Fig. 1

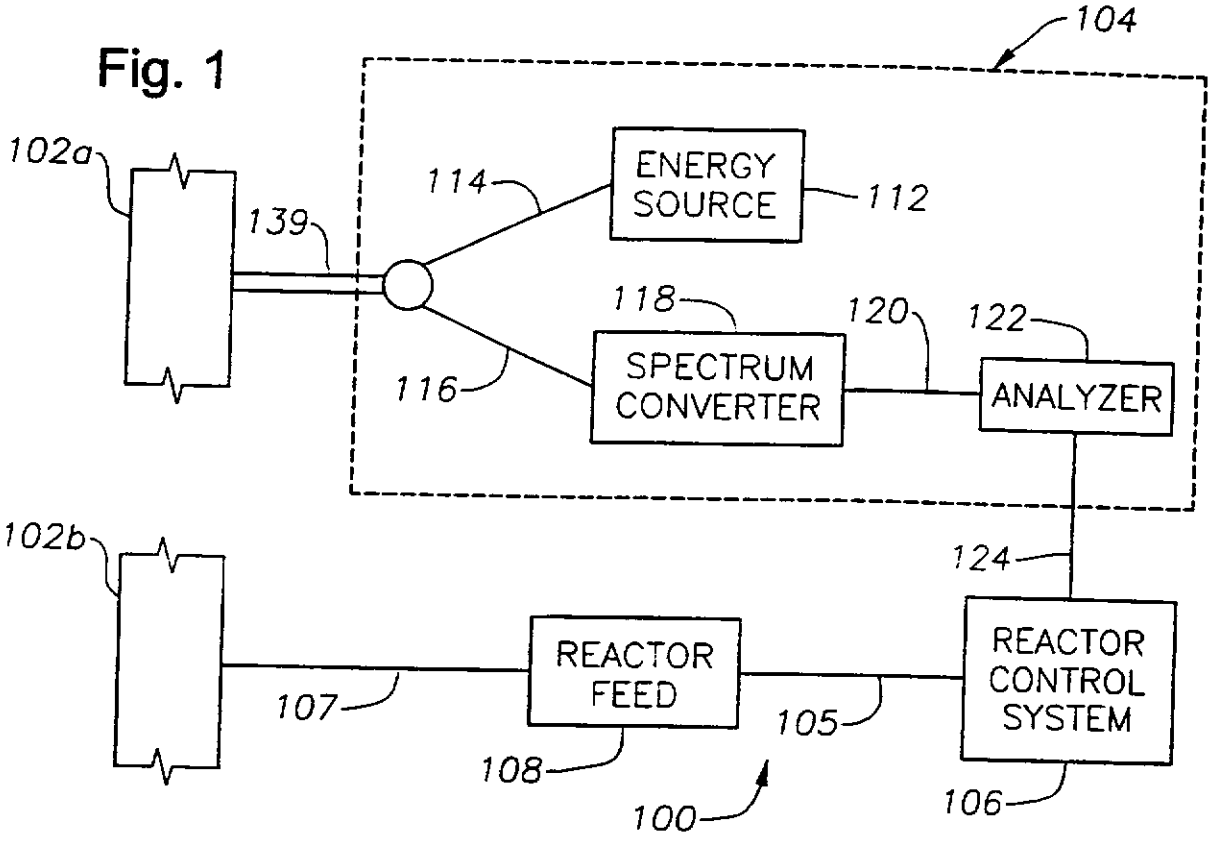


Fig. 2

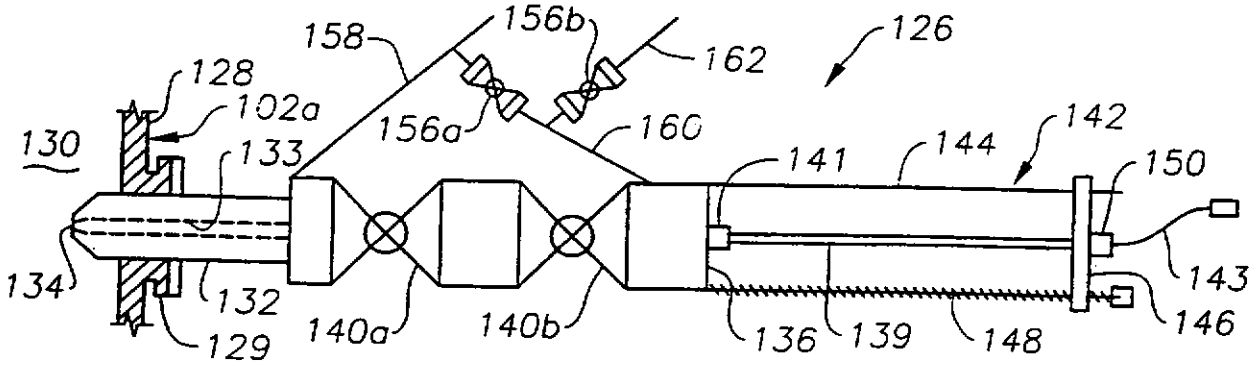


Fig. 3

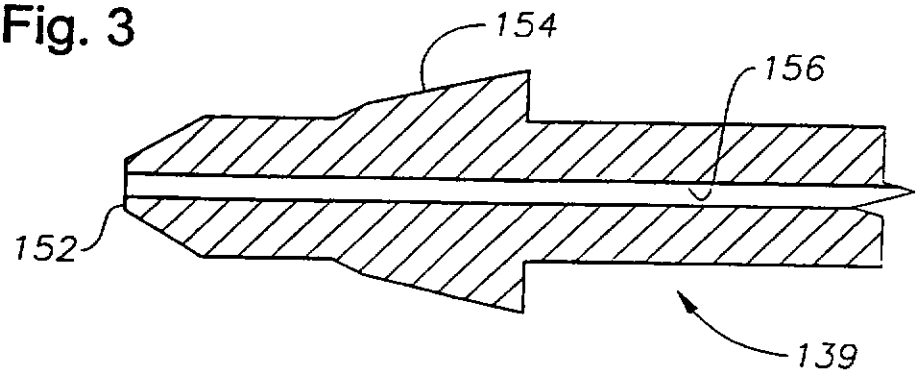


Fig. 4

HYDROGEN IN POLYPROPYLENE SLURRY
EXPERIMENTAL SETUP

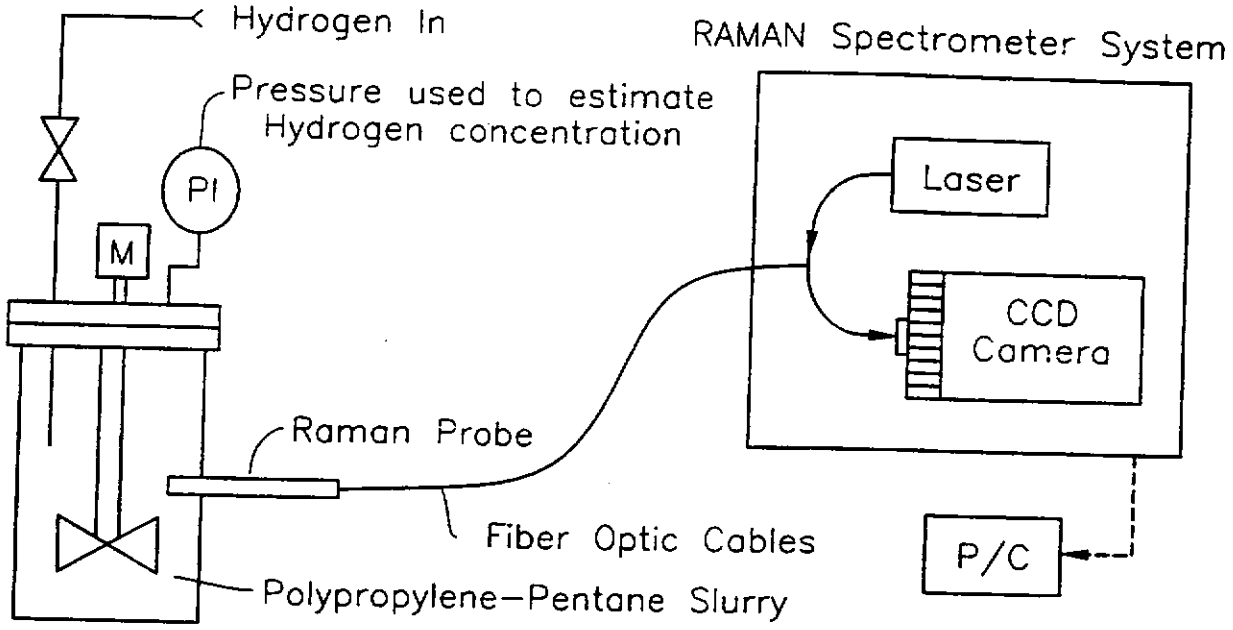


Fig. 5a

Raman Spectra of Pentane/Polypropylene Slurry

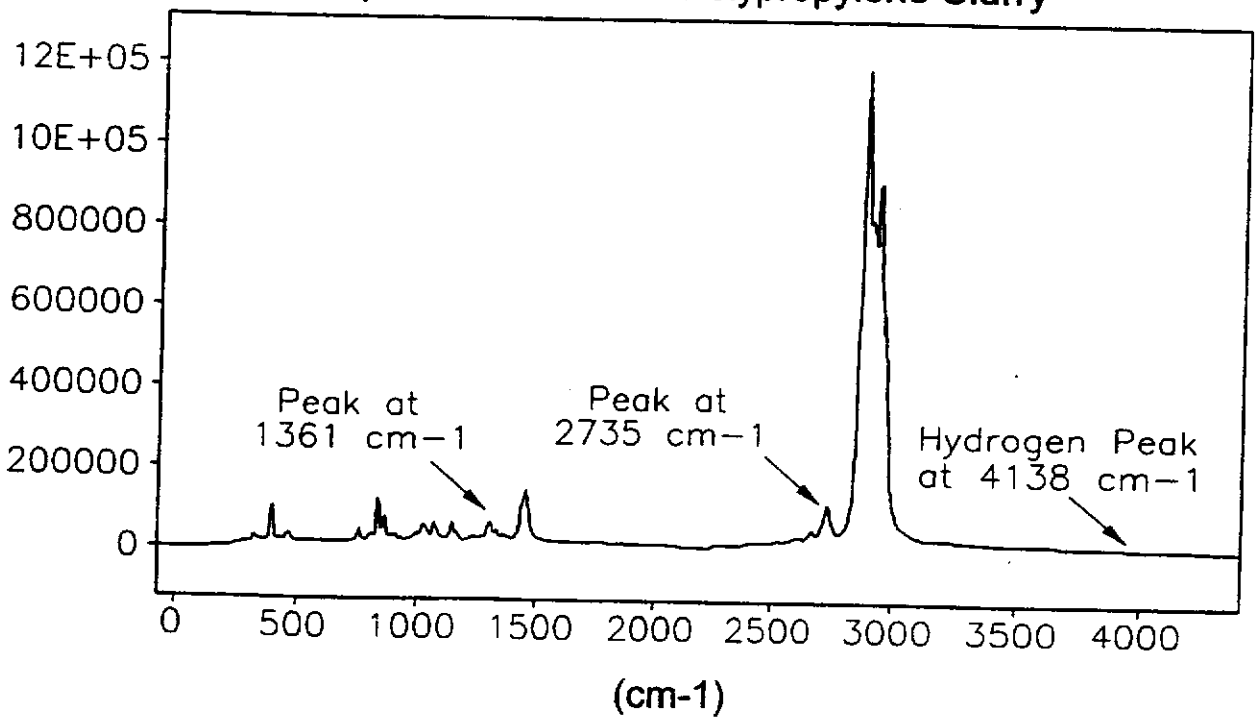


Fig. 5b

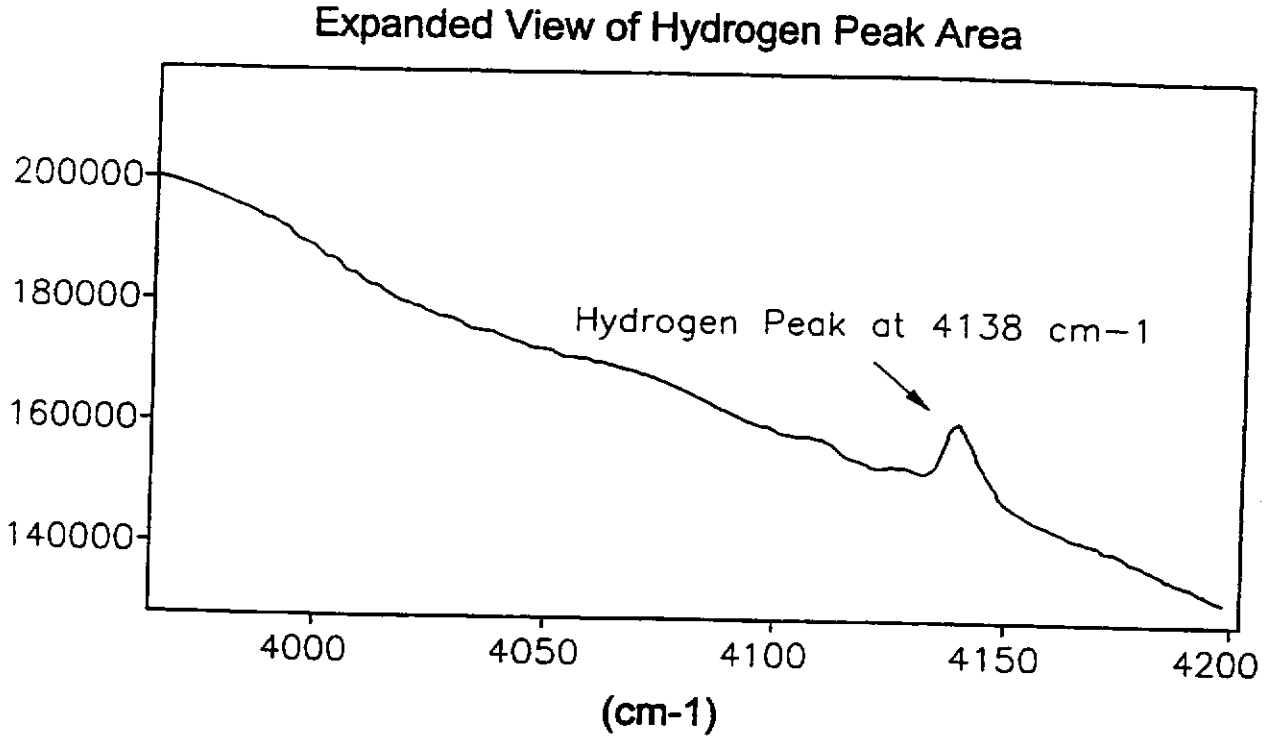

Expanded View of Hydrogen Peak Area
200000
180000
160000
140000
Hydrogen Peak at 4138 cm-1
4000
4050
4100
4150
4200
(cm-1)

Fig. 6

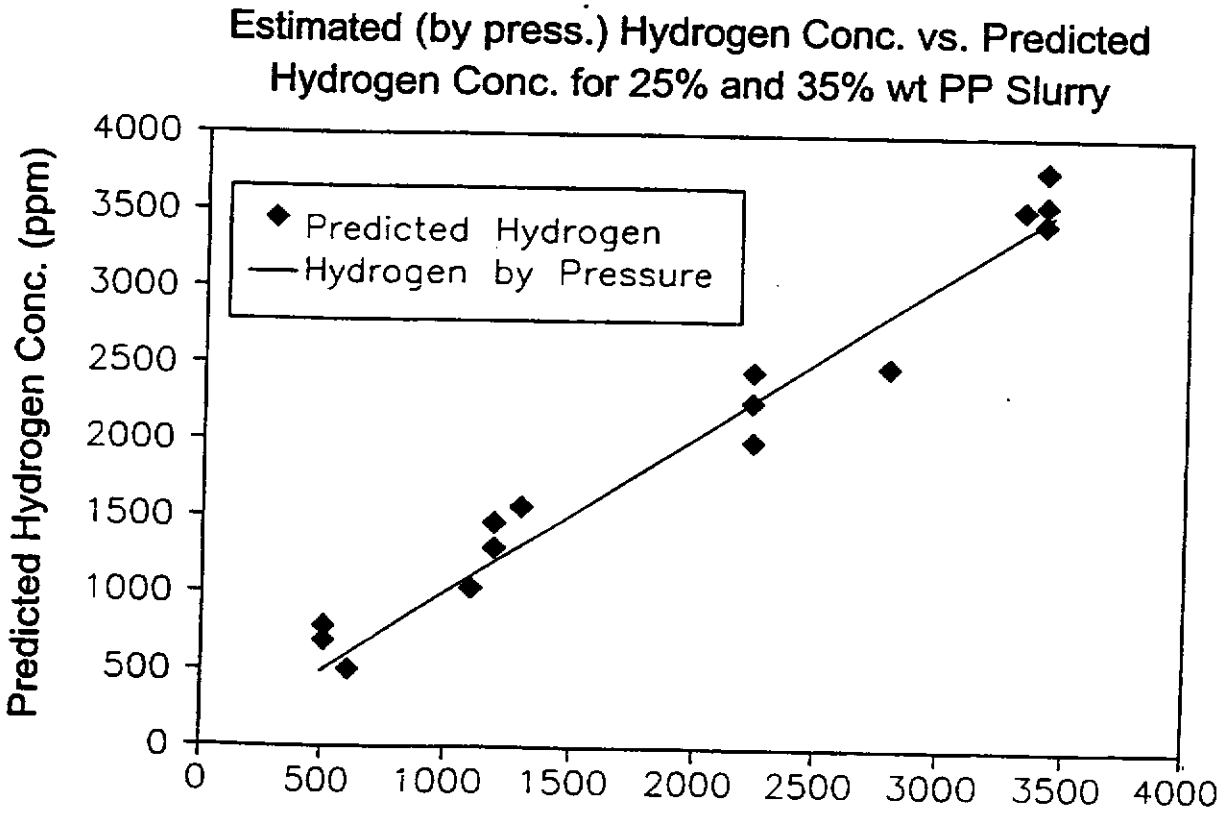

Estimated (by press.) Hydrogen Conc. vs. Predicted Hydrogen Conc. for 25% and 35% wt PP Slurry
Predicted Hydrogen Conc. (ppm)
4000
3500
3000
2500
2000
1500
1000
500
0
Predicted Hydrogen
Hydrogen by Pressure
0
500
1000
1500
2000
2500
3000
3500
4000

Fig. 7

Expanded Spectra of acetonitrile in pentane, showing impact of polymer on peak size

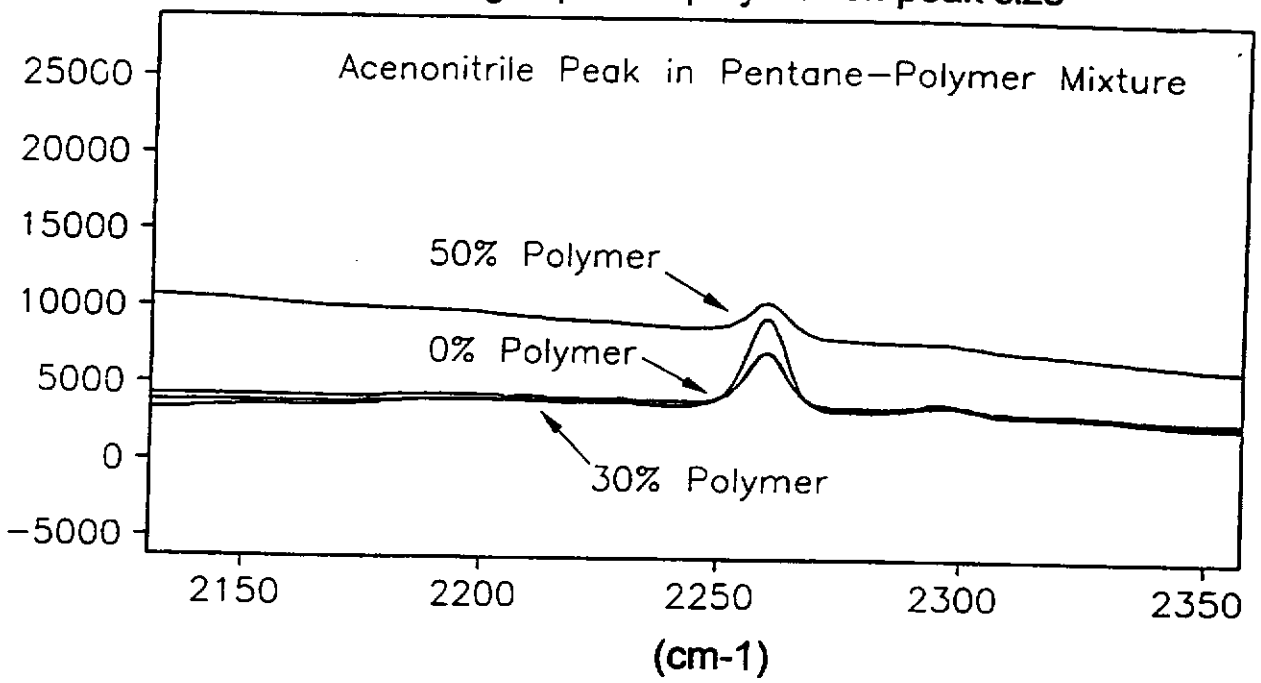


Fig. 8

Raman Spectrum of Polypropylene Granules

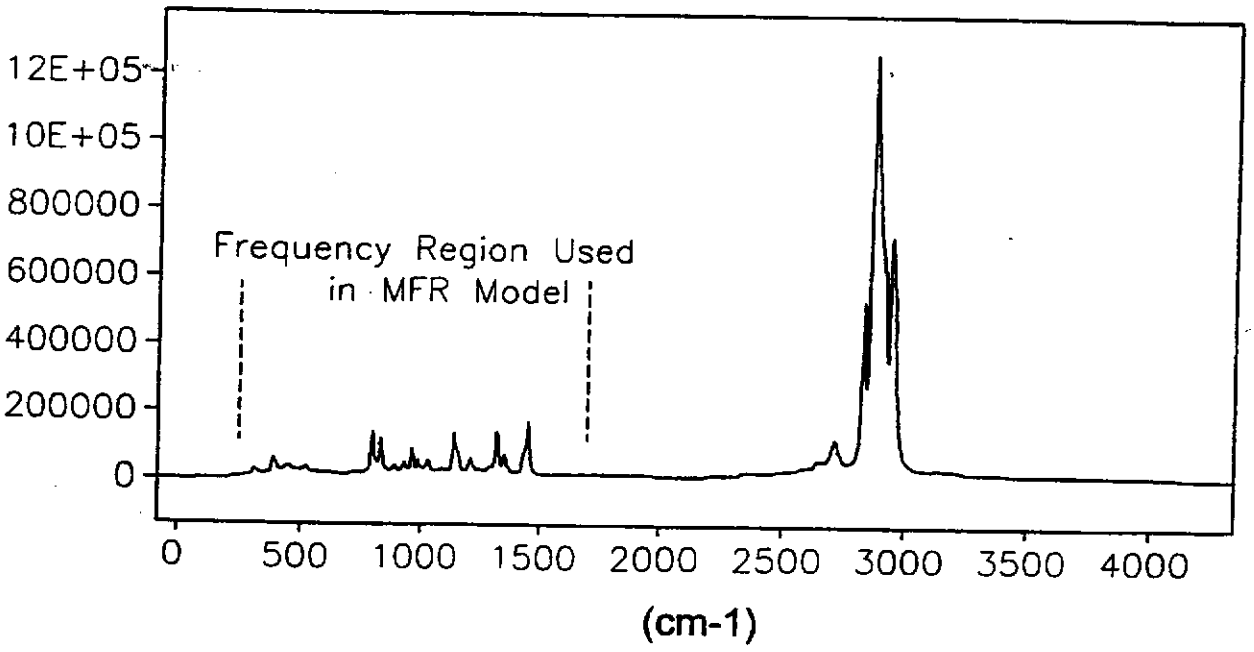


Fig. 9

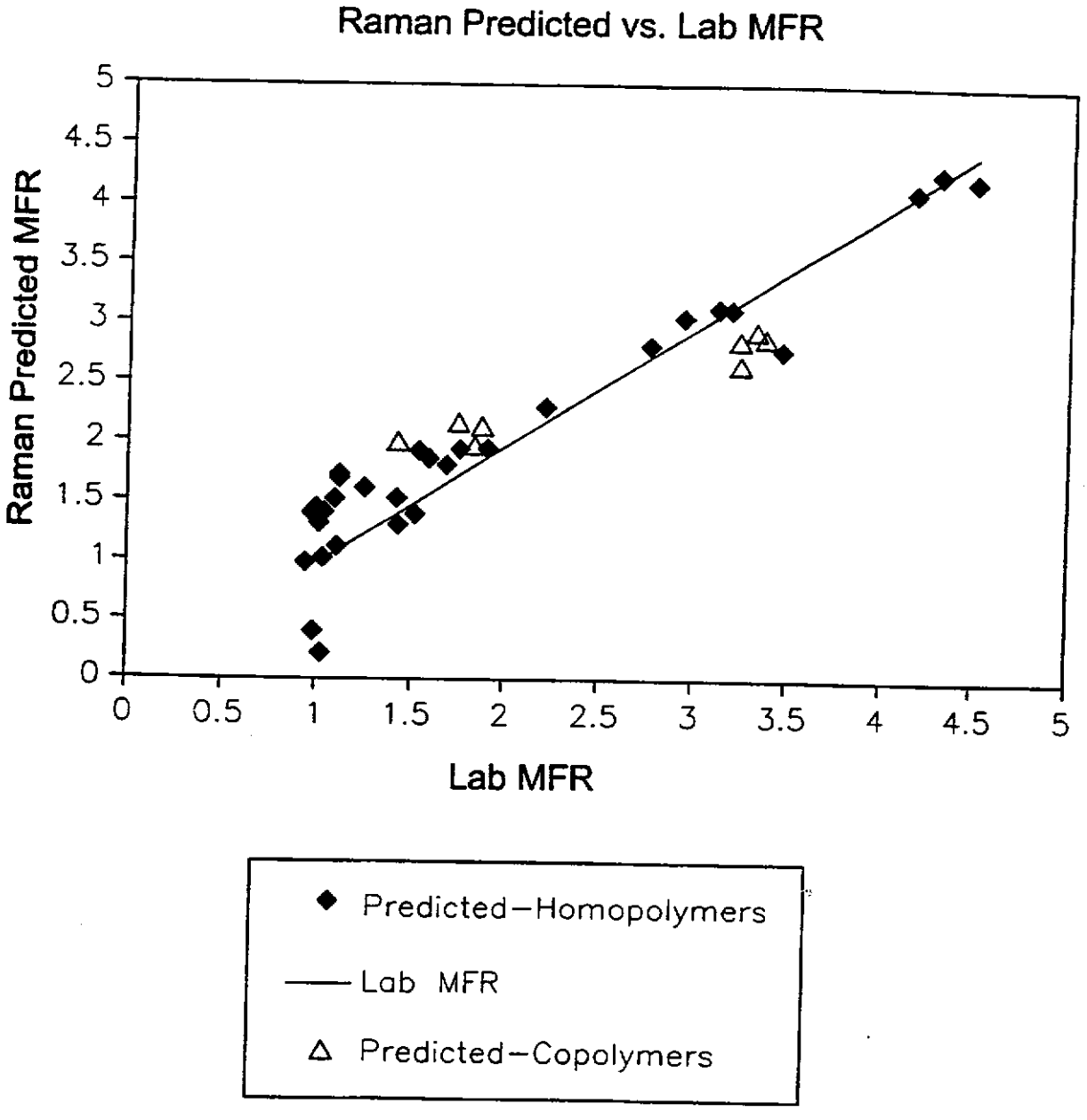

Raman Predicted vs. Lab MFR
Raman Predicted MFR
Lab MFR
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
Predicted–Homopolymers
Lab MFR
Predicted–Copolymers

Fig. 10

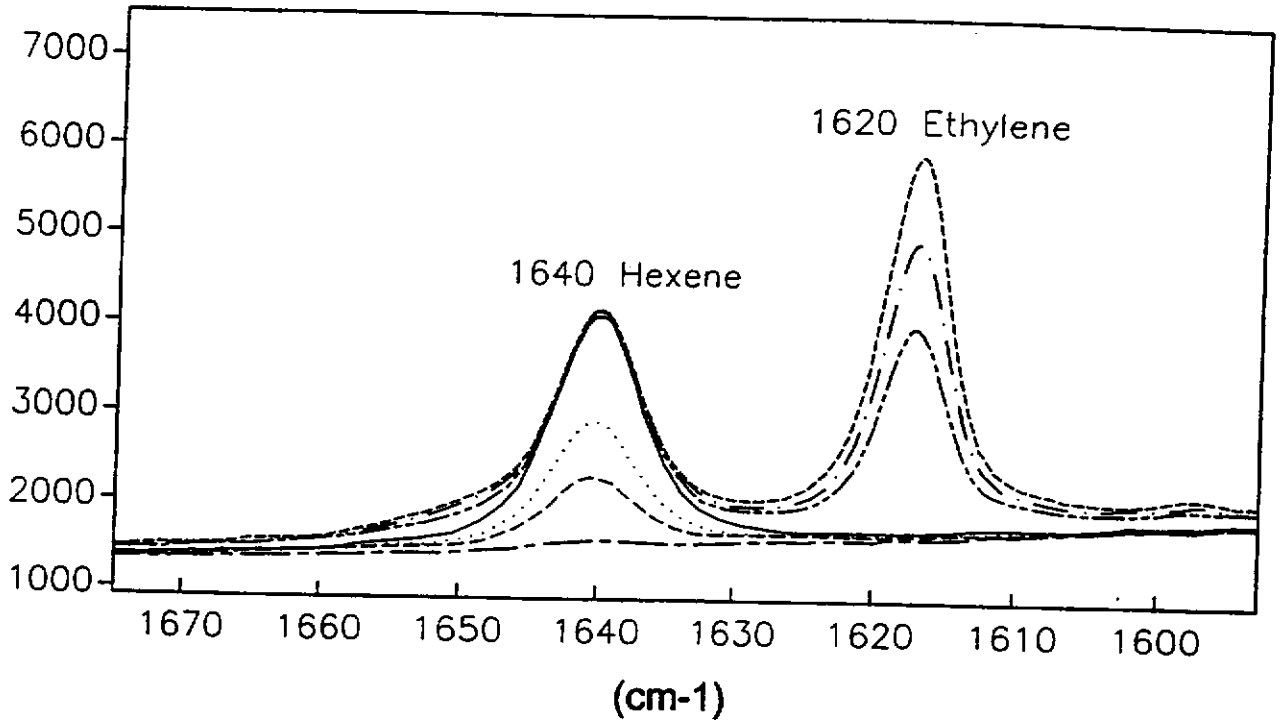

7000
6000
5000
4000
3000
2000
1000
1620 Ethylene
1640 Hexene
1670
1660
1650
1640
1630
1620
1610
1600
(cm-1)

Fig. 11

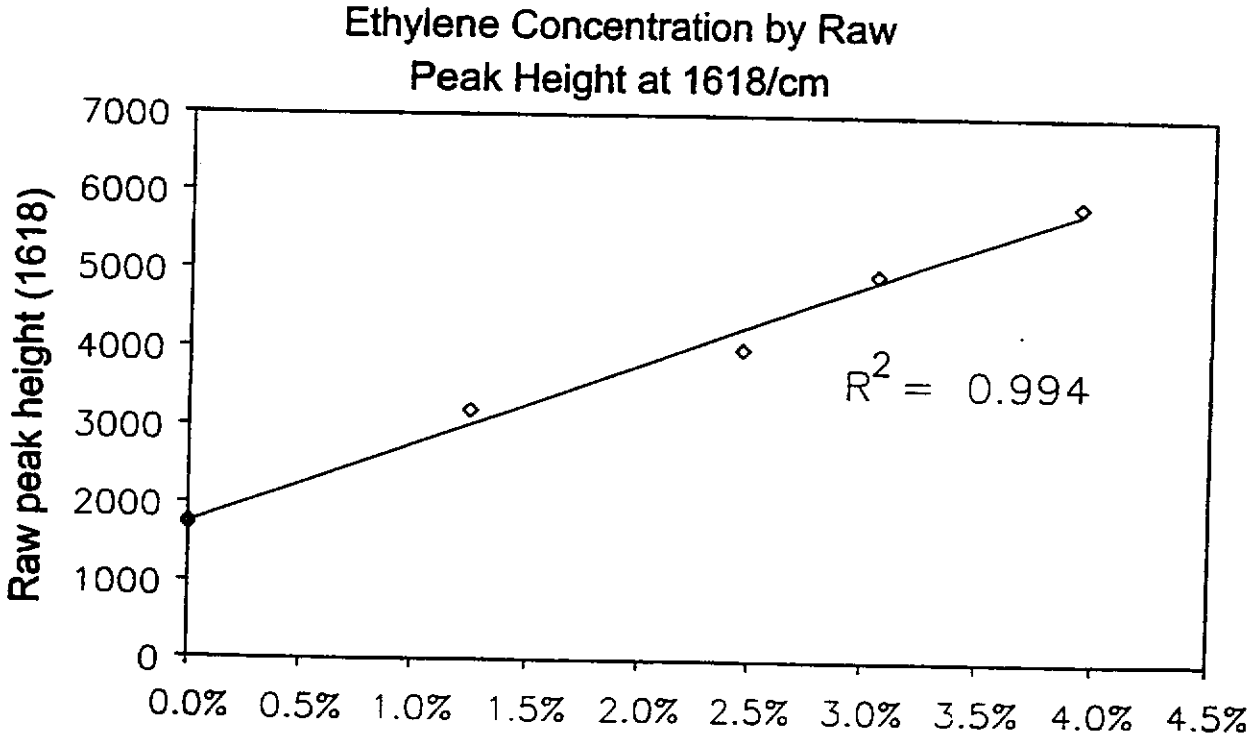

Ethylene Concentration by Raw Peak Height at 1618/cm
Raw peak height (1618)
7000
6000
5000
4000
3000
2000
1000
0
R^2 = 0.994
0.0%
0.5%
1.0%
1.5%
2.0%
2.5%
3.0%
3.5%
4.0%
4.5%

Fig. 12

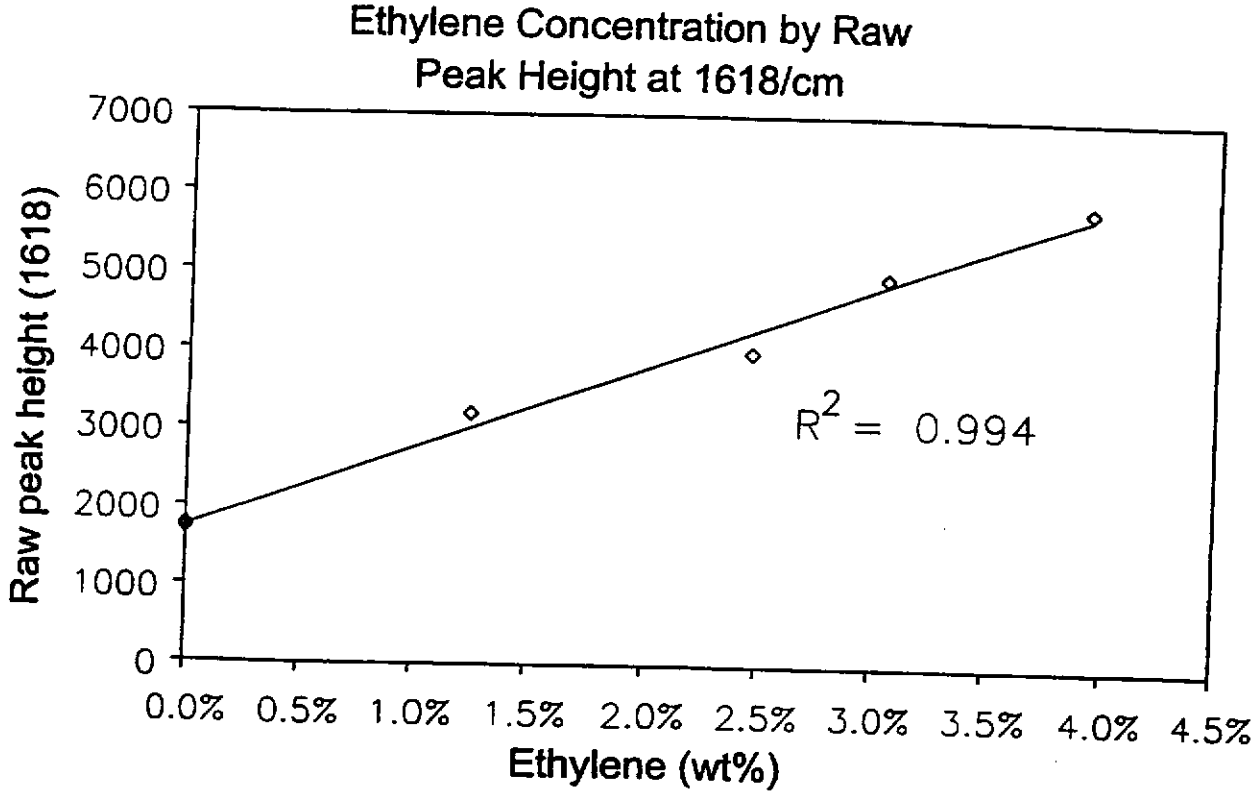
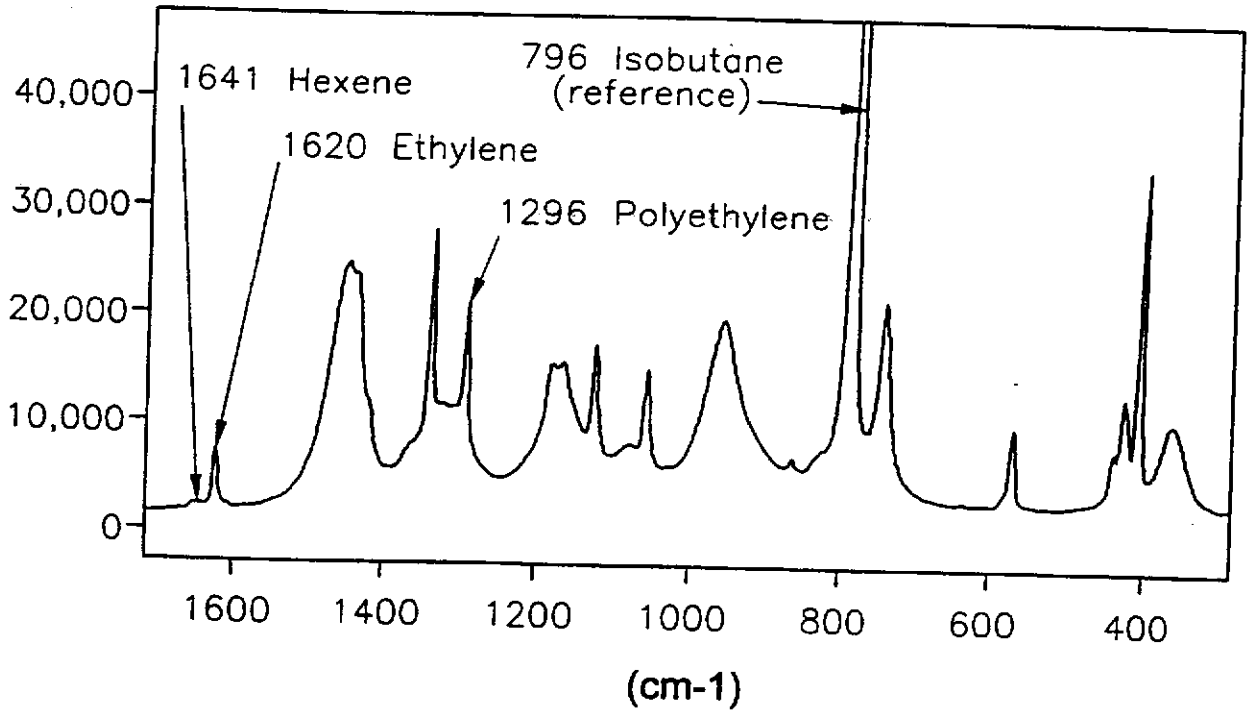

Ethylene Concentration by Raw Peak Height at 1618/cm
Raw peak height (1618)
7000
6000
5000
4000
3000
2000
1000
0
R^2 = 0.994
0.0% 0.5% 1.0% 1.5% 2.0% 2.5% 3.0% 3.5% 4.0% 4.5%
Ethylene (wt%)

Fig. 13


1641 Hexene
796 Isobutane (reference)
1620 Ethylene
1296 Polyethylene
40,000
30,000
20,000
10,000
0
1600 1400 1200 1000 800 600 400
(cm-1)

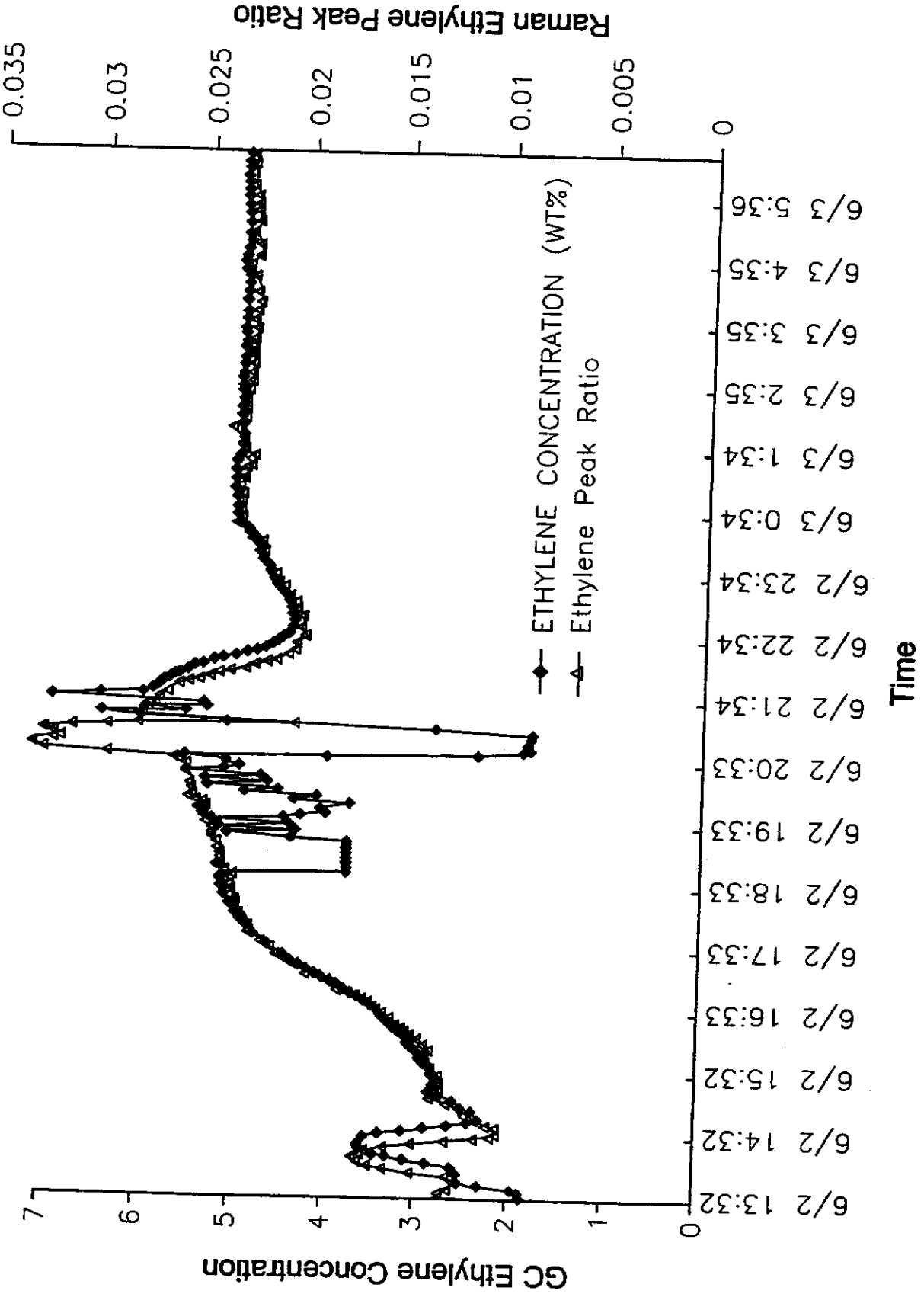

Raman Ethylene Peak Ratio
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
ETHYLENE CONCENTRATION (WT%)
Ethylene Peak Ratio
Time
6/3 5:36
6/3 4:35
6/3 3:35
6/3 2:35
6/3 1:34
6/3 0:34
6/2 23:34
6/2 22:34
6/2 21:34
6/2 20:33
6/2 19:33
6/2 18:33
6/2 17:33
6/2 16:33
6/2 15:32
6/2 14:32
6/2 13:32
GC Ethylene Concentration
7
6
5
4
3
2
1
0

Fig. 14

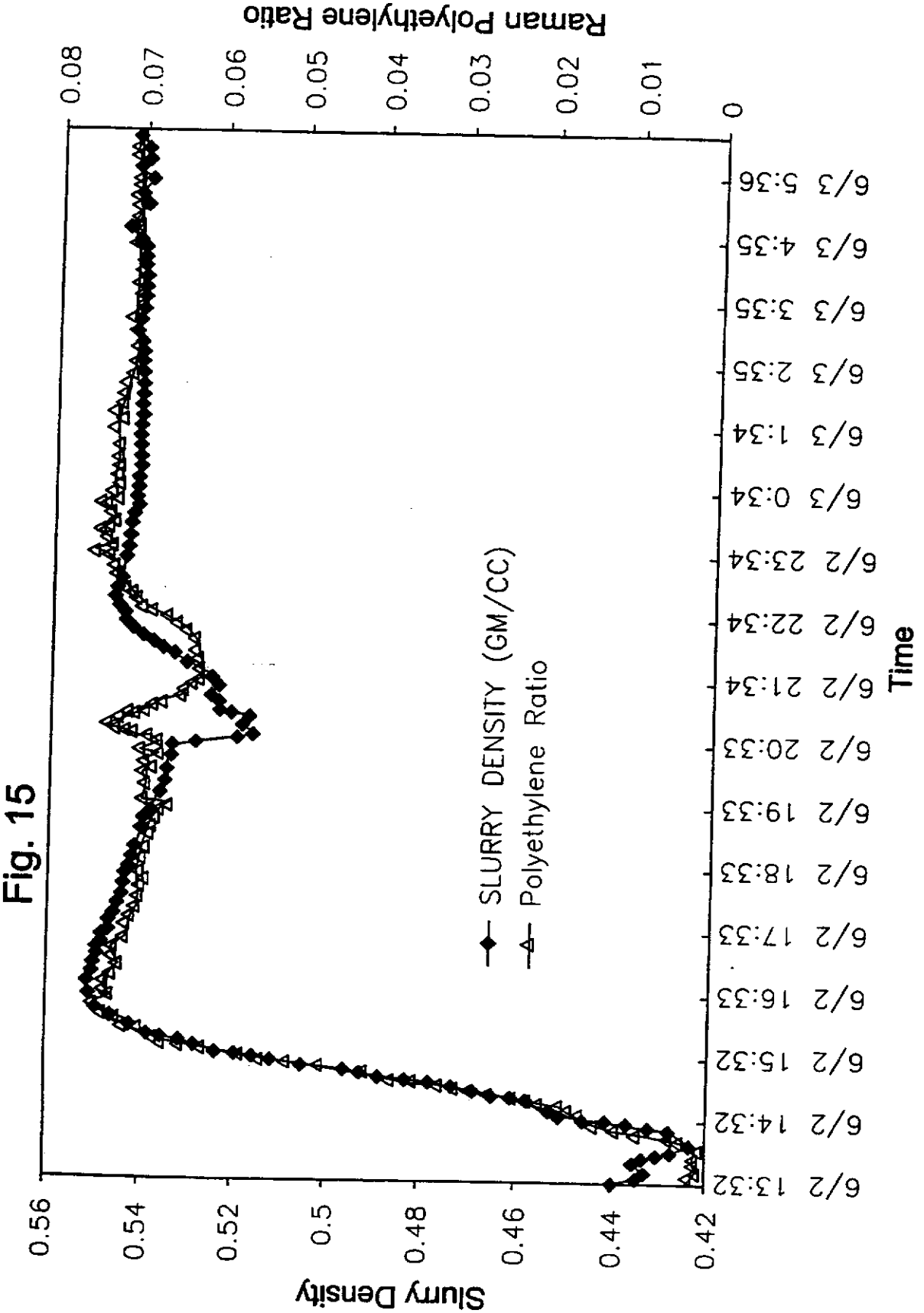

Raman Polyethylene Ratio
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
Slurry Density
0.56
0.54
0.52
0.5
0.48
0.46
0.44
0.42
Time
6/3 5:36
6/3 4:35
6/3 3:35
6/3 2:35
6/3 1:34
6/3 0:34
6/2 23:34
6/2 22:34
6/2 21:34
6/2 20:33
6/2 19:33
6/2 18:33
6/2 17:33
6/2 16:33
6/2 15:32
6/2 14:32
6/2 13:32
SLURRY DENSITY (GM/CC)
Polyethylene Ratio

Fig. 15

Fig. 16 Imaging Probe Assembly

