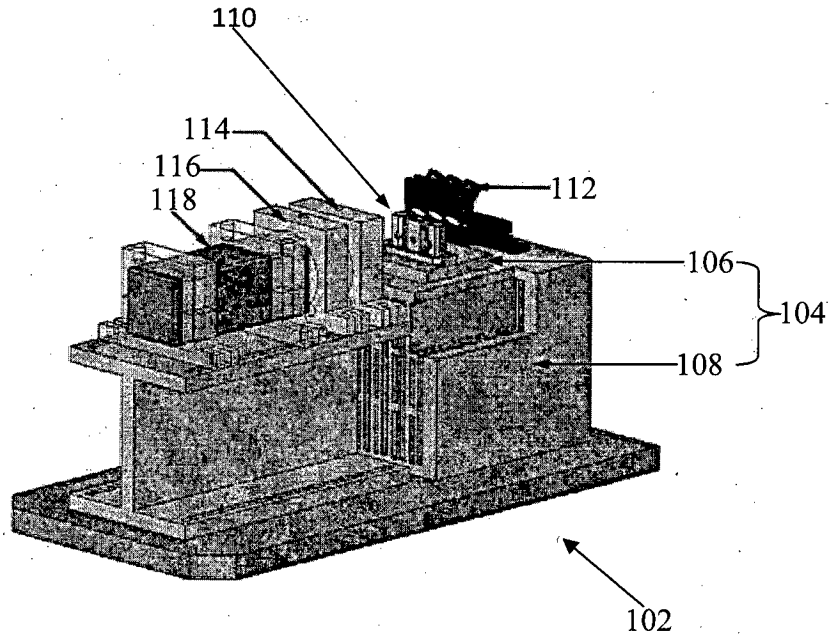
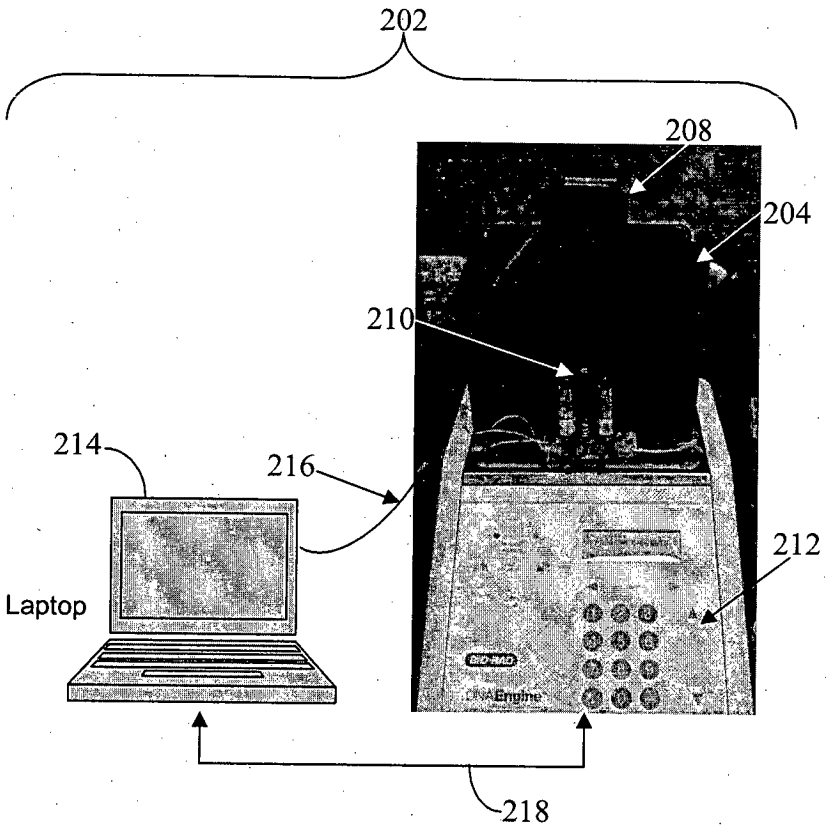


100

FIG. 1



200

FIG. 2

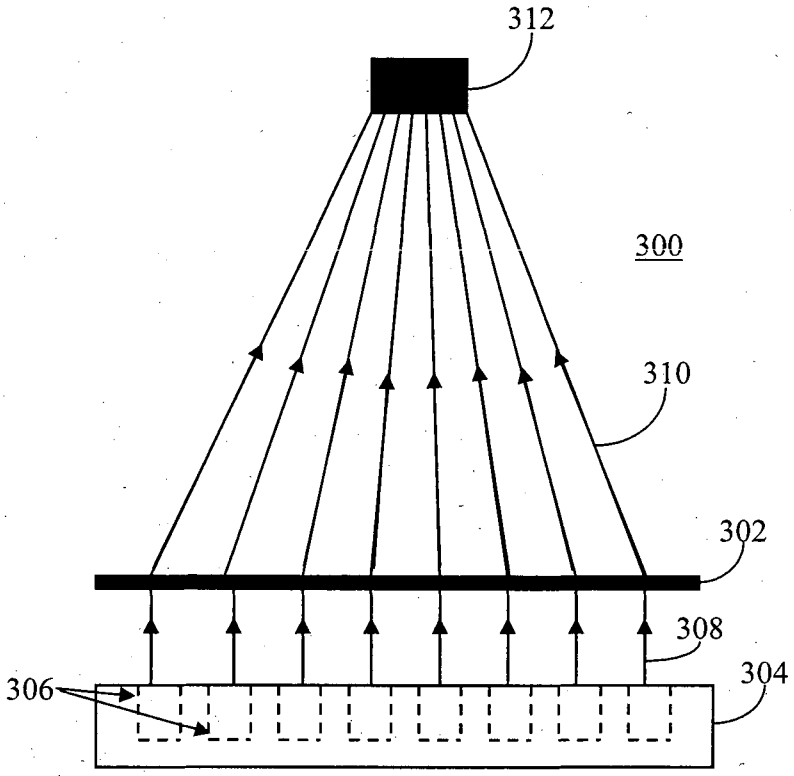


FIG. 3A

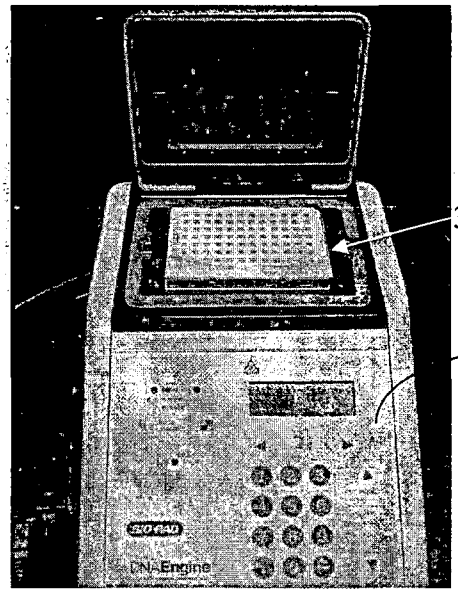


FIG. 3B

```
% initialization of imaging session
vidobj = videoinput('winvideo',1,'YUY2_1024x576');
src = getselectedsource(vidobj);
triggerconfig(vidobj,'manual');

% image acquisition
start(vidobj);
trigger(vidobj);
img_data = getdata(vidobj,1,'uint8','numeric');
imwrite(img_data,['img_' num2str(1) '.bmp'], 'bmp');

% termination of imaging session
delete(vidobj);
clear vidobj;
```

400

FIG. 4

```
warning off MATLAB:serial:fread:unsuccessfulRead

% set ferrotec as a variable for serial port
ferrotec=serial('COM7');

% set input buffer size as 5 bytes
set(ferrotec,'InputBufferSize',5);
set(ferrotec, 'BaudRate', 38400);

% open ferrotec serial port
fopen(ferrotec);

% Enable = 'OFF'
fwrite (ferrotec,[1, 6, 0, 6, 0, 32]); %set power output to off,

% Enable = 'ON'
fwrite (ferrotec,[1, 6, 0, 6, 0, 33]); % set power output to on,

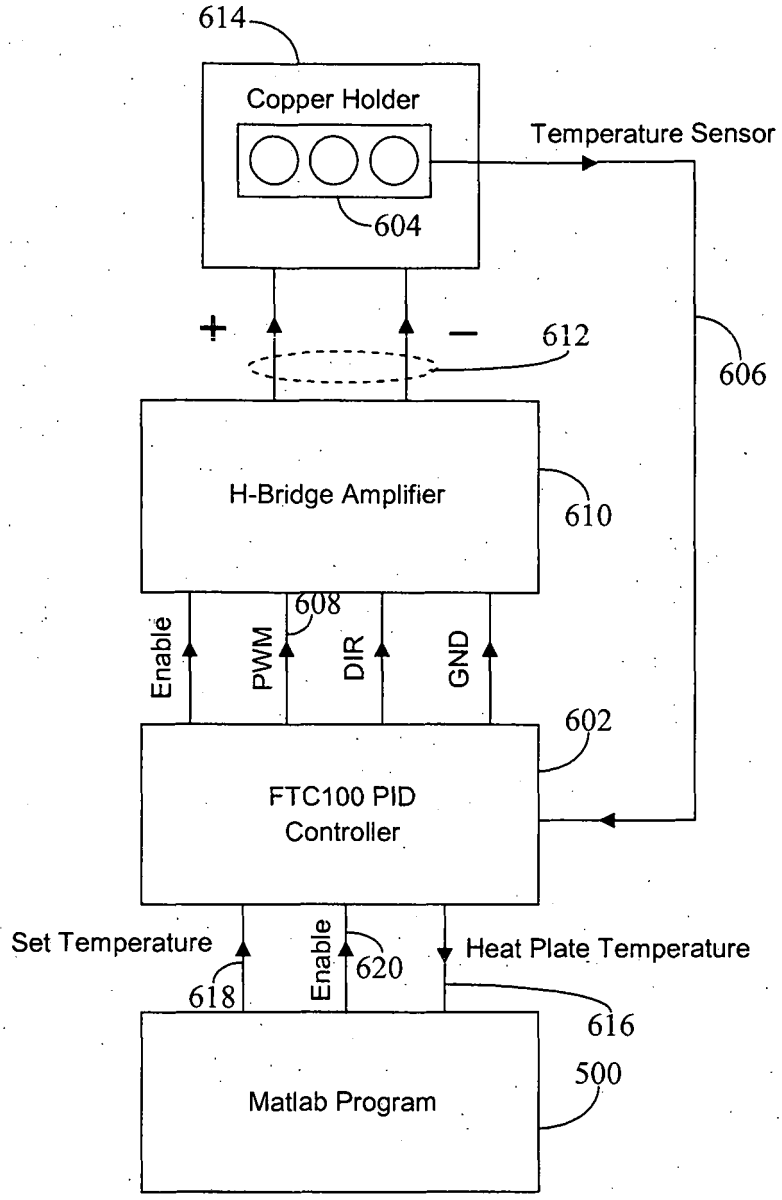
%set temperature value to i deg C
fwrite (ferrotec, [1, 6, 0, 0,  floor(i*10/256), rem(i*10,256)]);

% set power output to off
fwrite (ferrotec,[1, 6, 0, 6, 0, 32]);

% terminate ferrotec session
fclose(ferrotec);
delete(ferrotec);
clear ferrotec;
```

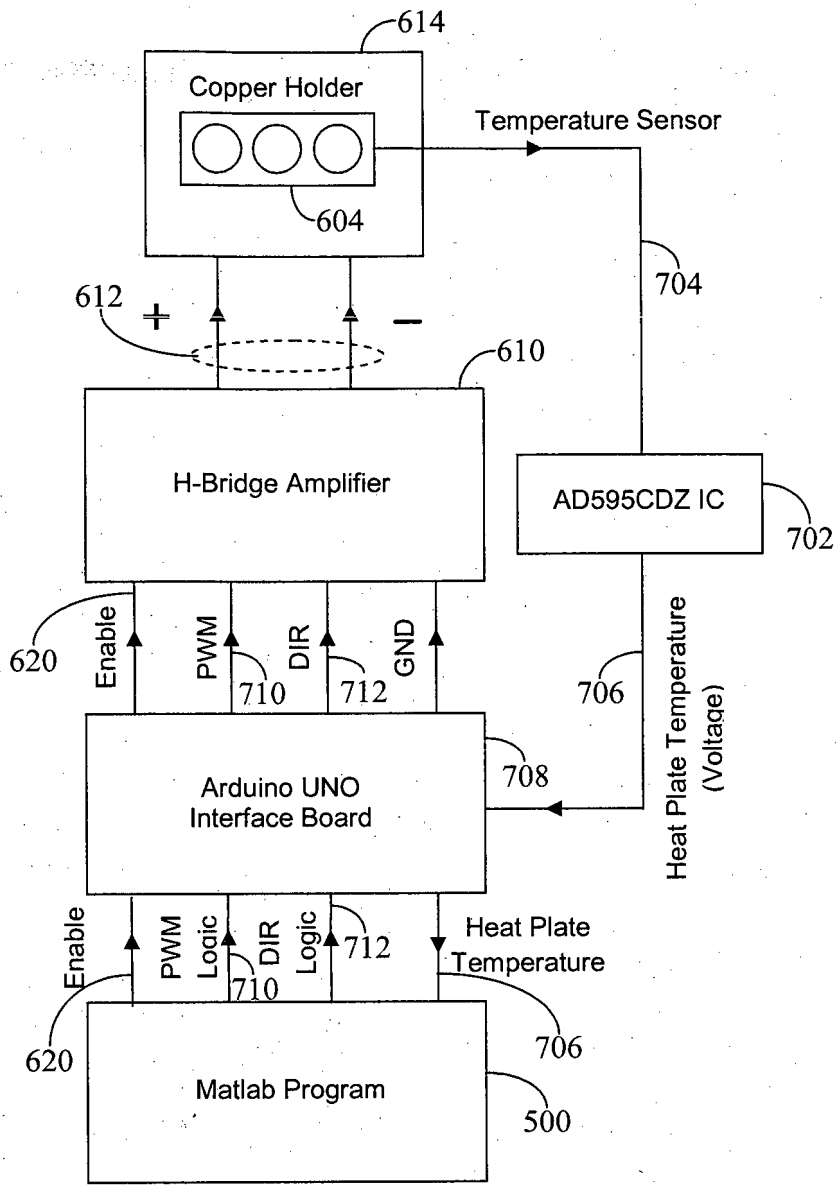
500

FIG. 5


614
Copper Holder
604
Temperature Sensor
606
+
−
612
H-Bridge Amplifier
610
608
Enable
PWM
DIR
GND
602
FTC100 PID
Controller
Set Temperature
618
Enable
620
Heat Plate Temperature
616
Matlab Program
500

600

FIG. 6


614
Copper Holder
604
Temperature Sensor
704
612
+
−
610
H-Bridge Amplifier
AD595CDZ IC
702
620
Enable
PWM
710
DIR
712
GND
706
Heat Plate Temperature (Voltage)
Arduino UNO Interface Board
708
Enable
PWM Logic
710
DIR Logic
712
Heat Plate Temperature
620
706
Matlab Program
500

700

FIG. 7

```
% initialization of imaging session
vidobj = videoinput('winvideo',1,'YUY2_1024x576');
src = getselectedsource(vidobj);
triggerconfig(vidobj,'manual');
triggerconfig(vidobj,'manual');

% capture baseline image
start(vidobj);
trigger(vidobj);
img_data = getdata(vidobj,1,'uint8','numeric');
imwrite(img_data,['img_' num2str(1) '.tif'], 'tiff');
stop(vidobj);

%initialize ptc200

ptc200 =
serial('COM1','BaudRate',9600,'DataBits',8,'FlowControl','software','Parity
','none','StopBits',1);
ptc200.Terminator = {'CR/LF' 'LF'};
fopen(ptc200);

x = sprintf('%s', 'VESSEL "Plate"');
fprintf(ptc200,x);
x = sprintf('%s', 'VOLUME 10');
fprintf(ptc200,x);

% input temperature range
ask=true;
while ask
    reply= input('Type "y" to begin heating. \n', 's');
    if reply =='y'
        ask = false;
        reply=input('Enter first temperature: \n');
            temp1=reply;
        reply=input('Enter second temperature: \n');
            temp2=reply;
        reply=input('In increments of: \n');
            step1=reply;
        reply=input('Enter buffer/incubation time: \n');
            time1=reply;

    end
    if reply ~='y'
        dump_reply=reply;
    end
end
```

FIG. 8A

FIG. 8B

800

FIG. 8A

```
for i=[temp1:step1:temp2] %temp1:step1:temp2

    flag = 1;
    t01 = clock; %initial time
    t0 = 3600*t01(4)+60*t01(5)+t01(6); % converted to seconds
    i

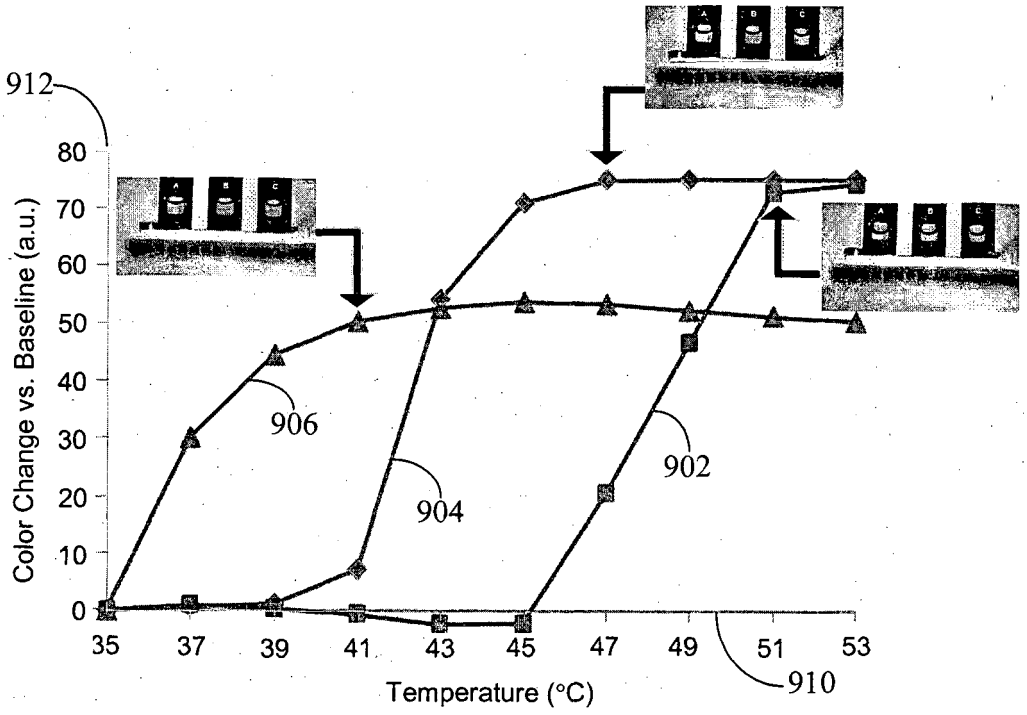
while(flag)
   x = sprintf('%s', 'INCUBATE i');
   fprintf(ptc200,x);
   t1 = clock;
   t = 3600*t1(4)+60*t1(5)+t1(6); %current time
   time_elapsed = t-t0;
   if time_elapsed >= time1 %time1 %buffer time
      %capture and save image
      img_num = 0;
      start(vidobj);
      trigger(vidobj);
      img_data = getdata(vidobj,1,'uint8','numeric');
      imwrite(img_data,['img_' num2str(img_num+i) '.tif'], 'tif');
      img_num = img_num+1;
      stop(vidobj);
      flag=0;
      time_elapsed
   end
end
end
delete(vidobj);
clear vidobj;
fclose(ptc200);
delete(ptc200);
clear ptc200;
```

FIG. 8A

FIG. 8B

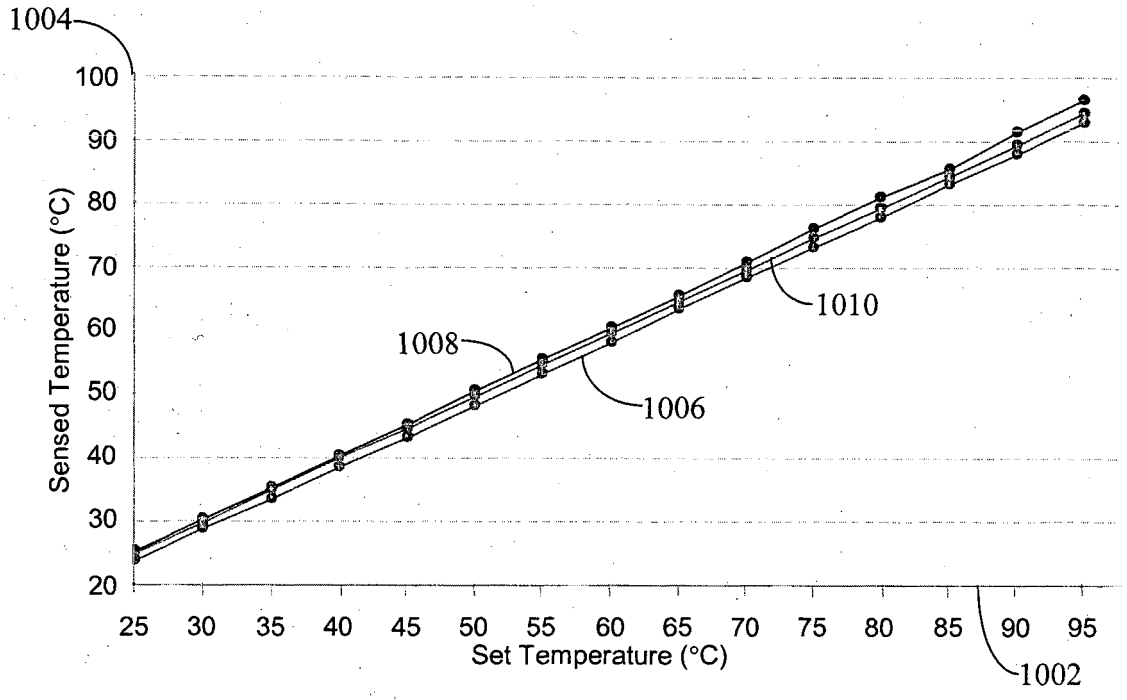
800

FIG. 8B


912
80
70
60
50
40
30
20
10
0
Color Change vs. Baseline (a.u.)
906
904
902
35
37
39
41
43
45
47
49
51
53
Temperature (°C)
910

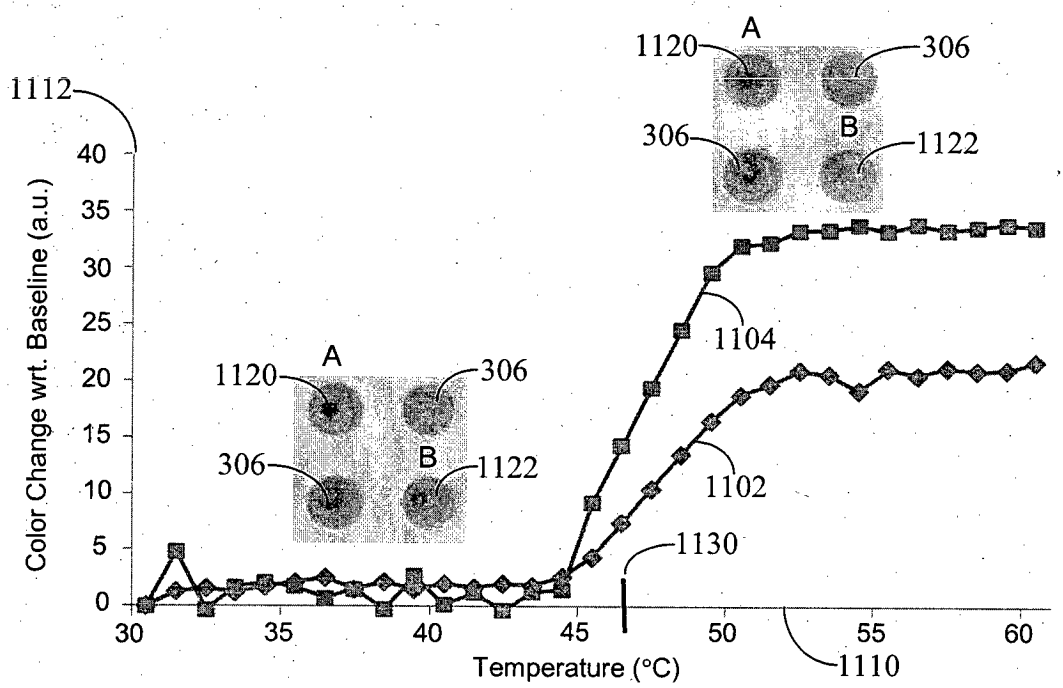
900

FIG. 9


1004
100
90
80
70
60
50
40
30
20
Sensed Temperature (°C)
25 30 35 40 45 50 55 60 65 70 75 80 85 90 95
Set Temperature (°C)
1008
1006
1010
1002

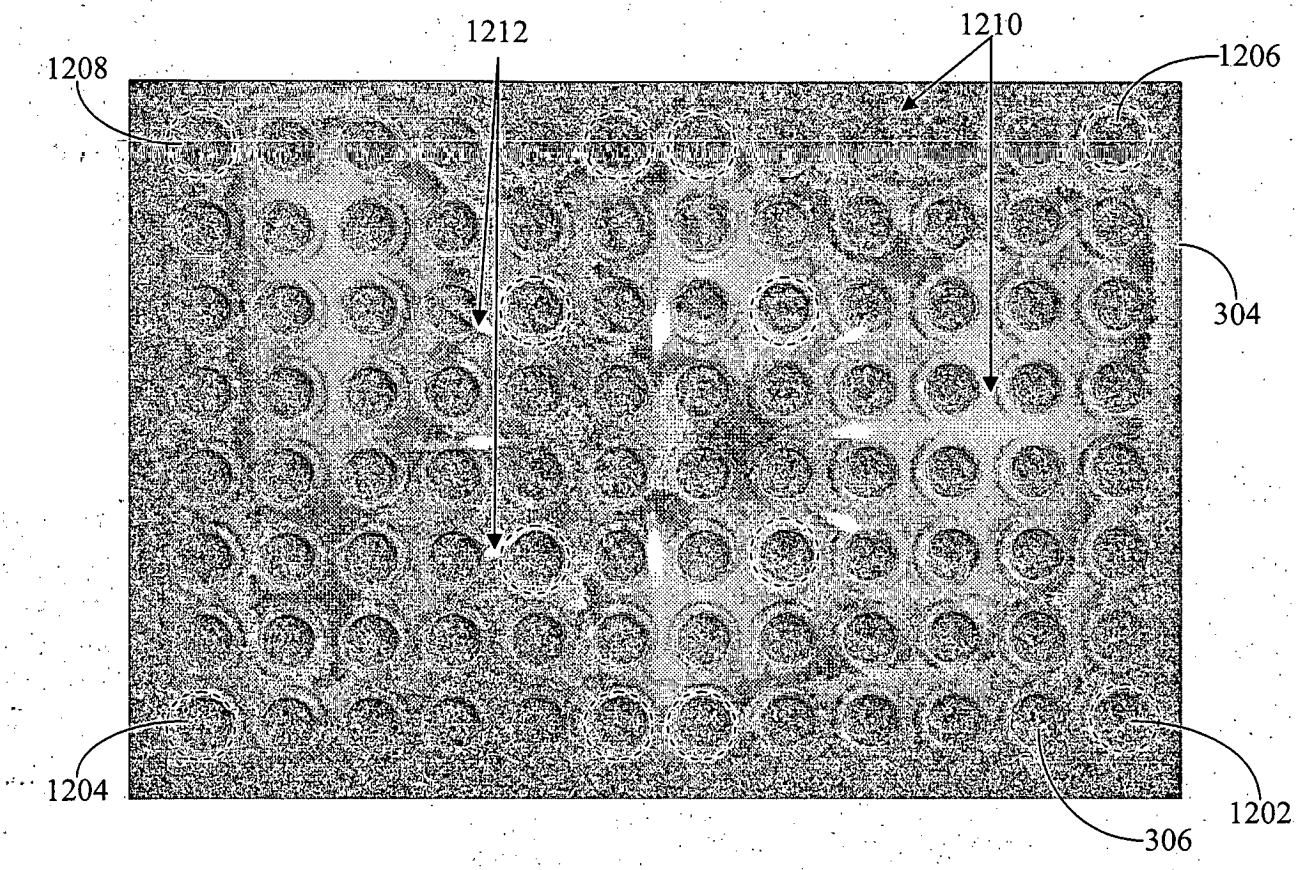
1000

FIG. 10


1112
Color Change wrt. Baseline (a.u.)
40
35
30
25
20
15
10
5
0
30
35
40
45
50
55
60
Temperature (°C)
A
1120
306
306
B
1122
1104
1102
1130
1110
A
1120
306
306
B
1122

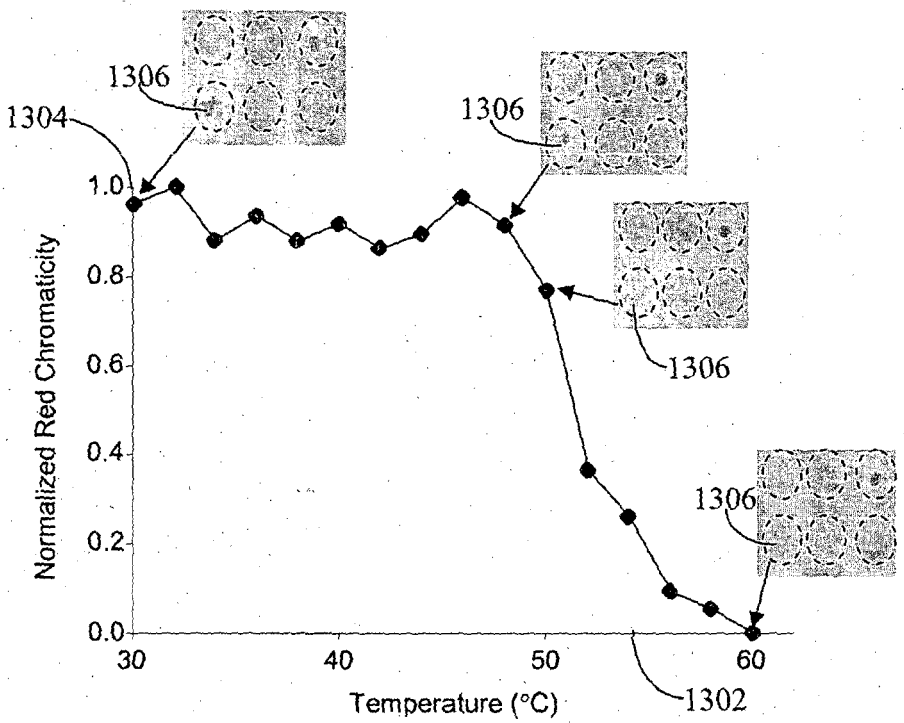
1100

FIG. 11



1200

FIG. 12


1306
1304
1306
1306
1306
1.0
0.8
0.6
0.4
0.2
0.0
Normalized Red Chromaticity
30
40
50
60
Temperature (°C)
1302

1300

FIG. 13