Figure 1B

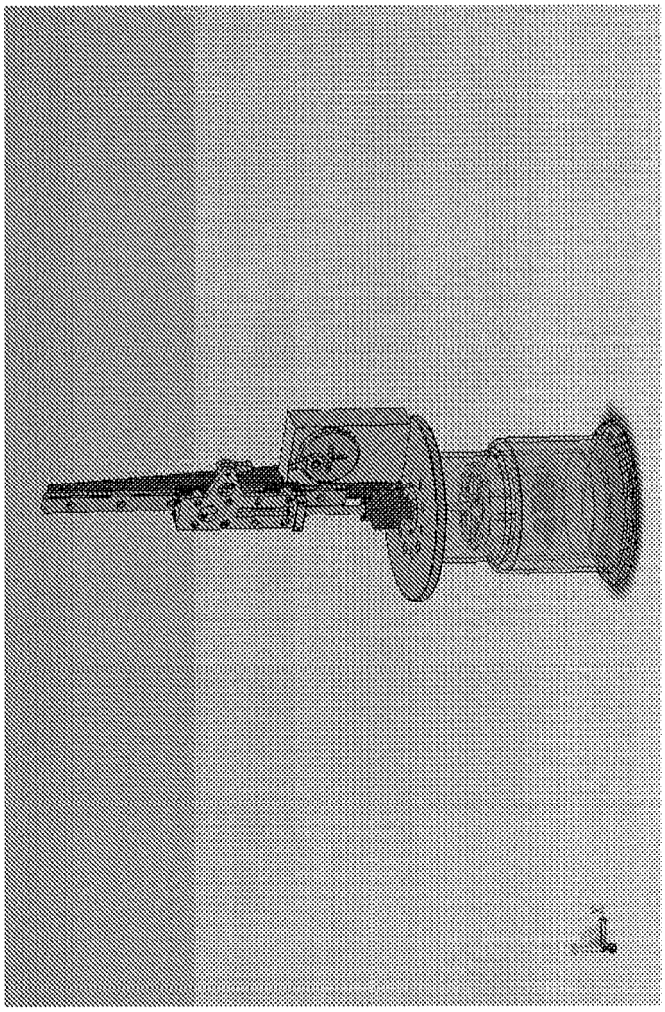


Figure 1A

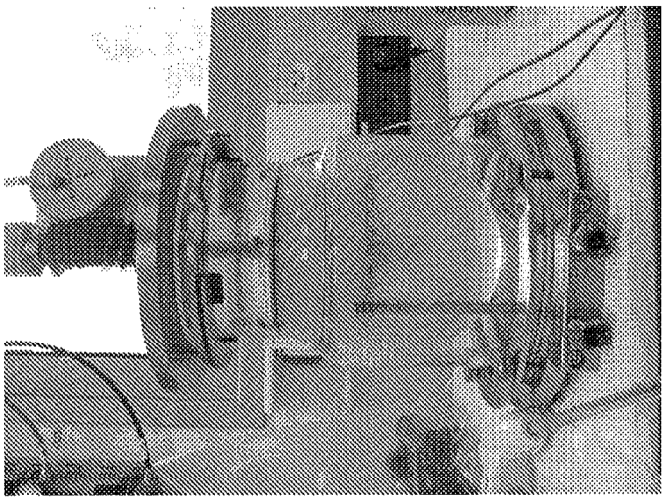


Figure 2

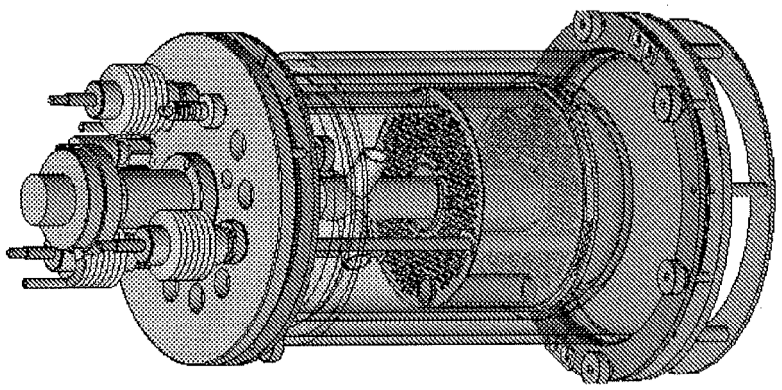
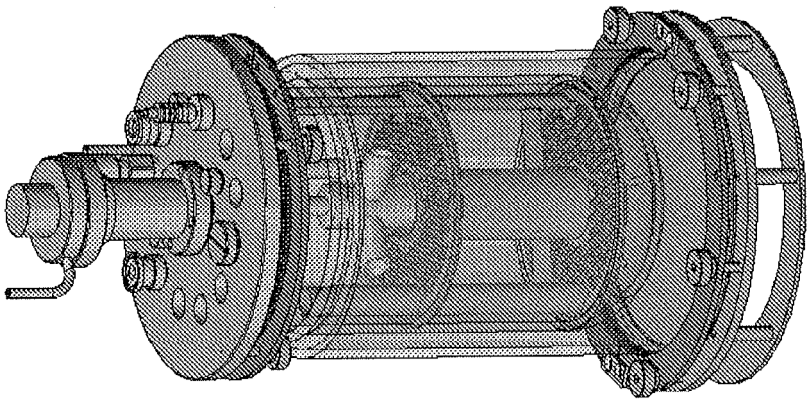


Figure 3



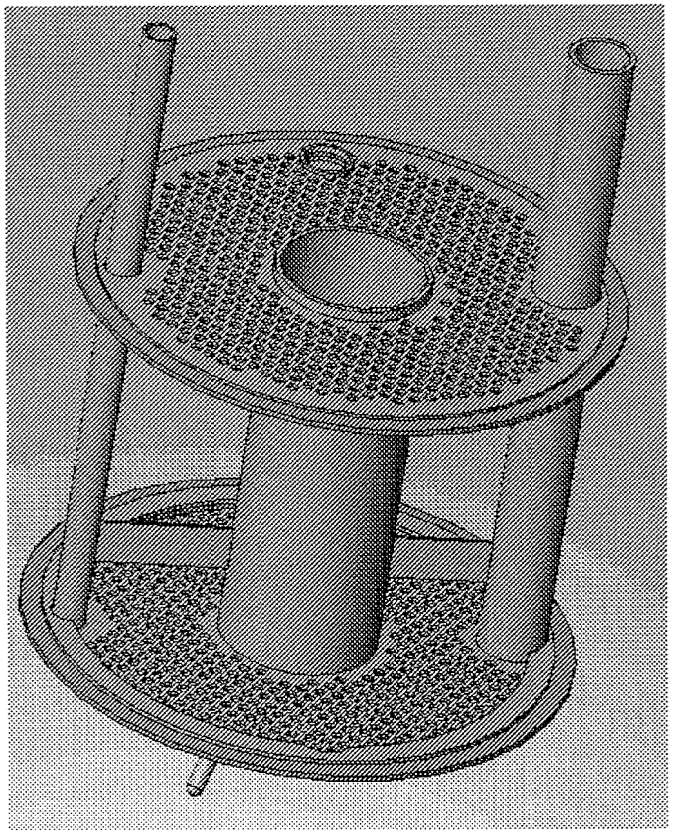


Figure 4A

Figure 4B

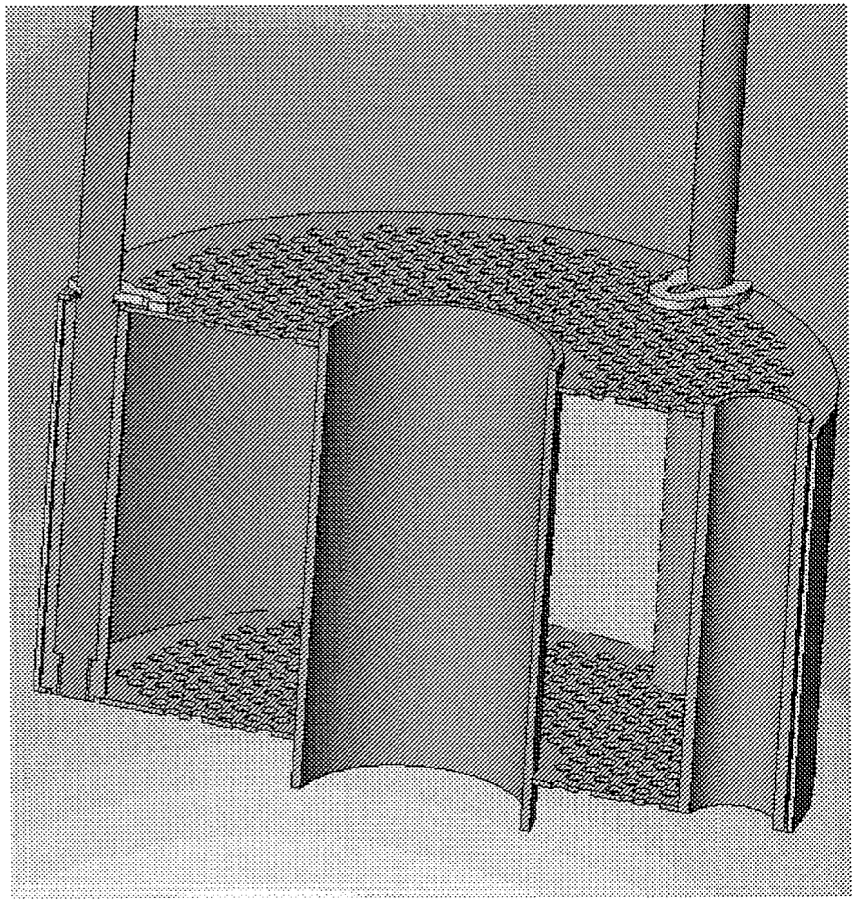


Figure 4C

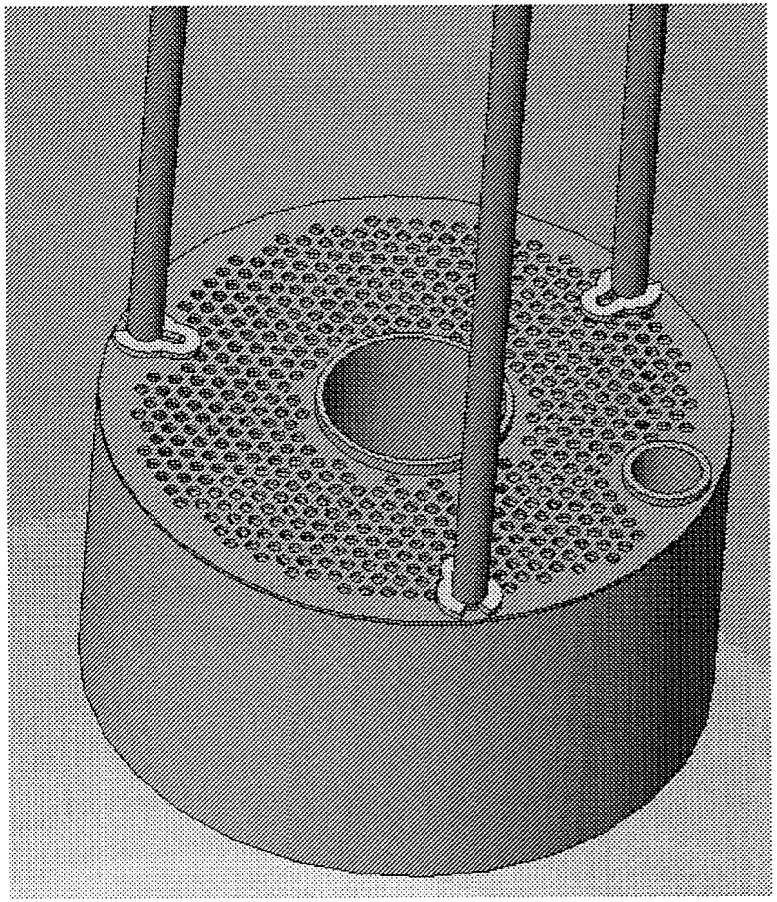


Figure 5

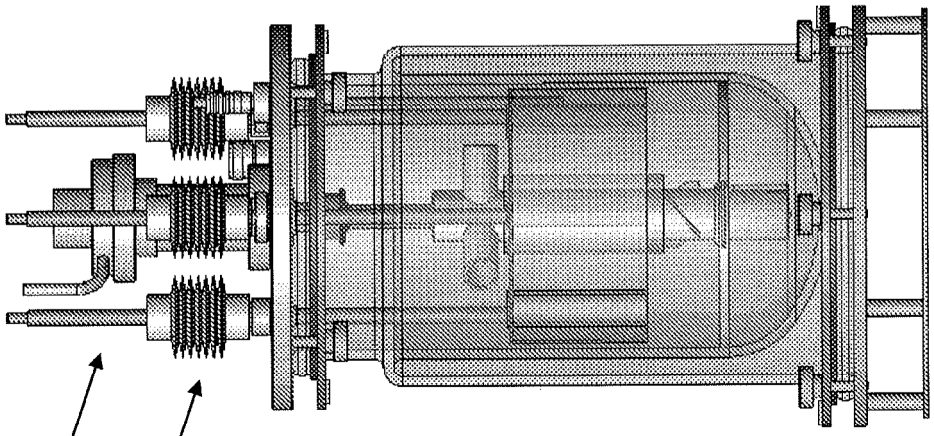


Figure 6

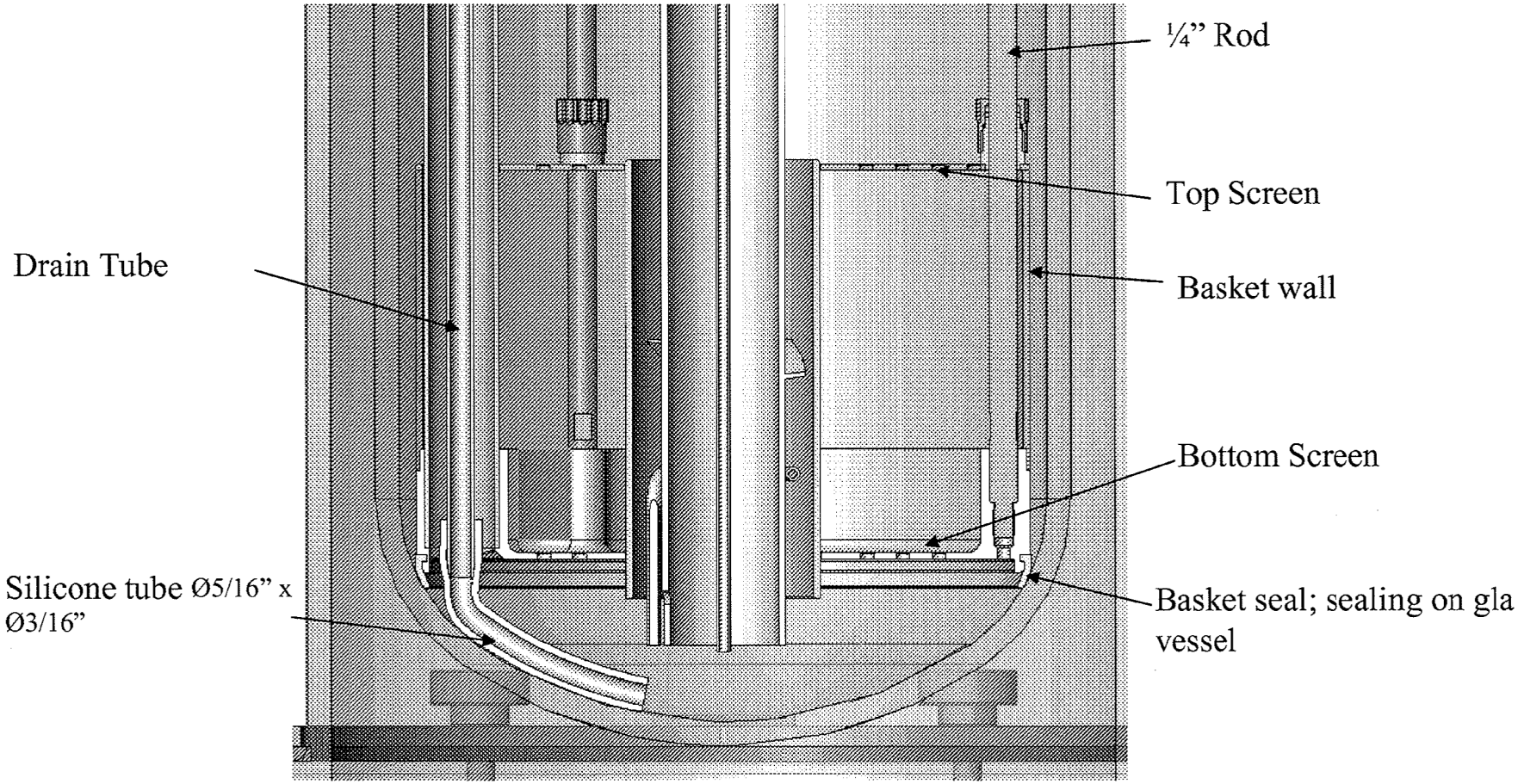
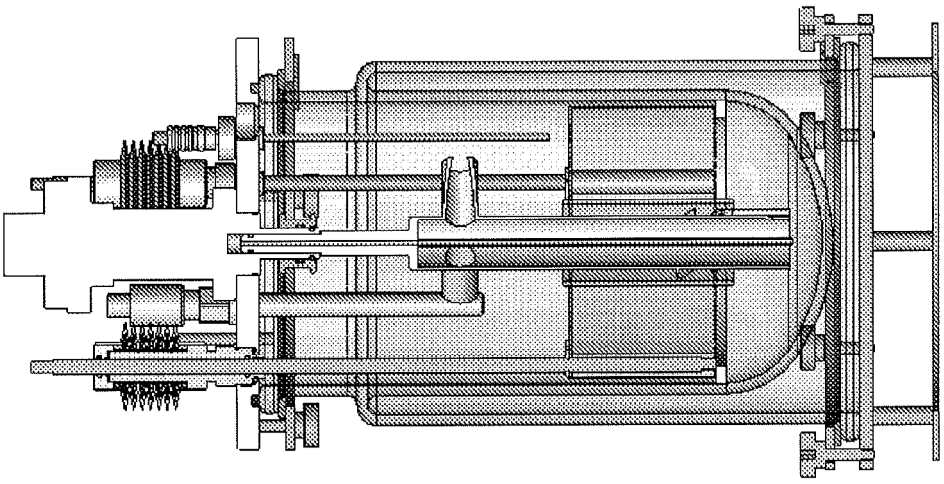

¼" Rod
Top Screen
Drain Tube
Basket wall
Bottom Screen
Silicone tube Ø5/16" x Ø3/16"
Basket seal; sealing on gla vessel

Figure 7



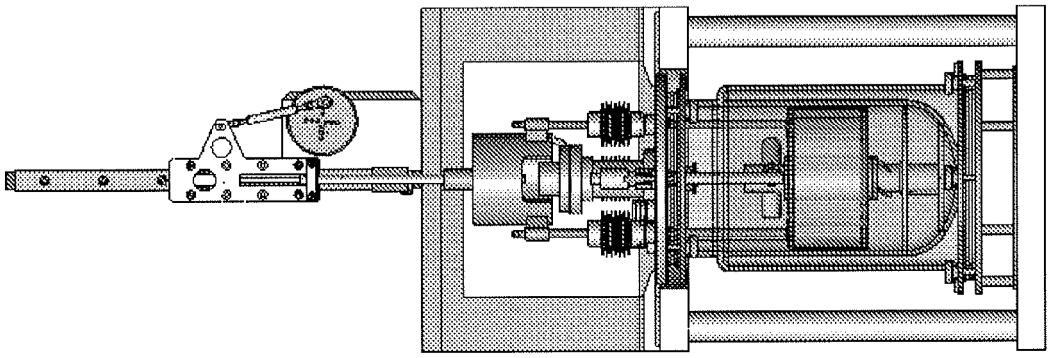


Figure 8

Figure 9A

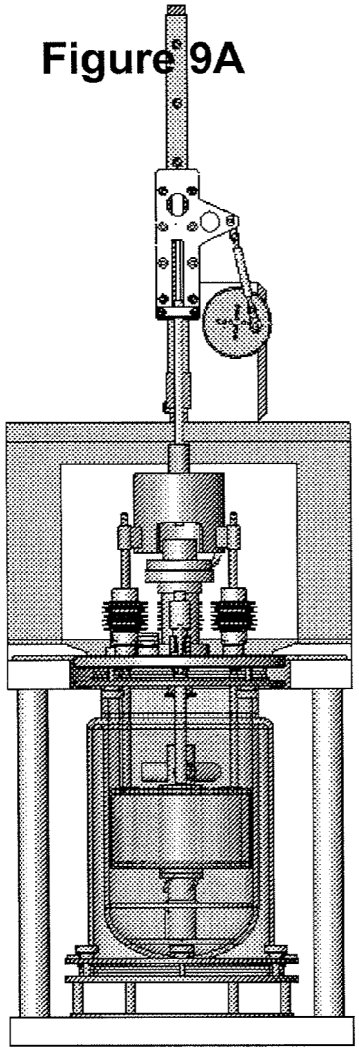


Figure 9B

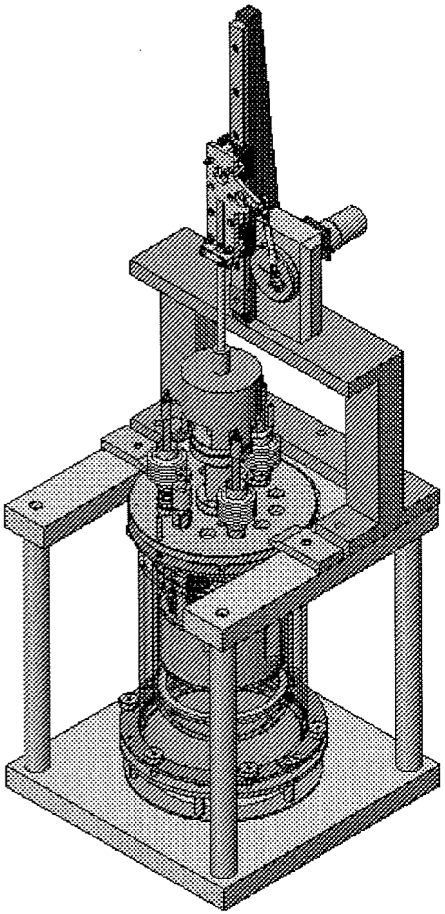


Figure 9C

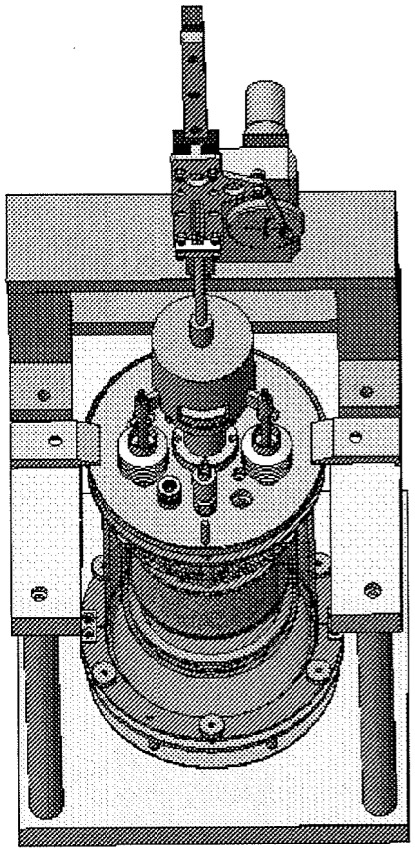


Figure 9D

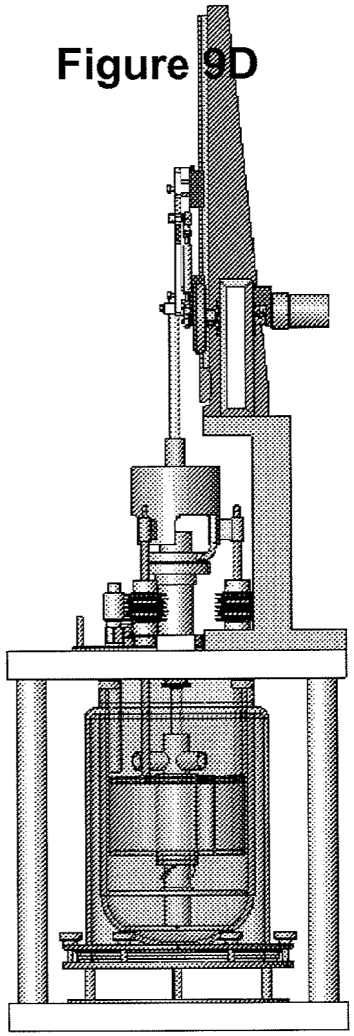


Figure 10

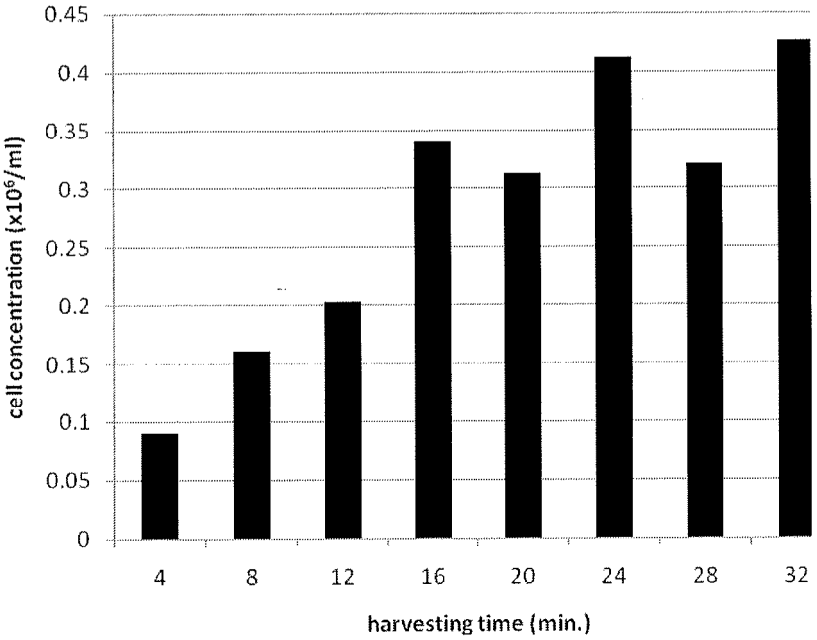

0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
cell concentration (x10⁶/ml)
4
8
12
16
20
24
28
32
harvesting time (min.)

Figure 11

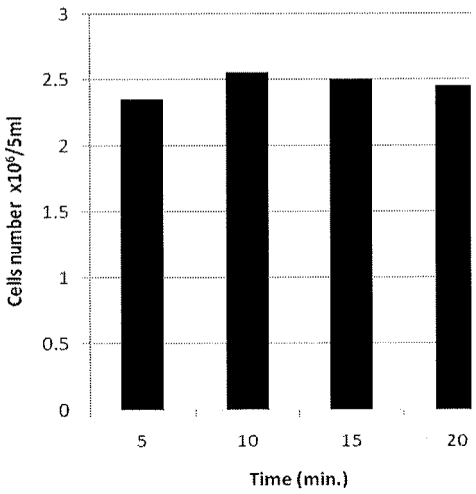


Figure 12

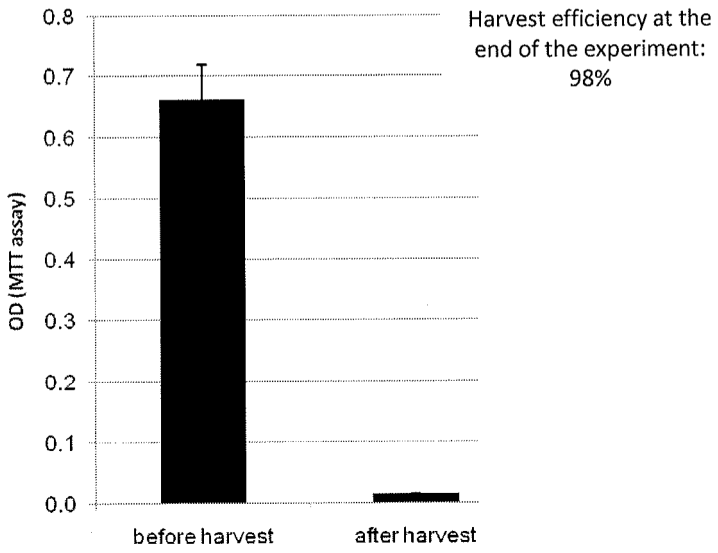

0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
OD (MTT assay)
before harvest
after harvest
Harvest efficiency at the end of the experiment: 98%

Figure 13

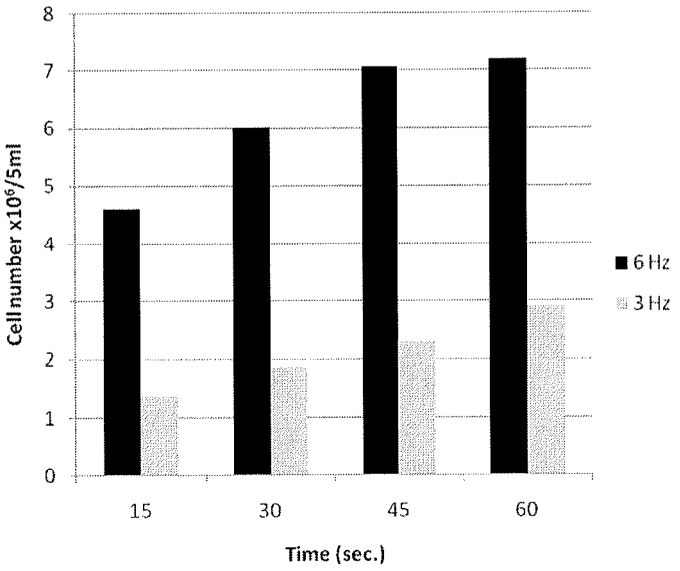


Figure 14

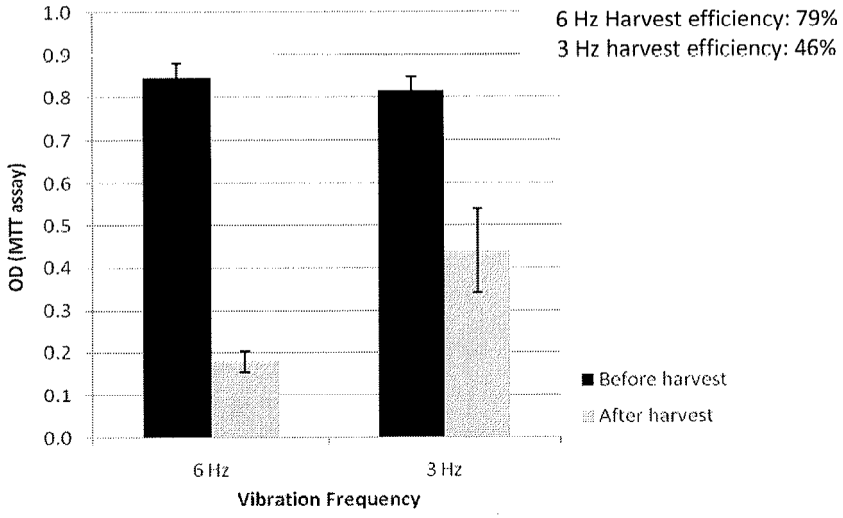

6 Hz Harvest efficiency: 79%
3 Hz harvest efficiency: 46%
OD (MTT assay)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
6 Hz
3 Hz
Vibration Frequency
Before harvest
After harvest

Figure 15

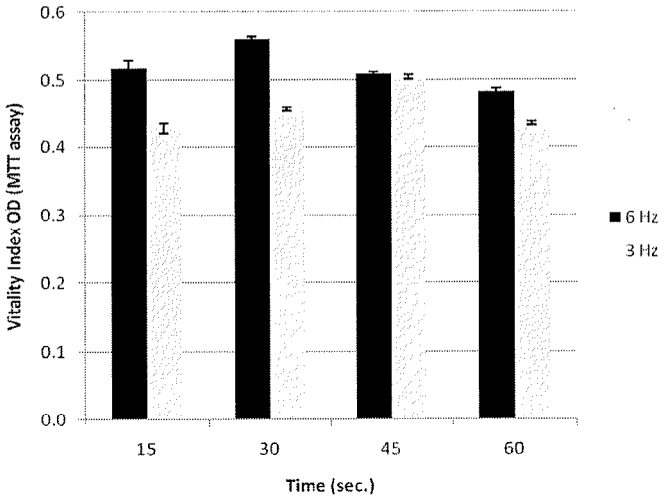

0.6
0.5
0.4
0.3
0.2
0.1
0.0
Vitality Index OD (MTT assay)
15
30
45
60
Time (sec.)
6 Hz
3 Hz

Figure 16

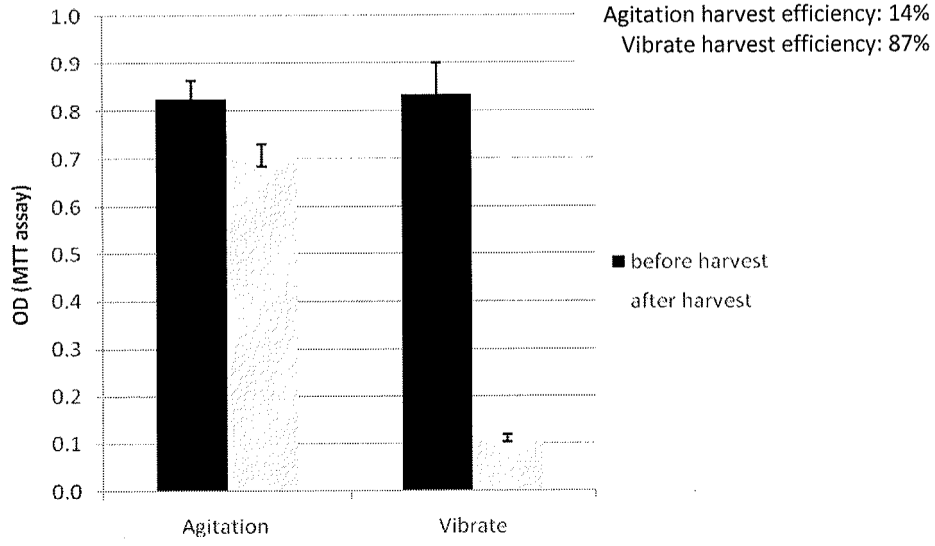

Agitation harvest efficiency: 14%
Vibrate harvest efficiency: 87%
OD (MTT assay)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Agitation
Vibrate
before harvest
after harvest

Figure 17

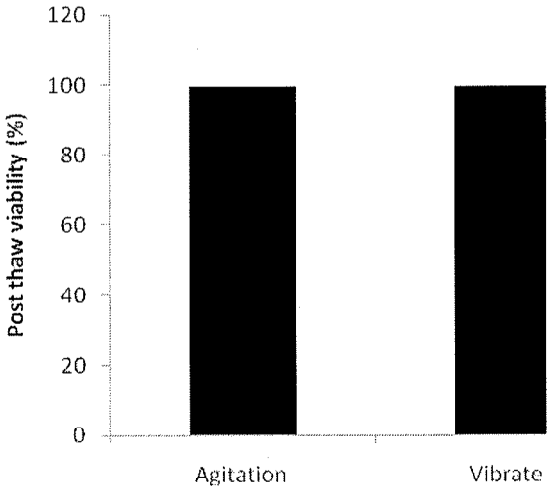


Figure 18

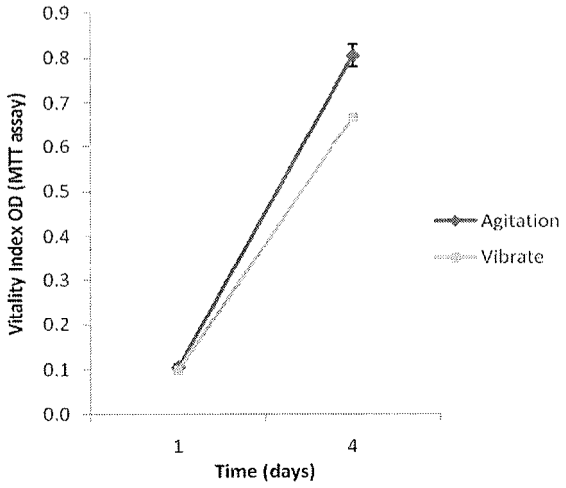

0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Vitality Index OD (MTT assay)
1
4
Time (days)
Agitation
Vibrate

Figure 19

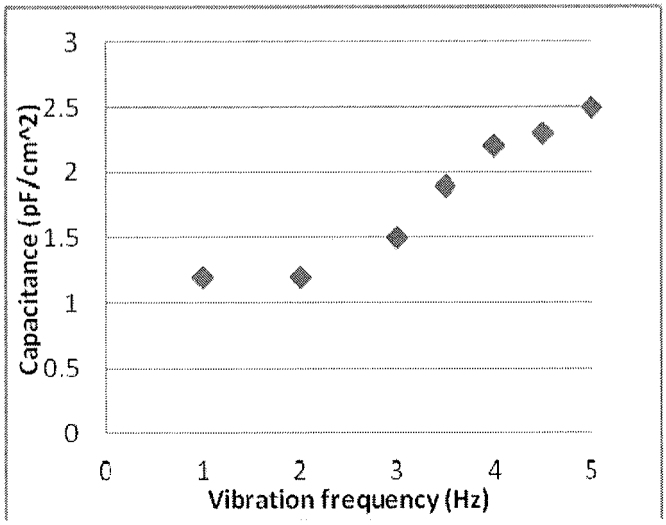

Capacitance (pF/cm^2)
3
2.5
2
1.5
1
0.5
0
0
1
2
3
4
5
Vibration frequency (Hz)

Figure 20

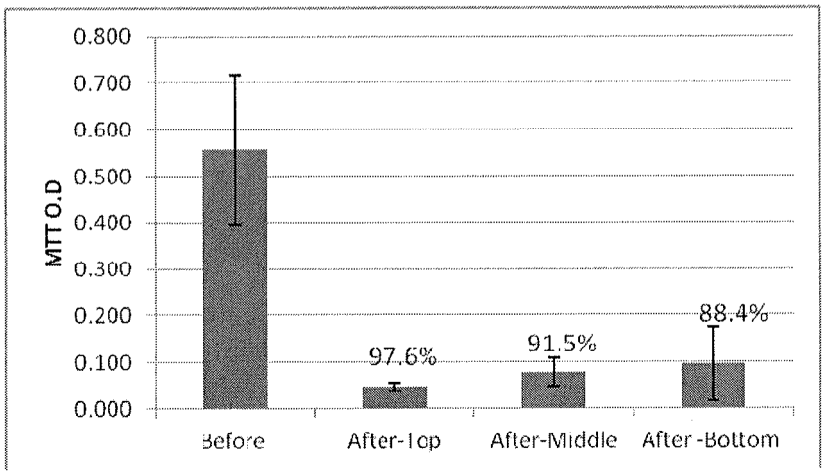

0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
MTT O.D
97.6%
91.5%
88.4%
Before
After-Top
After-Middle
After -Bottom

Figure 21

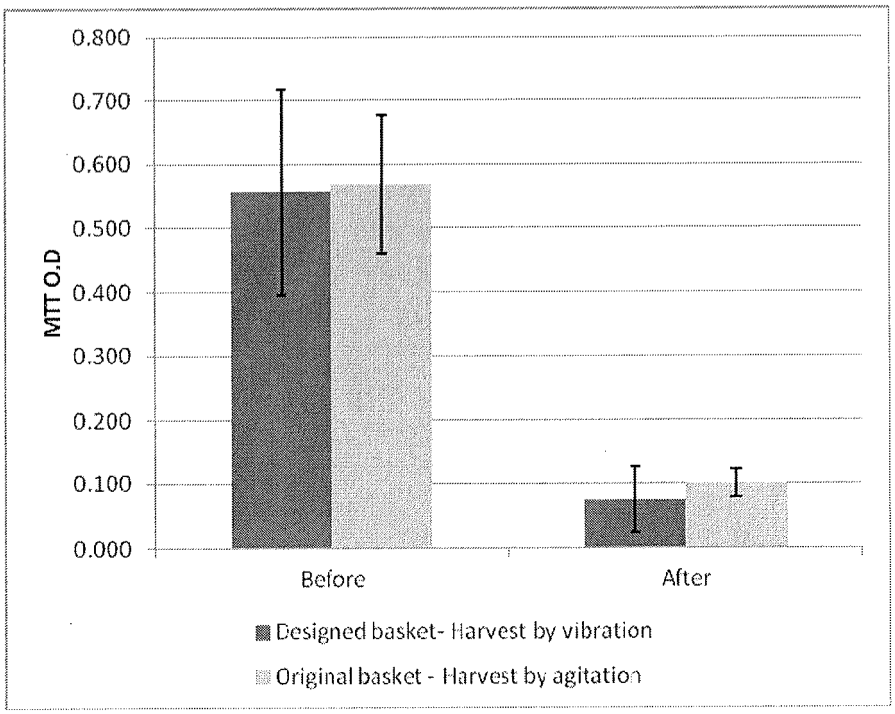

0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
MTT O.D
Before
After
Designed basket- Harvest by vibration
Original basket - Harvest by agitation

Figure 22

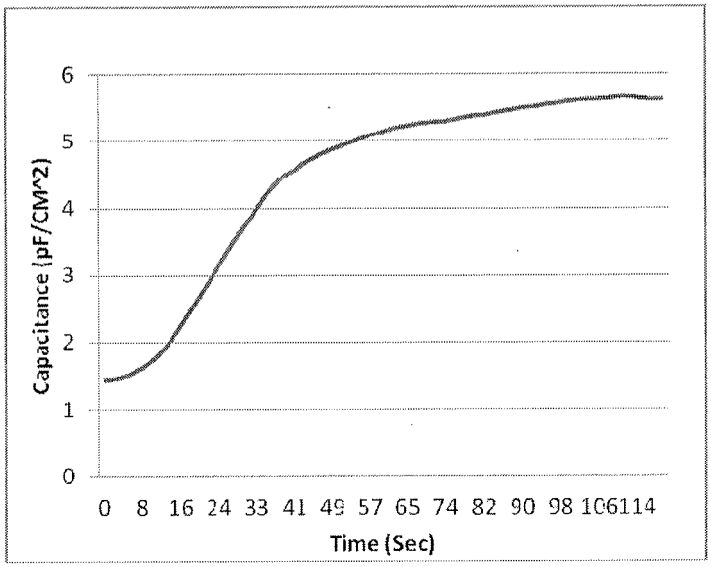

Capacitance (pF/CM^2)
6
5
4
3
2
1
0
0 8 16 24 33 41 49 57 65 74 82 90 98 106114
Time (Sec)

Figure 23

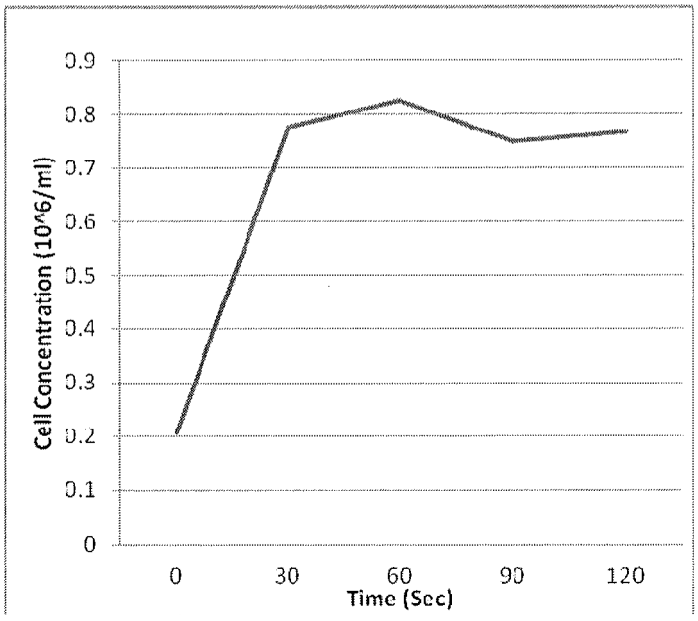

0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Cell Concentration (10^6/ml)
0
30
60
90
120
Time (Sec)

Figure 24

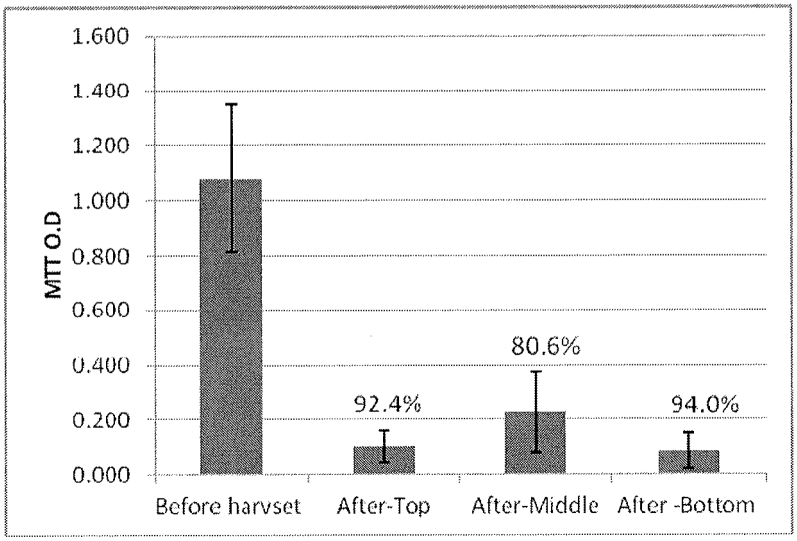
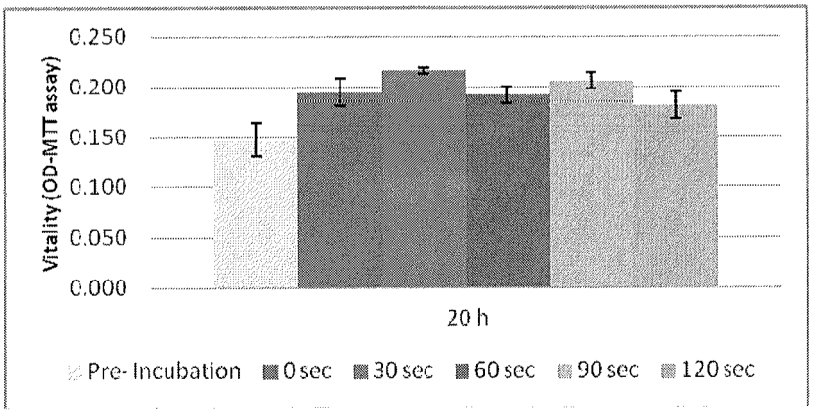

1.600
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
MTT O.D
92.4%
80.6%
94.0%
Before harvset
After-Top
After-Middle
After -Bottom

Figure 25


0.250
0.200
0.150
0.100
0.050
0.000
Vitality (OD-MTT assay)
20 h
Pre- Incubation
0 sec
30 sec
60 sec
90 sec
120 sec