FIG. 1A

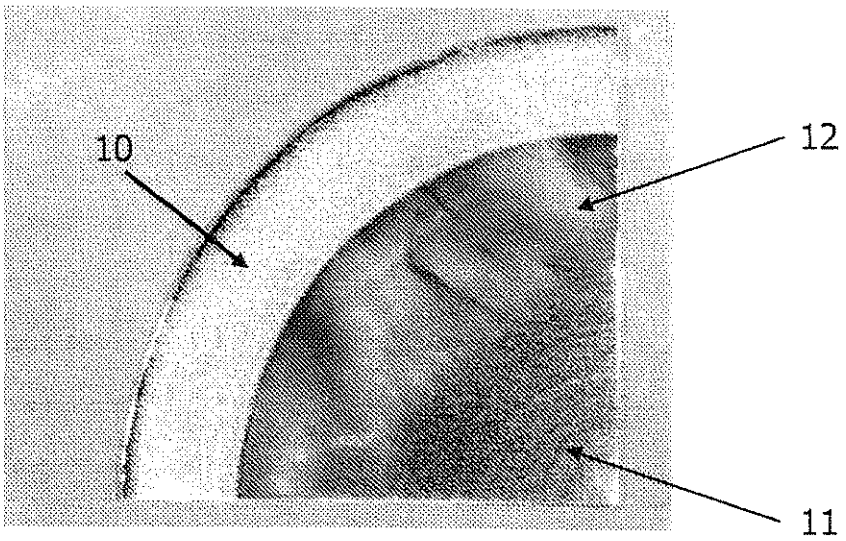


FIG. 1B

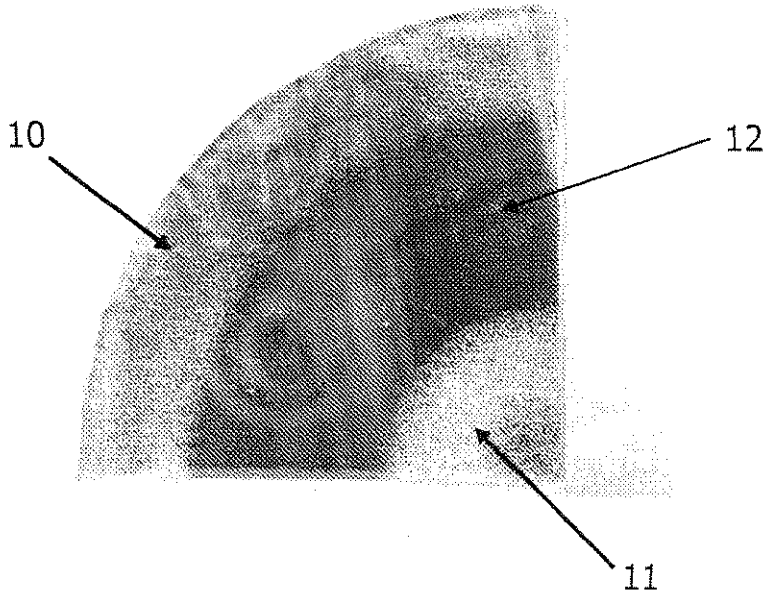


FIG. 2A

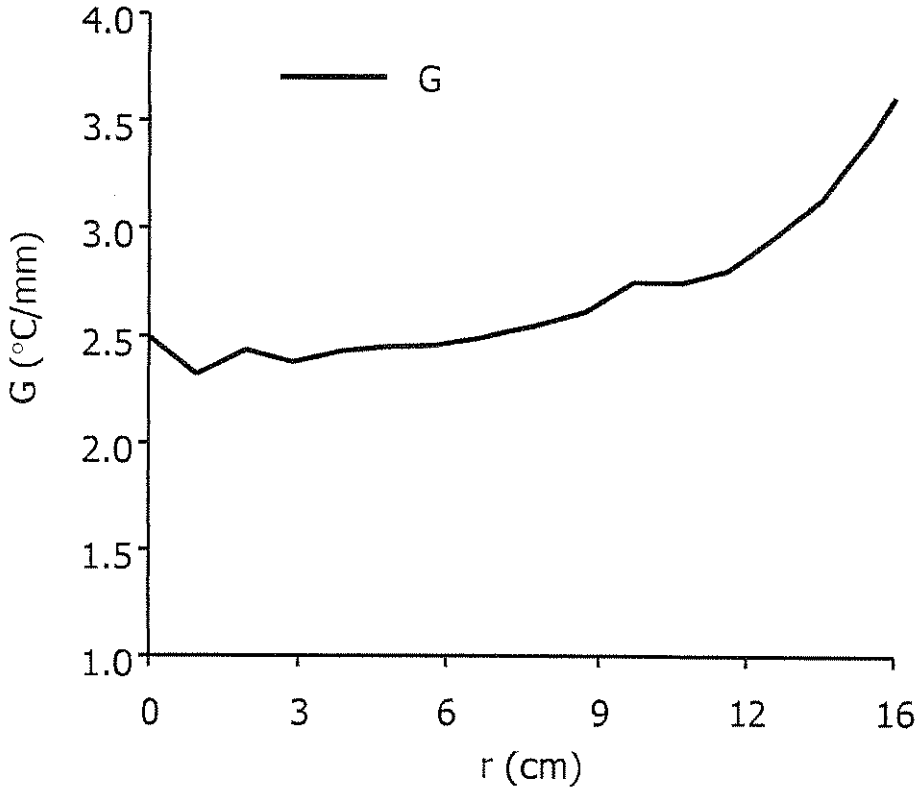


FIG. 2B

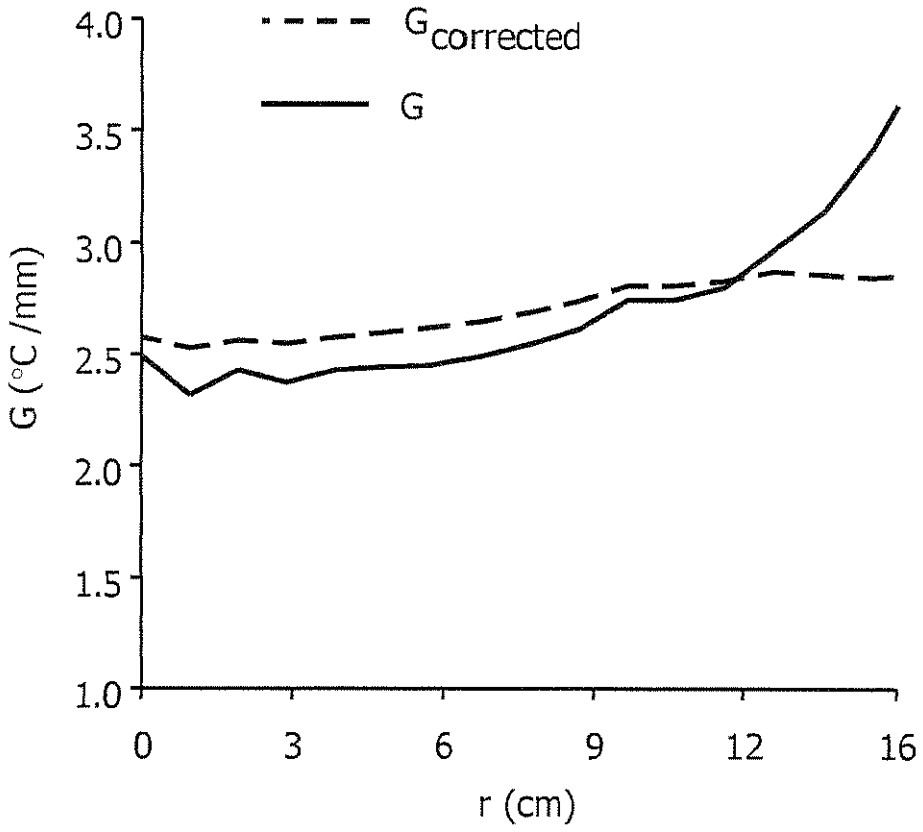


FIG. 3

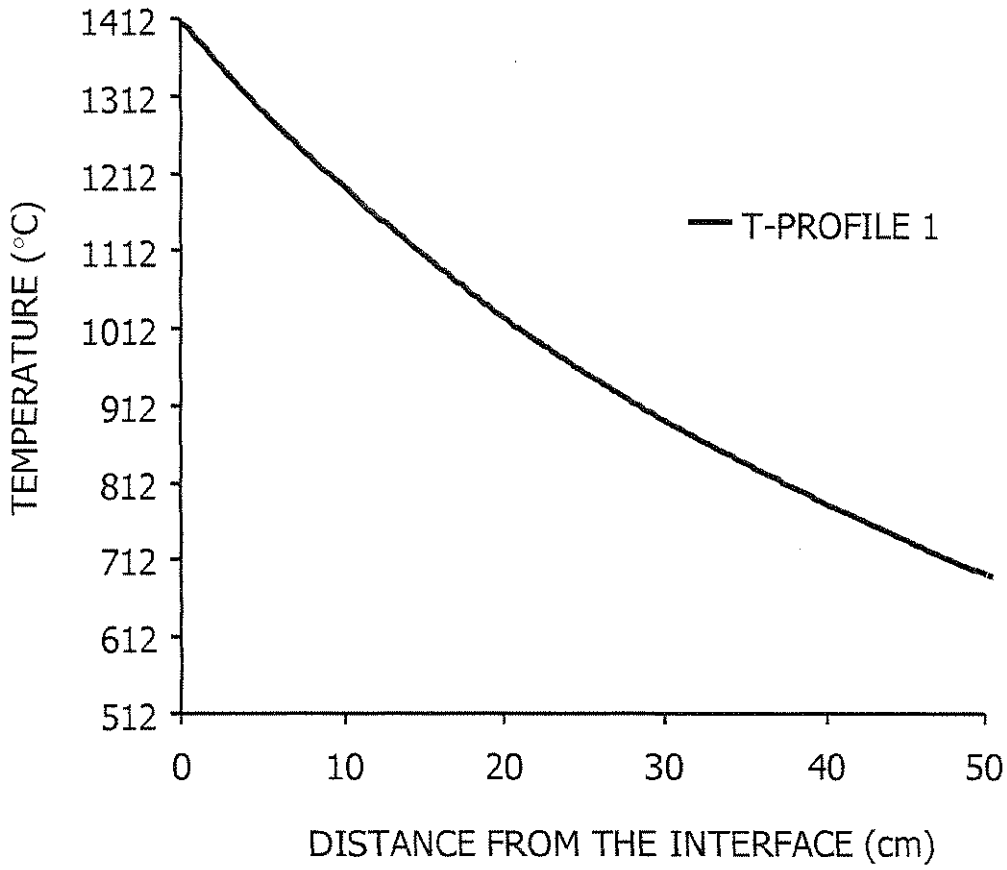

1412
1312
1212
1112
1012
912
812
712
612
512
TEMPERATURE (°C)
T-PROFILE 1
0
10
20
30
40
50
DISTANCE FROM THE INTERFACE (cm)

FIG. 4

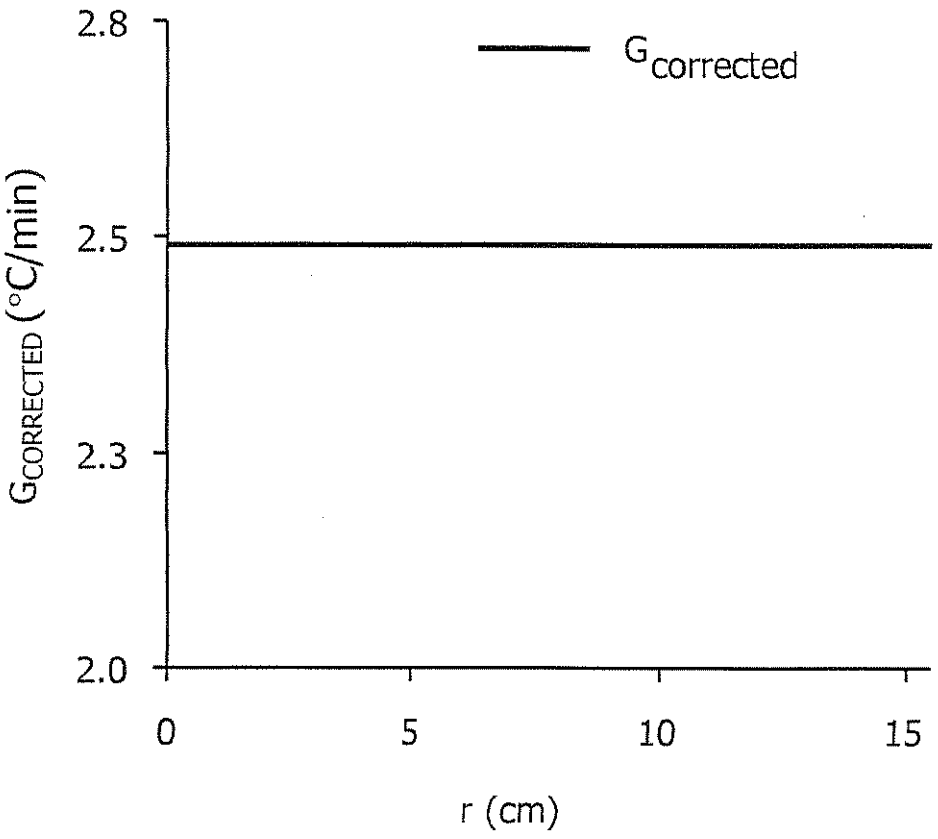


FIG. 5

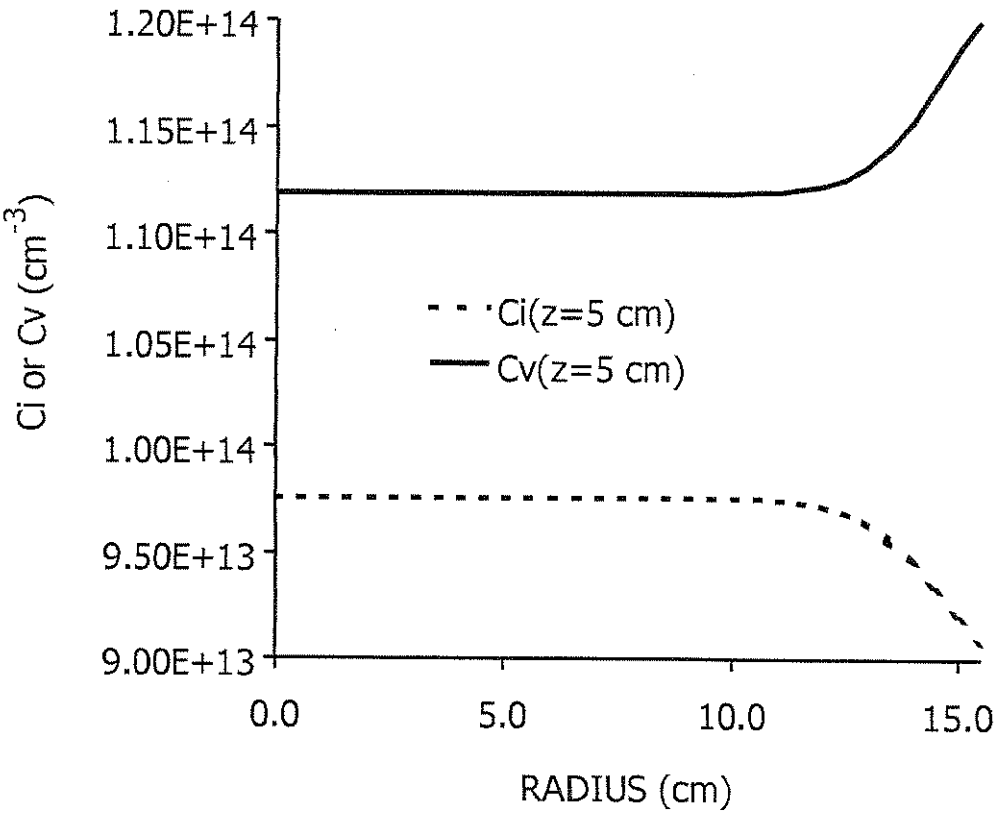

1.20E+14
1.15E+14
1.10E+14
1.05E+14
1.00E+14
9.50E+13
9.00E+13
Ci or Cv (cm-3)
Ci(z=5 cm)
Cv(z=5 cm)
0.0
5.0
10.0
15.0
RADIUS (cm)

FIG. 6

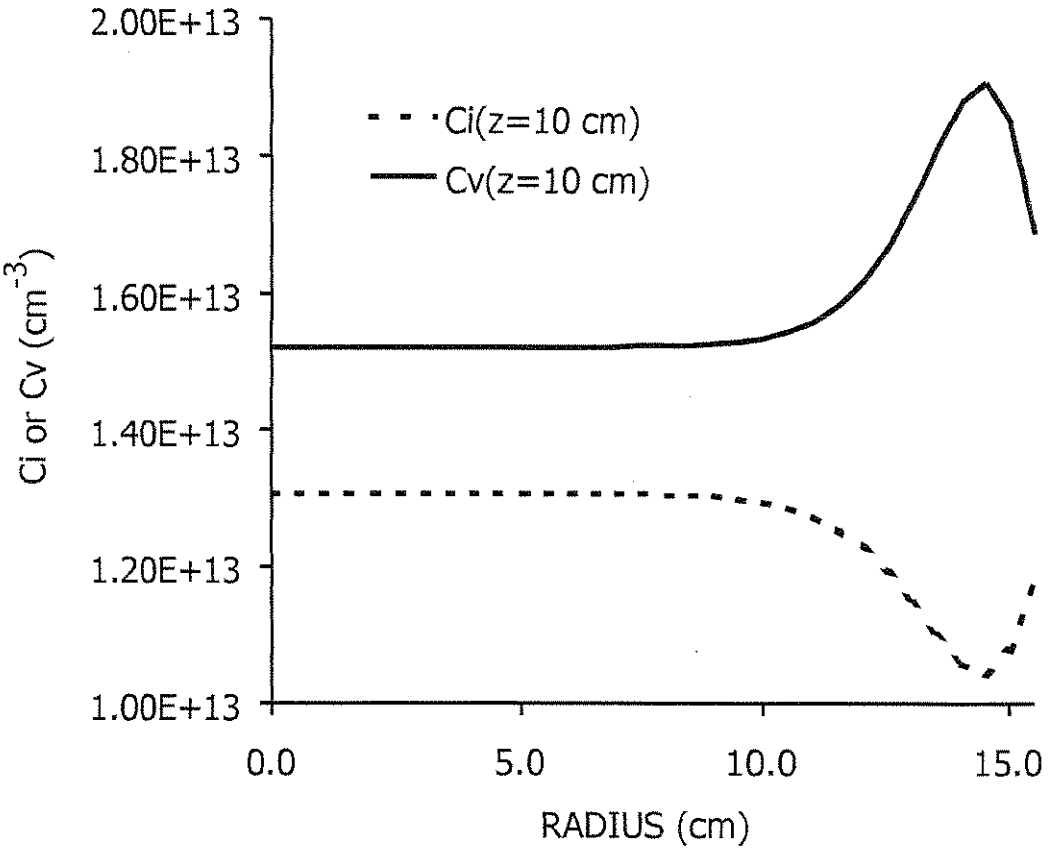

2.00E+13
1.80E+13
1.60E+13
1.40E+13
1.20E+13
1.00E+13
Ci or Cv (cm-3)
Ci(z=10 cm)
Cv(z=10 cm)
0.0
5.0
10.0
15.0
RADIUS (cm)

FIG. 7

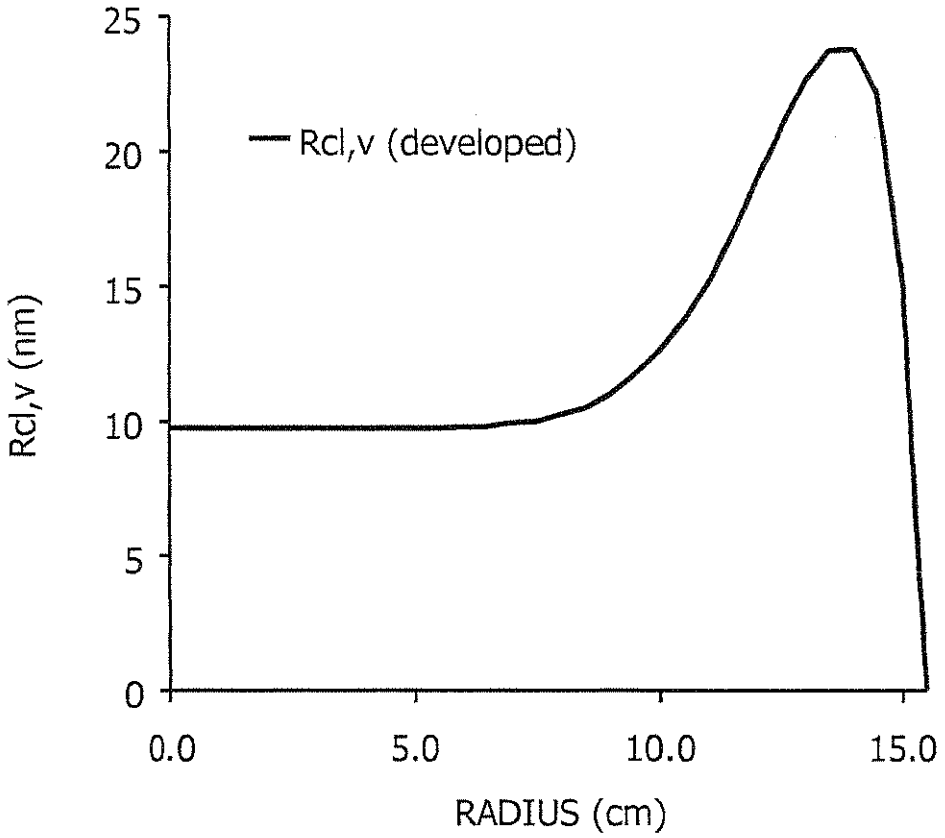


FIG. 8

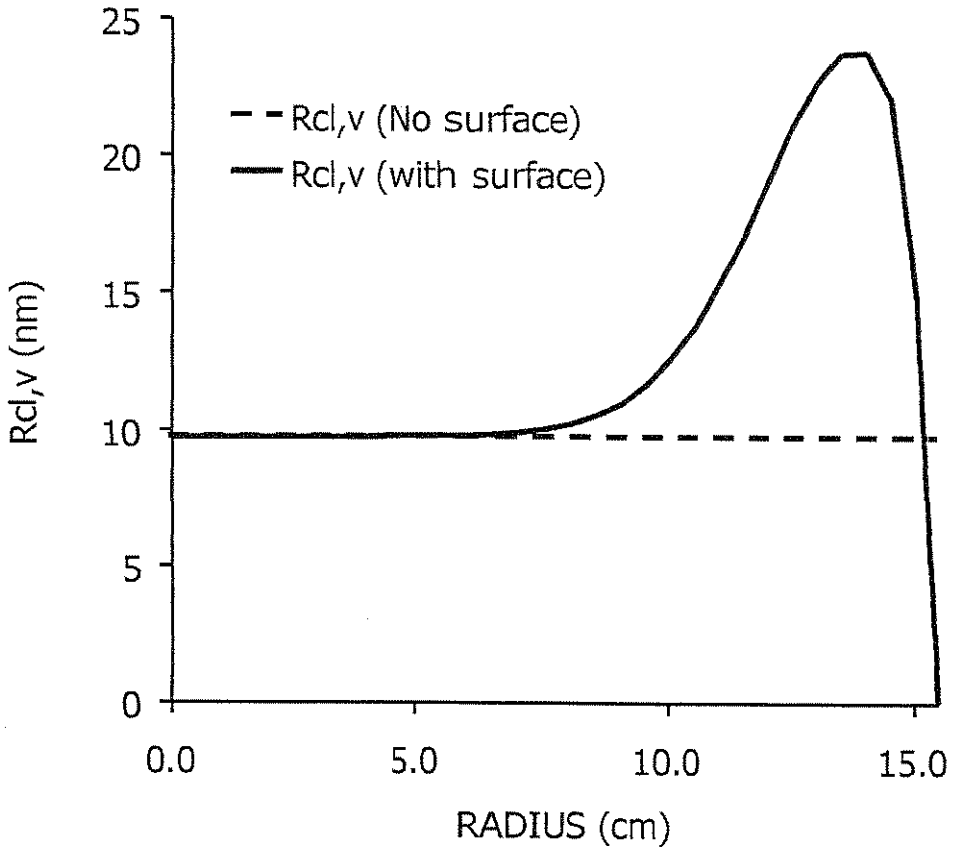

25
20
15
10
5
0
Rcl,v (nm)
Rcl,v (No surface)
Rcl,v (with surface)
0.0
5.0
10.0
15.0
RADIUS (cm)

FIG. 9

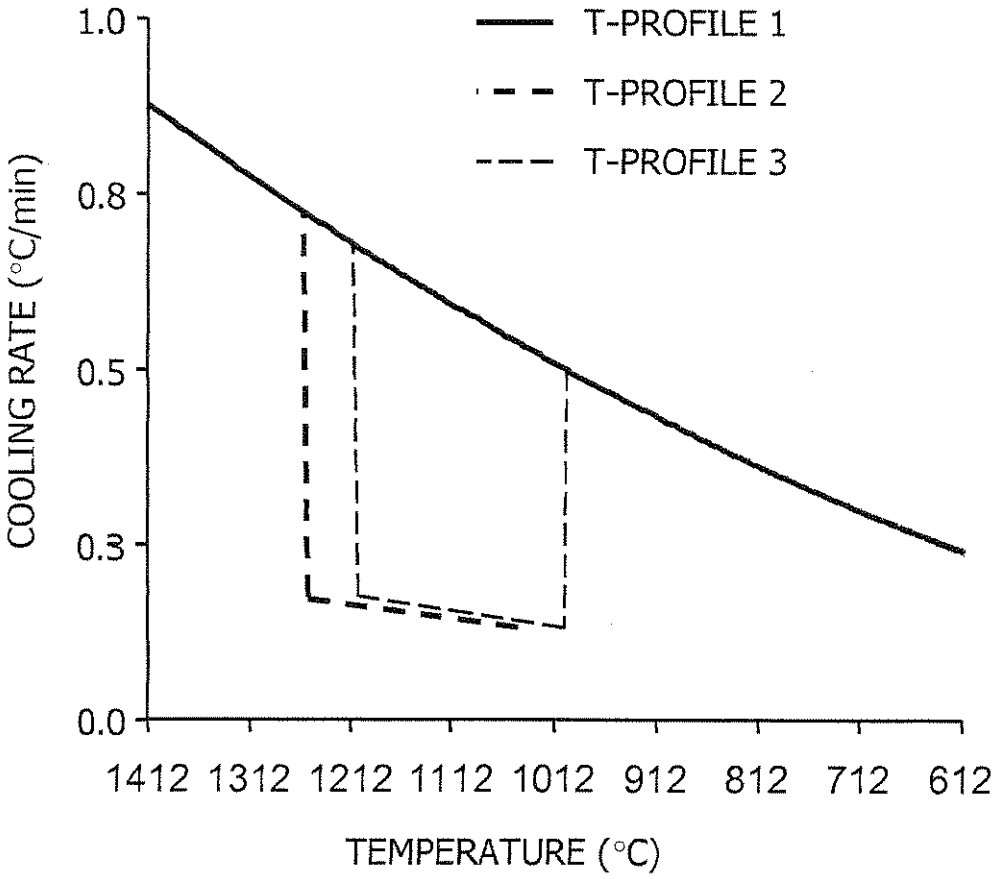

T-PROFILE 1
T-PROFILE 2
T-PROFILE 3
COOLING RATE (°C/min)
1.0
0.8
0.5
0.3
0.0
1412 1312 1212 1112 1012 912 812 712 612
TEMPERATURE (°C)

FIG. 10

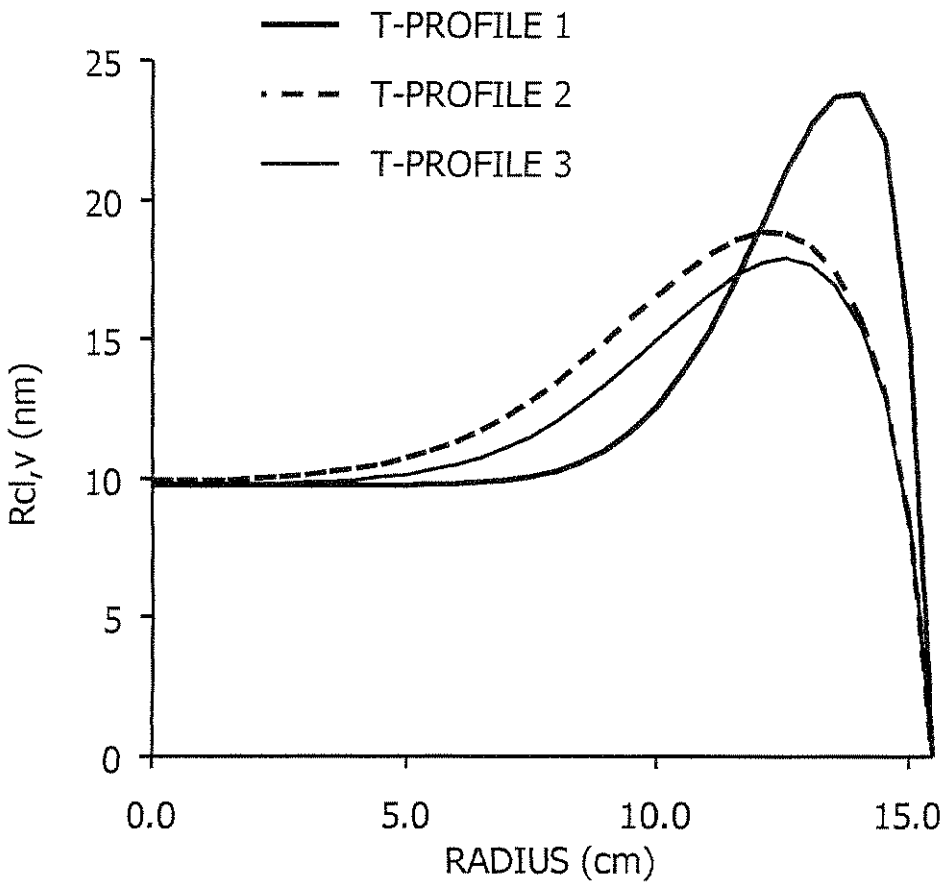

T-PROFILE 1
T-PROFILE 2
T-PROFILE 3
25
20
15
10
5
0
Rcl,v (nm)
0.0
5.0
10.0
15.0
RADIUS (cm)

FIG. 11

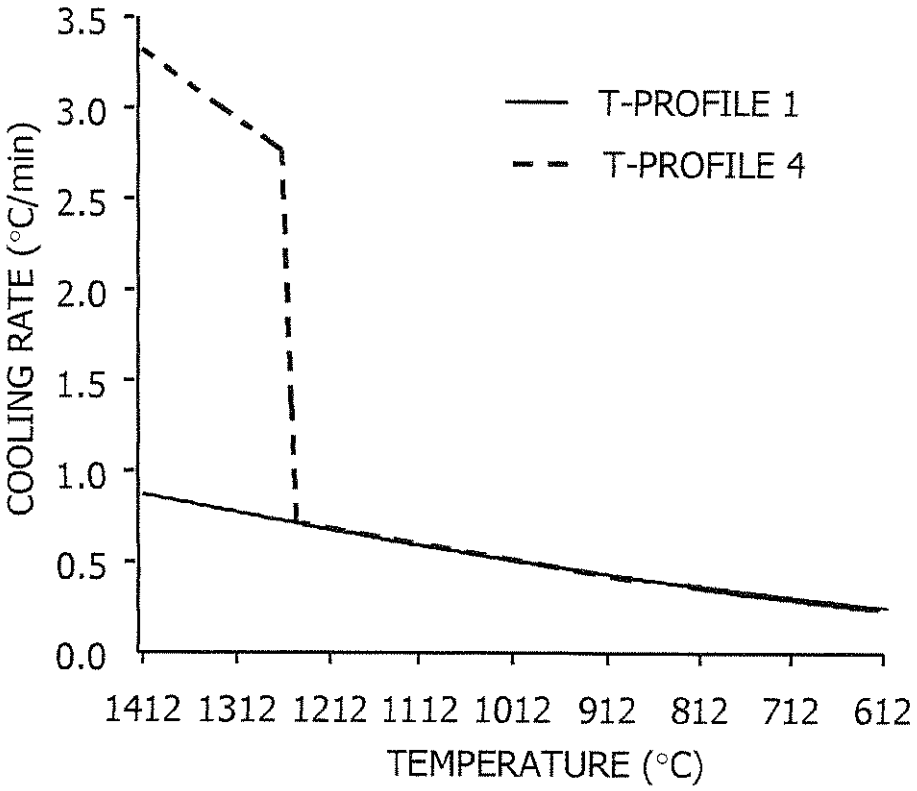

3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
COOLING RATE (°C/min)
T-PROFILE 1
T-PROFILE 4
1412 1312 1212 1112 1012 912 812 712 612
TEMPERATURE (°C)

FIG. 12

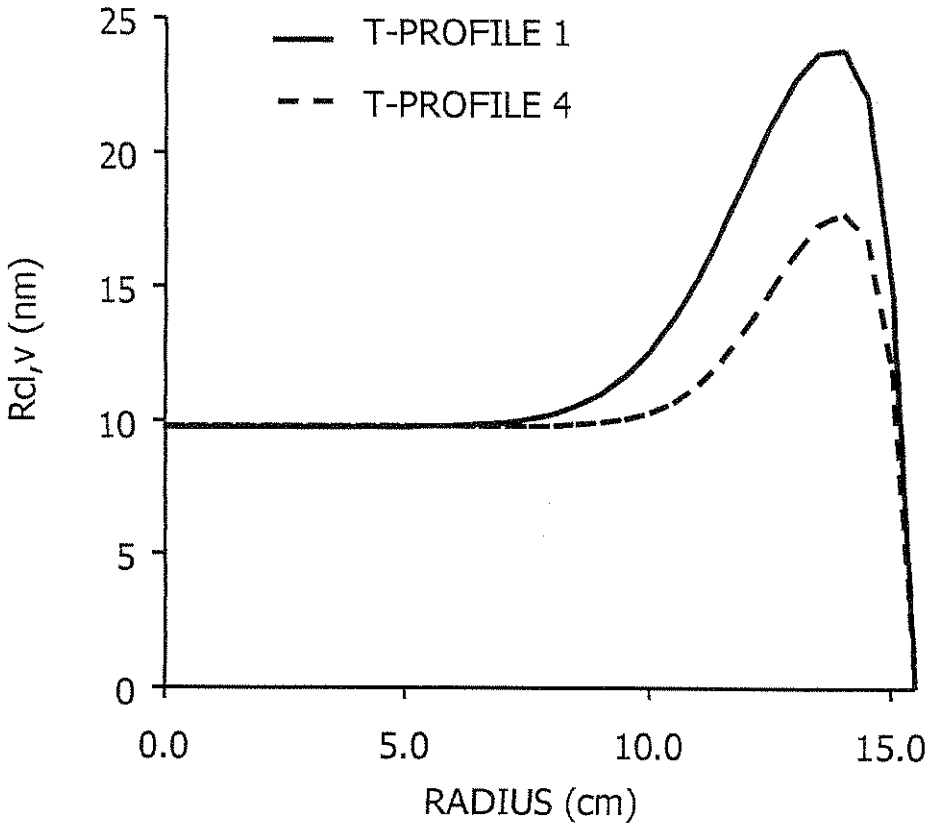

T-PROFILE 1
T-PROFILE 4
25
20
15
10
5
0
Rcl,v (nm)
0.0
5.0
10.0
15.0
RADIUS (cm)

FIG. 13

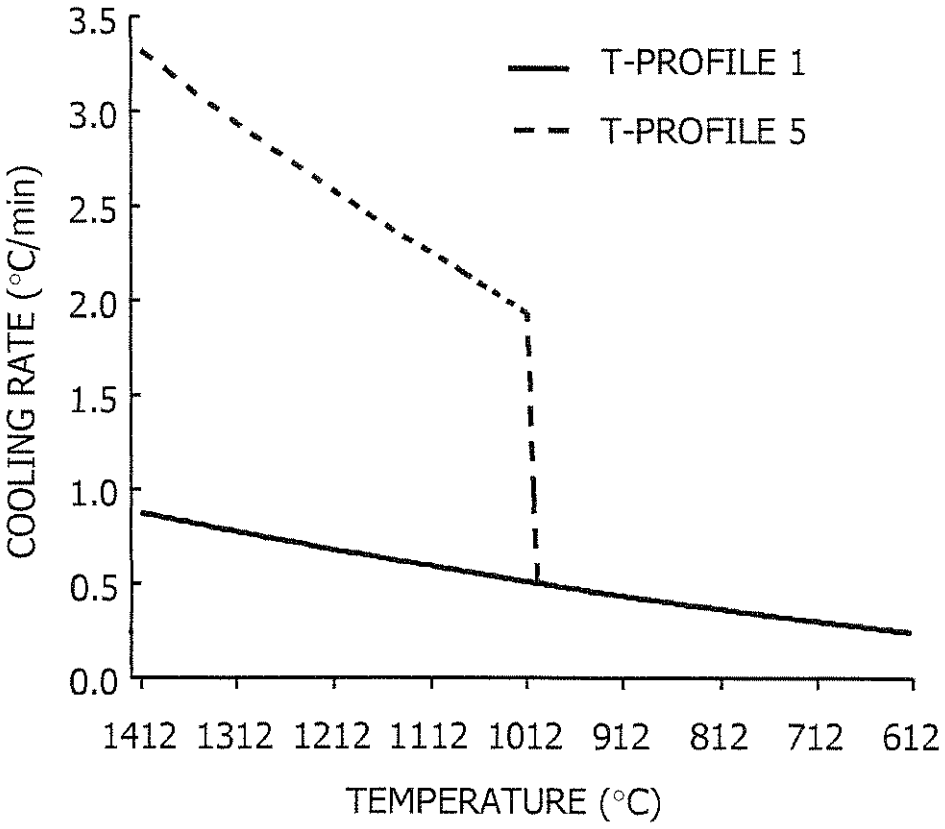

3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
COOLING RATE (°C/min)
T-PROFILE 1
T-PROFILE 5
1412 1312 1212 1112 1012 912 812 712 612
TEMPERATURE (°C)

FIG. 14

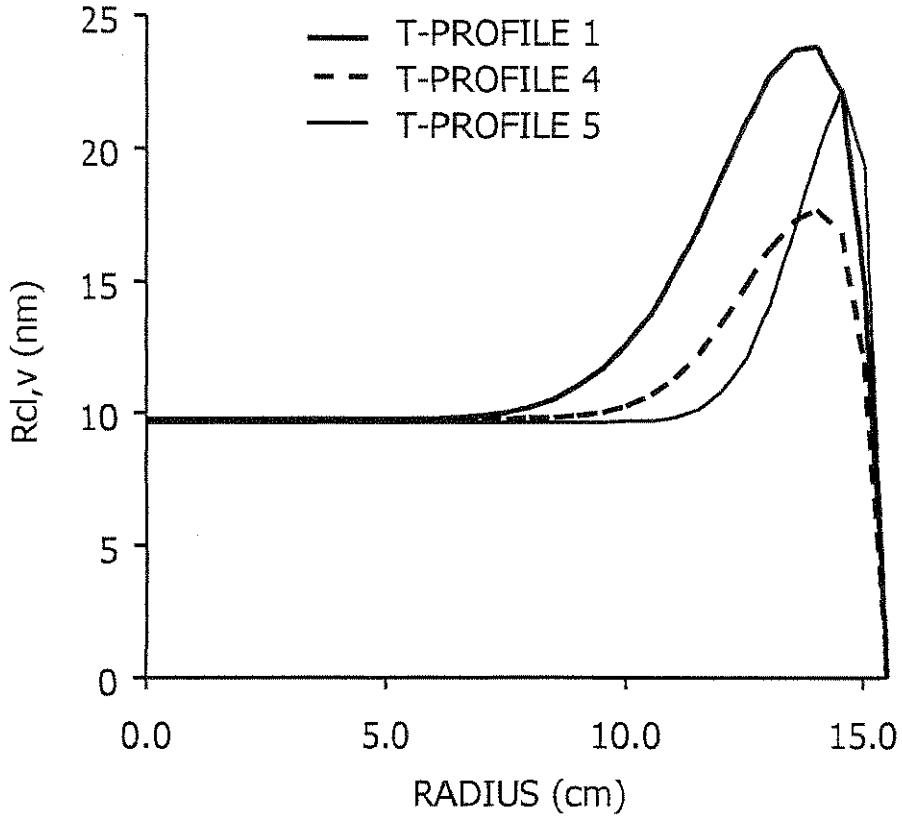

T-PROFILE 1
T-PROFILE 4
T-PROFILE 5
Rcl,v (nm)
25
20
15
10
5
0
0.0
5.0
10.0
15.0
RADIUS (cm)

FIG. 15

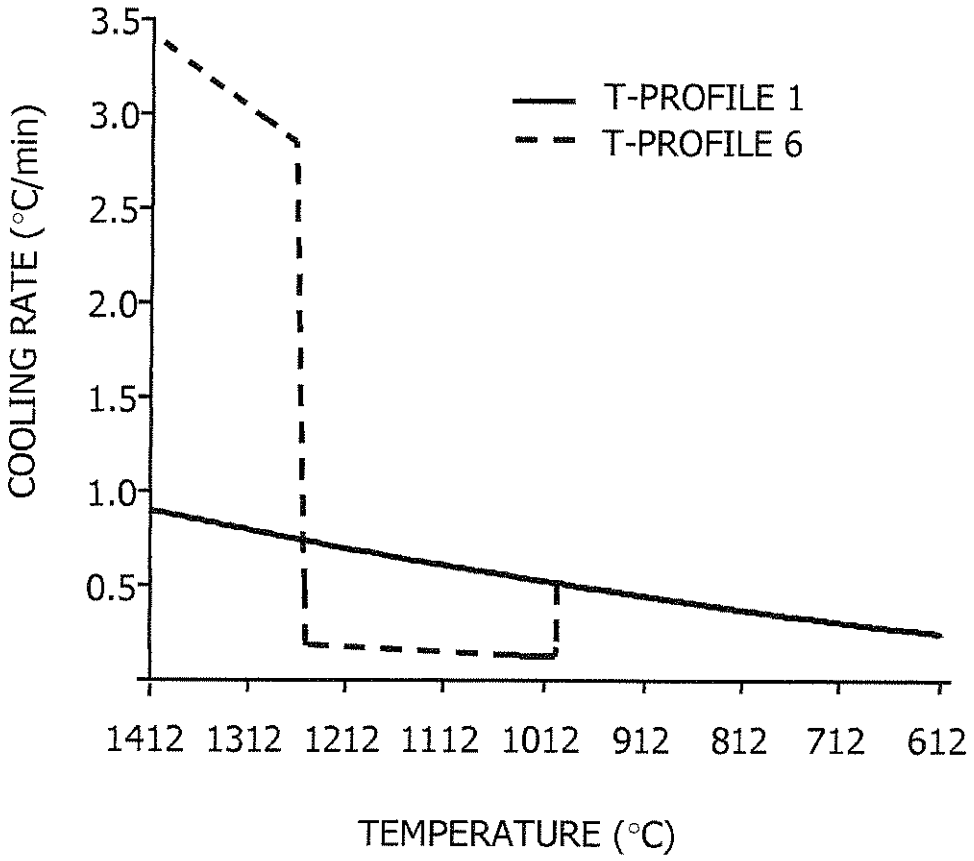

3.5
3.0
2.5
2.0
1.5
1.0
0.5
COOLING RATE (°C/min)
T-PROFILE 1
T-PROFILE 6
1412 1312 1212 1112 1012 912 812 712 612
TEMPERATURE (°C)

FIG. 16

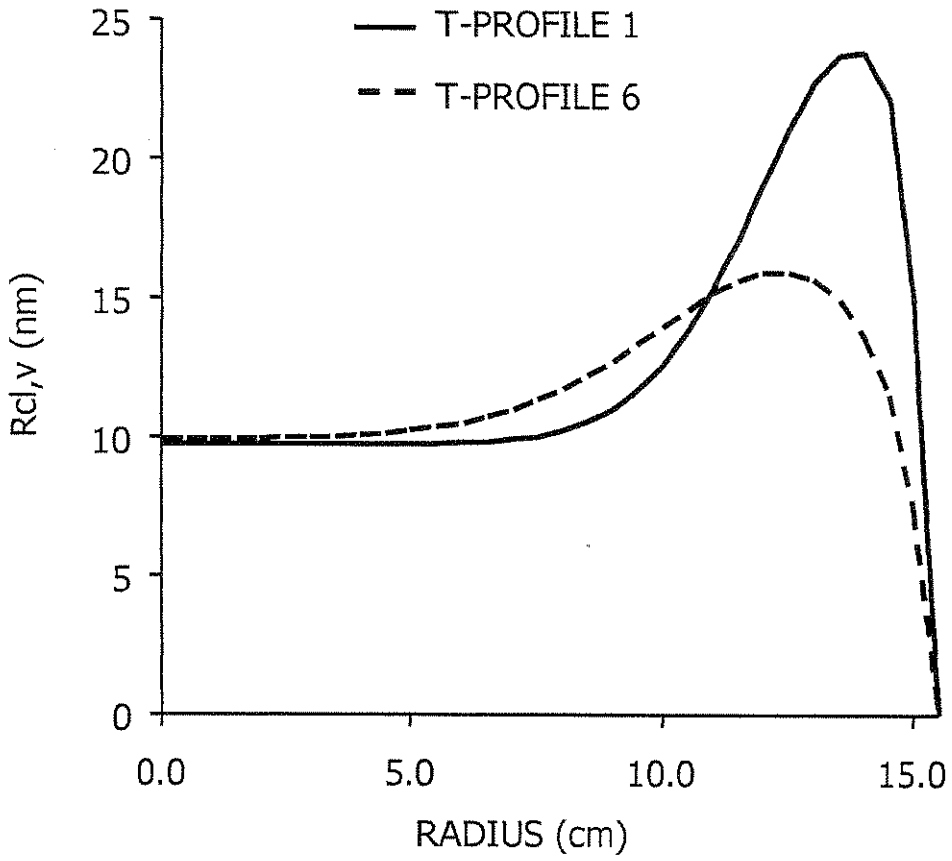

T-PROFILE 1
T-PROFILE 6
25
20
15
10
5
0
Rcl,v (nm)
0.0
5.0
10.0
15.0
RADIUS (cm)

FIG. 17

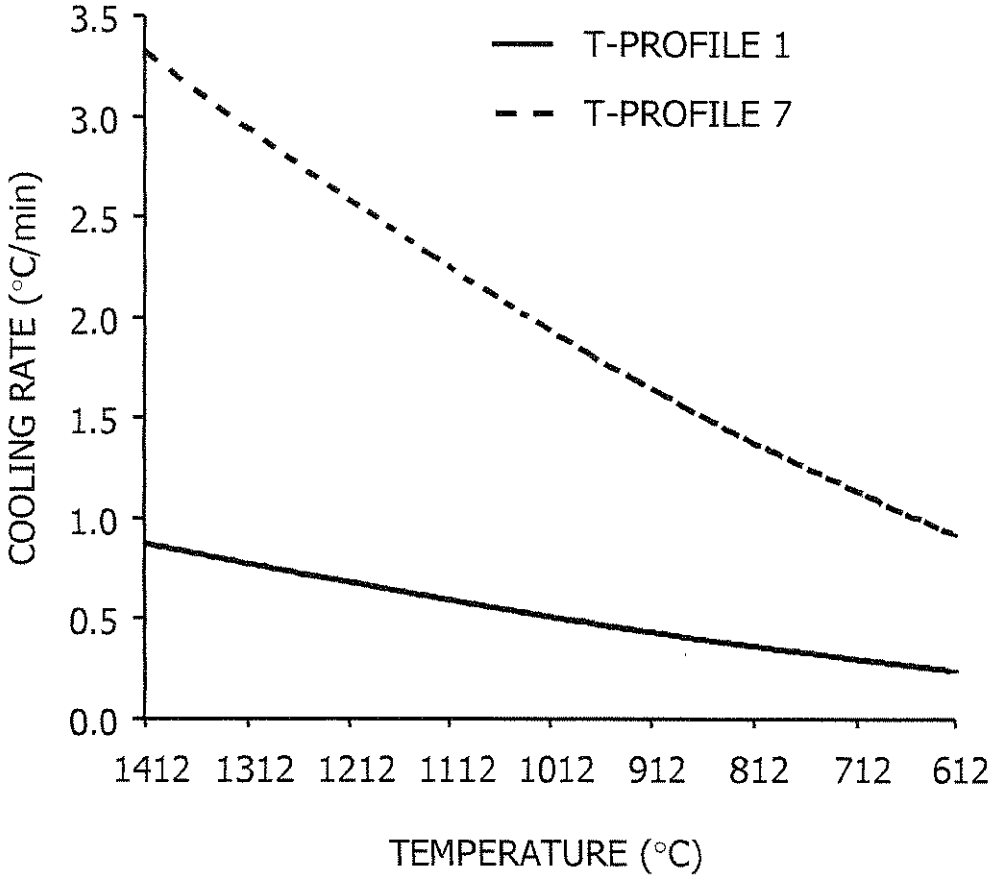

3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
COOLING RATE (°C/min)
T-PROFILE 1
T-PROFILE 7
1412
1312
1212
1112
1012
912
812
712
612
TEMPERATURE (°C)

FIG. 18

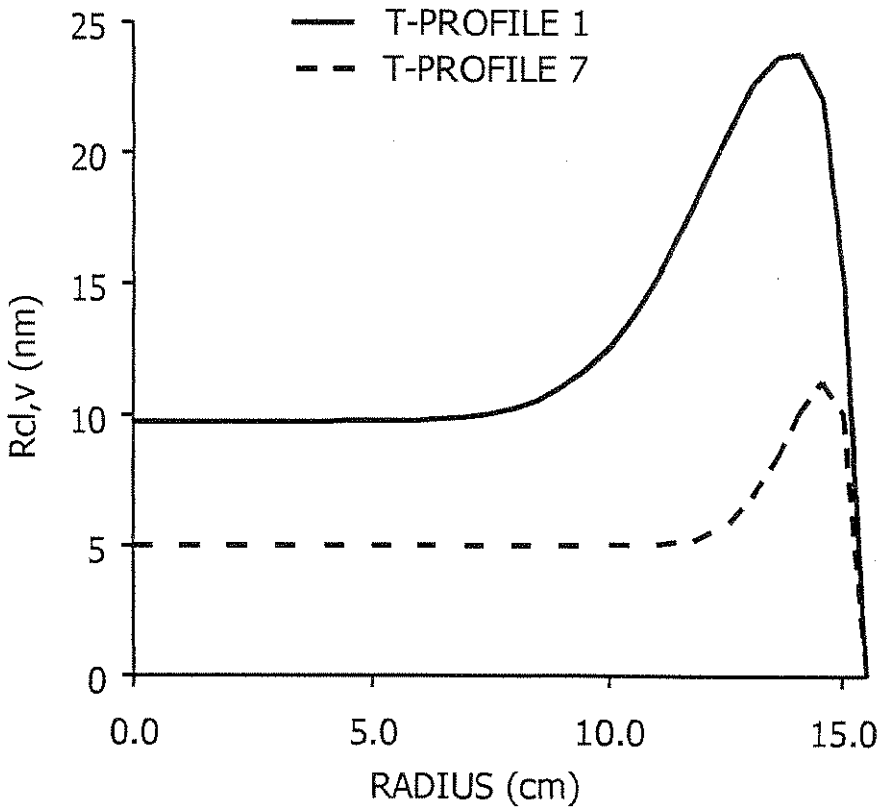

T-PROFILE 1
T-PROFILE 7
25
20
15
10
5
0
Rcl,v (nm)
0.0
5.0
10.0
15.0
RADIUS (cm)

FIG. 19

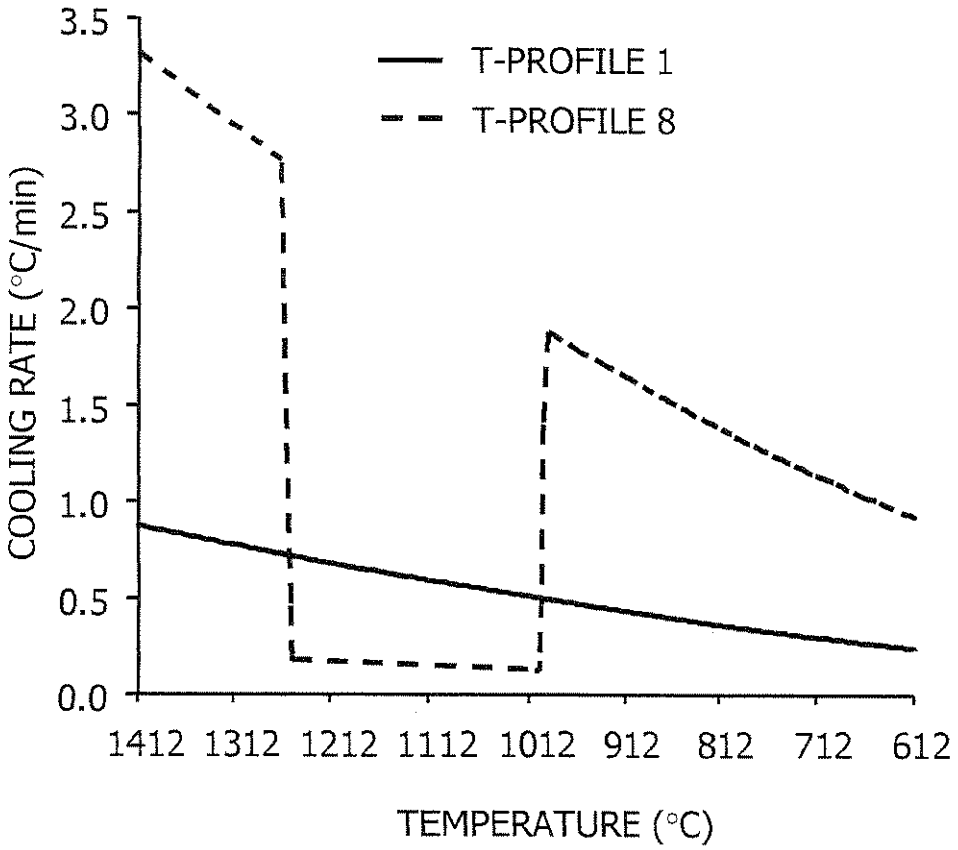

3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
COOLING RATE (°C/min)
T-PROFILE 1
T-PROFILE 8
1412 1312 1212 1112 1012 912 812 712 612
TEMPERATURE (°C)

FIG. 20

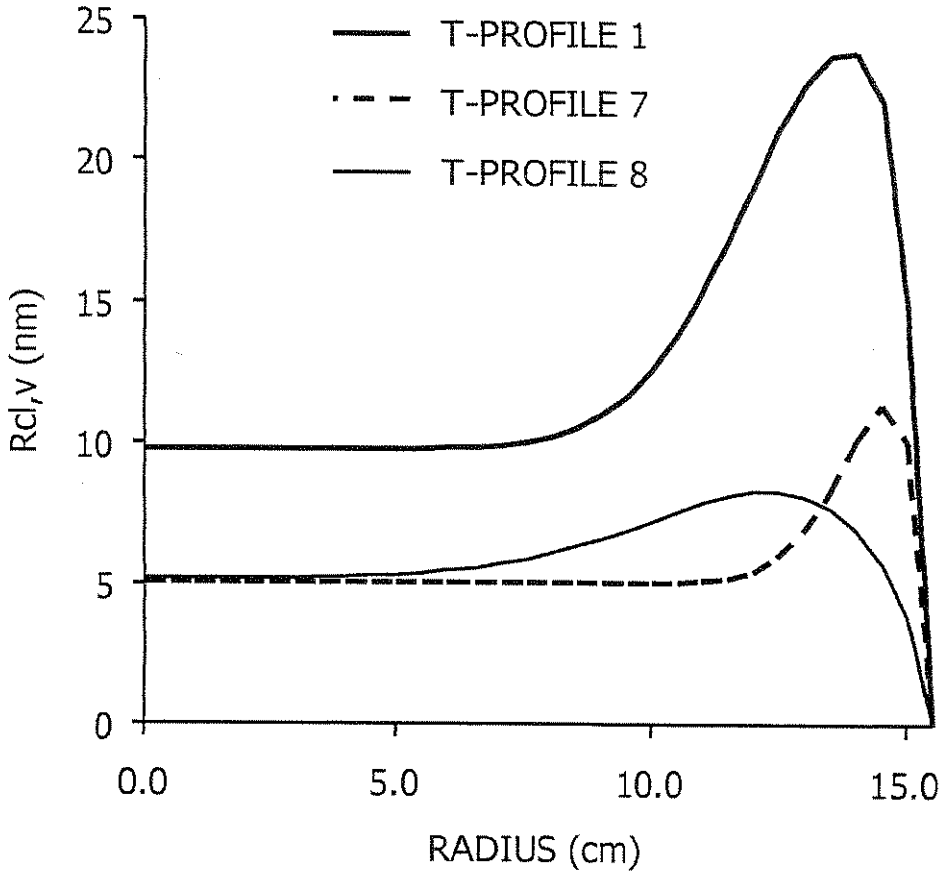

T-PROFILE 1
T-PROFILE 7
T-PROFILE 8
25
20
15
10
5
0
Rcl,v (nm)
0.0
5.0
10.0
15.0
RADIUS (cm)

FIG. 21

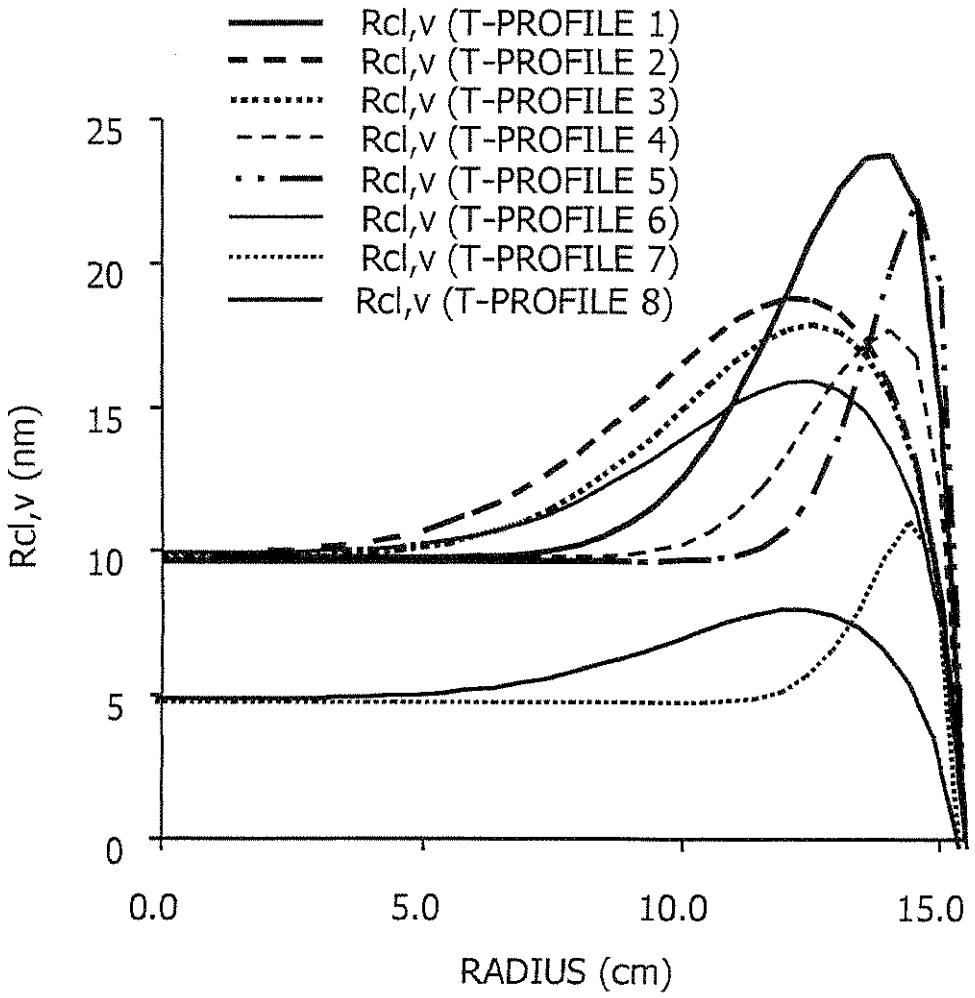

Rcl,v (T-PROFILE 1)
Rcl,v (T-PROFILE 2)
Rcl,v (T-PROFILE 3)
Rcl,v (T-PROFILE 4)
Rcl,v (T-PROFILE 5)
Rcl,v (T-PROFILE 6)
Rcl,v (T-PROFILE 7)
Rcl,v (T-PROFILE 8)
25
20
15
10
5
0
Rcl,v (nm)
0.0
5.0
10.0
15.0
RADIUS (cm)

FIG. 22

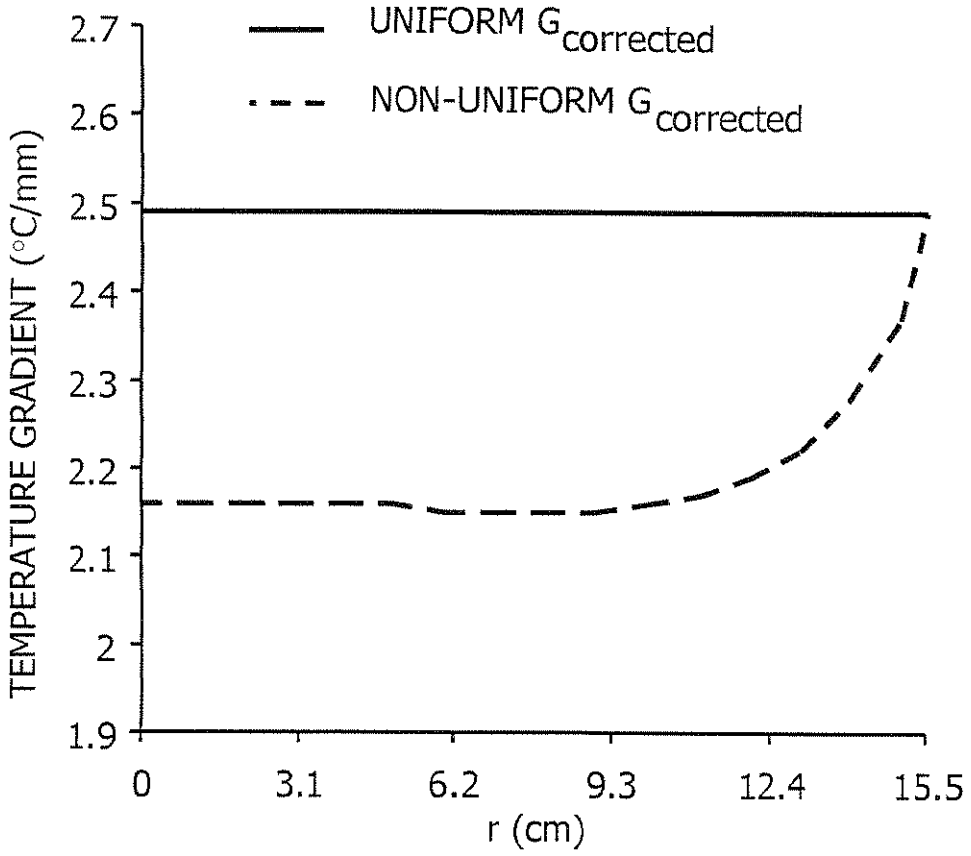

UNIFORM $G_{corrected}$
NON-UNIFORM $G_{corrected}$
TEMPERATURE GRADIENT (°C/mm)
2.7
2.6
2.5
2.4
2.3
2.2
2.1
2
1.9
0
3.1
6.2
9.3
12.4
15.5
r (cm)

FIG. 23

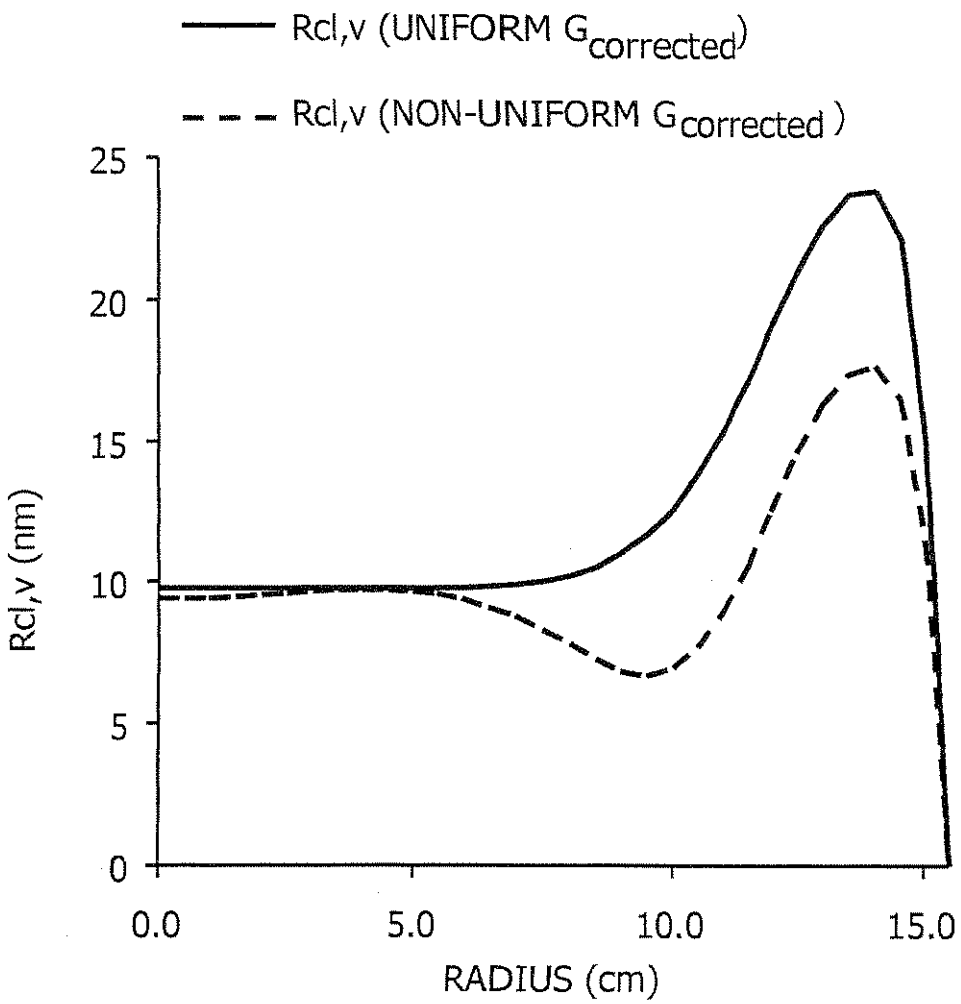

Rcl,v (UNIFORM G corrected)
Rcl,v (NON-UNIFORM G corrected)
25
20
15
10
5
0
Rcl,v (nm)
0.0
5.0
10.0
15.0
RADIUS (cm)

FIG. 24

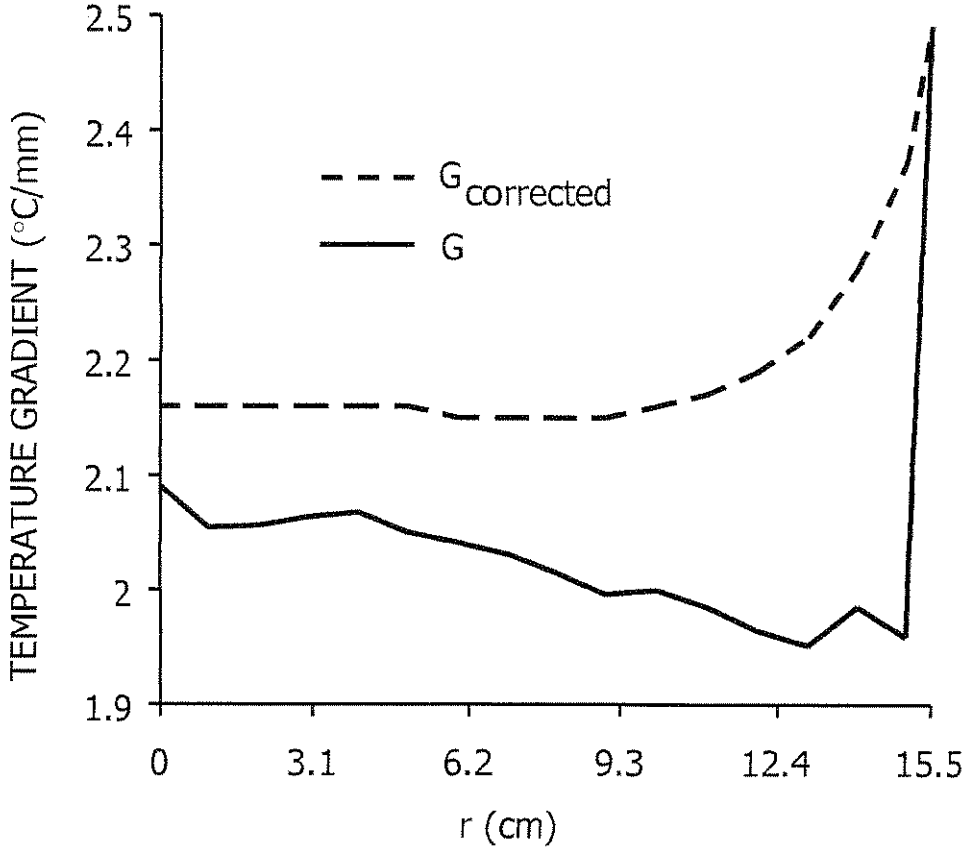

2.5
2.4
2.3
2.2
2.1
2
1.9
TEMPERATURE GRADIENT (°C/mm)
G corrected
G
0
3.1
6.2
9.3
12.4
15.5
r (cm)

FIG. 25

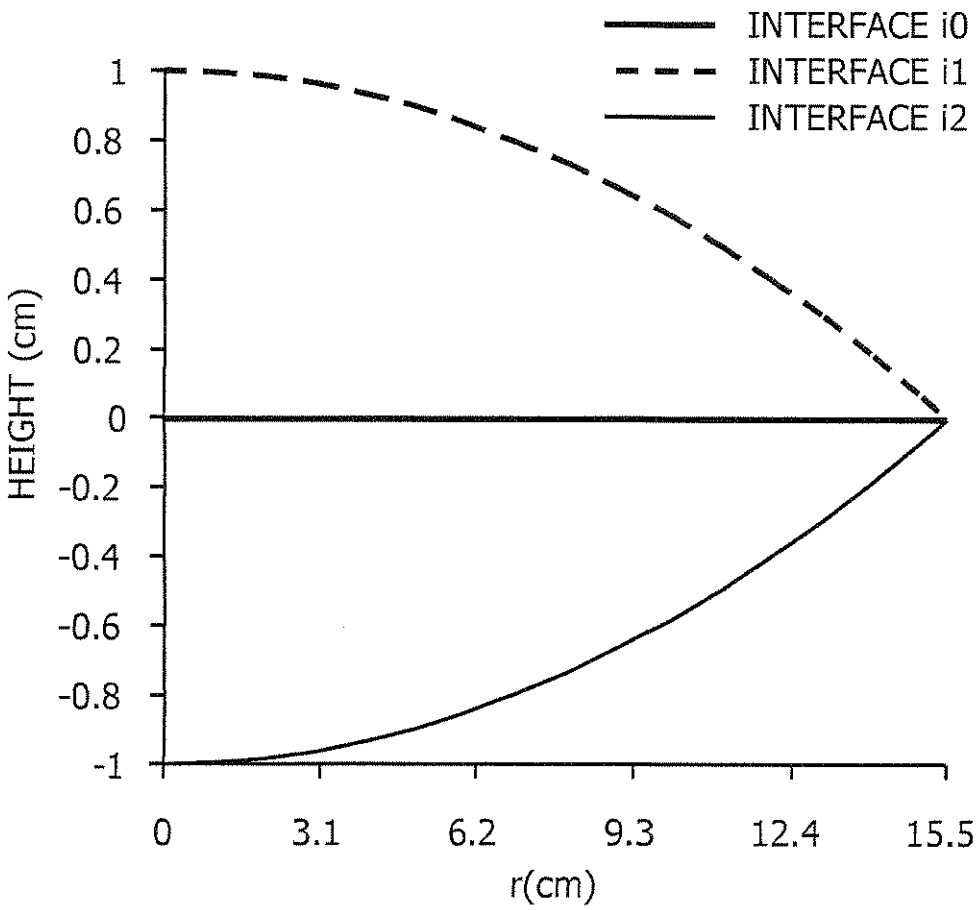

INTERFACE i0
INTERFACE i1
INTERFACE i2
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
HEIGHT (cm)
0
3.1
6.2
9.3
12.4
15.5
r(cm)

FIG. 26

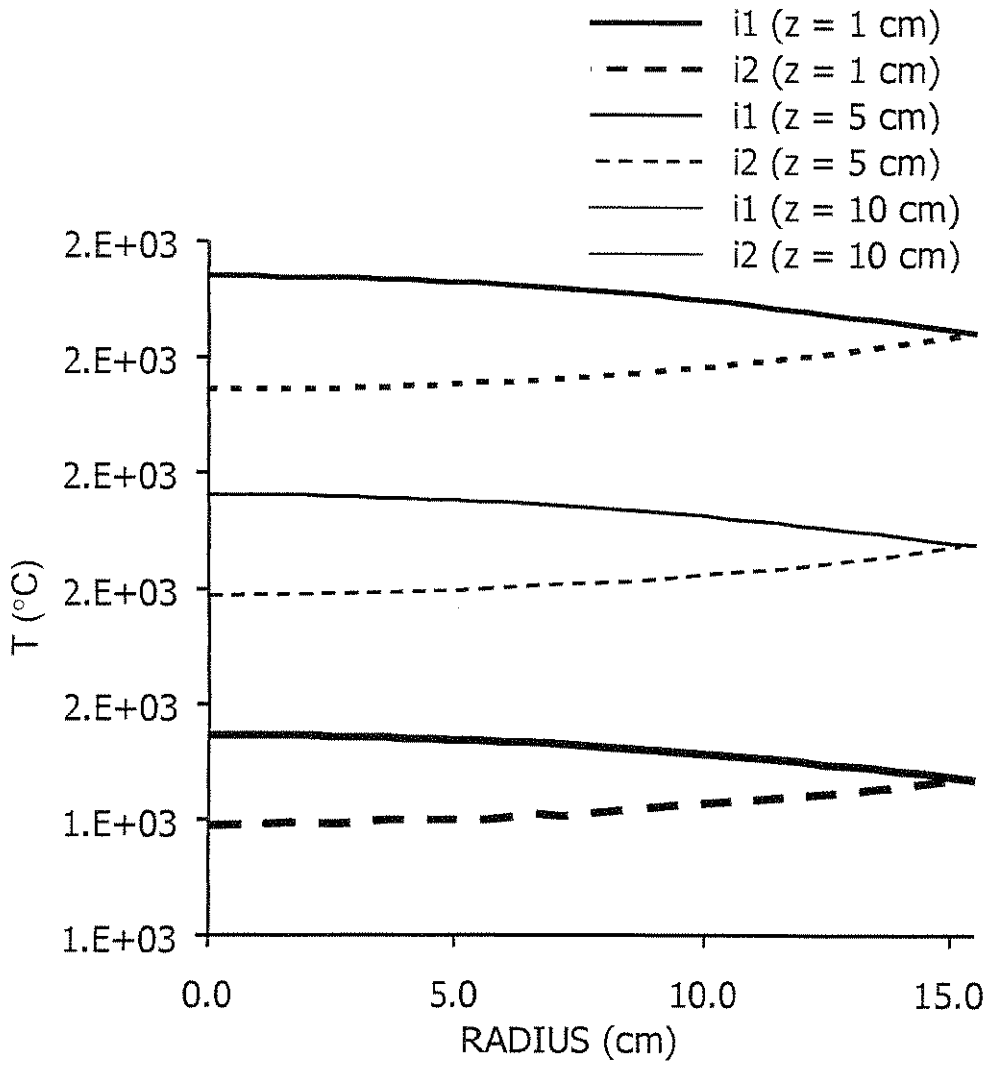

i1 (z = 1 cm)
i2 (z = 1 cm)
i1 (z = 5 cm)
i2 (z = 5 cm)
i1 (z = 10 cm)
i2 (z = 10 cm)
2.E+03
2.E+03
2.E+03
2.E+03
2.E+03
1.E+03
1.E+03
T (°C)
0.0
5.0
10.0
15.0
RADIUS (cm)

FIG. 27

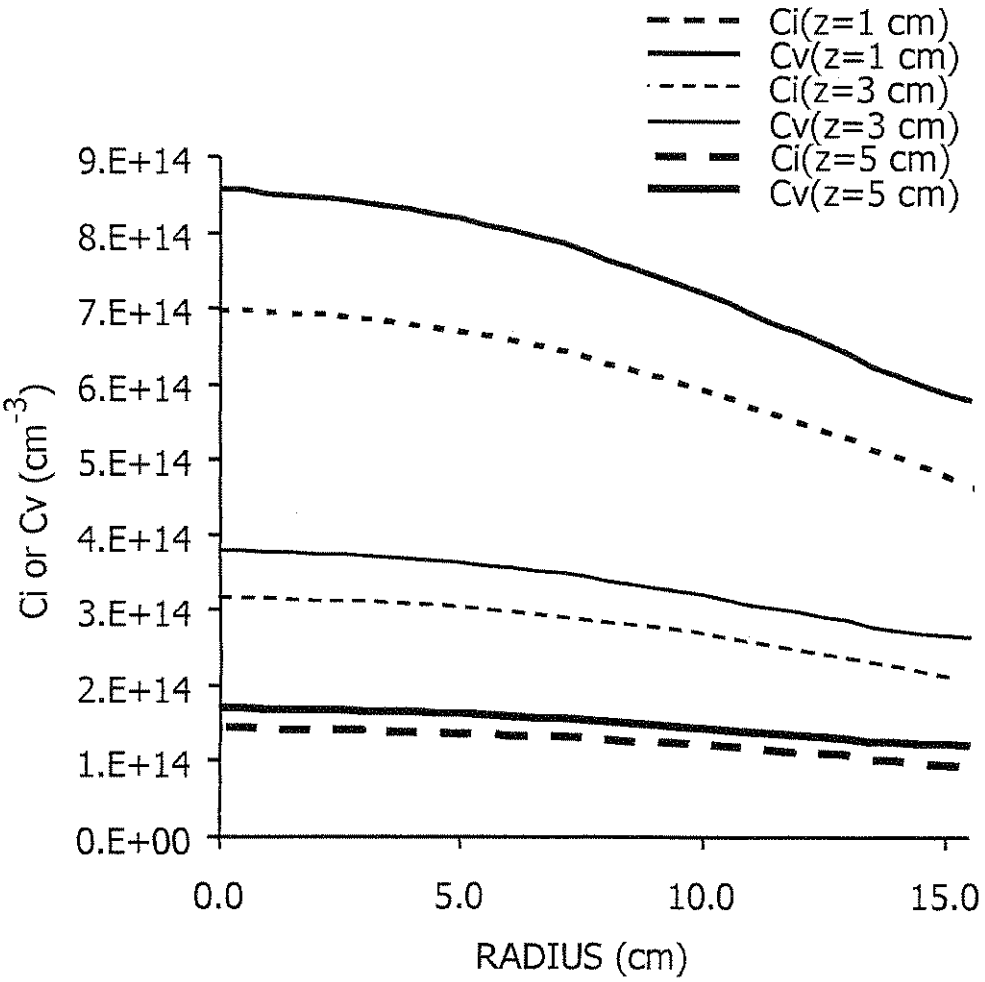

Ci(z=1 cm)
Cv(z=1 cm)
Ci(z=3 cm)
Cv(z=3 cm)
Ci(z=5 cm)
Cv(z=5 cm)
9.E+14
8.E+14
7.E+14
6.E+14
5.E+14
4.E+14
3.E+14
2.E+14
1.E+14
0.E+00
Ci or Cv (cm-3)
0.0
5.0
10.0
15.0
RADIUS (cm)

FIG. 28

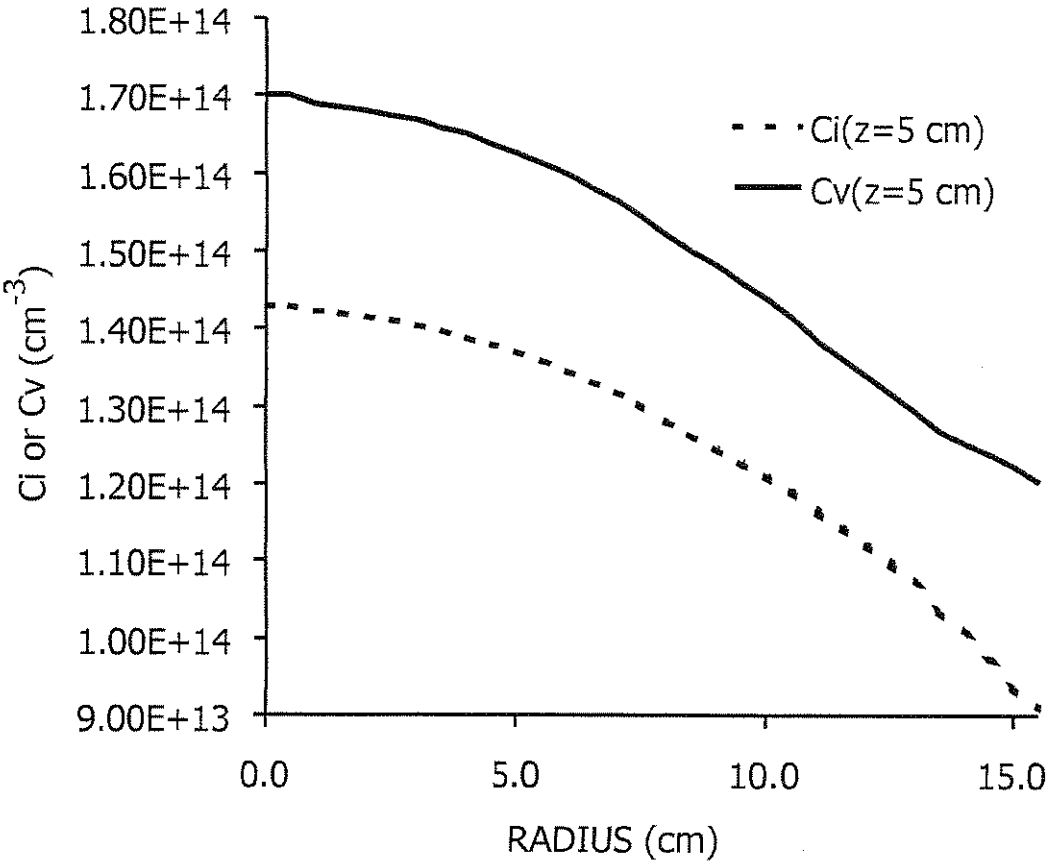

1.80E+14
1.70E+14
1.60E+14
1.50E+14
1.40E+14
1.30E+14
1.20E+14
1.10E+14
1.00E+14
9.00E+13
Ci or Cv (cm-3)
0.0
5.0
10.0
15.0
RADIUS (cm)
Ci(z=5 cm)
Cv(z=5 cm)

FIG. 29

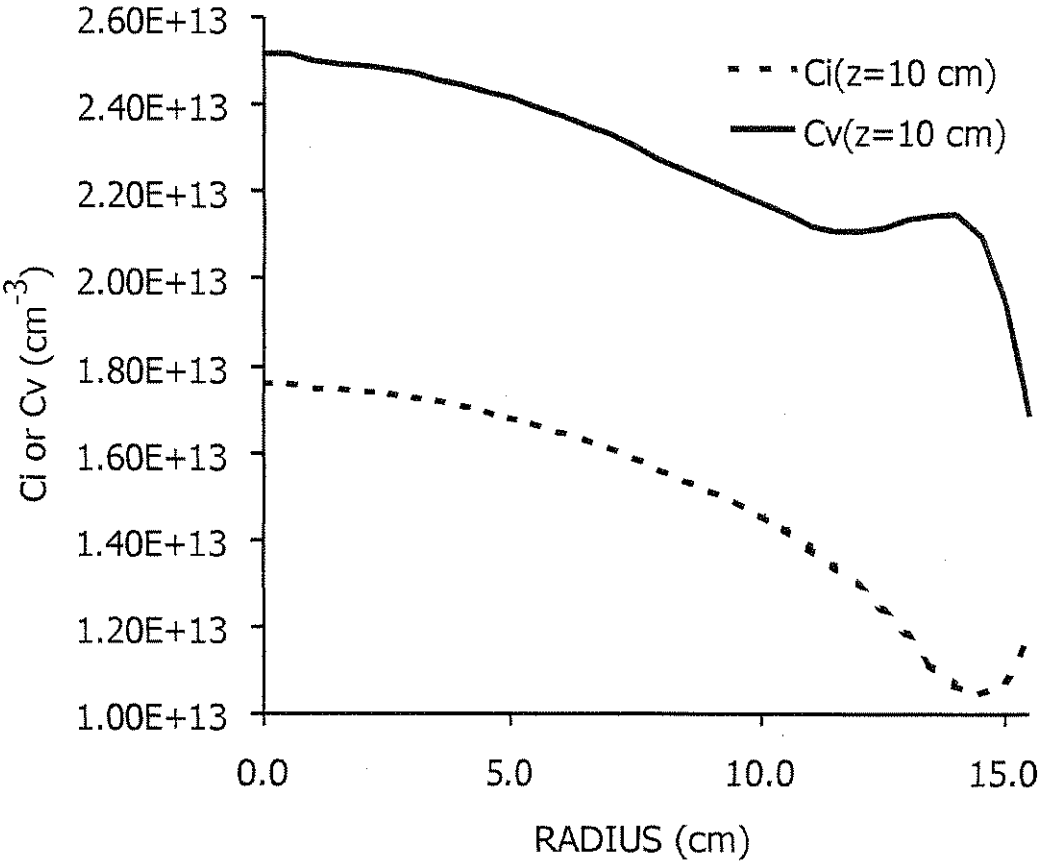

2.60E+13
2.40E+13
2.20E+13
2.00E+13
1.80E+13
1.60E+13
1.40E+13
1.20E+13
1.00E+13
Ci or Cv (cm-3)
Ci(z=10 cm)
Cv(z=10 cm)
0.0
5.0
10.0
15.0
RADIUS (cm)

FIG. 30

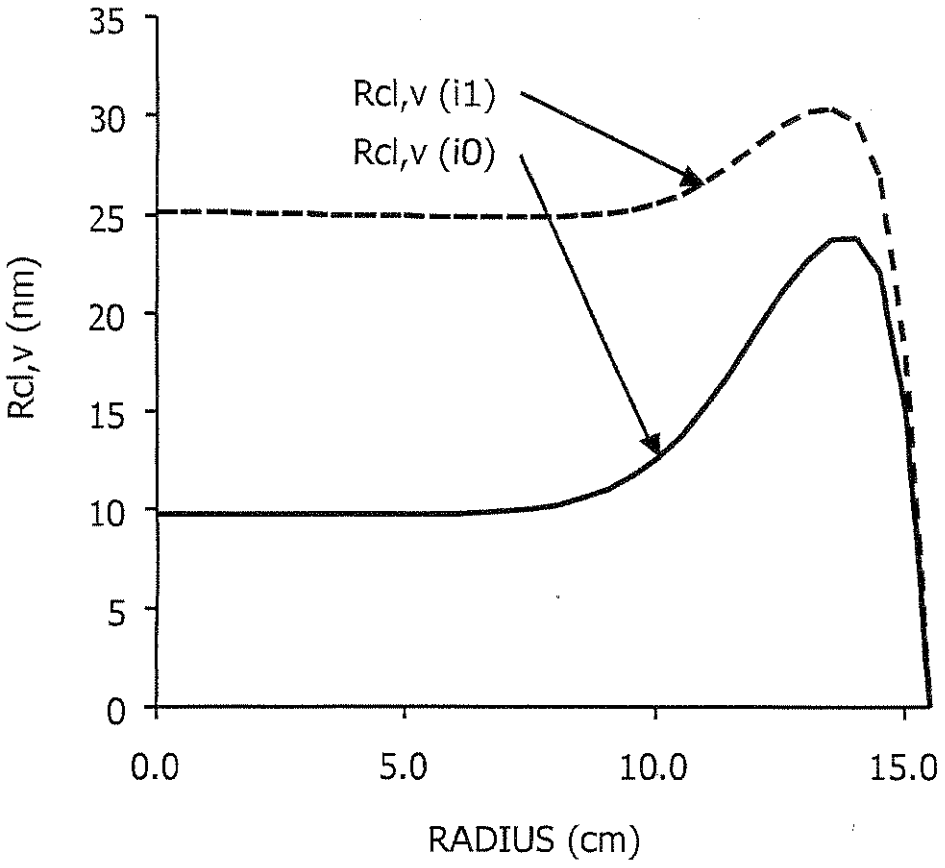

35
30
25
20
15
10
5
0
Rcl,v (nm)
Rcl,v (i1)
Rcl,v (i0)
0.0
5.0
10.0
15.0
RADIUS (cm)

FIG. 31

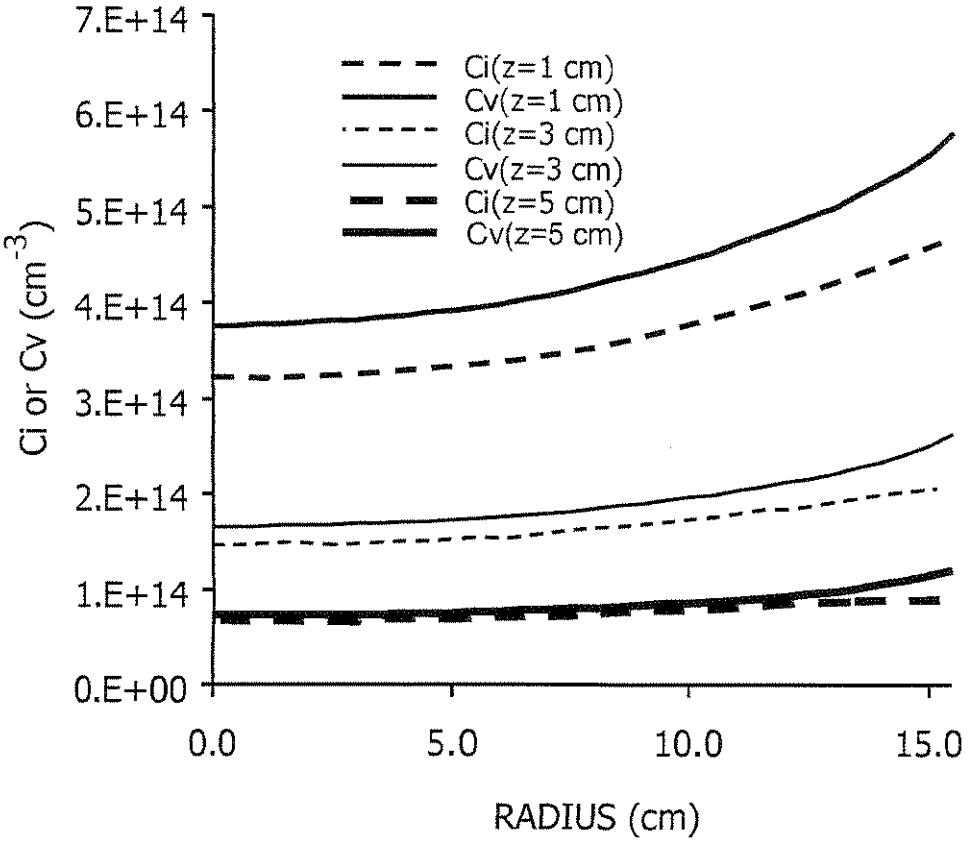

7.E+14
6.E+14
5.E+14
4.E+14
3.E+14
2.E+14
1.E+14
0.E+00
Ci or Cv (cm-3)
0.0
5.0
10.0
15.0
RADIUS (cm)
Ci(z=1 cm)
Cv(z=1 cm)
Ci(z=3 cm)
Cv(z=3 cm)
Ci(z=5 cm)
Cv(z=5 cm)

FIG. 32

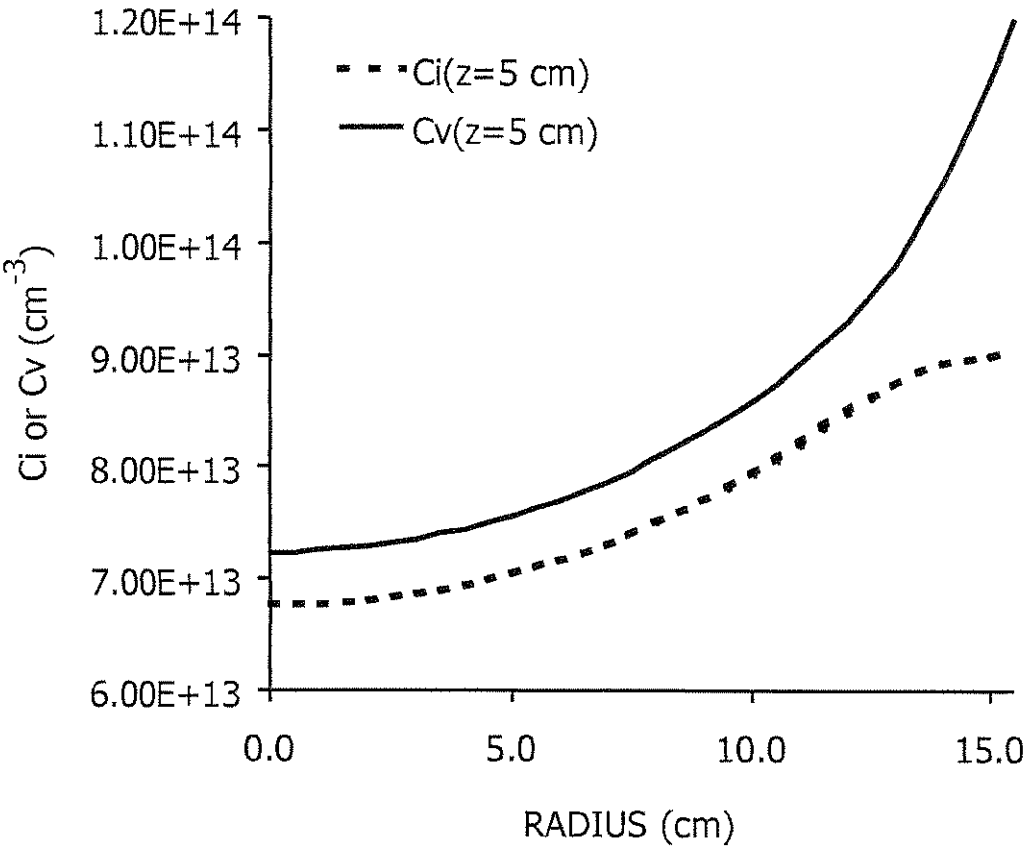

1.20E+14
1.10E+14
1.00E+14
9.00E+13
8.00E+13
7.00E+13
6.00E+13
Ci or Cv (cm-3)
Ci(z=5 cm)
Cv(z=5 cm)
0.0
5.0
10.0
15.0
RADIUS (cm)

FIG. 33

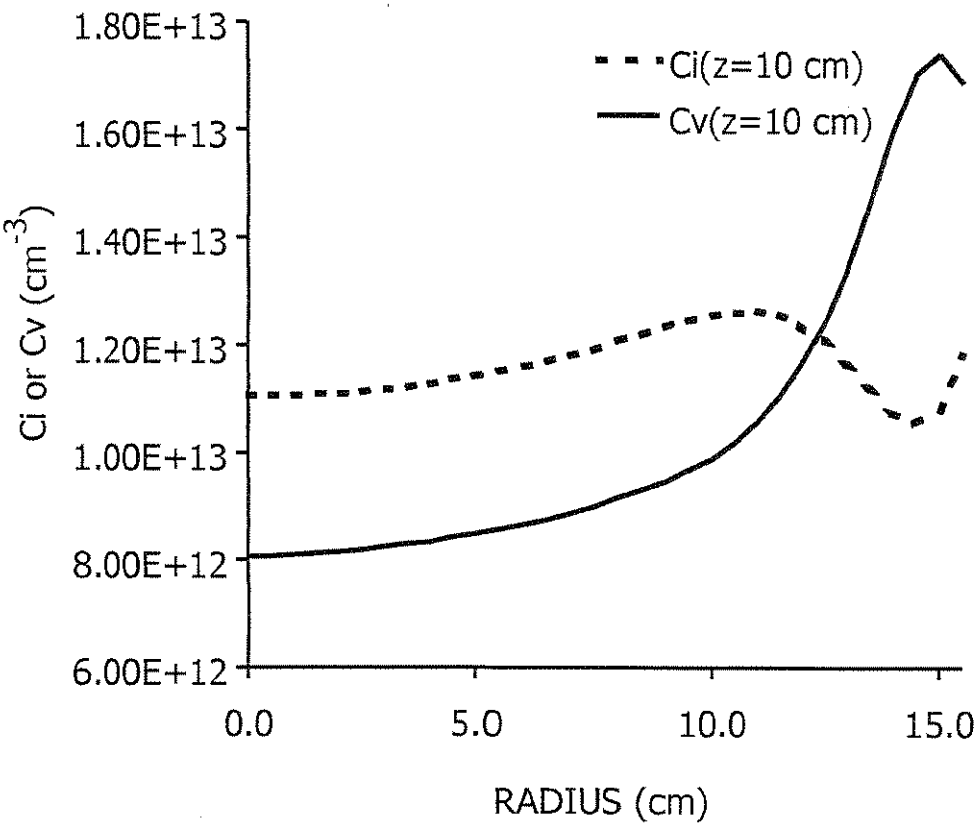

1.80E+13
1.60E+13
1.40E+13
1.20E+13
1.00E+13
8.00E+12
6.00E+12
Ci or Cv (cm-3)
Ci(z=10 cm)
Cv(z=10 cm)
0.0
5.0
10.0
15.0
RADIUS (cm)

FIG. 34

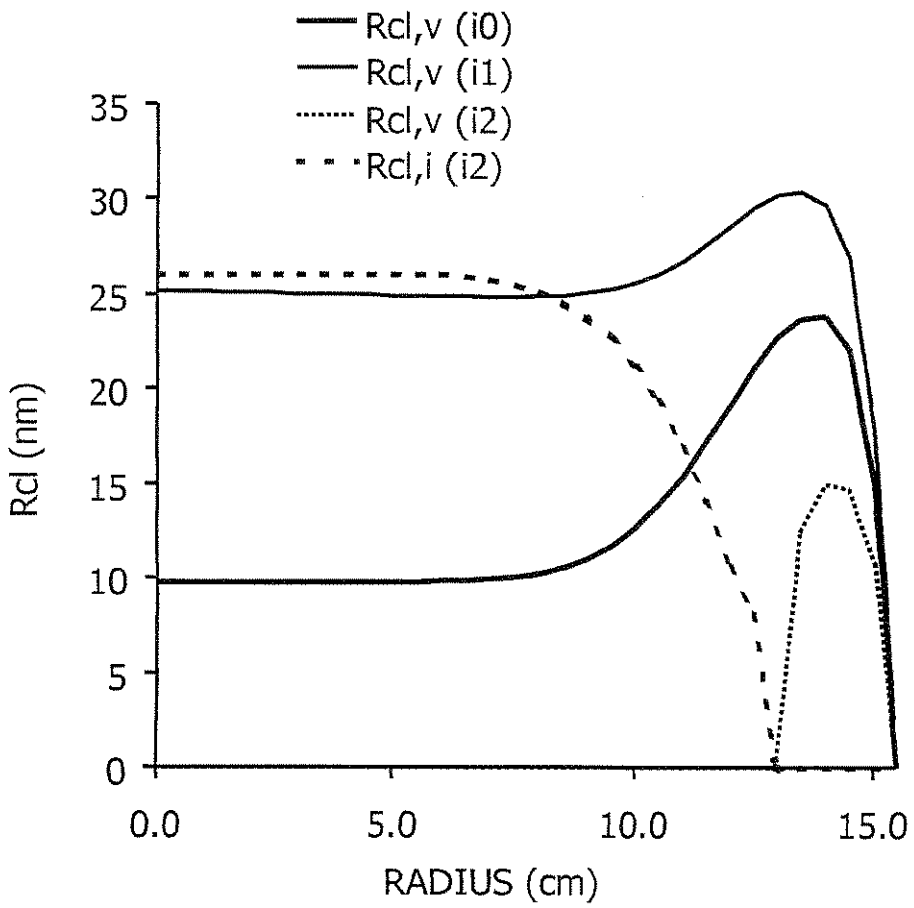
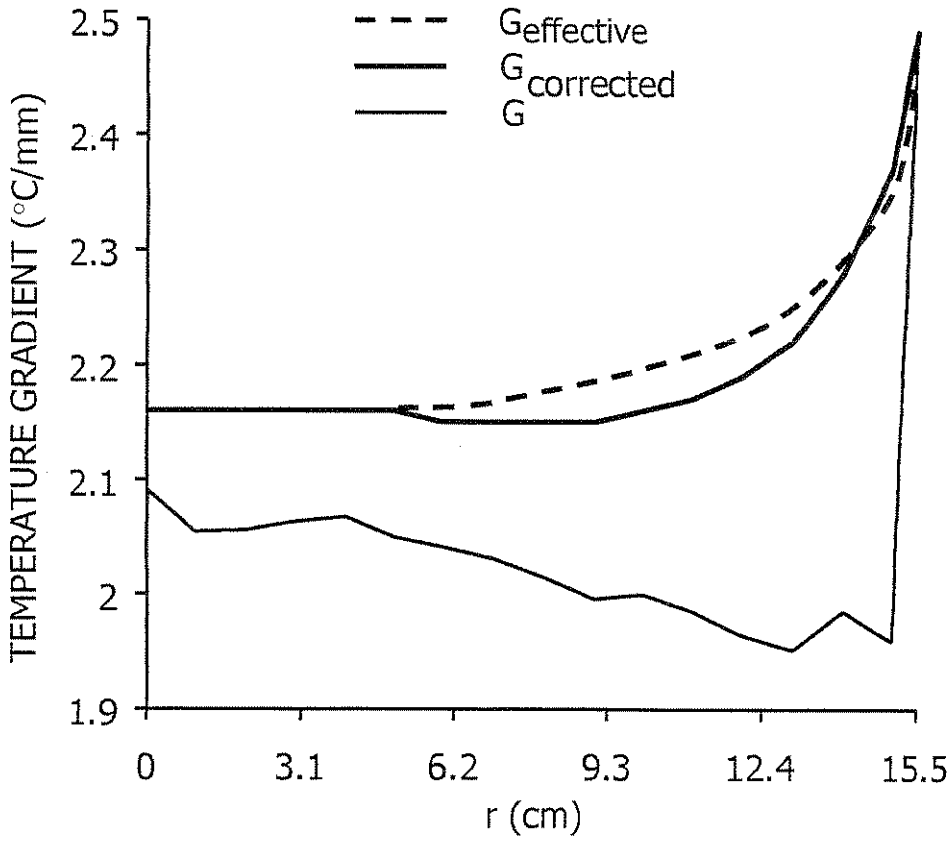

Rcl,v (i0)
Rcl,v (i1)
Rcl,v (i2)
Rcl,i (i2)
35
30
25
20
15
10
5
0
Rcl (nm)
0.0
5.0
10.0
15.0
RADIUS (cm)

FIG. 35


2.5
2.4
2.3
2.2
2.1
2
1.9
TEMPERATURE GRADIENT (°C/mm)
Geffective
Gcorrected
G
0
3.1
6.2
9.3
12.4
15.5
r (cm)