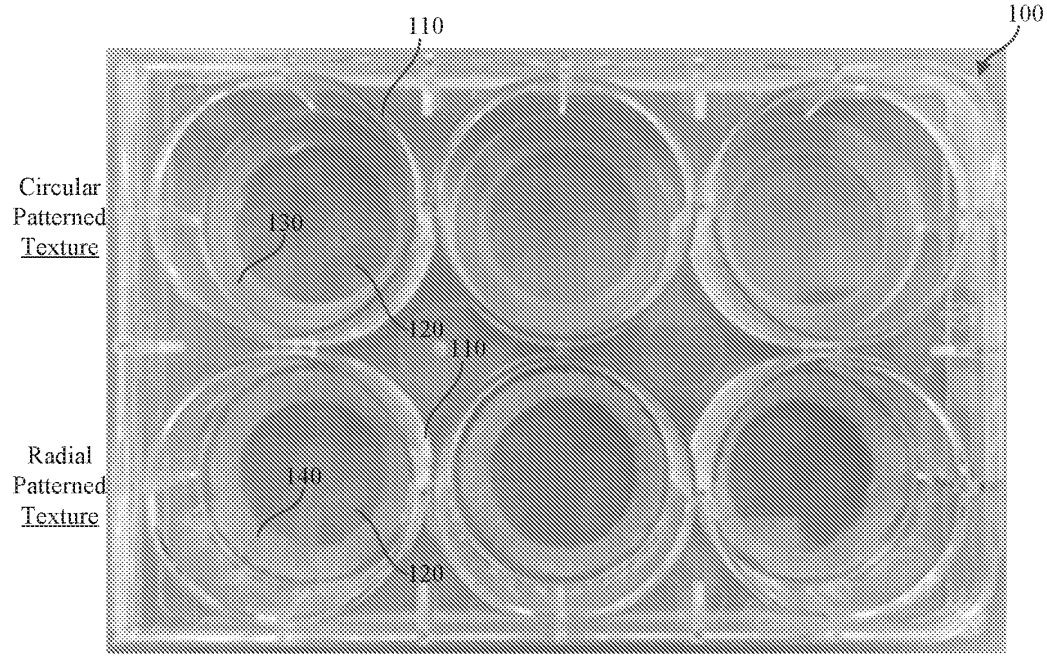

110
100
Circular Patterned Texture
130
120
110
Radial Patterned Texture
140
120

FIG. 1A

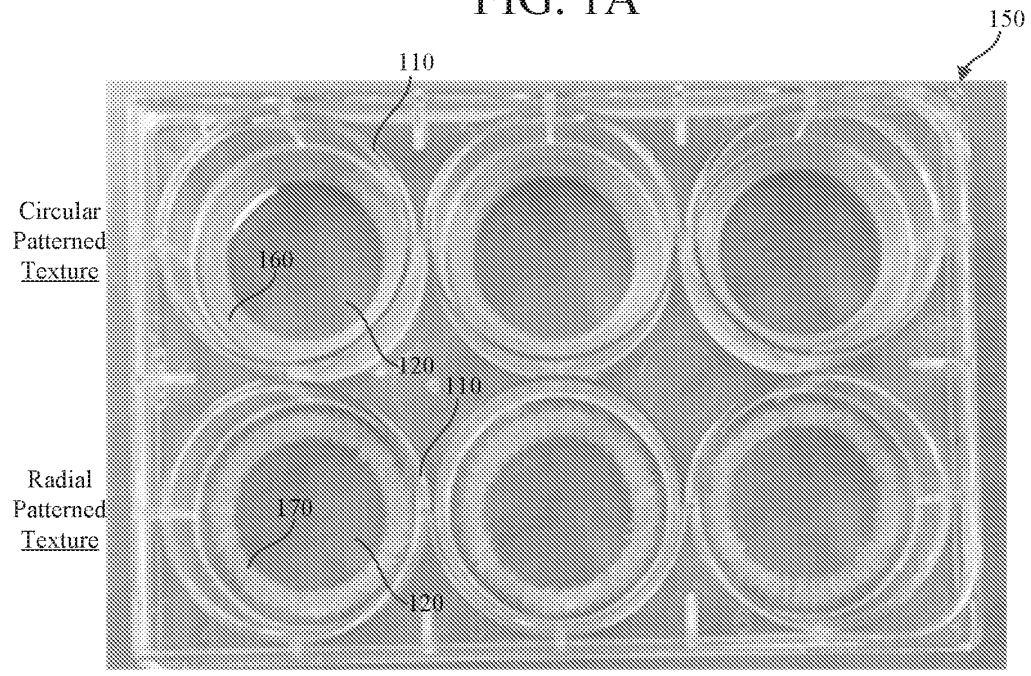

150
110
Circular Patterned Texture
160
120
110
Radial Patterned Texture
170
120

FIG. 1B

60 grit Circular Patterned Texture

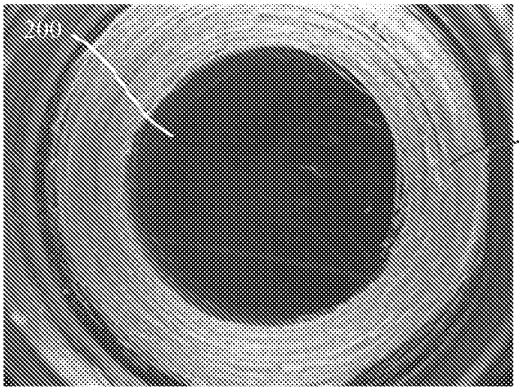


FIG. 2A

150 grit Circular Patterned Texture

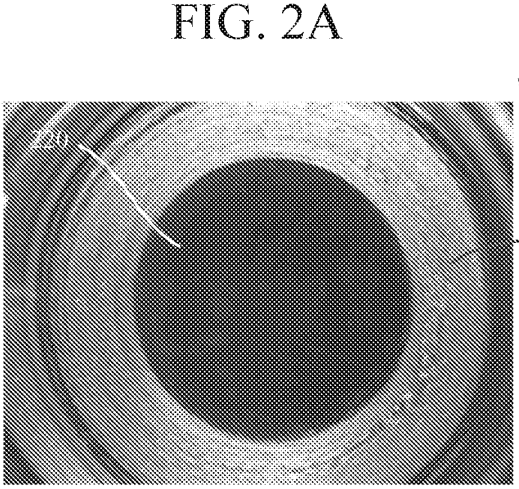


FIG. 2B

800 grit Circular Patterned Texture

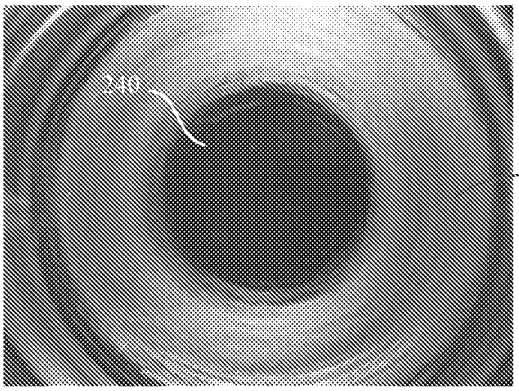


FIG. 2C

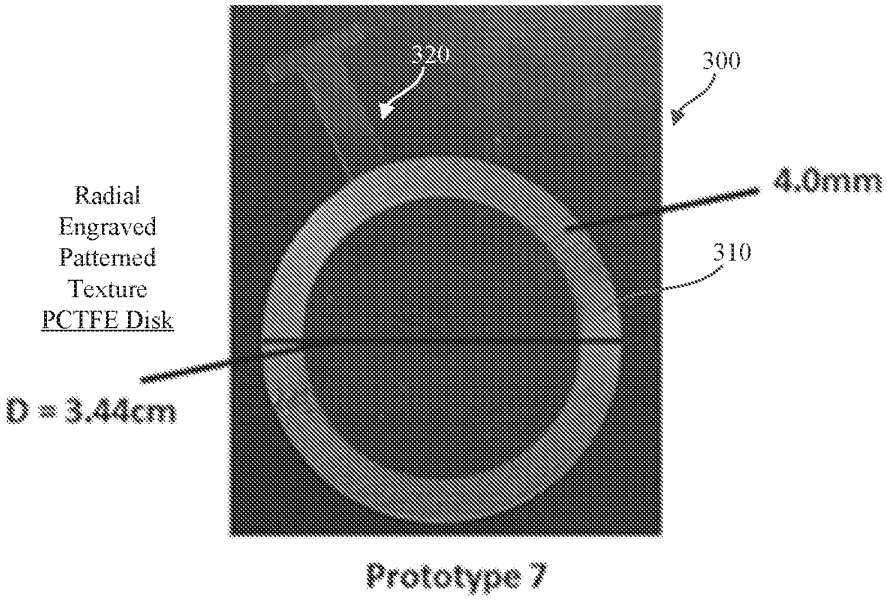


FIG. 3A

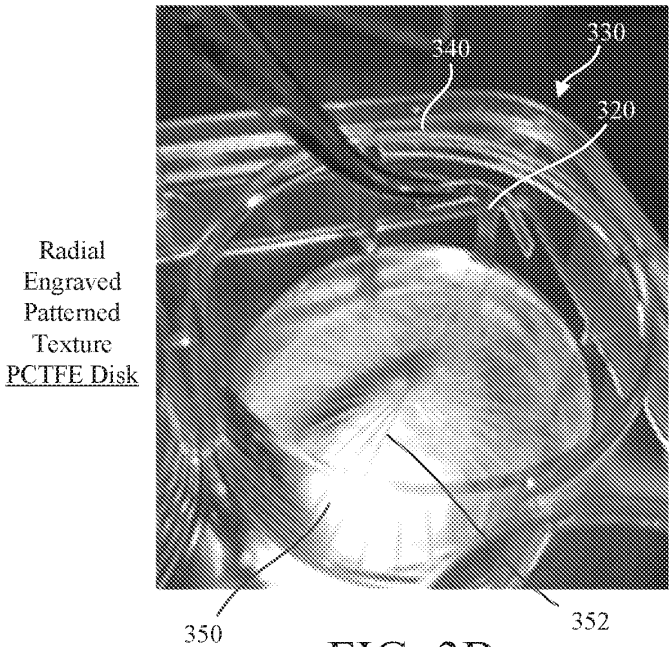


FIG. 3B

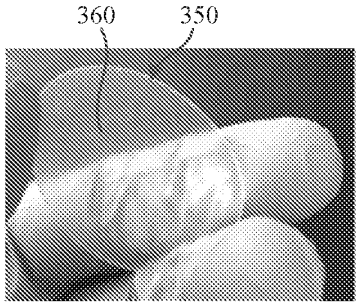


FIG. 3C

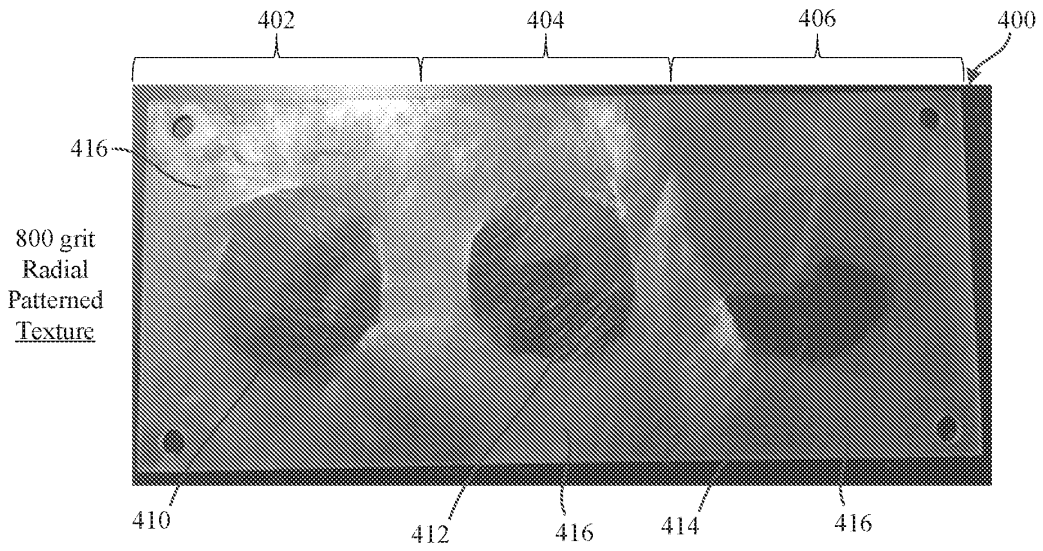

402
404
406
400
416
800 grit
Radial
Patterned
Texture
410
412
416
414
416

FIG. 4A

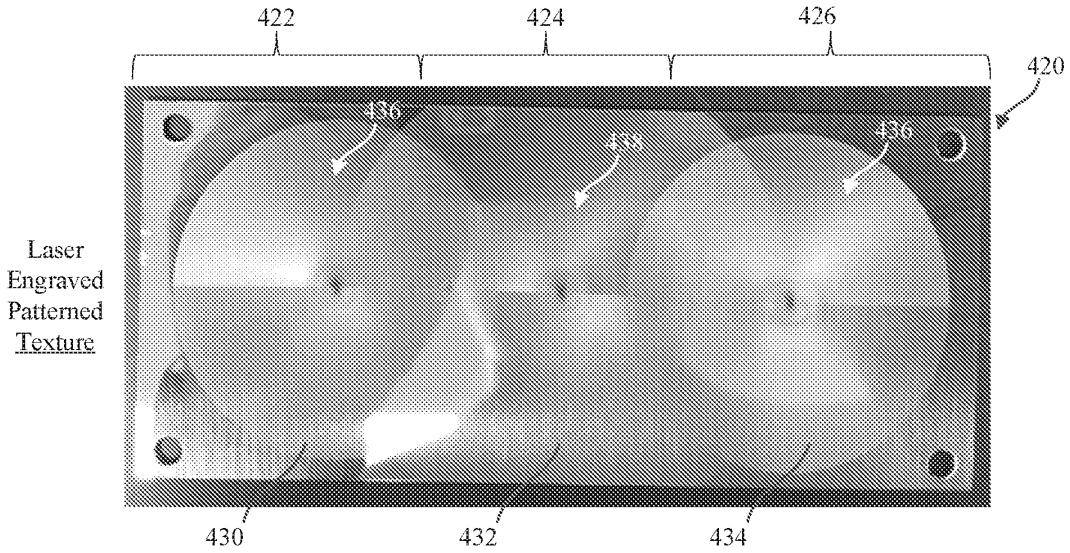

422
424
426
420
436
438
436
Laser
Engraved
Patterned
Texture
430
432
434

FIG. 4B

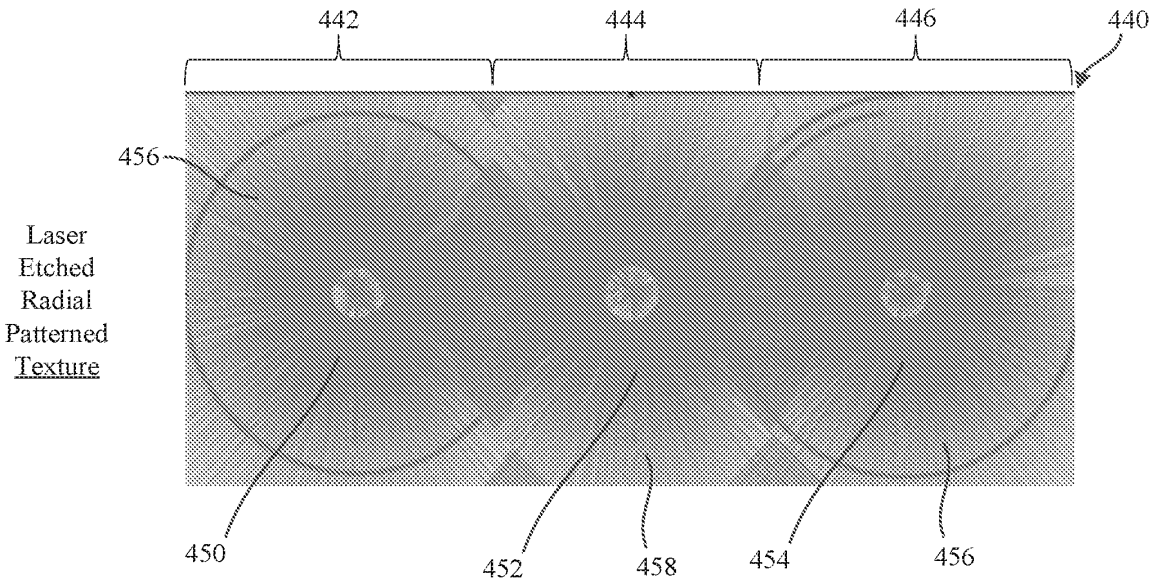
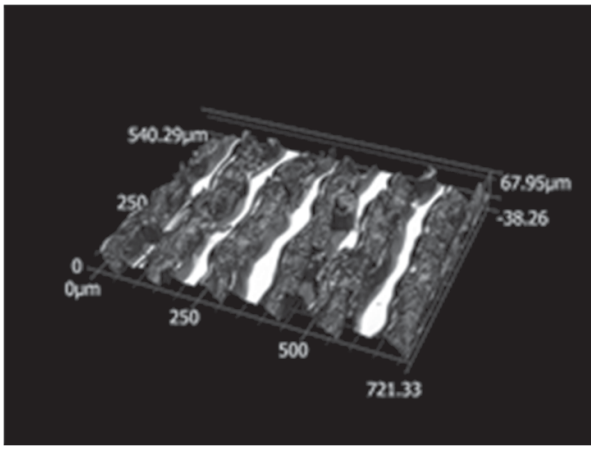

442
444
446
440
456
Laser
Etched
Radial
Patterned
Texture
450
452
458
454
456

FIG. 4C

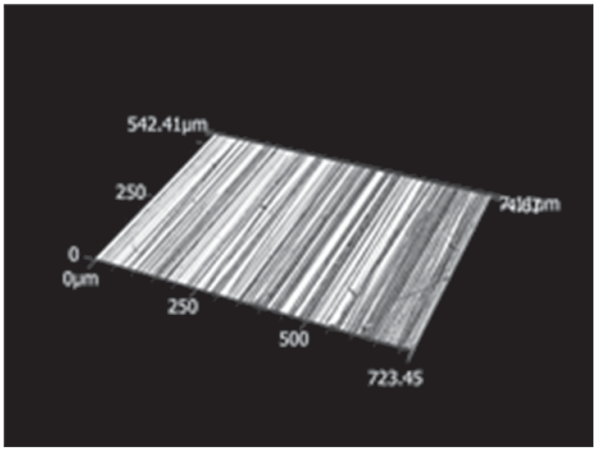
Die-Cut Patterned Texture



500

FIG. 5A

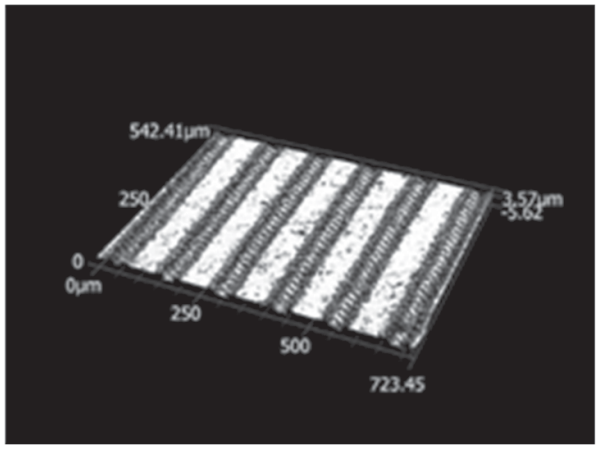
800 grit Patterned Texture



510

FIG. 5B

Laser Engraved Patterned Texture



520

FIG. 5C

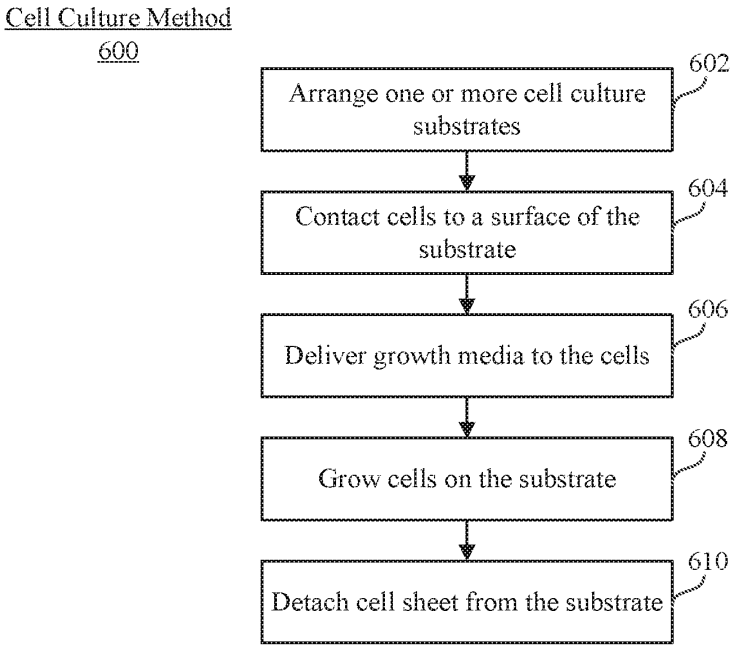

Cell Culture Method
600
Arrange one or more cell culture substrates
602
Contact cells to a surface of the substrate
604
Deliver growth media to the cells
606
Grow cells on the substrate
608
Detach cell sheet from the substrate
610

FIG. 6

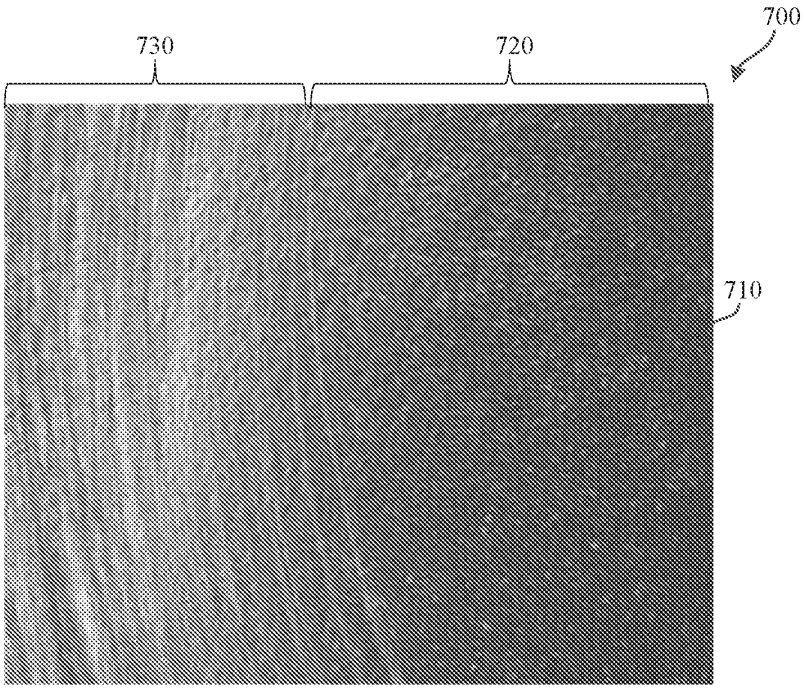


FIG. 7A

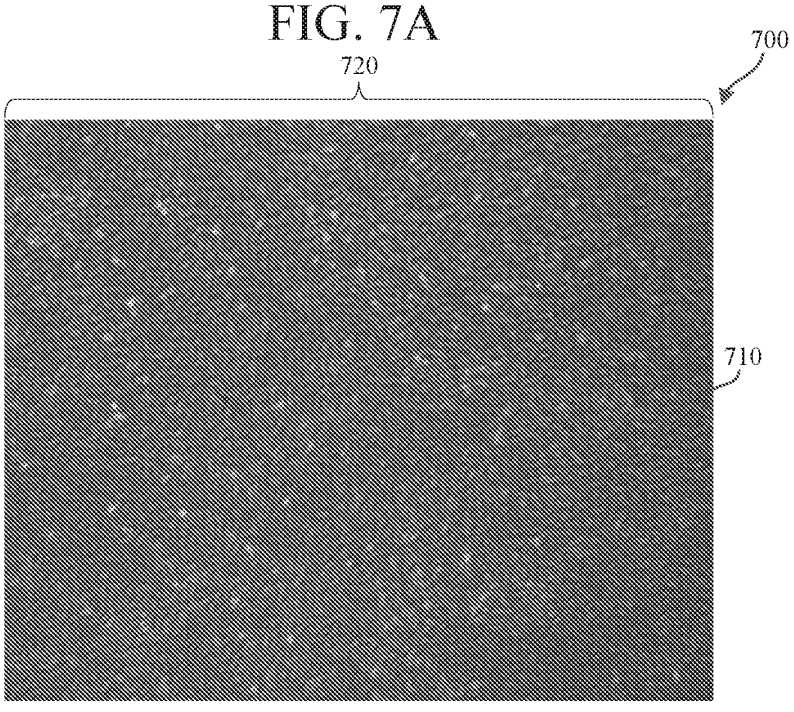


FIG. 7B

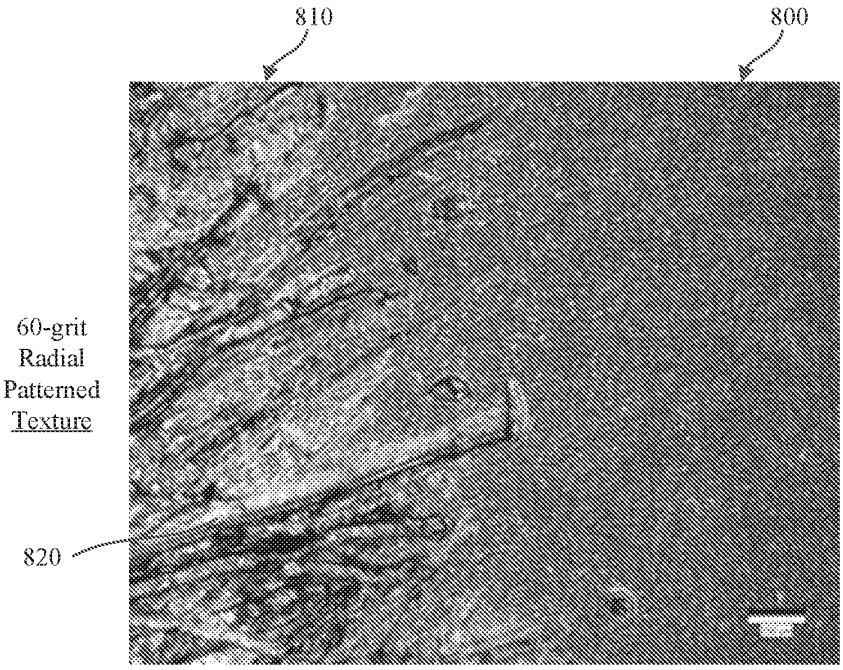

810
800
60-grit
Radial
Patterned
Texture
820

FIG. 8A

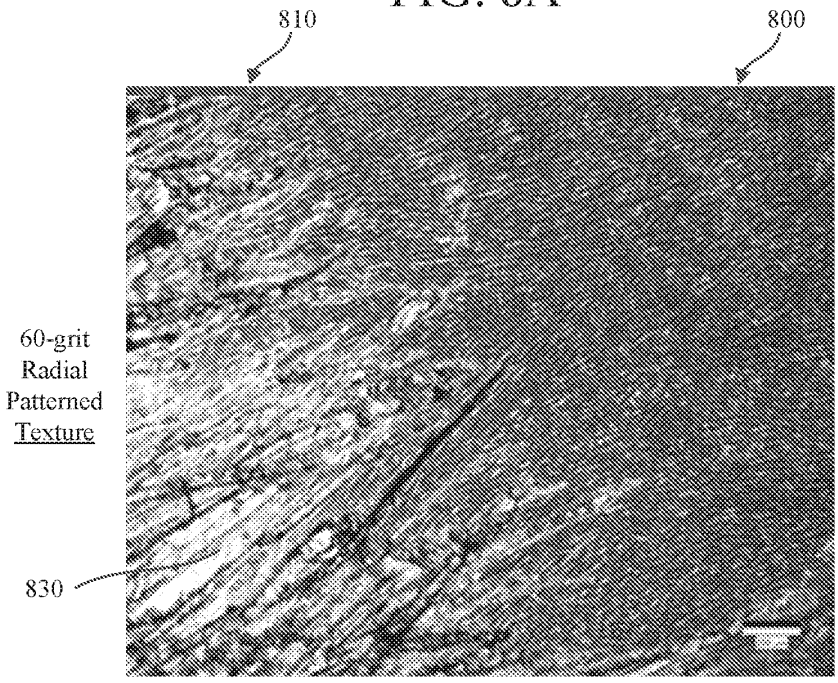

810
800
60-grit
Radial
Patterned
Texture
830

FIG. 8B

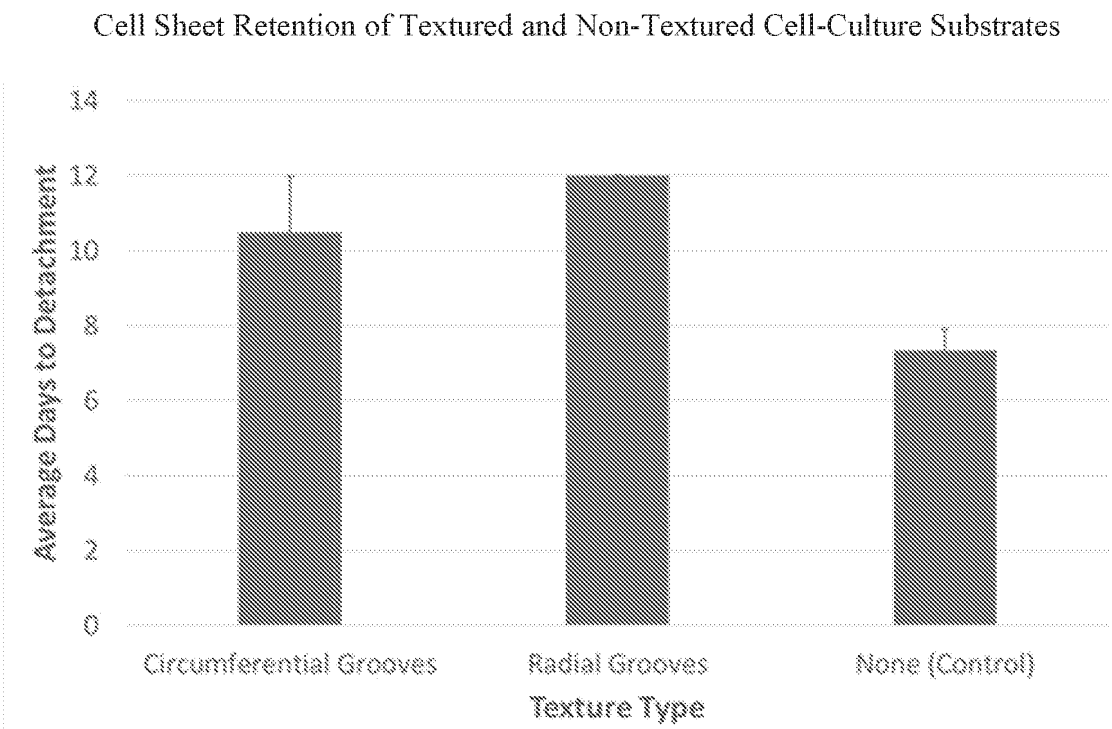

Cell Sheet Retention of Textured and Non-Textured Cell-Culture Substrates
Average Days to Detachment
14
12
10
8
6
4
2
0
Circumferential Grooves
Radial Grooves
None (Control)
Texture Type

FIG. 9A

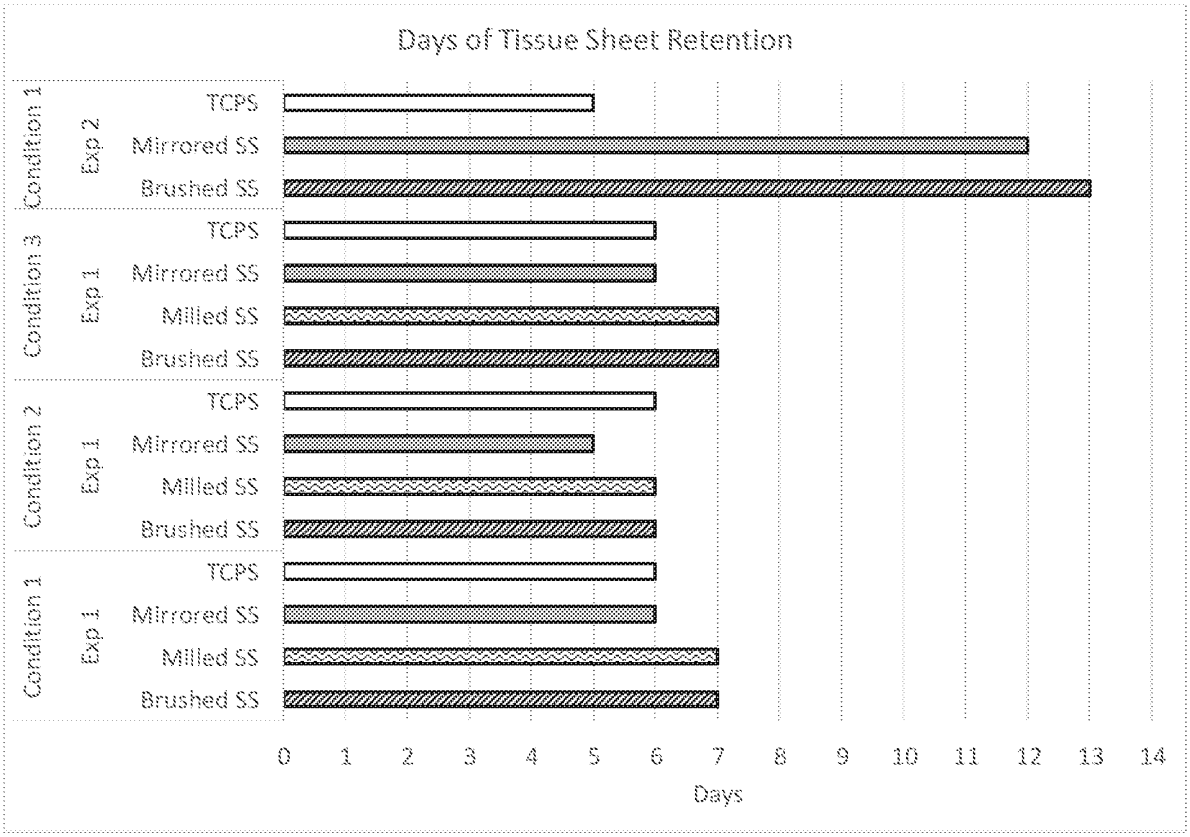
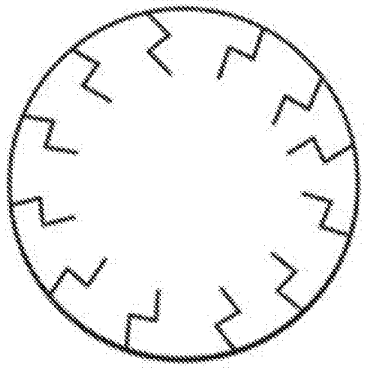

Days of Tissue Sheet Retention
Condition 1
Exp 2
TCPS
Mirrored SS
Brushed SS
Condition 3
Exp 1
TCPS
Mirrored SS
Milled SS
Brushed SS
Condition 2
Exp 1
TCPS
Mirrored SS
Milled SS
Brushed SS
Condition 1
Exp 1
TCPS
Mirrored SS
Milled SS
Brushed SS
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14
Days

FIG. 9B

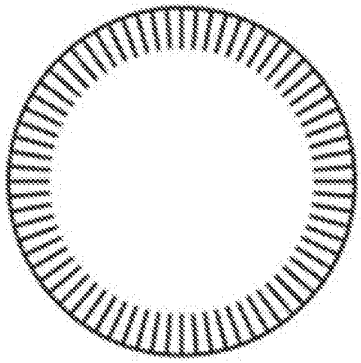
Non-linear Patterned Texture



1000

FIG. 10A

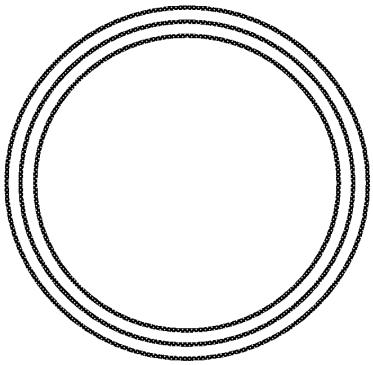
Radial Patterned Texture



1010

FIG. 10B

Circumferential Patterned Texture



1020

FIG. 10C

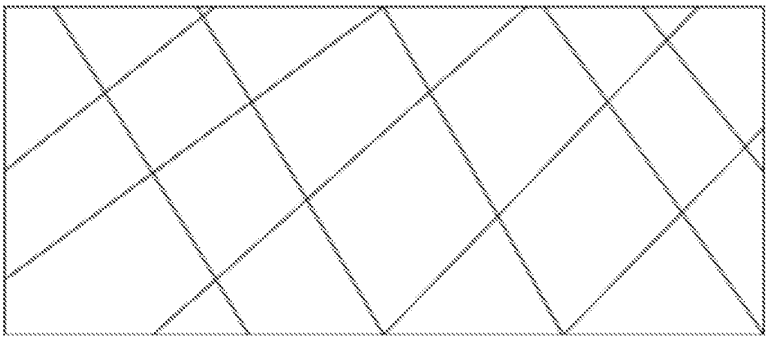


FIG. 10D

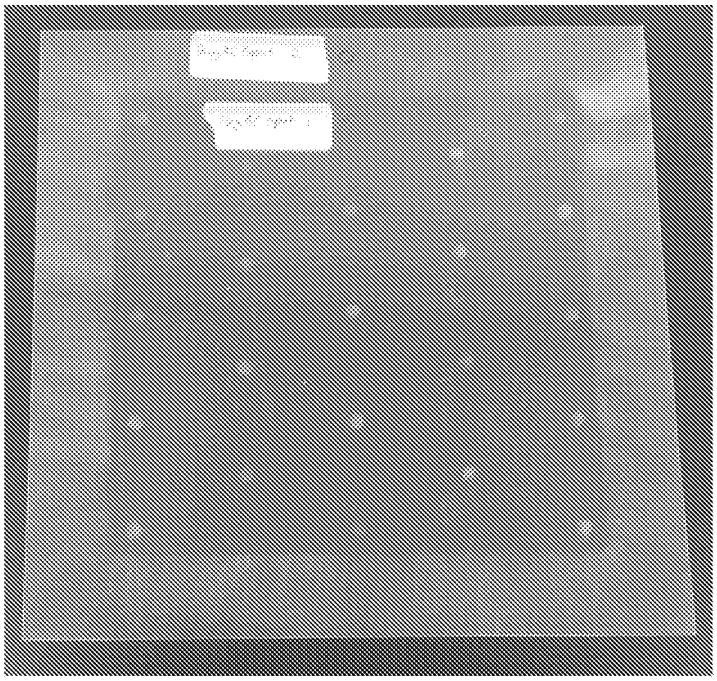


FIG. 10E

Cross-hatched Patterned Texture

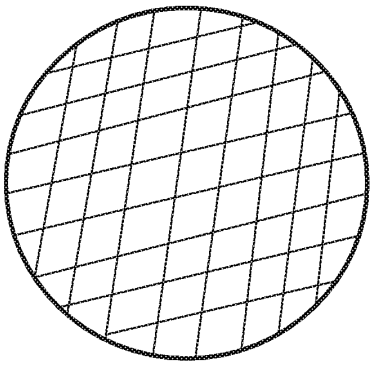


FIG. 10F

Dense Patterned Texture

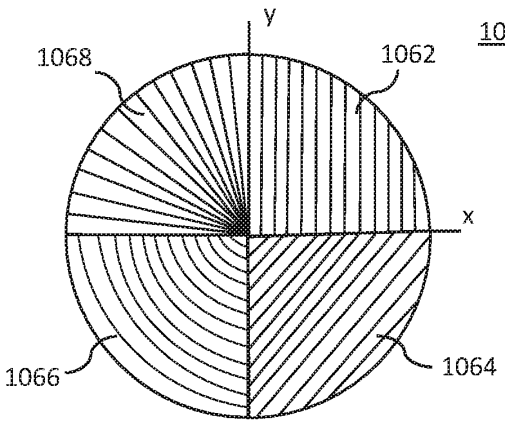


FIG. 10G

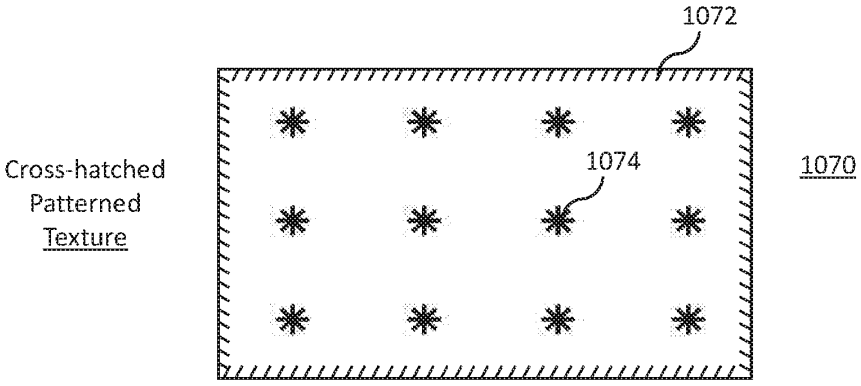


FIG. 10H

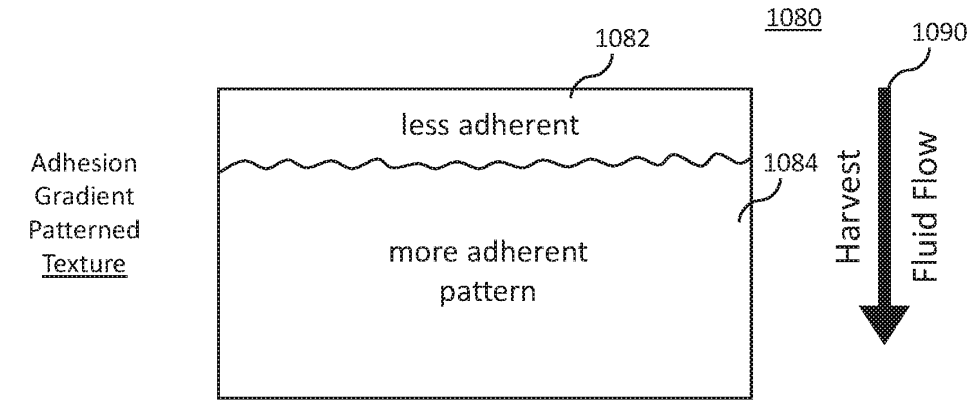


FIG. 10I

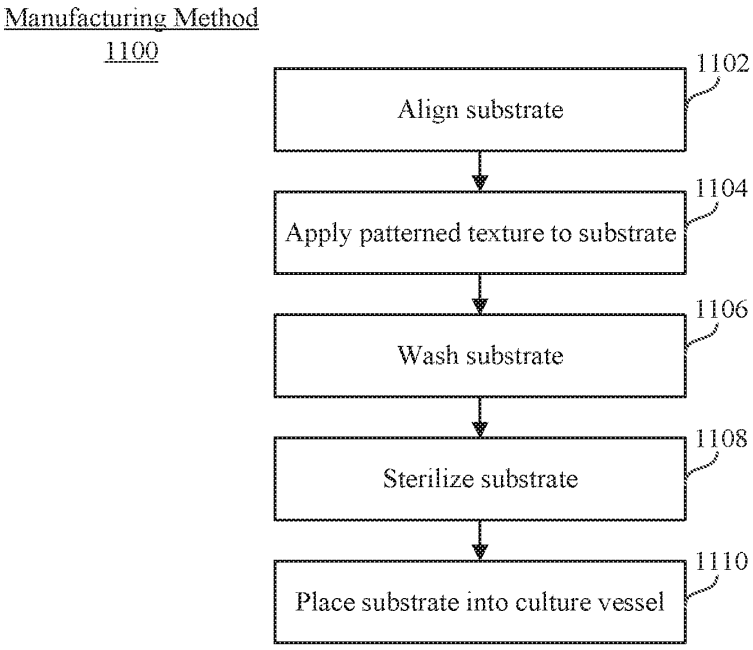

Manufacturing Method
1100
Align substrate
1102
Apply patterned texture to substrate
1104
Wash substrate
1106
Sterilize substrate
1108
Place substrate into culture vessel
1110

FIG. 11

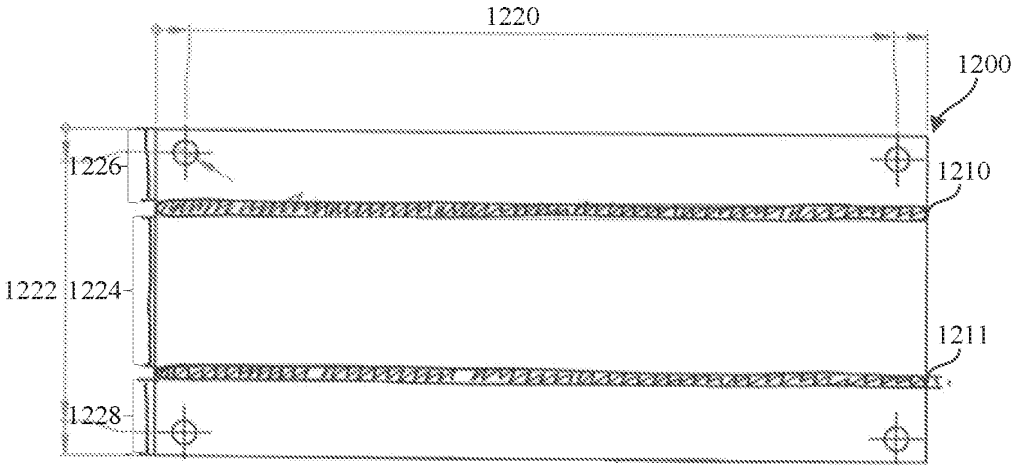


FIG. 12A

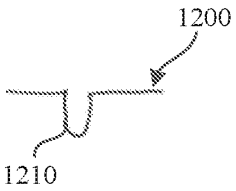


FIG. 12B

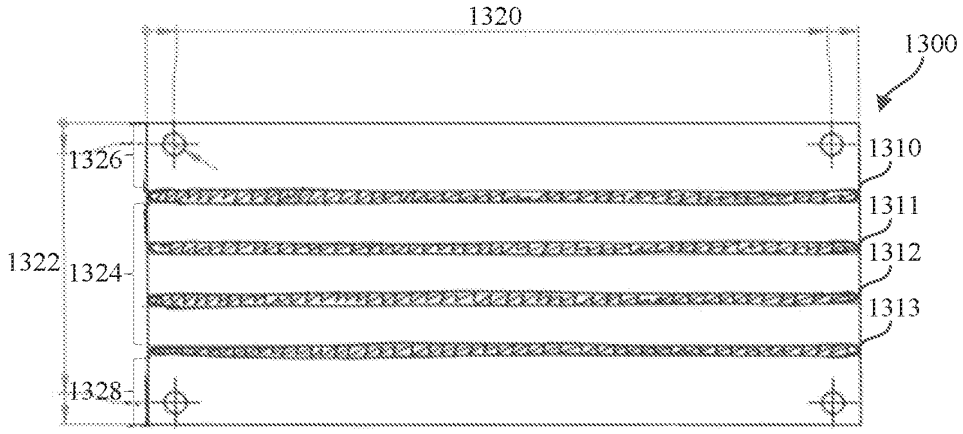


FIG. 13

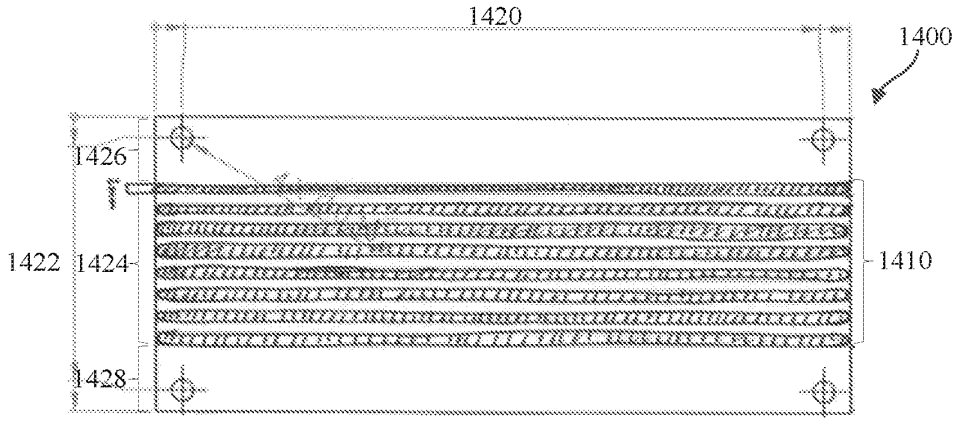


FIG. 14

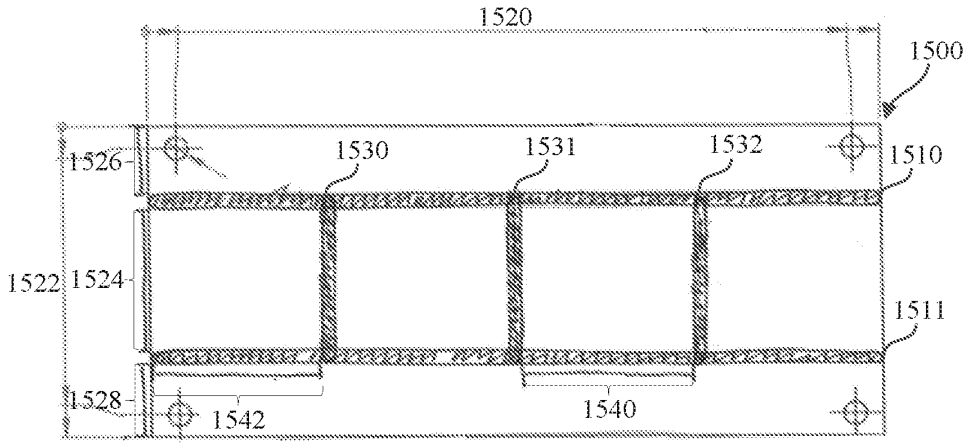

1520
1500
1526
1530
1531
1532
1510
1522
1524
1511
1528
1542
1540

FIG. 15

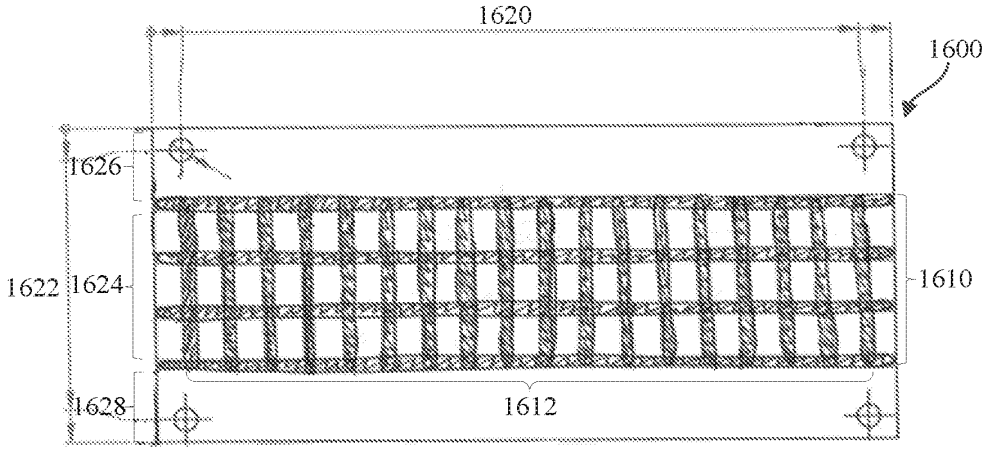


FIG. 16

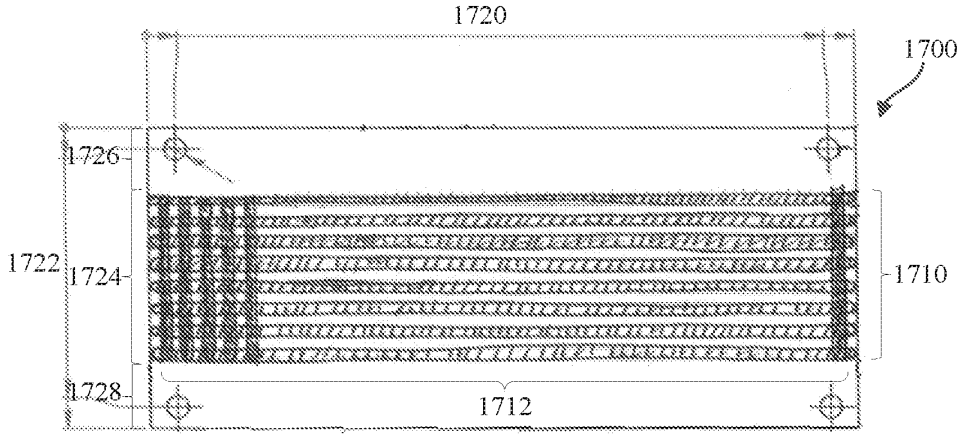


FIG. 17

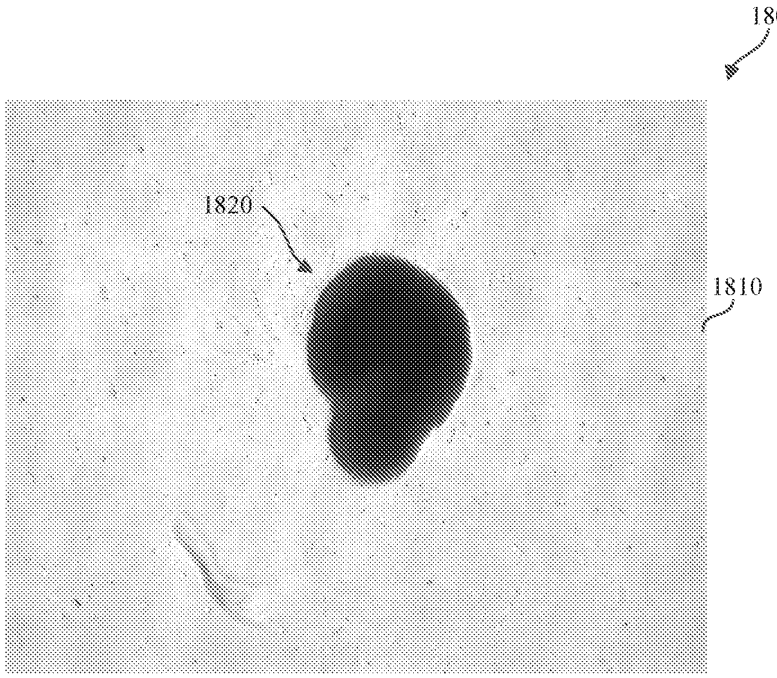


FIG. 18A

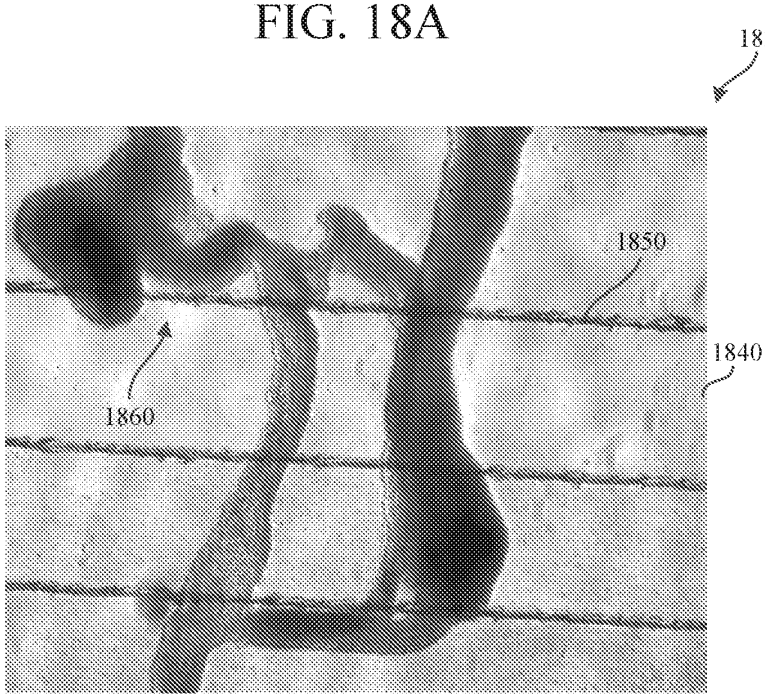


FIG. 18B

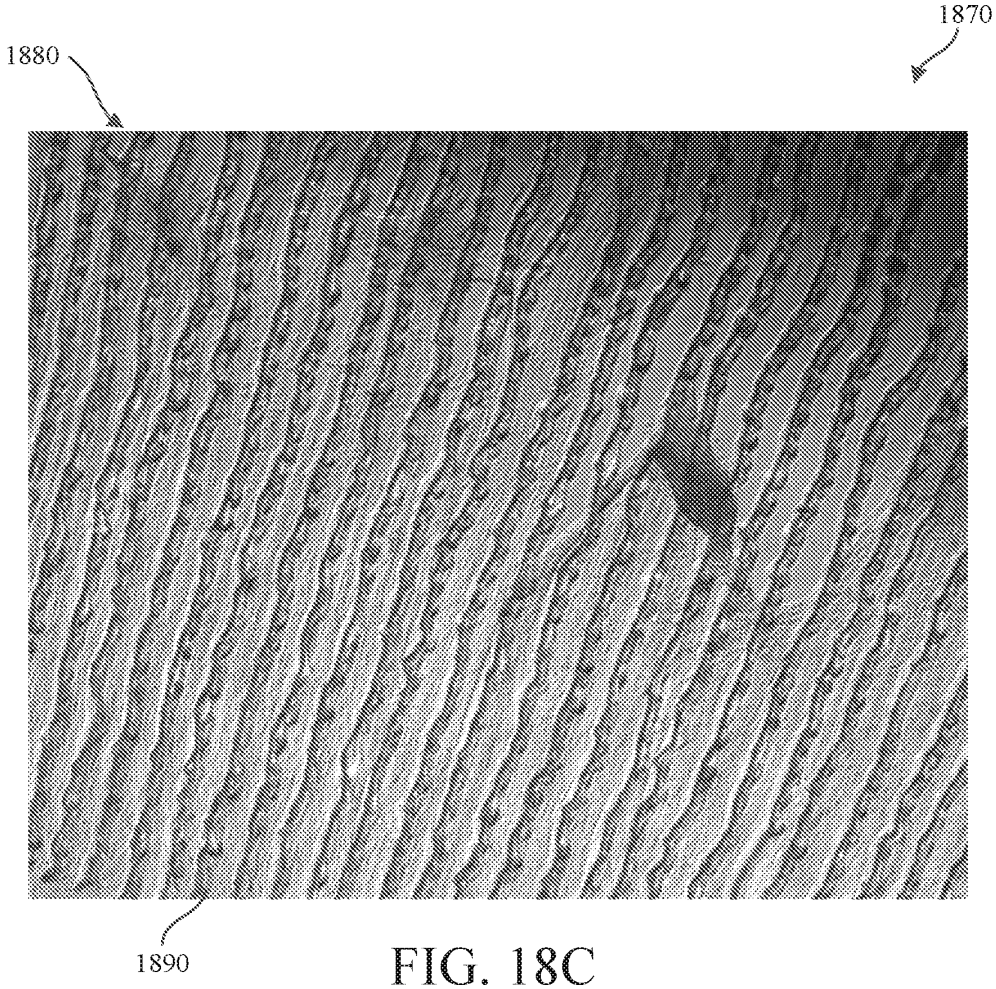


FIG. 18C

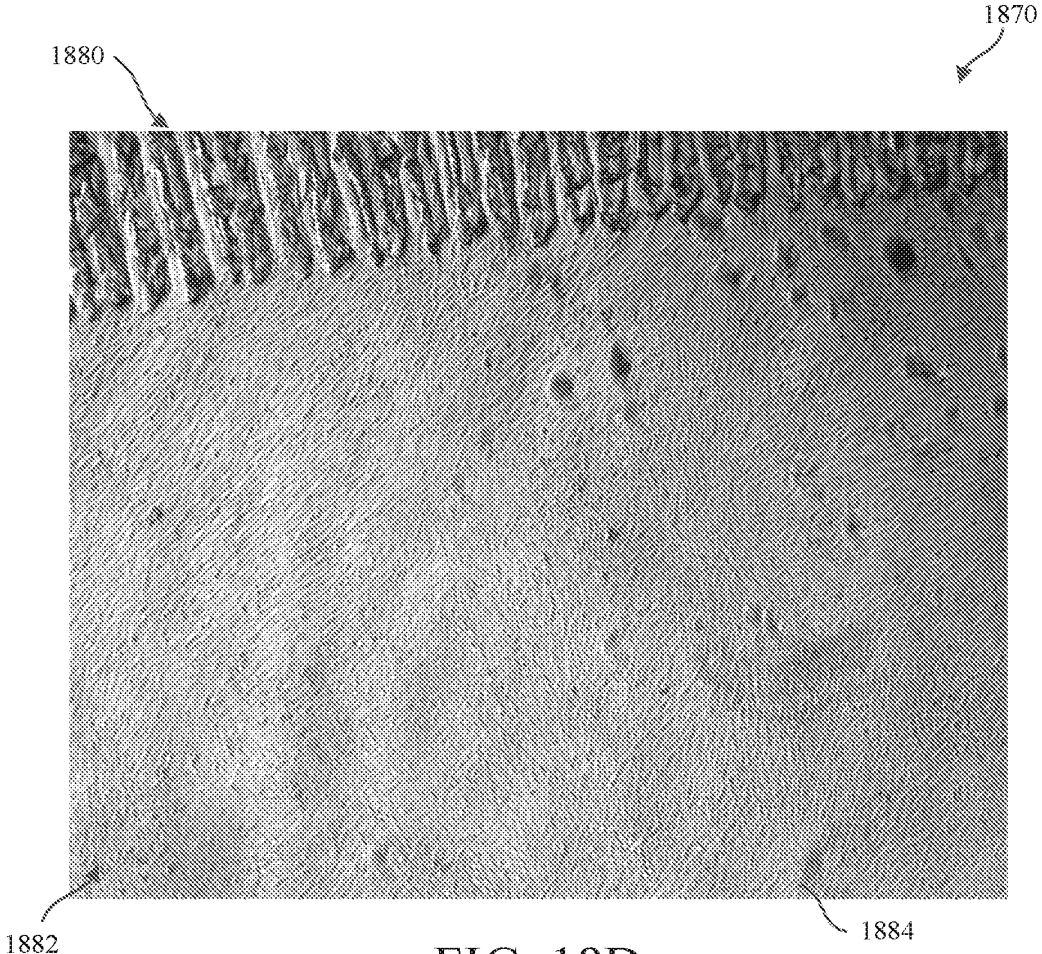


FIG. 18D

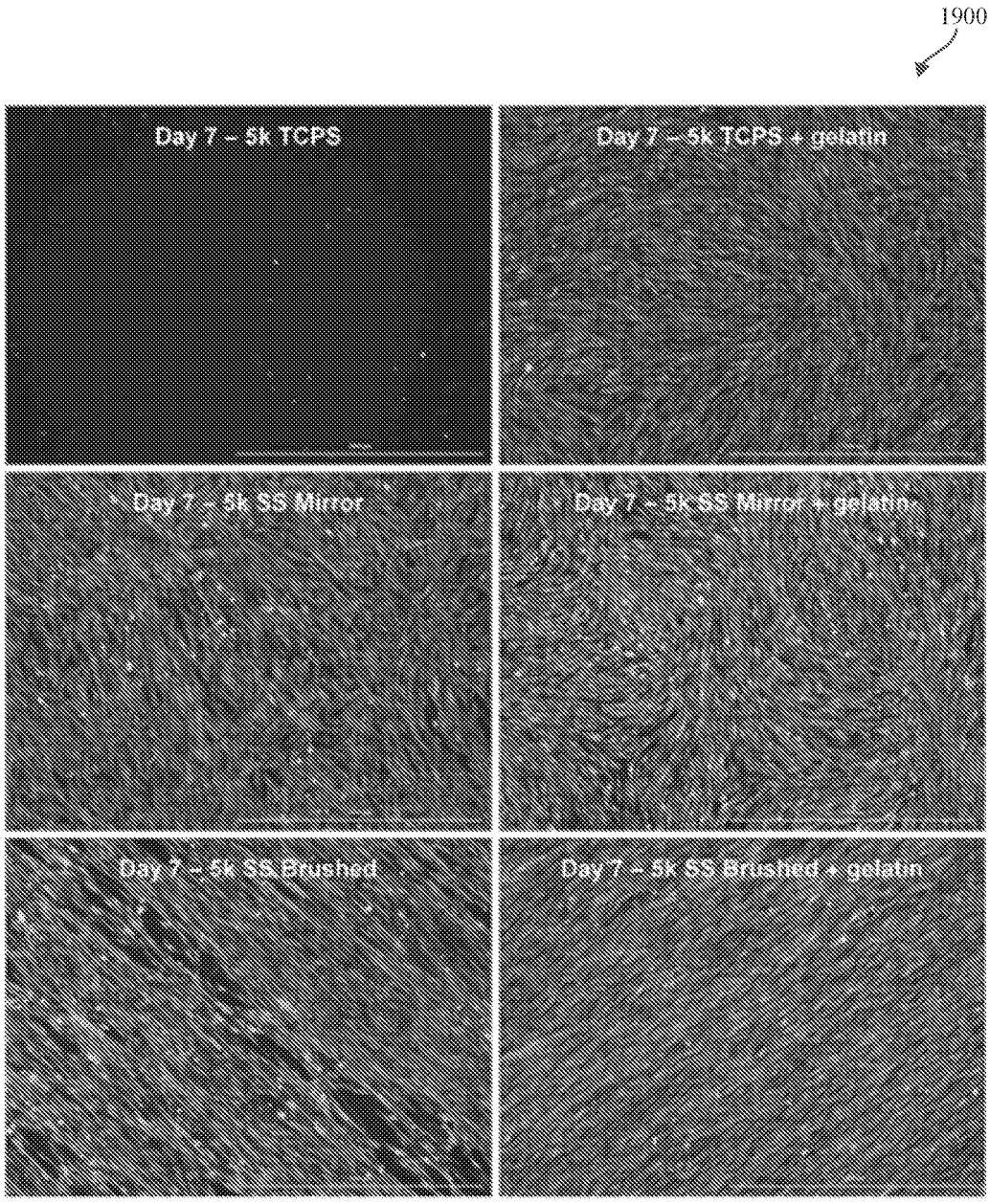

1900
Day 7 – 5k TCPS
Day 7 – 5k TCPS + gelatin
Day 7 – 5k SS Mirror
Day 7 – 5k SS Mirror + gelatin
Day 7 – 5k SS Brushed
Day 7 – 5k SS Brushed + gelatin

FIG. 19