FIG. 1 (a)

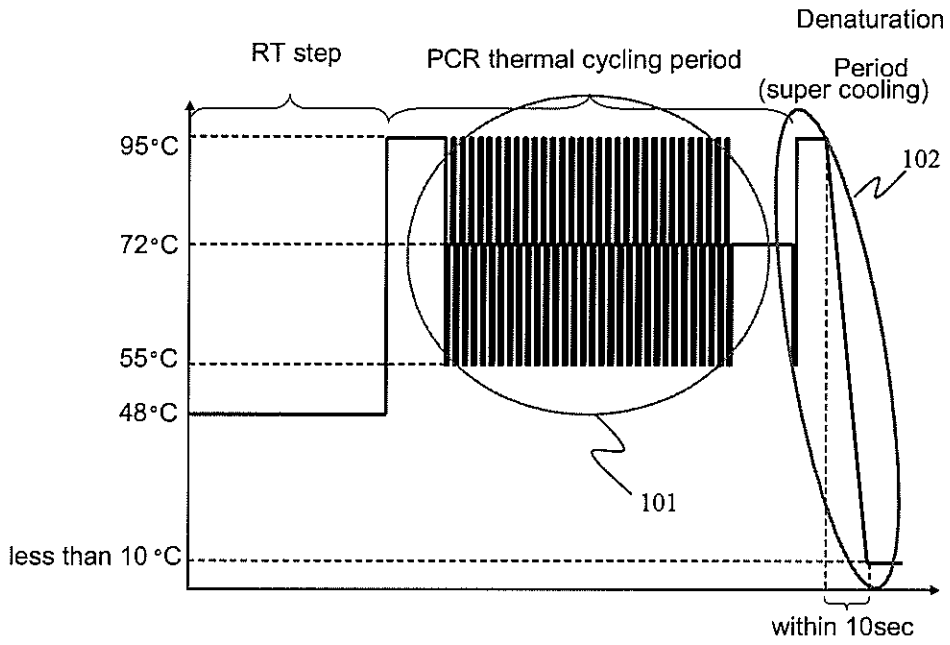

RT step
PCR thermal cycling period
Denaturation
Period
(super cooling)
95°C
72°C
55°C
48°C
less than 10 °C
101
102
within 10sec

FIG. 1 (b)

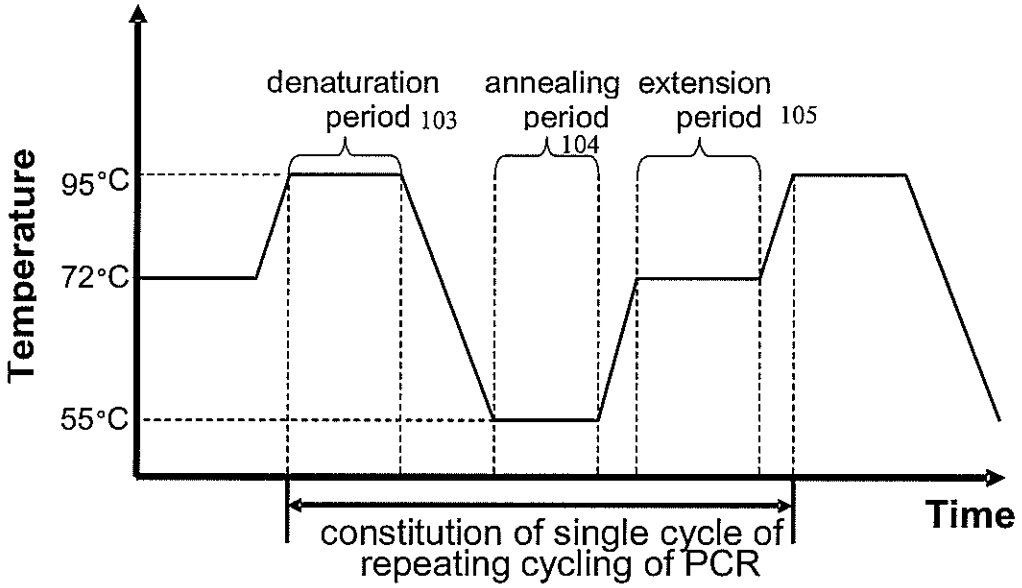

denaturation
period 103
annealing
period
104
extension
period 105
95°C
72°C
55°C
Temperature
Time
constitution of single cycle of
repeating cycling of PCR

FIG. 2 (a)

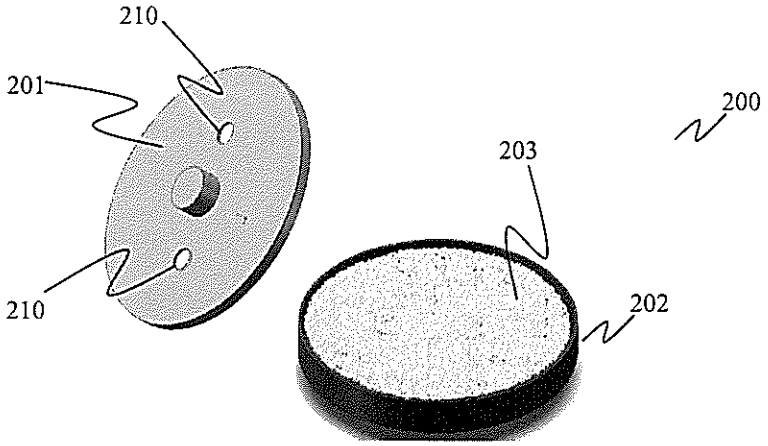


FIG. 2 (b)

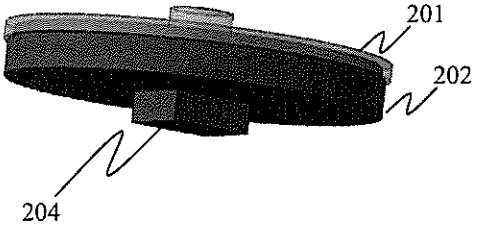


FIG. 2 (c)

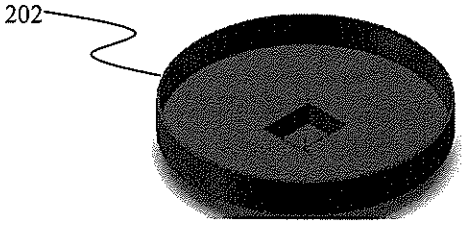


FIG. 3 (a)

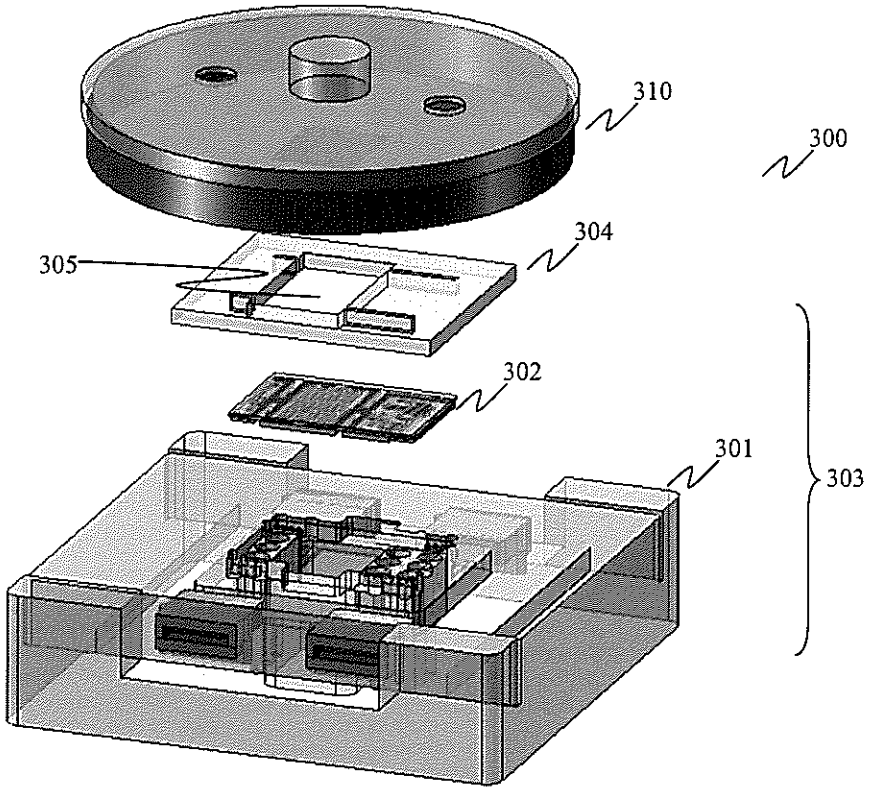


FIG. 3 (b)

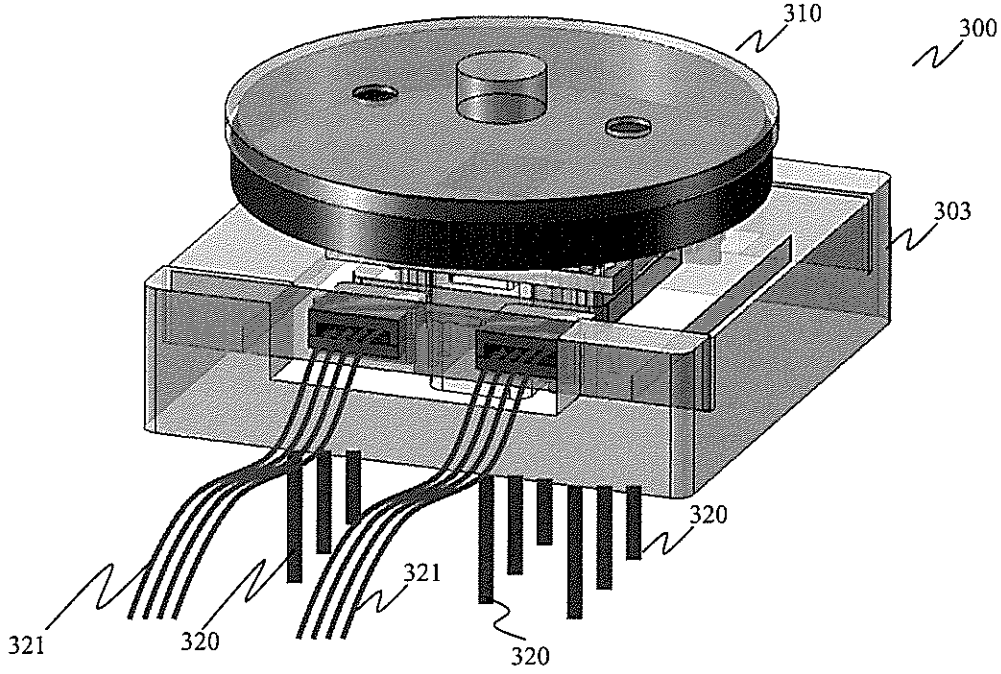


FIG. 3 (c)

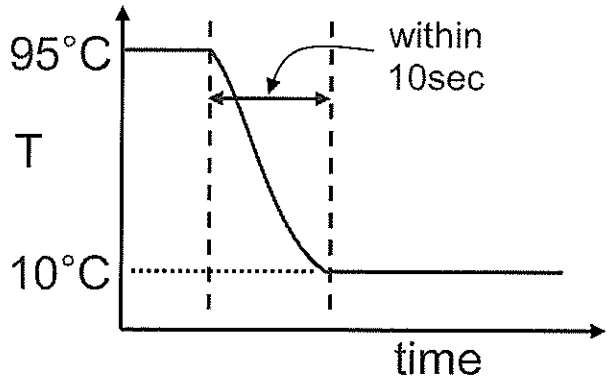

95°C
T
10°C
within
10sec
time

FIG. 4

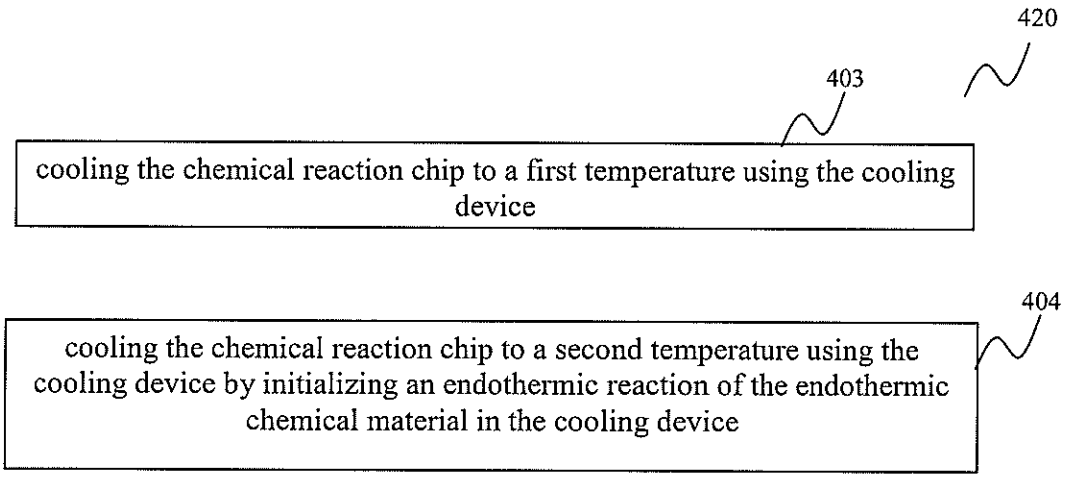

420
403
cooling the chemical reaction chip to a first temperature using the cooling device
404
cooling the chemical reaction chip to a second temperature using the cooling device by initializing an endothermic reaction of the endothermic chemical material in the cooling device

FIG. 5 (a)

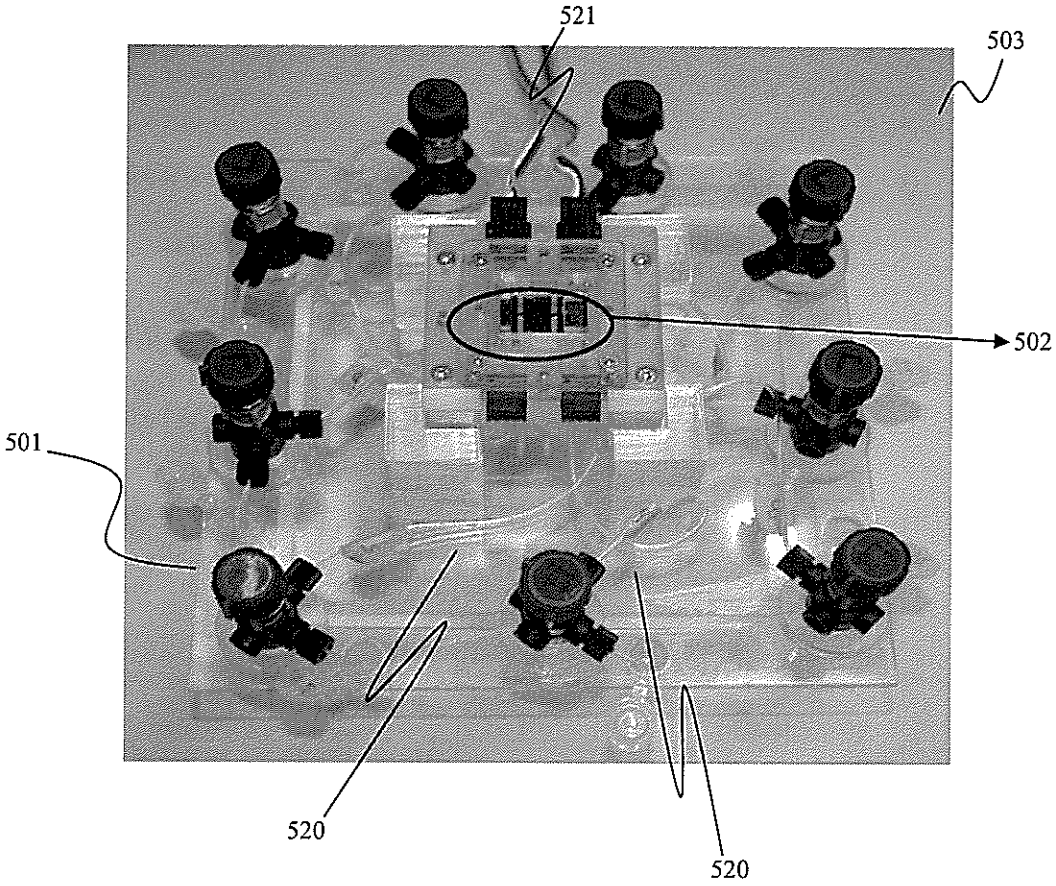


FIG. 5 (b)

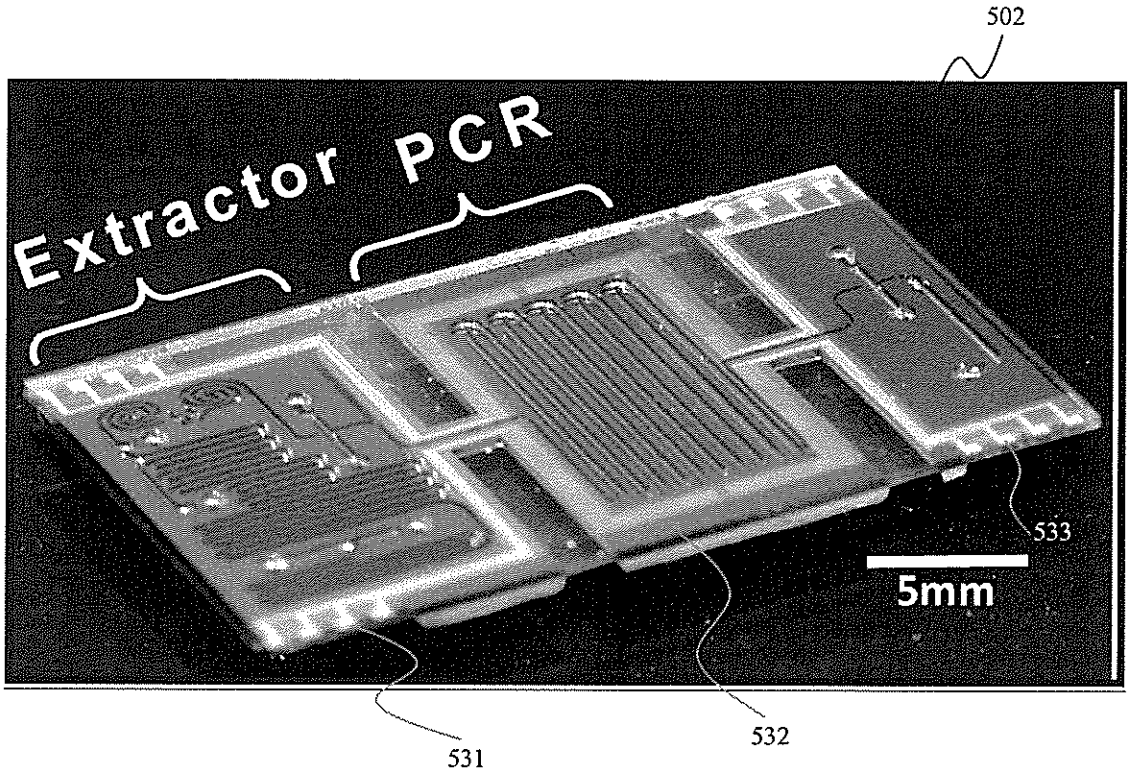


FIG. 5 (c)

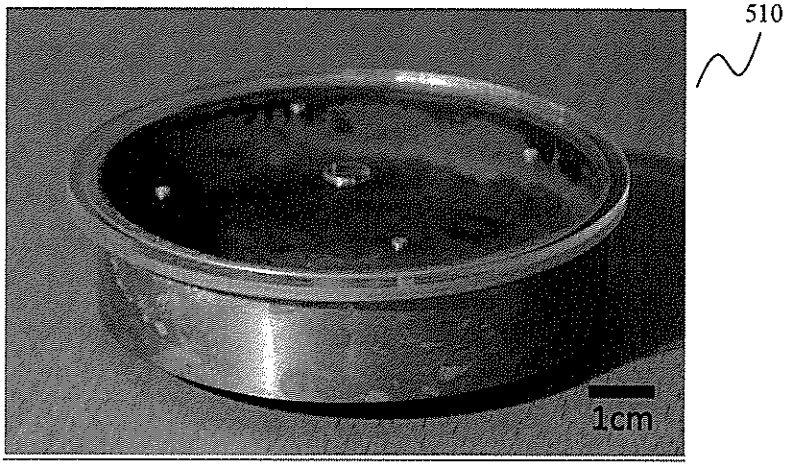


FIG. 5 (d)

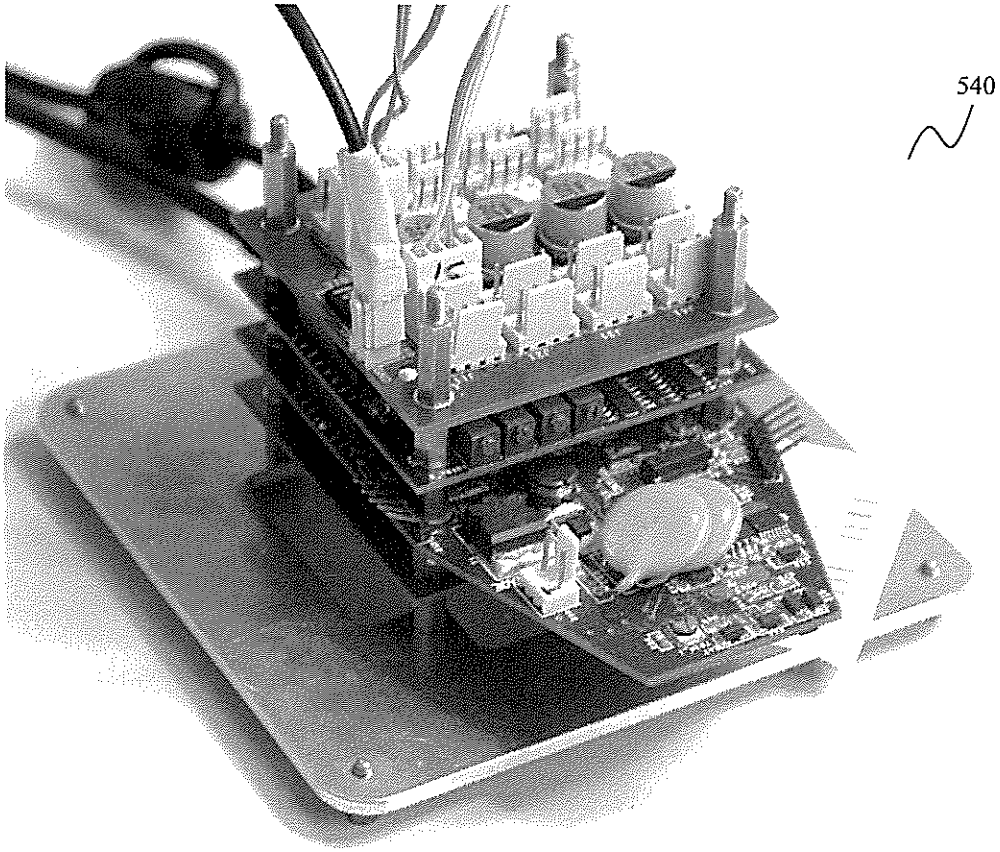


FIG. 5 (e)

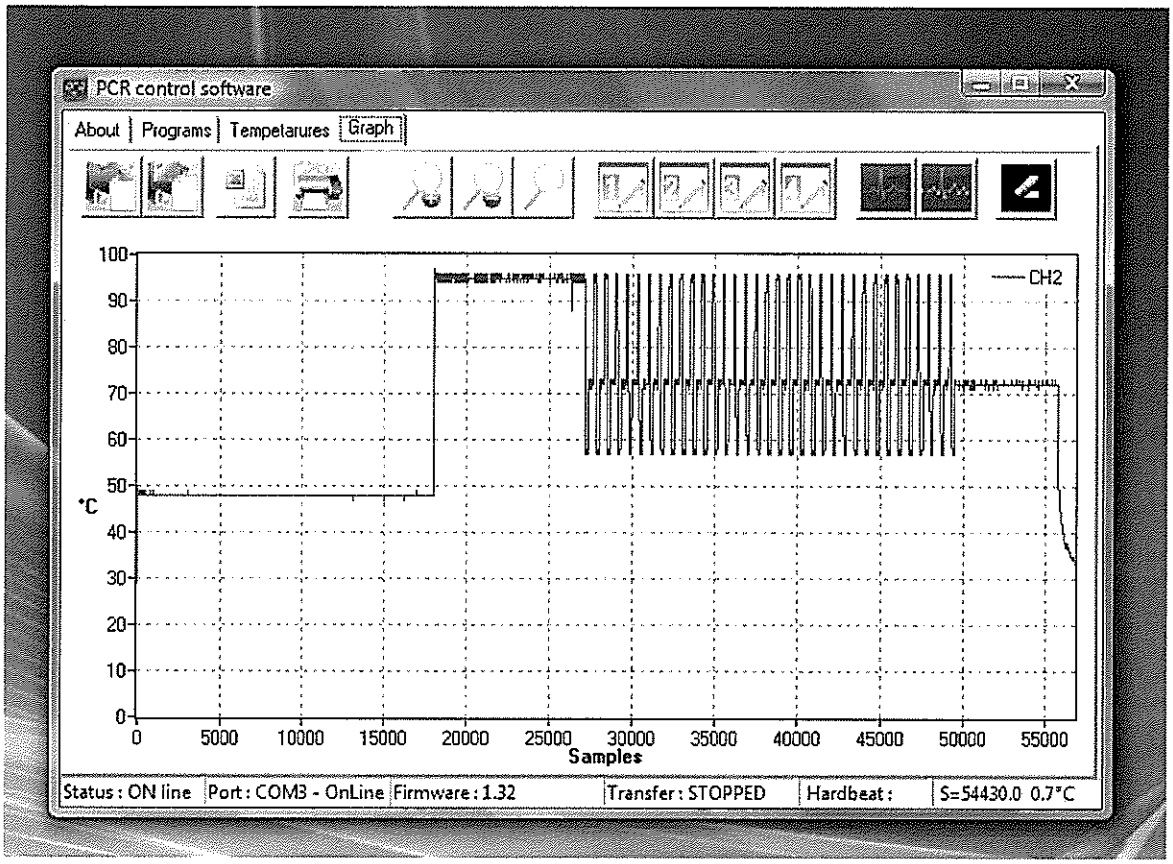

PCR control software
About
Programs
Tempetarures
Graph
CH2
°C
100
90
80
70
60
50
40
30
20
10
0
0
5000
10000
15000
20000
25000
30000
35000
40000
45000
50000
55000
Samples
Status : ON line
Port : COM3 - OnLine
Firmware : 1.32
Transfer : STOPPED
Hardbeat :
S=54430.0 0.7°C

FIG. 6

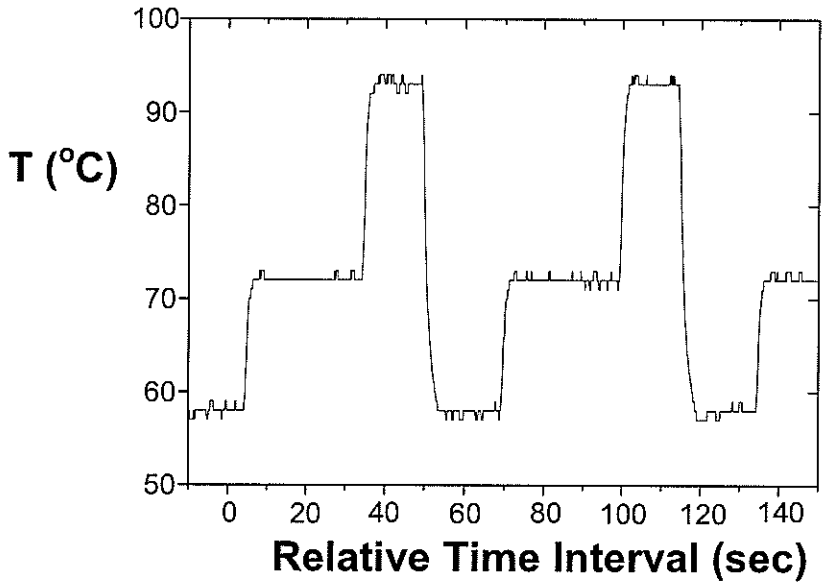

T (°C)
100
90
80
70
60
50
0
20
40
60
80
100
120
140
Relative Time Interval (sec)

FIG. 7

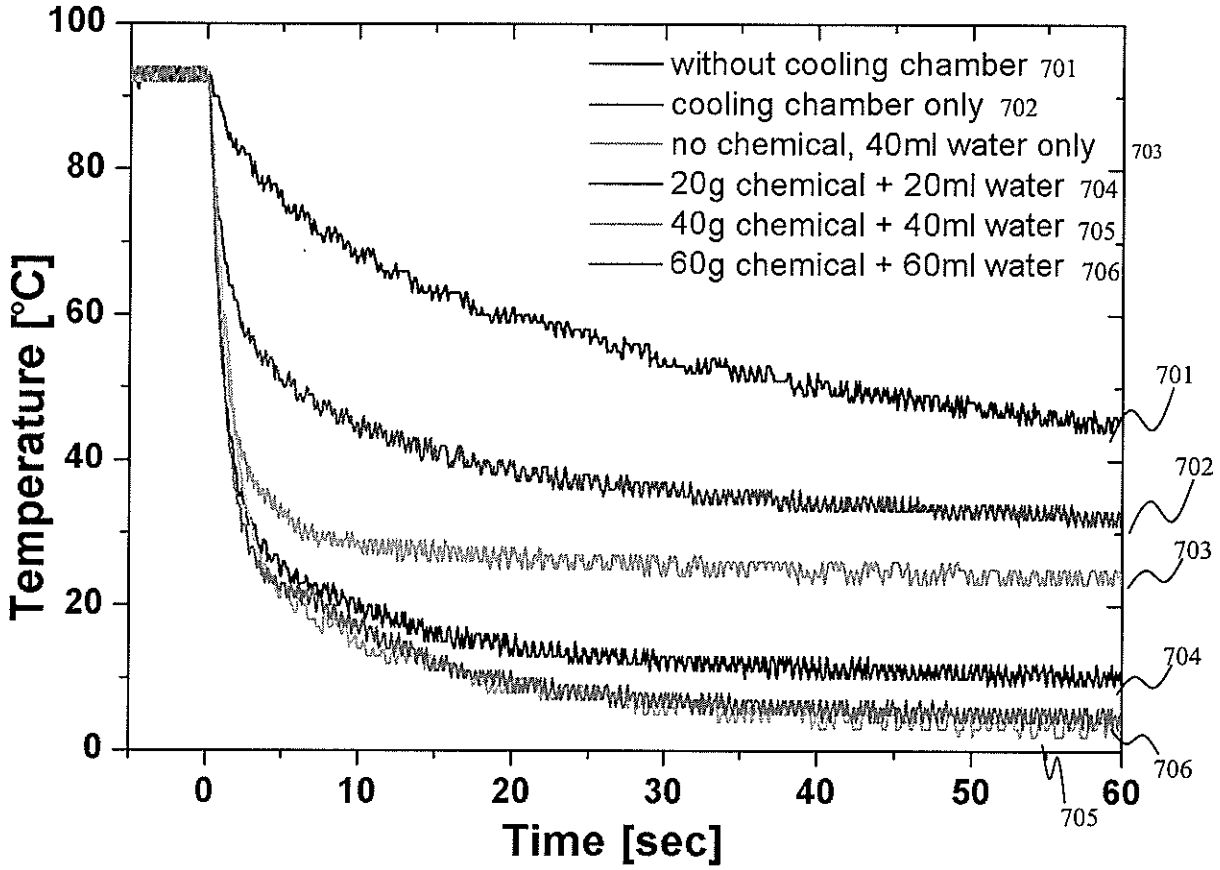
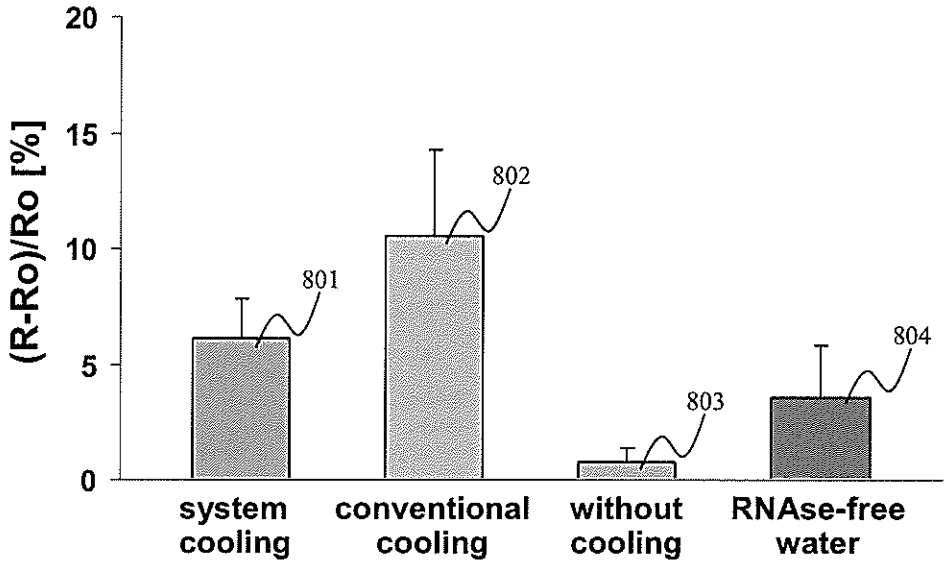

without cooling chamber 701
cooling chamber only 702
no chemical, 40ml water only 703
20g chemical + 20ml water 704
40g chemical + 40ml water 705
60g chemical + 60ml water 706
Temperature [°C]
Time [sec]
0
20
40
60
80
100
0
10
20
30
40
50
60
701
702
703
704
705
706

FIG. 8


20
15
10
5
0
(R-Ro)/Ro [%]
801
802
803
804
system cooling
conventional cooling
without cooling
RNAse-free water