Figure 1

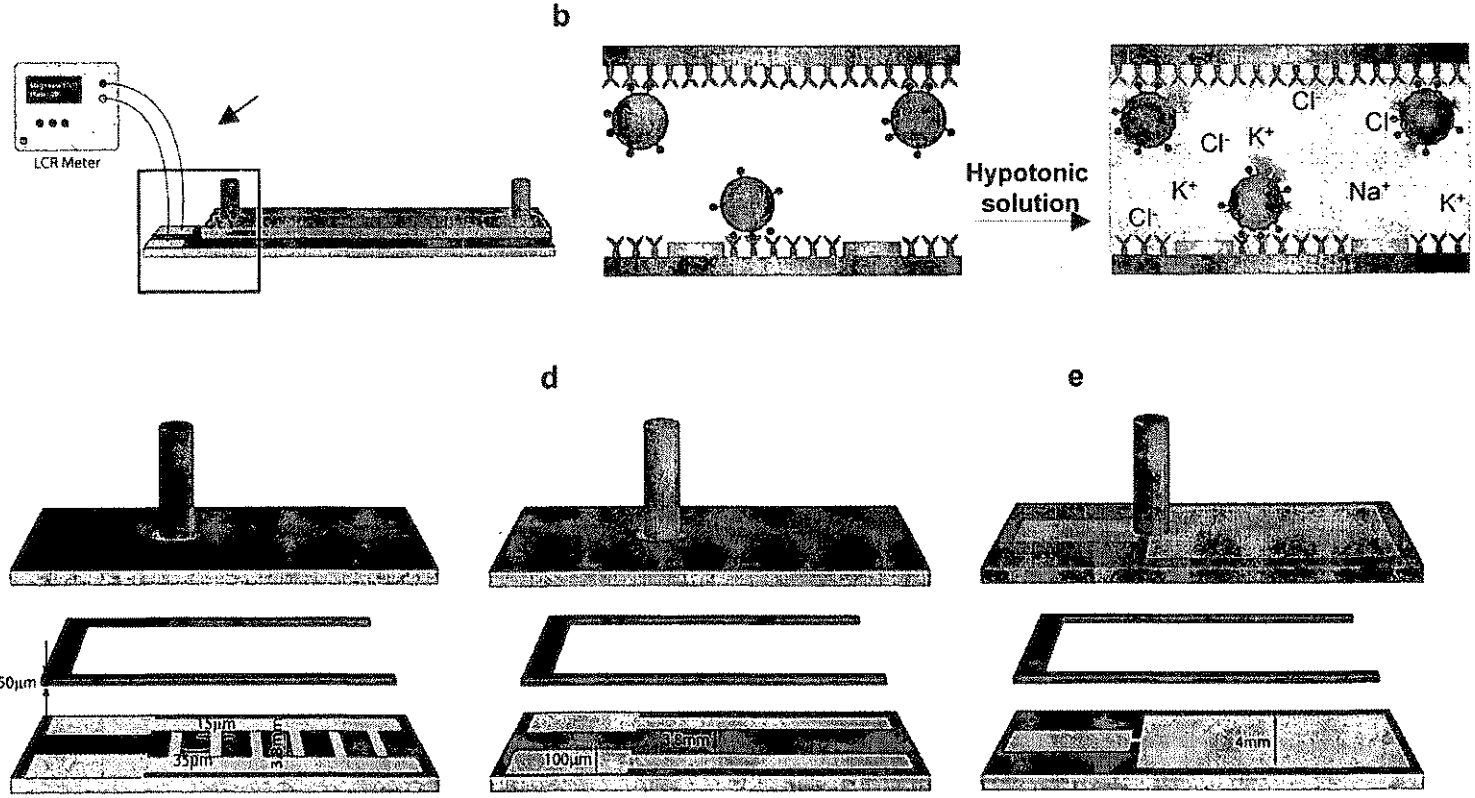

a
LCR Meter
b
Hypotonic solution
Cl-
K+
Na+
c
50µm
15µm
35µm
d
3.8mm
100µm
e
4mm

Figure 2

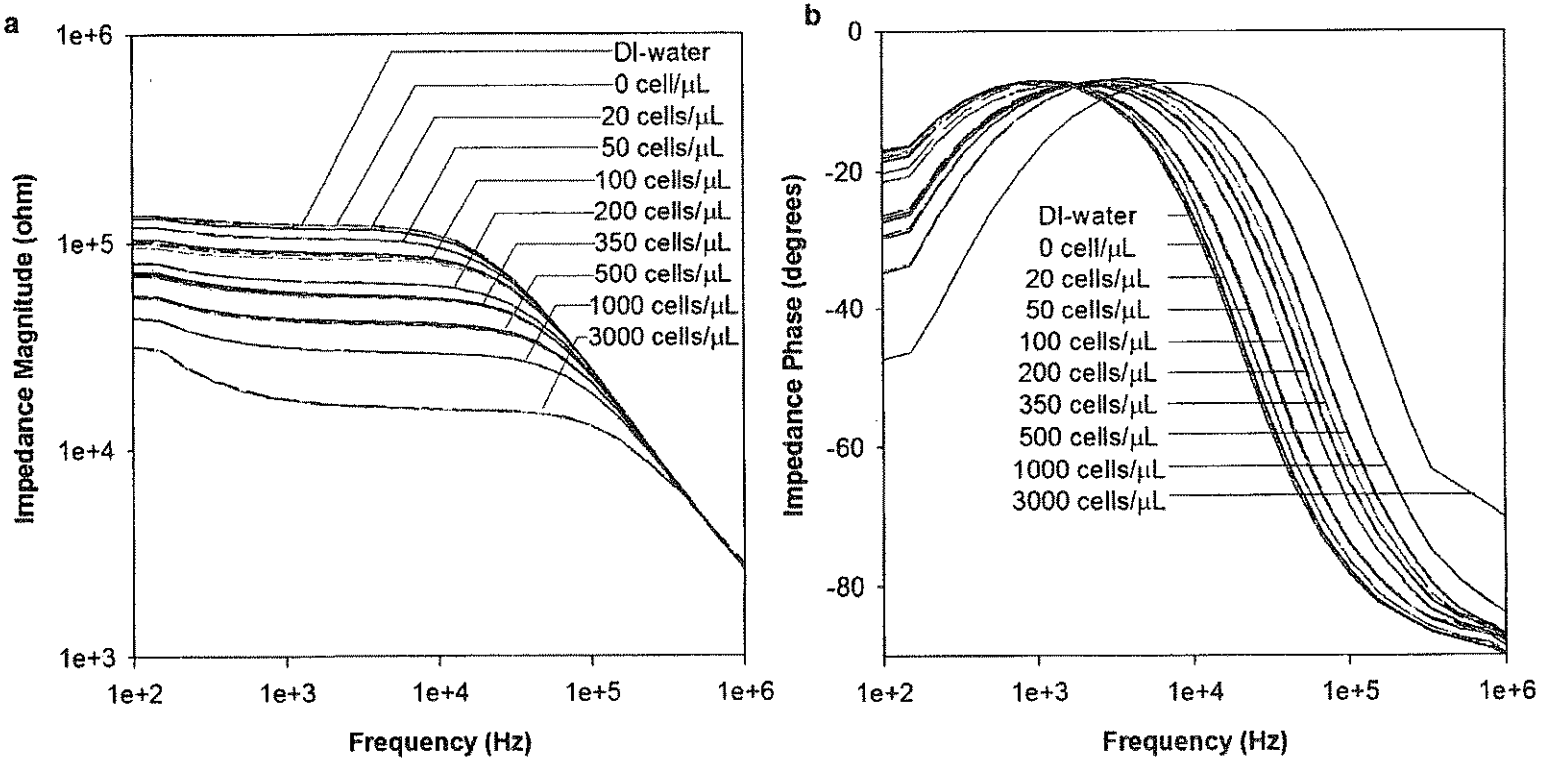

a
Impedance Magnitude (ohm)
1e+6
1e+5
1e+4
1e+3
1e+2
1e+3
1e+4
1e+5
1e+6
Frequency (Hz)
DI-water
0 cell/μL
20 cells/μL
50 cells/μL
100 cells/μL
200 cells/μL
350 cells/μL
500 cells/μL
1000 cells/μL
3000 cells/μL
b
Impedance Phase (degrees)
0
-20
-40
-60
-80
1e+2
1e+3
1e+4
1e+5
1e+6
Frequency (Hz)
DI-water
0 cell/μL
20 cells/μL
50 cells/μL
100 cells/μL
200 cells/μL
350 cells/μL
500 cells/μL
1000 cells/μL
3000 cells/μL

Figure 2 continued

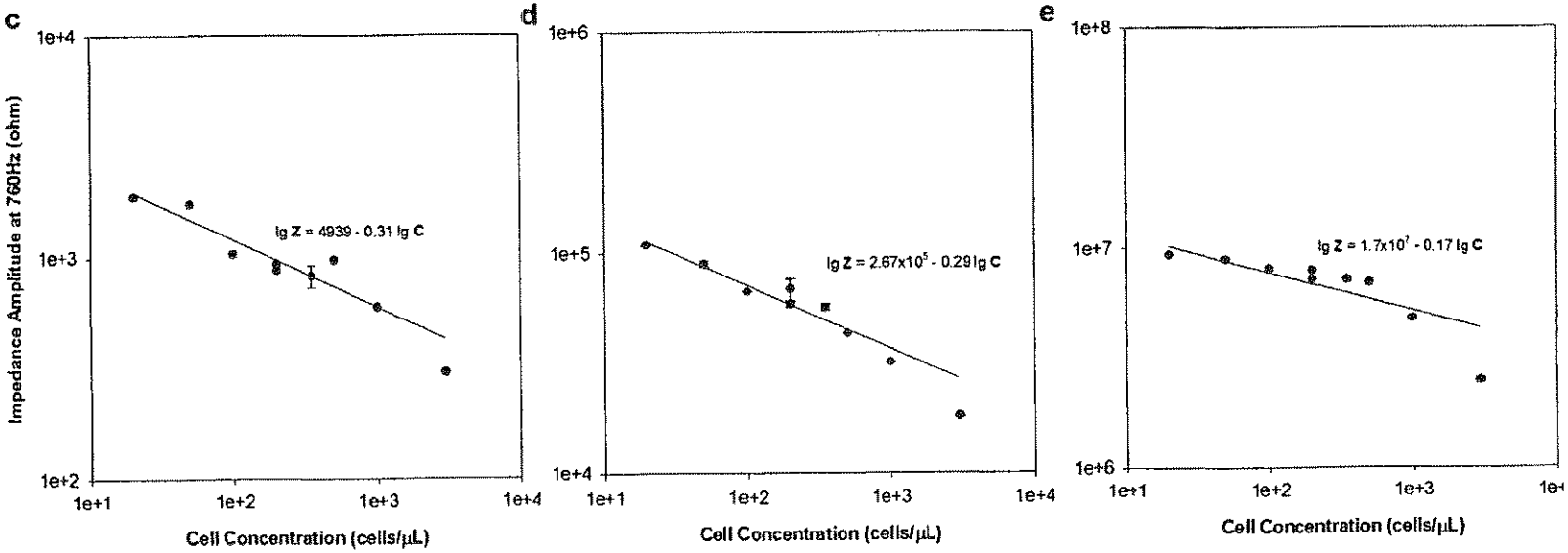


Figure 3

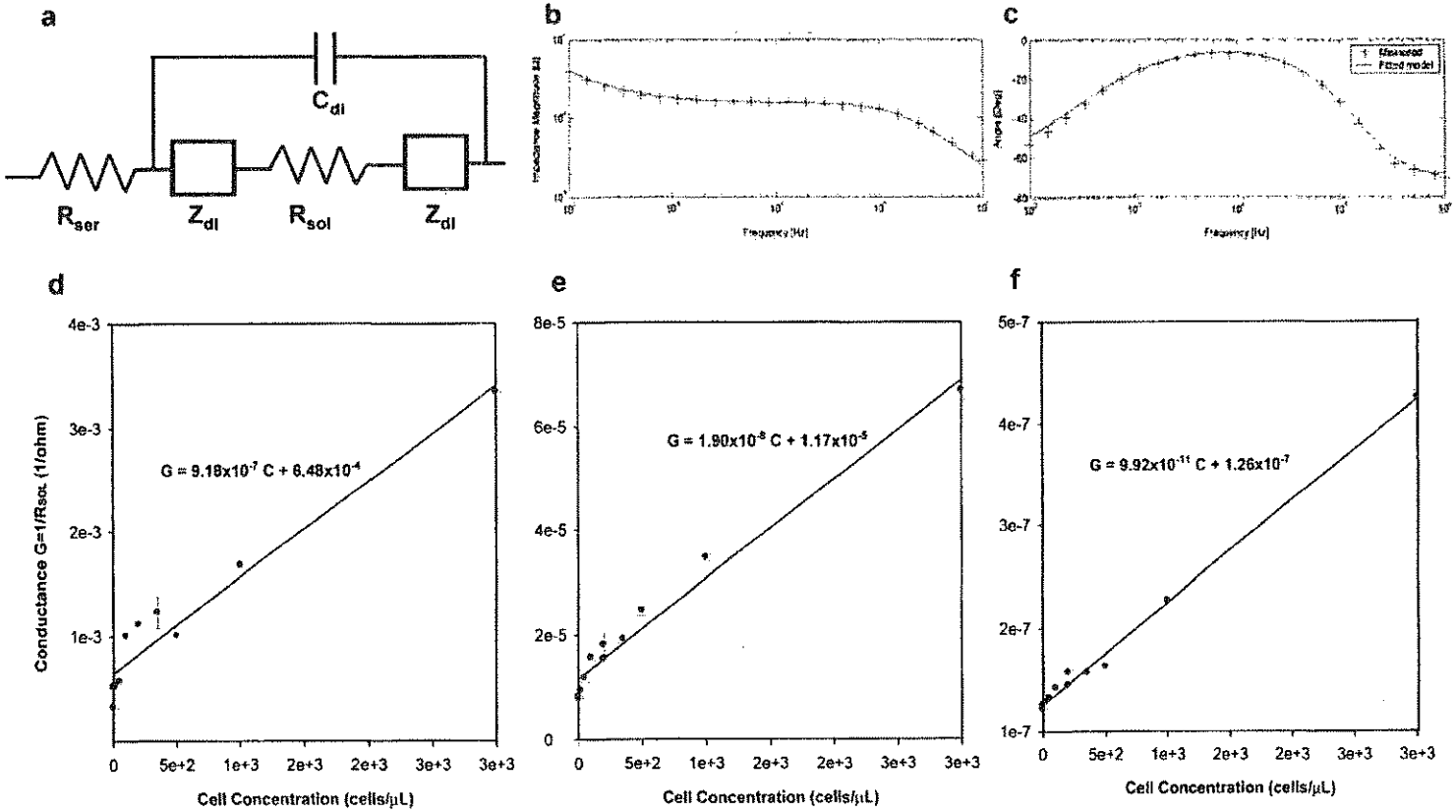

a
C_{dl}
R_{ser}
Z_{dl}
R_{sol}
Z_{dl}
b
Frequency [Hz]
c
Measured
Fitted model
Frequency [Hz]
d
Conductance G=1/Rsol (1/ohm)
G = 9.18x10⁻⁷ C + 6.48x10⁻⁴
4e-3
3e-3
2e-3
1e-3
0
5e+2
1e+3
2e+3
2e+3
3e+3
3e+3
Cell Concentration (cells/µL)
e
G = 1.90x10⁻⁸ C + 1.17x10⁻⁵
8e-5
6e-5
4e-5
2e-5
0
Cell Concentration (cells/µL)
f
G = 9.92x10⁻¹¹ C + 1.26x10⁻⁷
5e-7
4e-7
3e-7
2e-7
1e-7
Cell Concentration (cells/µL)

Figure 4

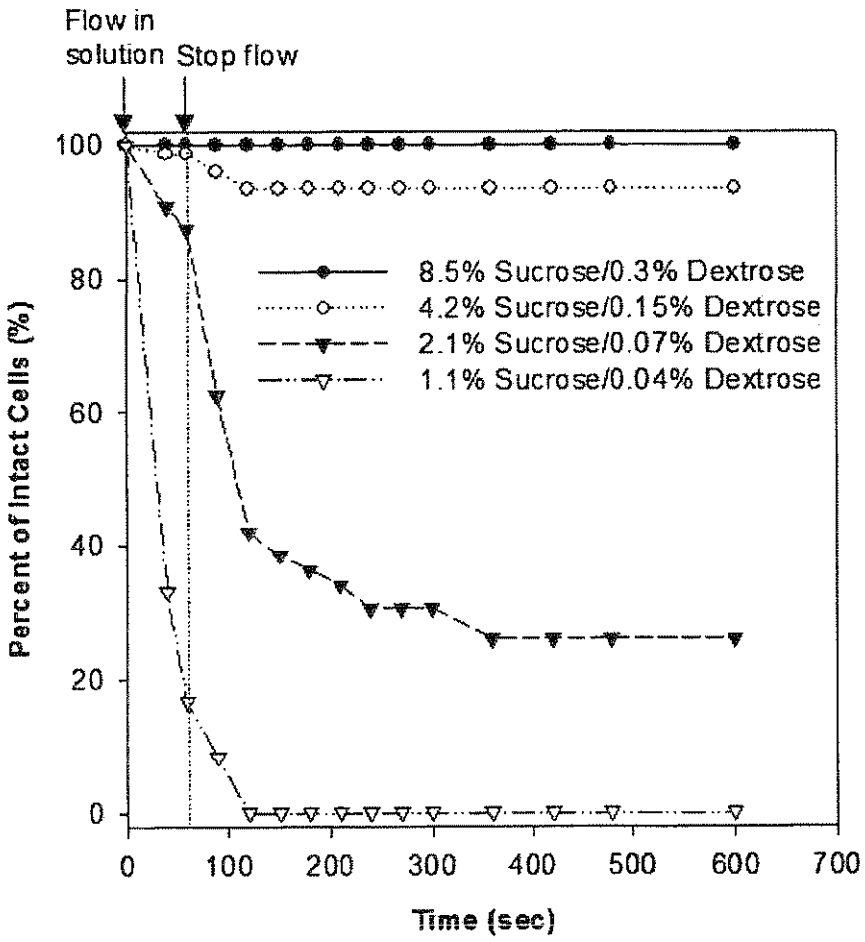
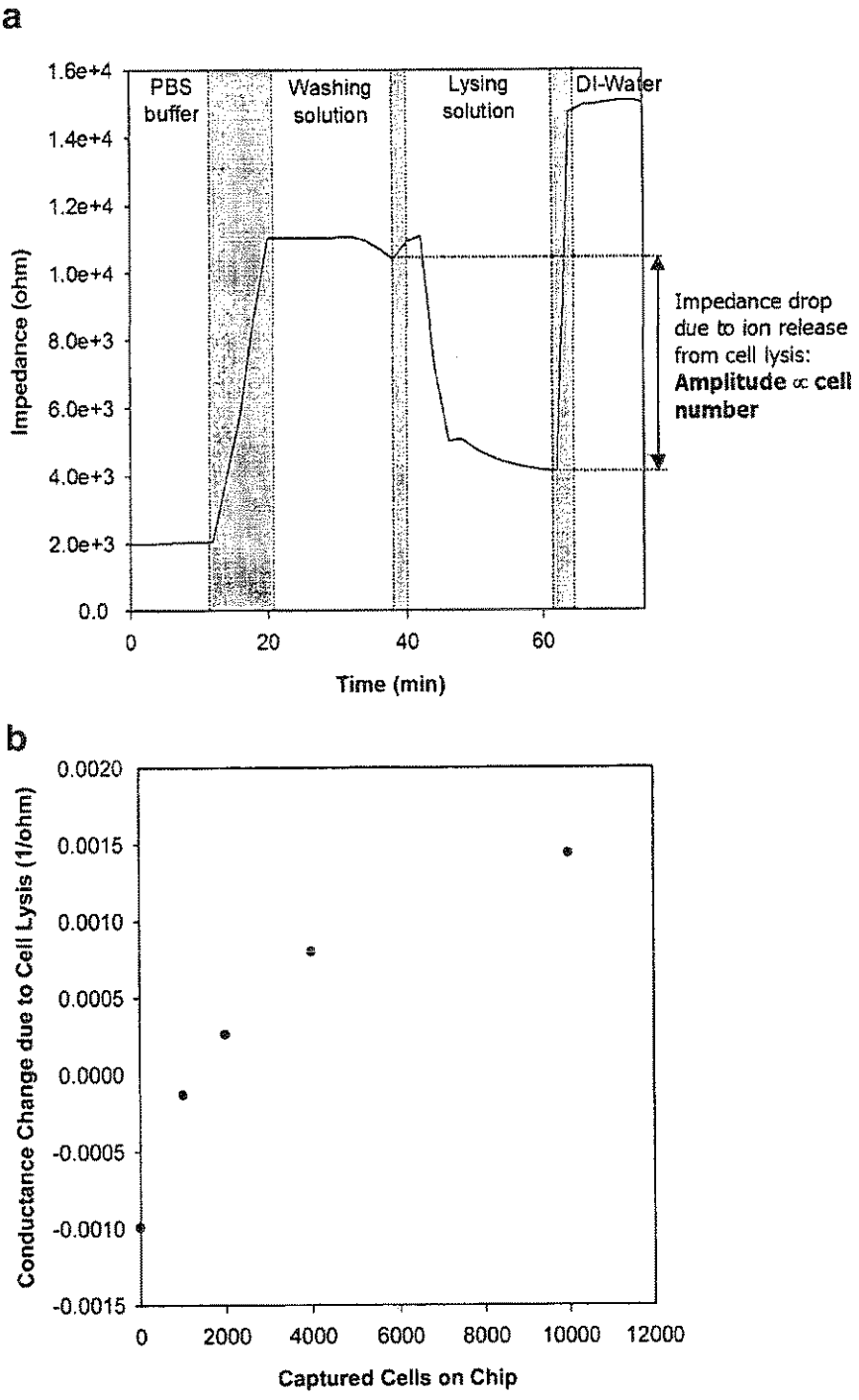

Flow in solution
Stop flow
100
80
60
40
20
0
Percent of Intact Cells (%)
0
100
200
300
400
500
600
700
Time (sec)
8.5% Sucrose/0.3% Dextrose
4.2% Sucrose/0.15% Dextrose
2.1% Sucrose/0.07% Dextrose
1.1% Sucrose/0.04% Dextrose

Figure 5


a
1.6e+4
1.4e+4
1.2e+4
1.0e+4
8.0e+3
6.0e+3
4.0e+3
2.0e+3
0.0
Impedance (ohm)
PBS buffer
Washing solution
Lysing solution
DI-Water
Impedance drop due to ion release from cell lysis: Amplitude ∝ cell number
0
20
40
60
Time (min)
b
0.0020
0.0015
0.0010
0.0005
0.0000
-0.0005
-0.0010
-0.0015
Conductance Change due to Cell Lysis (1/ohm)
0
2000
4000
6000
8000
10000
12000
Captured Cells on Chip