Rapid Detection of Novel Coronavirus SARS-CoV-2 by RT-LAMP Coupled Solid-State Nanopores

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Supplementary Figures

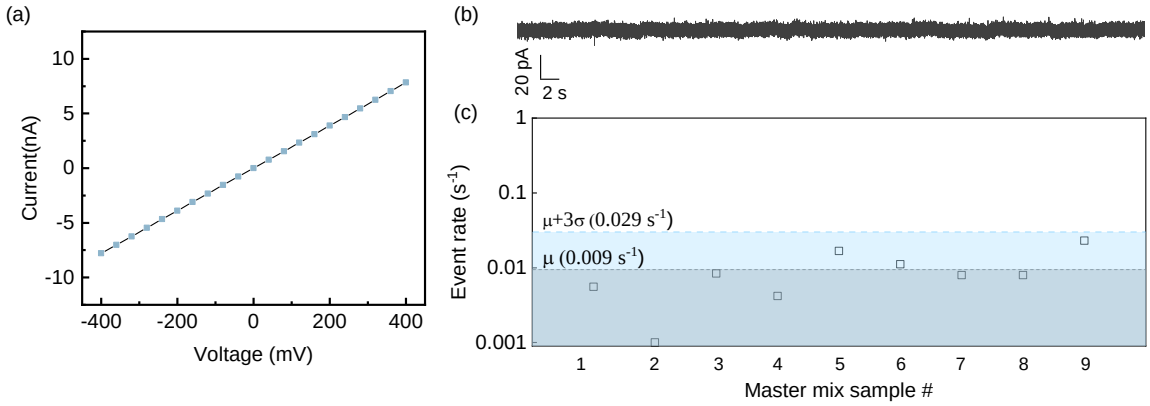


Figure S1. (a) The glass nanopores were characterized using an I-V scan in 1 M KCl, corresponding to a nanopore with about 10 nm in diameter. (b) Representative current time traces of master mix (negative control) samples. (c) Event rate of 9 negative control samples. The mean (μ) is 0.009 s^{-1}, standard deviation (σ) is 0.007 $s^{-1,}$ and μ+3σ was 0.029 s^{-1}.

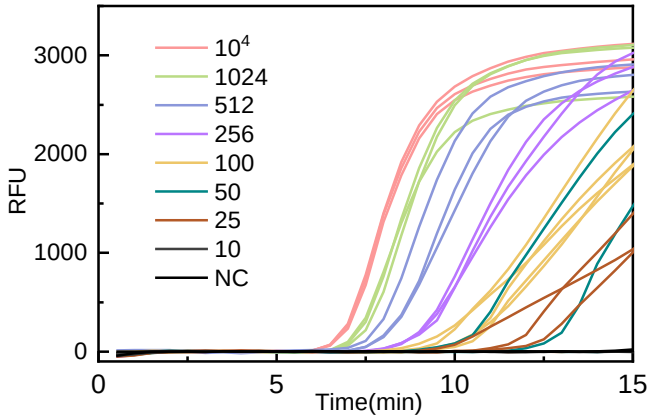


Figure S2. Real-time result of the RT-LAMP reaction using the SARS-CoV-2 spiked saliva sample at different concentrations.

Supplementary Tables

Table S1. RT-LAMP primer sets targeting N and E regions of SARS-Cov-2 [1]

Primer		Sequence (5'-3')
Gene N	**F3**	AACACAAGCTTTCGGCAG
	B3	GAAATTTGGATCTTTGTCATCC
	BIP	TGCGGCCAATGTTTGTAATCAGCCAAGGAAATTTTGGGGAC
	FIP	CGCATTGGCATGGAAGTCACTTTGATGGCACCTGTGTAG
	LF	TTCCTTGTCTGATTAGTTC
	LB	ACCTTCGGGAACGTGGTT
Gene E	**F3**	AACACAAGCTTTCGGCAG
	B3	GAAATTTGGATCTTTGTCATCC
	BIP	TGCGGCCAATGTTTGTAATCAGCCAAGGAAATTTTGGGGAC
	FIP	CGCATTGGCATGGAAGTCACTTTGATGGCACCTGTGTAG
	LF	TTCCTTGTCTGATTAGTTC
	LB	ACCTTCGGGAACGTGGTT

Table S2. RT- LAMP Master mix

Components	Working Concentration (25µl)
FIP/BIP primers	1.6 µM
F3/B3 primers	0.2 µM
LF/LB primers	0.4 µM
Isothermal Amplification	1x
$MgSO_4$	6 mM
Betaine	0.4 M
dNTP	1.4 mM
syto-9 green fluorescent	0.5 µM
Bst 2.0 DNA polymerase	10 U
WarmStart Reverse Transcriptase	7.5 U
UP Water	6 µl

Table S3. RT- PCR primer sets targeting N1 regions of SARS-Cov-2

Primer	Sequence
2019-nCoV-N1-F	5'-GAC CCC AAA ATC AGC GAA AT-3'
2019-nCoV-N1-R	5'-TCT GGT TAC TGC CAG TTG AAT CTG-3'
2019-nCoV-N1-P	5-FAM-ACC CCG CAT TAC GTT TGG TGG ACC-BHQ1-3'

Table S4 Summary of clinical sample testing with RT-PCR and nanopore method

Sample#	RT-PCR	Nanopore (s^{-1})
1	P	27.81
2	P	18.65
3	P	17.05
4	P	17.20
5	P	7.13
6	P	10.00
7	P	63.00
8	P	154.50
9	P	98.00
10	P	87.67
11	P	62.75
12	P	106.50
13	P	105.25
14	P	93.33
15	P	0.06
16	P	76.67
17	P	54.88
18	P	71.11
19	P	77.20
20	P	72.29
21	P	72.00
22	P	72.50
23	P	65.20
24	P	28.80
25	P	40.56
26	P	44.50
27	P	45.00
28	P	54.17
29	P	21.80
30	P	35.60
31	P	38.25
32	P	38.00
33	P	44.20
34	P	54.20
35	P	60.80
36	P	54.83
37	P	56.50
38	P	60.50
39	P	59.25
40	P	49.71
41	P	55.25
42	P	53.83
43	P	63.25
44	P	97.20
45	P	114.00
46	P	103.20
47	P	91.80
48	P	113.25
49	P	96.40
50	P	103.40
51	N	0.012
52	N	0.005
53	N	0.023
54	N	0.007
55	N	59.667
56	N	0.007
57	N	0.037
58	N	72.000
59	N	0.020
60	N	0.015
61	N	0.017
62	N	0.033
63	N	38.833
64	N	0.020
65	N	0.030
66	N	0.057
67	N	0.024
68	N	0.007
69	N	0.043
70	N	0.039
71	N	0.003
72	N	0.033
73	N	0.019
74	N	37.000
75	N	0.018
76	N	0.007
77	N	0.025
78	N	0.008
79	N	0.007
80	N	0.003
81	N	0.005
82	N	35.000
83	N	43.556
84	N	0.003
85	N	0.005
86	N	0.004
87	N	0.007
88	N	0.008
89	N	0.003
90	N	0.022
91	N	0.003
92	N	0.018
93	N	0.010
94	N	0.007
95	N	0.003
96	N	0.005
97	N	0.010
98	N	0.005
99	N	0.007
100	N	0.027
101	N	0.010
102	N	0.074
103	N	0.106
104	N	0.057
105	N	0.035
106	N	0.065
107	N	0.038
108	N	0.038
109	N	1.210
110	N	0.018
111	N	0.017
112	N	0.018
113	N	0.012
114	N	0.040
115	N	0.027
116	N	0.027
117	N	0.015
118	N	0.008
119	N	0.008
120	N	0.006
121	N	71.800
122	N	0.005
123	N	0.003
124	N	0.022
125	N	0.010
126	N	0.028
127	N	0.007

Supplementary References

S(1) Broughton, J. P.; Deng, X.; Yu, G.; Fasching, C. L.; Servellita, V.; Singh, J.; Miao, X.; Streithorst, J. A.; Granados, A.; Sotomayor-Gonzalez, A. CRISPR–Cas12-based detection of SARS-CoV-2. *Nature biotechnology* **2020,** *38* (7), 870-874.