

FIG. 1A

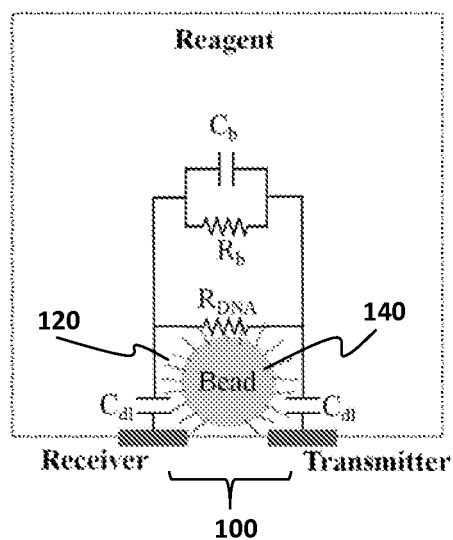


FIG. 1B

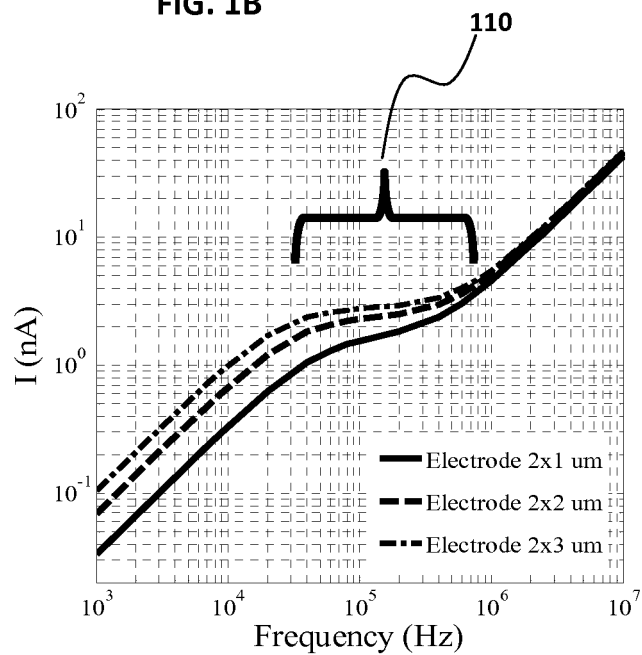


FIG. 1C

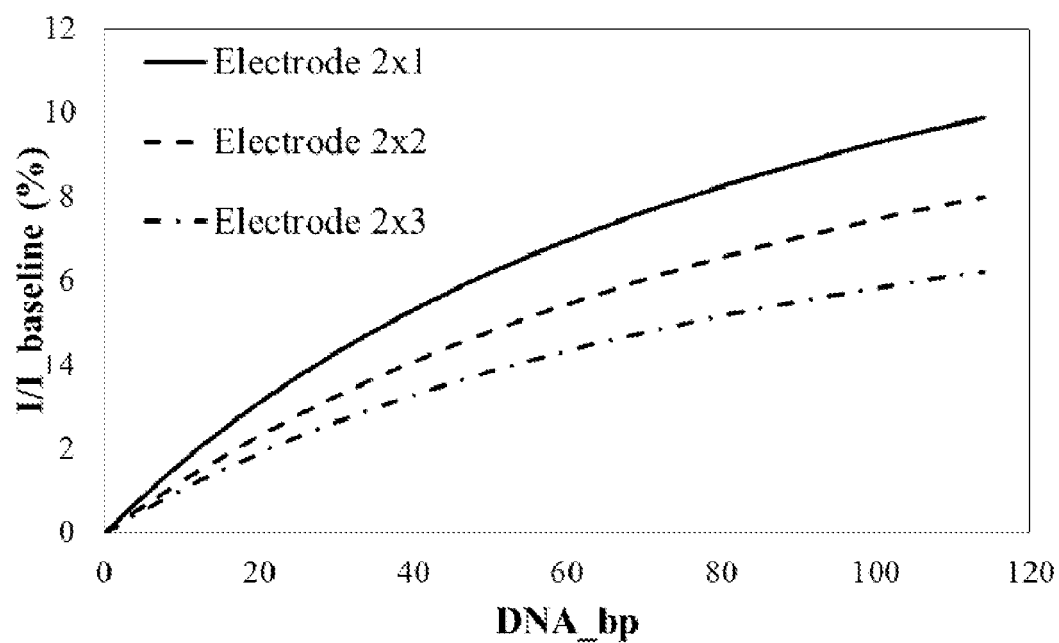


FIG. 1D

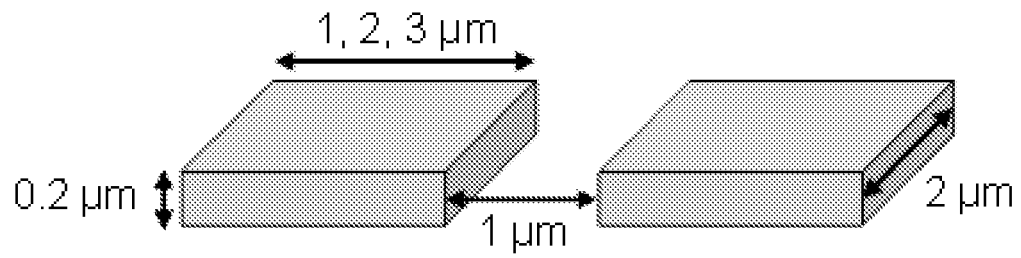


FIG. 1E

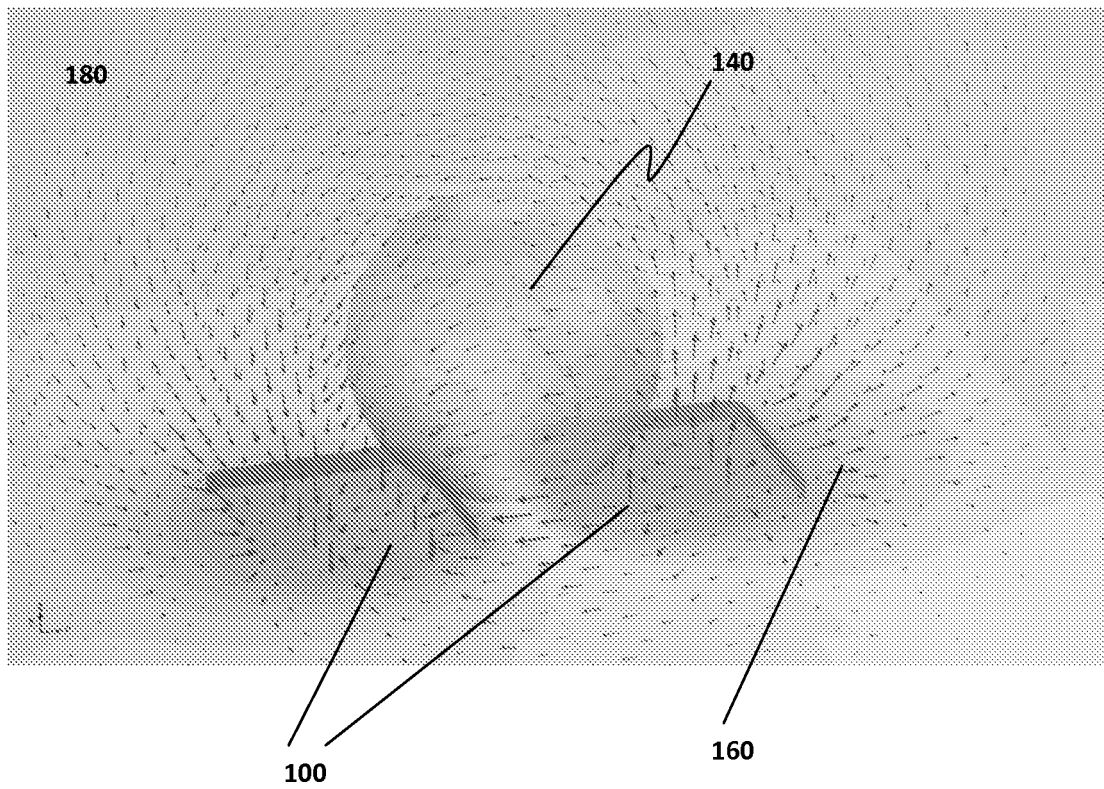


FIG. 2A

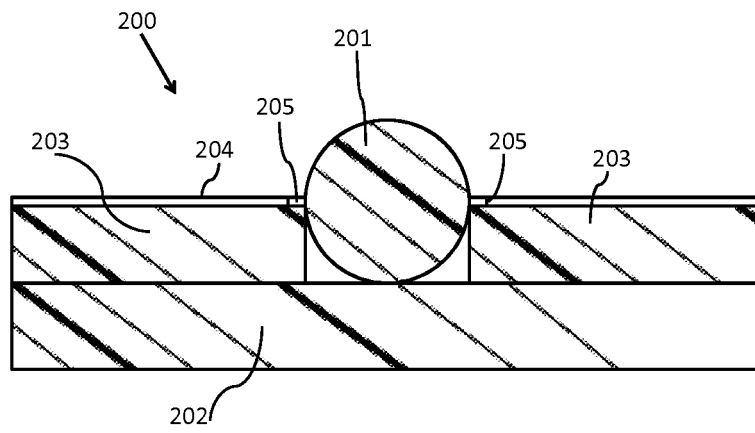


FIG. 2B

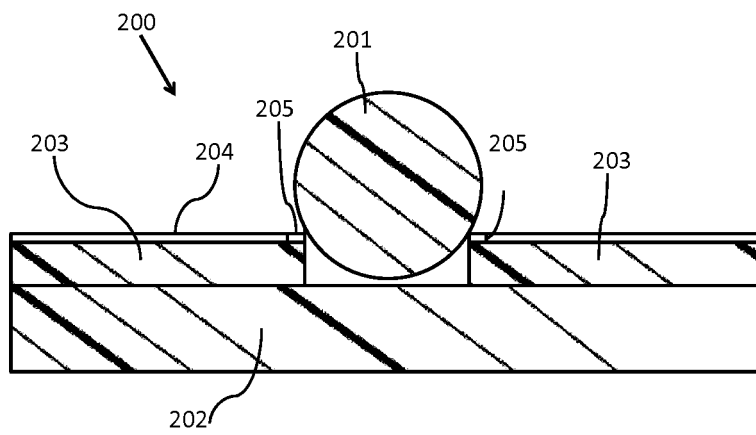


FIG. 2C

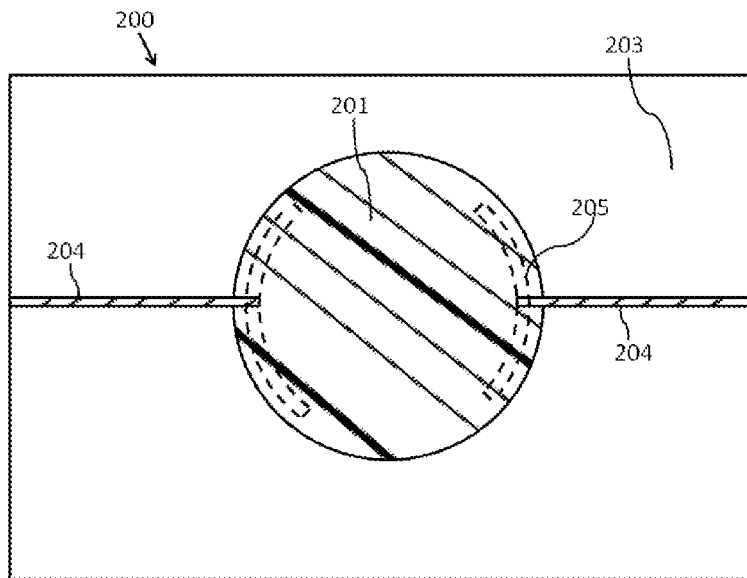


FIG. 3

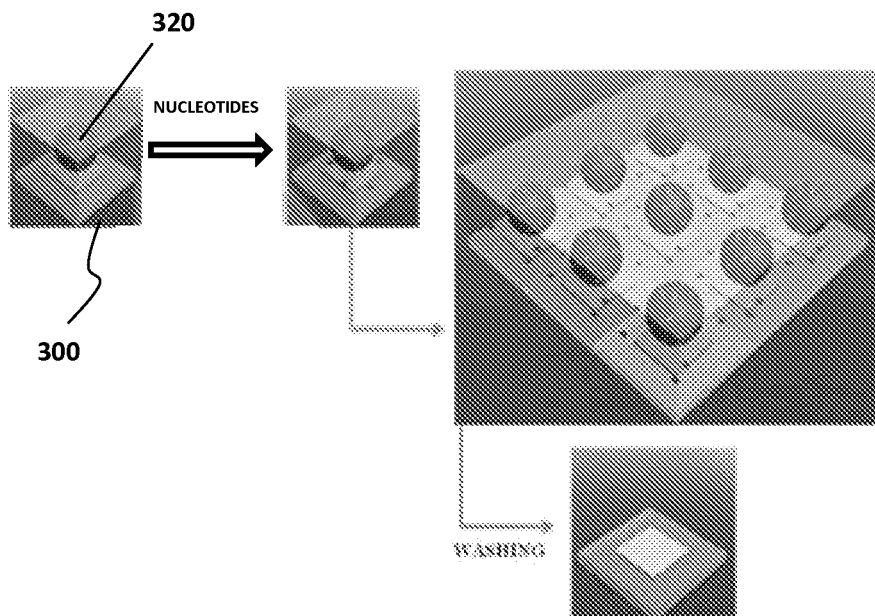


FIG. 4A

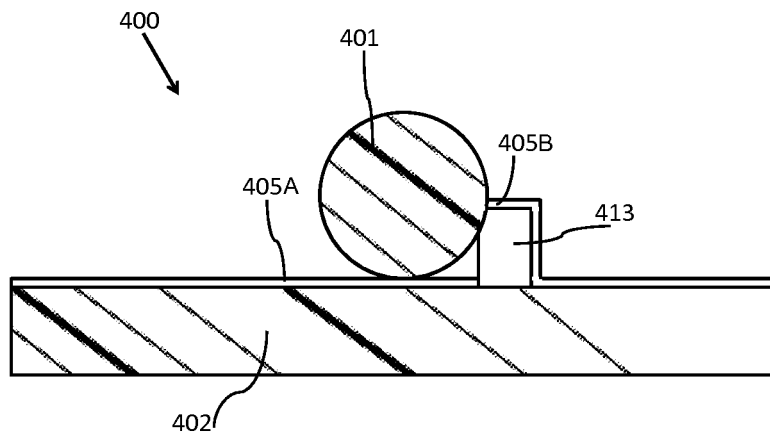


FIG. 4B

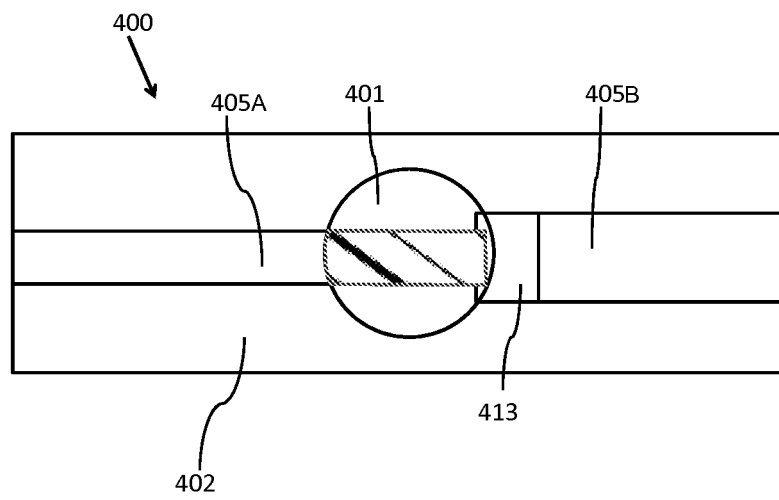


FIG. 4C

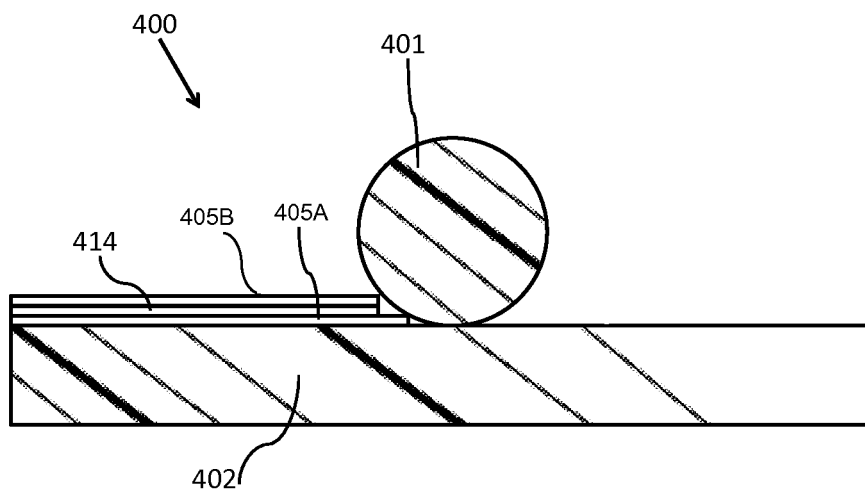


FIG. 4D

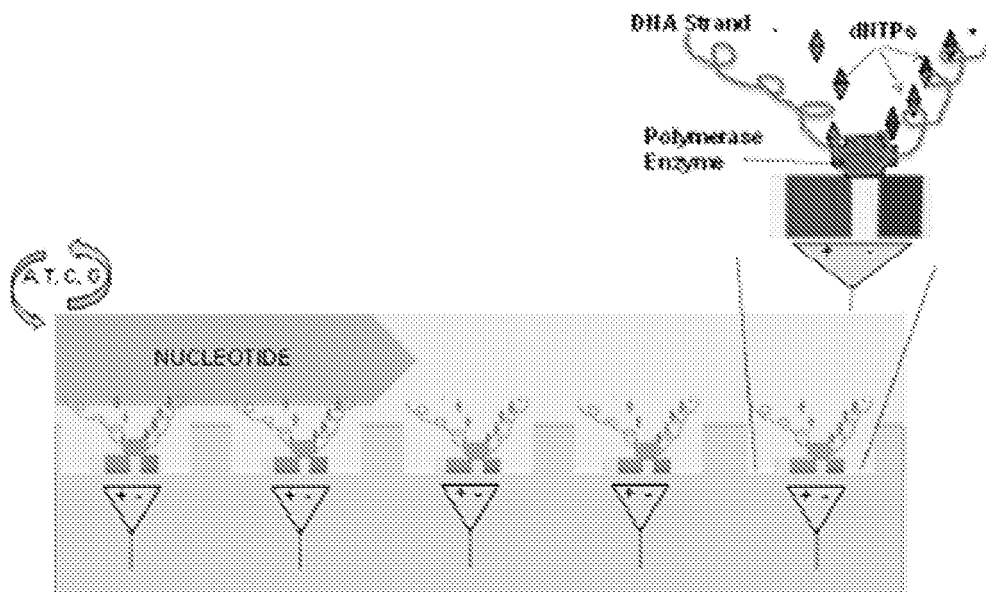


FIG. 5A

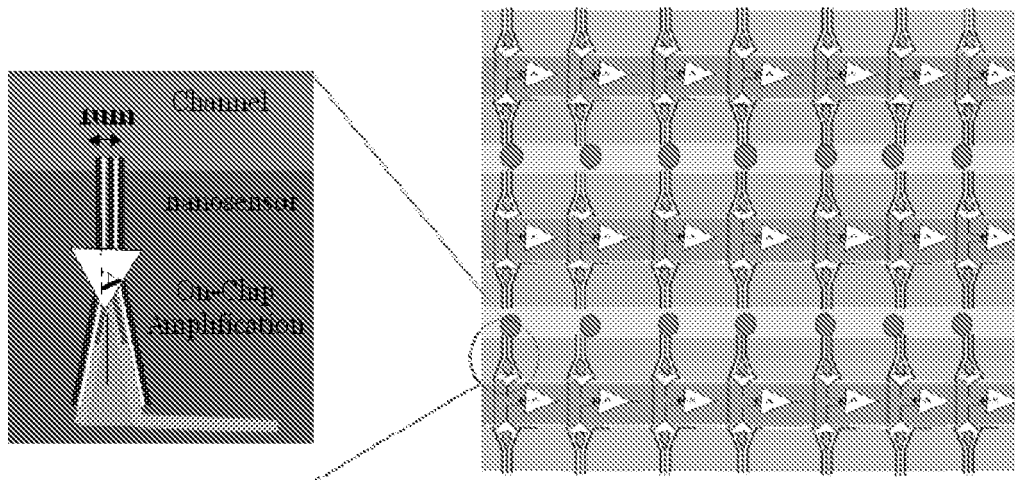


FIG. 5B

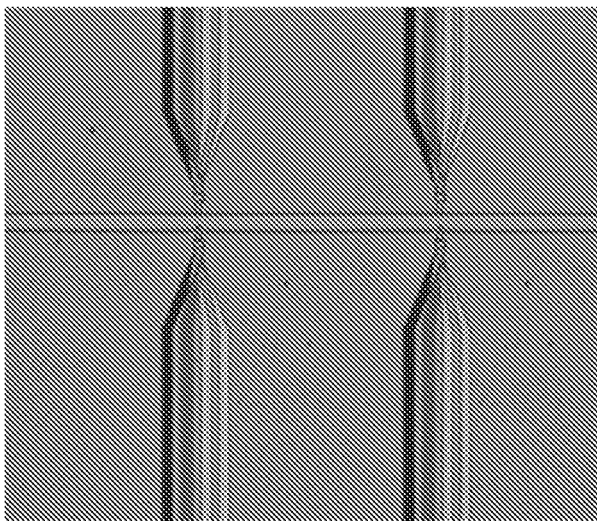


FIG. 6

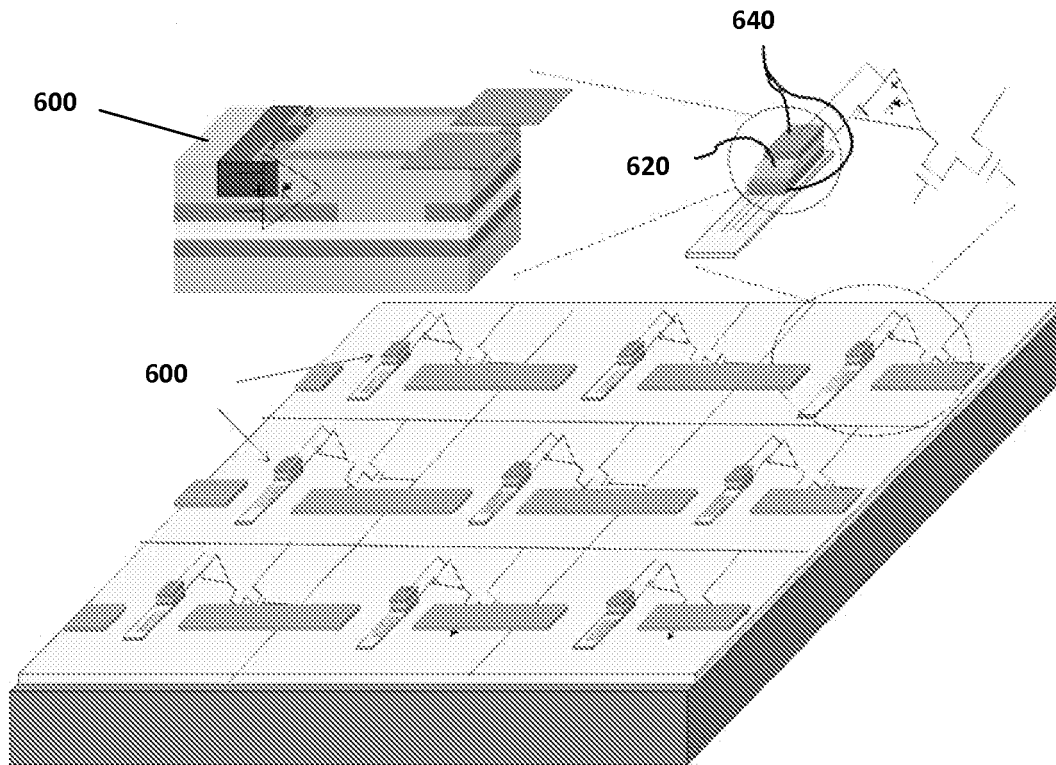


FIG. 7

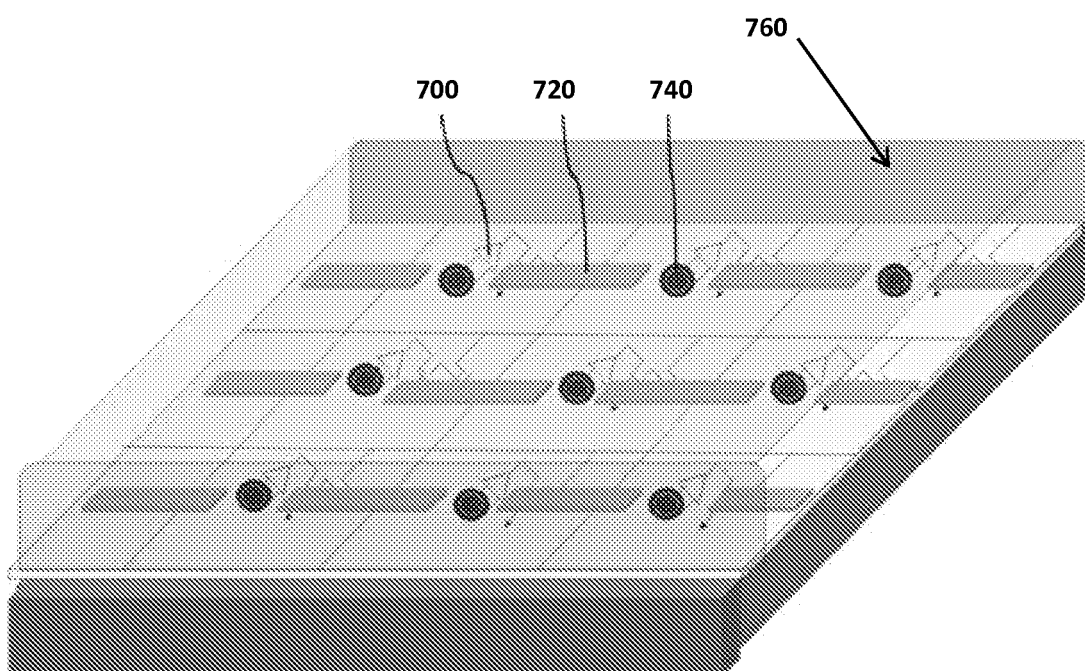


FIG. 8

hydroquinone $\leftrightarrow$ *p*-benzoquinone + 2H⁺ + 2e⁻

$$E_{\text{red}}^{\circ} = 0.699 \text{ V (vs SHE)}$$

2H₂O(l) $\leftrightarrow$ O₂(g) + 4H⁺ + 4e⁻; $E_{\text{red}}^{\circ} = 1.229 \text{ V (vs SHE)}$

anodic reaction $\text{C}_6\text{H}_4\text{O}_2\text{H}_2 \rightarrow \text{C}_6\text{H}_4\text{O}_2 + 2\text{H}^+(\text{aq}) + 2\text{e}^-$ cathodic reaction $\text{C}_6\text{H}_4\text{O}_2 + 2\text{H}_2\text{O} + 2\text{e}^- \rightarrow \text{C}_6\text{H}_4\text{O}_2\text{H}_2 + 2\text{OH}^-$

FIG. 9A

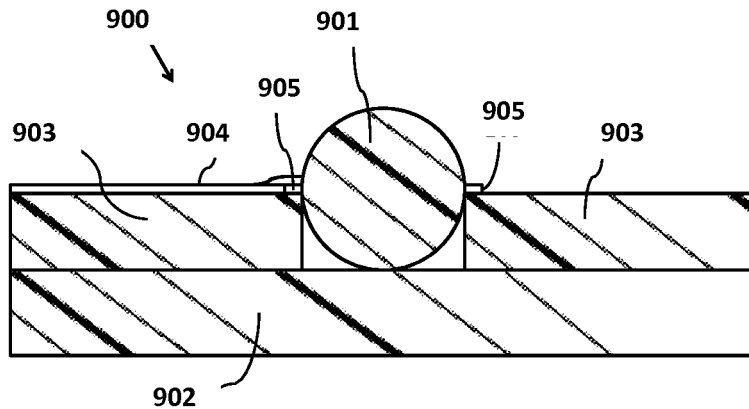


FIG. 9B

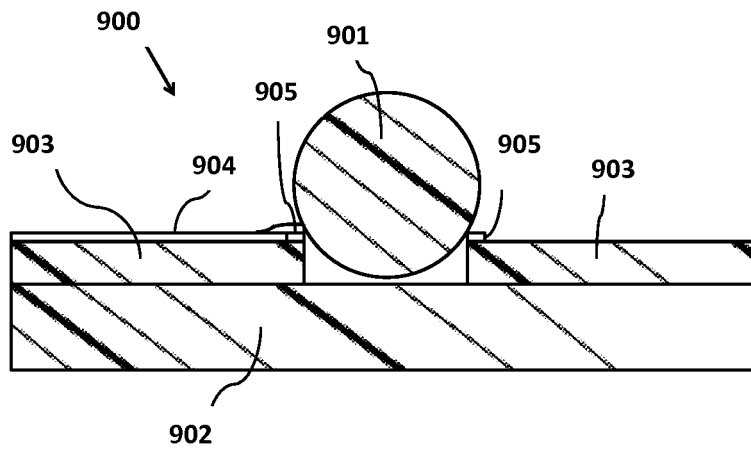


FIG. 9C

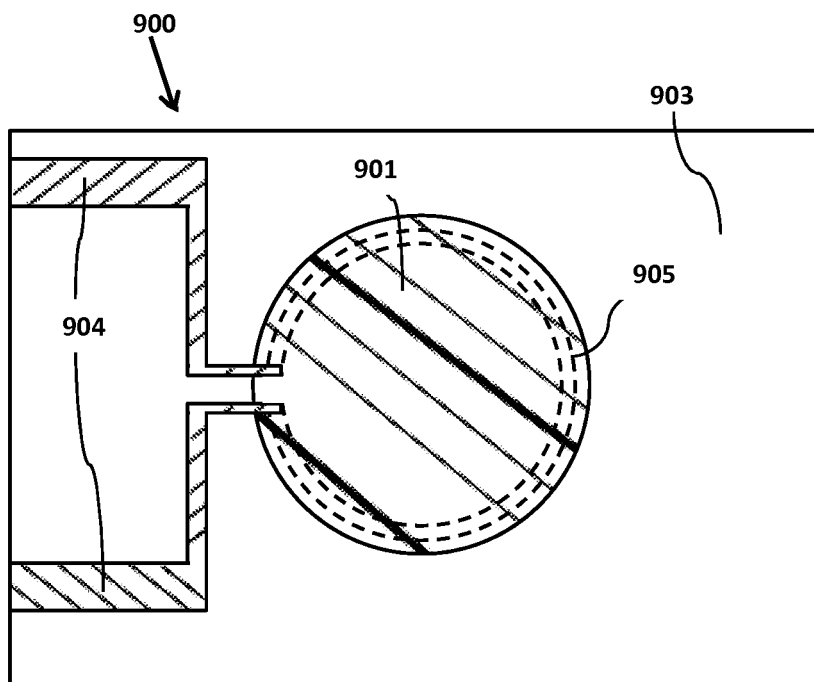


FIG. 10

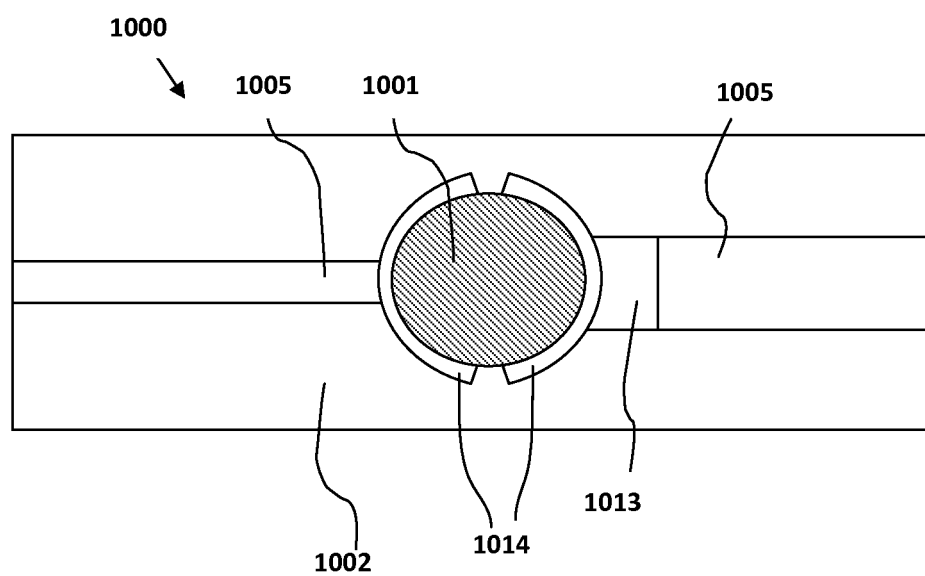


FIG. 11A

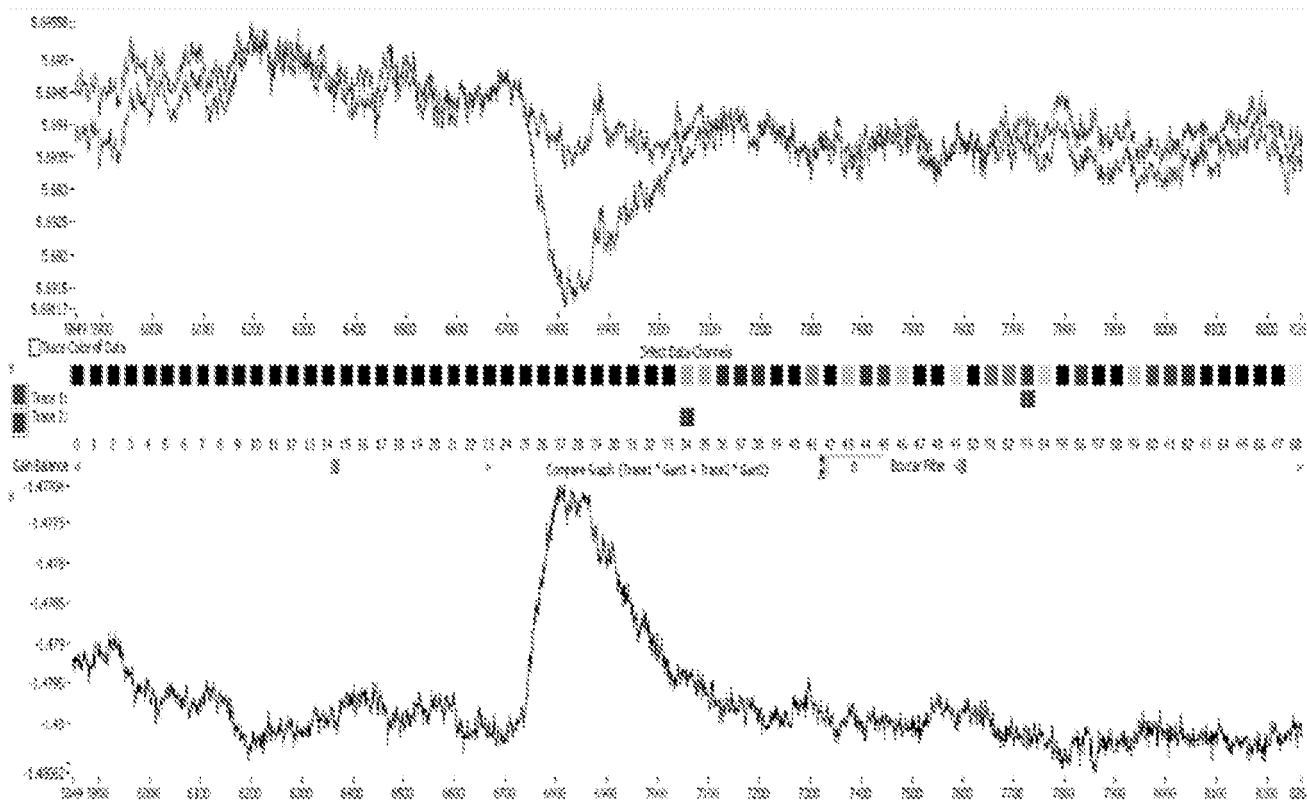


FIG. 11B

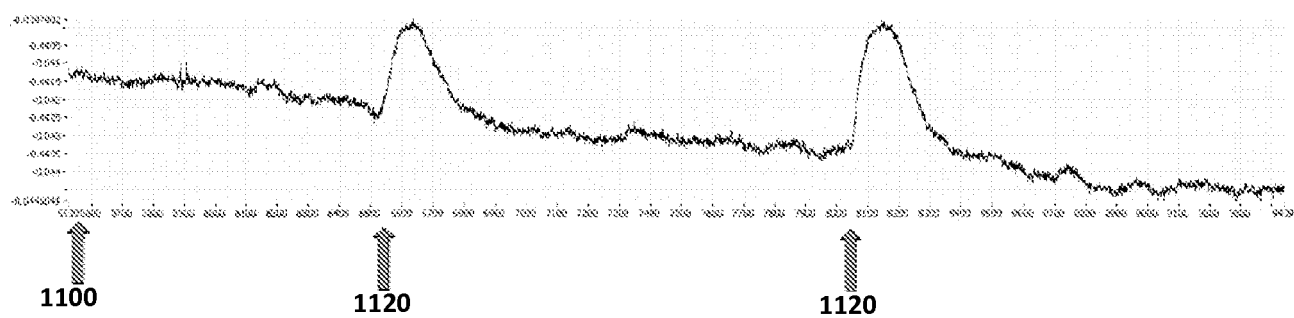


FIG. 11C

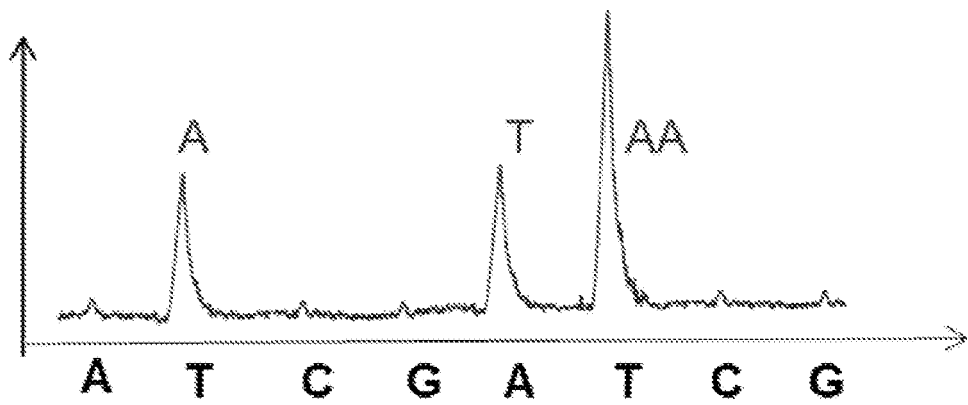


FIG. 12A

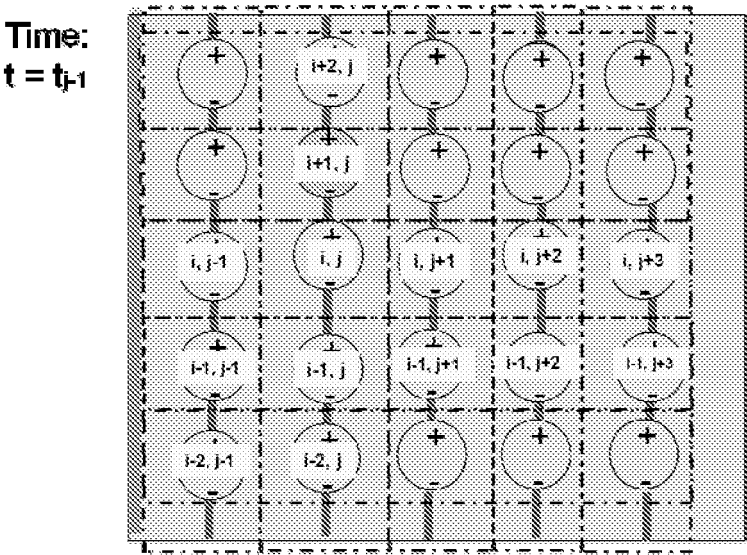


FIG. 12B

In case of constant
speed flow:
 $t \sim = t_0 + dt$

t_{j-1} is the time that the flow hit the "j-1"
column (in average).

The time that we like to monitor
the reaction of cells in column j-1
is around (record the signal of j-1
column sensors):

$$dt_{j-1} \sim = t_j - t_{j-1} (+ t_{\text{reaction}})$$

rather than continues read out of the cells

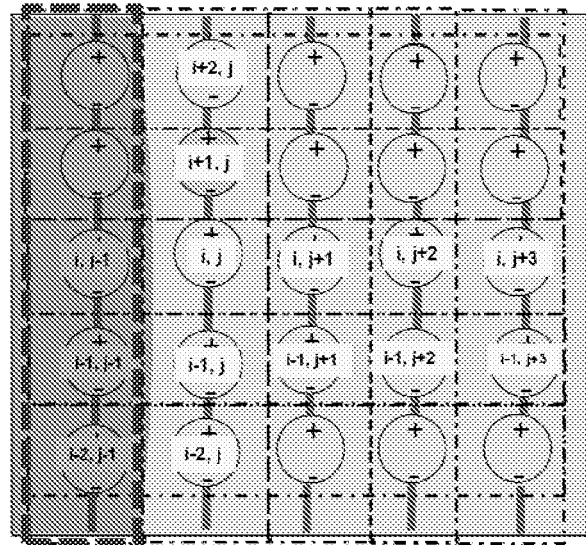


FIG. 12C

In case of
constant speed
flow :
 $t_{j+1} \sim = t_0 + 3dt$

t_{j+1} is the time that the flow hit the "j+1"
column (in average) at first point.

The time that we like to monitor
the reaction of cells in column j+1
is around (record the signal of j+1
column sensors):

$$dt_{j+3} \sim = t_{j+2} - t_{j+1} (+ t_{\text{reaction}})$$

rather than continues read out of the cells

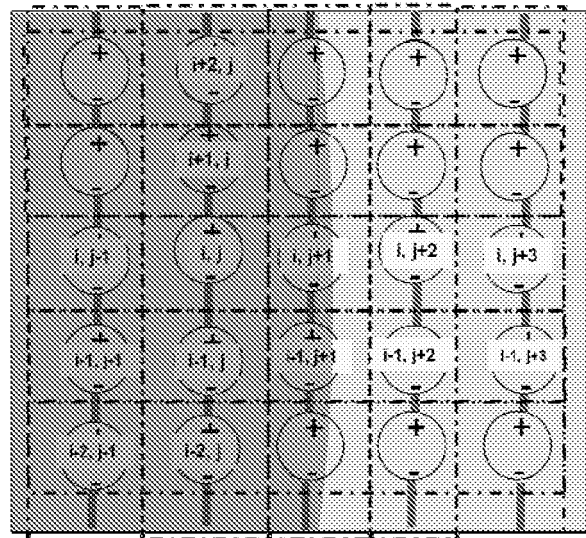
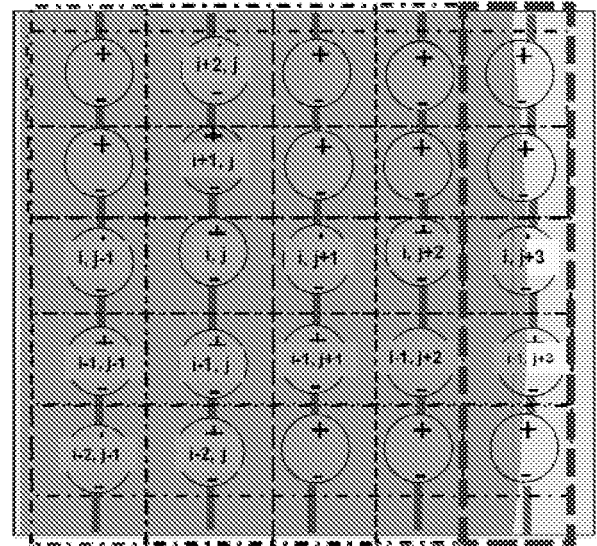


FIG. 12D

In case of
constant speed
flow :
 $t_{j+3} \sim t_0 + 5dt$

t_{j+3} is the time that the flow hit the "j+3"
column (in average) at first point.

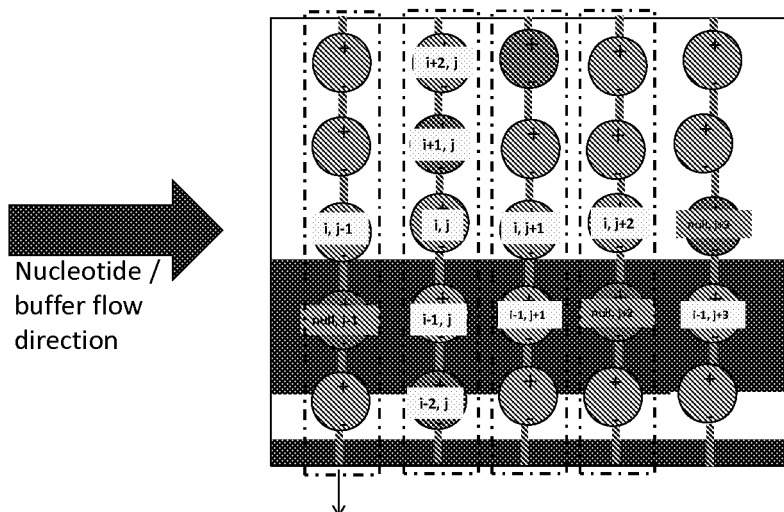
The time that we like to monitor
the reaction of cells in column j+3
is around (record the signal of j+3
column sensors):



$$dt_{j+3} \sim t_{j+4} - t_{j+3} (+ \text{reaction})$$

rather than continues read out of the cells

FIG. 12E



$$X_{i,j} = S_{i,j} - S_{null, j-1}$$

FIG. 12F

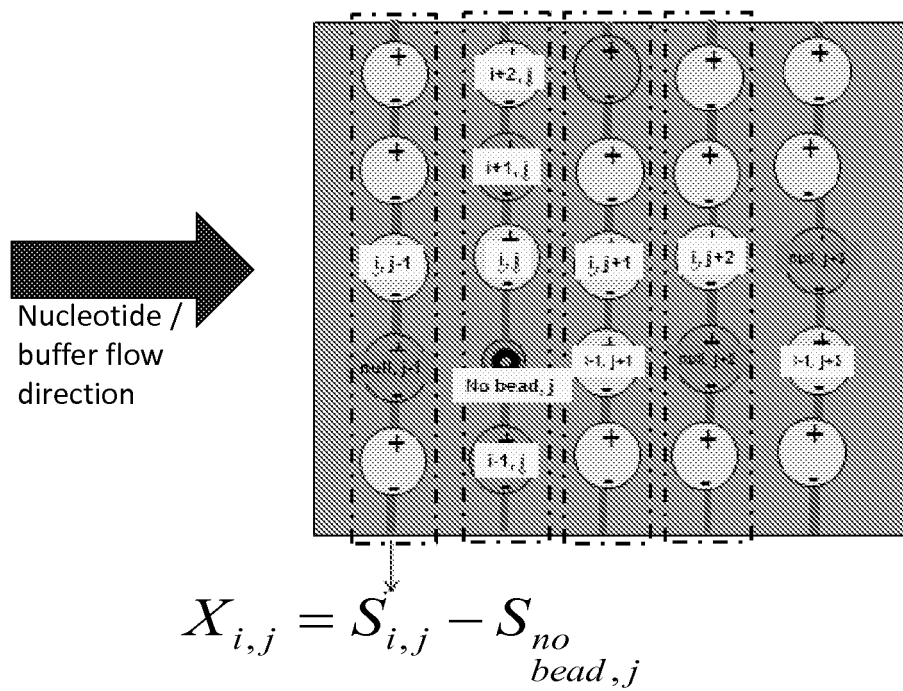


FIG. 12G

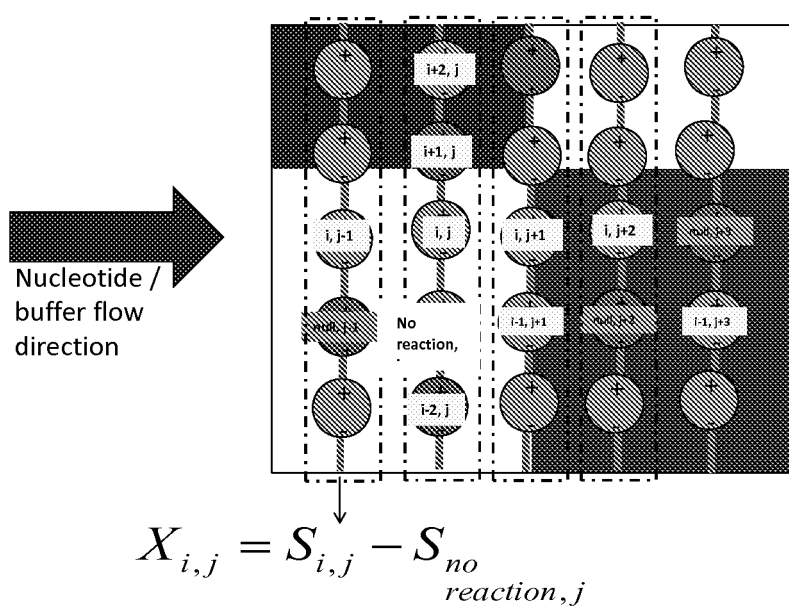


FIG. 12H

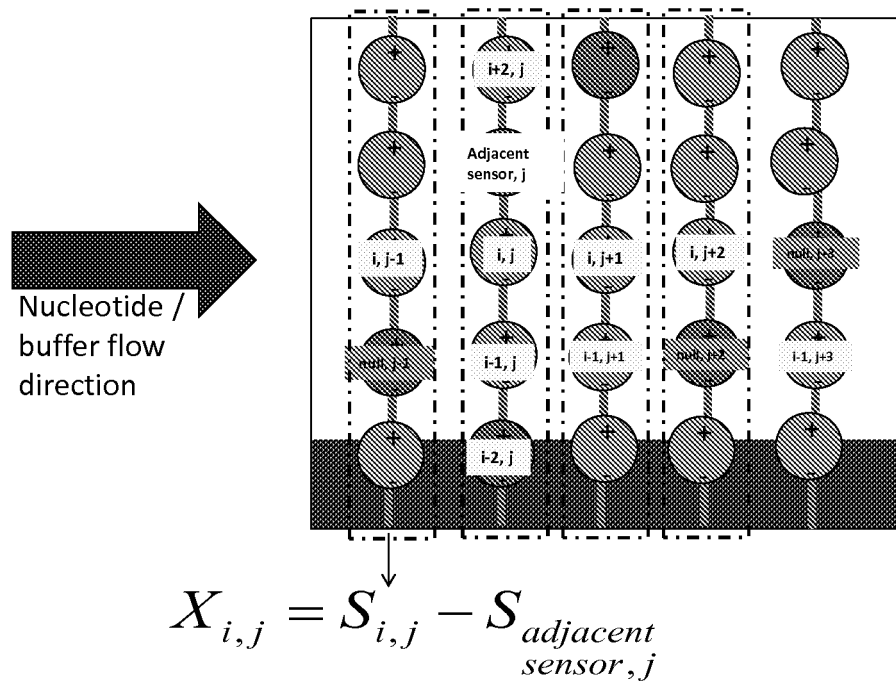


FIG. 12I

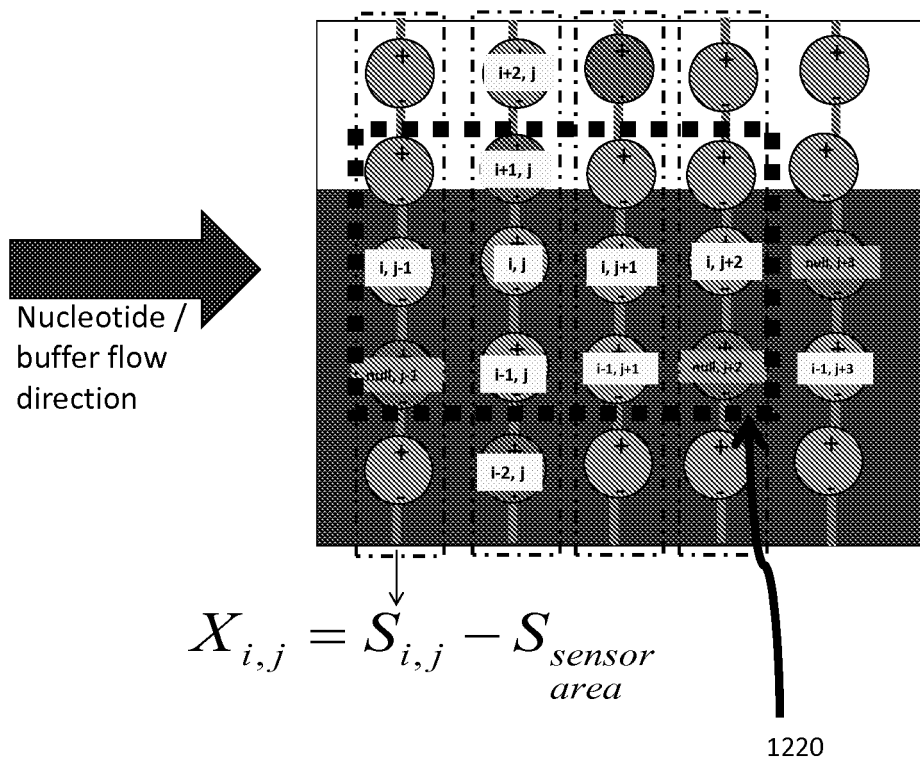


FIG. 12J

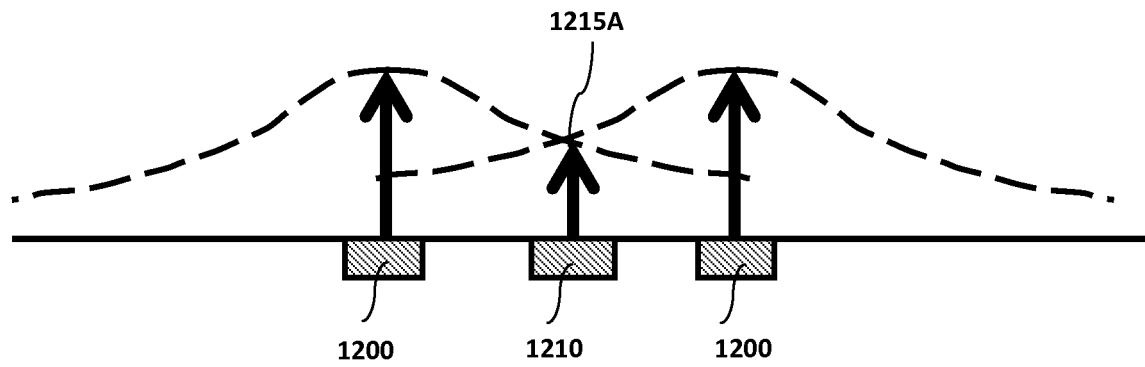


FIG. 12K

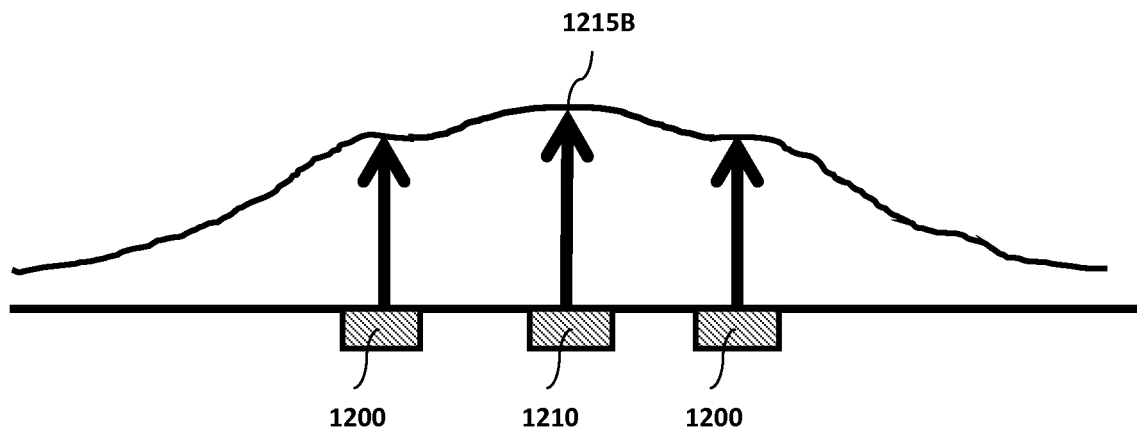
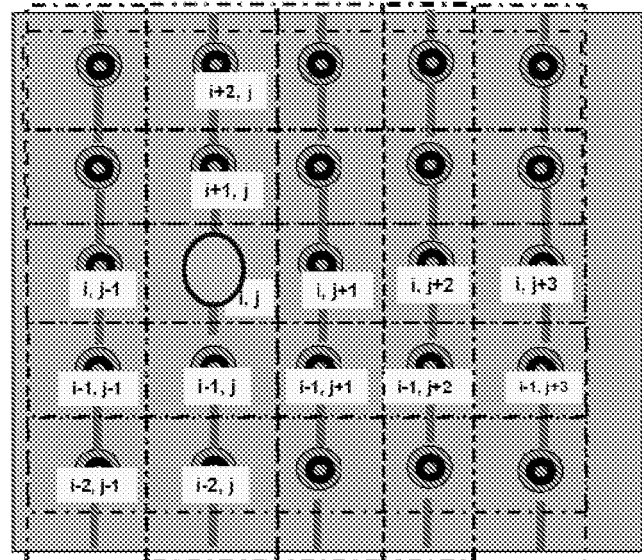


FIG. 12L

Calibration:

- Monitor the effect of a DNA-bead signal (or any signal) from a pixel on the neighbor cells (by reading with the neighbor sensors).
- Extract the $n \times n$ matrix of $A_{i,j}$ for each pixel/cell either in time or frequency domain
- post processing the output signals during the sequencing of beads by inverse post-processing.

$$A_{i,j}(t) = \begin{bmatrix} \dots & A_{i,j}(k,p) & \dots \\ f_{\text{cell}(k,p) \text{ over cell}(i,j)} \end{bmatrix}$$



$$A_{i,j}(k,p) = f_{\text{cell}(k,p) \text{ over cell}(i,j)}$$

FIG. 12M

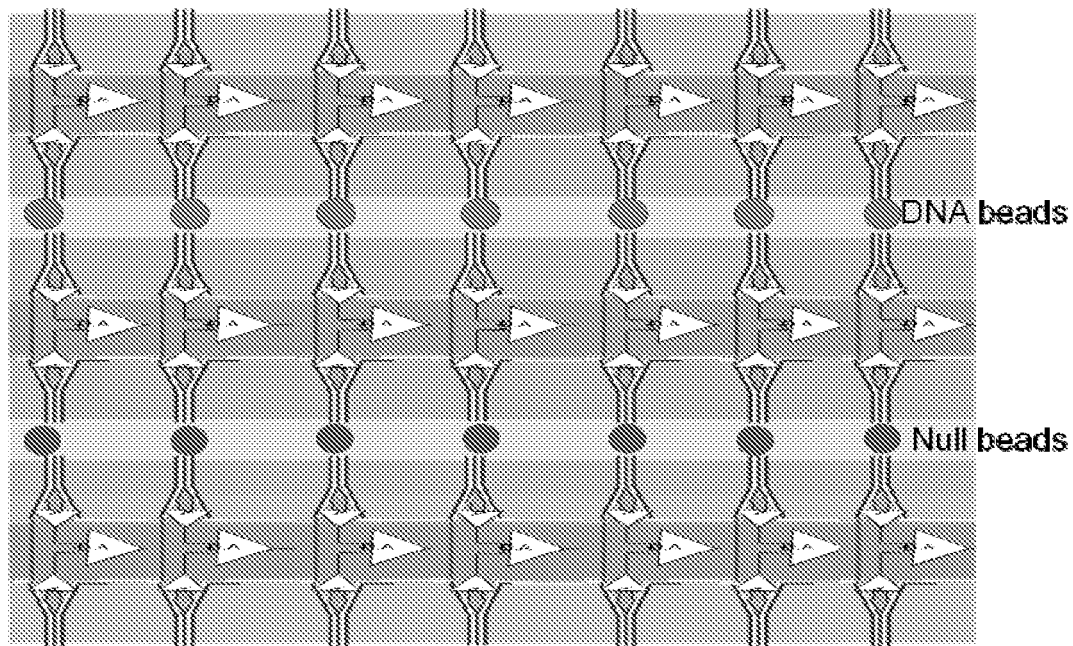


FIG. 12N

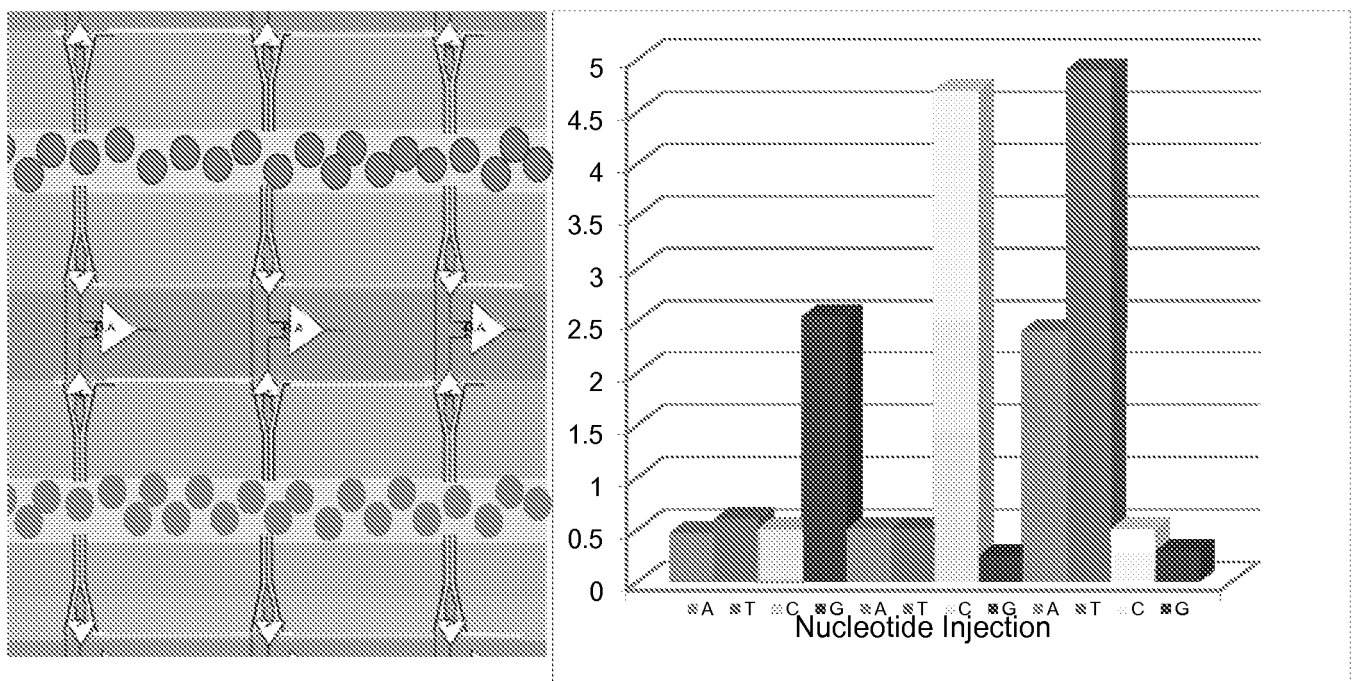


FIG. 13B



FIG. 14

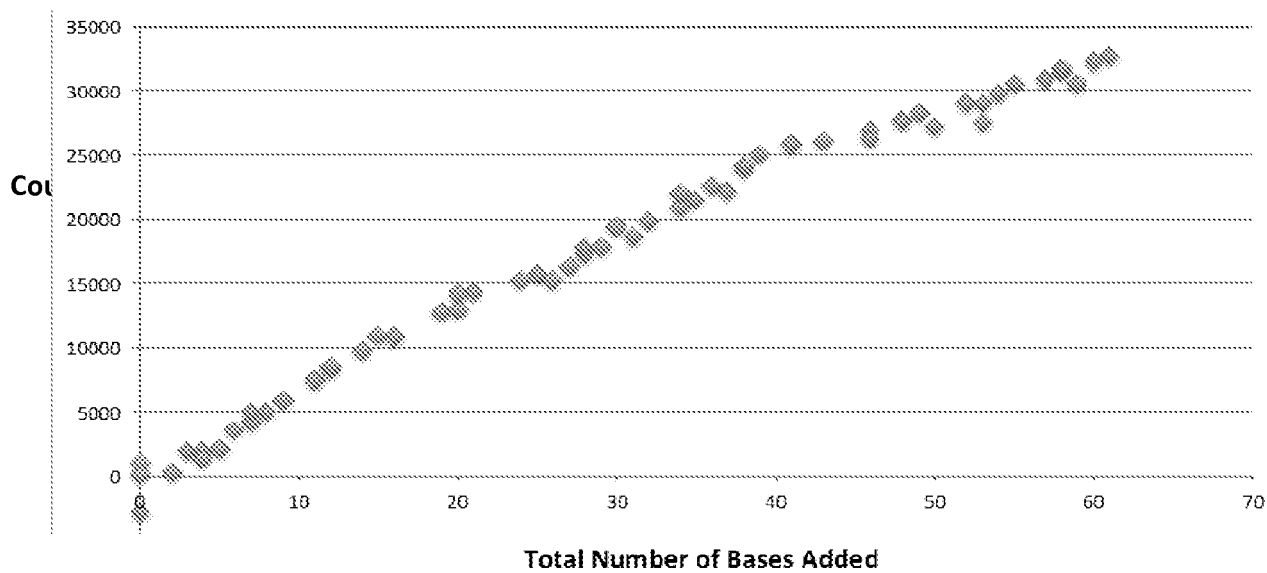


FIG. 15

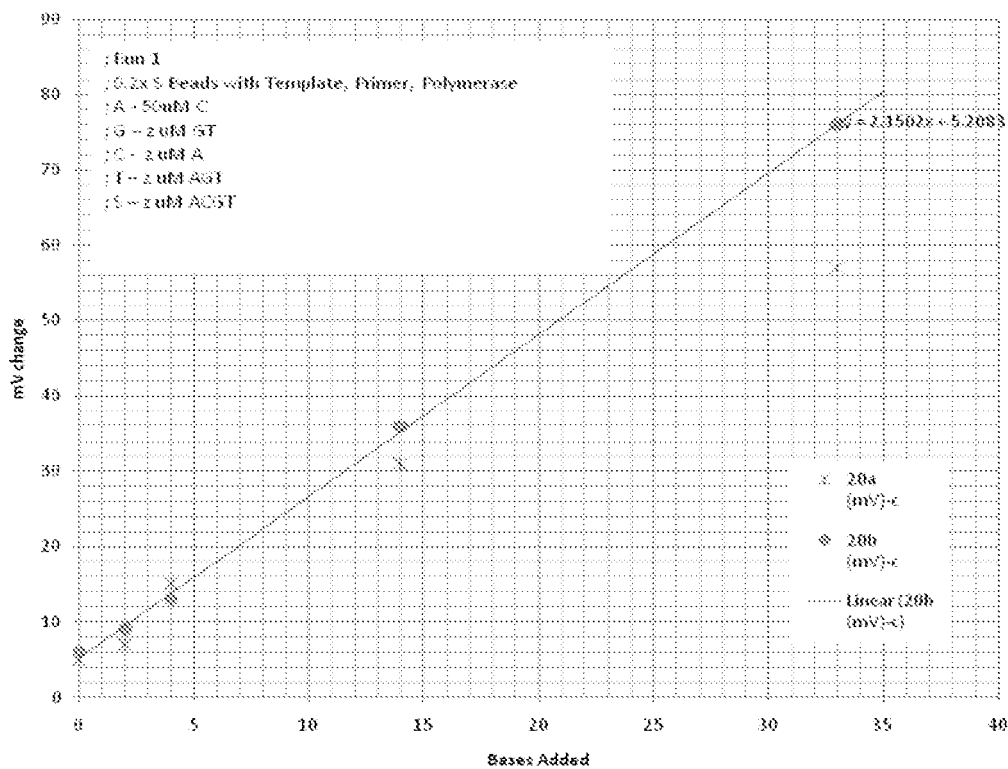


FIG. 16

Raw Single Ended Signal:

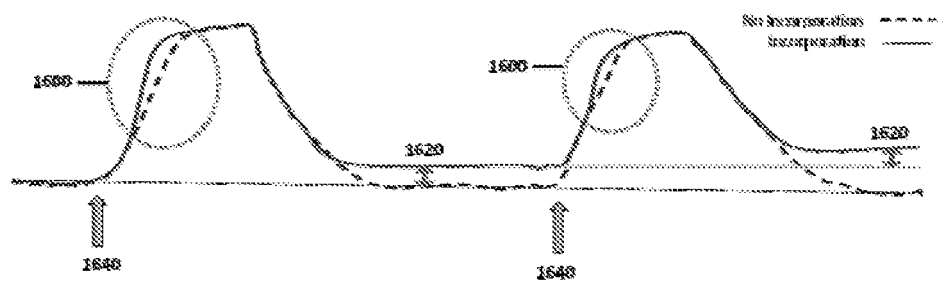


FIG. 17

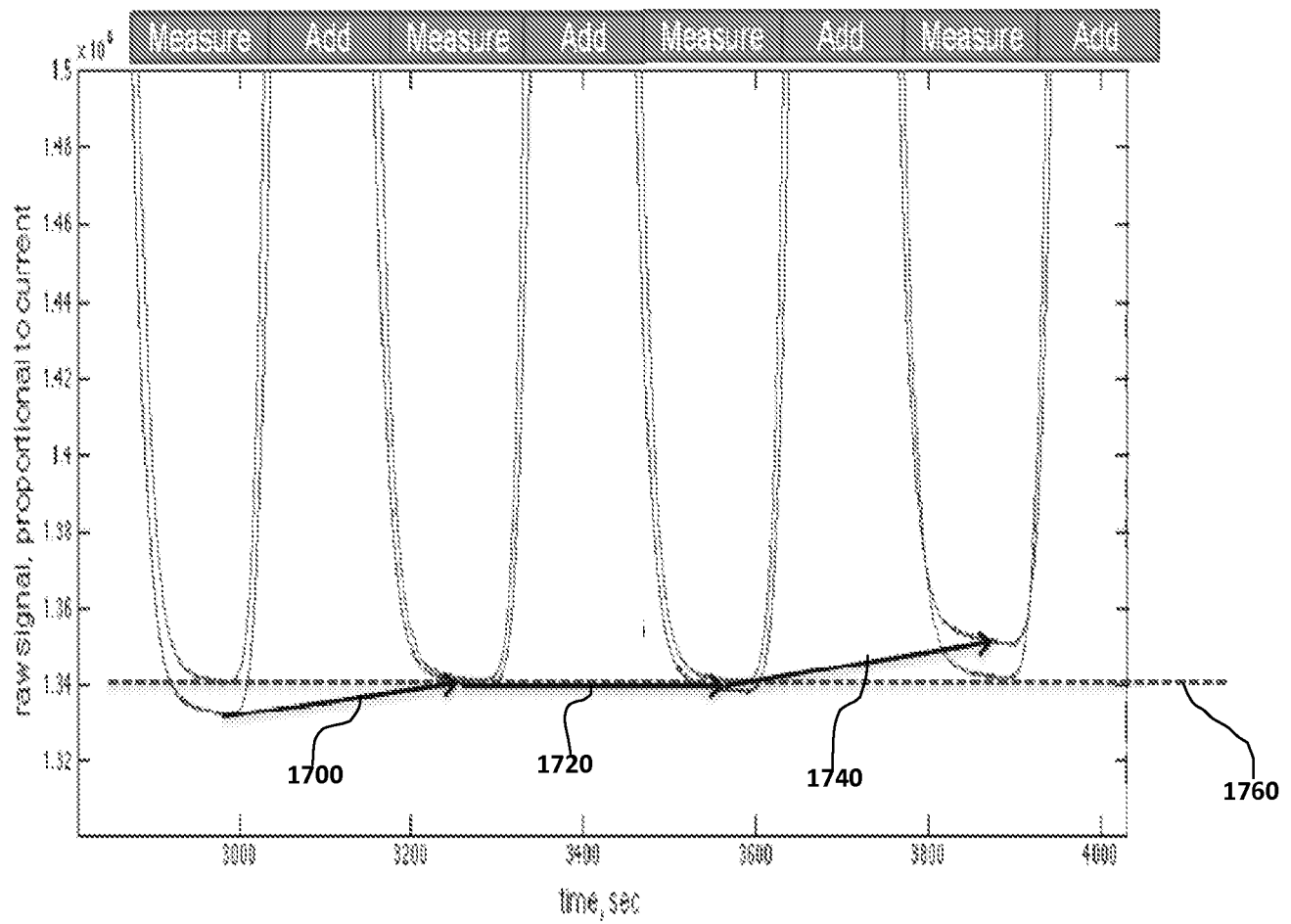


FIG. 18A

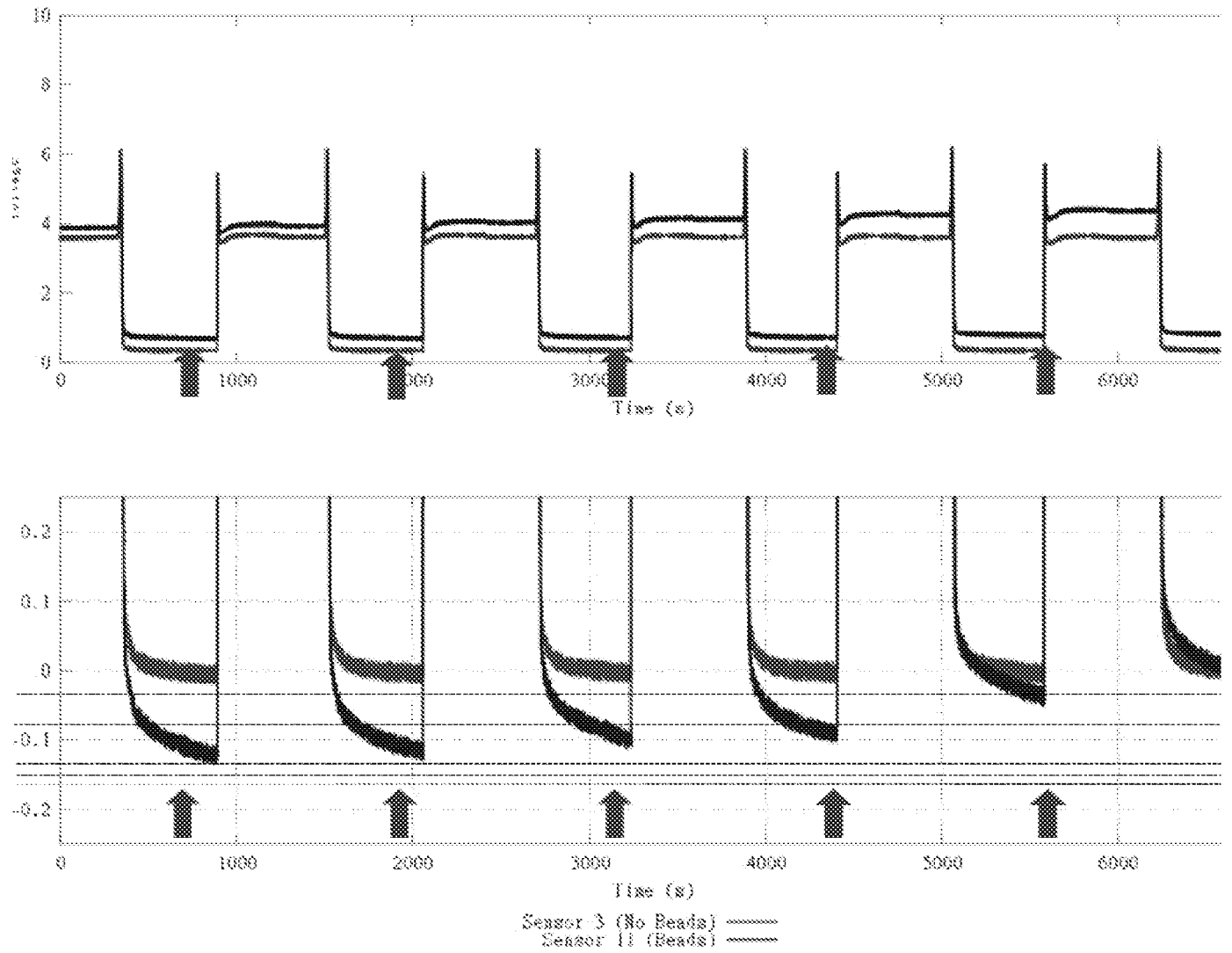


FIG. 18B

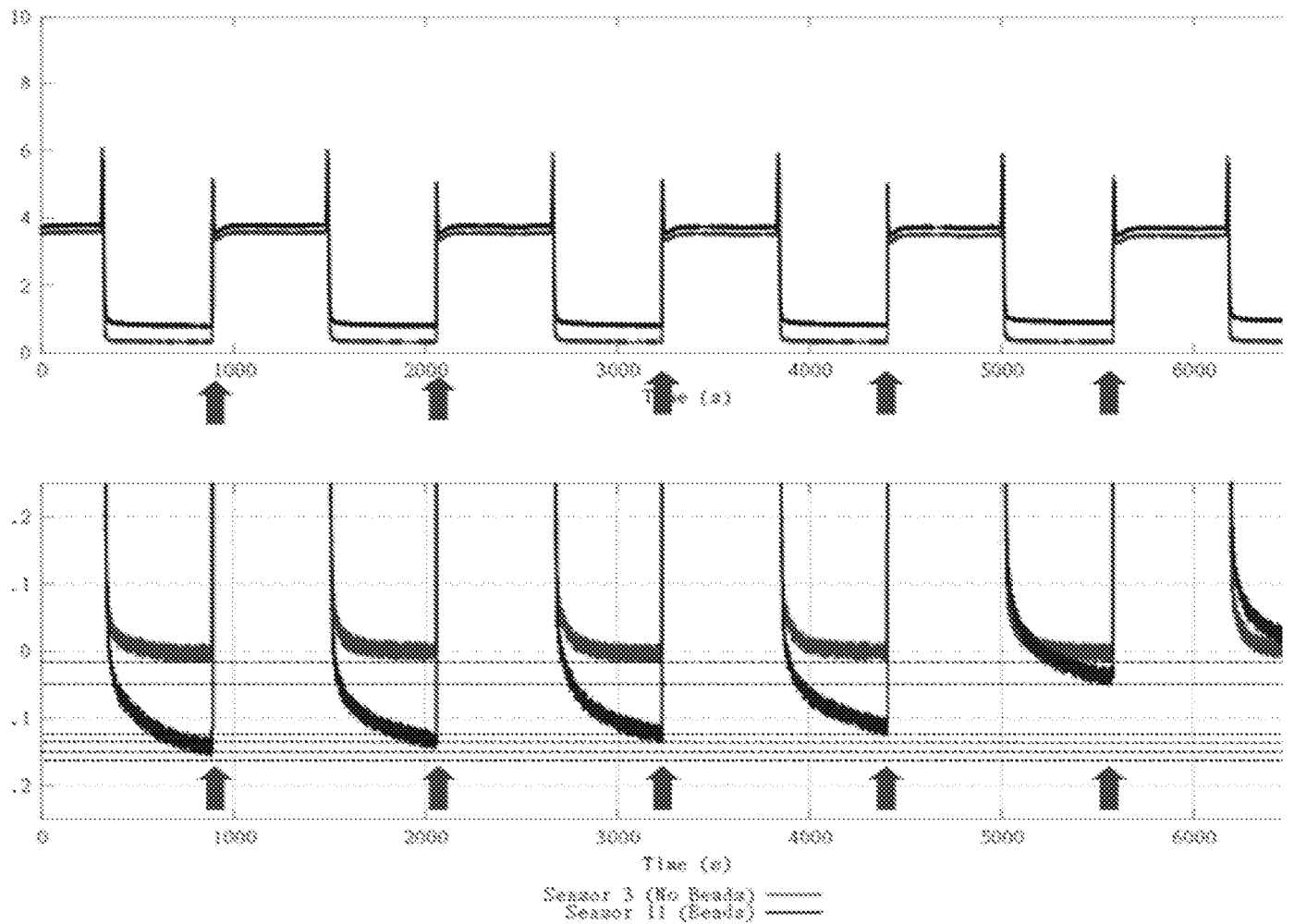


FIG. 19A

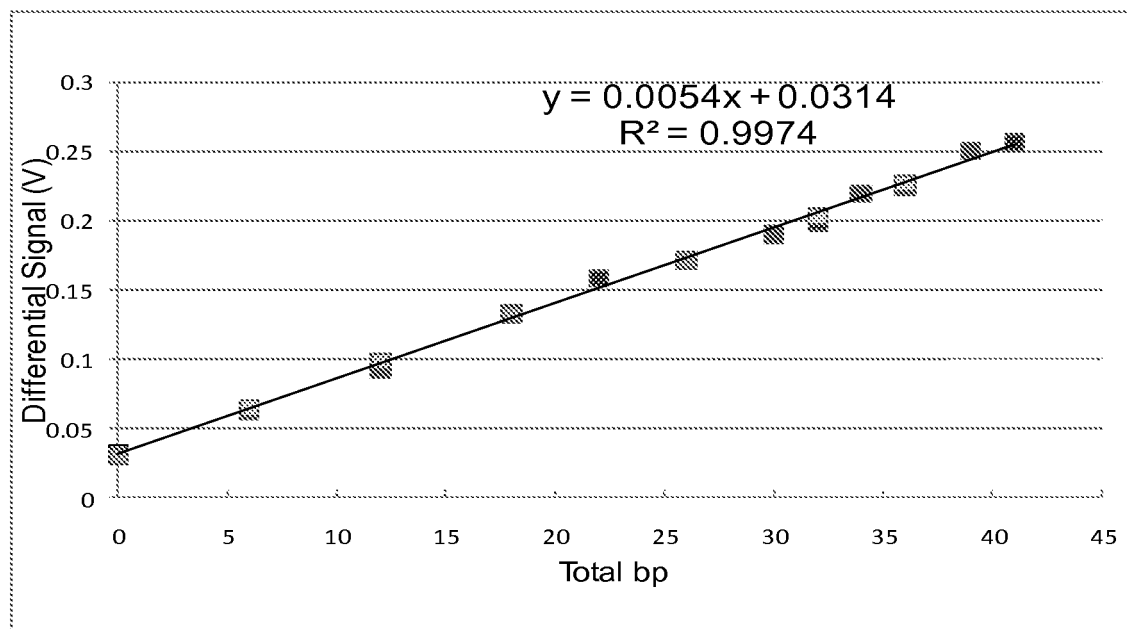


FIG. 19B

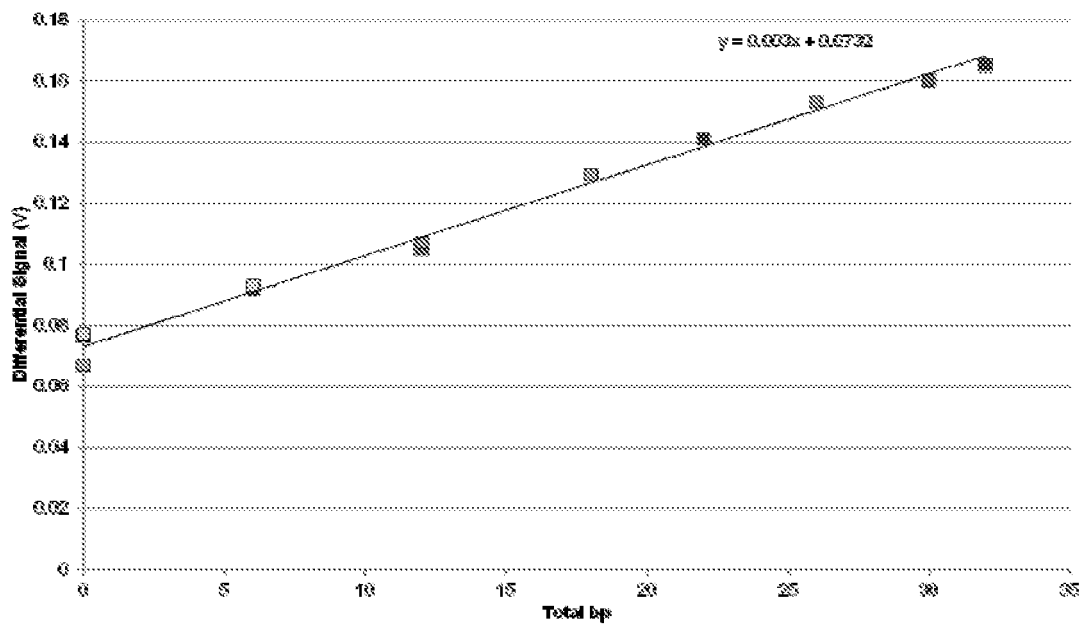


FIG. 19C

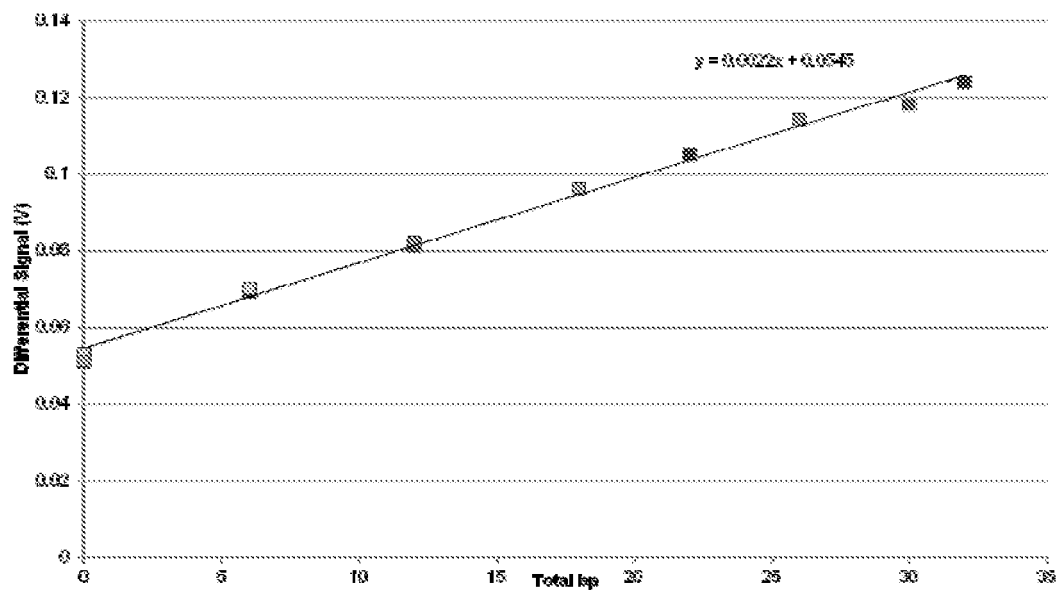


FIG. 20

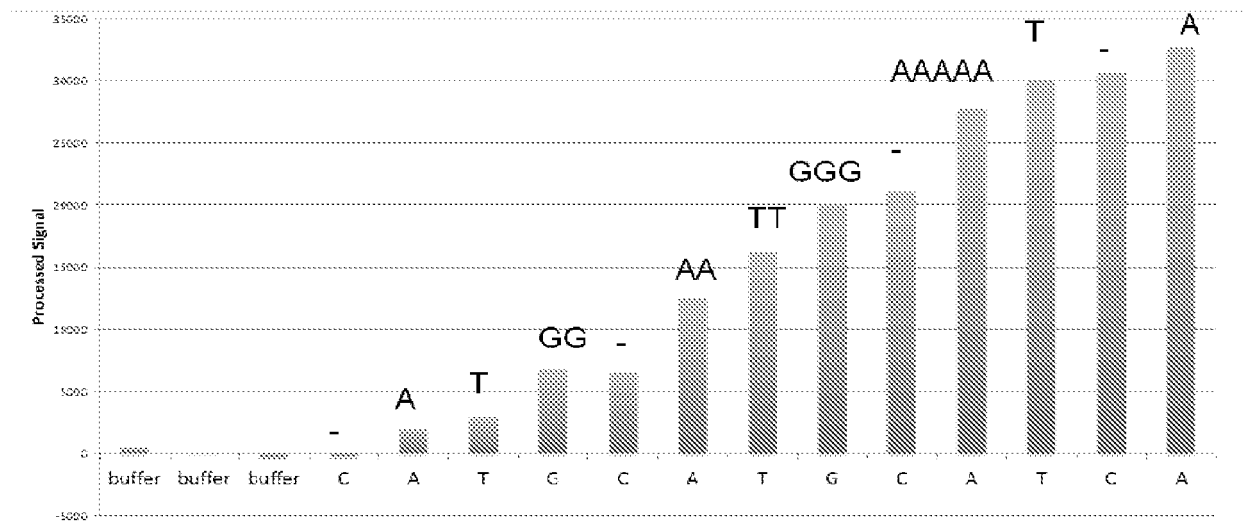


FIG. 21

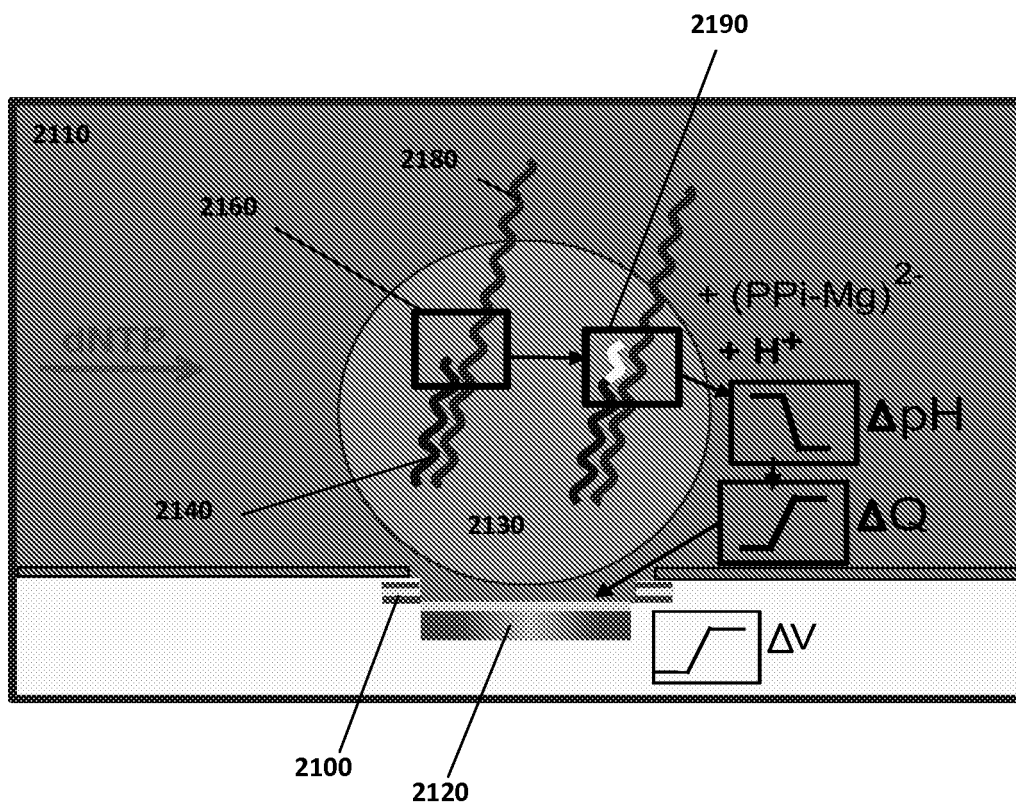


FIG. 22A

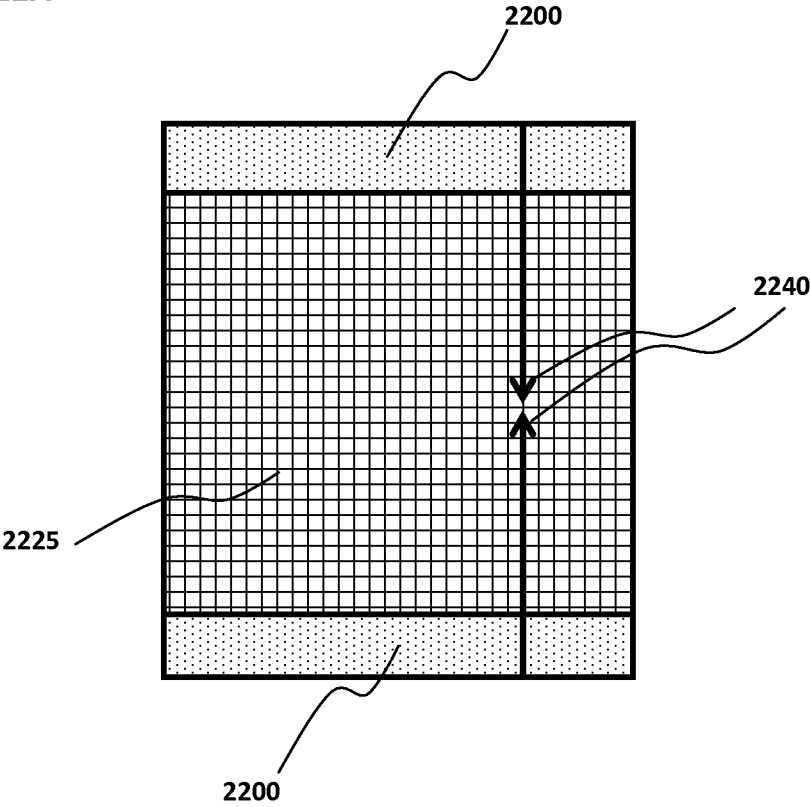


FIG. 22B

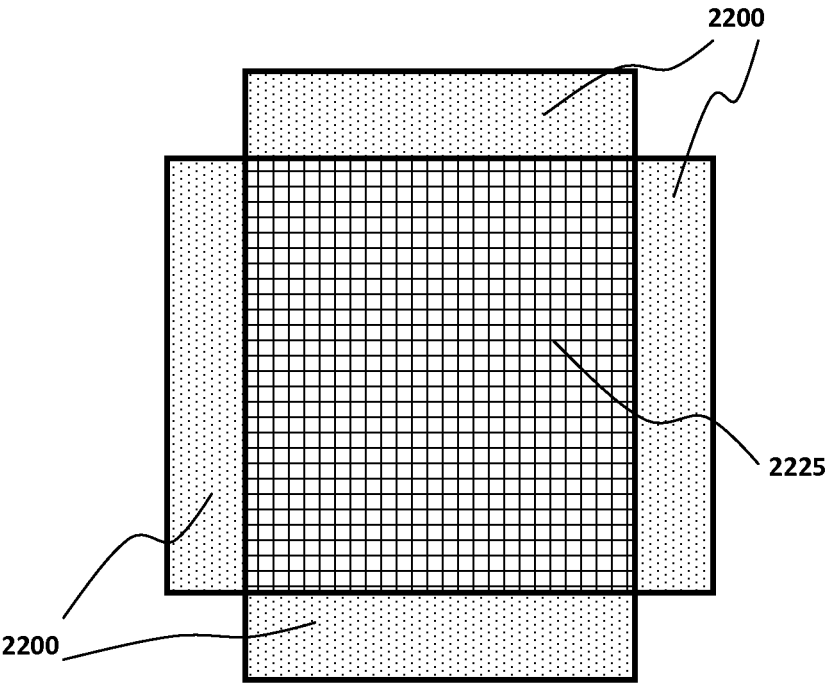


FIG. 23

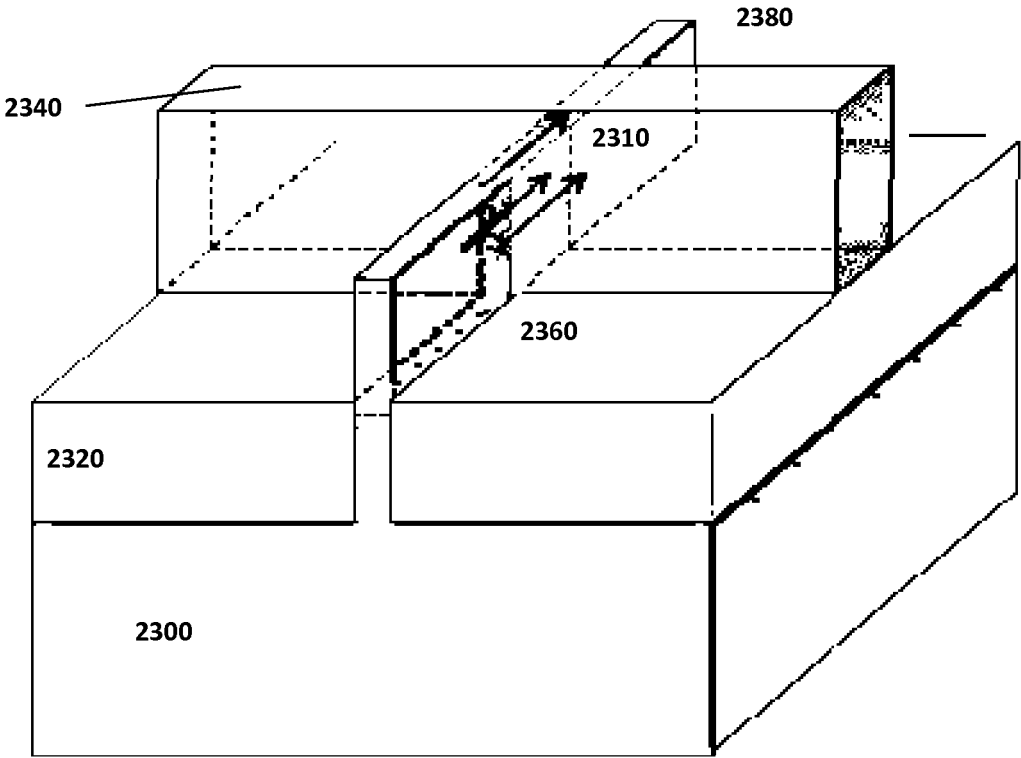


FIG. 24

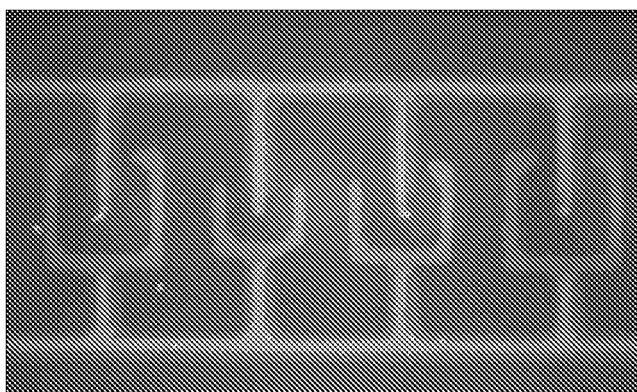
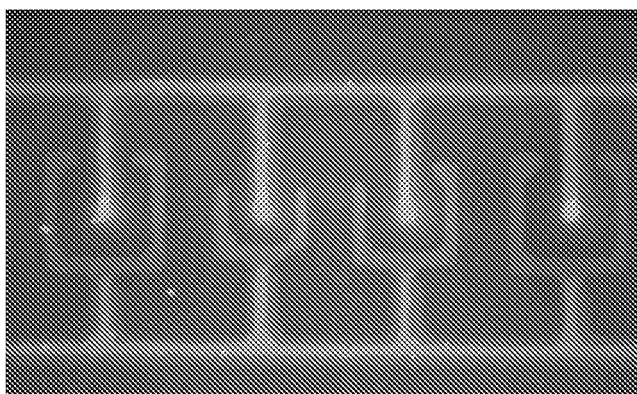
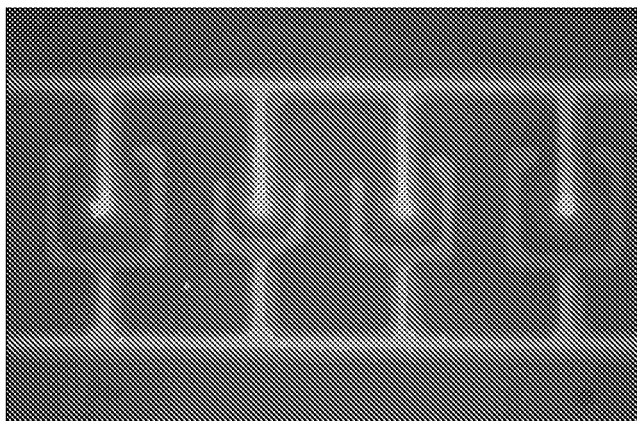
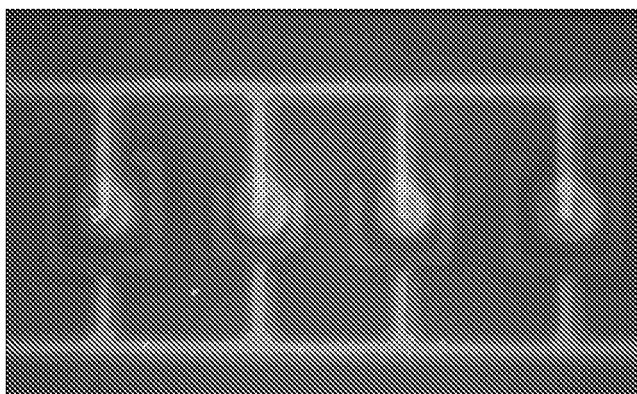
**t = 0 sec****t = 24 sec****t = 64 sec****t = 77 sec**

FIG. 25

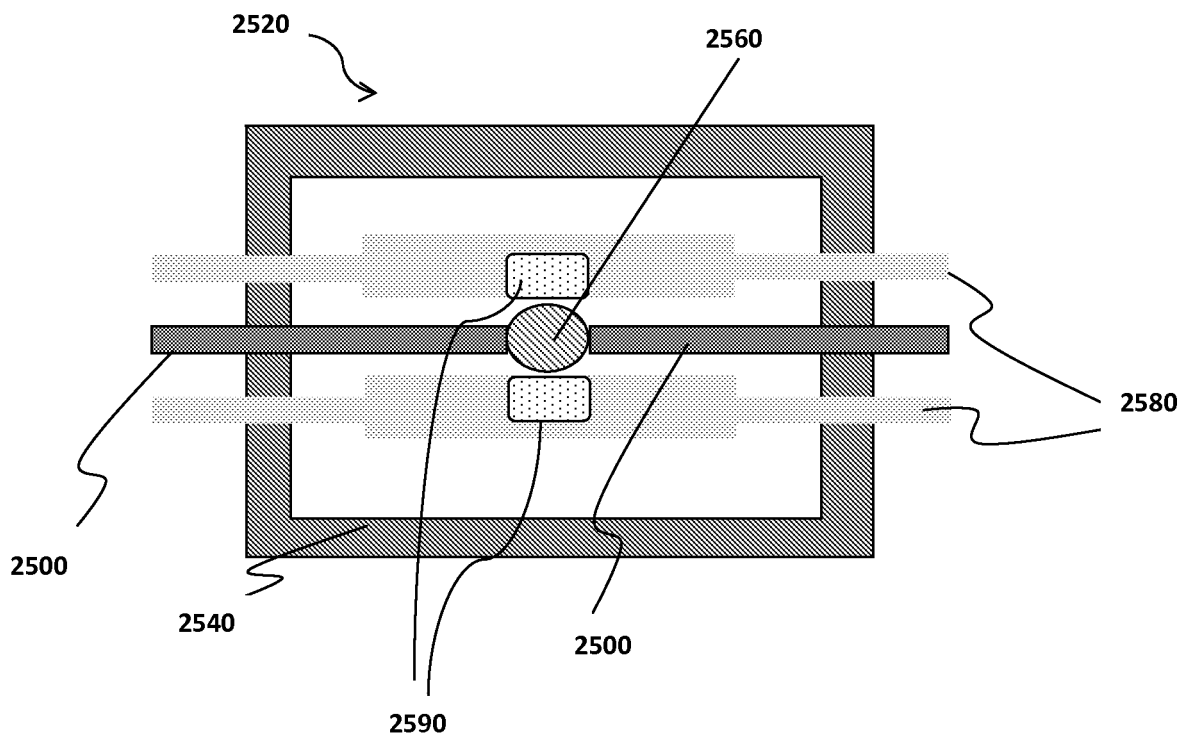


FIG. 26

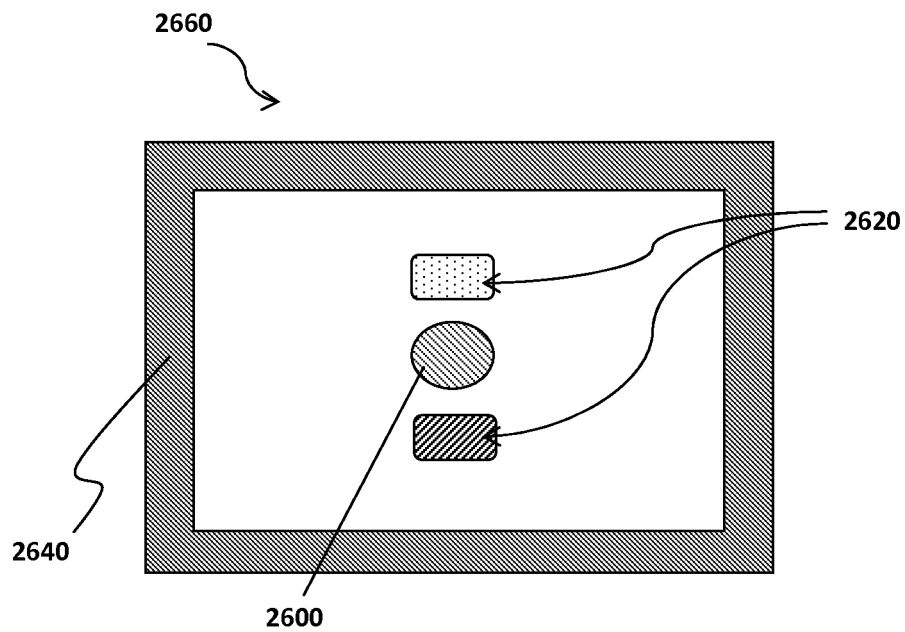


FIG. 27A

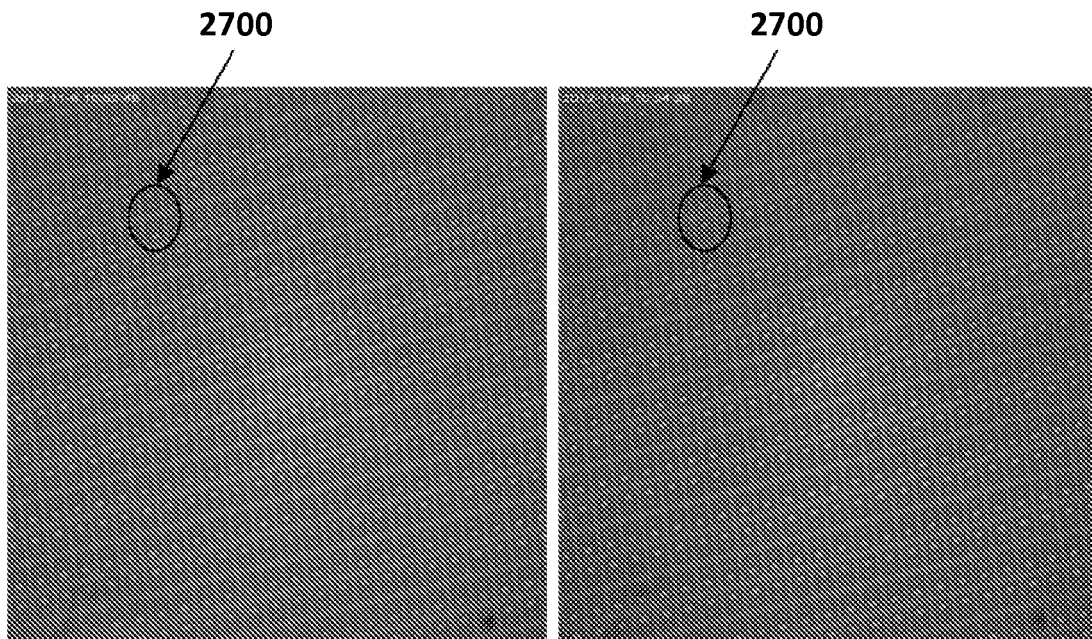


FIG. 27B

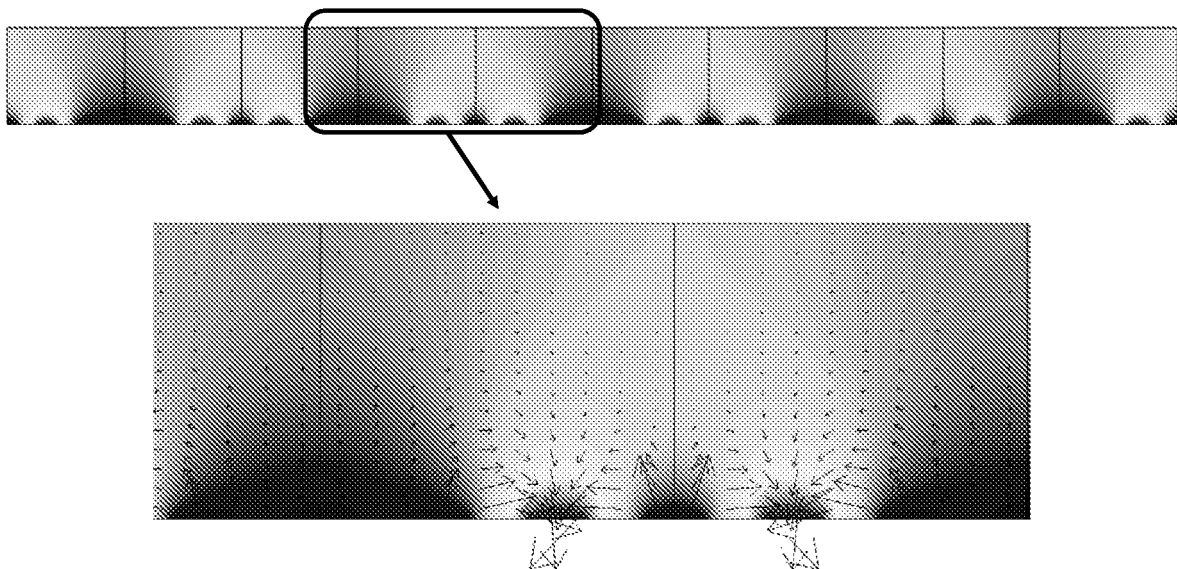


FIG. 27C

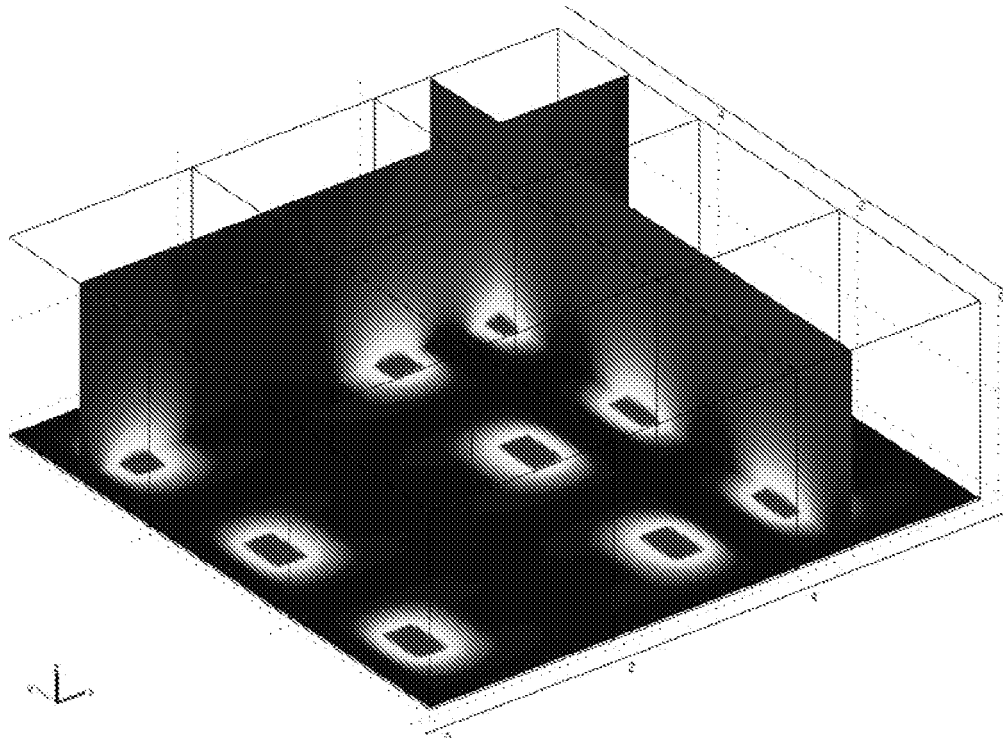


FIG. 28

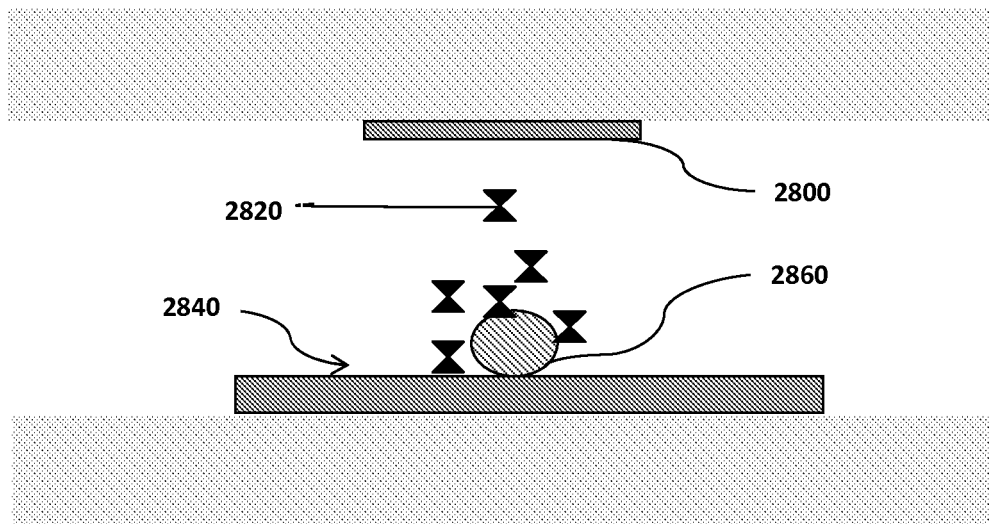


FIG. 29

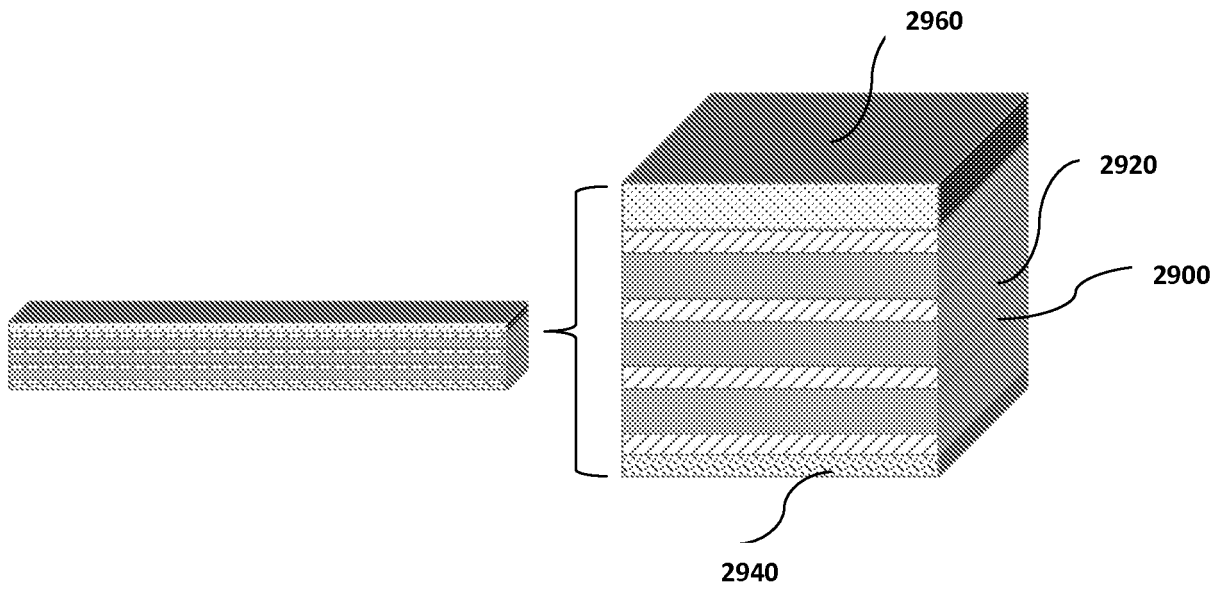


FIG. 30

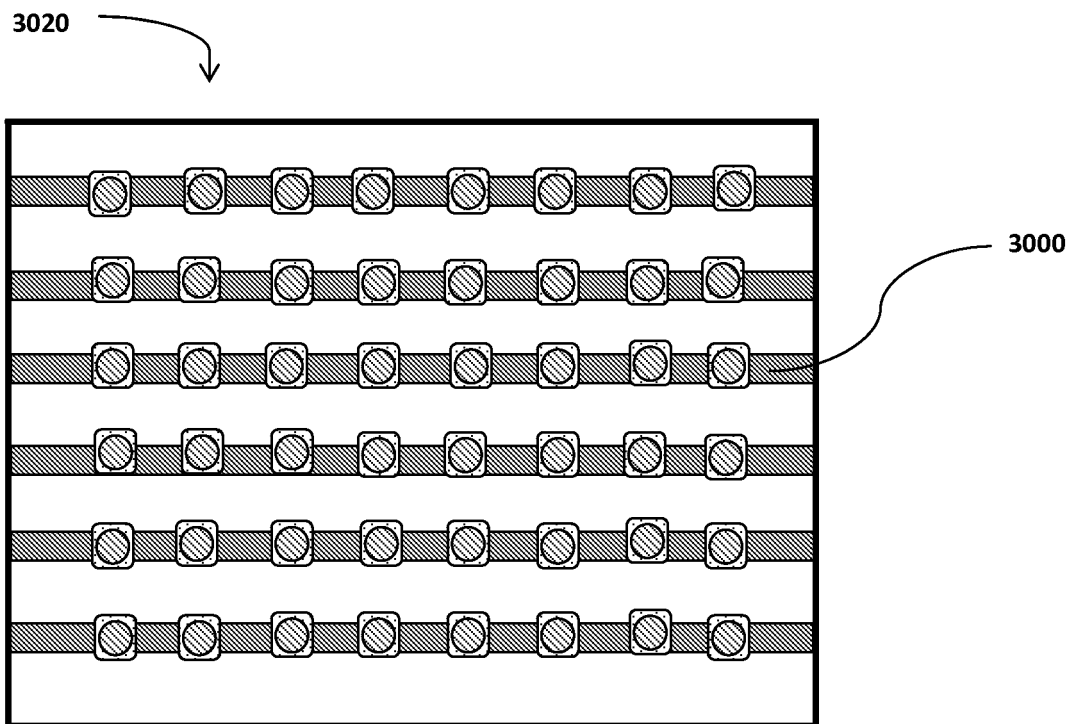


FIG. 31

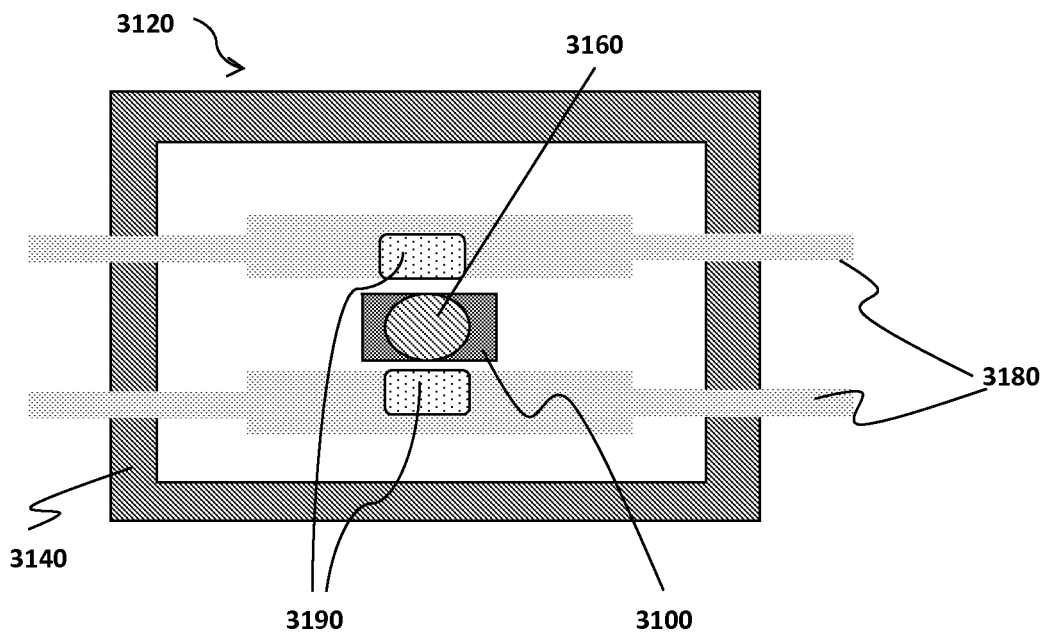


FIG. 32

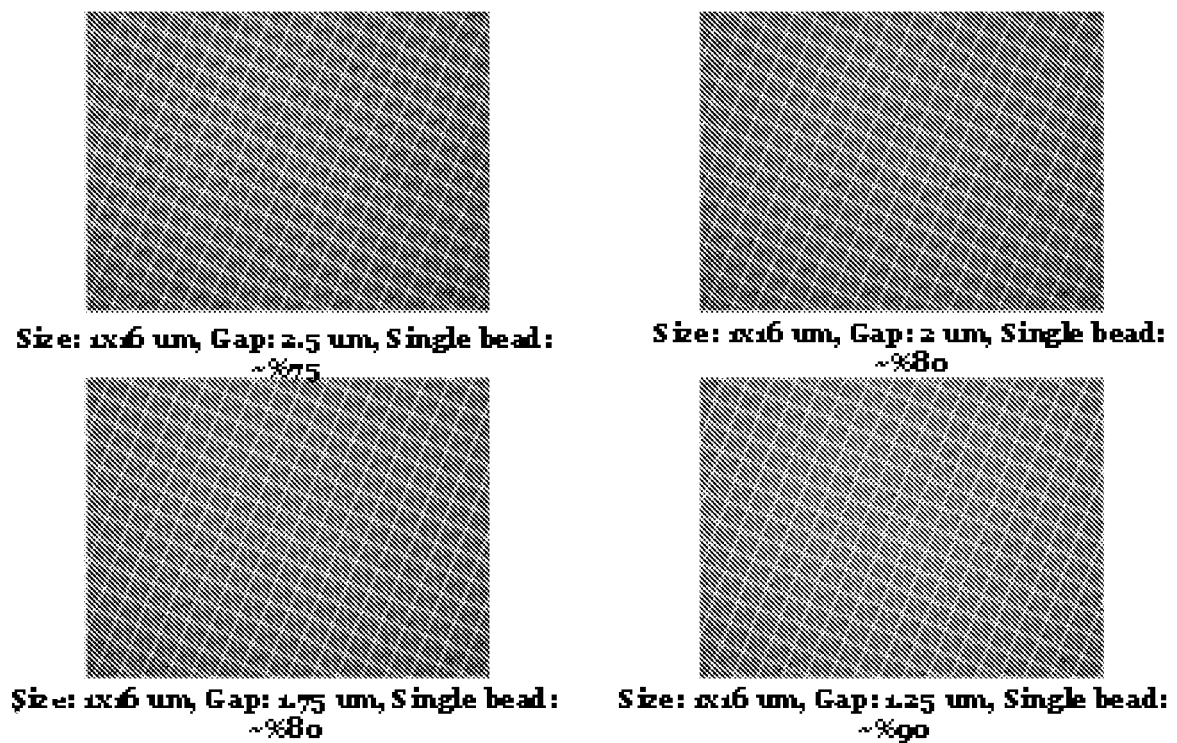


FIG. 33A

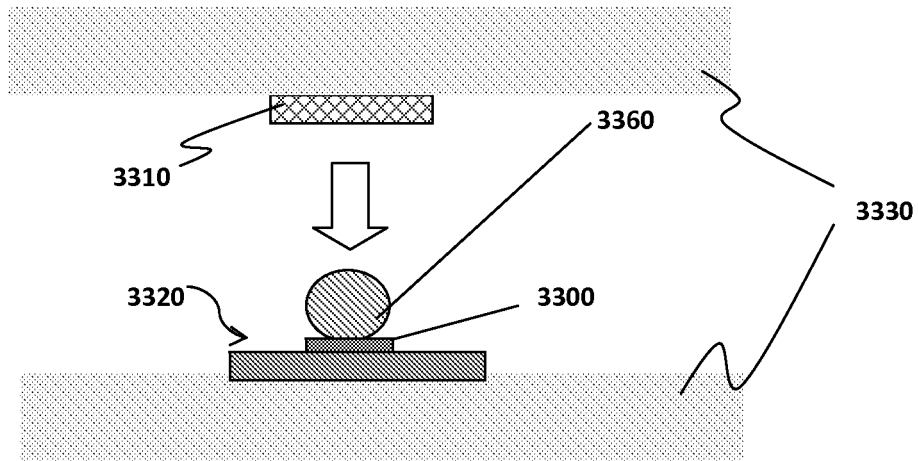


FIG. 33B

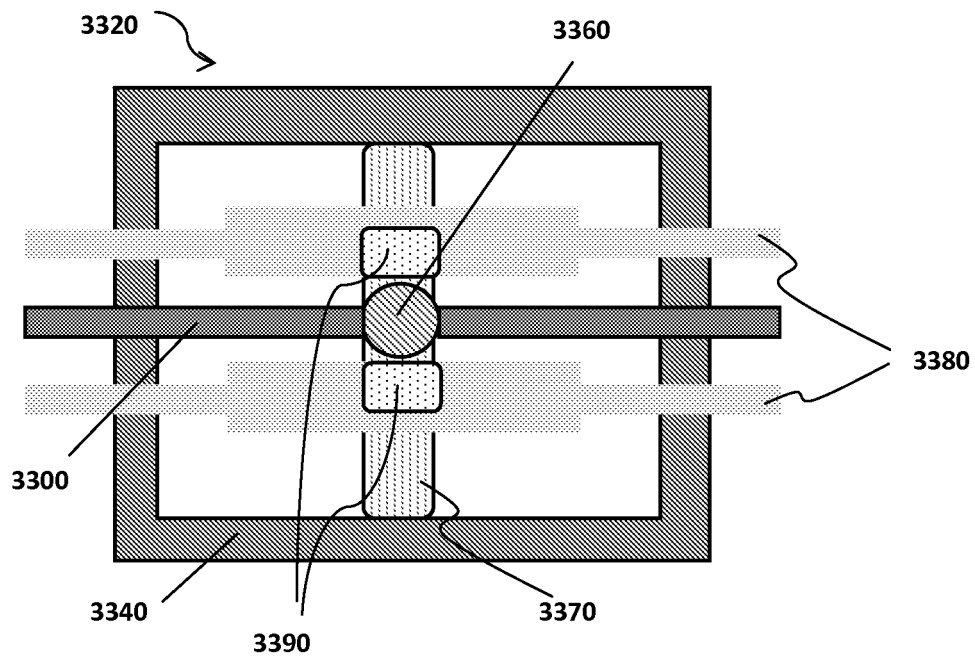


FIG. 33C

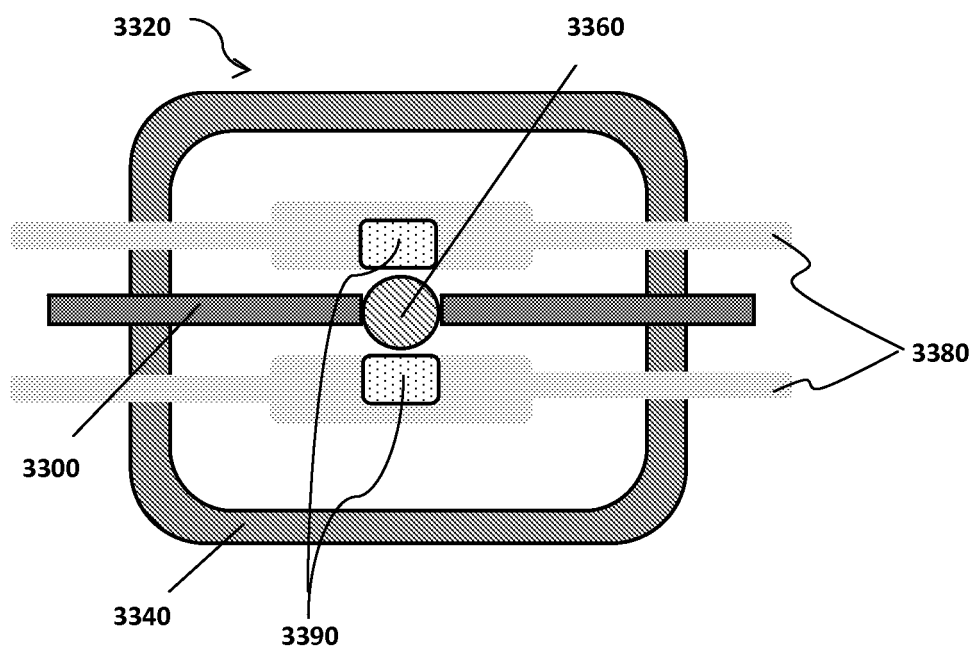


FIG. 33D

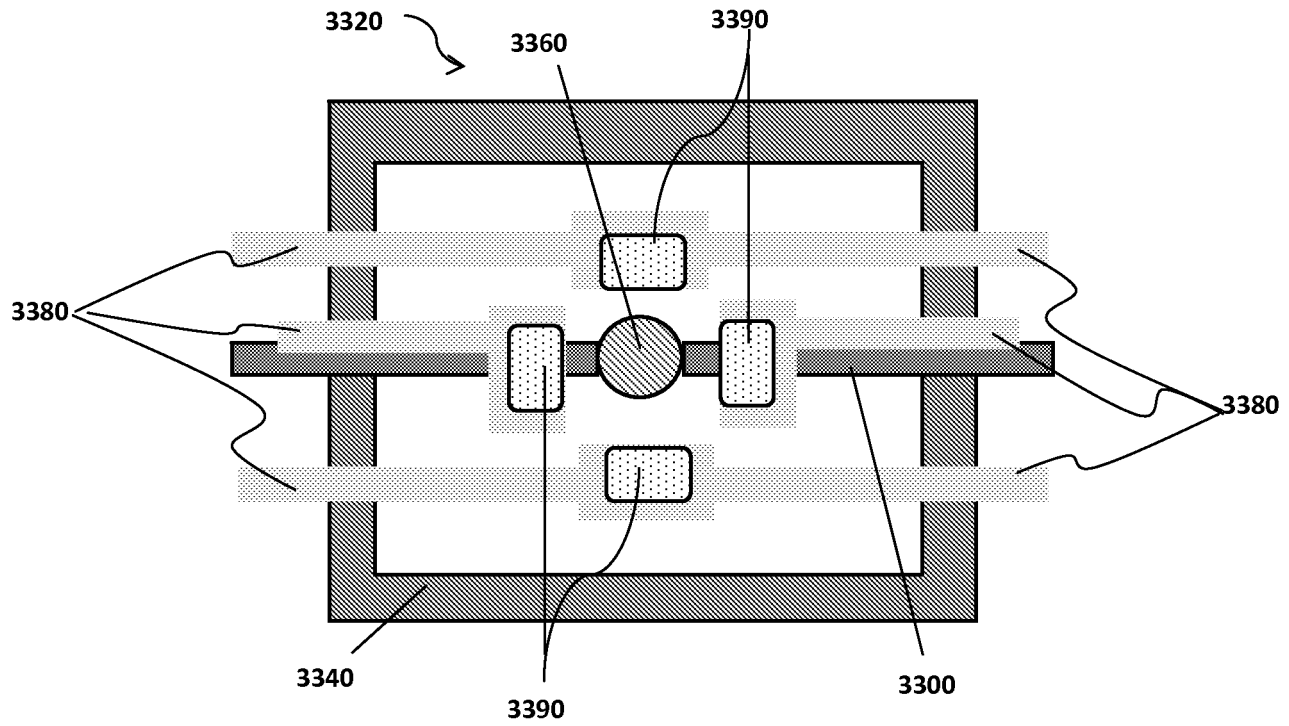


FIG. 33E

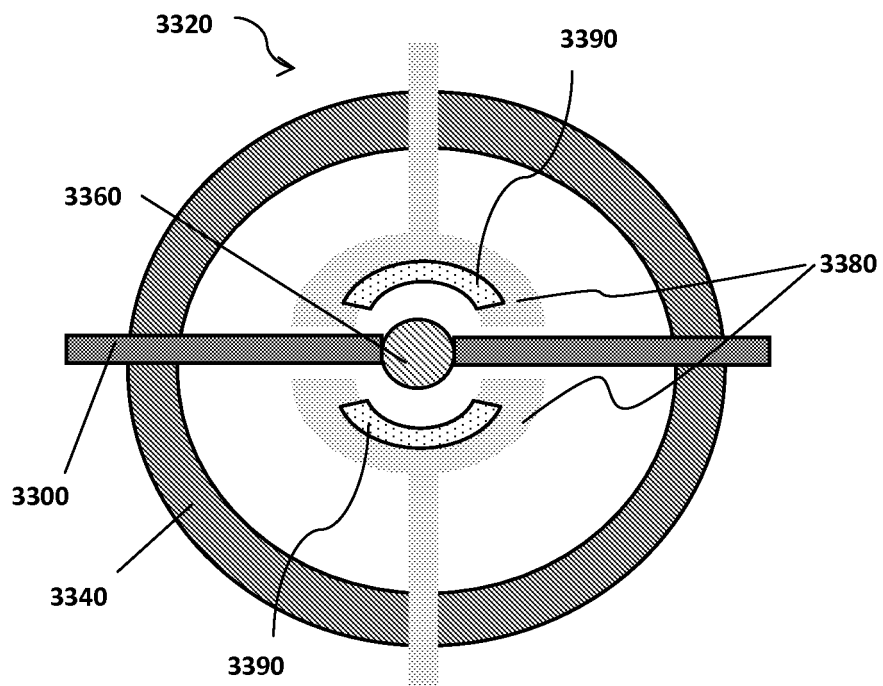


FIG. 33F

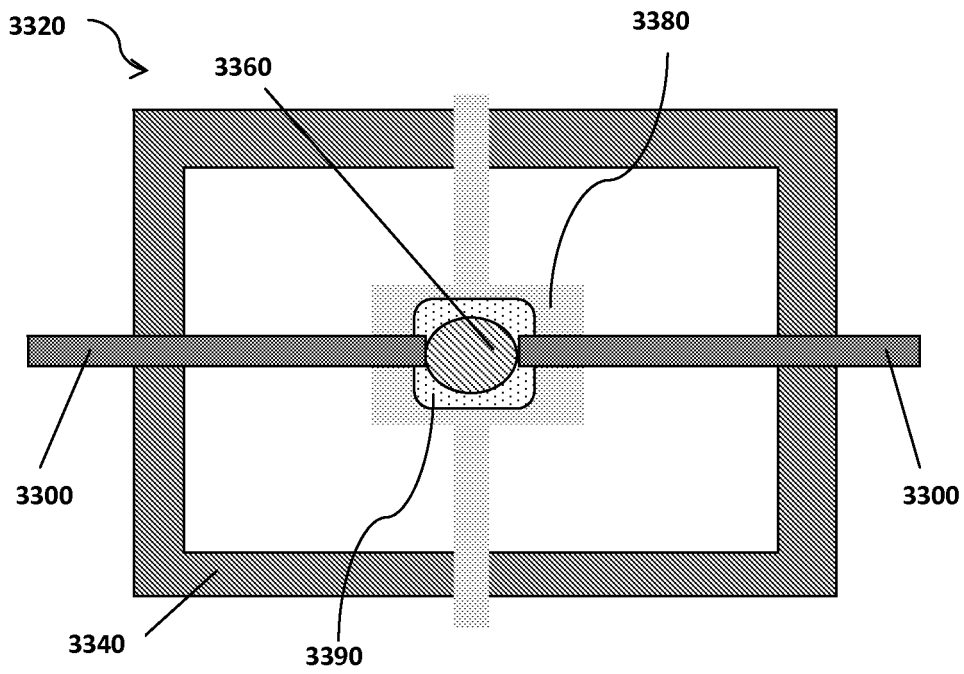


FIG. 33G

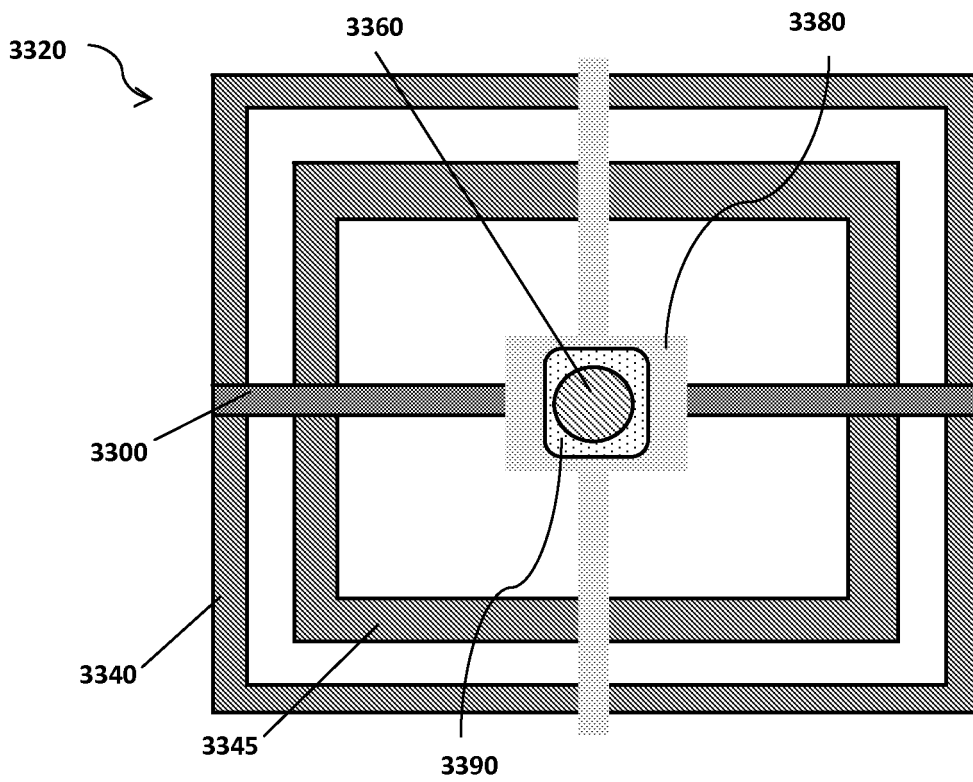


FIG. 33H

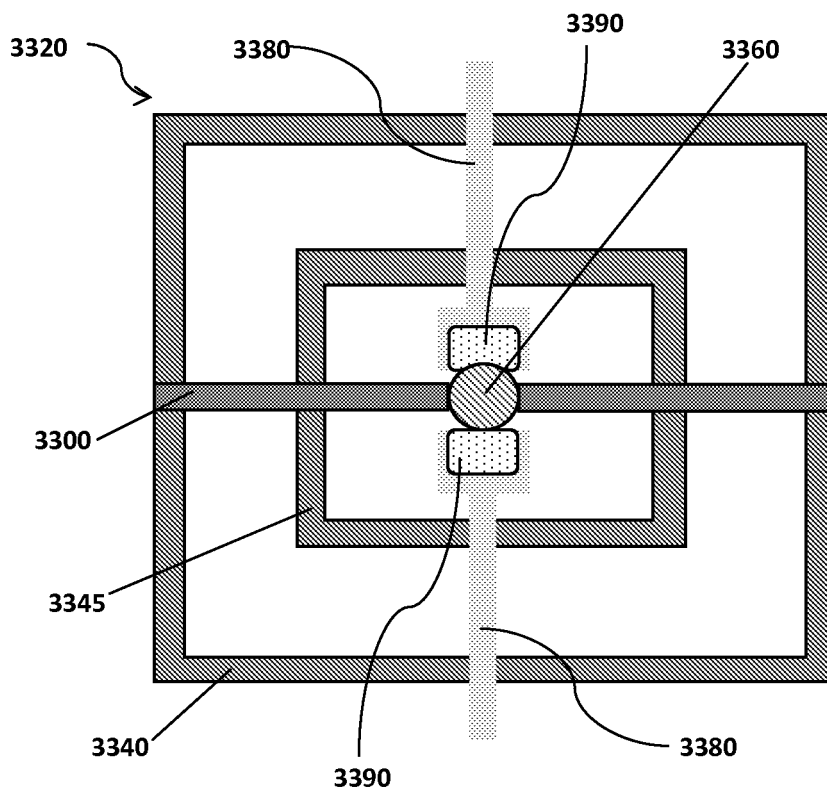


FIG. 33I

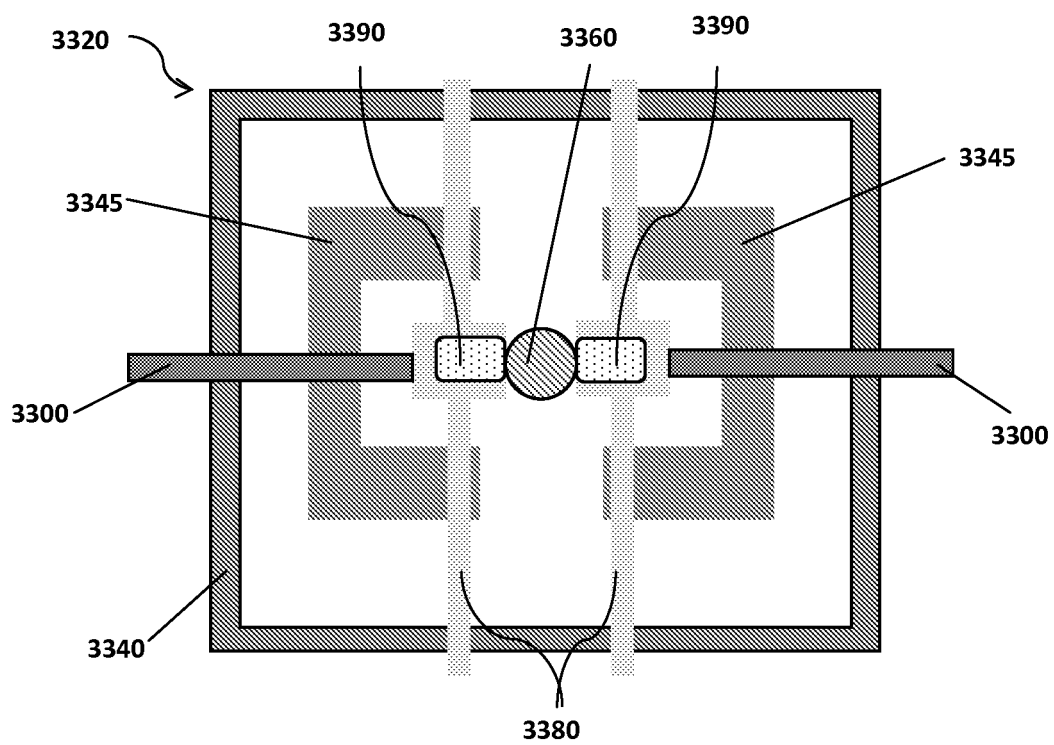


FIG. 33J

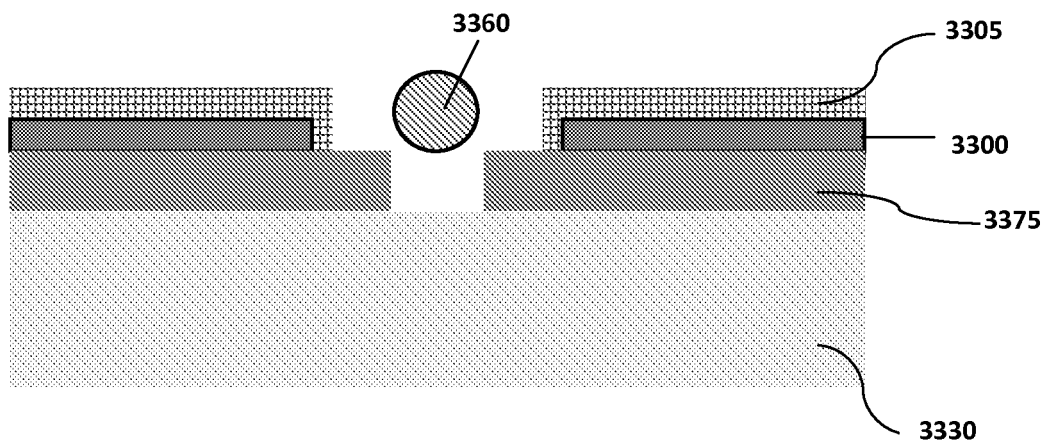


FIG. 33K

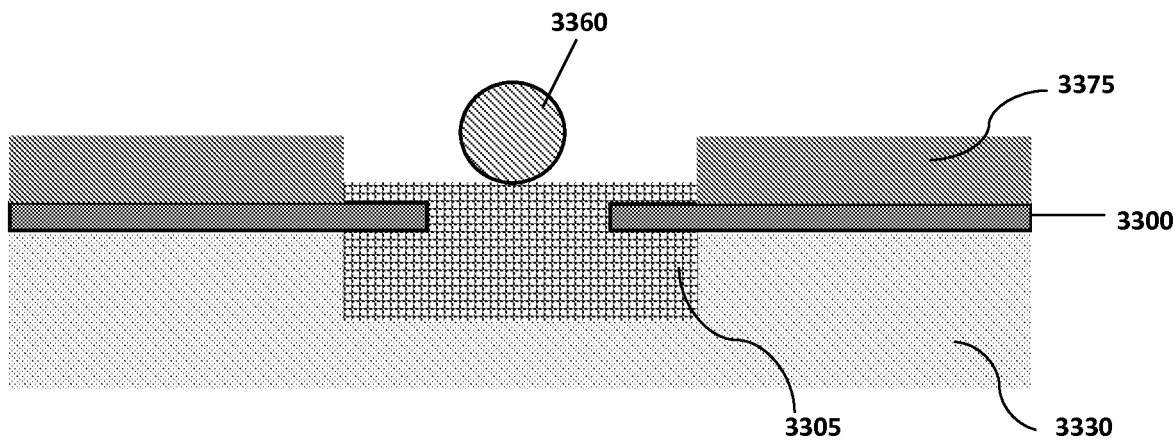


FIG. 33L

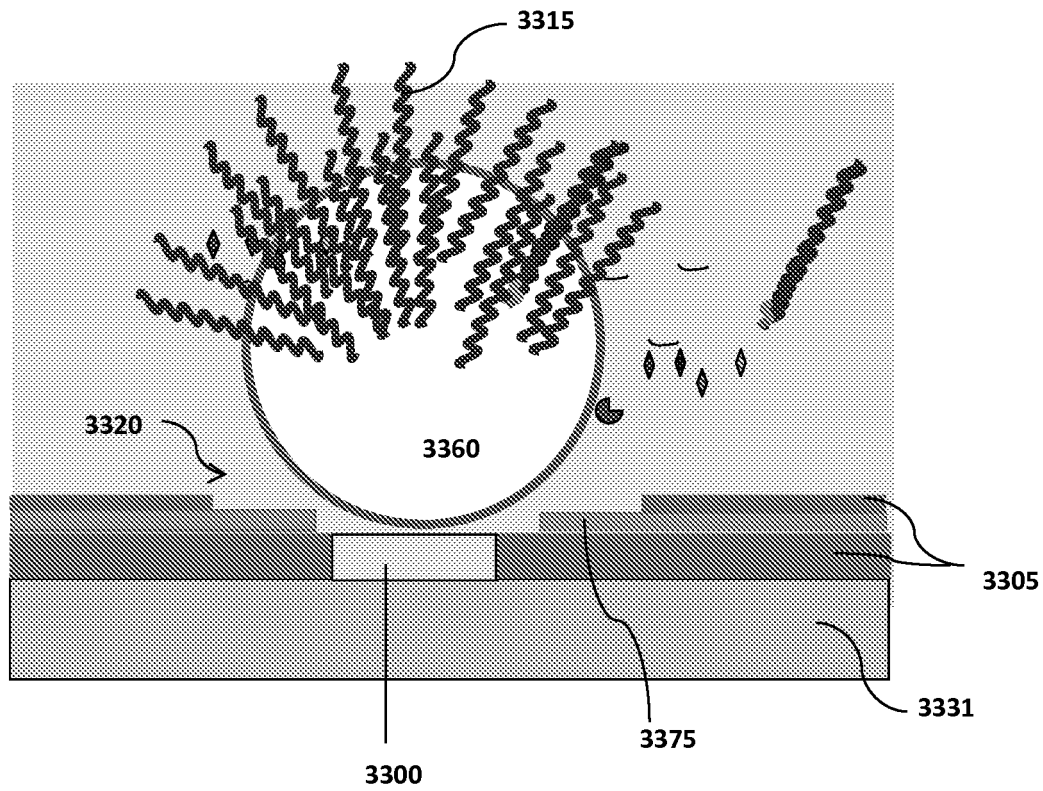


FIG. 33M

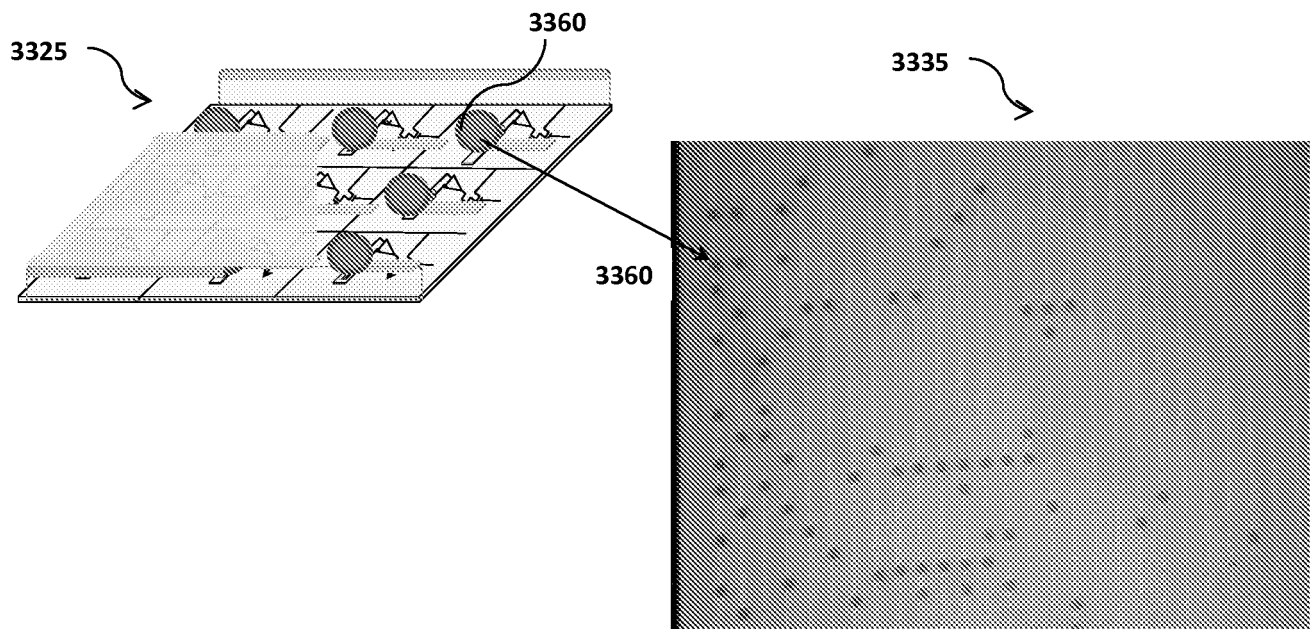


FIG. 33N

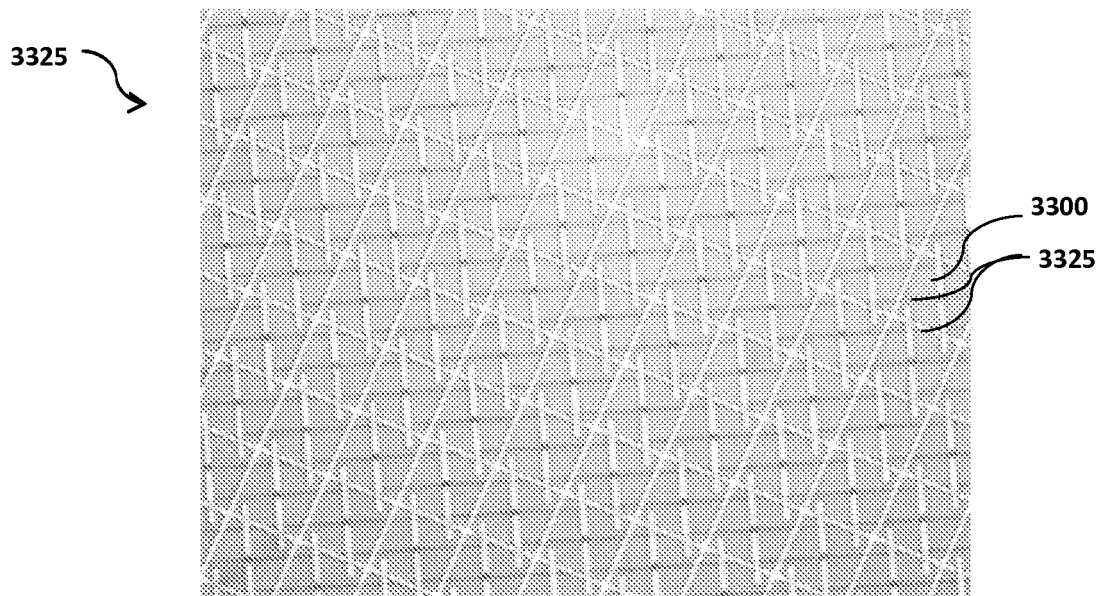


FIG. 34A

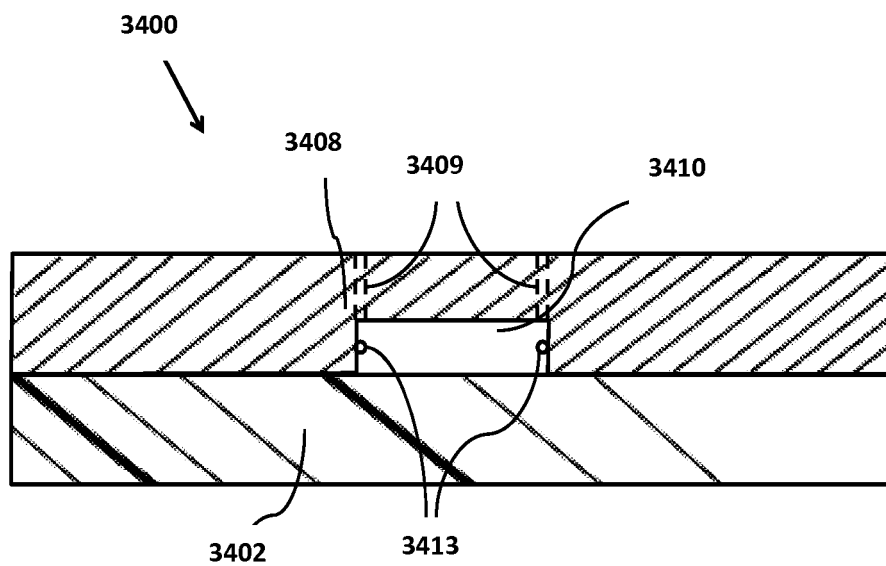


FIG. 34B

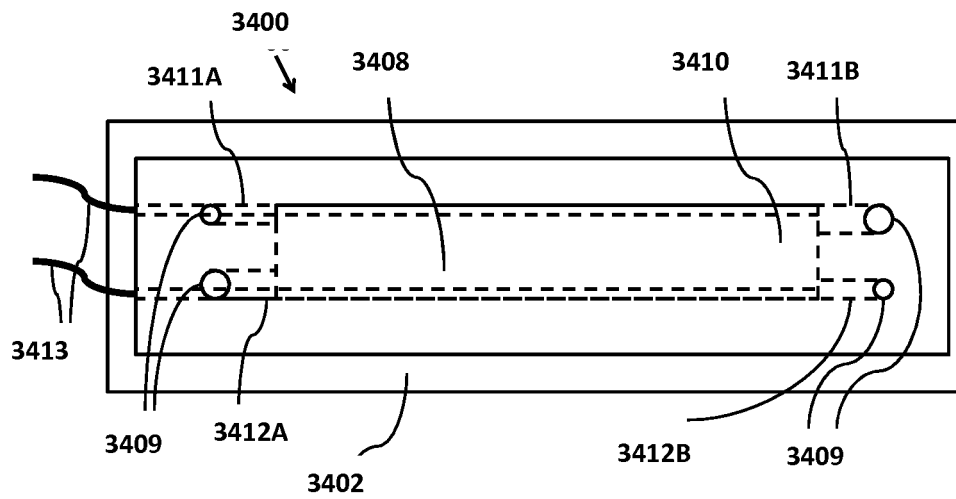


FIG. 34C

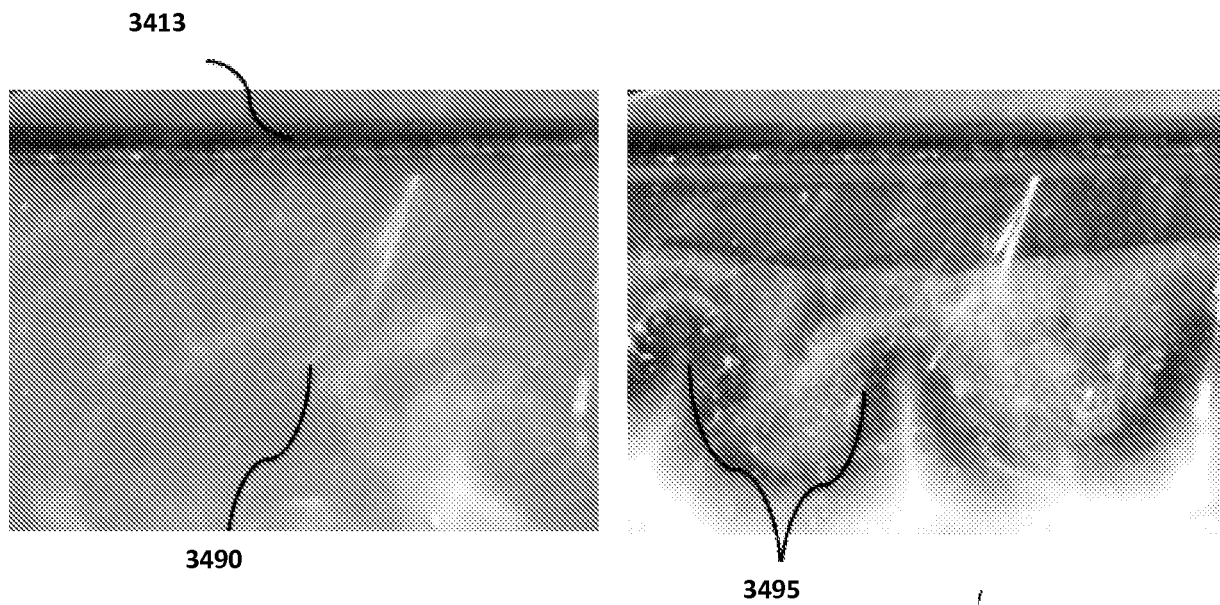


FIG. 34D

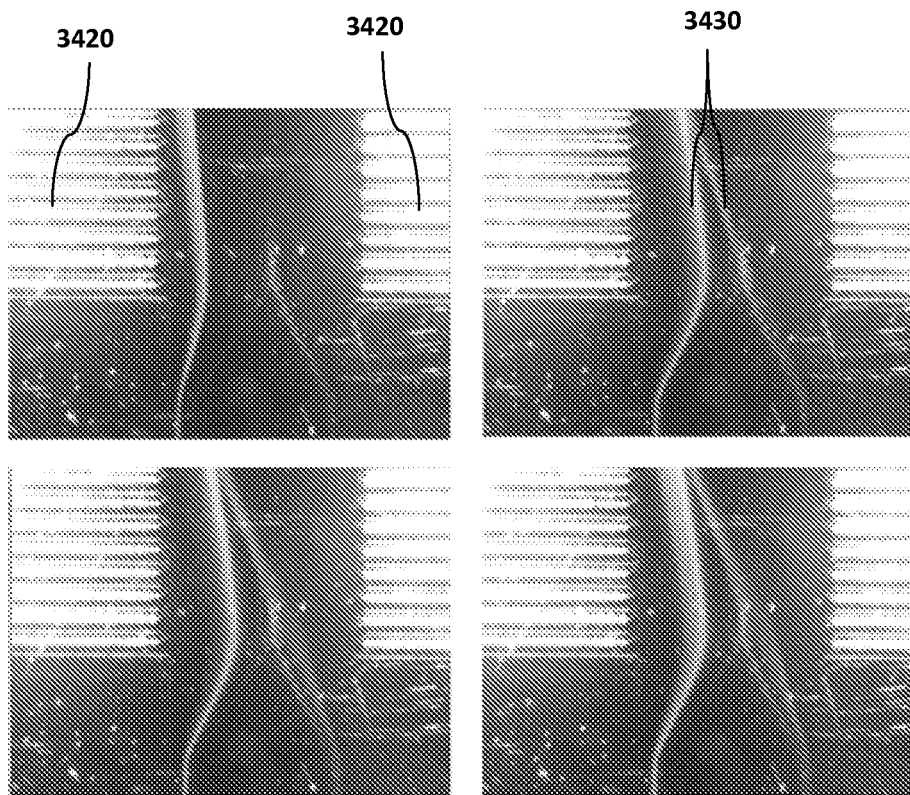


FIG. 34E

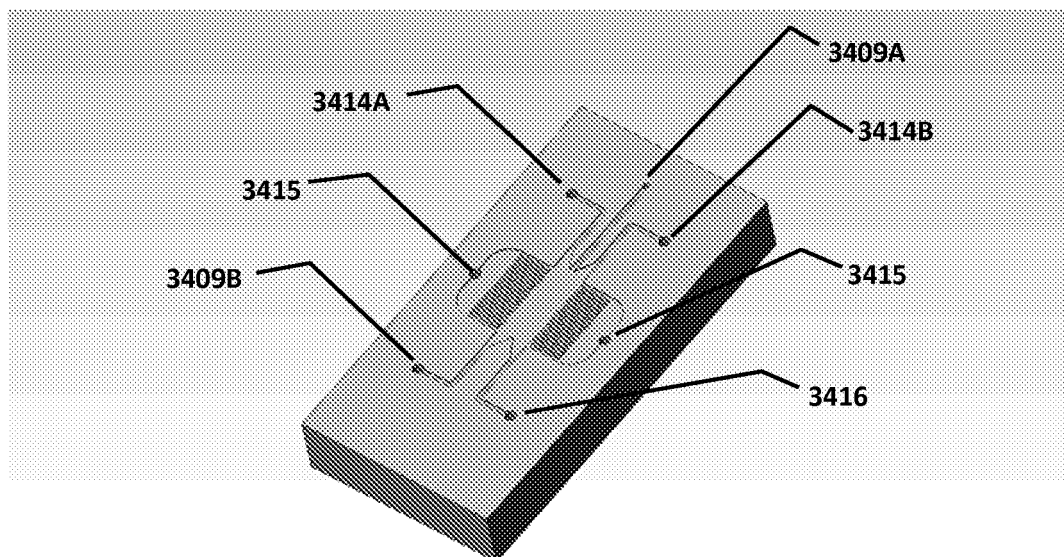


FIG. 35

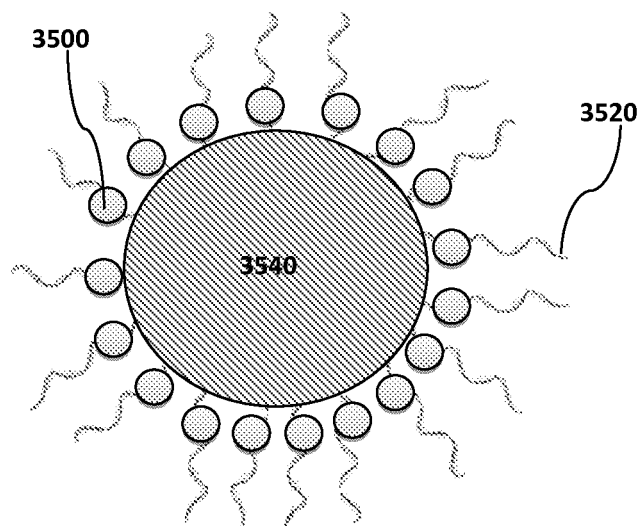


FIG. 36A

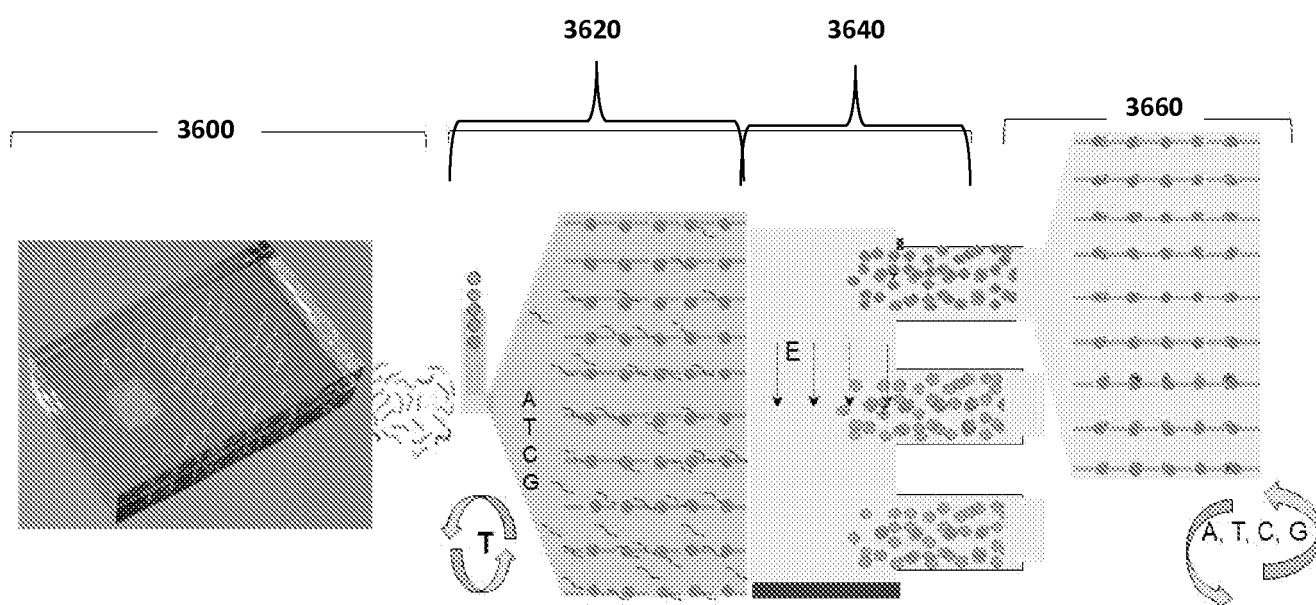


FIG. 36B

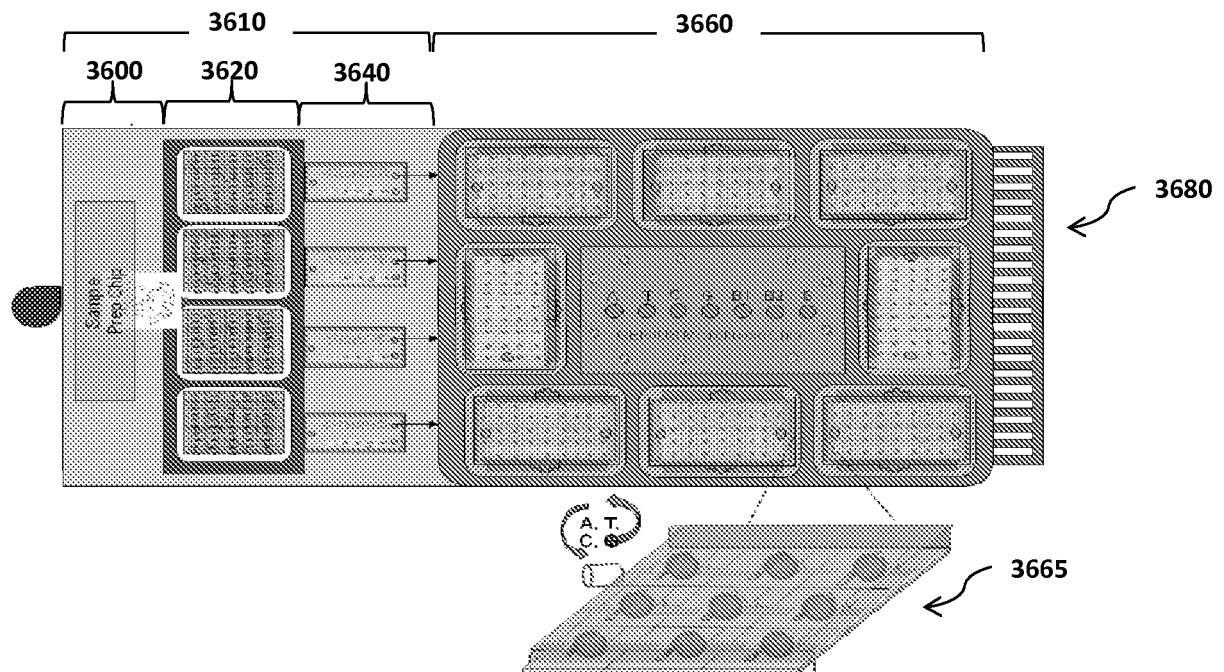


FIG. 37

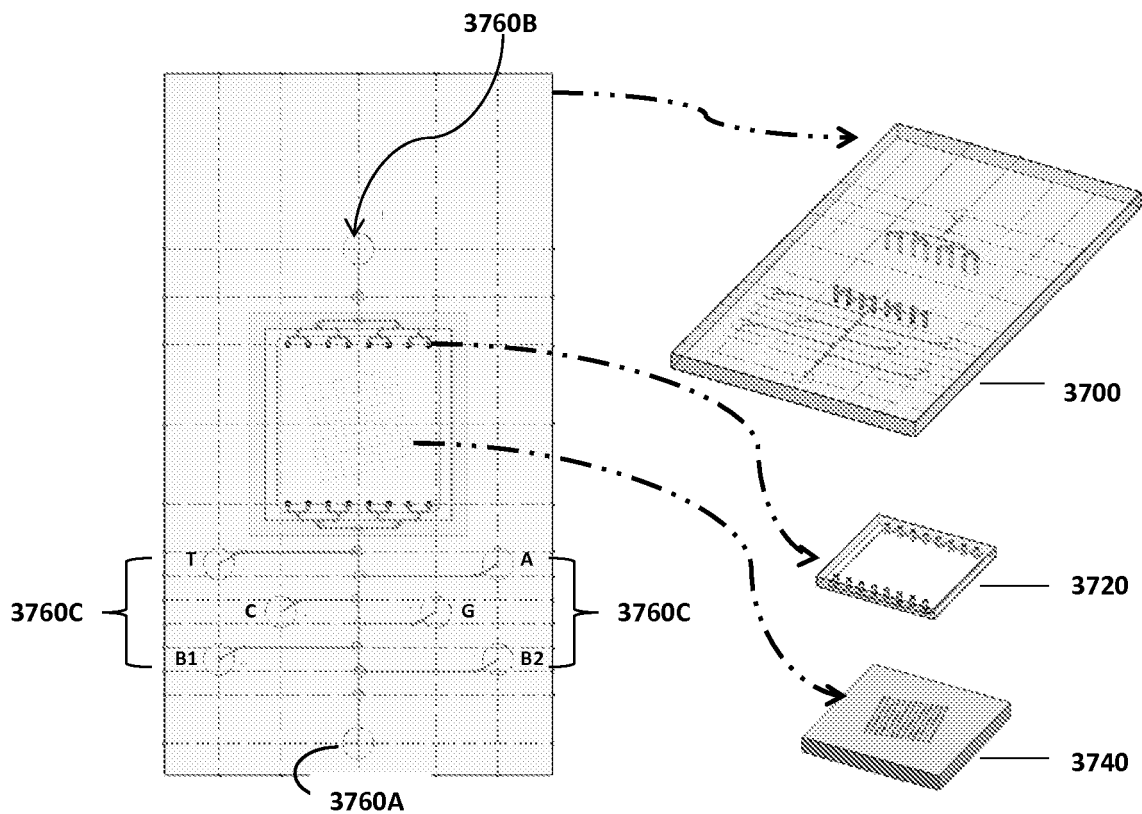


FIG. 38A

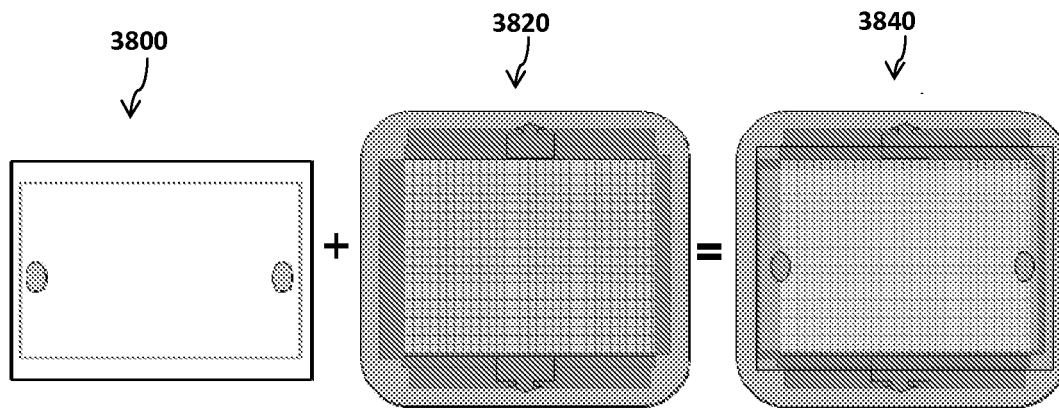


FIG. 38B

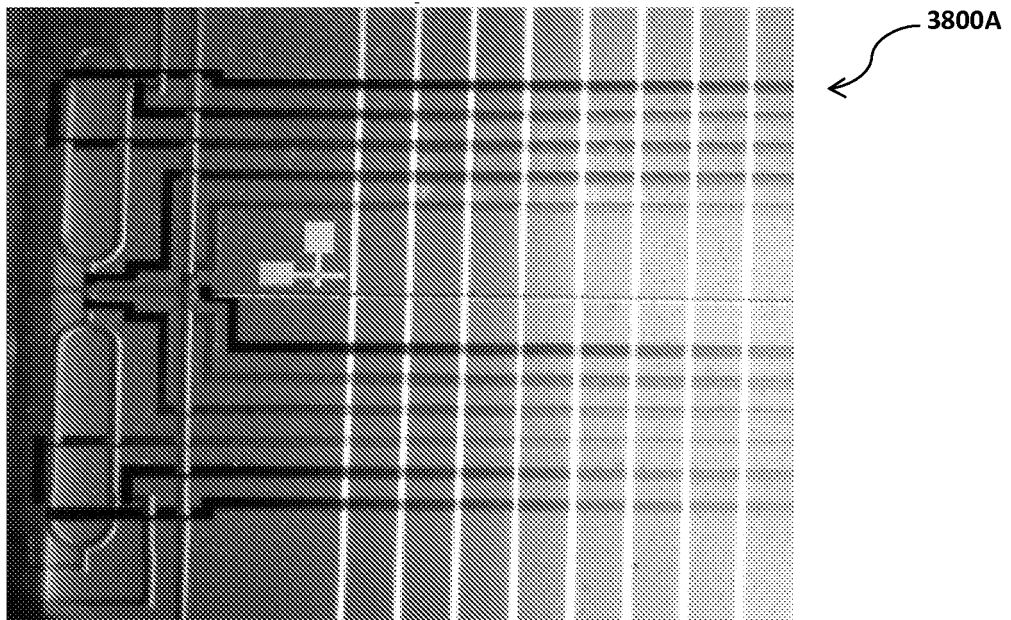


FIG. 38C

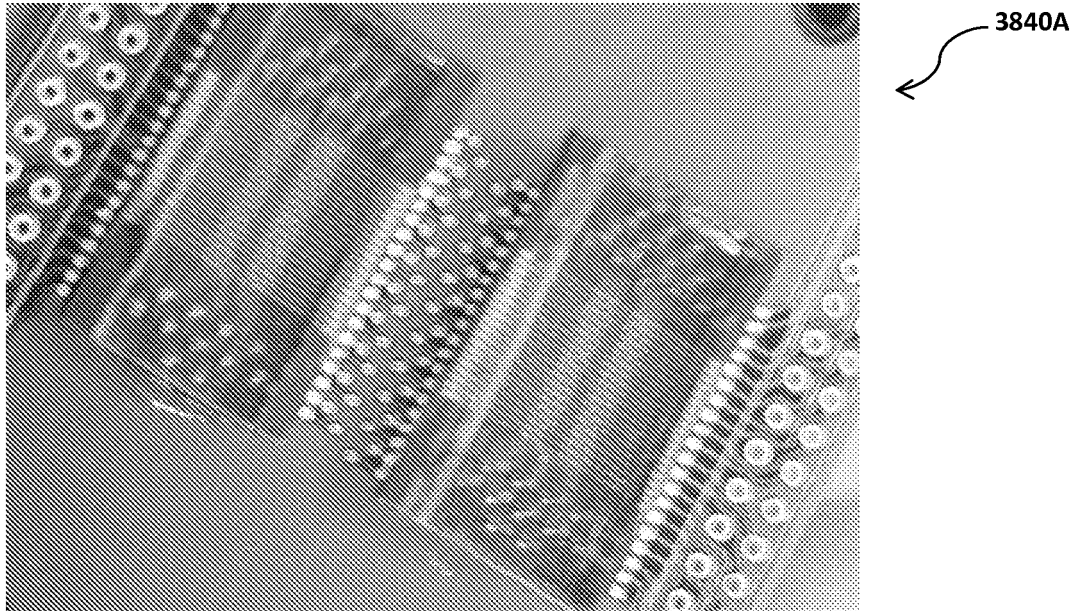


FIG. 39

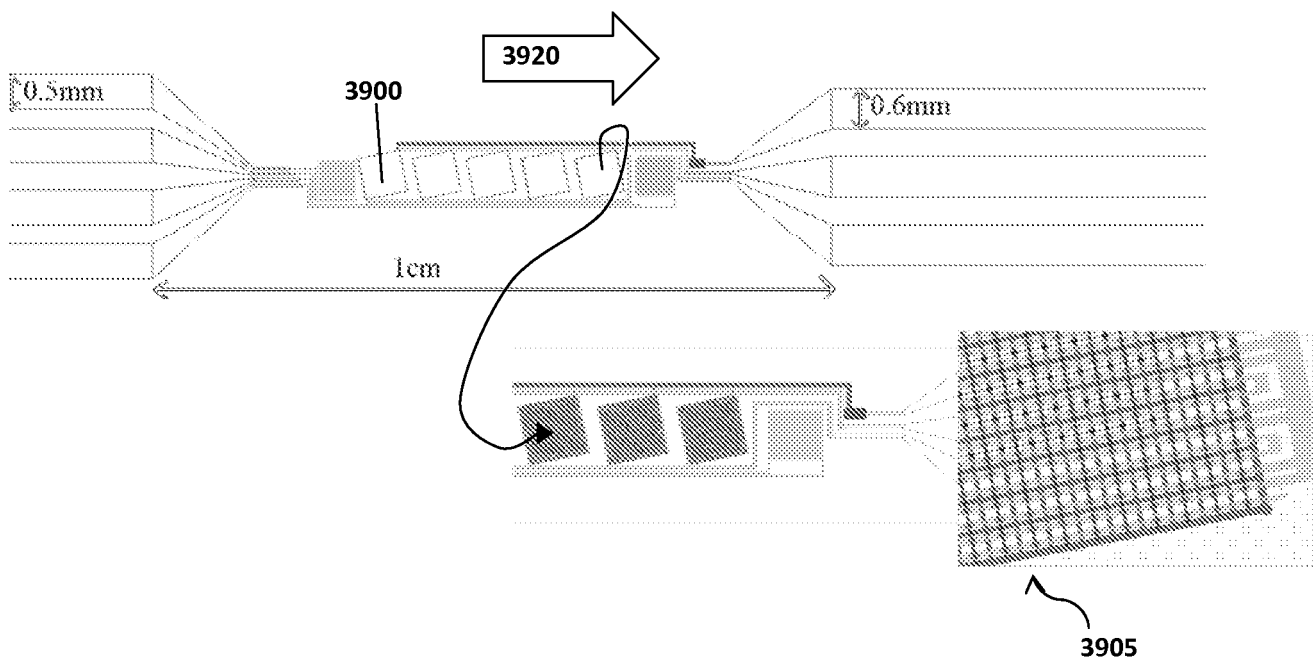


FIG. 40

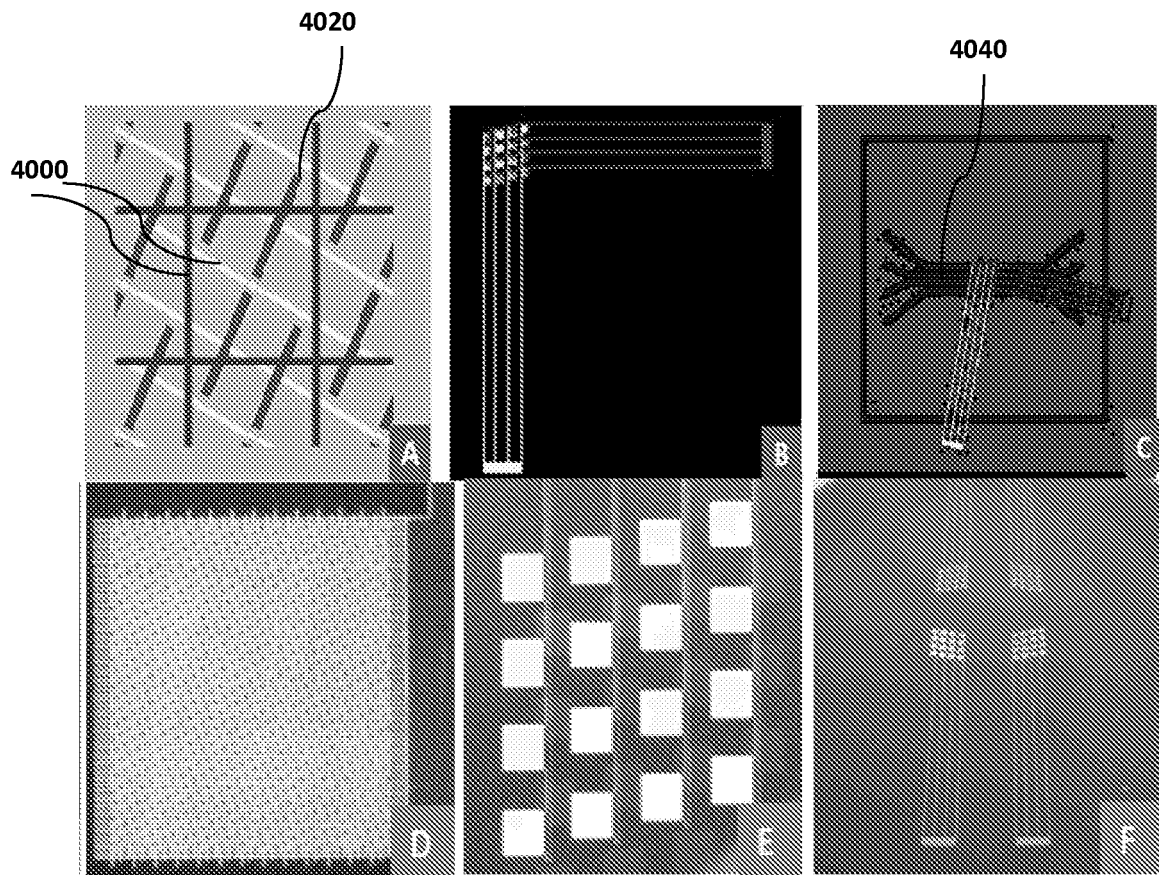


FIG. 41

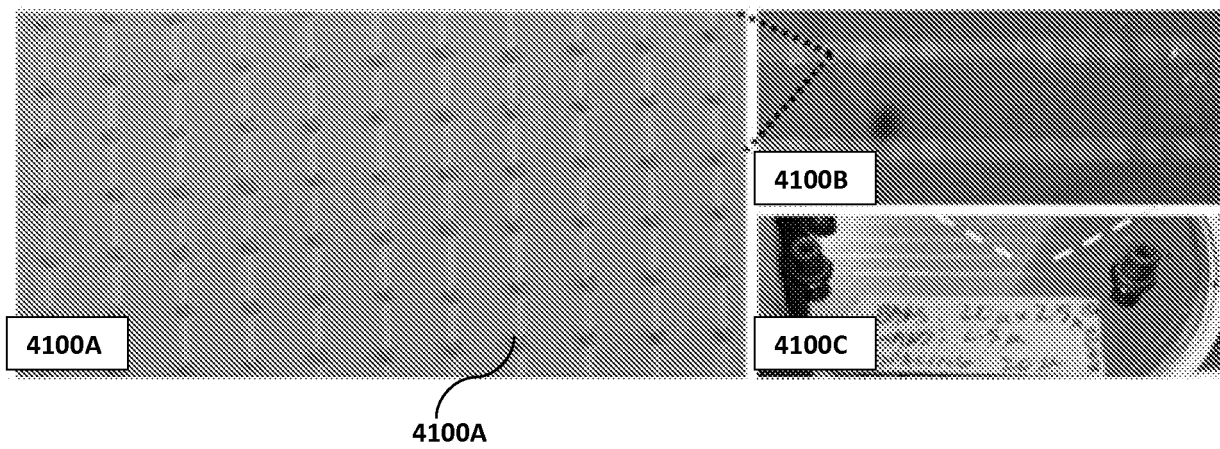


FIG. 42

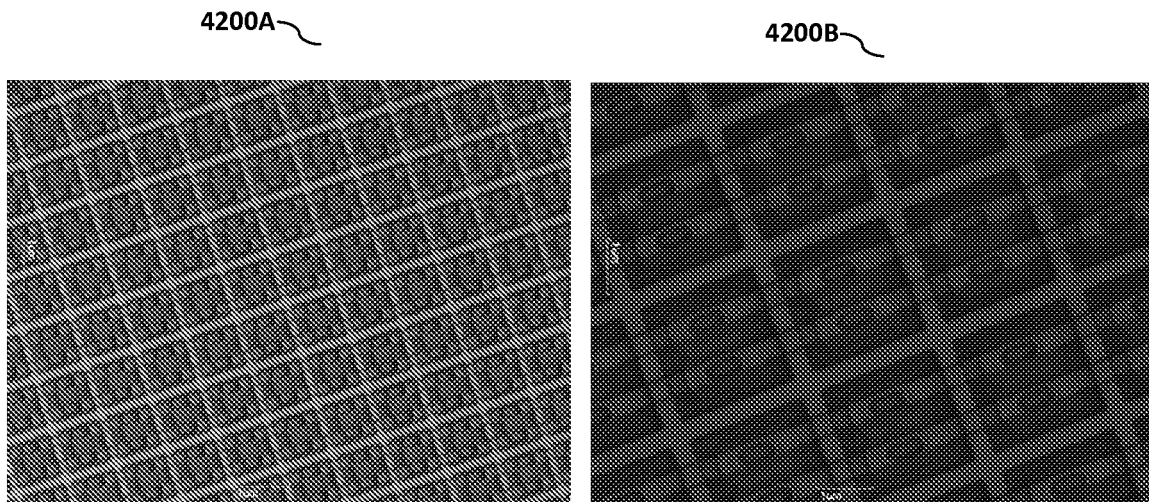


FIG. 43A

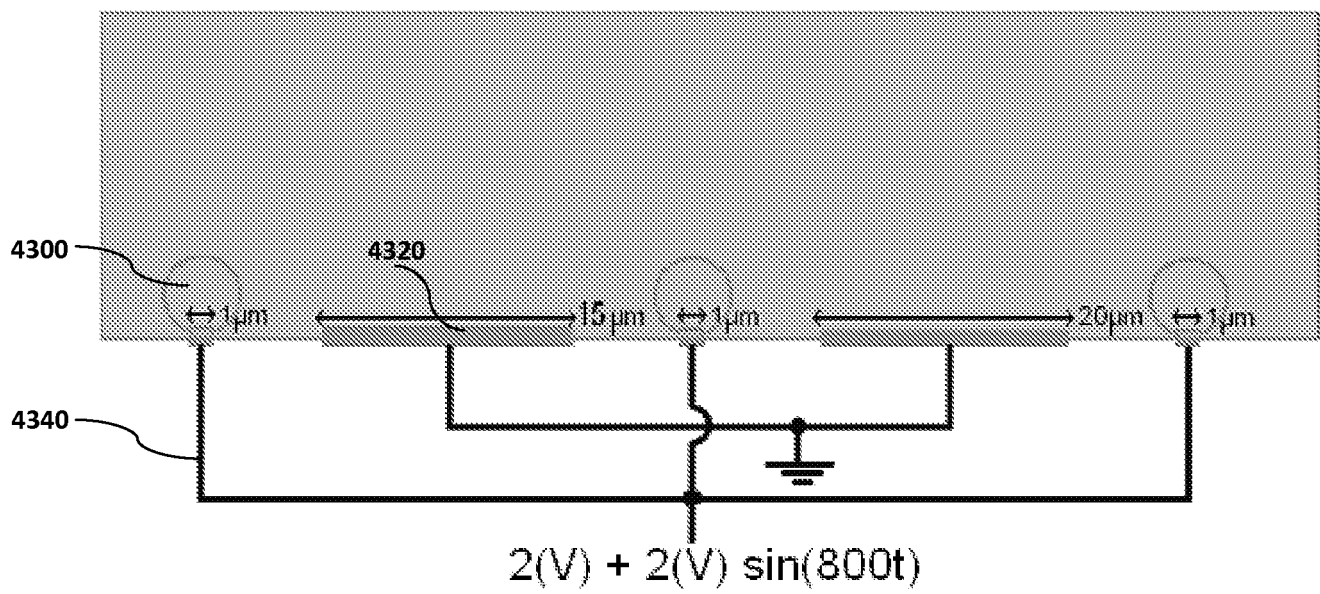


FIG. 43B

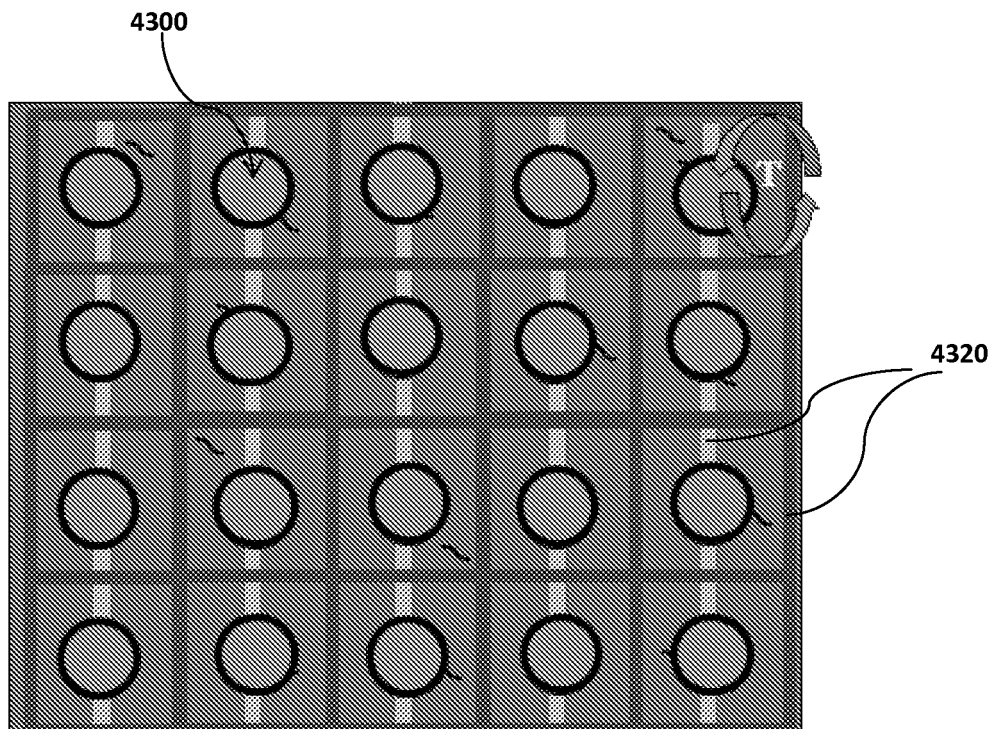


FIG. 44A

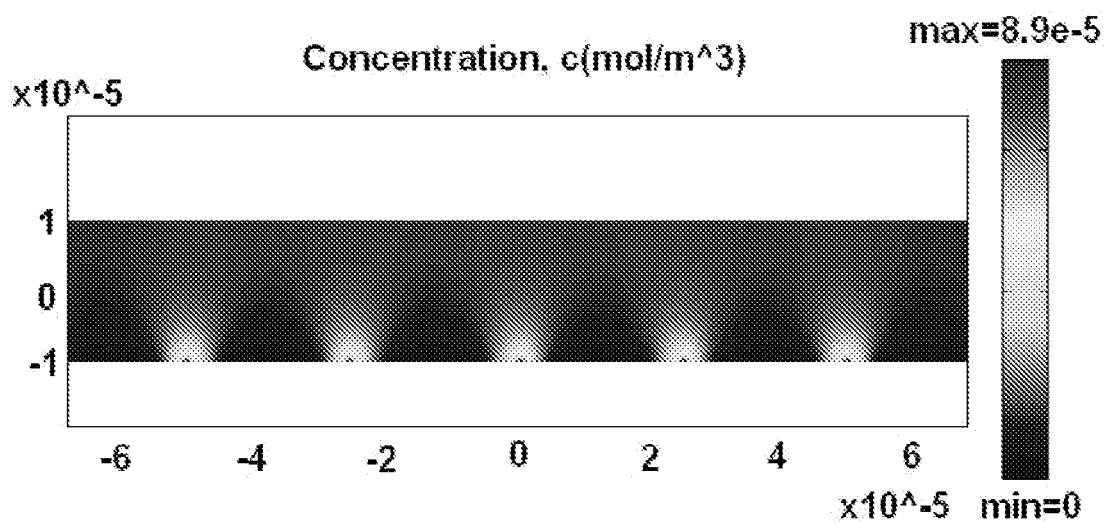


FIG. 44B

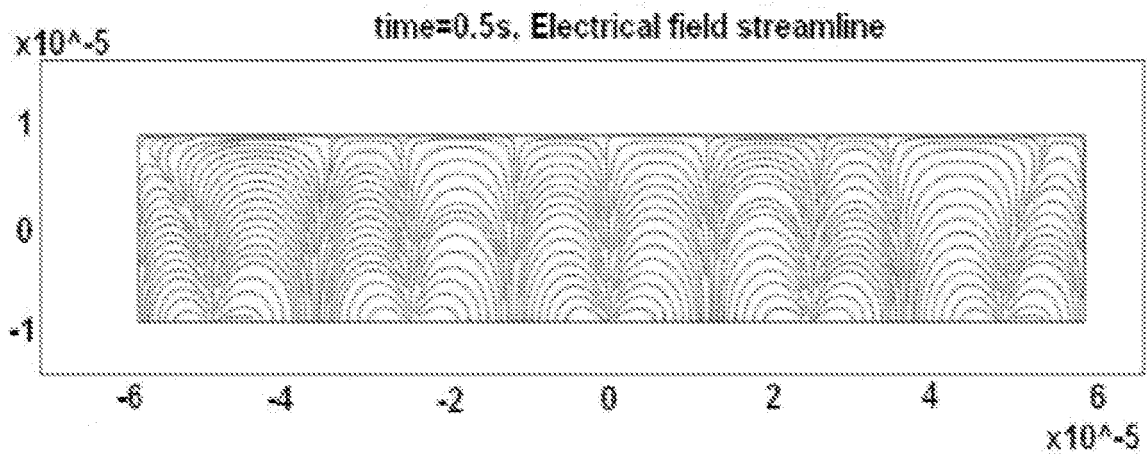


FIG. 44C

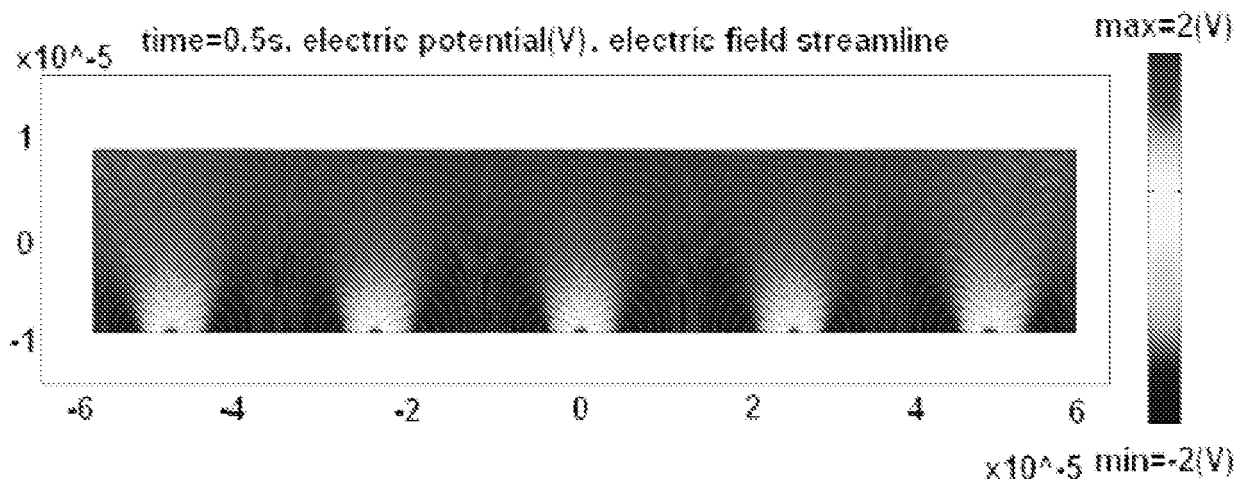


FIG. 44D

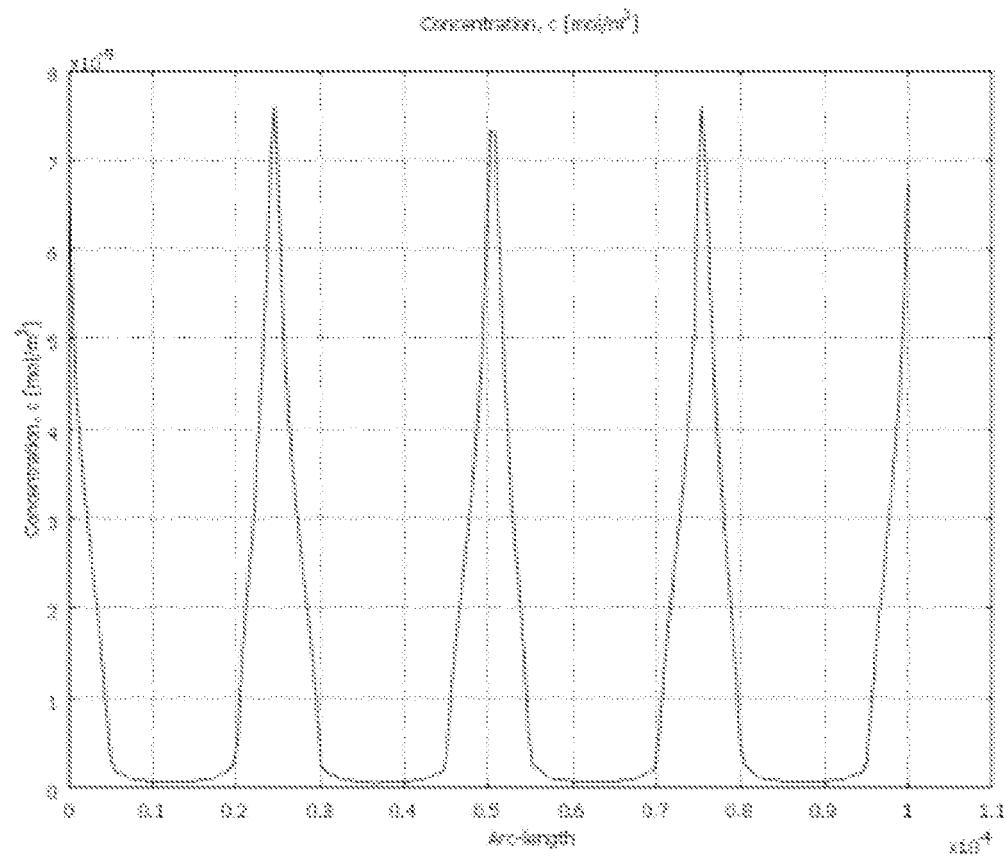


FIG. 45

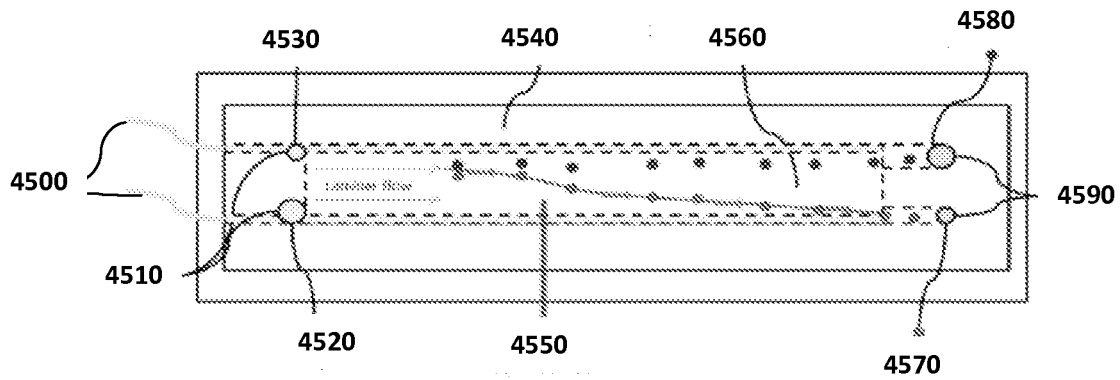


FIG. 46A

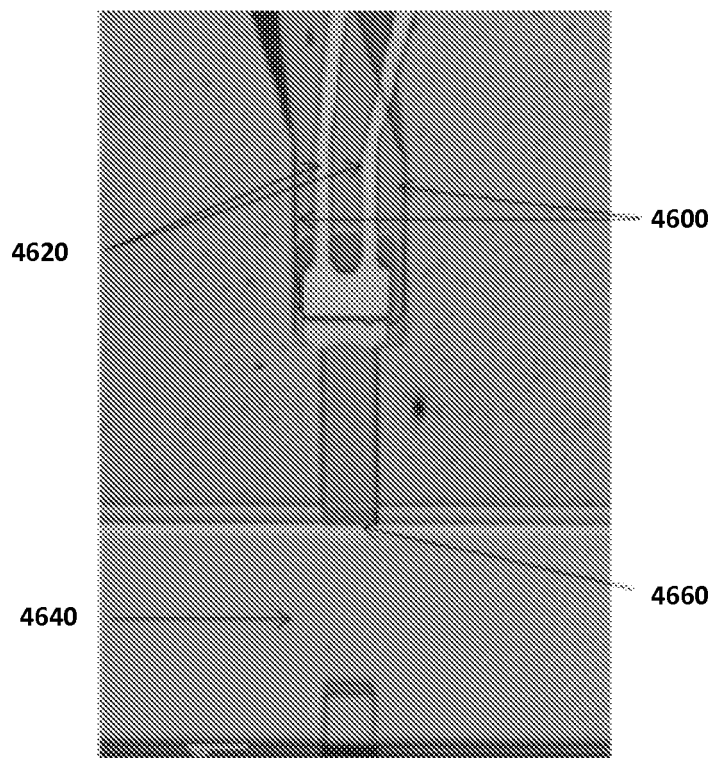


FIG. 46B

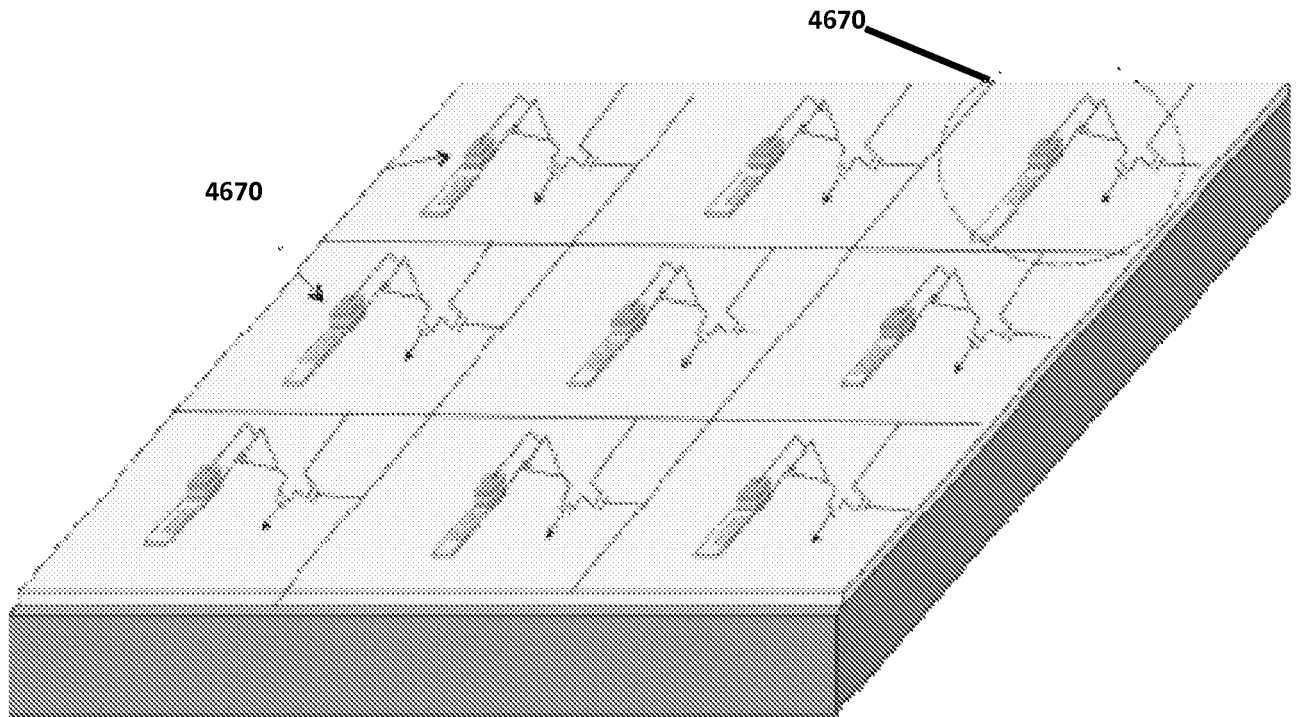


FIG. 46C

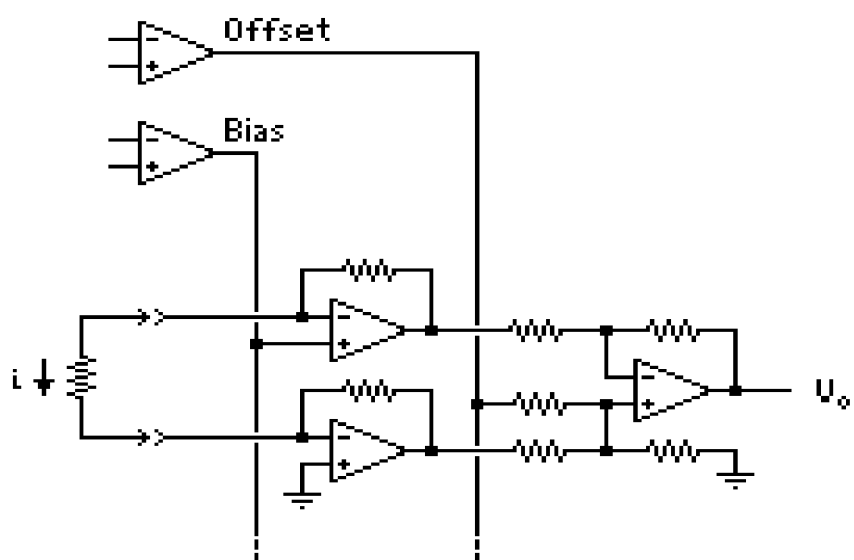


FIG. 47A

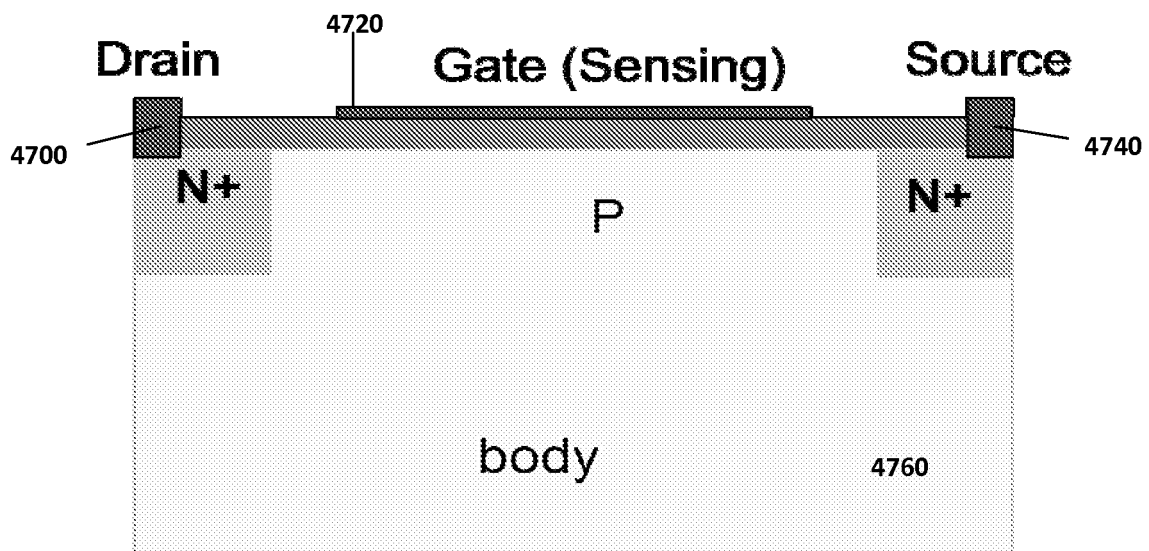


FIG. 47B

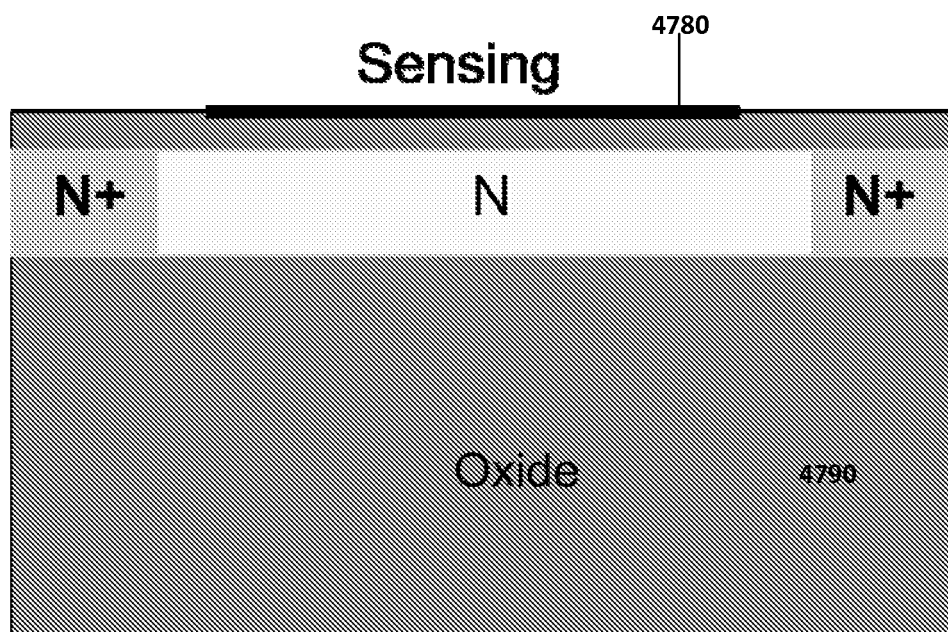


FIG. 47C

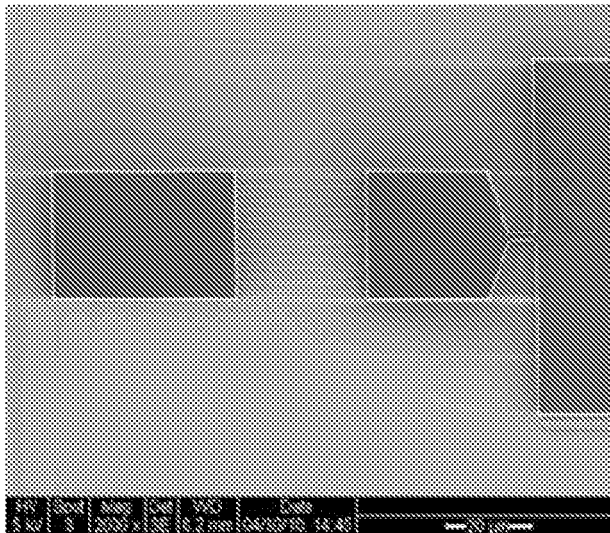


FIG. 47D

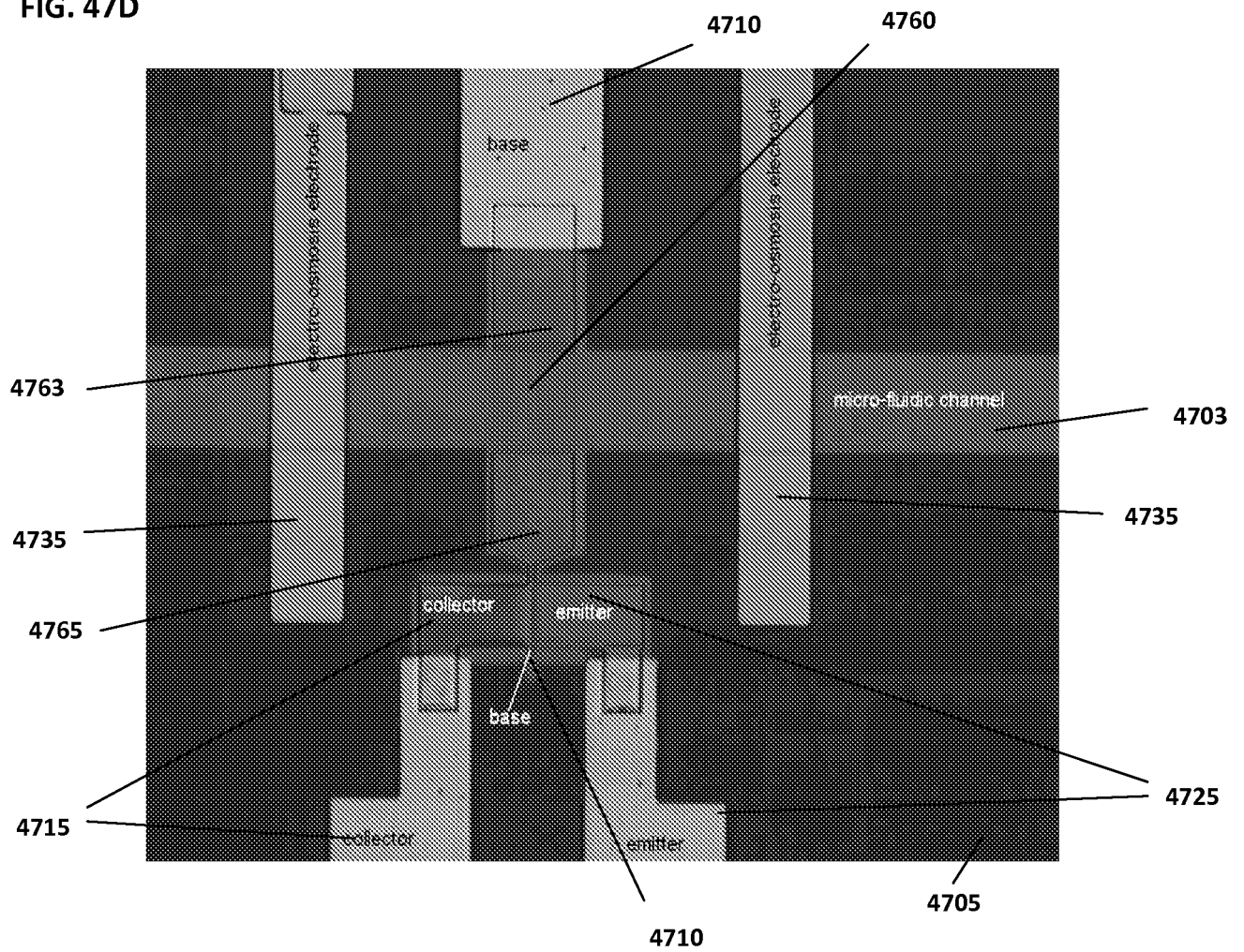


FIG. 48

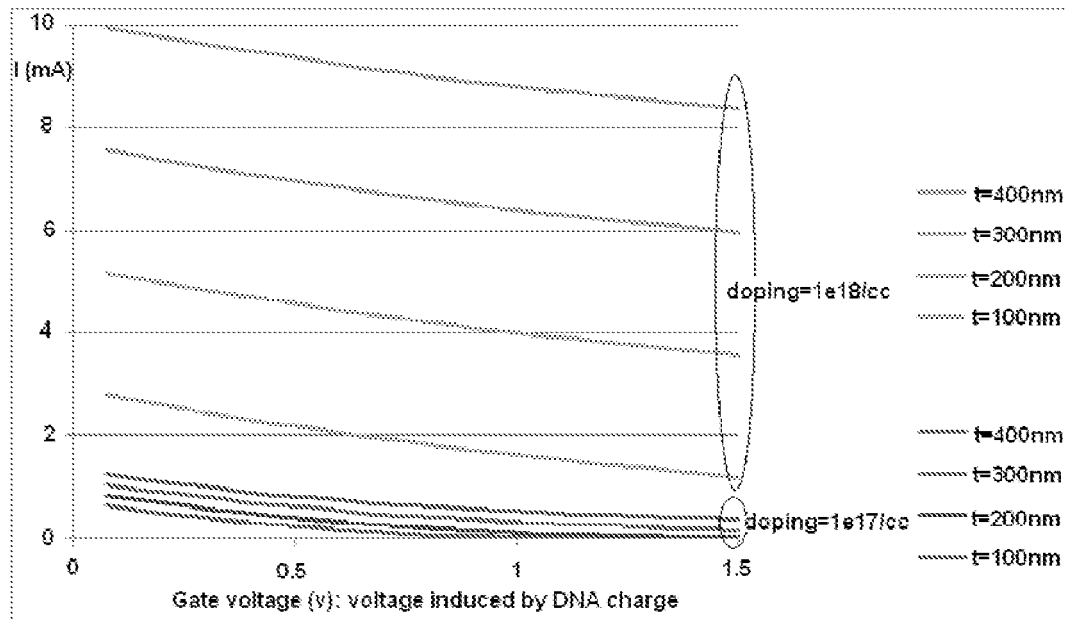


FIG. 49A

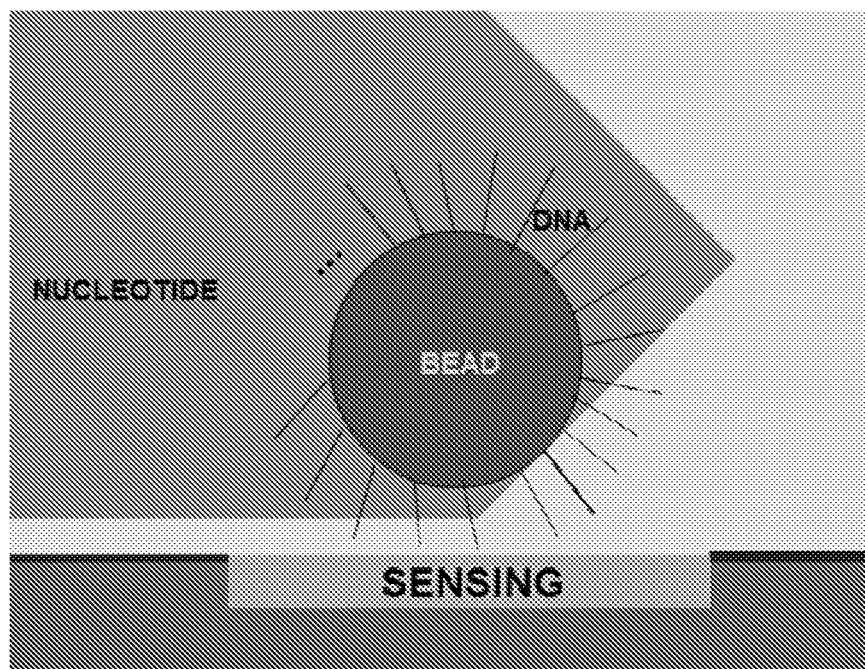


FIG. 49B

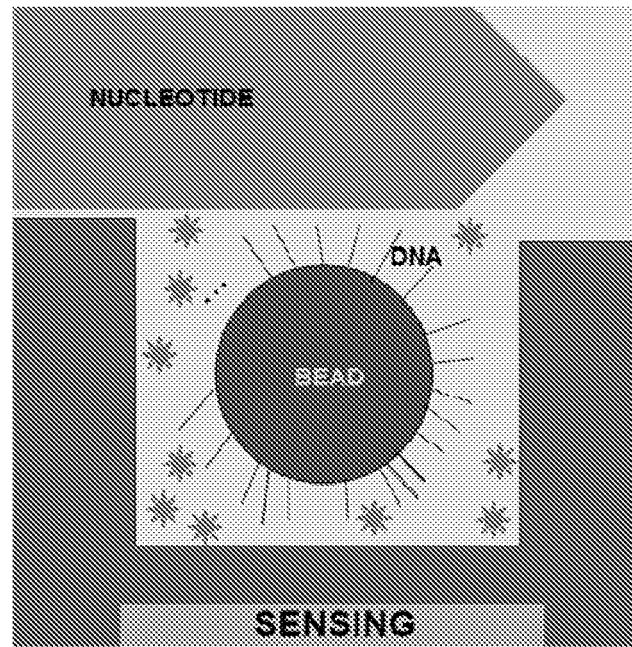


FIG. 50A

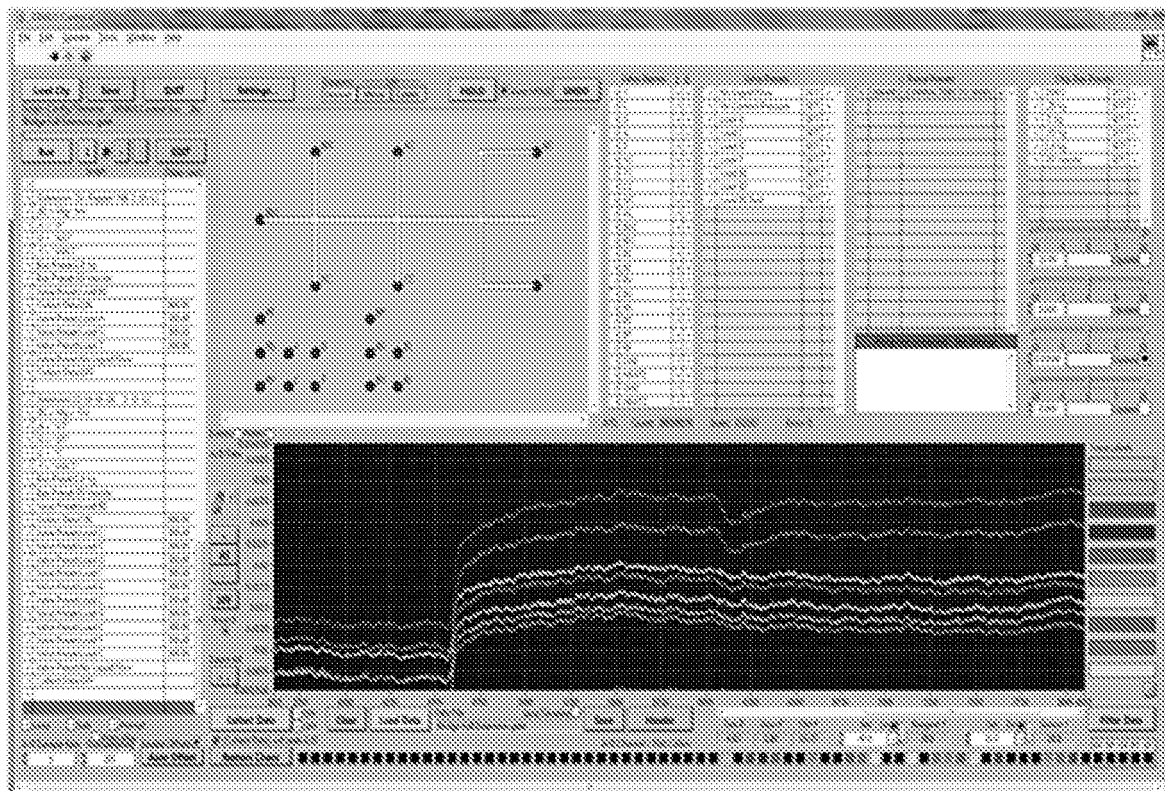


FIG. 50B

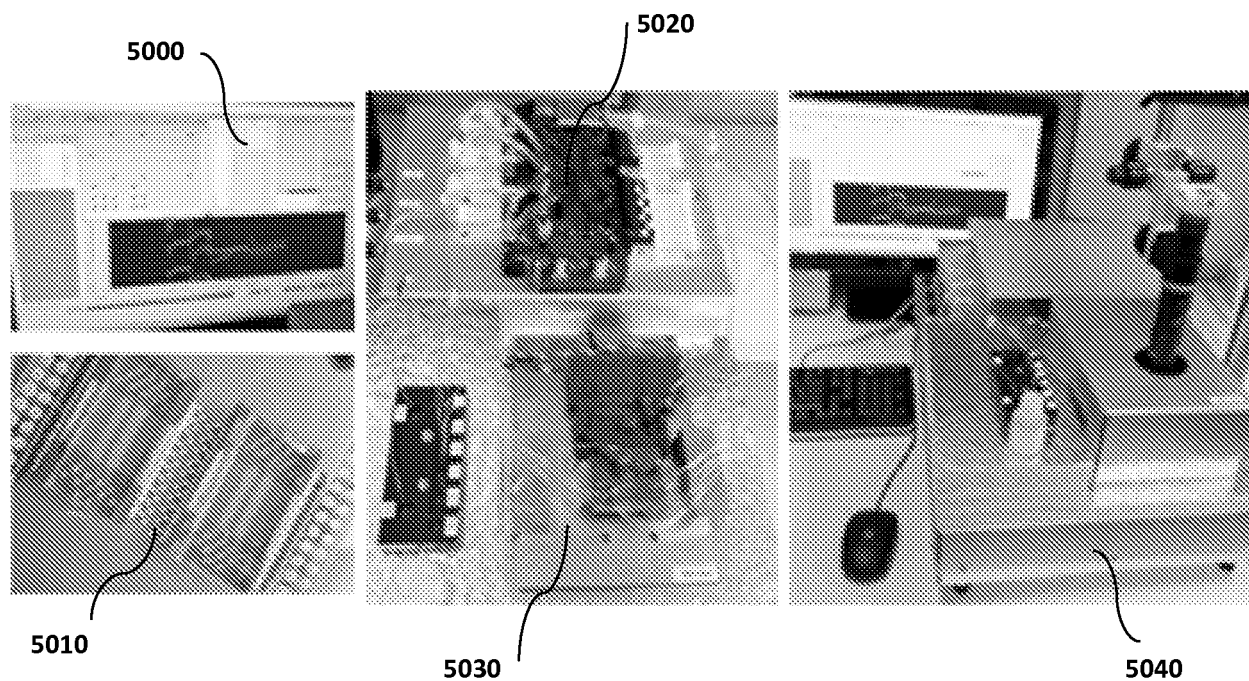


FIG. 51

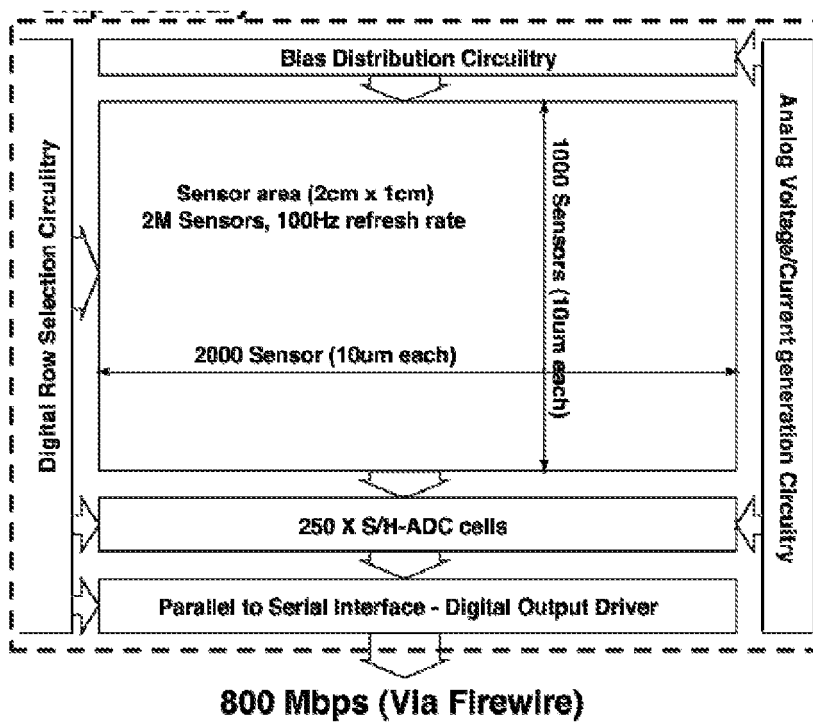


FIG. 52

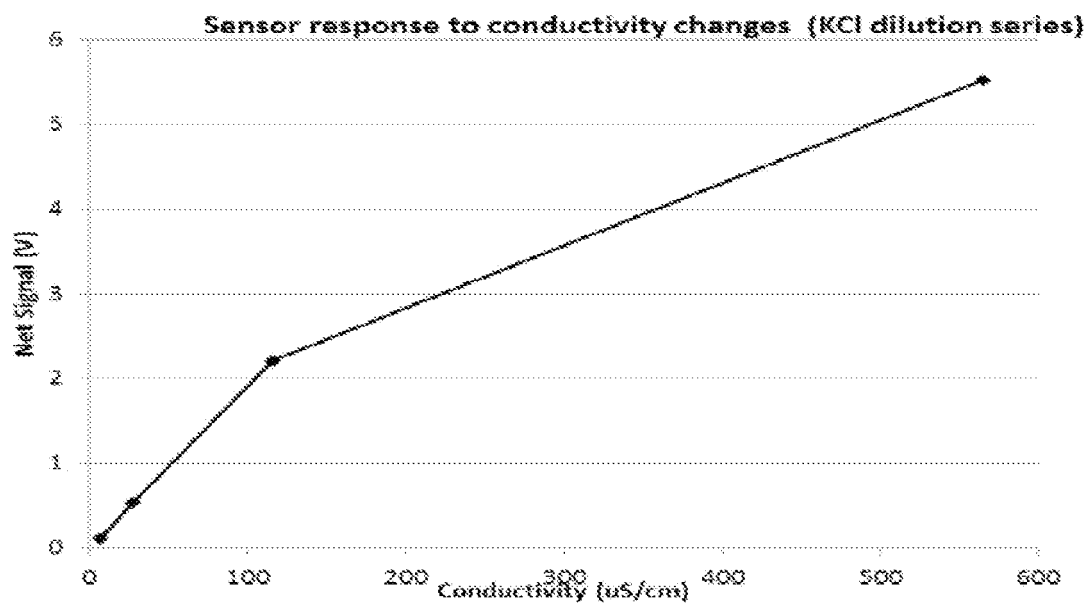


FIG. 53A

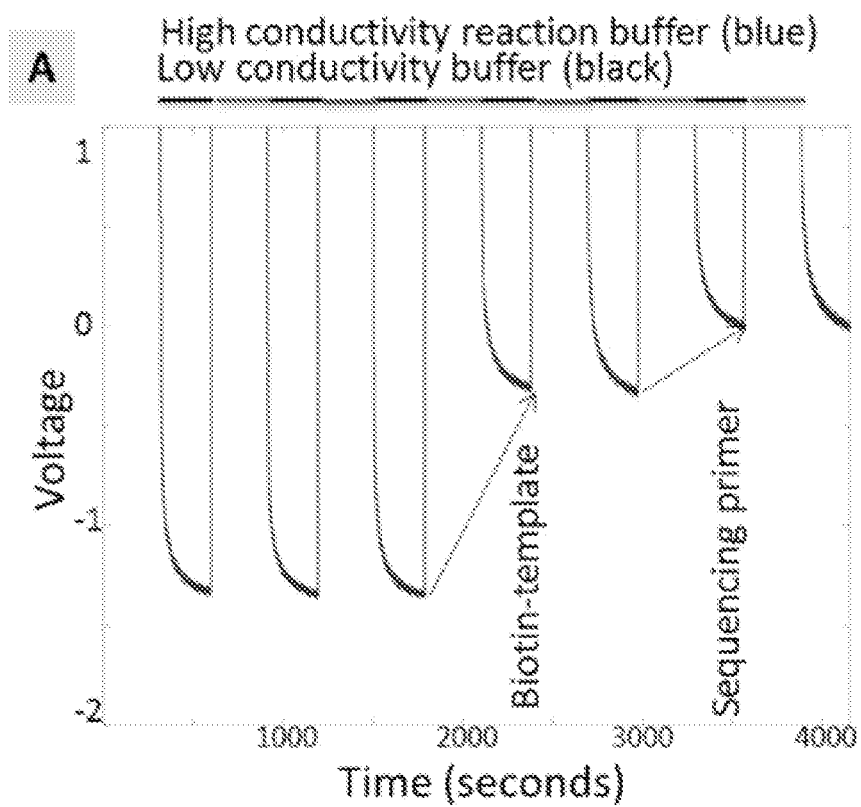


FIG. 53B

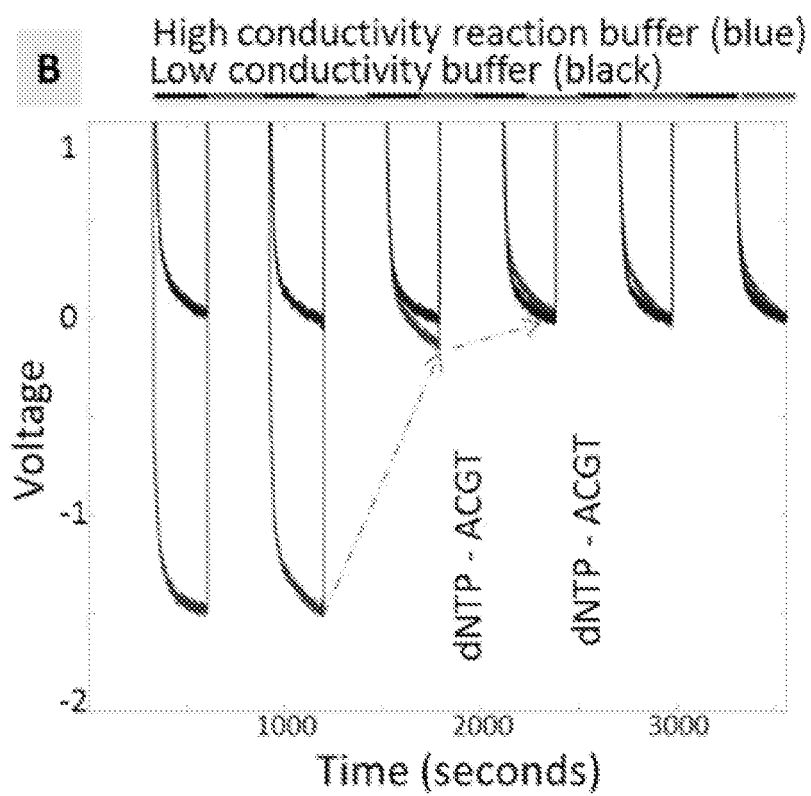


FIG. 54A

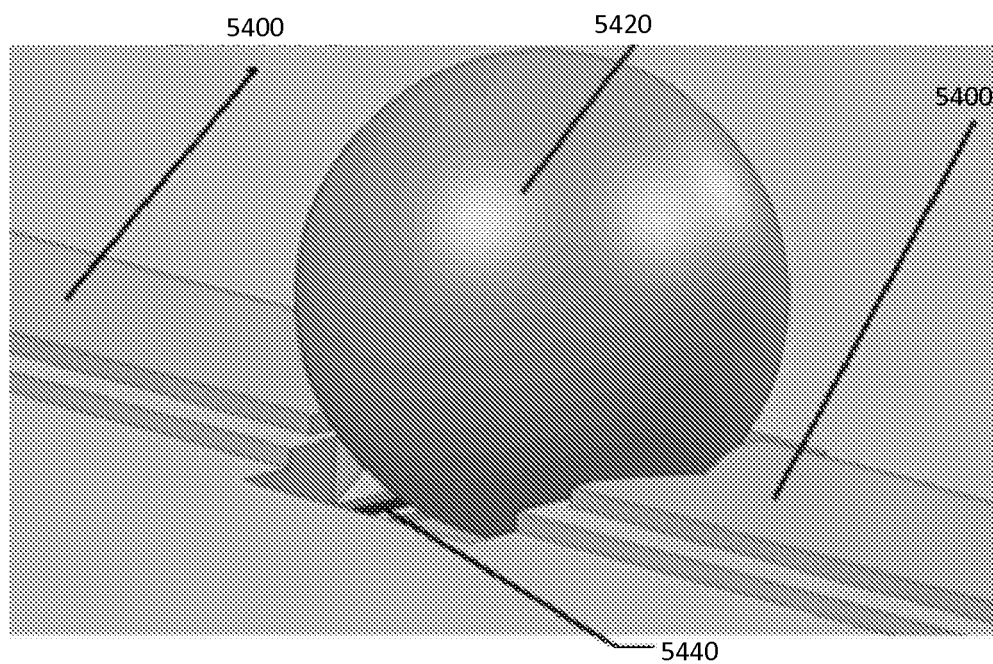


FIG. 54B

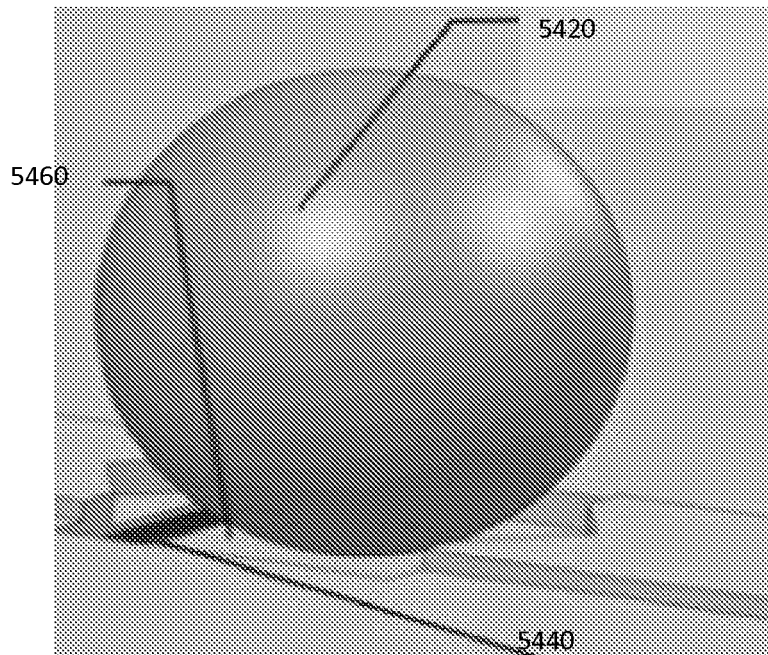


FIG. 54C

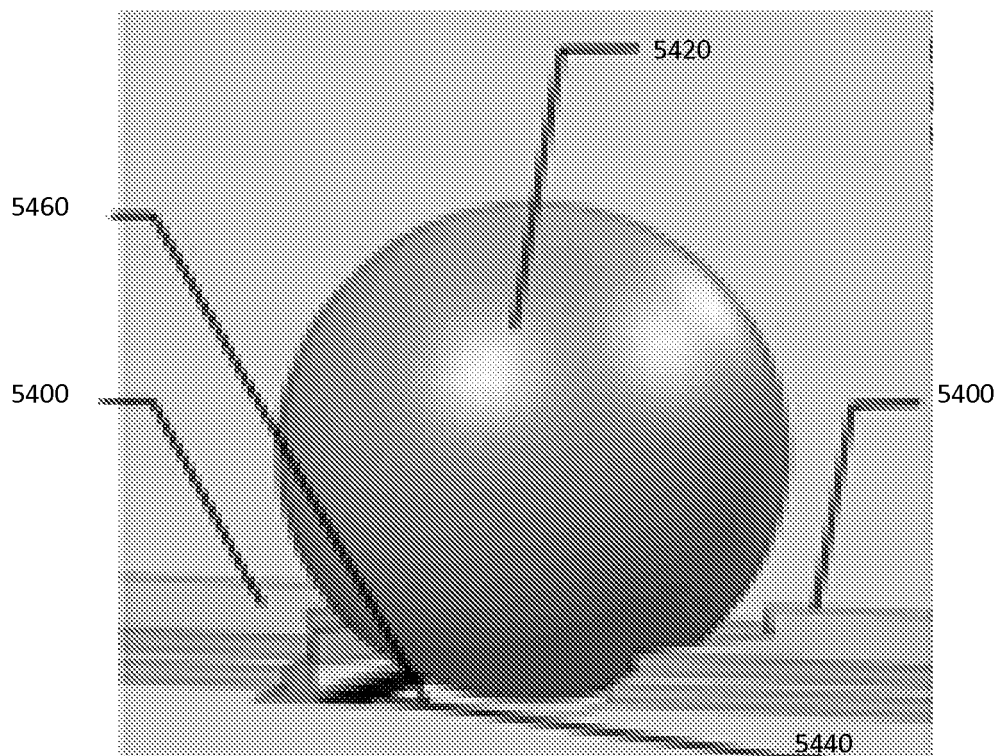


FIG. 55A

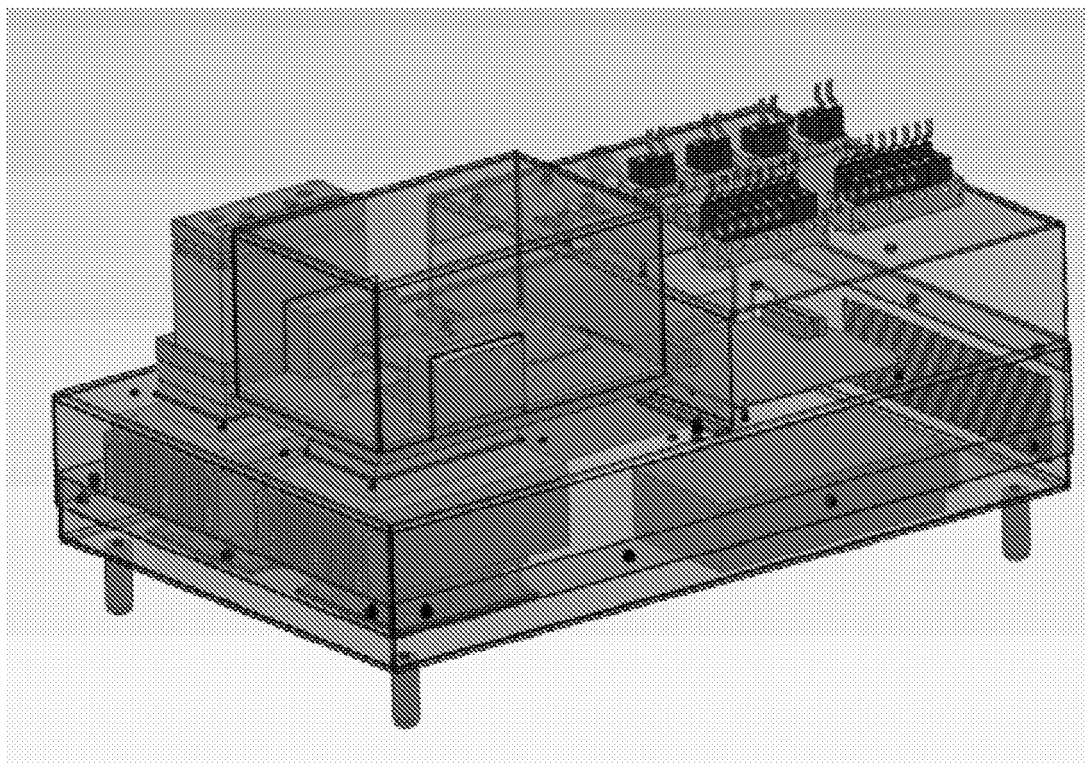


FIG. 55B

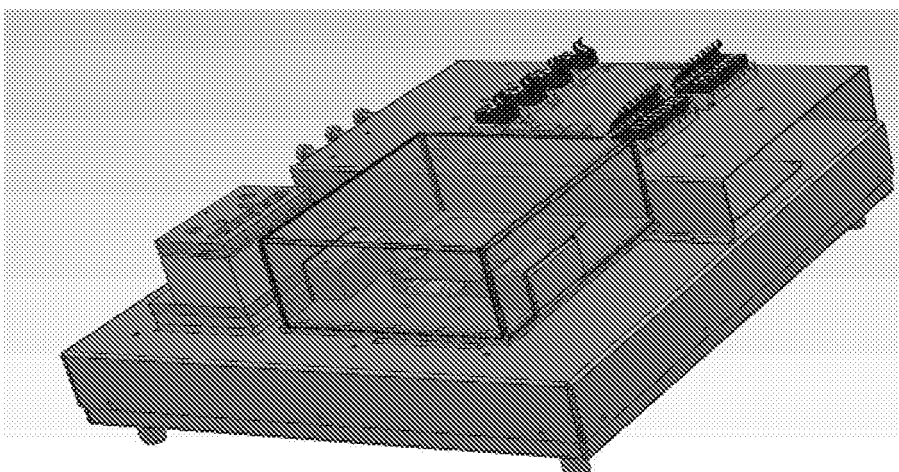


FIG. 56

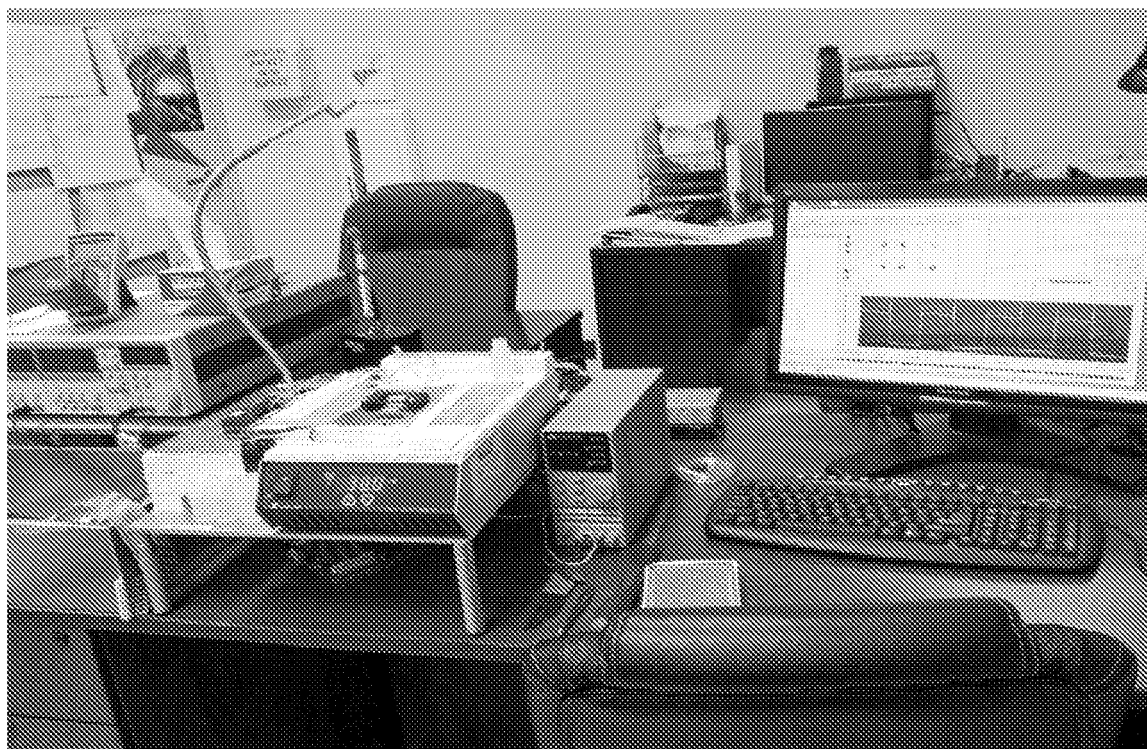


FIG. 57

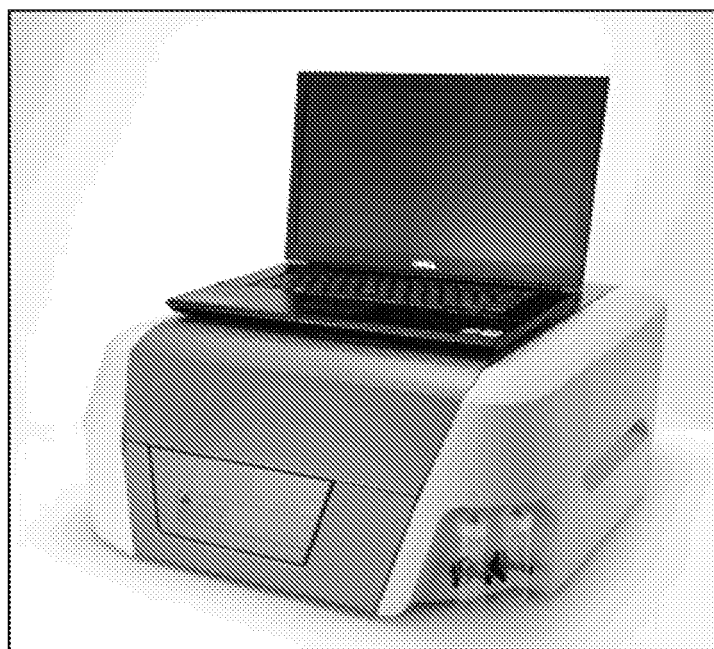


FIG. 58

