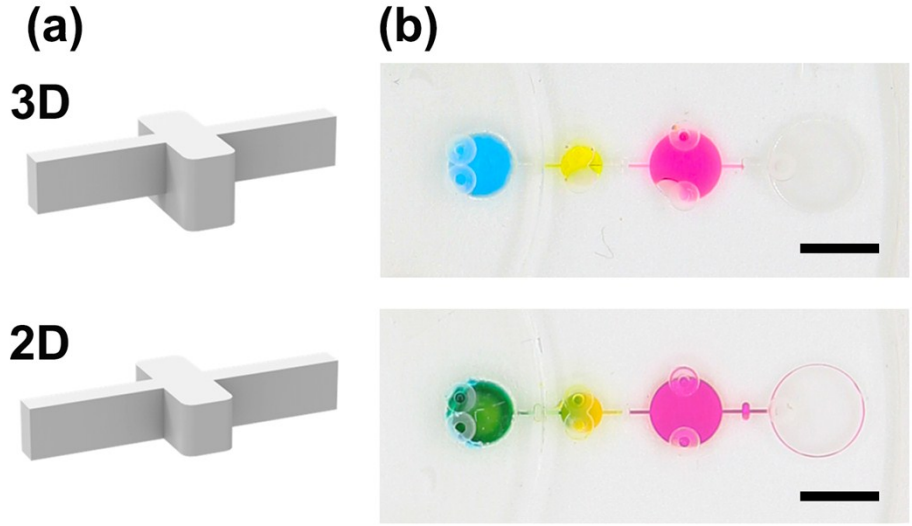

Figure S1. On-chip capillary valves for liquid control. (a) Schematic of 3D (expansion structure in both the horizontal plane and the vertical plane) and 2D (expansion structure in the horizontal plane) capillary valves. (b) Photograph of 3D capillary valves that can prevent the mixing of different color dyes from different chambers (C1, C2 and C3) under stagnant conditions, whereas 2D capillary valves cannot block the flow of dyes between different chambers. Scale bar, 5 mm.

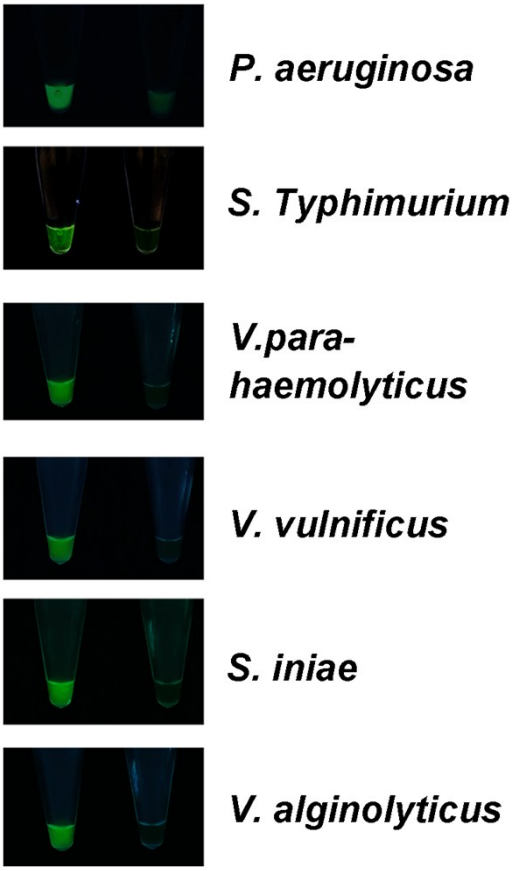

Figure S2. The availability and specificity of primers verified by LAMP reaction in tubes. After 1 h amplification, the solutions with target plasmids (left) generate strong fluorescence, while the solutions without plasmids (right) remain dark under UV excitation at 365 nm.

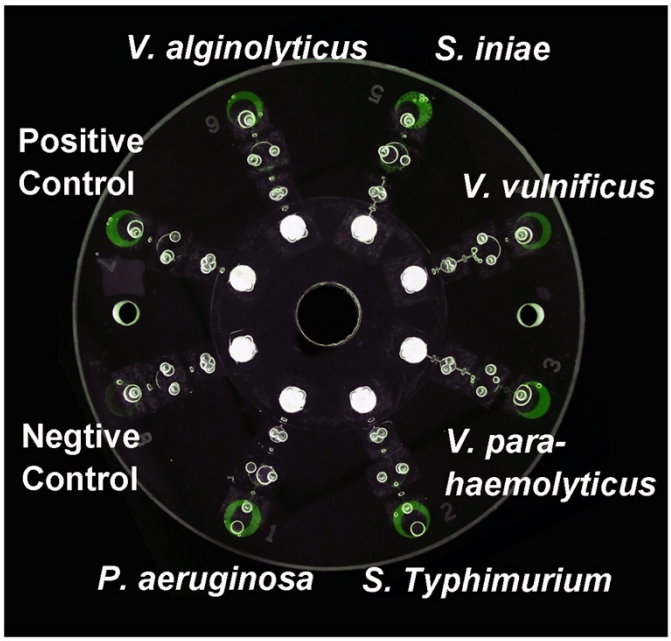

Figure S3. Photograph of the microfluidic disc for multiplex detection of nucleic acids in bacteria after 3-day storage at room temperature. The preserved fluorescent signals could facilitate the re-checking of assay results in clinical diagnosis.

Table S1. Nucleotide sequences of the conserved fragments of pathogenic bacteria.

Name	Target fragment sequence (5’ to 3’)
P. aeruginosa (191 bp) oprL gene (Accession Number: Z50191, 810-1000)	GCGTTGCCGCCAACAATGGCGGCAACGTTCCT CCTTCCGGGTATGGCACGGCAGGTGCCGGCGG CGCCTTTACCGGAGGTGGGGTGACAACCCCCA CCTCCGTGCAGGGCGAACTGTTCATGCAGCTC CAGCAGATGCAGGACGAGTTGGCTCGCCTGCG TGGCACGCTCGAGCGAGAGGTTGCCCGCATG
S. Typhimurium (244 bp) invA gene (Accession Number: M90846, 225-468)	GGCGATATTGGTGTTTATGGGGTCGTTCTACAT TGACAGAATCCTCAGTTTTTCAACGTTTCCTGC GGTACTGTTAATTACCACGCTCTTTCGTCTGGC ATTATCGATCAGTACCAGTCGTCTTATCTTGAT TGAAGCCGATGCCGGTGAAATTATCGCCACGT TCGGGCAATTCGTTATTGGCGATAGCCTGGCG GTGGGTTTTGTTGTCTTCTCTATTGTCACCGTG GTCCAGTTTATCGTT
V.parahaemolyticus (229 bp) thermolabile hemolysin gene (Accession Number: M36437, 283-511)	AGCTACTCGAAAGATGATCCAGCGACCGATTG GGAATGGGCAAAAAACGAAGATGGTAGCTACT TCACCATTGACGGCTACTGGTGGAGCTCCGTTT CATTTAAAAACATGTTCTACACCAACACGTCG CAAAACGTTATCCGTCAGCGTTGTGAAGCAAC ATTAGATTTGGCGAACGAGAACGCAGACATTA CGTTCTTCGCCGCTGACAATCGCTTCTCATACA ACC
V. vulnificus (308 bp) outer membrane protein TolC gene (Accession Number: DQ296643, 999-1306)	TCTTGAAGCCACTTATCGCGGTGTCGTGAAAG AAGTGCGAGCGCAAAACAACAACATCAATGCC TCAATCGGTGCACTTCGTGCGTATGAGCAATCT GTTGTTTCTGCGCGTTCAGCATTAGAAGCAACC GAAGCGGGCTTTGATGTTGGTACTCGTACTATT GTGGATGTACTTGATGCCACTCGTCGCCTTTAC GATGCCAACAAAAACCTATCGAATGCACGCTA CAACTACATCTTGAGTGTACTGCAACTTCGTCA GGCGGTGGGTACACTGAGCGAGCAAGATGTAC TGGATGTTGATGCTG
S. iniae (271 bp) DNA gyrase subunit B	GAAGATGATTCCATTACCGTTGTTGATGATGGC CGTGGGATTCCTGTTGATATTCAAGAAAAAAC

gene (Accession Number: KC560771, 220-490)	GGGTCGACCTGCTGTTGAAACAGTCTTTACAGT TCTCCATGCTGGAGGTAAATTCGGCGGAGGCG GTTATAAGGTTTCAGGTGGTCTGCATGGGGTTG GTTCATCAGTTGTTAATGCCCTCTCAACACAGT TAGATGTCCGGGTTTATAAAAATGGAAATATC TACTATCAAGAATTTAAACGTGGTGTGGTAGG AGAAGATTTAG
V. alginolyticus (232 bp) Outer membrane protein gene (Accession Number: GU318325, 162-393)	CTACCTAGAAATGGAATTCGGCGGCCGCTCTG GTATCTTCGACCTTTACGGCTACGTTGATGTAT TCAACCTAACTTCTGATCCAGGTAGCGACAAA GCTGGCGCAGAGAAGATCTTTATGAAATTCGC TCCACGTATGTCTCTAGATGCGGTAACTGGTAA AGACCTATCTTTCGGTCCAGTTCAAGAGCTATA CGTTGCAACTCTAATCGAGTGGGGTGGTAACT CTGGT

Table S2. LAMP primers for pathogen detection.

Primer name	Sequence (5’ to 3’)
P. aeruginosa-F3	GCGTTGCCGCCAACAATG
P. aeruginosa-B3	CATGCGGGCAACCTCTC
P. aeruginosa-FIP	GTTGTCACCCCACCTCCGGGCGGCAACGTTCCTCC
P. aeruginosa-BIP	CTCCGTGCAGGGCGAACTGCAGGCGAGCCAACTC
P. aeruginosa-LF	ACCTGCCGTGCCATACC
P. aeruginosa-LB	GTTCATGCAGCTCCAGCAG
S. Typhimurium-F3	GGCGATATTGGTGTTTATGGGG
S. Typhimurium-B3	AACGATAAACTGGACCACGG
S. Typhimurium-FIP	GACGACTGGTACTGATCGATAGTTTTTCAACGTTTCCTGCGG
S. Typhimurium-BIP	CCGGTGAAATTATCGCCACACAAAACCCACCGCCAGG
S. Typhimurium-LF	GACGAAAGAGCGTGGTAATTAAC
S. Typhimurium-LB	GGGCAATTCGTTATTGGCGATAG
V.parahaemolyticus-F3	AGCTACTCGAAAGATGATCC
V.parahaemolyticus-B3	GGTTGTATGAGAAGCGATTG
V.parahaemolyticus-FIP	ATGTTTTTAAATGAAACGGAGCTCCGGCAAAAAACGAAGATGGT
V.parahaemolyticus-BIP	ACGTCGCAAAACGTTATCCGGCGAAGAACGTAATGTCTG
V.parahaemolyticus-LF	ACCAGTAGCCGTCAATG
V.parahaemolyticus-LB	TTAGATTTGGCGAACGAGA
V. vulnificus-F3	TCTTGAAGCCACTTATCGC

V. vulnificus-B3	CAGCATCAACATCCAGTACA
V. vulnificus-FIP	TACCAACATCAAAGCCCGCTTttttCGTGCGTATG AGCAATCT
V. vulnificus-BIP	GATGCCACTCGTCGCCTTttttGCAGTACACTCAA GATGTAGTT
V. vulnificus-LF	GGTTGCTTCTAATGCTGAACG
V. vulnificus-LB	AACCTATCGAATGCACGCT
S. iniae-F3	GAAGATGATTCCATTACCGTTG
S. iniae-B3	CTAAATCTTCTCCTACCACACC
S. iniae-FIP	TGAAACCTTATAACCGCCTCCGttttCTGCTGTTG AAACAGTCTTTAC
S. iniae-BIP	GGTCTGCATGGGGTTGGTTttttAACCCGGACATC TAACTGT
S. iniae-LF	TACCTCCAGCATGGAGAACT
S. iniae-LB	TCAGTTGTTAATGCCCTCTCAA
V. alginolyticus-F3	ACCAGAGTTACCACCCCAC
V. alginolyticus-B3	CTACCTAGAAATGGAATTCGG
V. alginolyticus-FIP	GTATGTCTCTAGATGCGGTAACTGGTttttCGATT AGAGTTGCAACGTATAGC
V. alginolyticus-BIP	GTCGCTACCTGGATCAGAAGTTAGGttttCGGCC GCTCTGGTATCTTCGAC
V. alginolyticus-LB	TGAATACATCAACGTAGCCGTAAAG