Figure 1

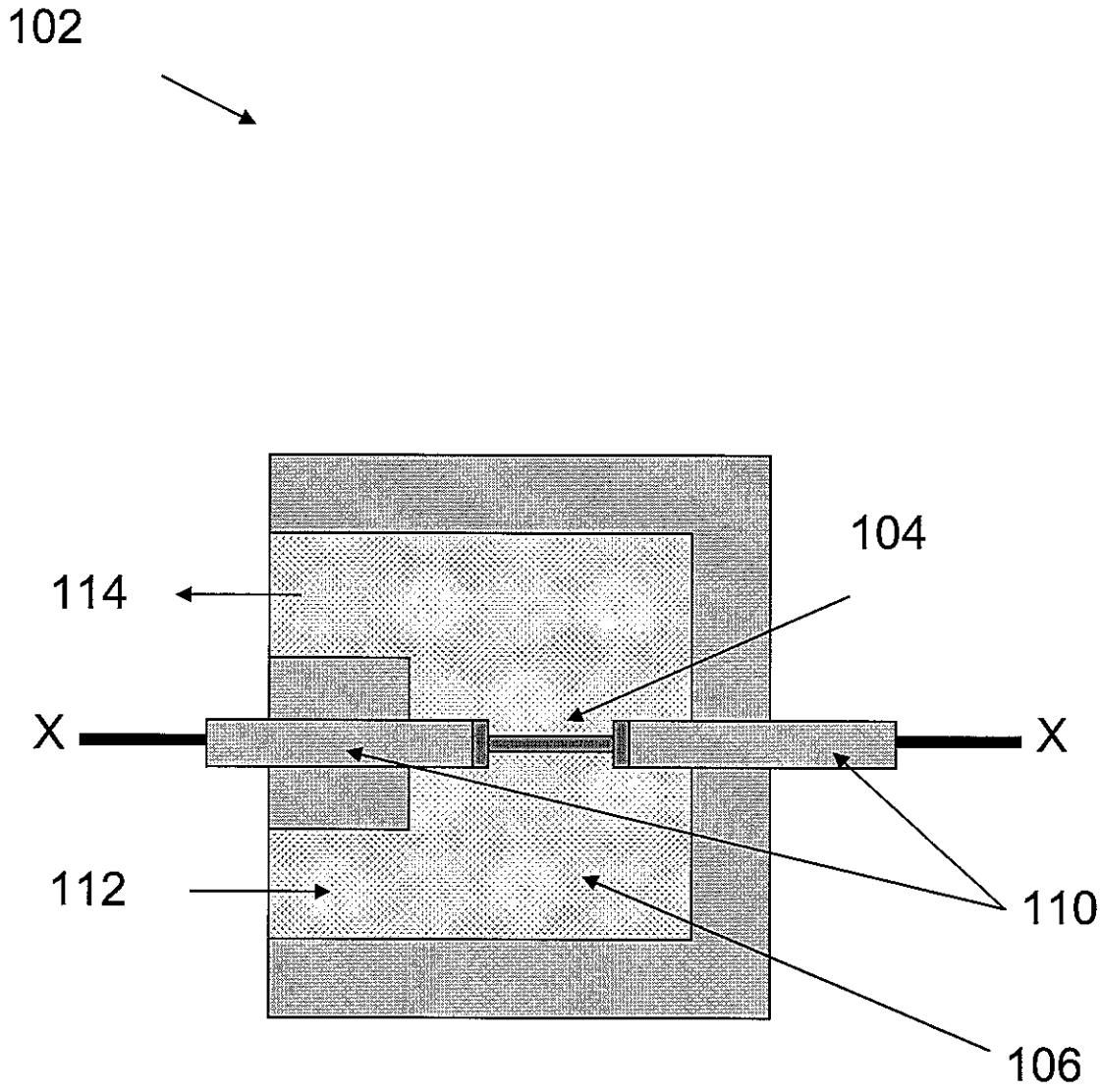


Figure 2A

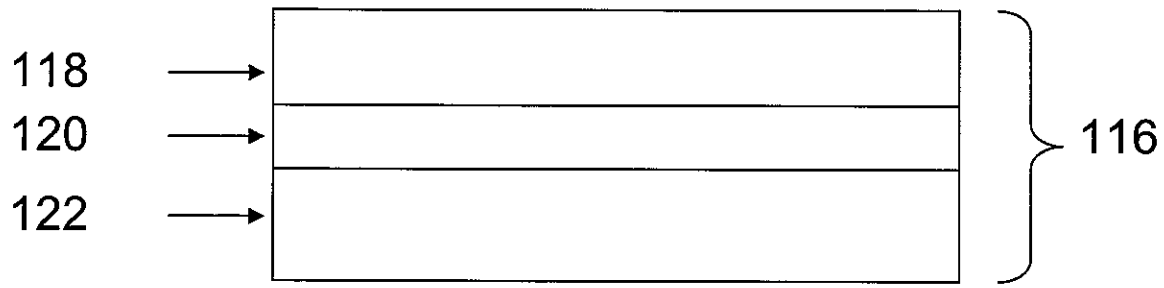


Figure 2B-1

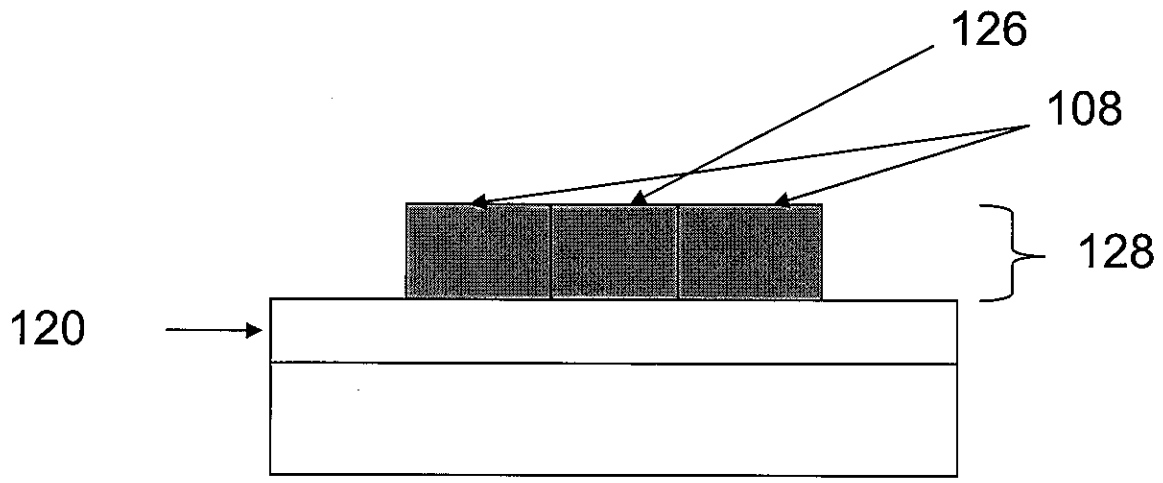


Figure 2B-2

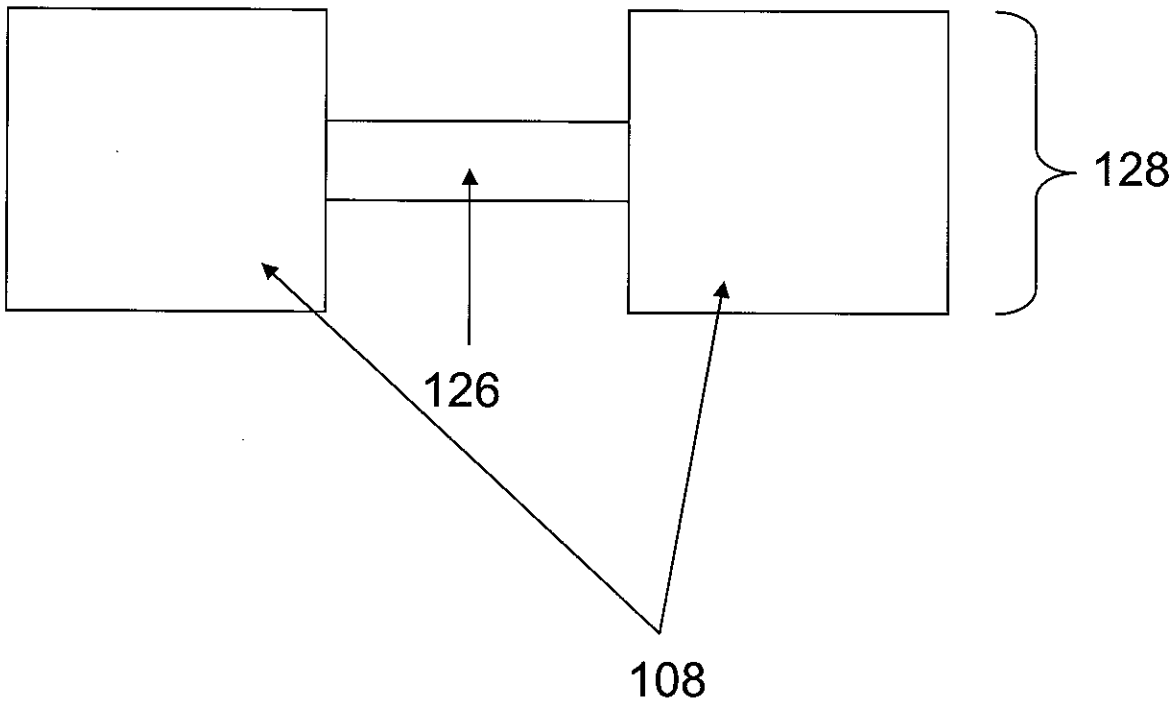


Figure 2C

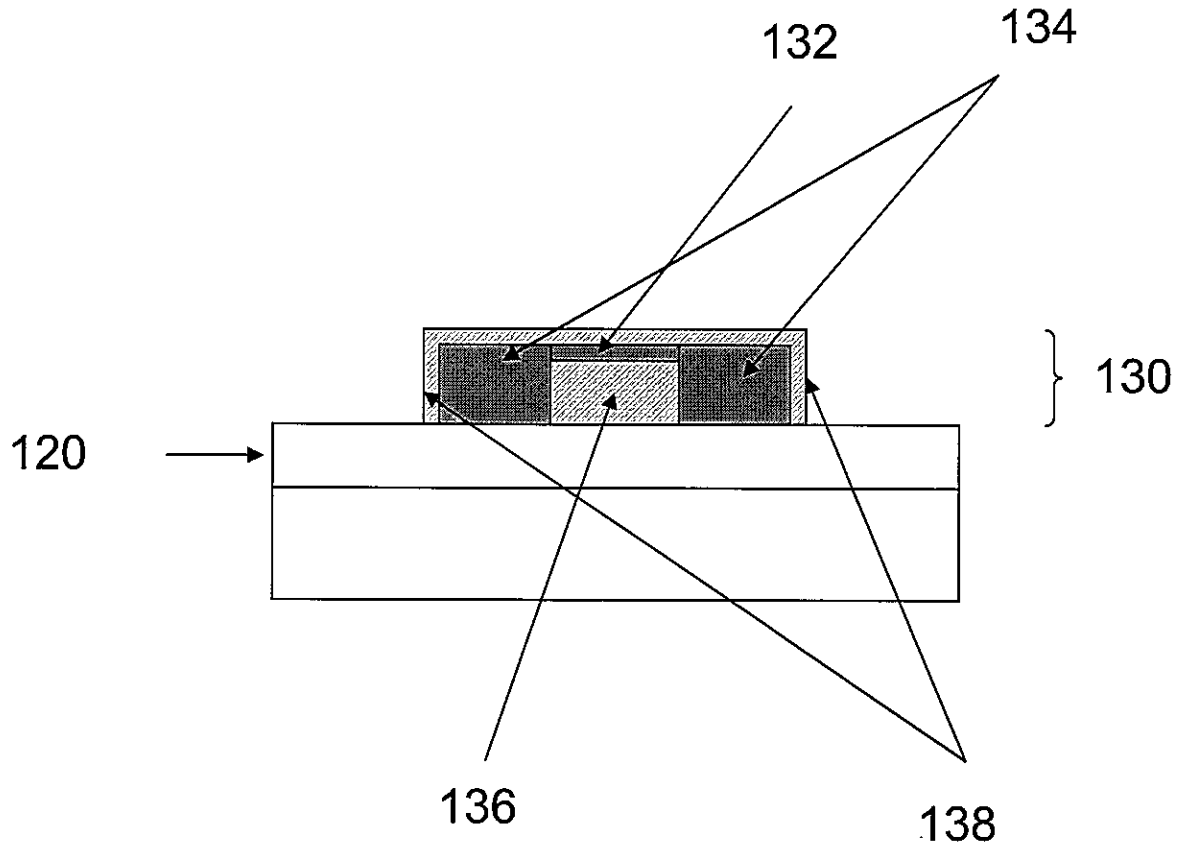


Figure 2D

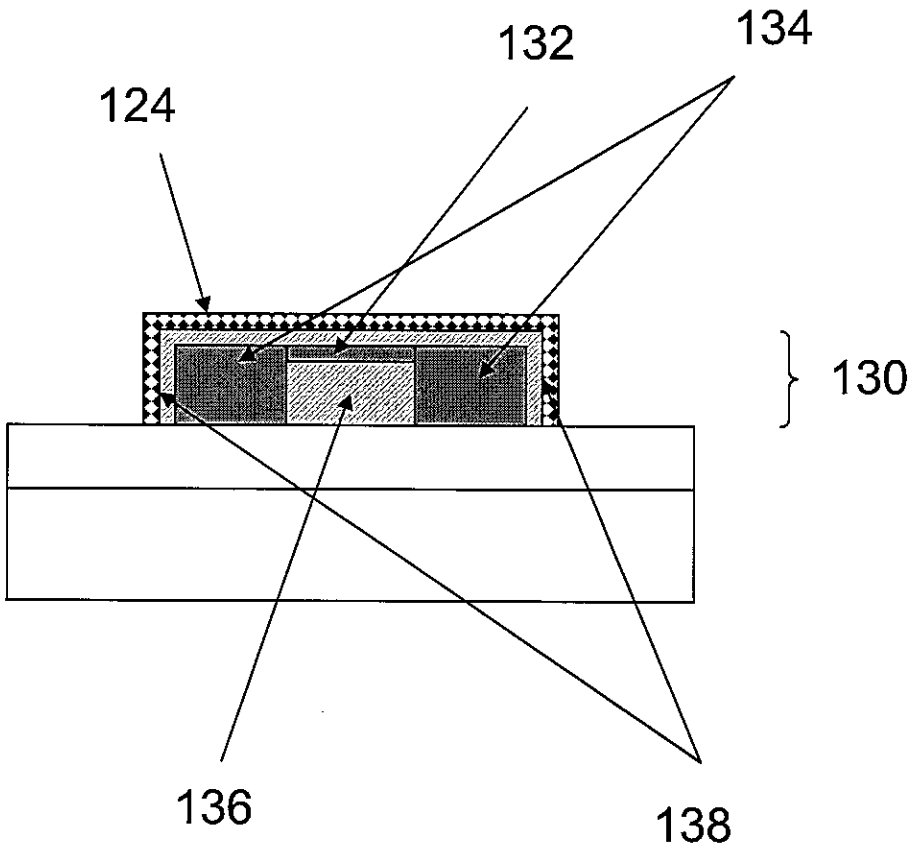


Figure 2E

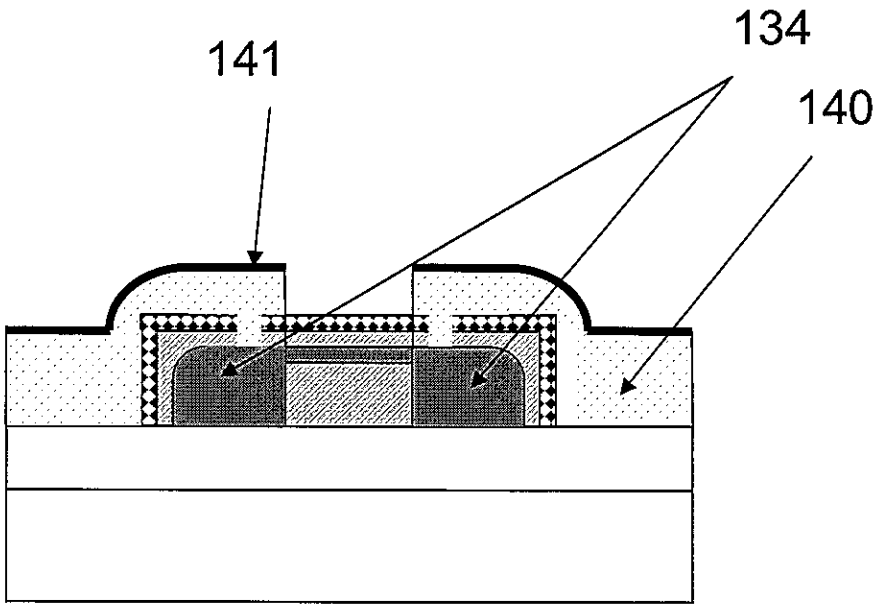


Figure 2F

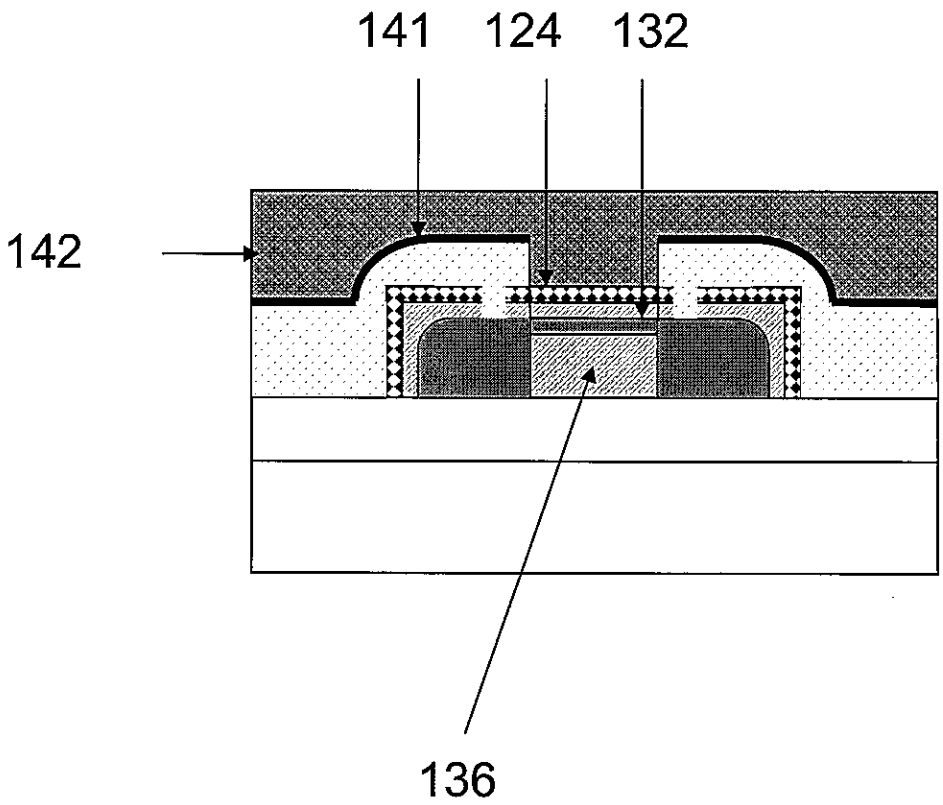


Figure 2G

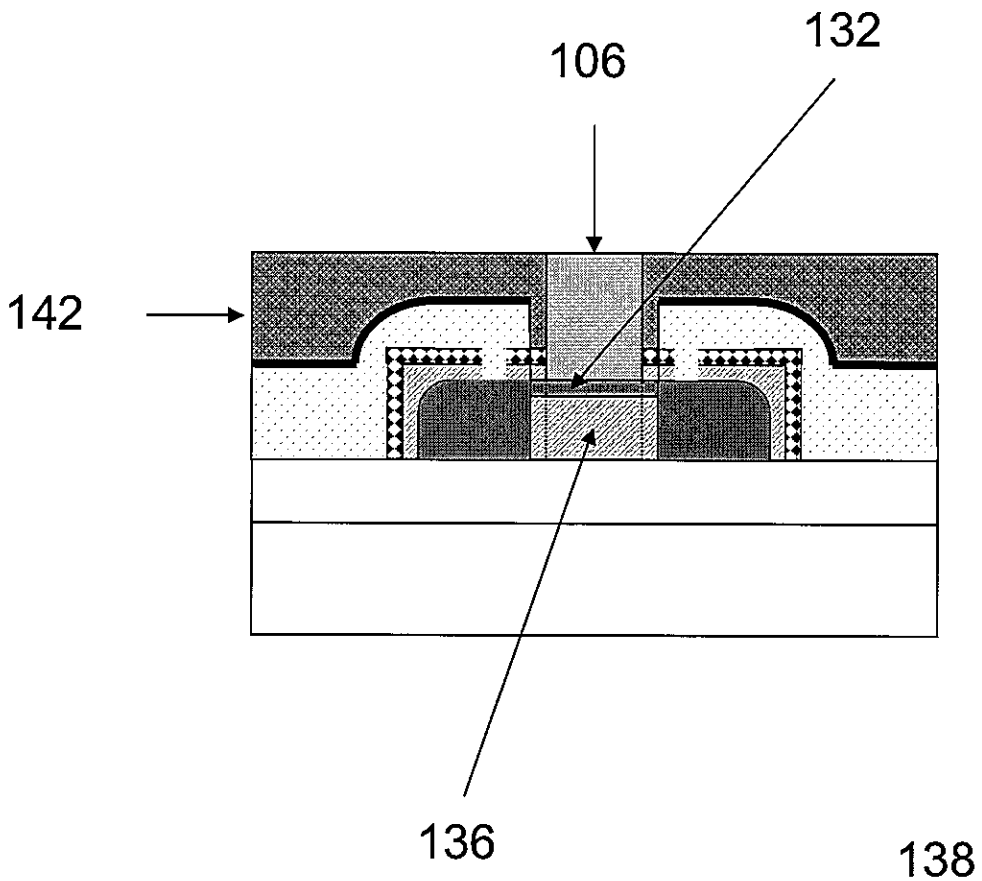
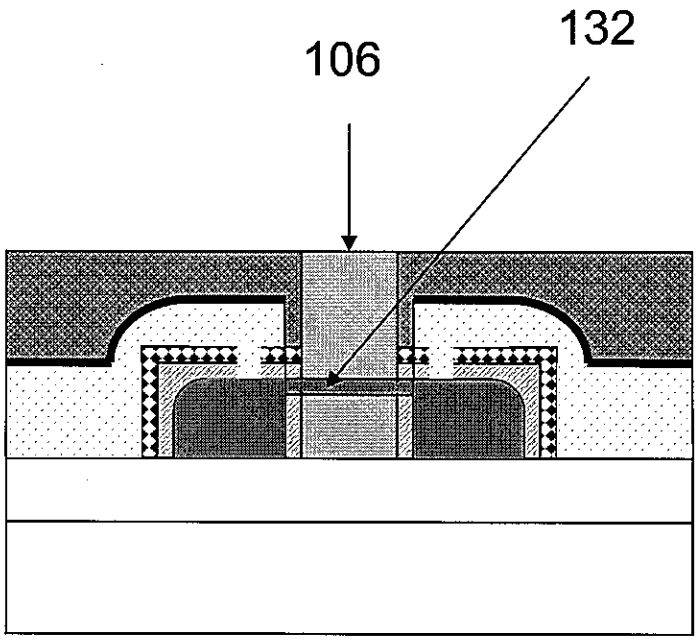
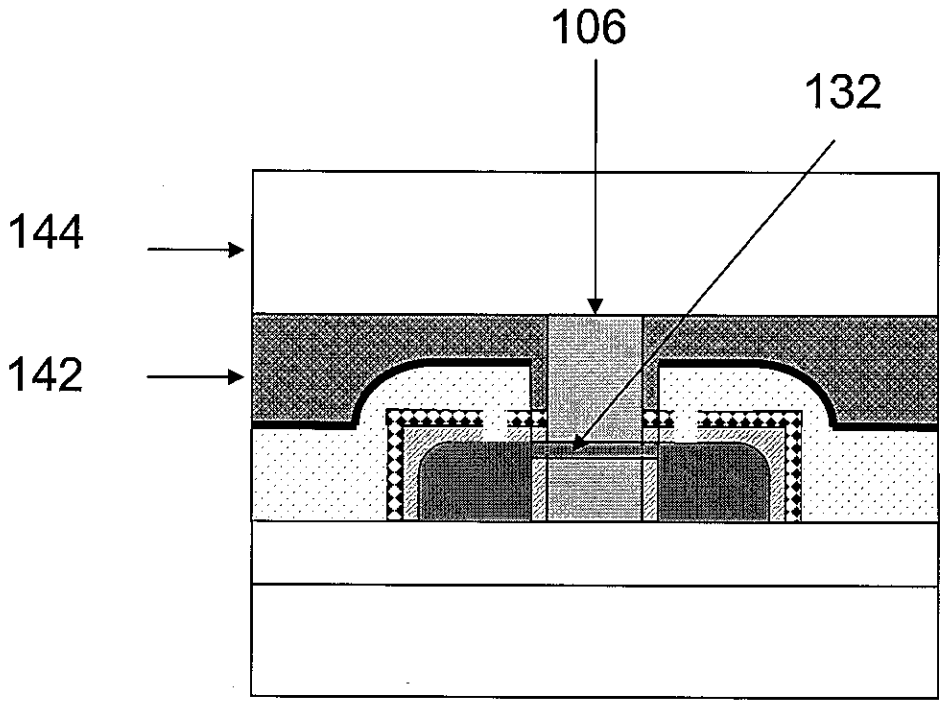


Figure 2H



138

Figure 2l



300

Figure 3

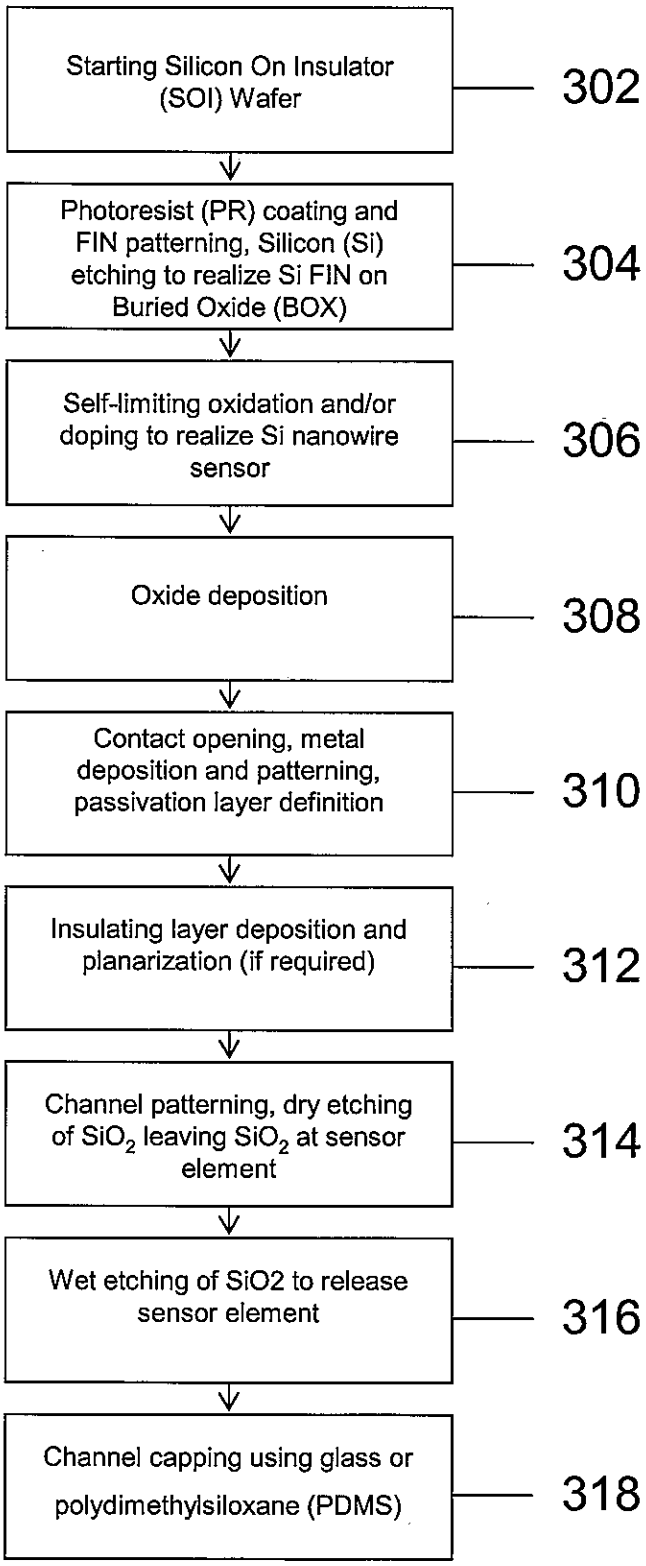

Starting Silicon On Insulator (SOI) Wafer
302
Photoresist (PR) coating and FIN patterning, Silicon (Si) etching to realize Si FIN on Buried Oxide (BOX)
304
Self-limiting oxidation and/or doping to realize Si nanowire sensor
306
Oxide deposition
308
Contact opening, metal deposition and patterning, passivation layer definition
310
Insulating layer deposition and planarization (if required)
312
Channel patterning, dry etching of SiO_2 leaving SiO_2 at sensor element
314
Wet etching of SiO2 to release sensor element
316
Channel capping using glass or polydimethylsiloxane (PDMS)
318

Figure 4A

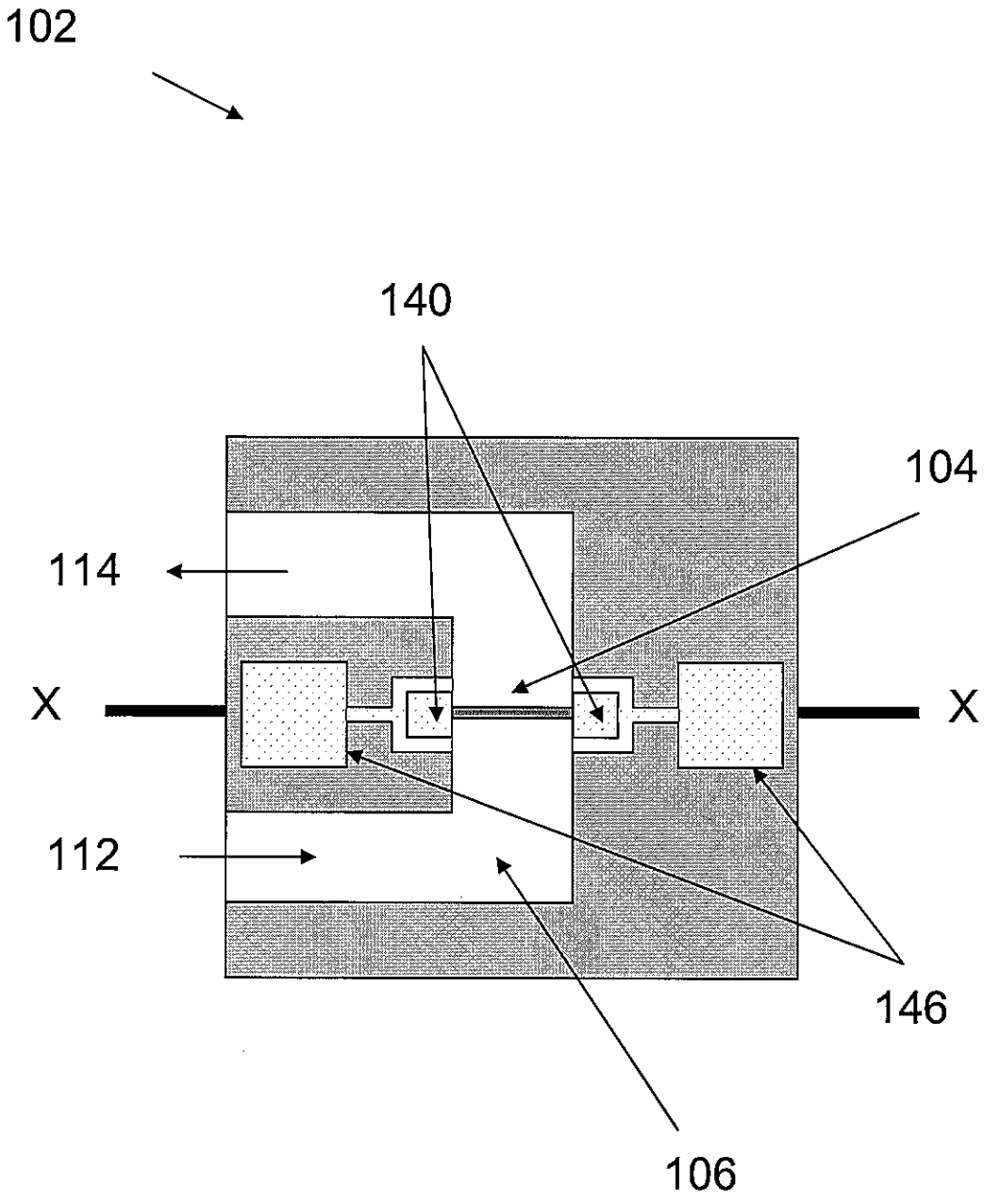


Figure 4B

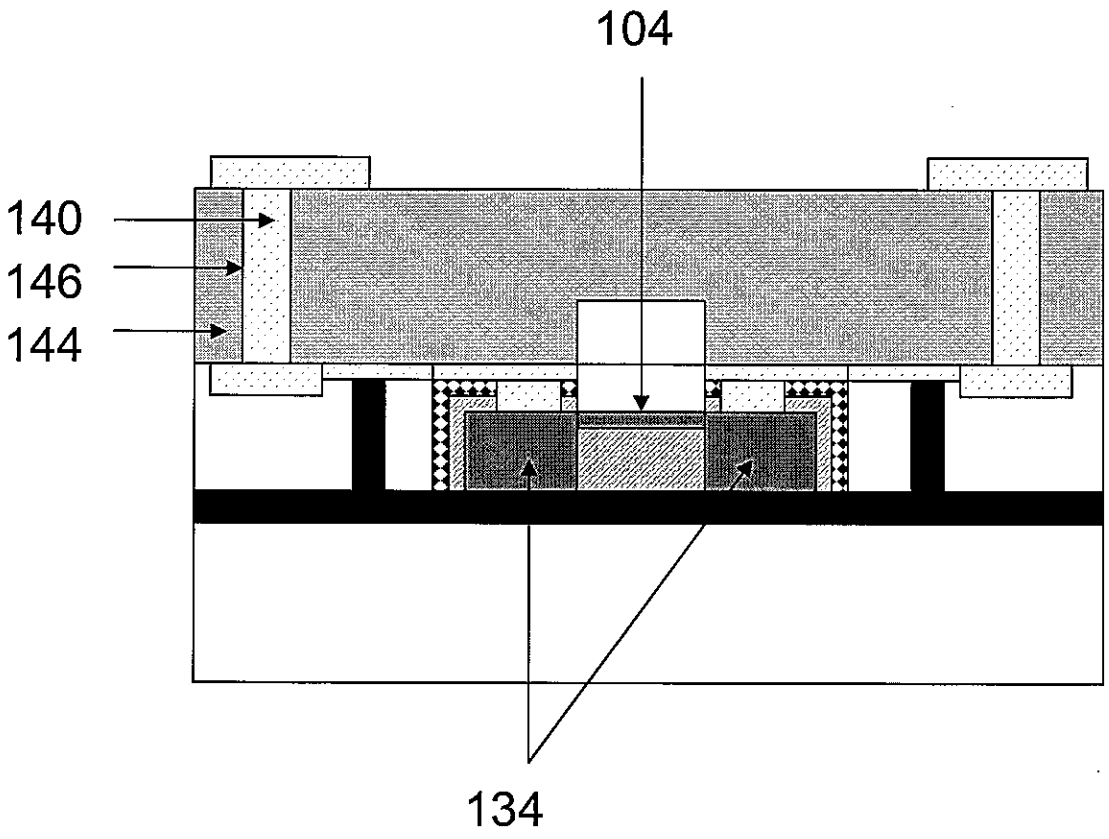


Figure 5A

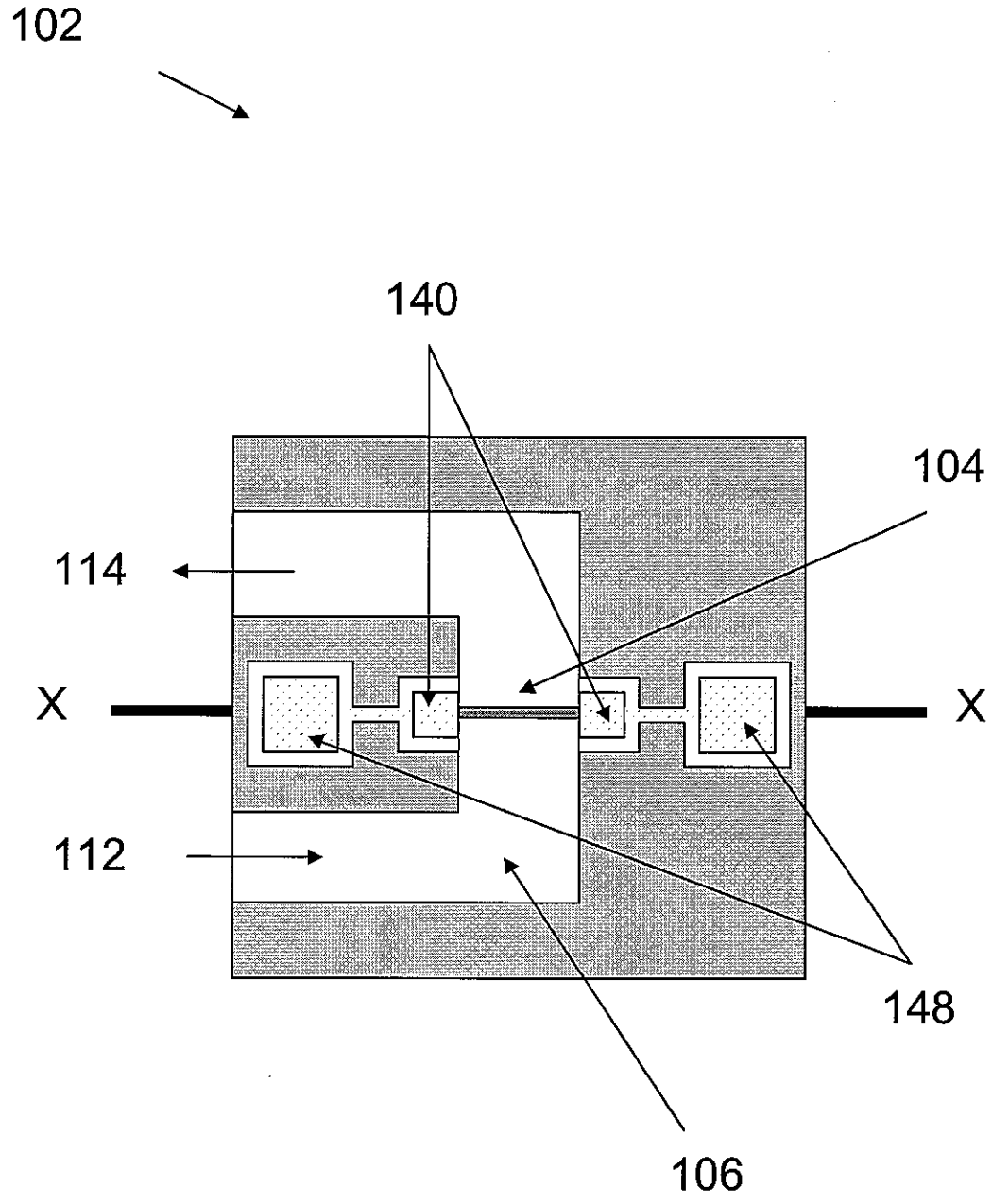


Figure 5B

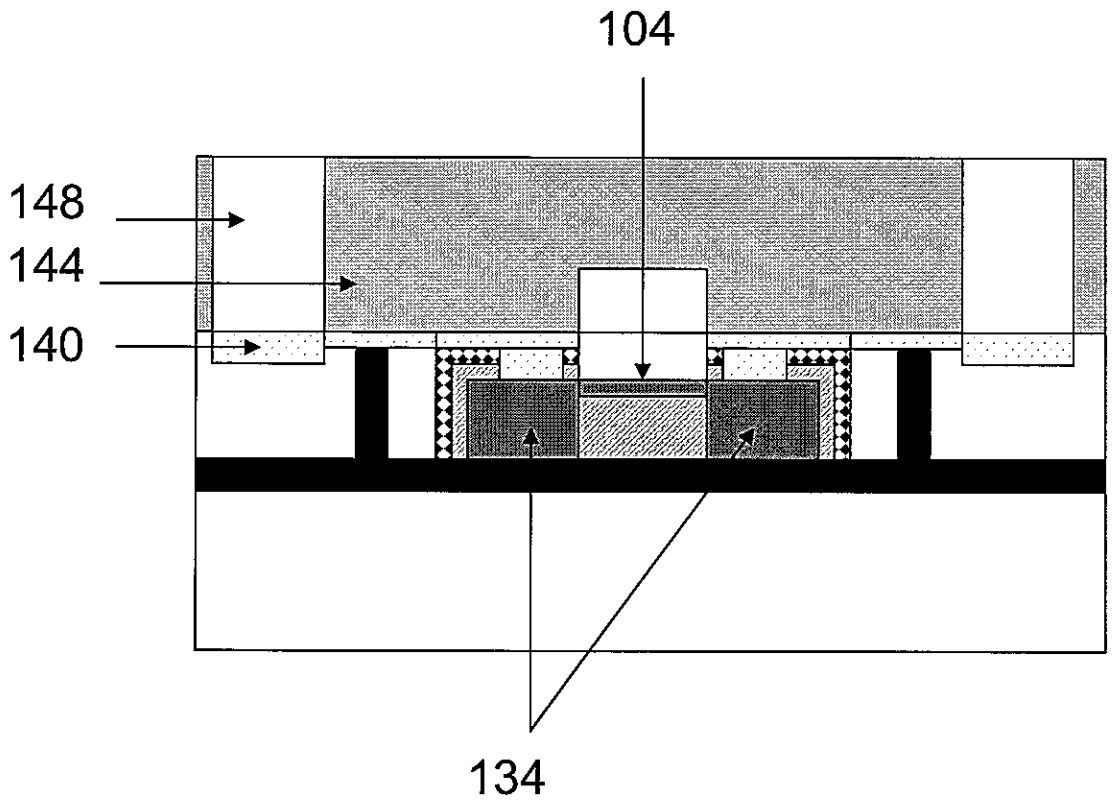


Figure 6A

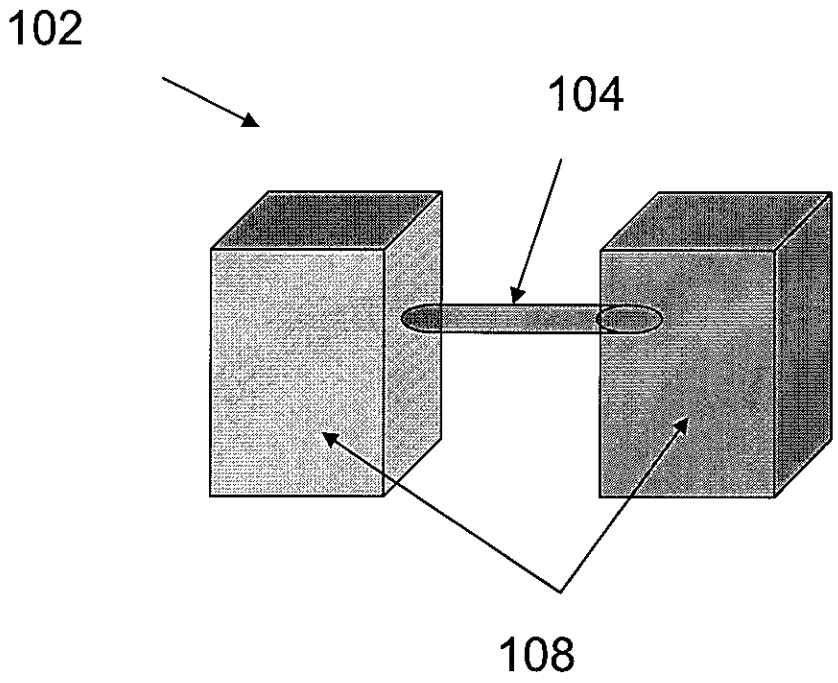


Figure 6B

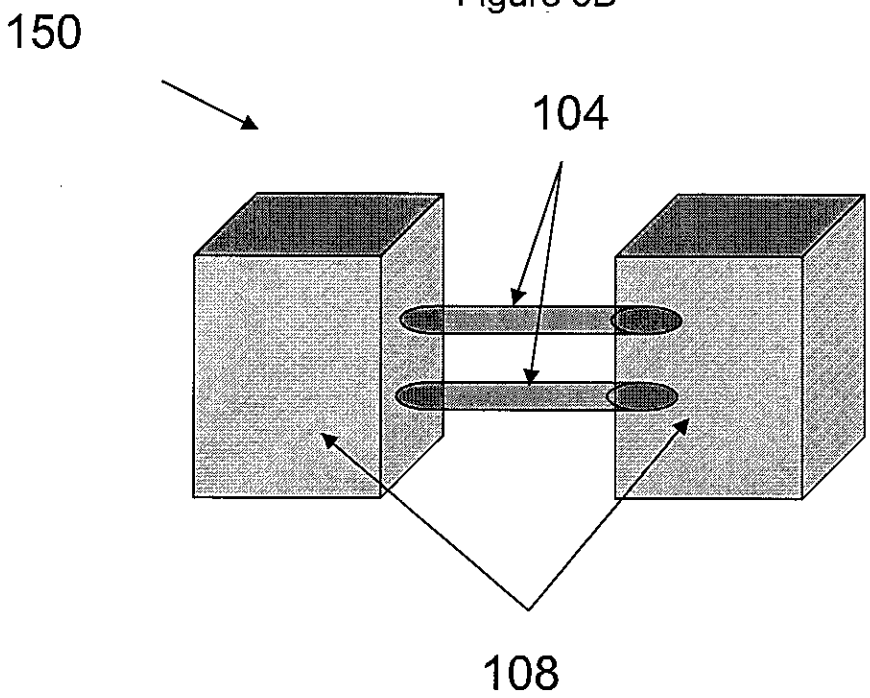


Figure 6C

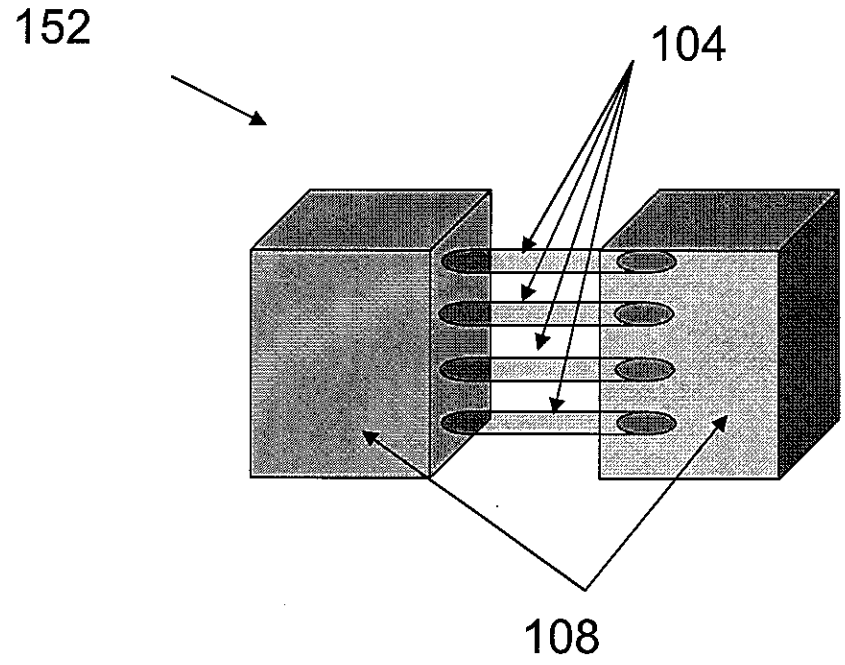


Figure 6D

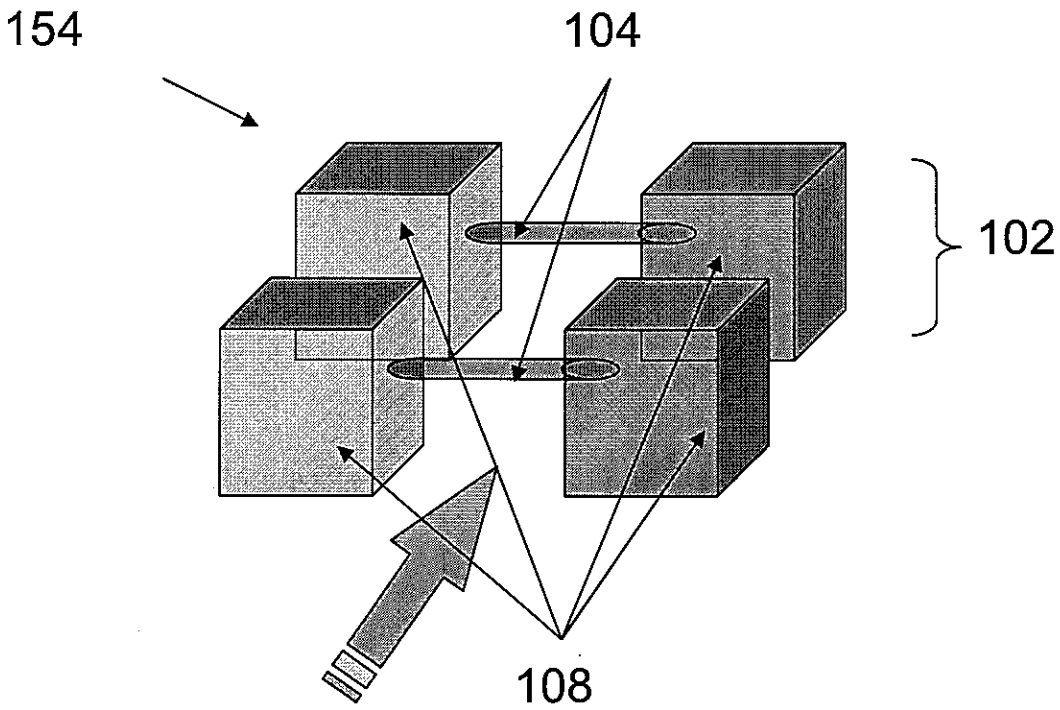


Figure 6E

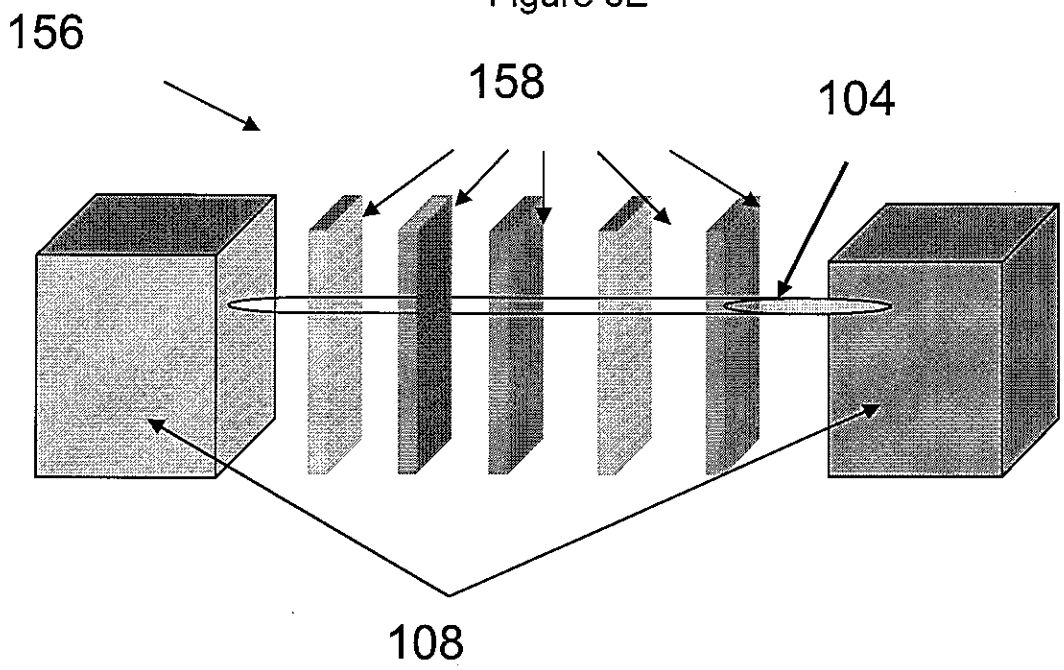


Figure 6F

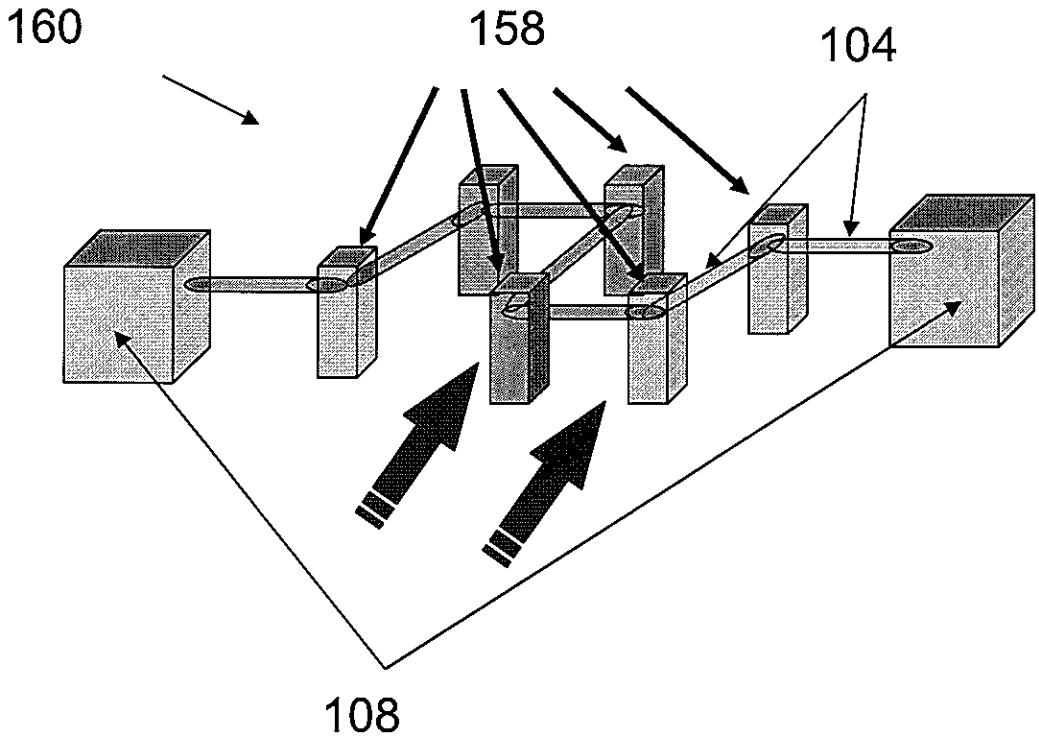


Figure 7A

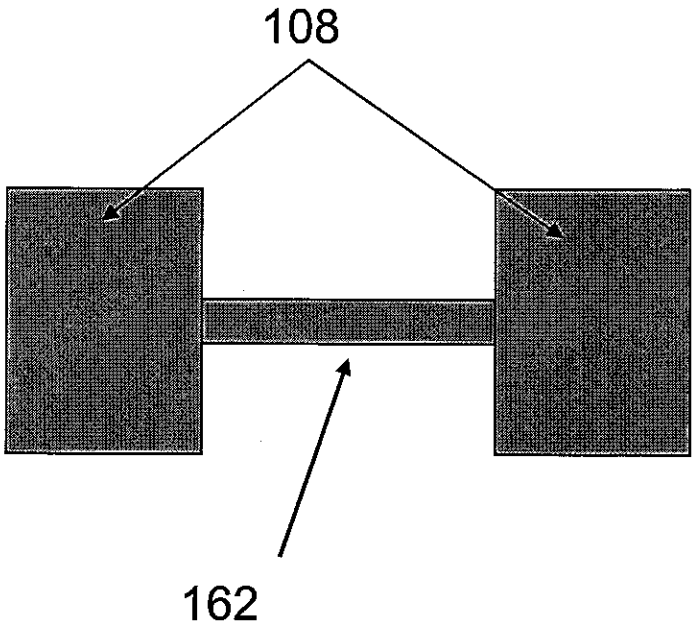


Figure 7B

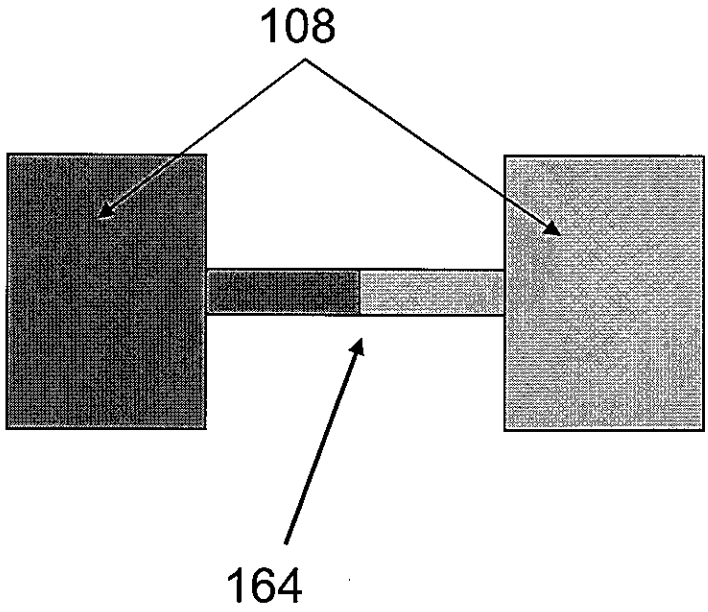


Figure 7C

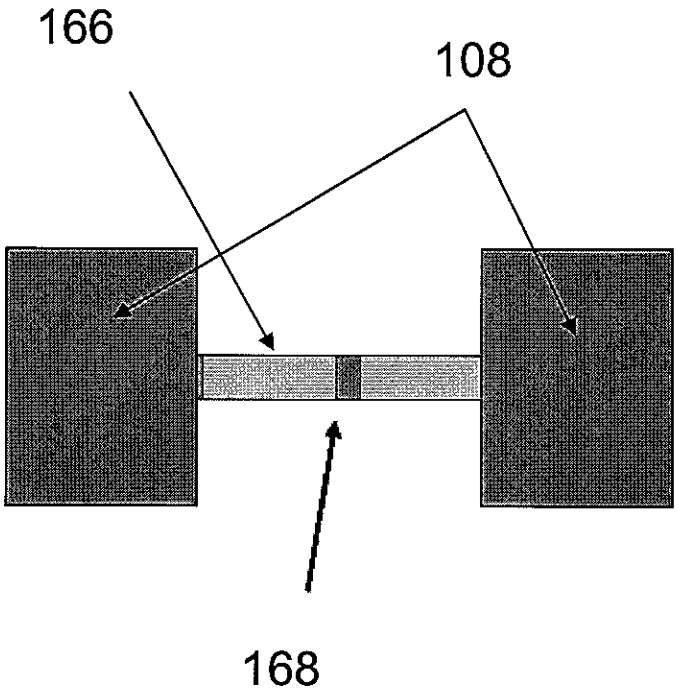


Figure 7D

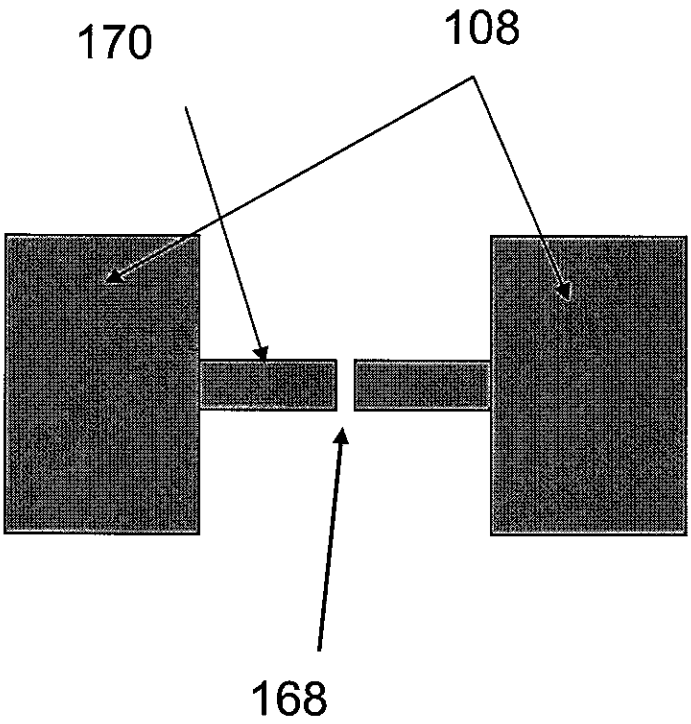
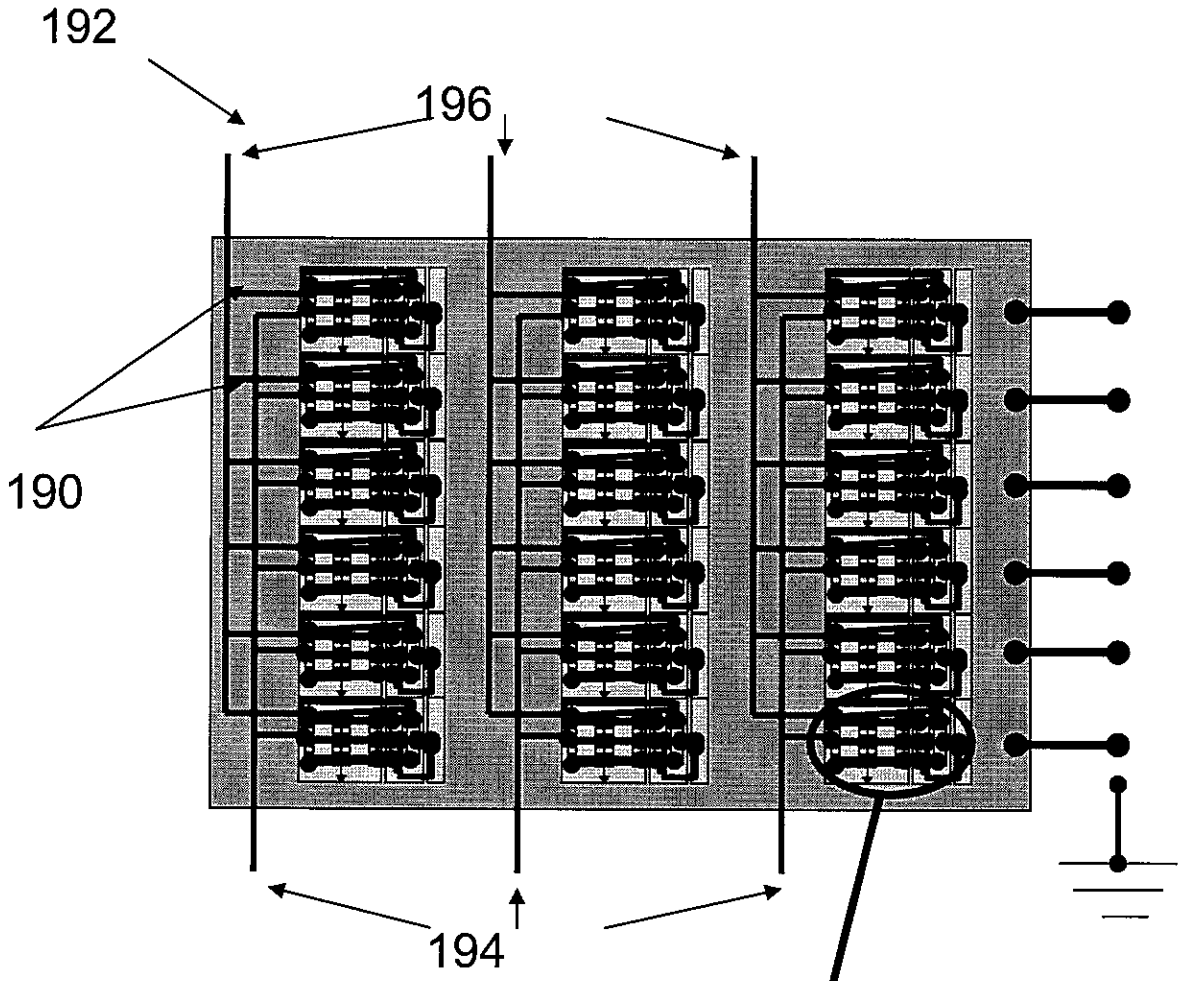


Figure 8



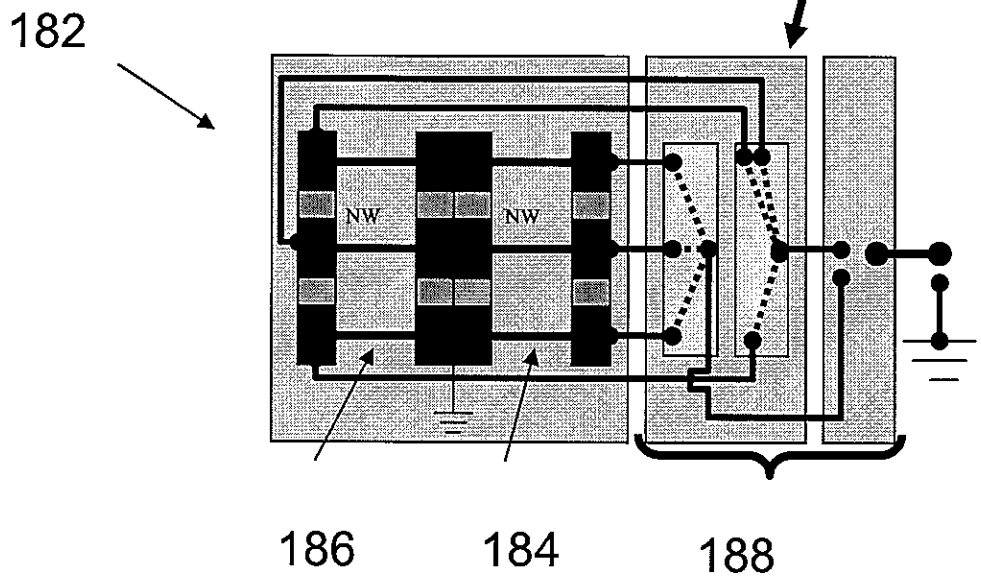


Figure 9A

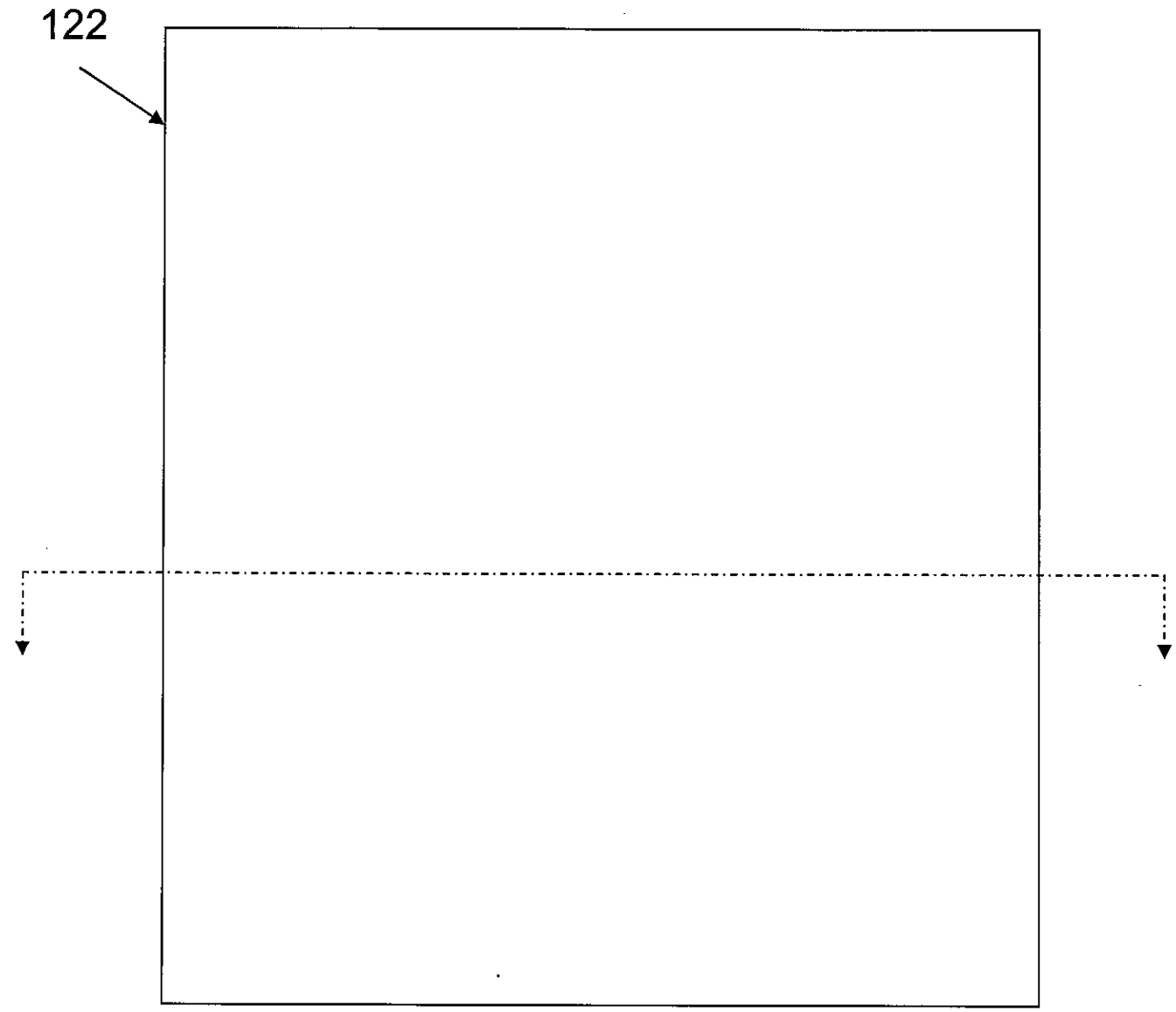
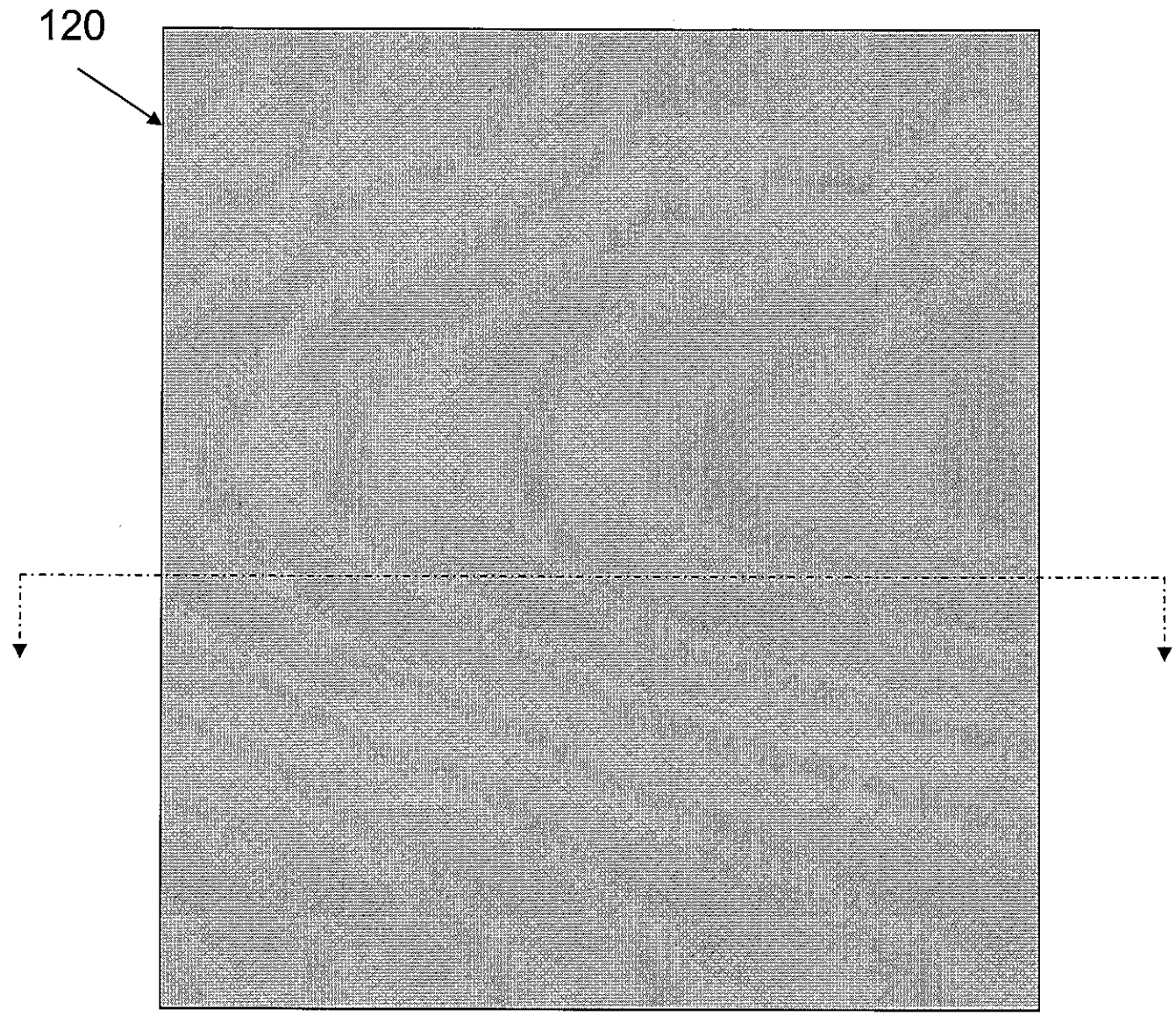




Figure 9B



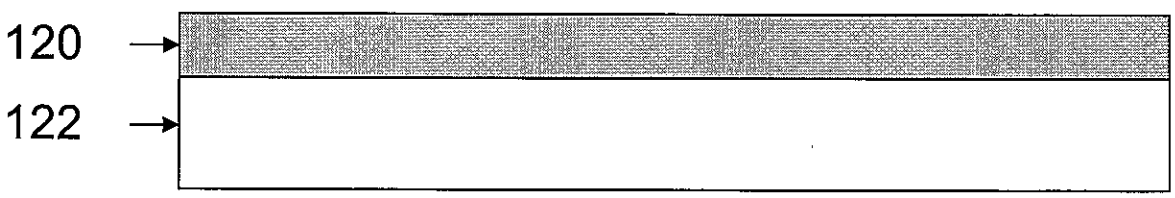
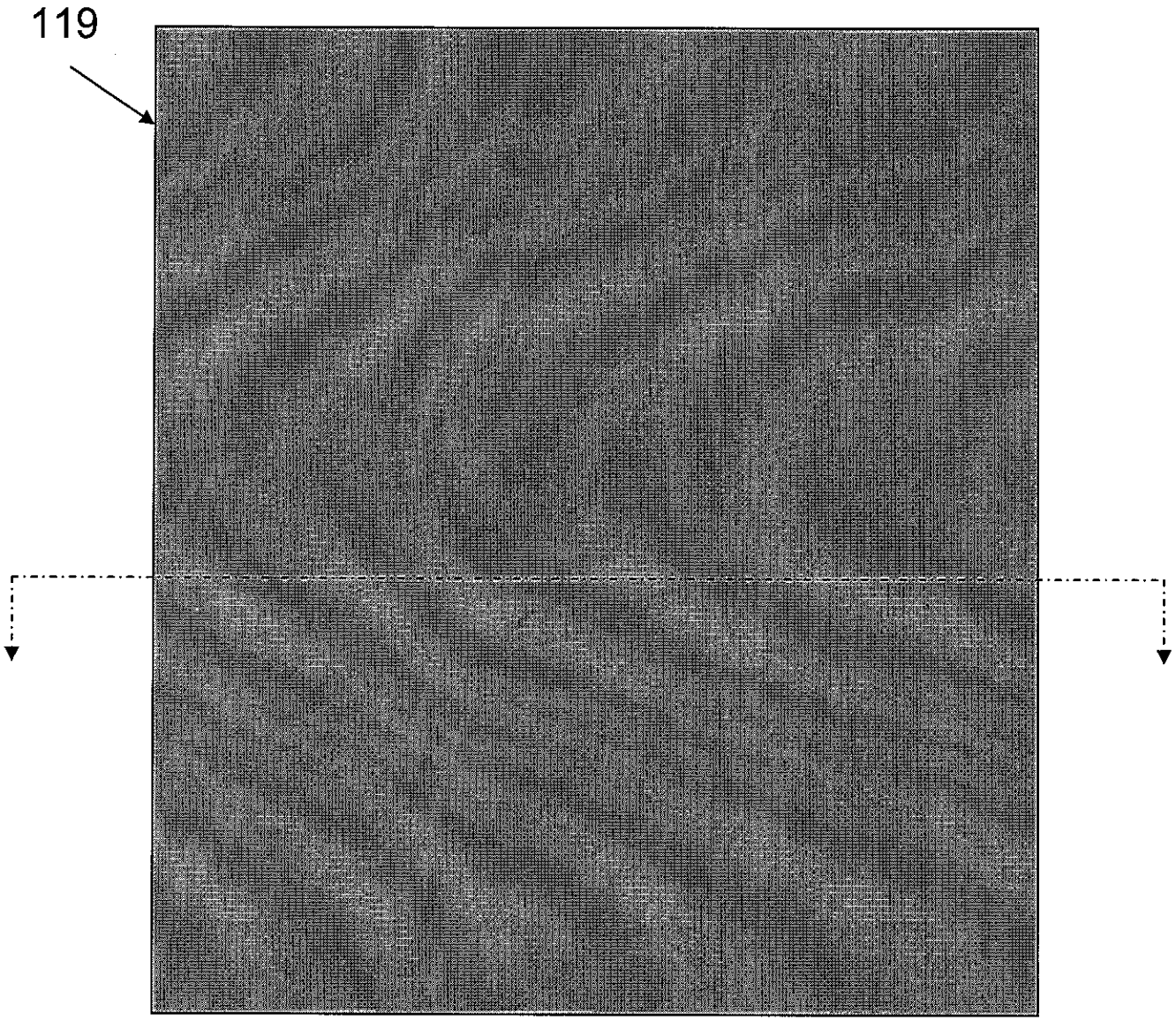


Figure 9C



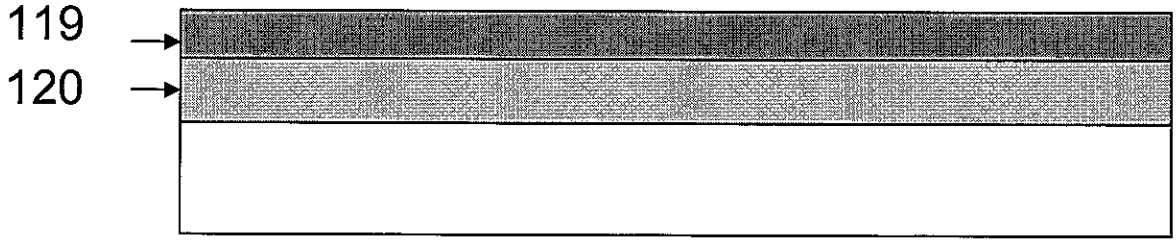


Figure 9D

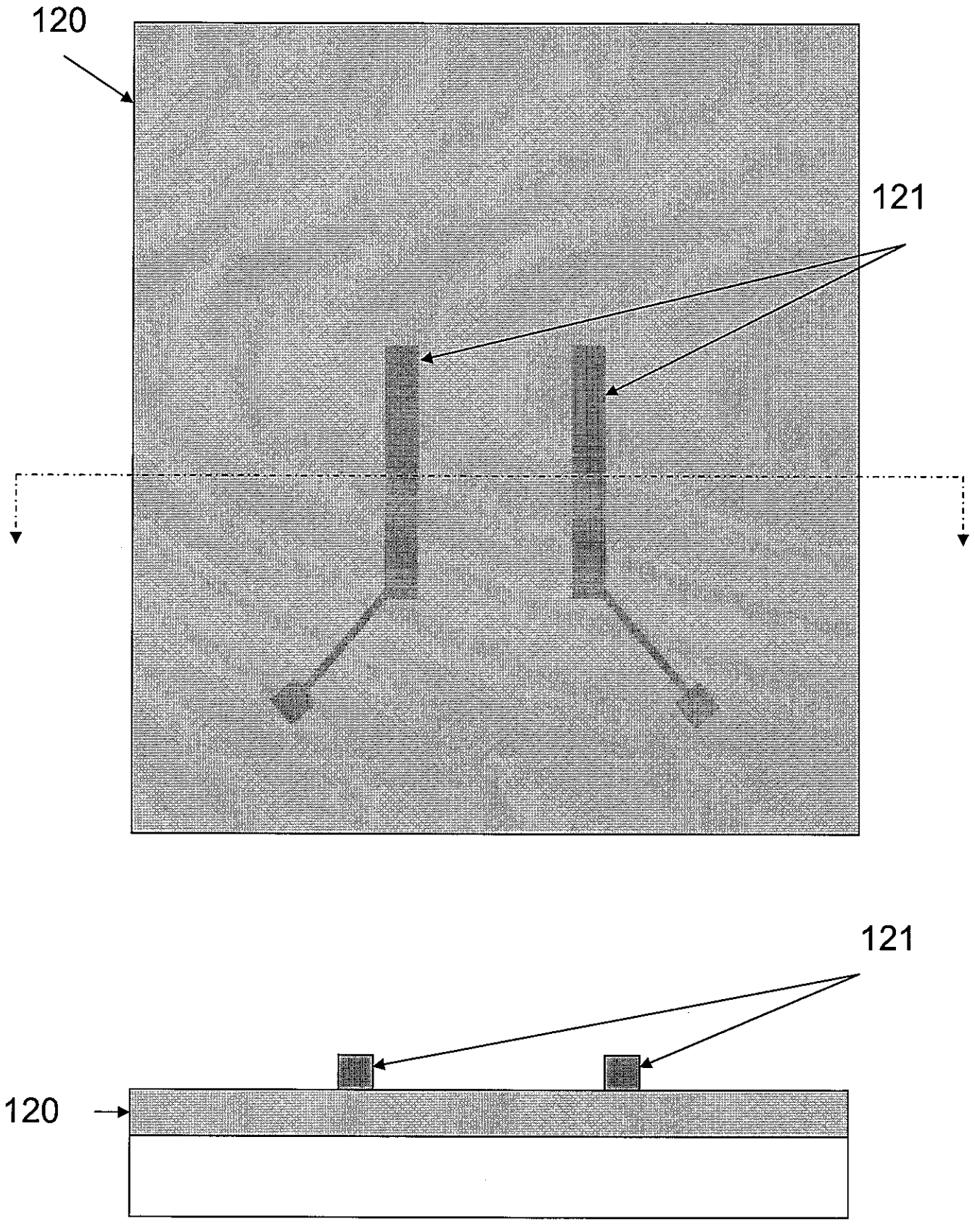
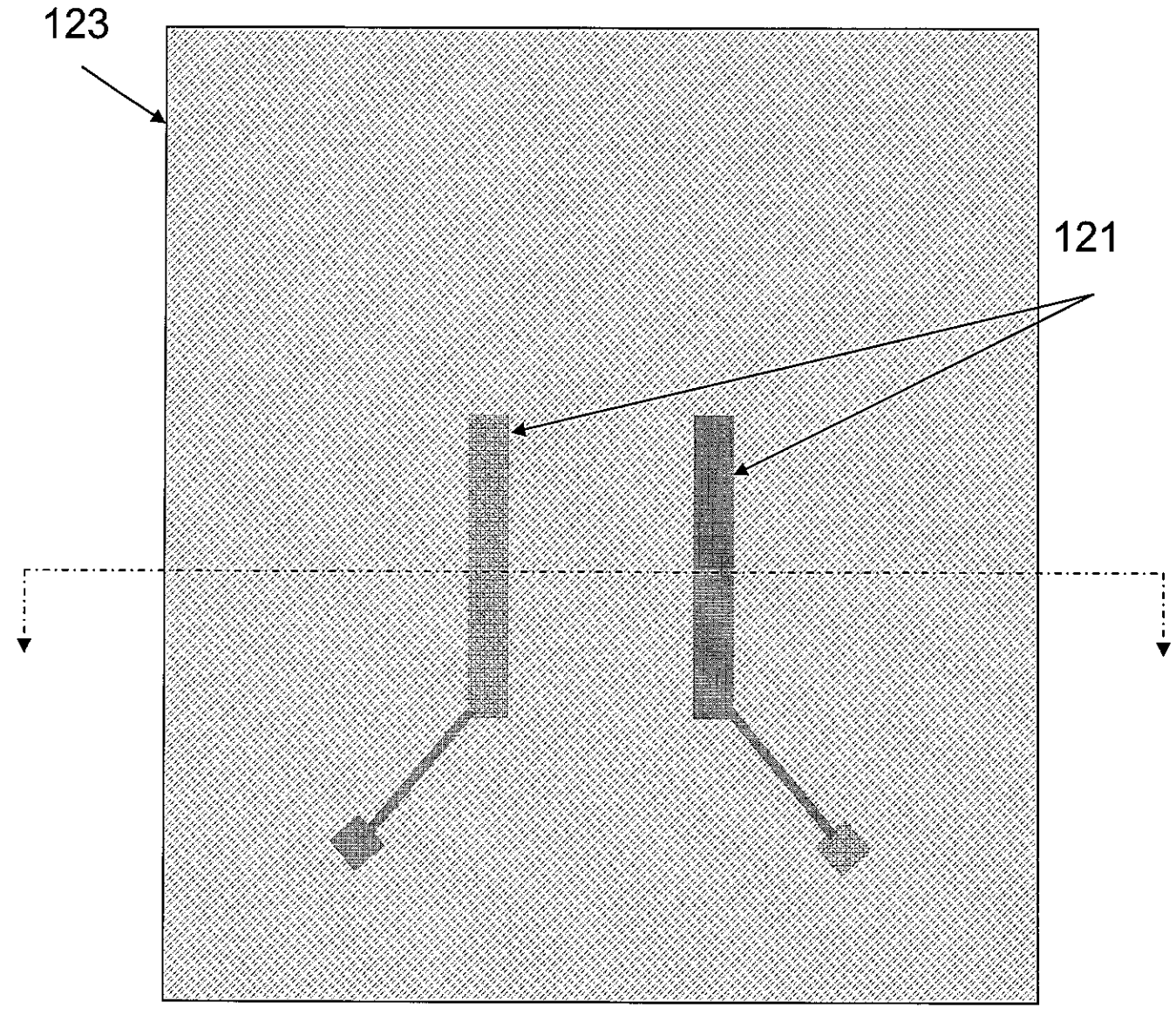


Figure 9E



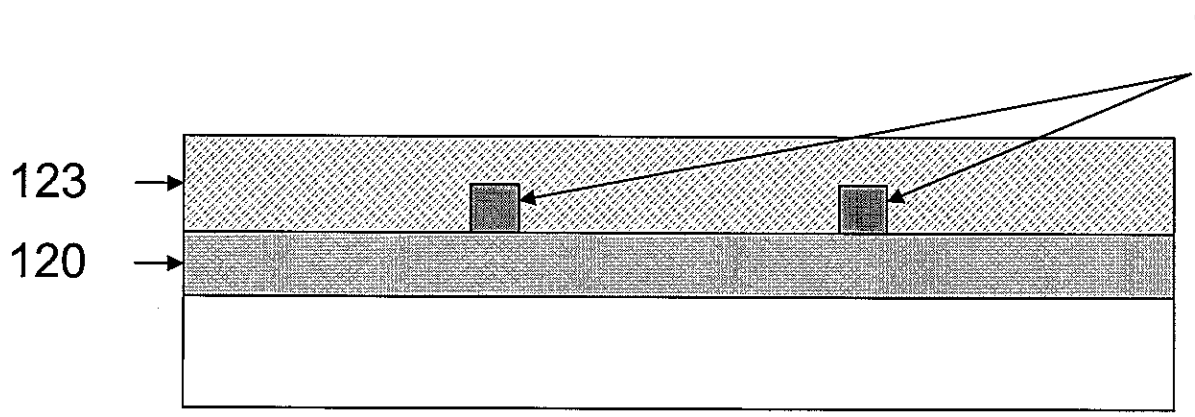
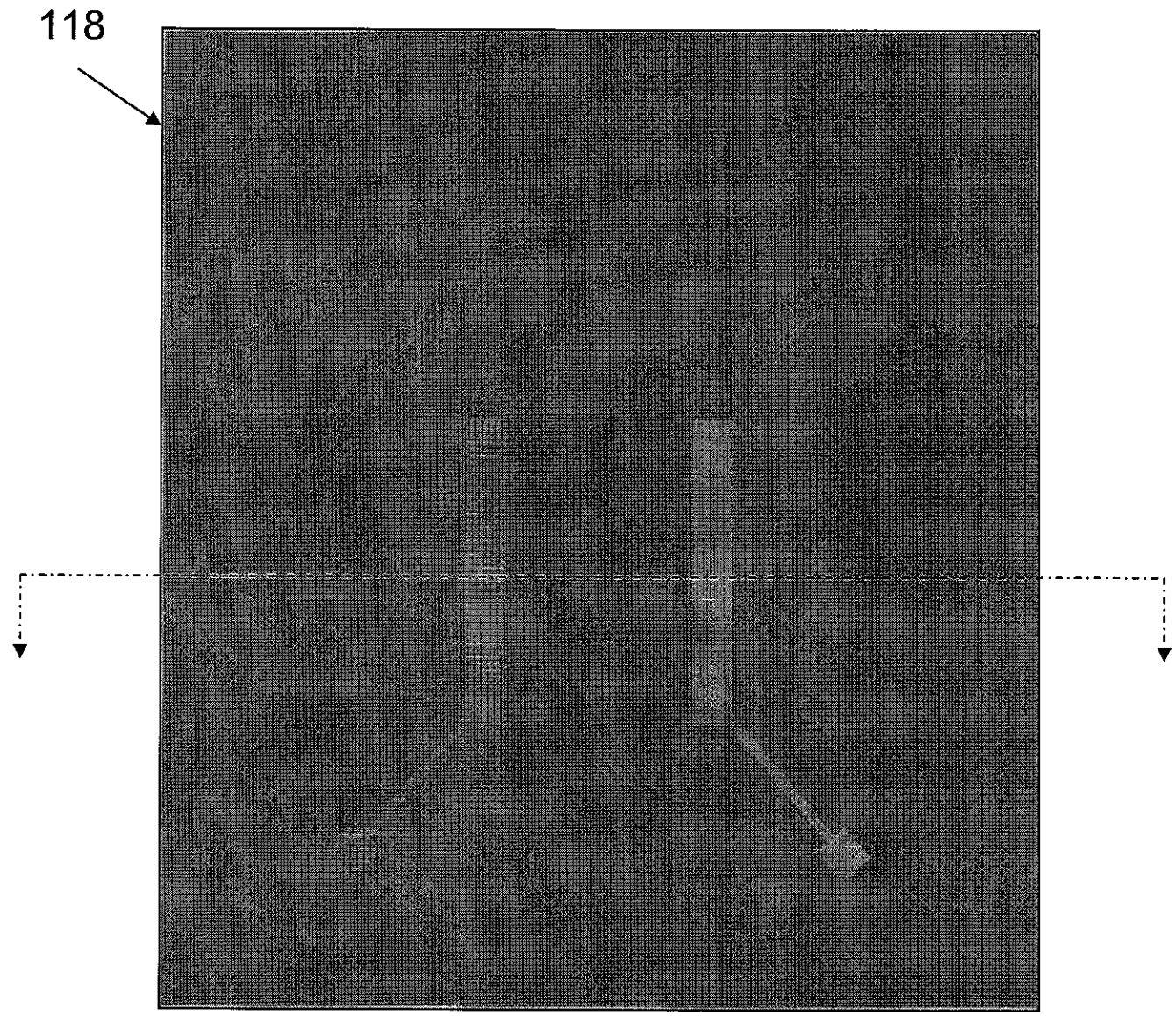


Figure 9F



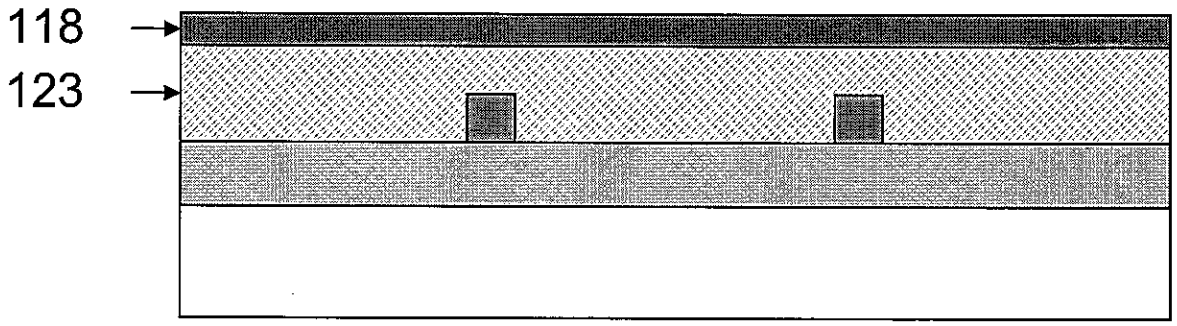


Figure 9G

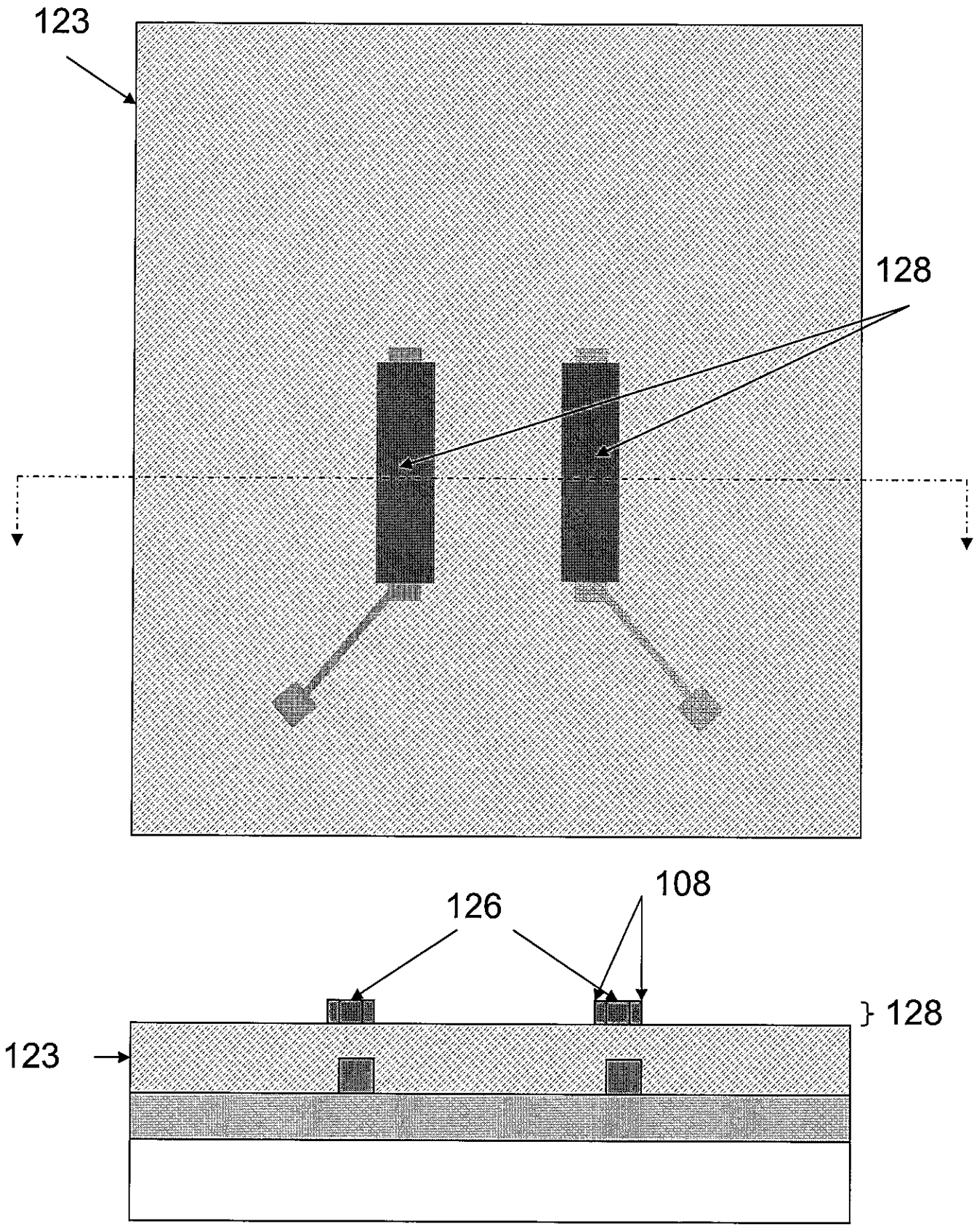


Figure 9H

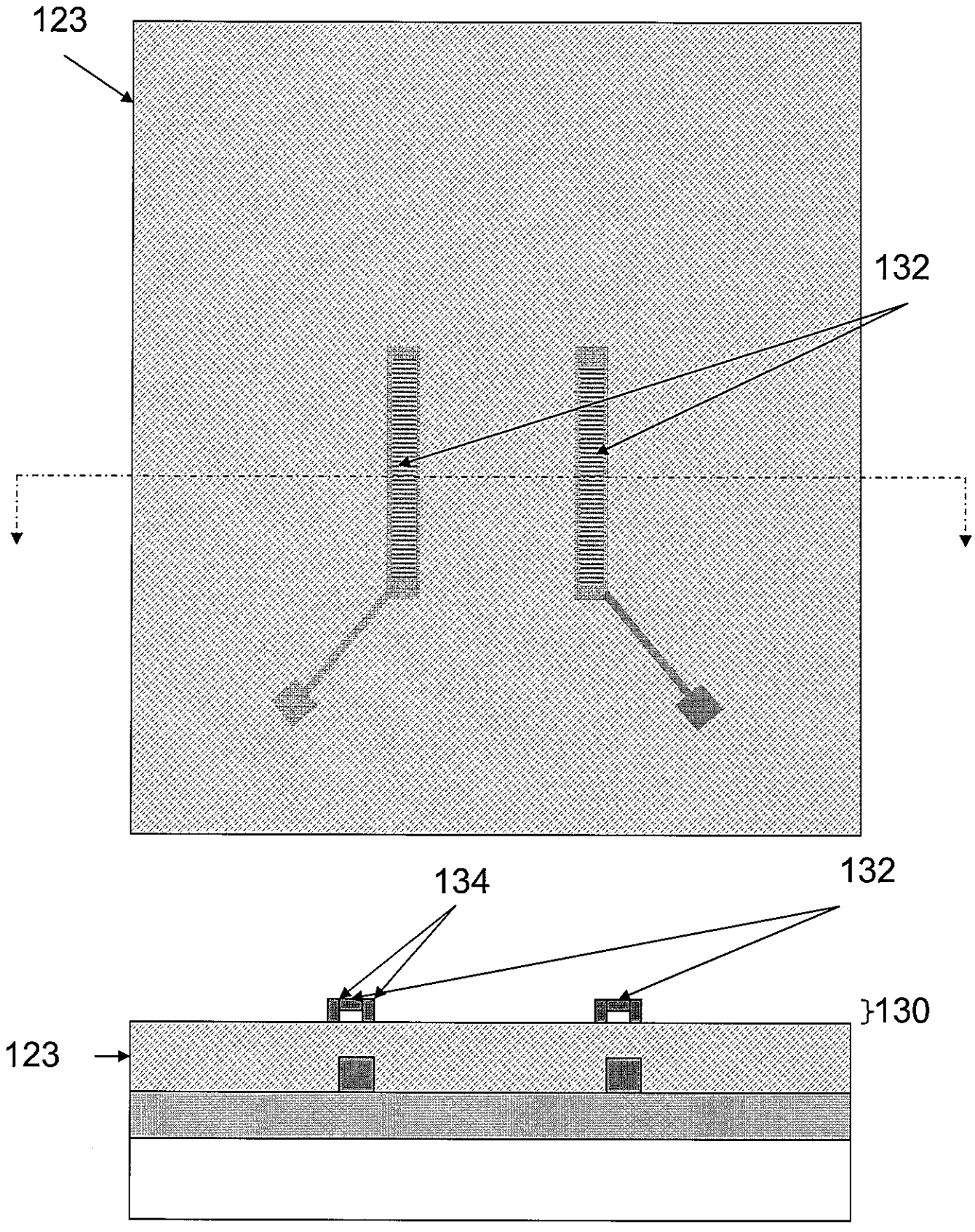


Figure 9I

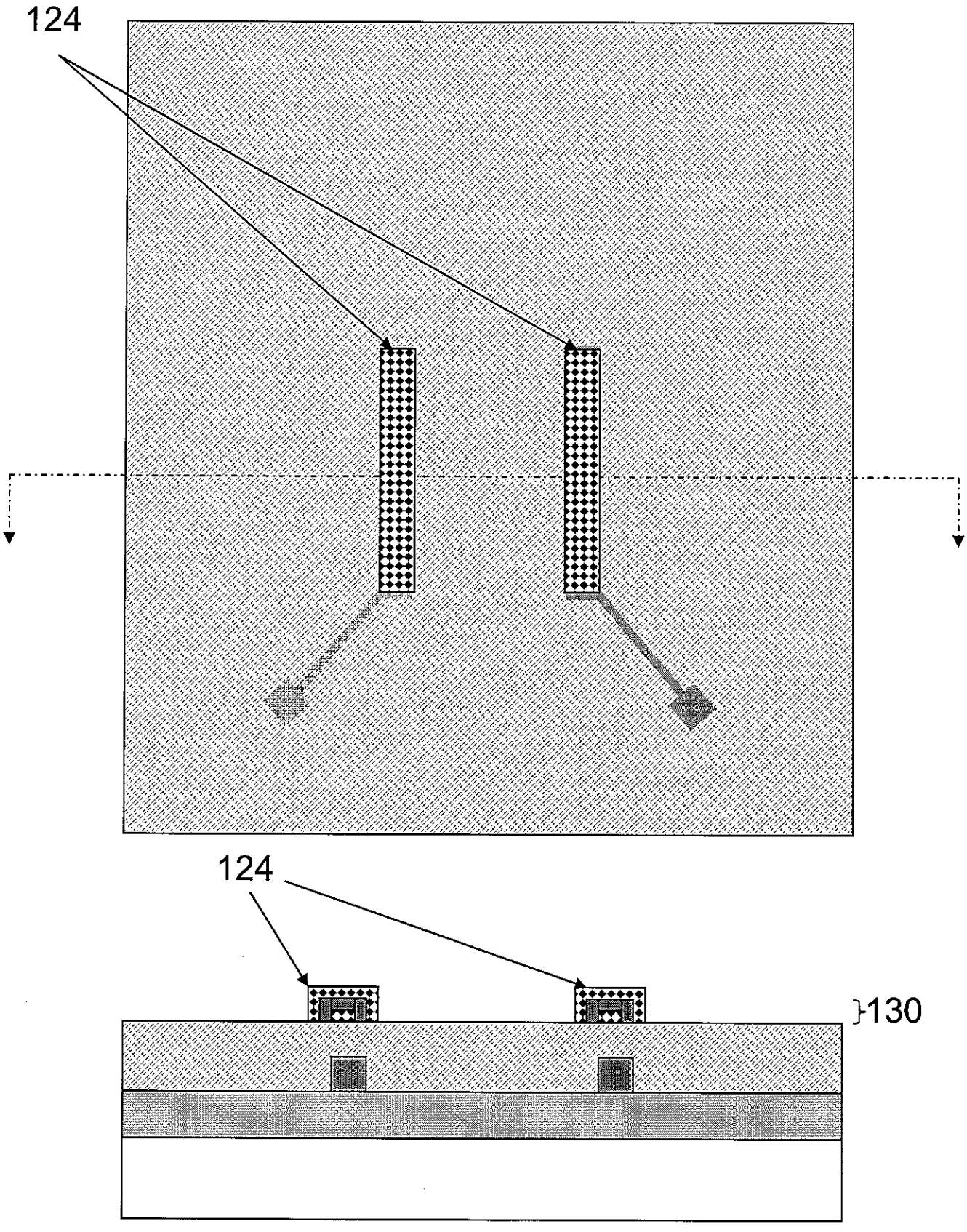


Figure 9J

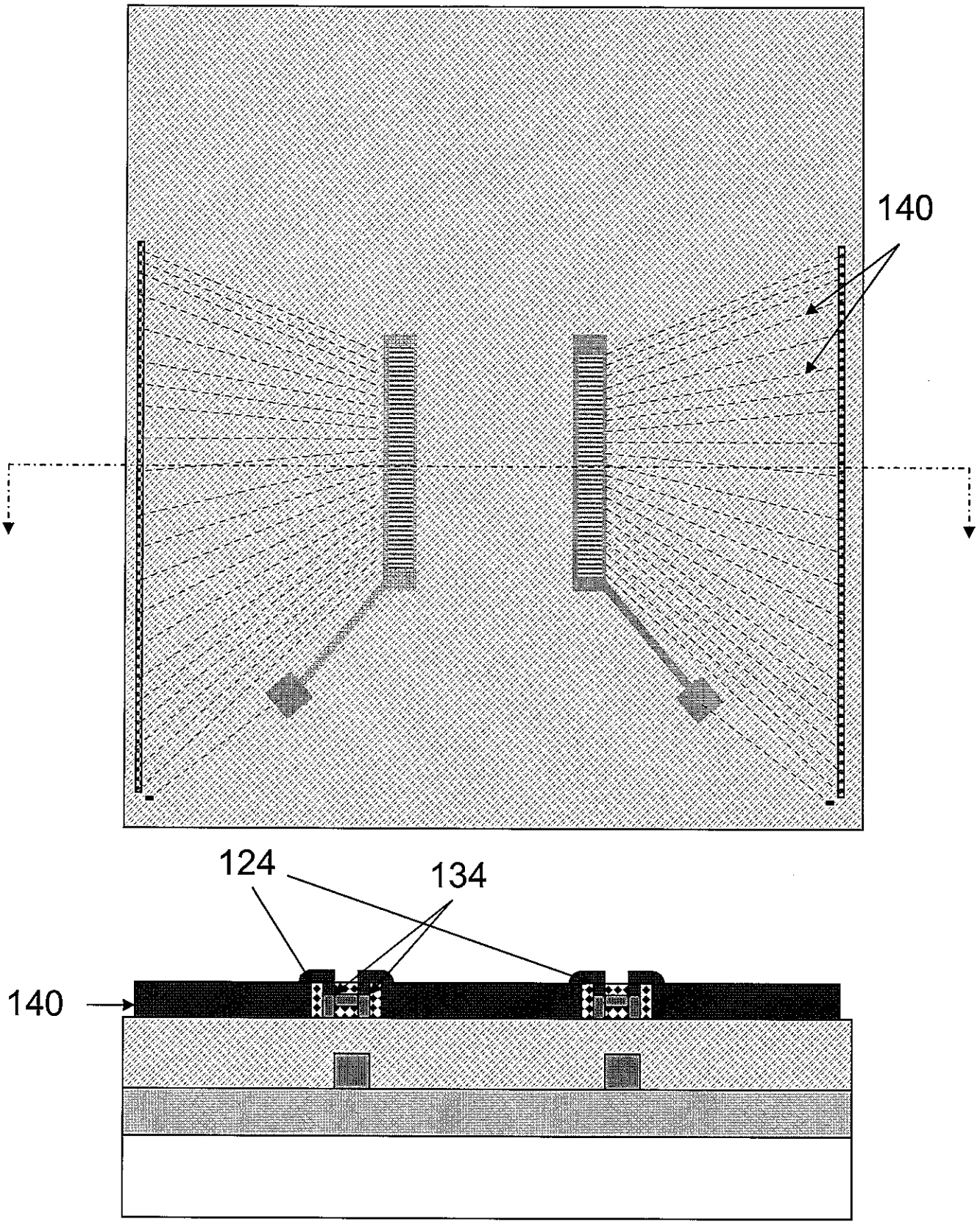


Figure 9K

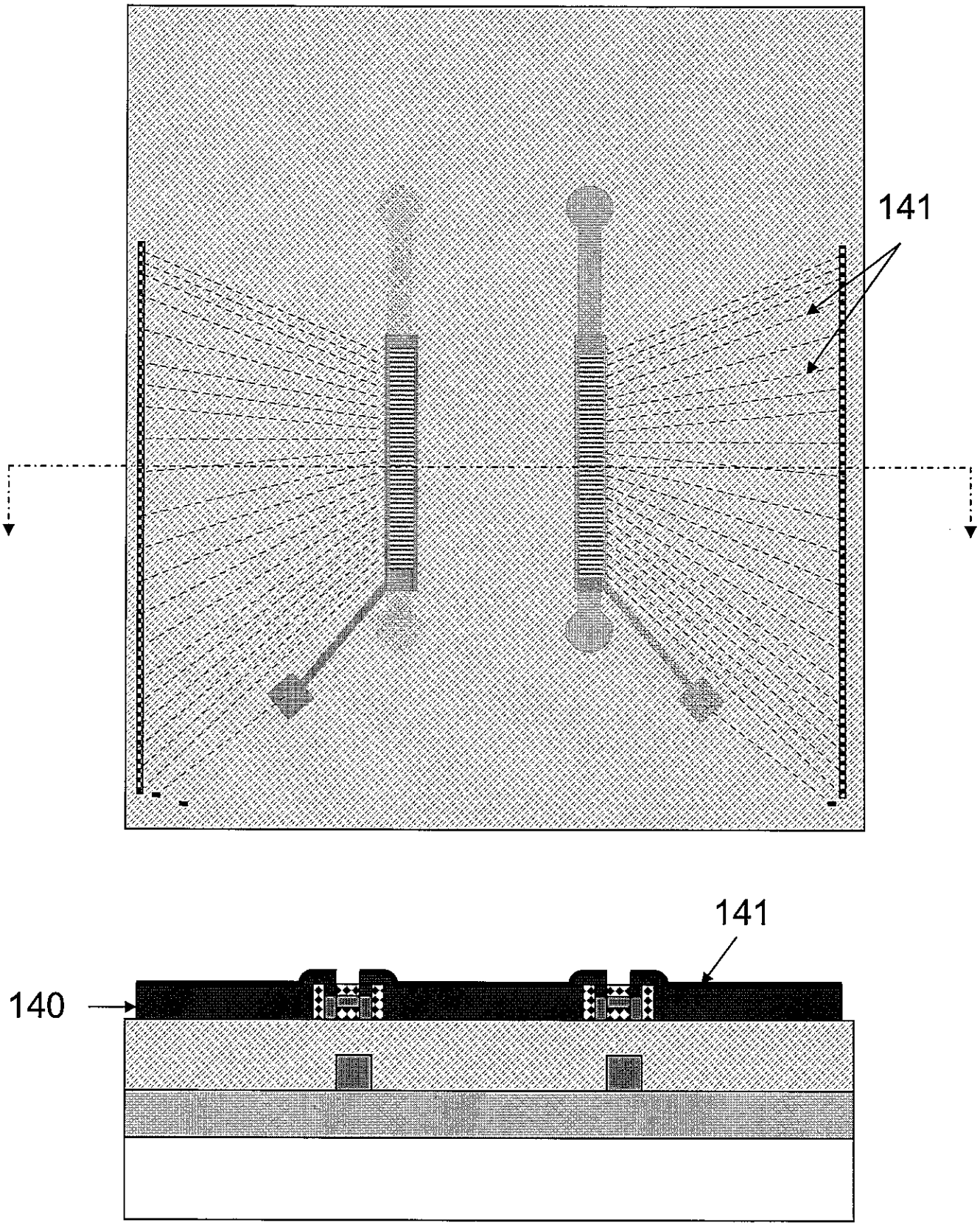


Figure 9L

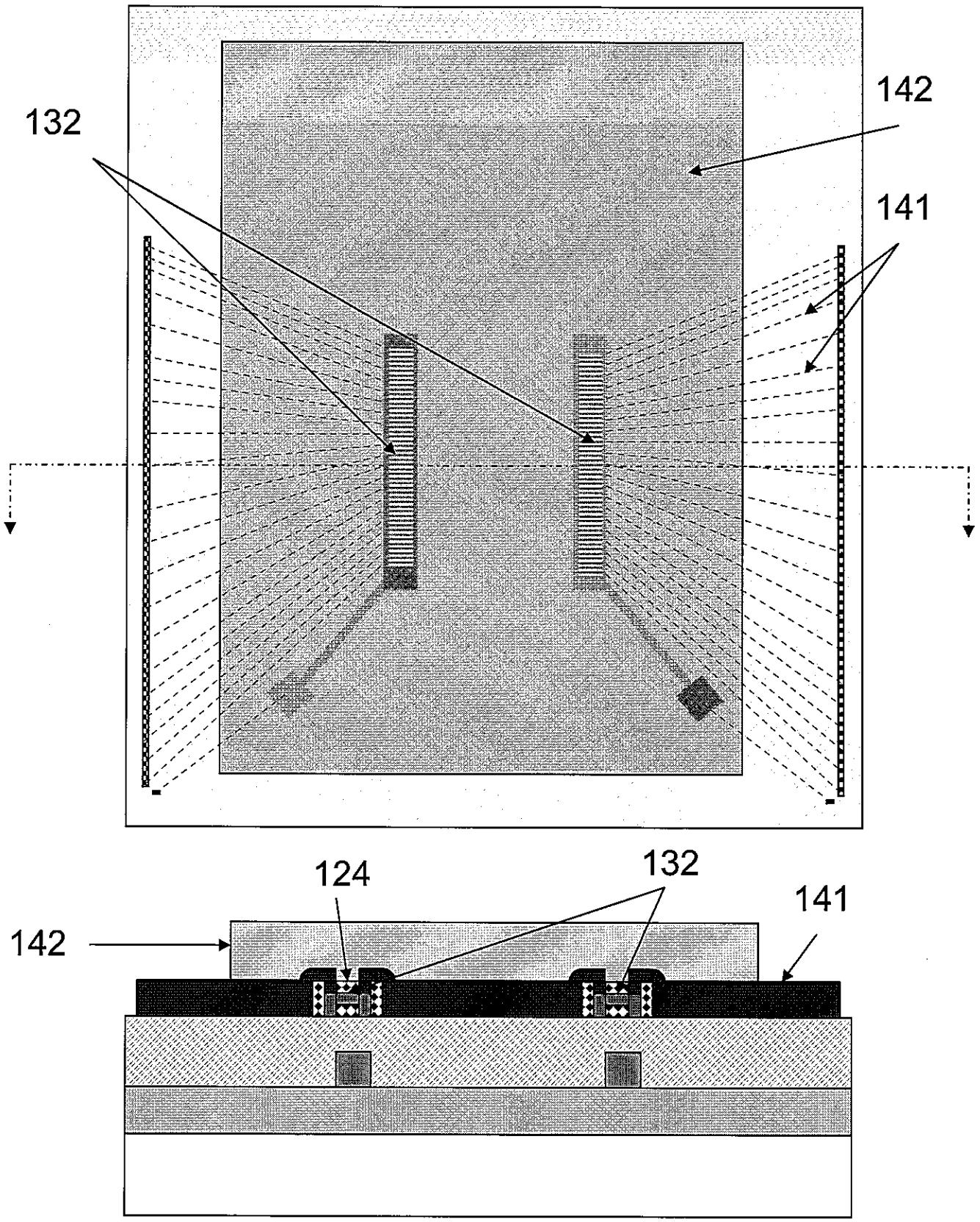


Figure 9M

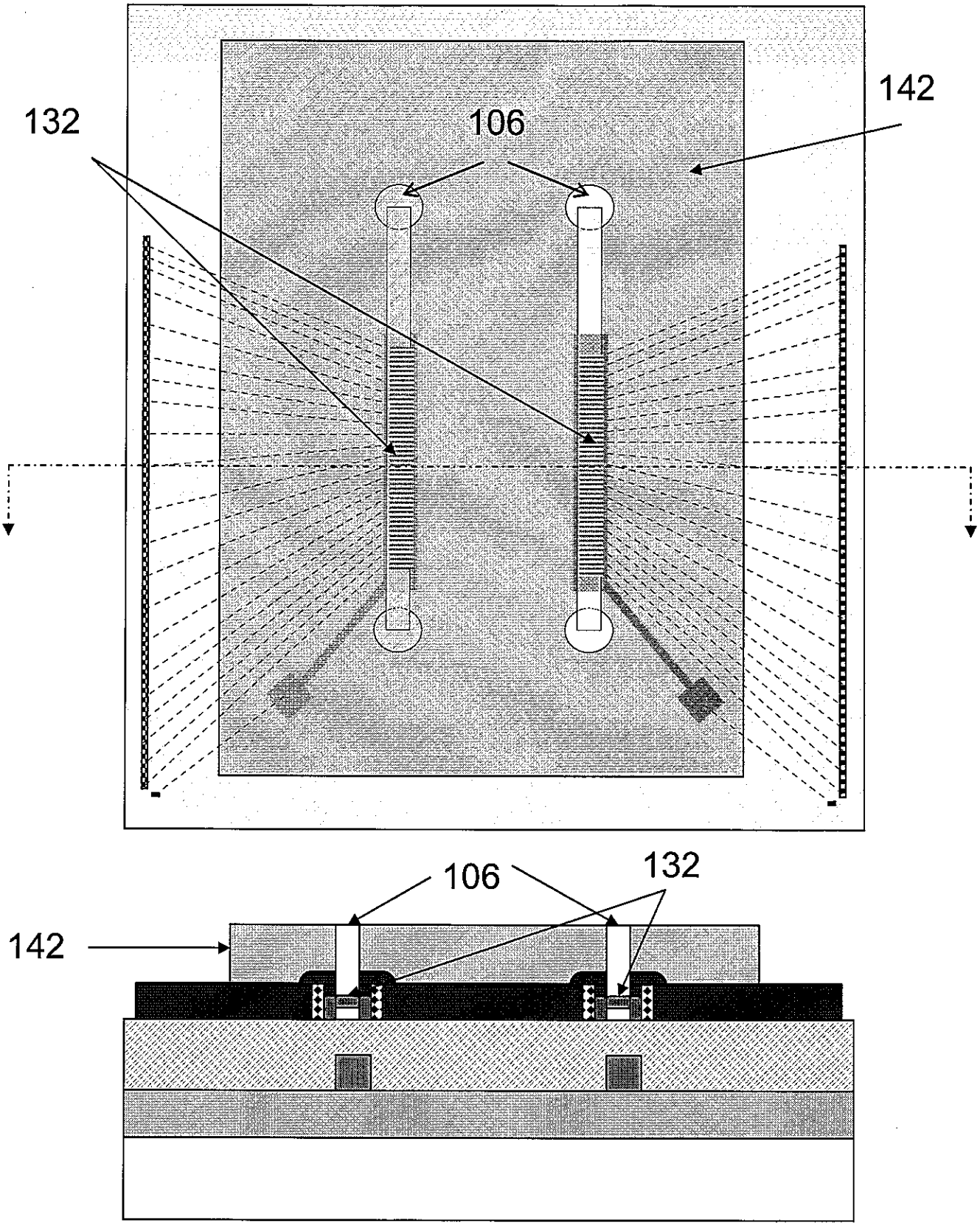


Figure 9N

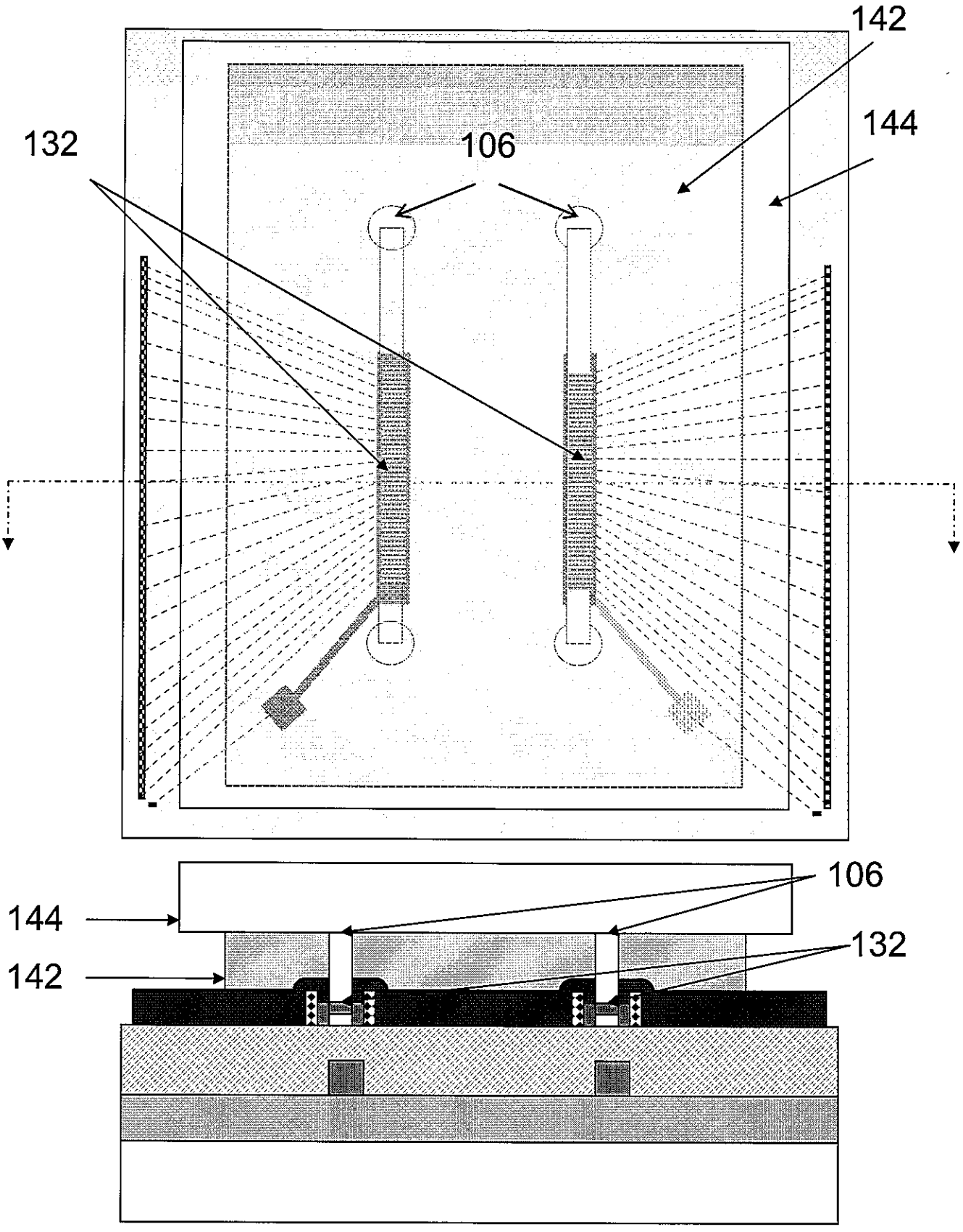


Figure 10

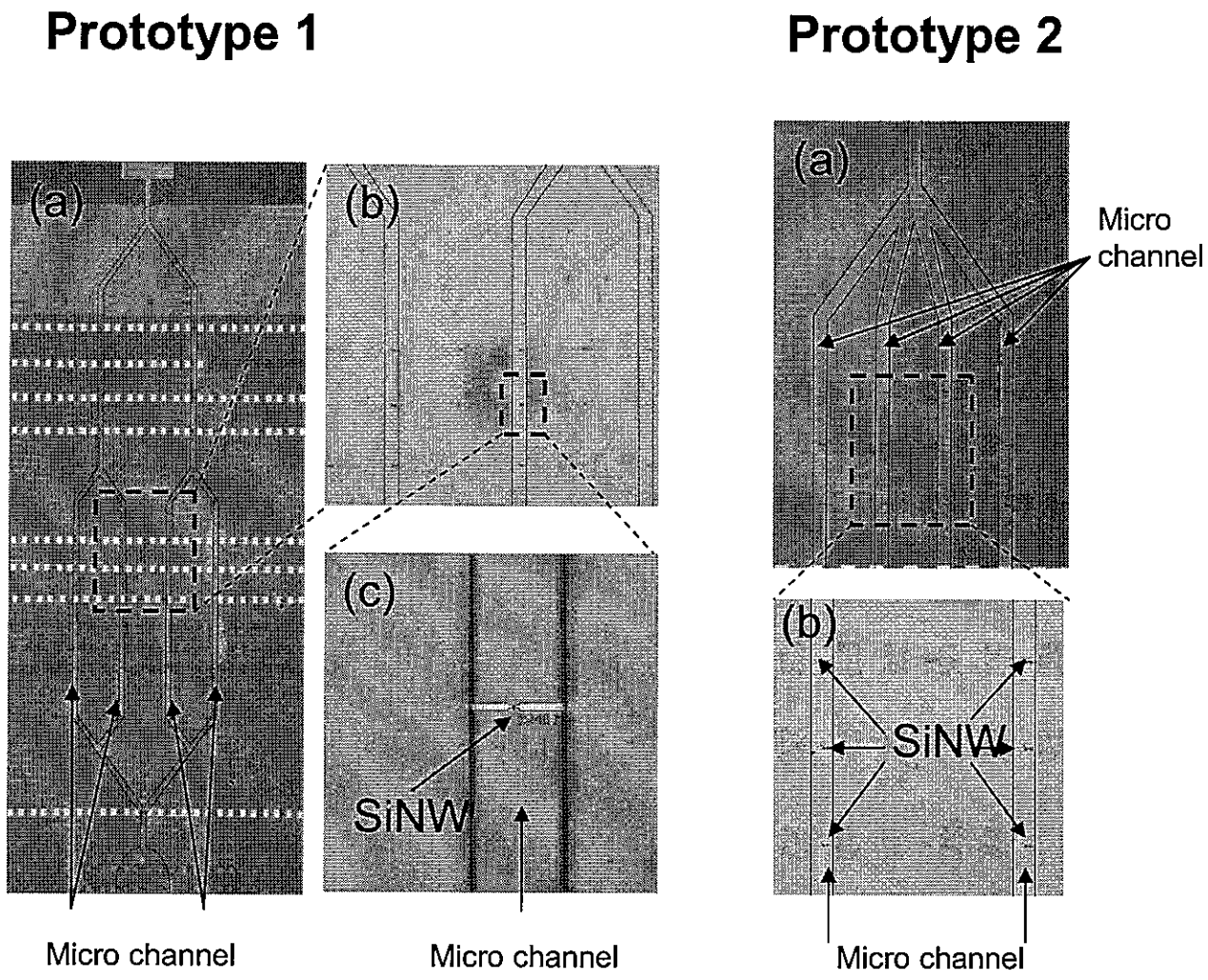

Prototype 1
Prototype 2
(a)
(b)
(c)
SiNW
Micro channel
Micro channel
(a)
Micro channel
(b)
SiNW
Micro channel

Figure 11

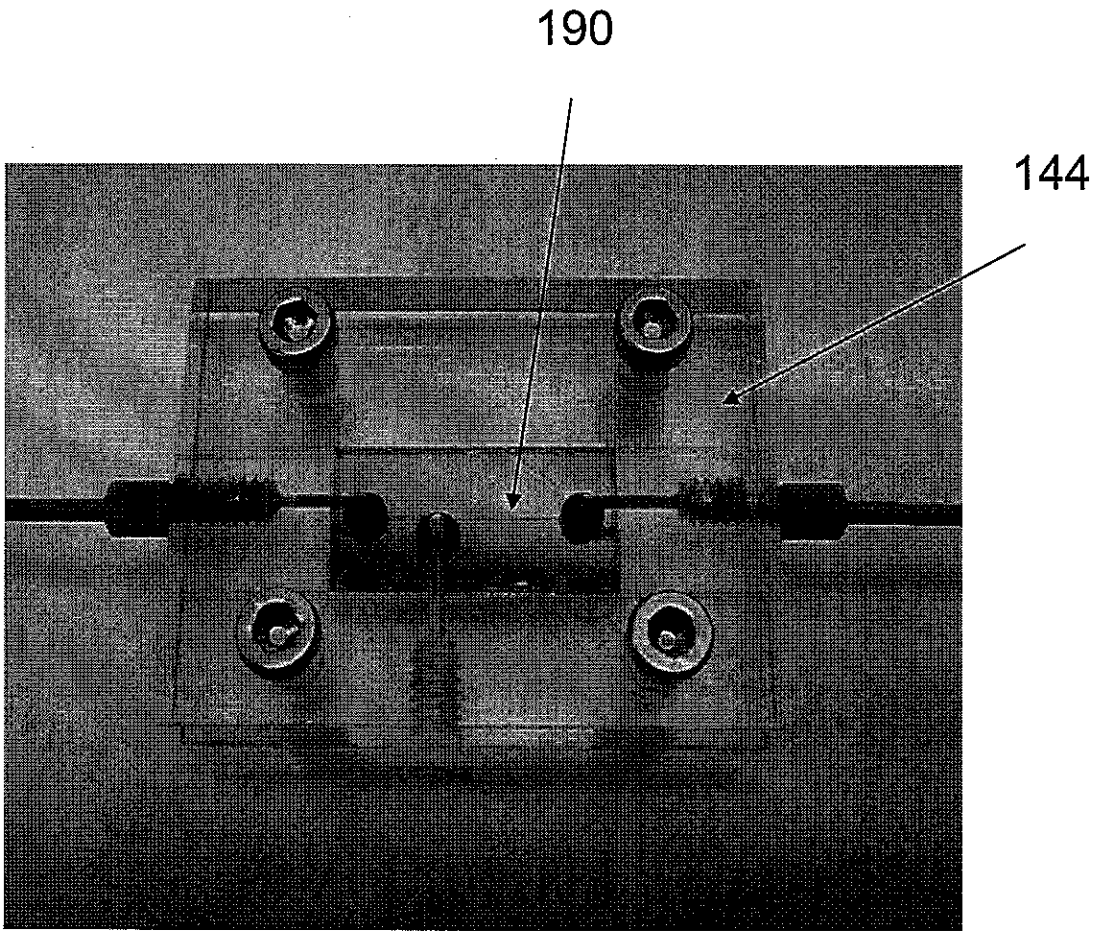


Figure 12A

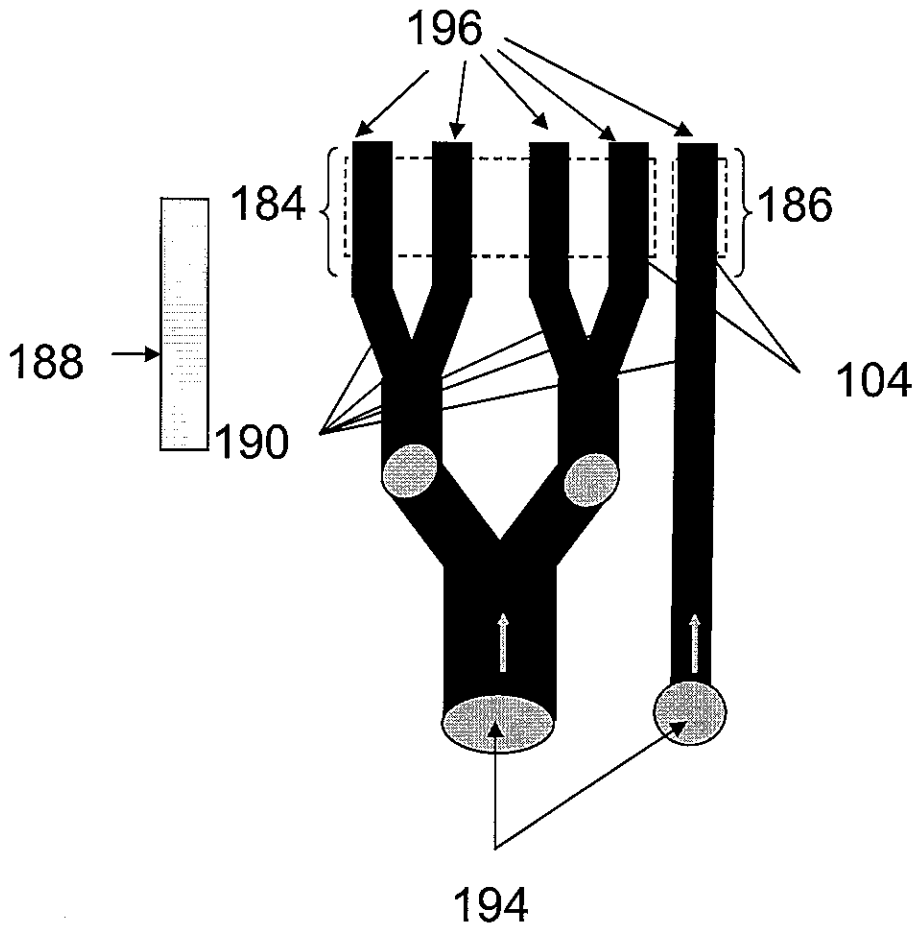


Figure 12B

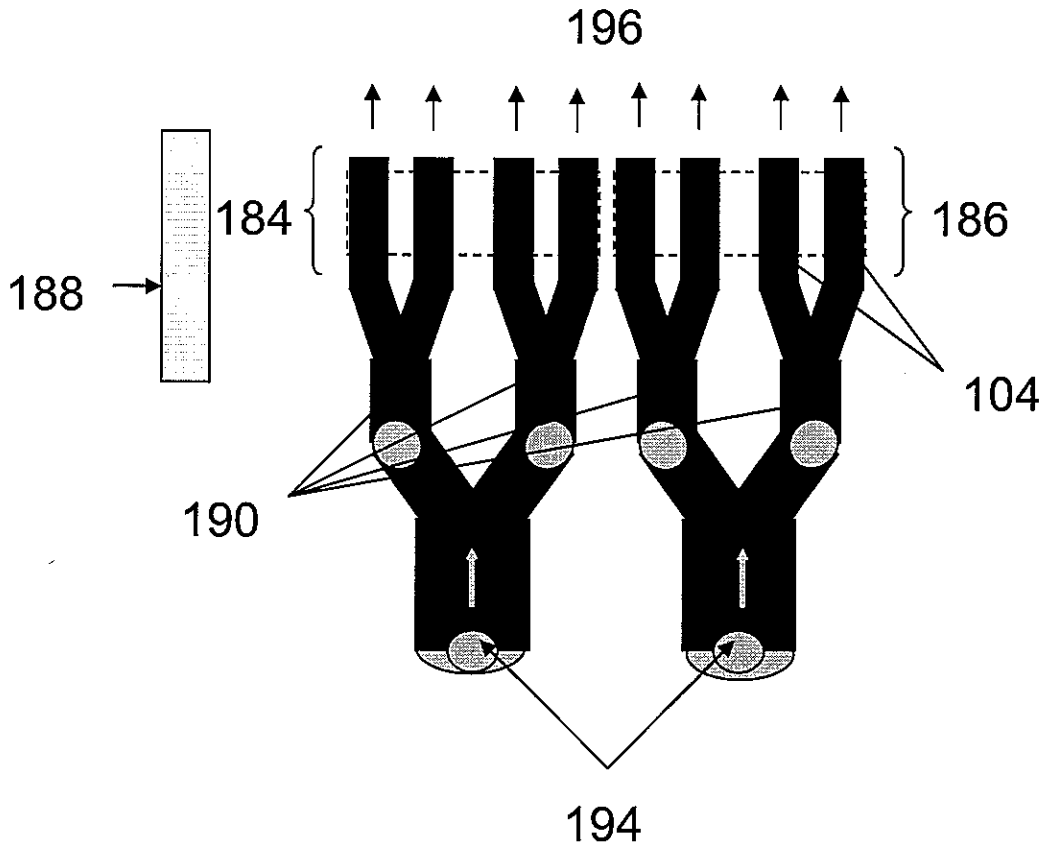


Figure 13A

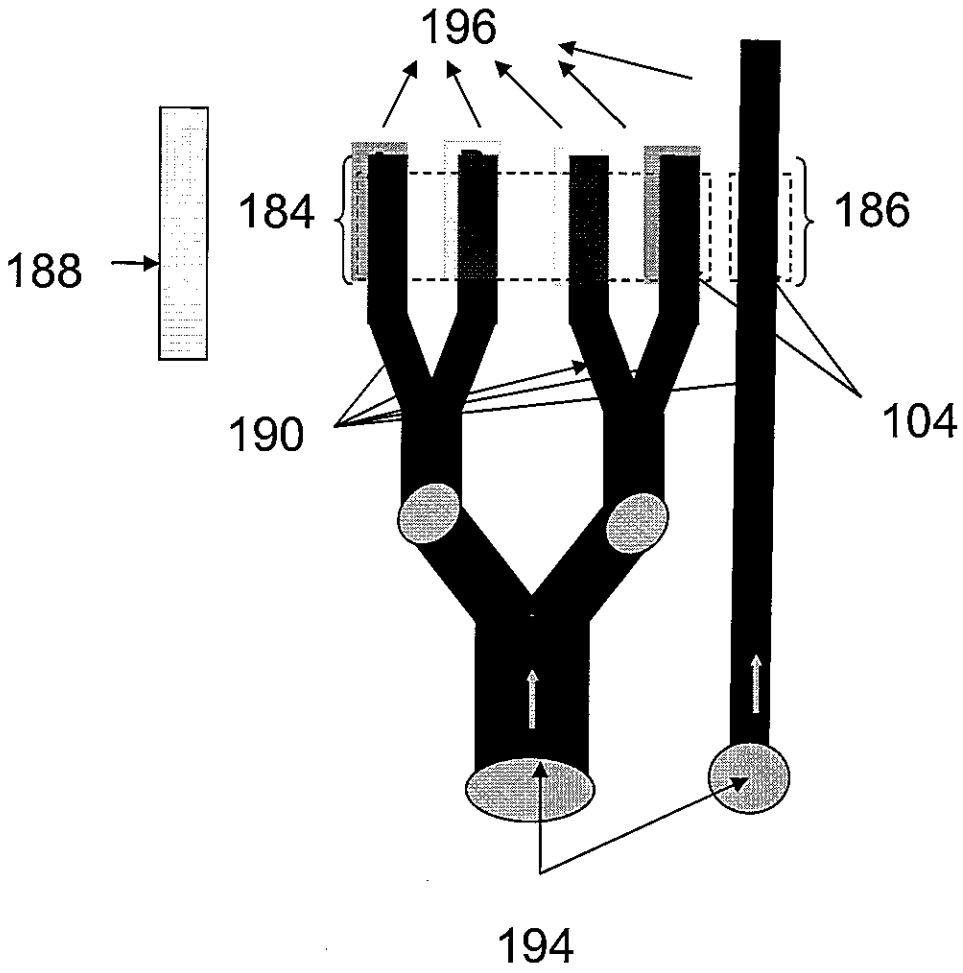


Figure 13B

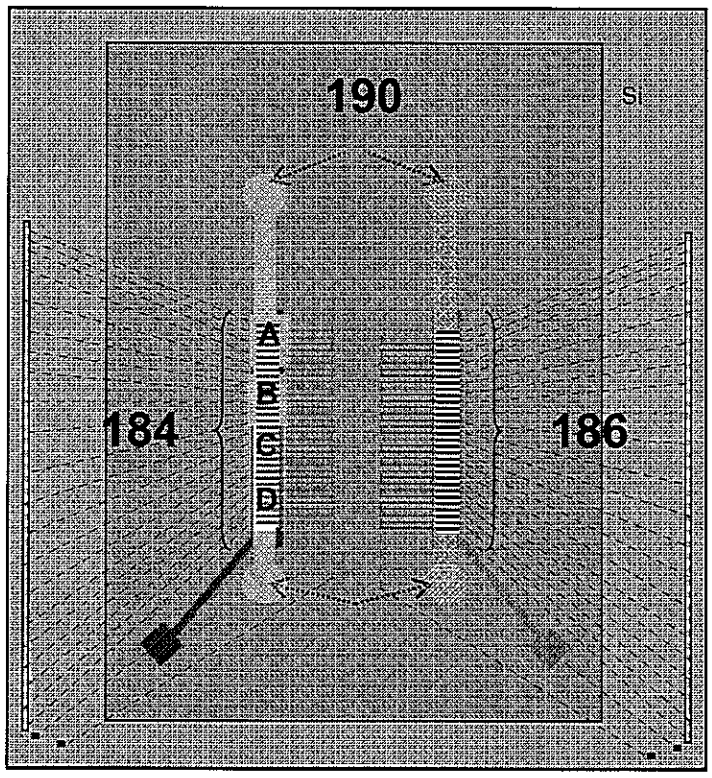


Figure 14A

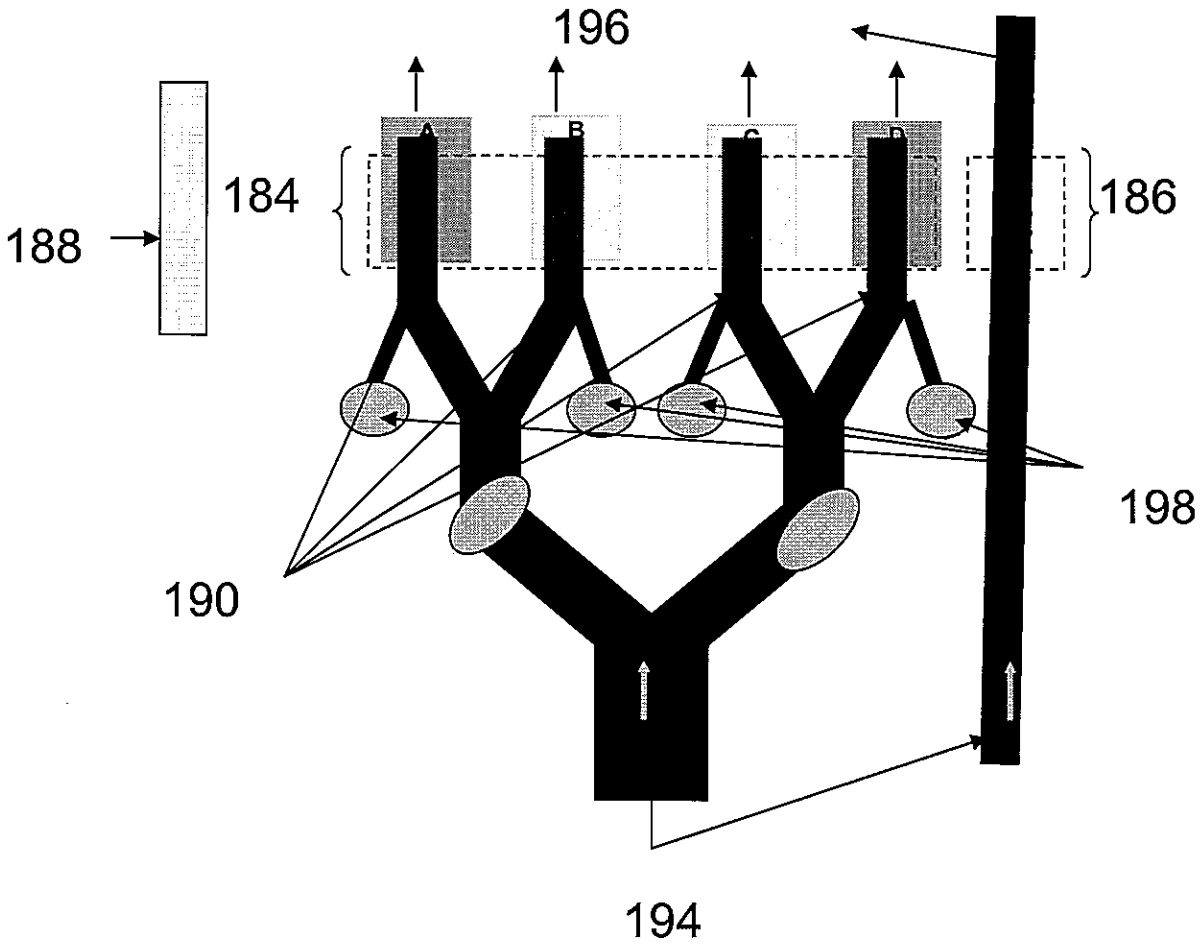


Figure 14B

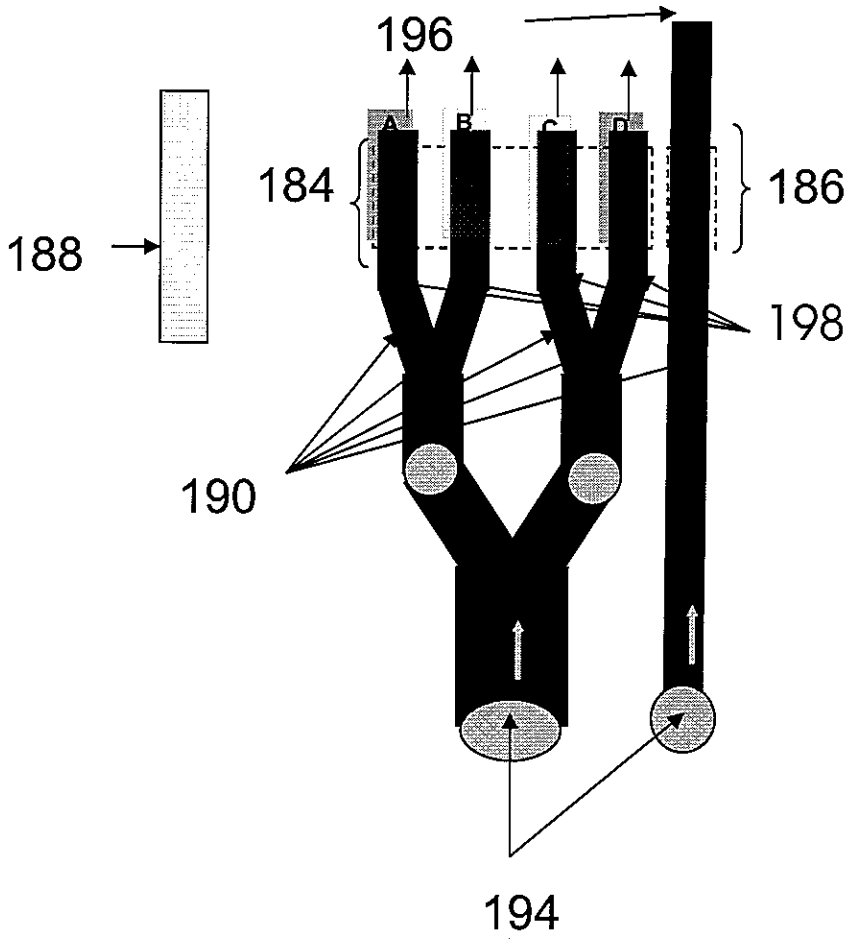


Figure 15

104

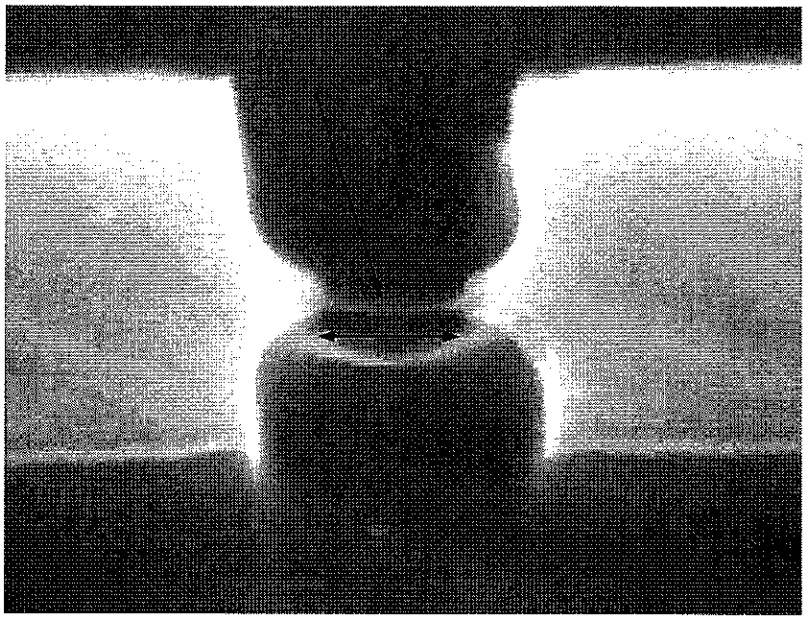


Figure 16A

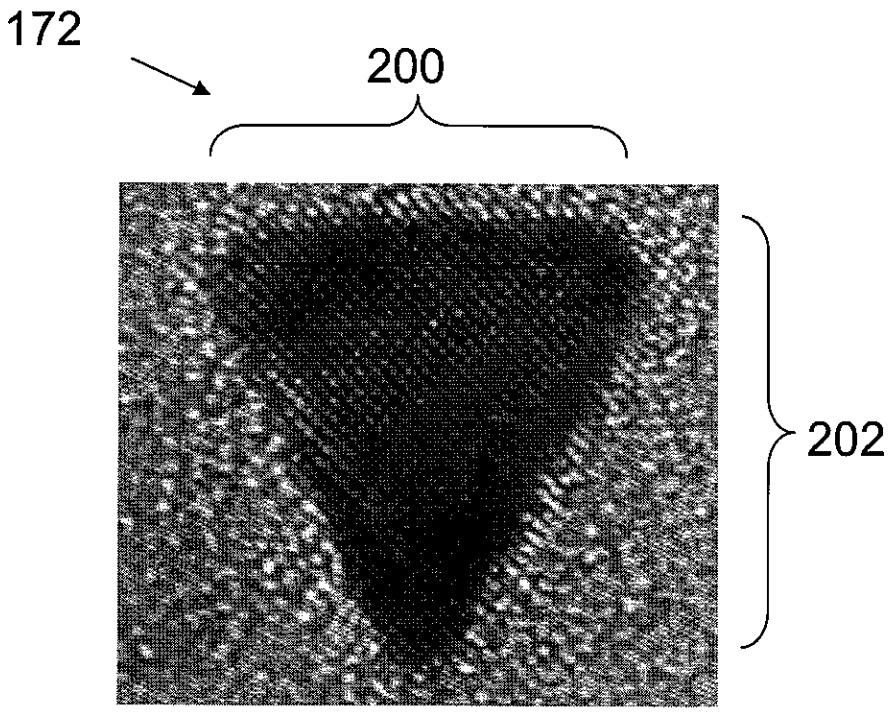


Figure 16B

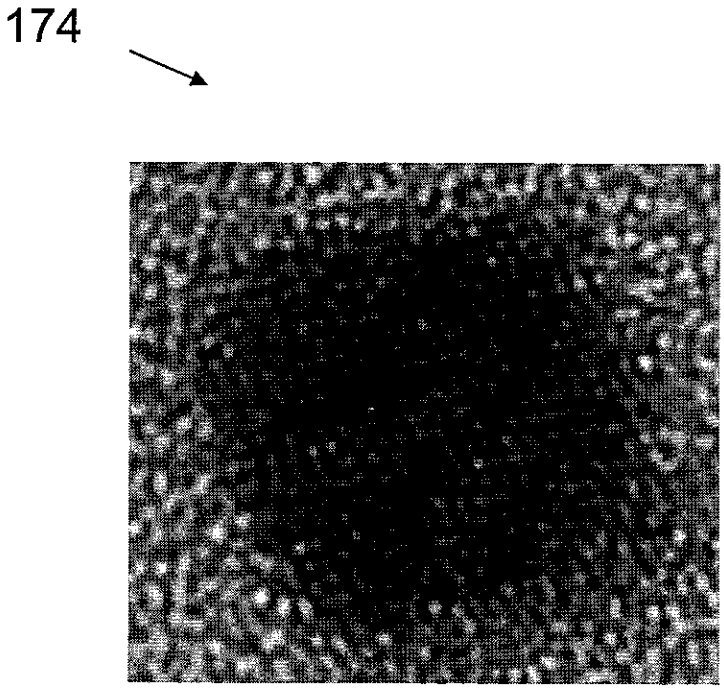


Figure 17

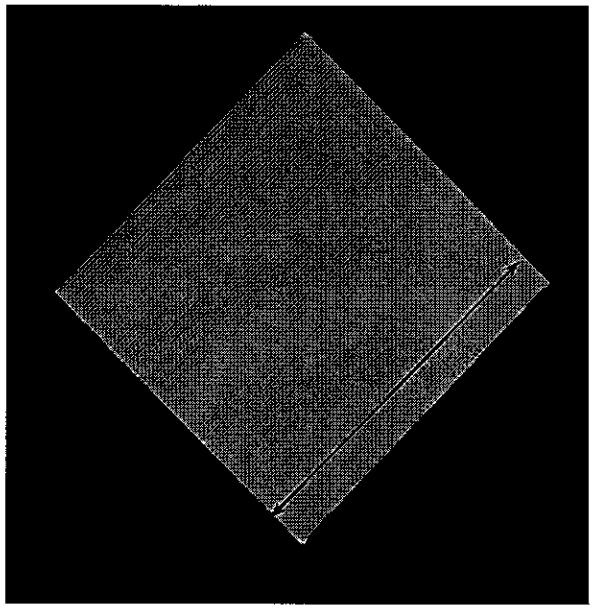


Figure 18

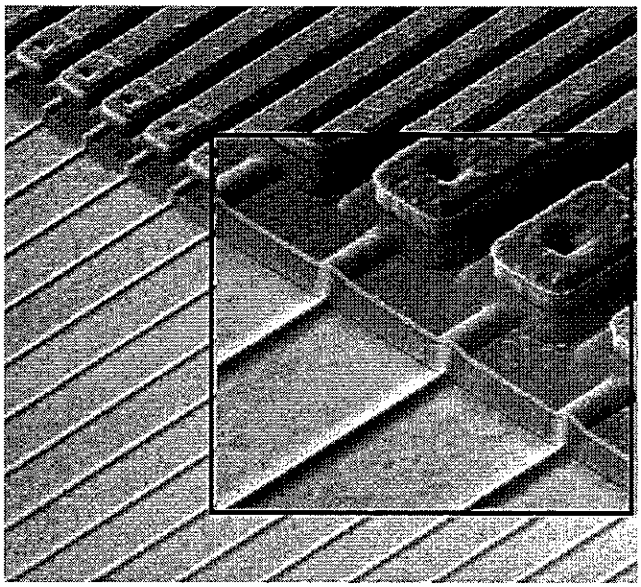


Figure 19A

176

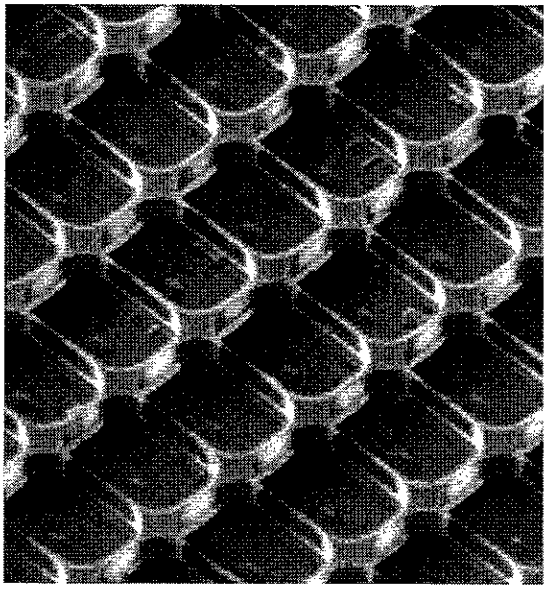


Figure 19B

176

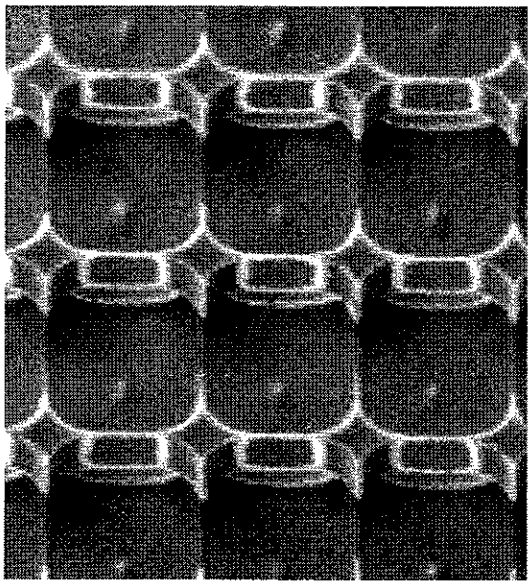


Figure 20

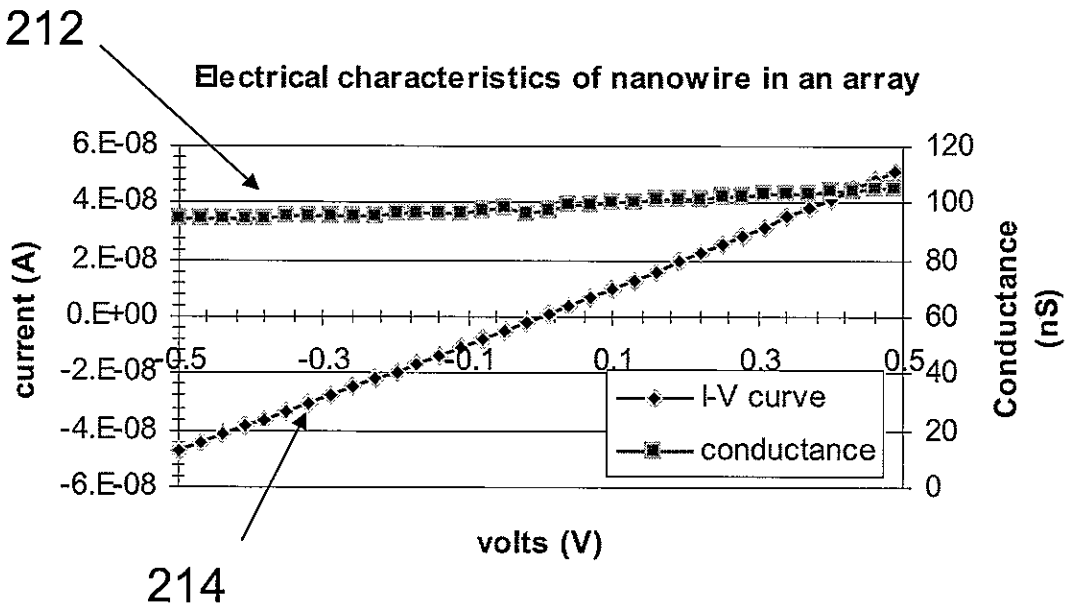

212
Electrical characteristics of nanowire in an array
6.E-08
4.E-08
2.E-08
0.E+00
-2.E-08
-4.E-08
-6.E-08
current (A)
-0.5
-0.3
-0.1
0.1
0.3
0.5
volts (V)
120
100
80
60
40
20
0
Conductance (nS)
I-V curve
conductance
214

Figure 21A

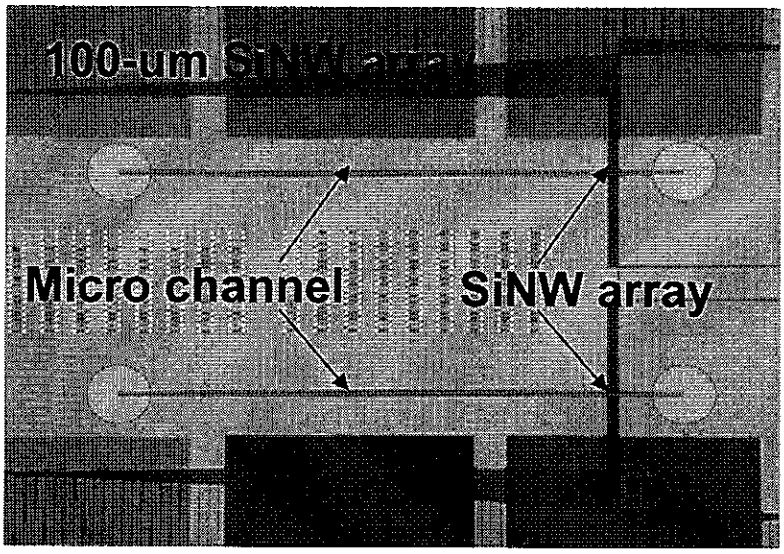


Figure 21B

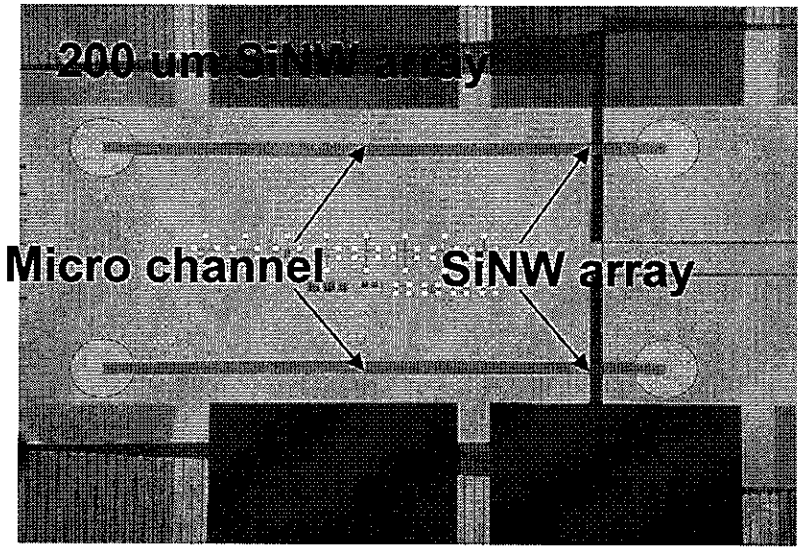


Figure 21C

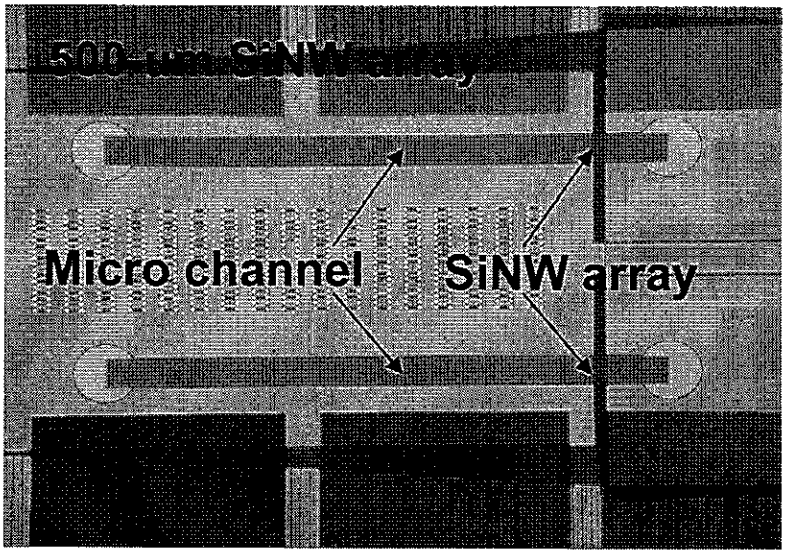


Figure 21D

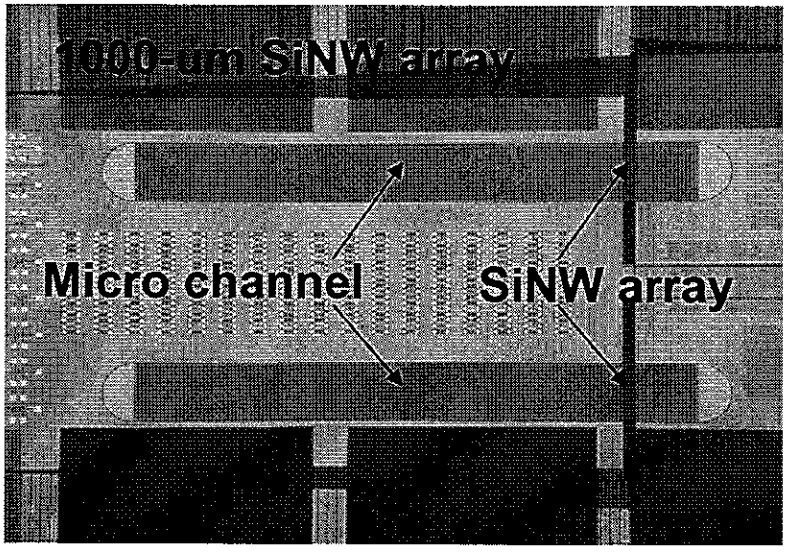


Figure 22A

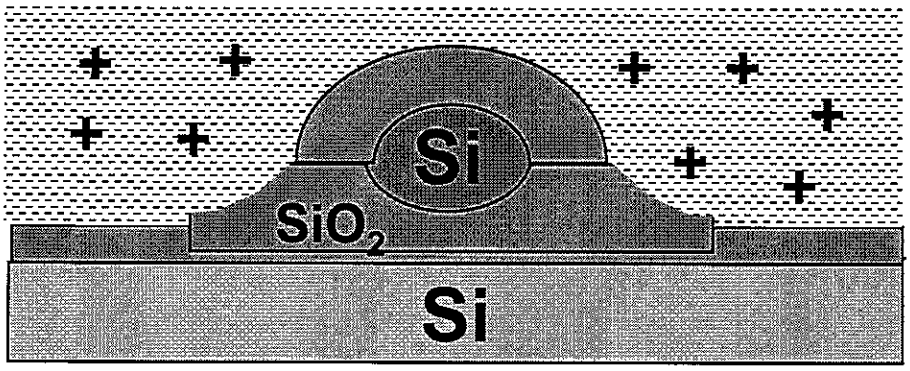


Figure 22B

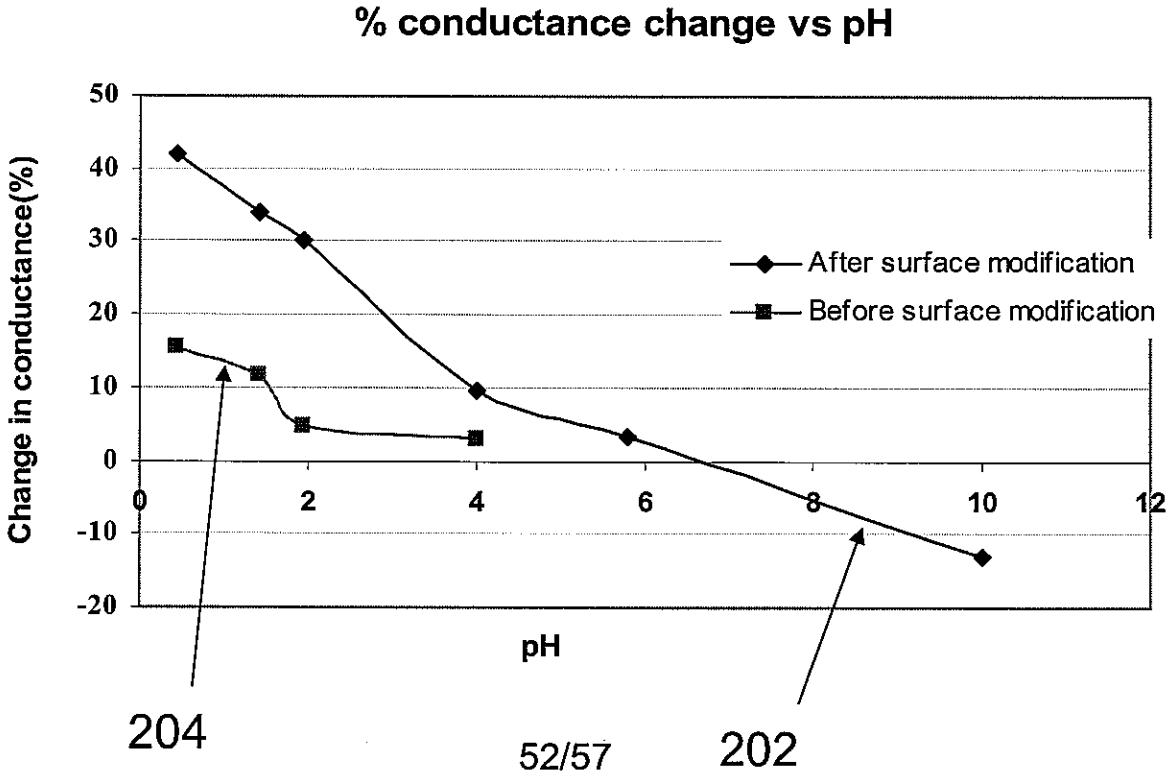


Figure 23

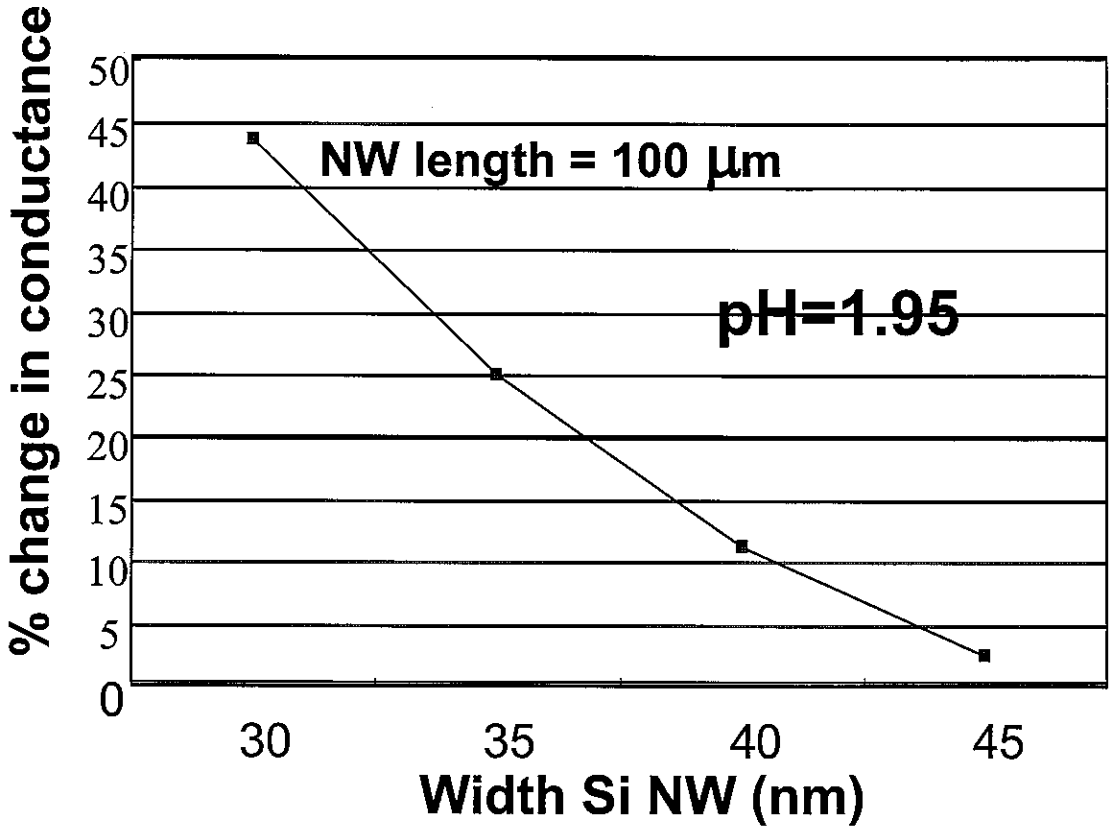

% change in conductance
50
45
40
35
30
25
20
15
10
5
0
NW length = 100 µm
pH=1.95
30
35
40
45
Width Si NW (nm)

Figure 24A

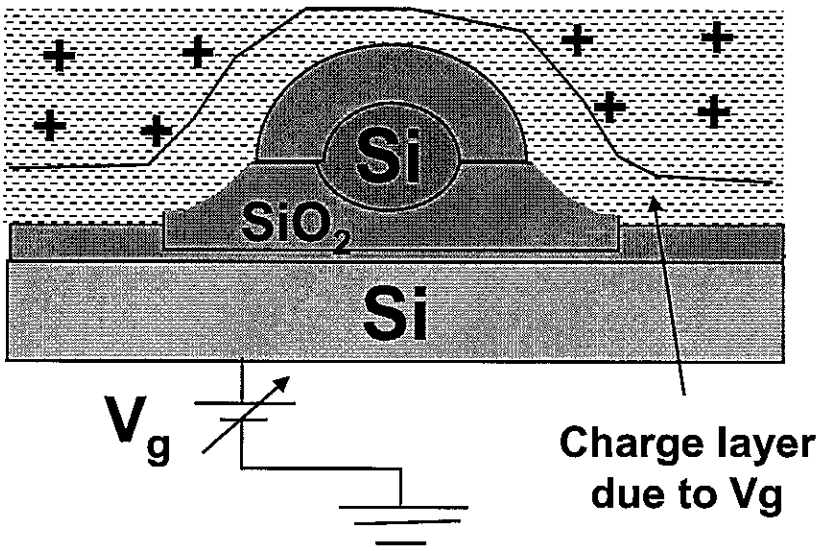


Figure 24B

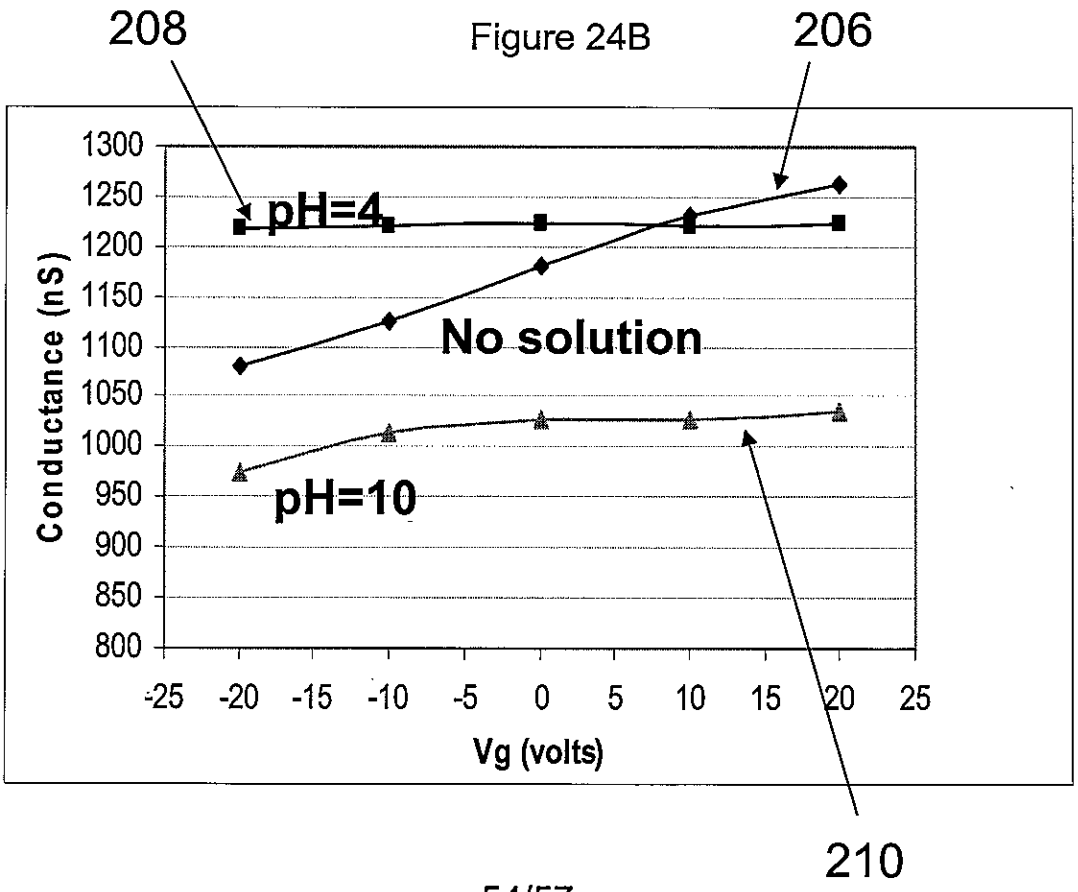


Figure 25

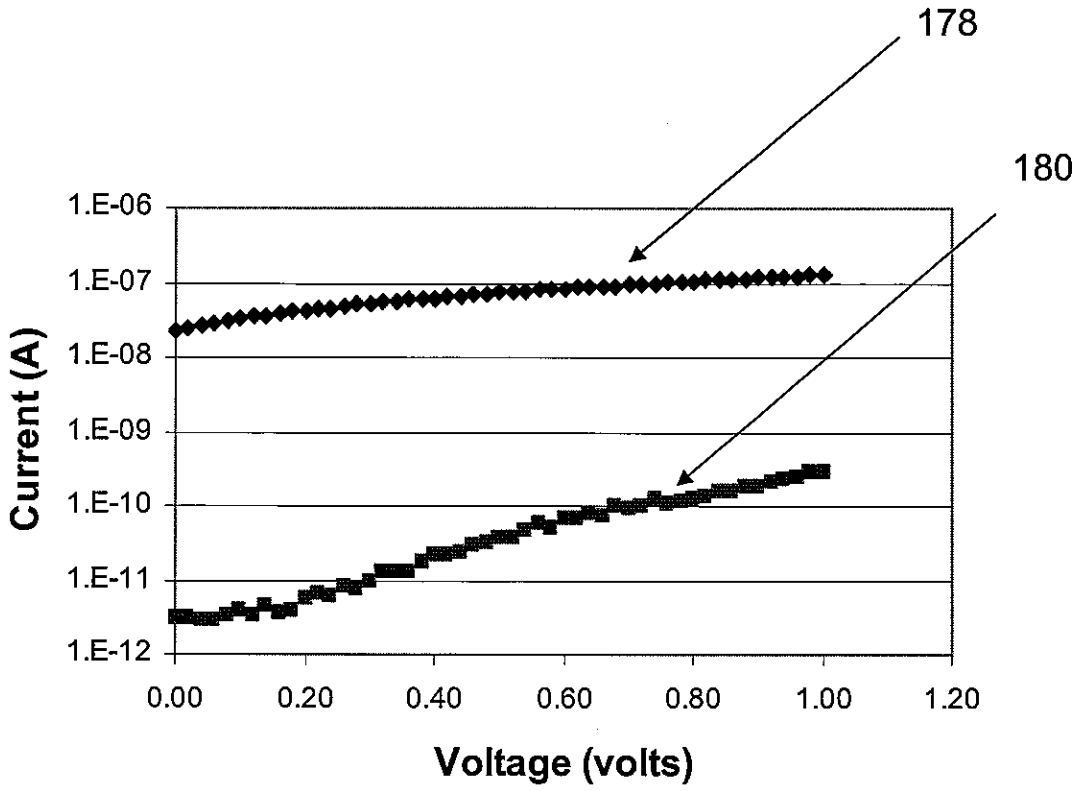

178
180
1.E-06
1.E-07
1.E-08
1.E-09
1.E-10
1.E-11
1.E-12
Current (A)
0.00
0.20
0.40
0.60
0.80
1.00
1.20
Voltage (volts)

Figure 26A

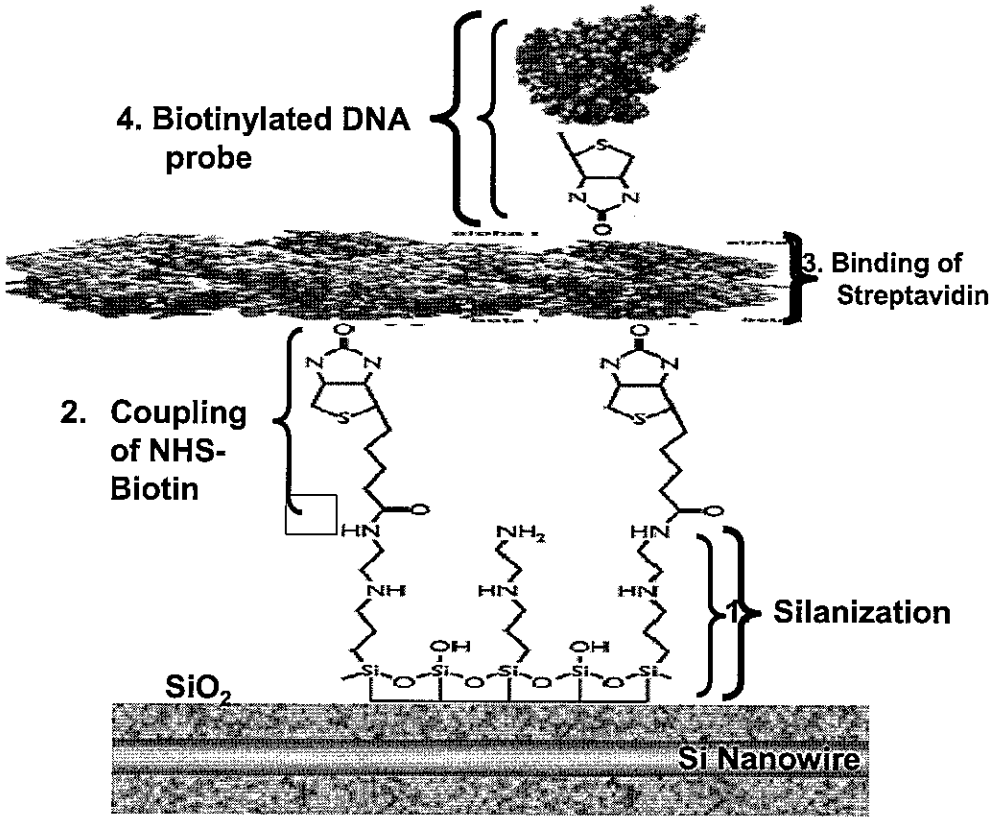
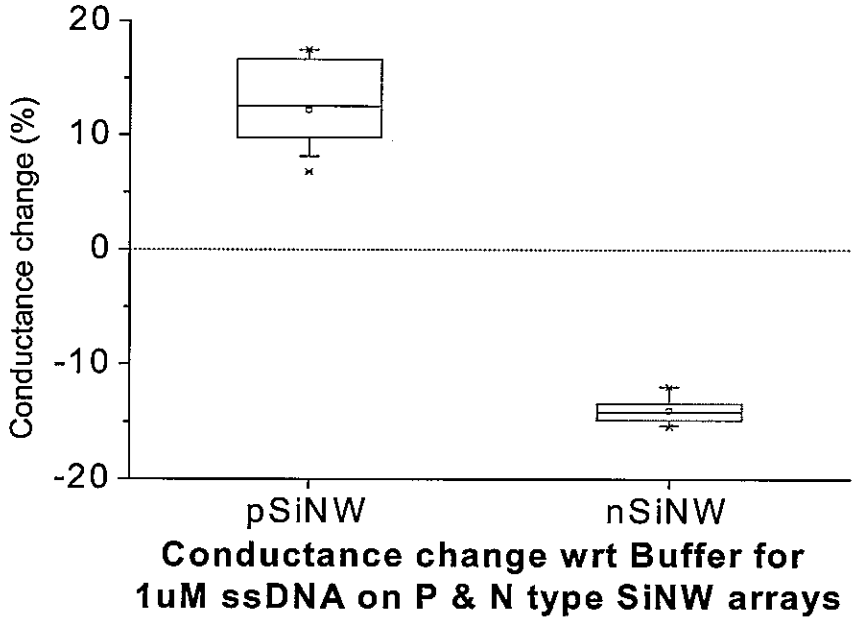
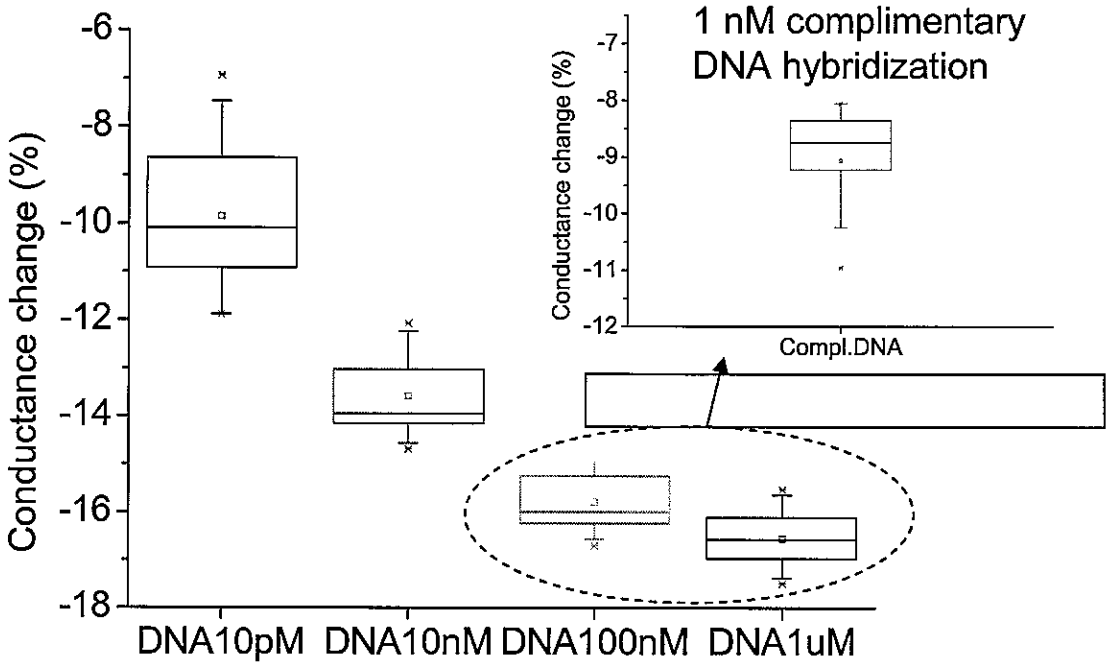


Figure 26B



Conductance change wrt Buffer for 1uM ssDNA on P & N type SiNW arrays

Figure 27



Conductance change wrt Buffer for ssDNA on N type SiNW arrays

SEQUENCE LISTING

<110> Agency for Science, Technology and Research (ASTAR)
<120> Methods for electrochemical detection/quantification of a nucleic acid
<160> 2
<170> MS Word for Windows

<210> 1
<211> 18
<212> DNA
<213> artificial sequence

<220>
<221> misc_binding
<223> primer E. coli K12 capture

<400> 1

ttaactttac tcccttcc 18

<210> 2
<211> 35
<212> DNA
<213> artificial sequence

<220>
<221> misc_binding
<223> E. coli K12

<400> 2

ggaagggagt aaagttaata cctttgctca ttgacg 35