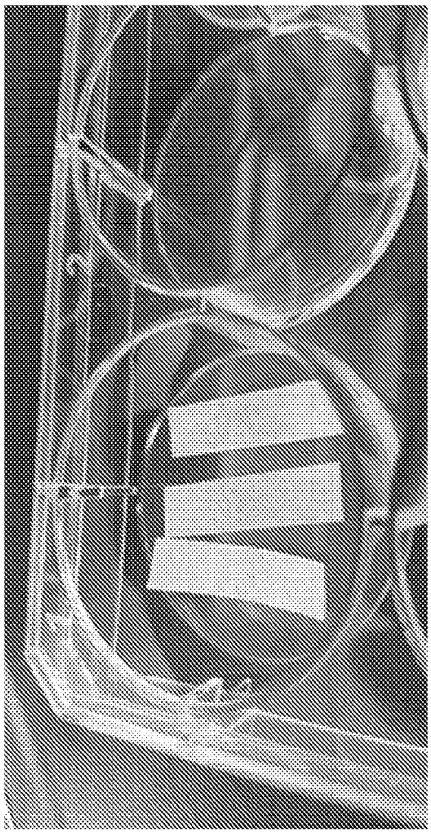


FIG. 1

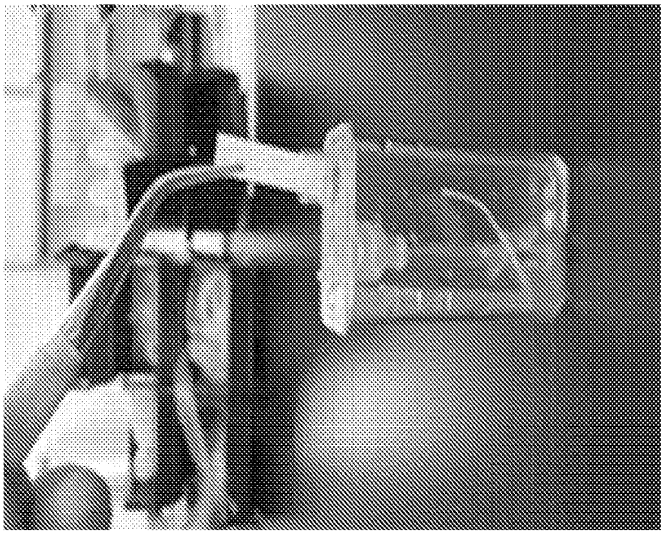


FIG. 2

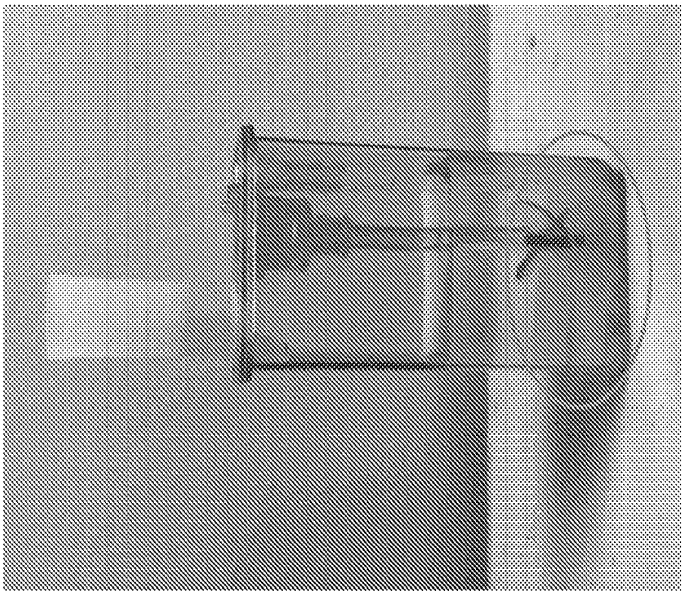


FIG. 3



FIG. 4

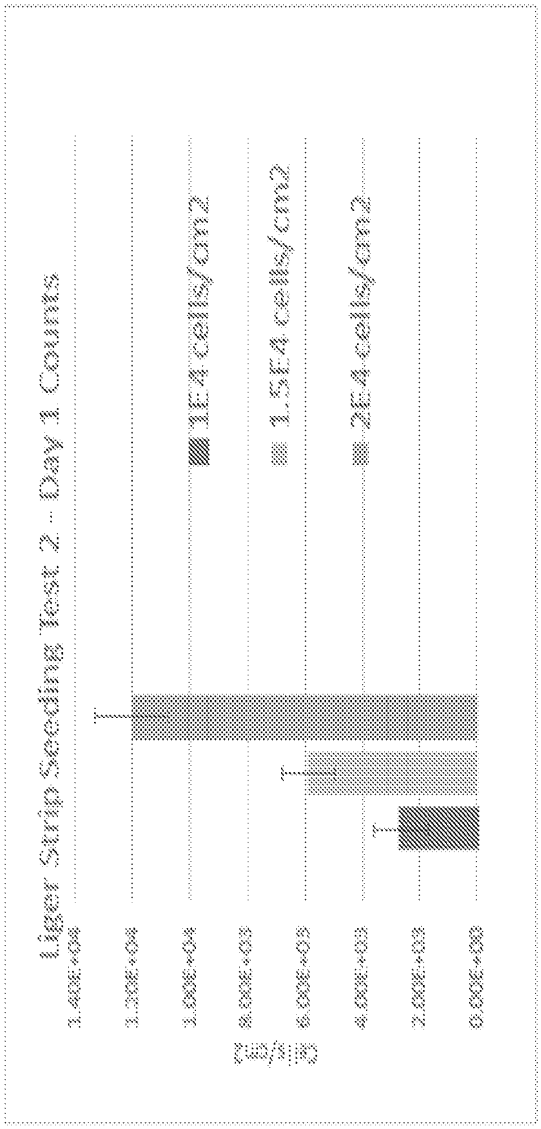

Ligar Strip Seeding Test 2 - Day 1 Counts
1E4 cells/cm2
1.5E4 cells/cm2
2E4 cells/cm2
CD/strip
1.40E+04
1.20E+04
1.00E+04
8.00E+03
6.00E+03
4.00E+03
2.00E+03
0.00E+00

FIG. 5

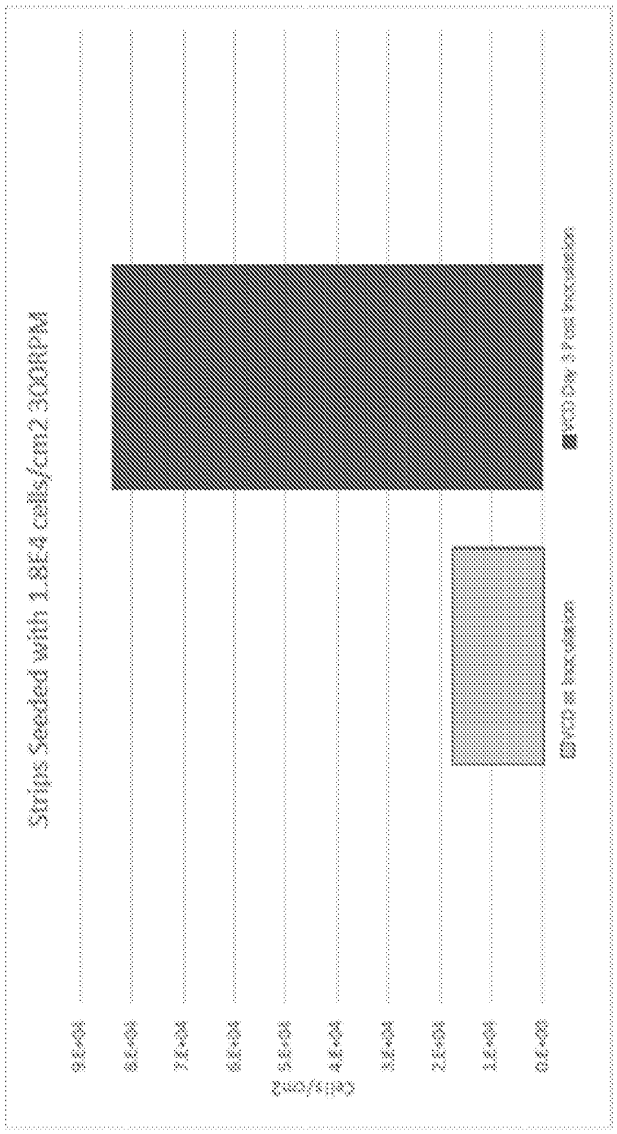

Strips Seeded with 1.8E4 cells/cm2 300RPM
Day 4 Post Inoculation
Day 0 Post Inoculation
9.0E+08
8.0E+08
7.0E+08
6.0E+08
5.0E+08
4.0E+08
3.0E+08
2.0E+08
1.0E+08
0.0E+00
Cells/strip

FIG. 6

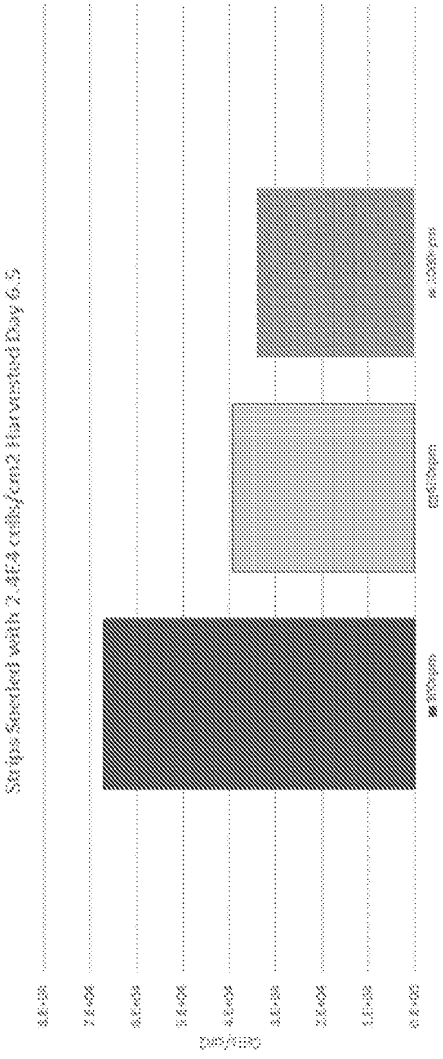


FIG. 7

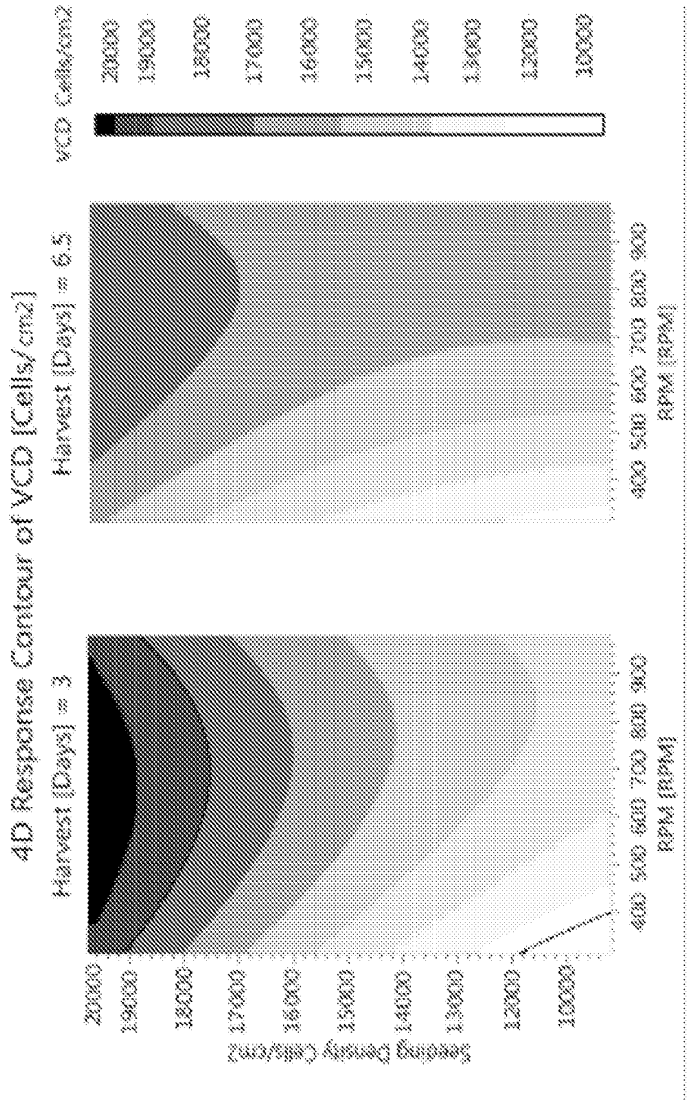

4D Response Contour of VCD [Cells/cm2]
Harvest [Days] = 3
Harvest [Days] = 6.5
VCD Cells/cm2
20000
19000
18000
17000
16000
15000
14000
13000
12000
10000
Seeding Density Cells/cm2
400 500 600 700 800 900
RPM [RPM]

FIG. 8

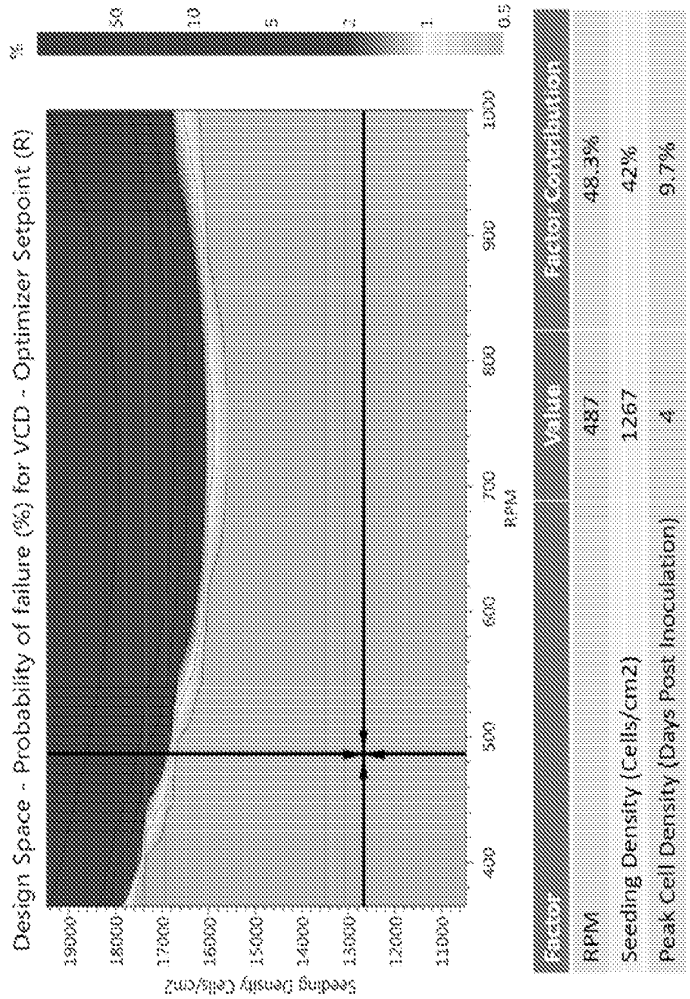

Design Space - Probability of failure (%) for VCD - Optimizer Setpoint (R)
%
50
10
5
2
1
0.5
Seeding Density Cells/cm2
19000
18000
17000
16000
15000
14000
13000
12000
11000
400
500
600
700
800
900
1000
RPM
Factor
Value
Factor Contribution
RPM
487
48.3%
Seeding Density (Cells/cm2)
1267
42%
Peak Cell Density (Days Post Inoculation)
4
9.7%

FIG. 9

FIG. 10A

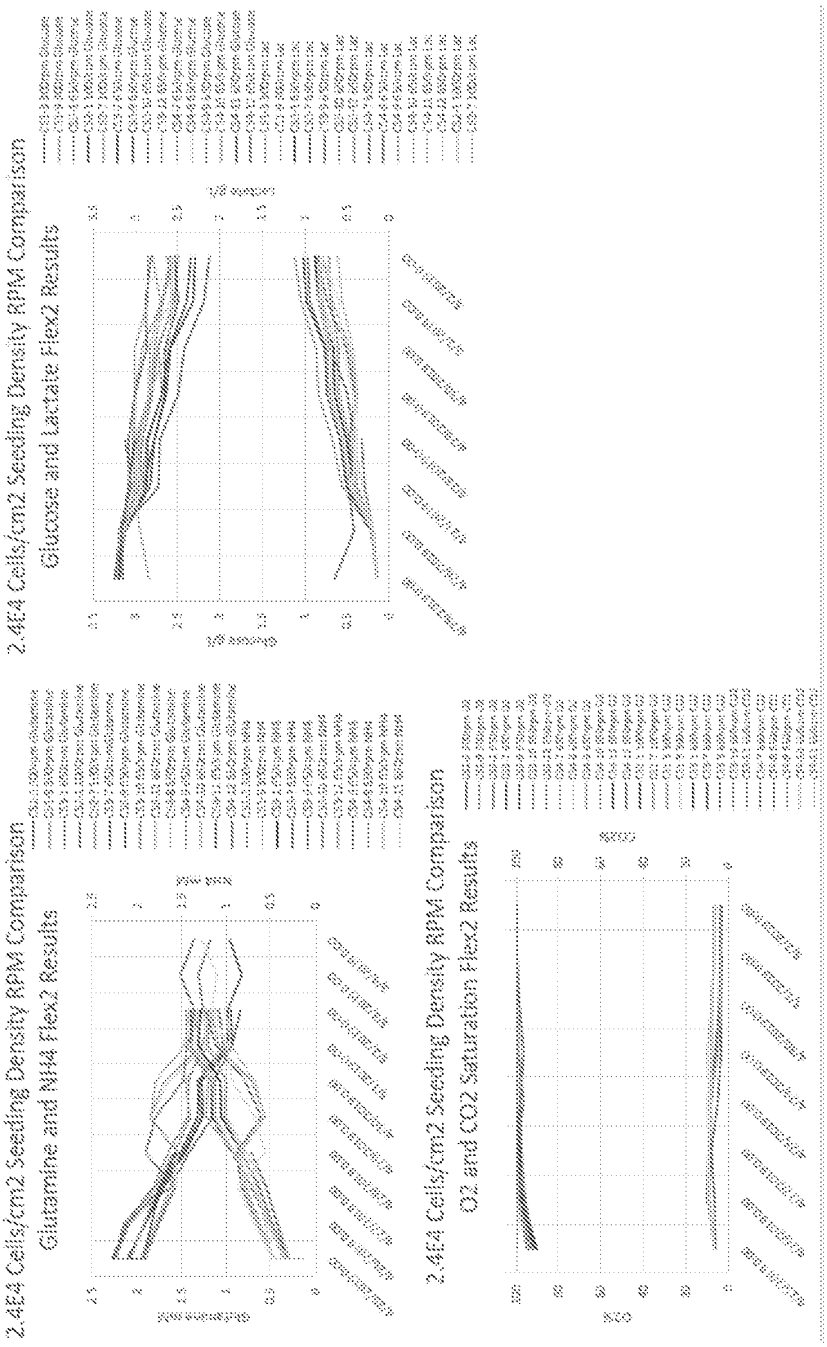

2.4E4 Cells/cm2 Seeding Density RPM Comparison
Glucose and Lactate Flex2 Results
2.4E4 Cells/cm2 Seeding Density RPM Comparison
Glutamine and NH4 Flex2 Results
2.4E4 Cells/cm2 Seeding Density RPM Comparison
O2 and CO2 Saturation Flex2 Results

FIG. 10B

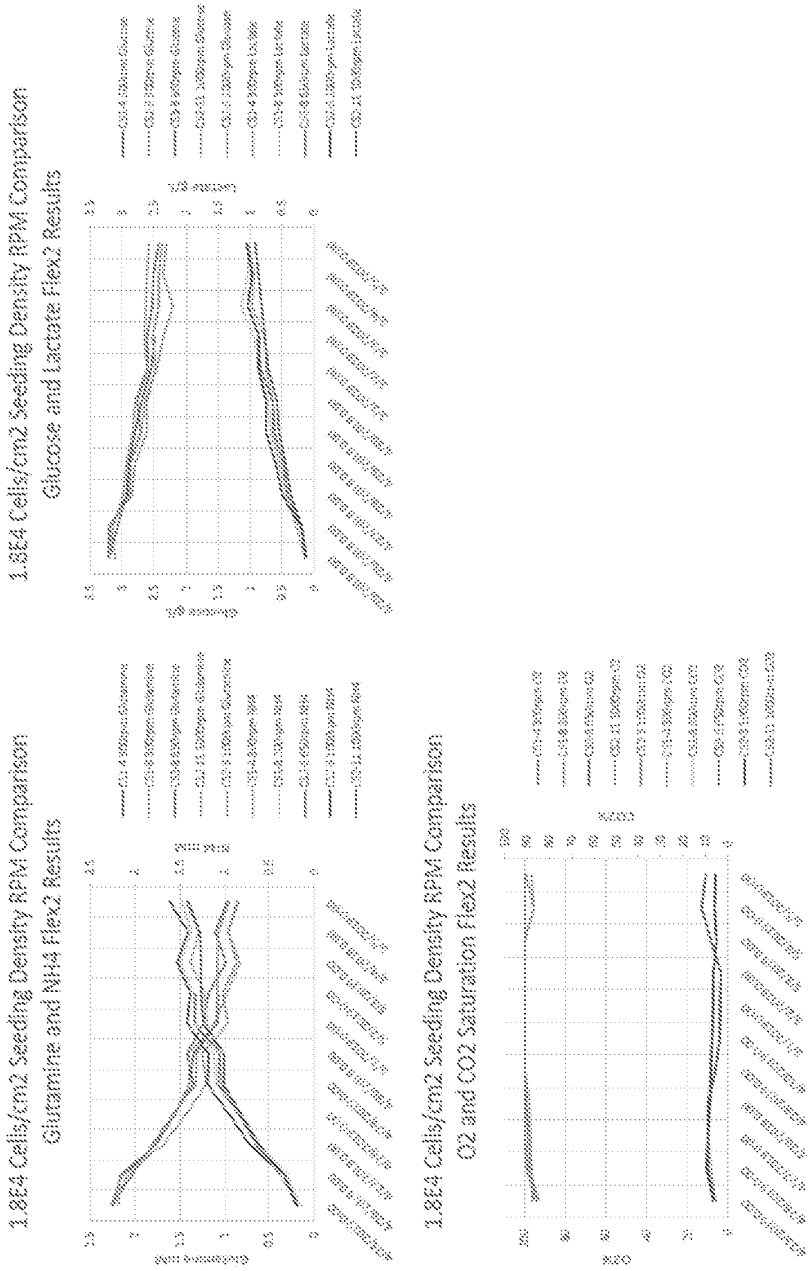
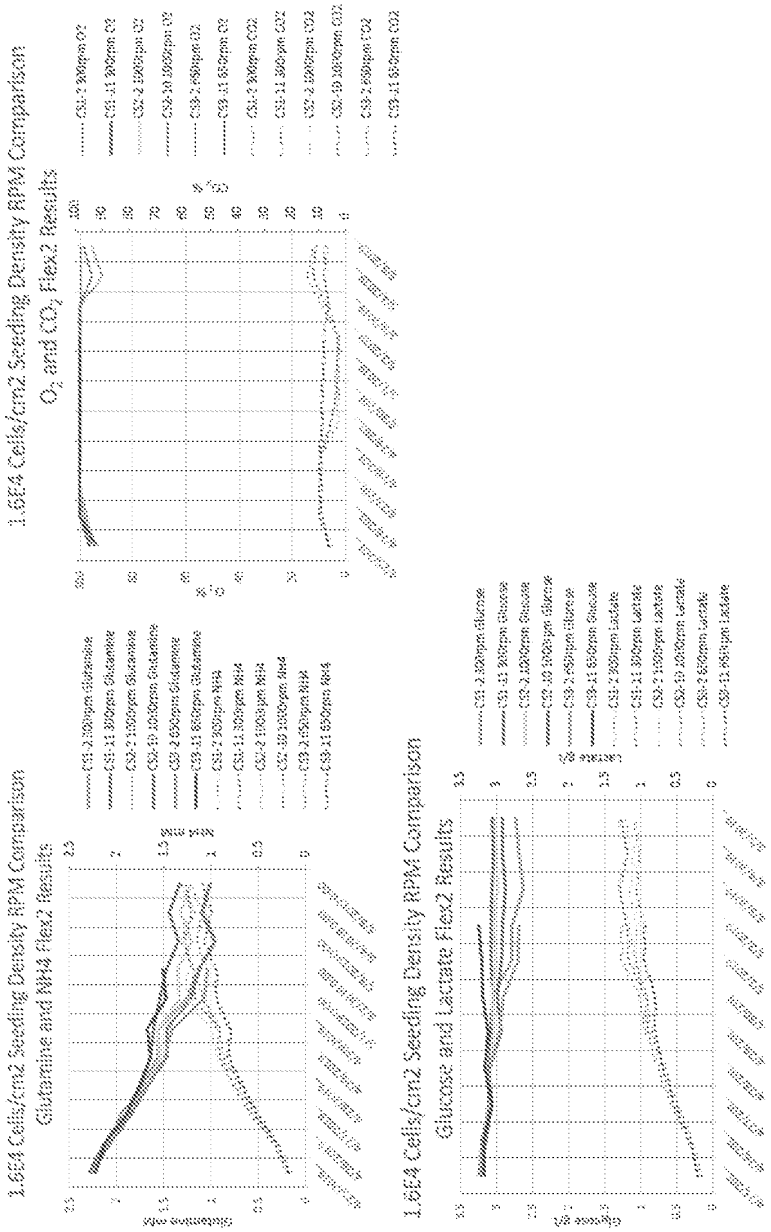

1.8E4 Cells/cm2 Seeding Density RPM Comparison
Glucose and Lactate Flex2 Results
1.8E4 Cells/cm2 Seeding Density RPM Comparison
Glutamine and NH4 Flex2 Results
1.8E4 Cells/cm2 Seeding Density RPM Comparison
O2 and CO2 Saturation Flex2 Results

FIG. 10C


1.6E4 Cells/cm2 Seeding Density RPM Comparison
Glutamine and NH4 Flex2 Results
1.6E4 Cells/cm2 Seeding Density RPM Comparison
O2 and CO2 Flex2 Results
1.6E4 Cells/cm2 Seeding Density RPM Comparison
Glucose and Lactate Flex2 Results

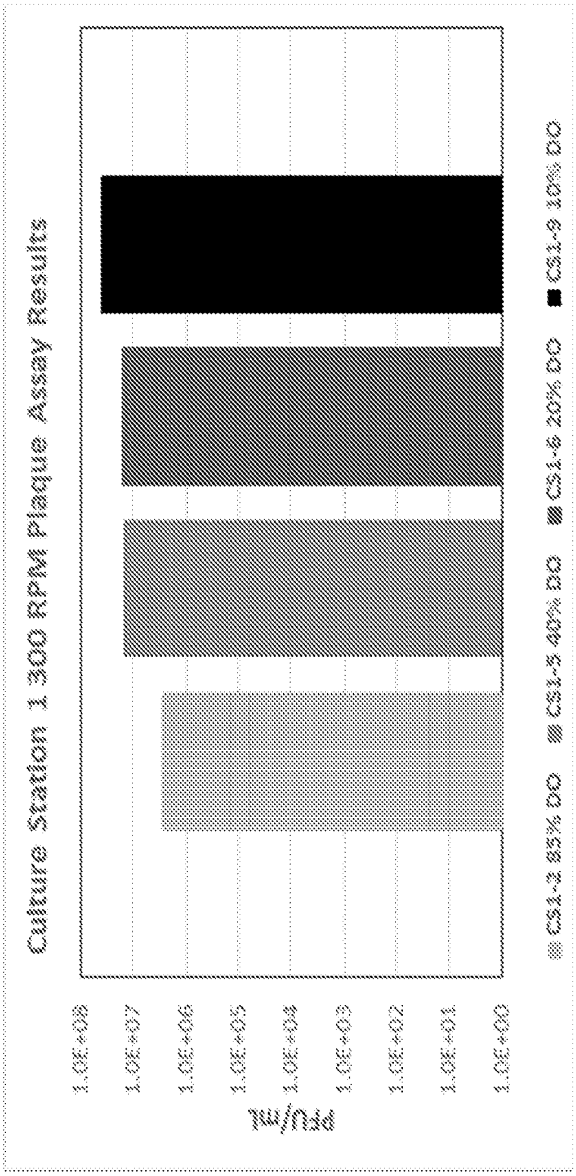
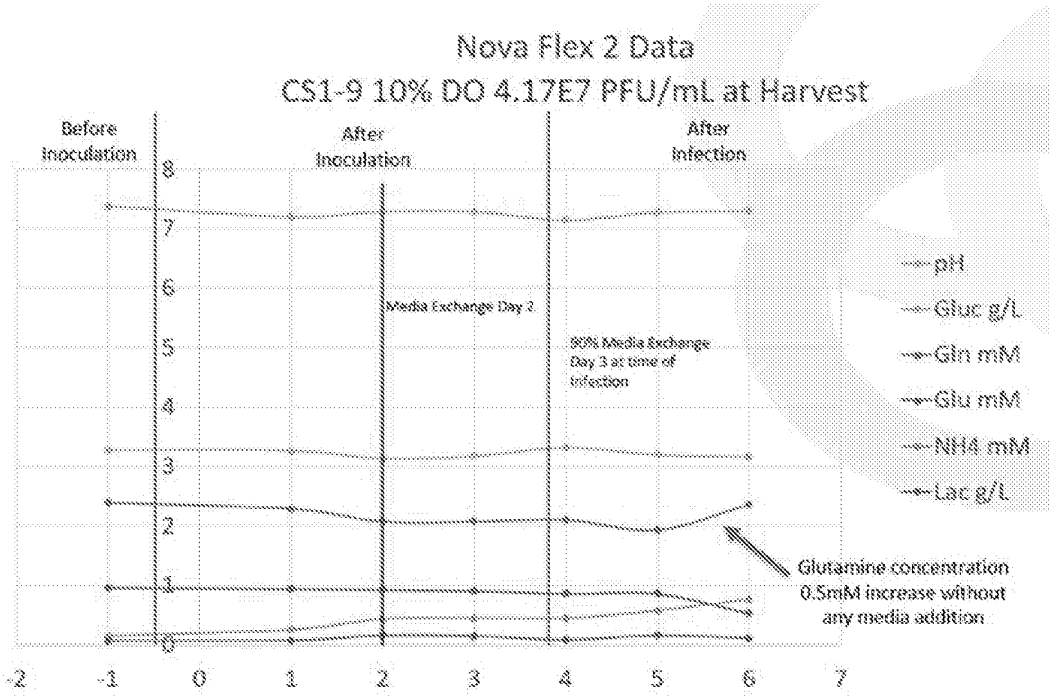

Culture Station 1 300 RPM Plaque Assay Results
PFU/mL
1.0E+08
1.0E+07
1.0E+06
1.0E+05
1.0E+04
1.0E+03
1.0E+02
1.0E+01
1.0E+00
CS1-3 85% DO
CS1-3 40% DO
CS1-6 20% DO
CS1-9 10% DO

FIG. 11

FIG. 12A


Nova Flex 2 Data
CS1-9 10% DO 4.17E7 PFU/mL at Harvest
Before Inoculation
After Inoculation
After Infection
Media Exchange Day 2
50% Media Exchange Day 3 at time of Infection
pH
Gluc g/L
Gln mM
Glu mM
NH4 mM
Lac g/L
Glutamine concentration 0.5mM increase without any media addition
8
7
6
5
4
3
2
1
0
-2
-1
0
1
2
3
4
5
6
7

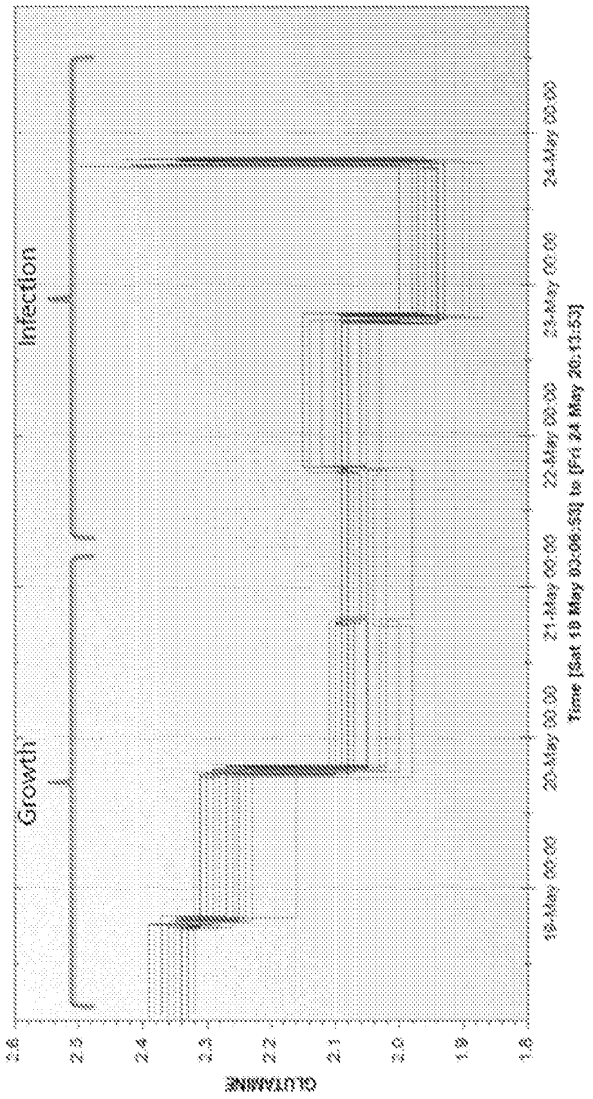

Growth
Infection
2.6
2.5
2.4
2.3
2.2
2.1
2.0
1.9
1.8
19-May 00:00
20-May 00:00
21-May 00:00
22-May 00:00
23-May 00:00
24-May 00:00

FIG. 12B