SUPPORTING INFORMATION

For

Novel hybrid epoxy silicone materials as efficient anticorrosive coatings for mild steel

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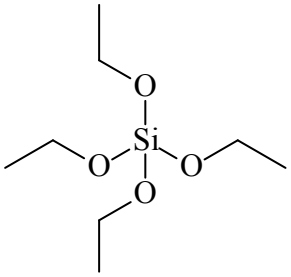
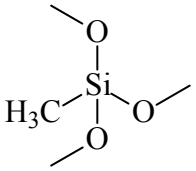
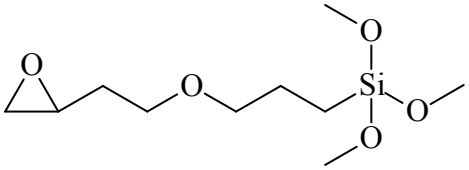
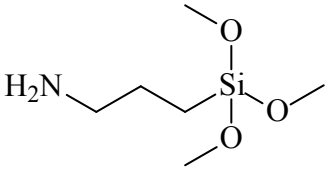
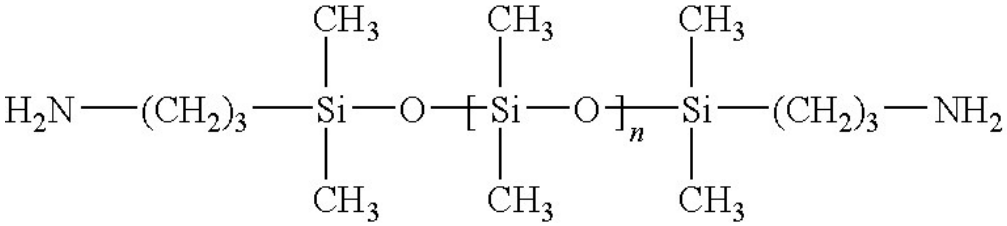
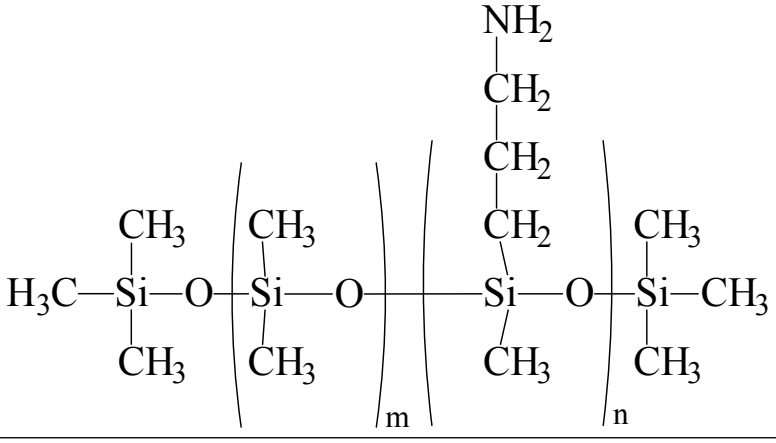
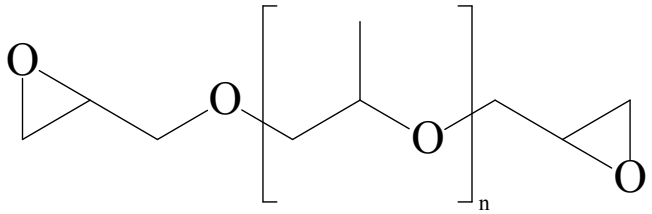
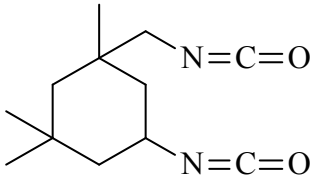
S1. Chemical structure of all chemicals involved in the synthesis of the hybrid coatings

TEOS	
MTMS	
GPTMS	
APTMS	
APT-PDMS	
APM-DMS	

DER736	
IPDI	

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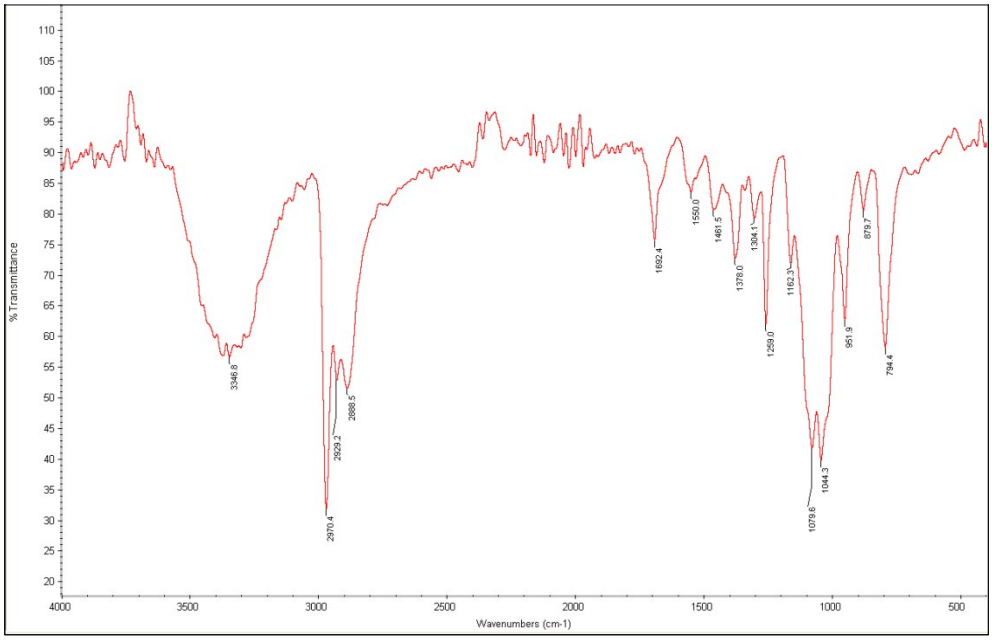
S2. FTIR spectra of the precursors and the prepared hybrid coatings

C1



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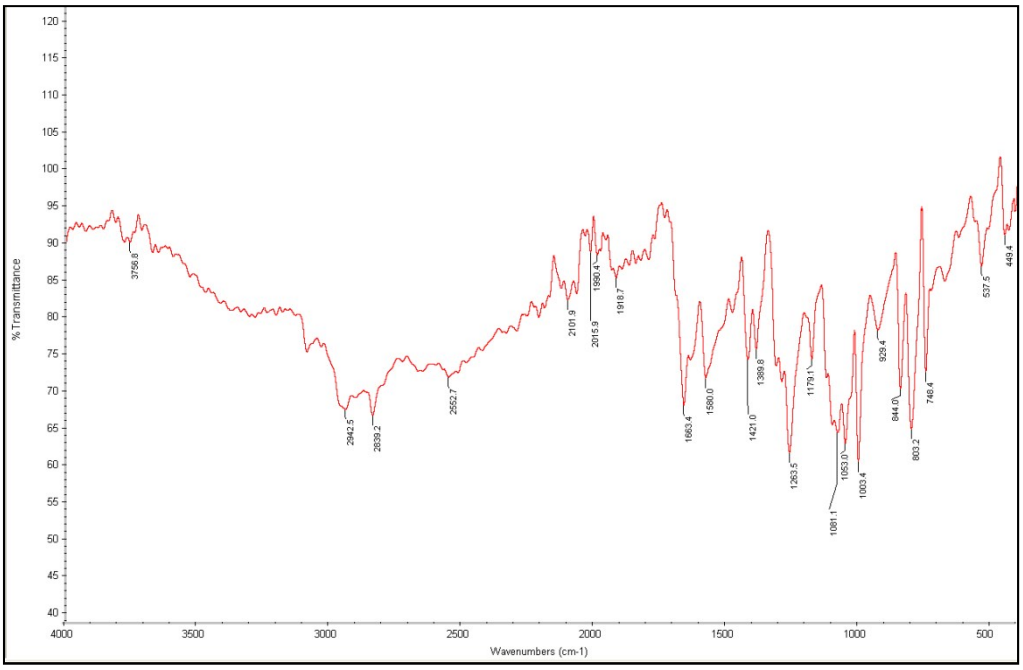

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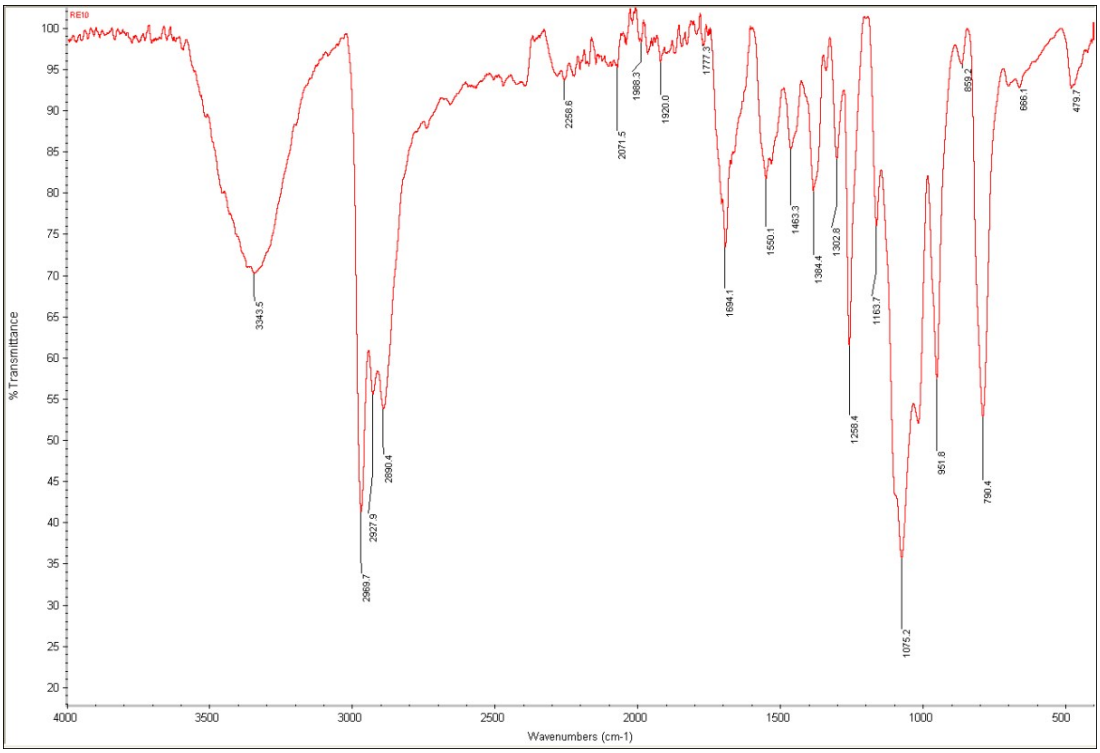
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% Transmittance
Wavenumbers (cm-1)
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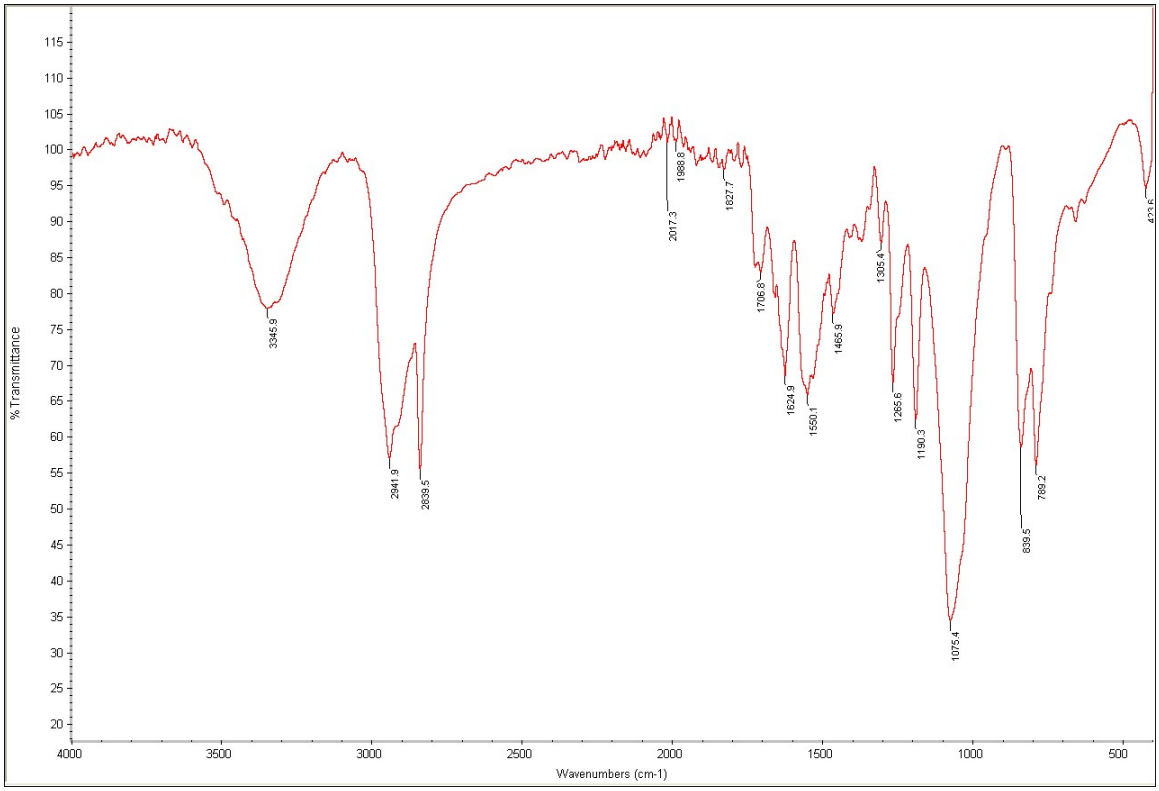
2927.9
2890.4
2258.6
2071.5
1988.3
1920.0
1777.3
1694.1
1550.1
1463.3
1384.4
1302.8
1258.4
1163.7
1075.2
951.8
859.2
790.4
686.1
479.7

C4


% Transmittance
Wavenumbers (cm-1)
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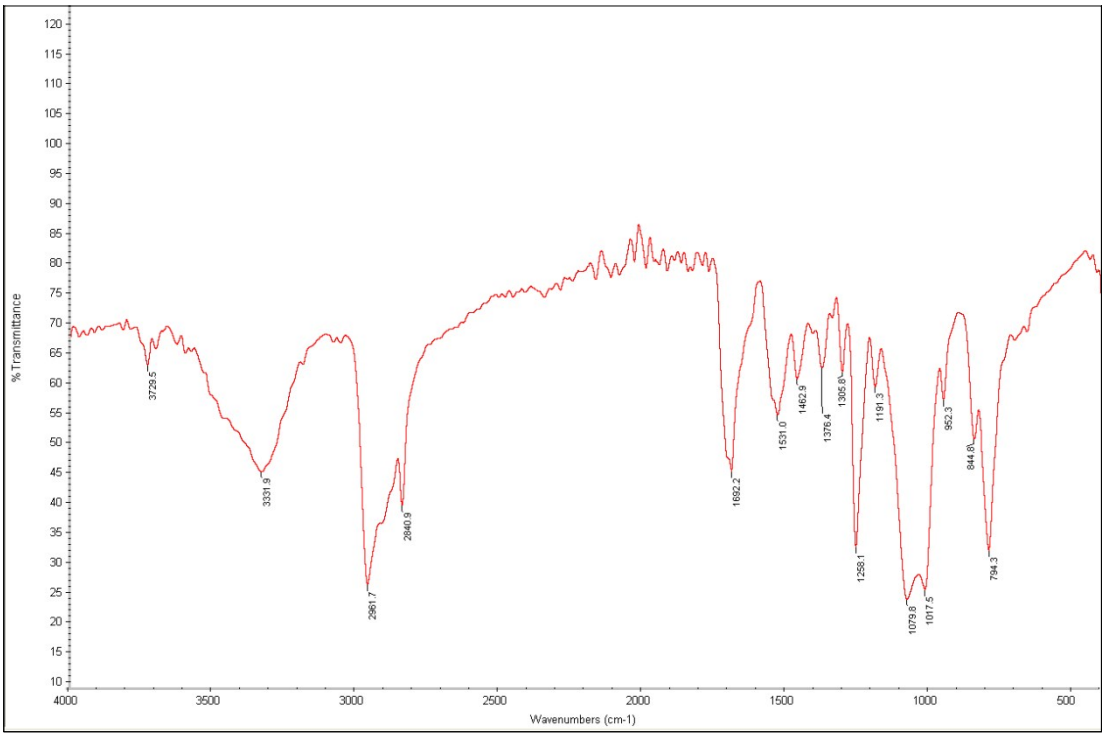
2941.9
2839.5
2017.3
1988.8
1827.7
1706.8
1624.9
1550.1
1465.9
1385.4
1265.6
1190.3
1075.4
839.5
789.2

C5


% Transmittance
Wavenumbers (cm-1)
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2840.9
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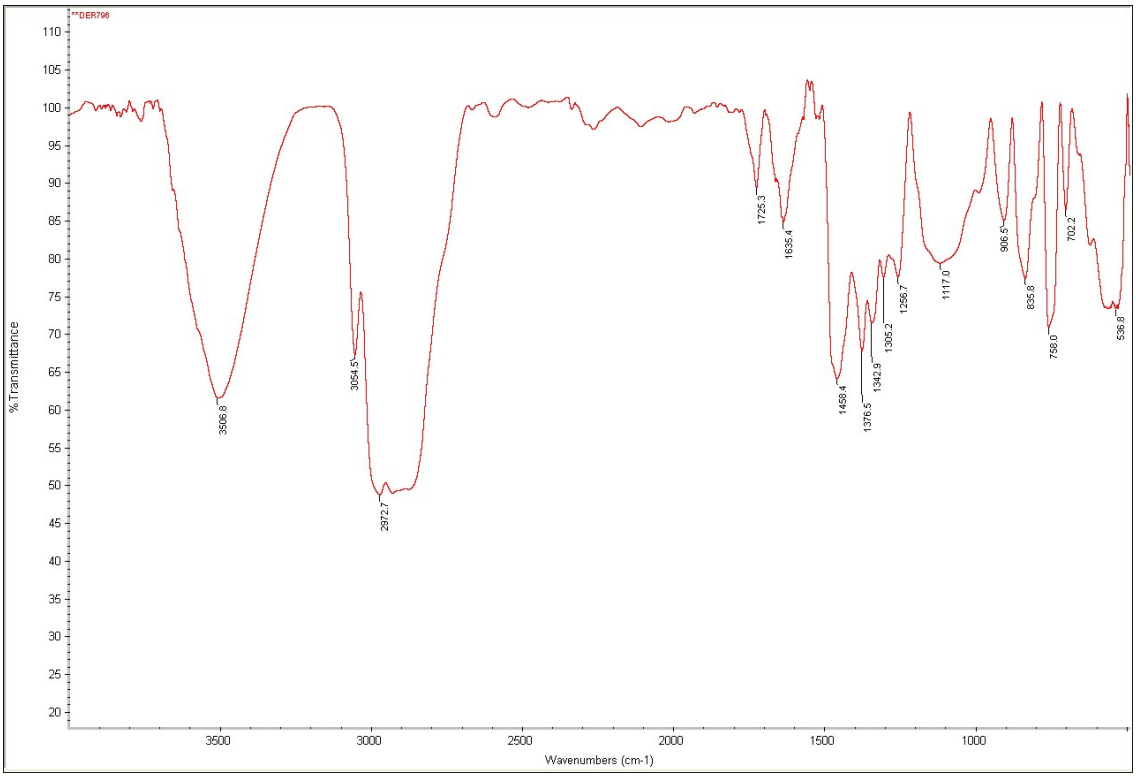
1531.0
1462.9
1376.4
1305.8
1258.1
1191.3
1079.8
1017.5
952.3
844.8
794.3

DER736


**DER736
% Transmittance
Wavenumbers (cm-1)
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3054.5
2972.7
1725.3
1635.4
1458.4
1376.5
1342.9
1305.2
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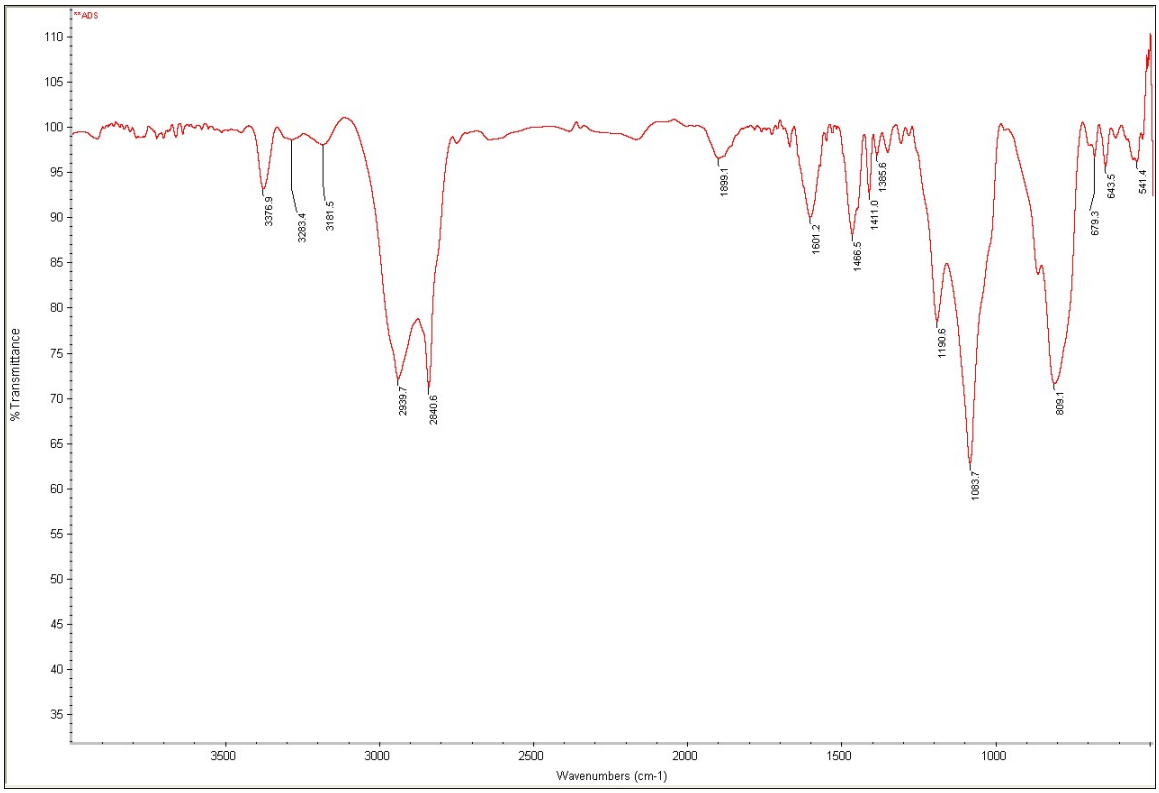
906.5
835.8
758.0
702.2
536.8

APTMS



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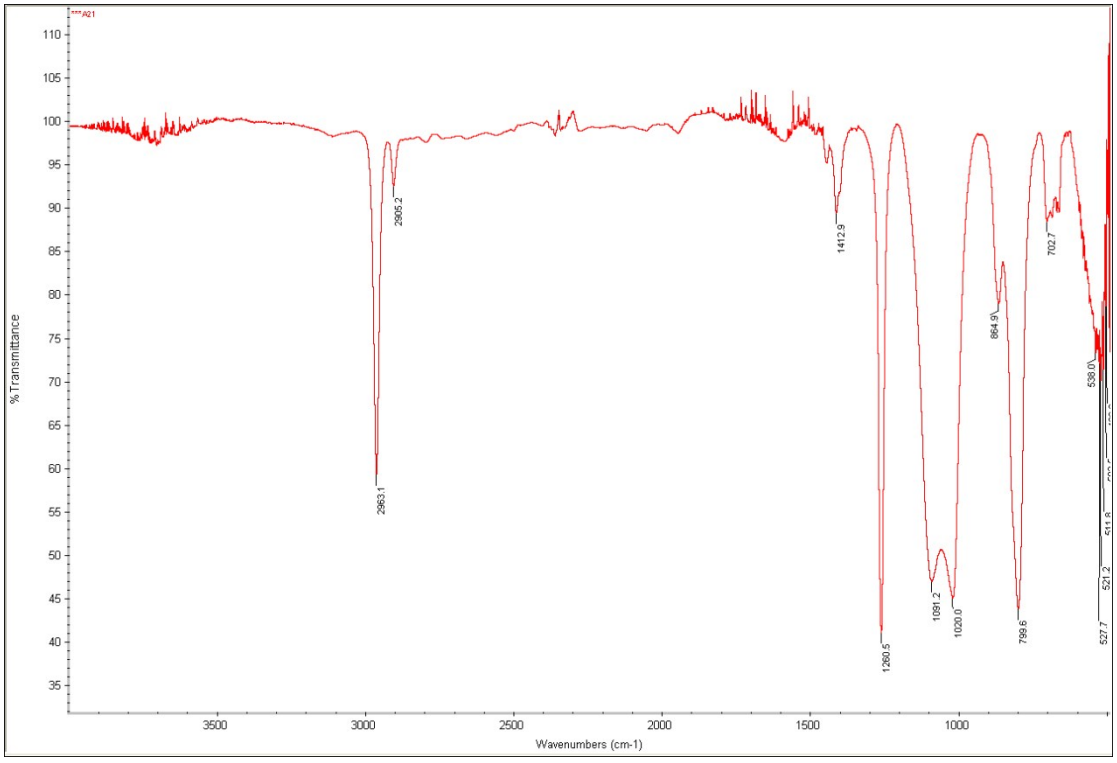

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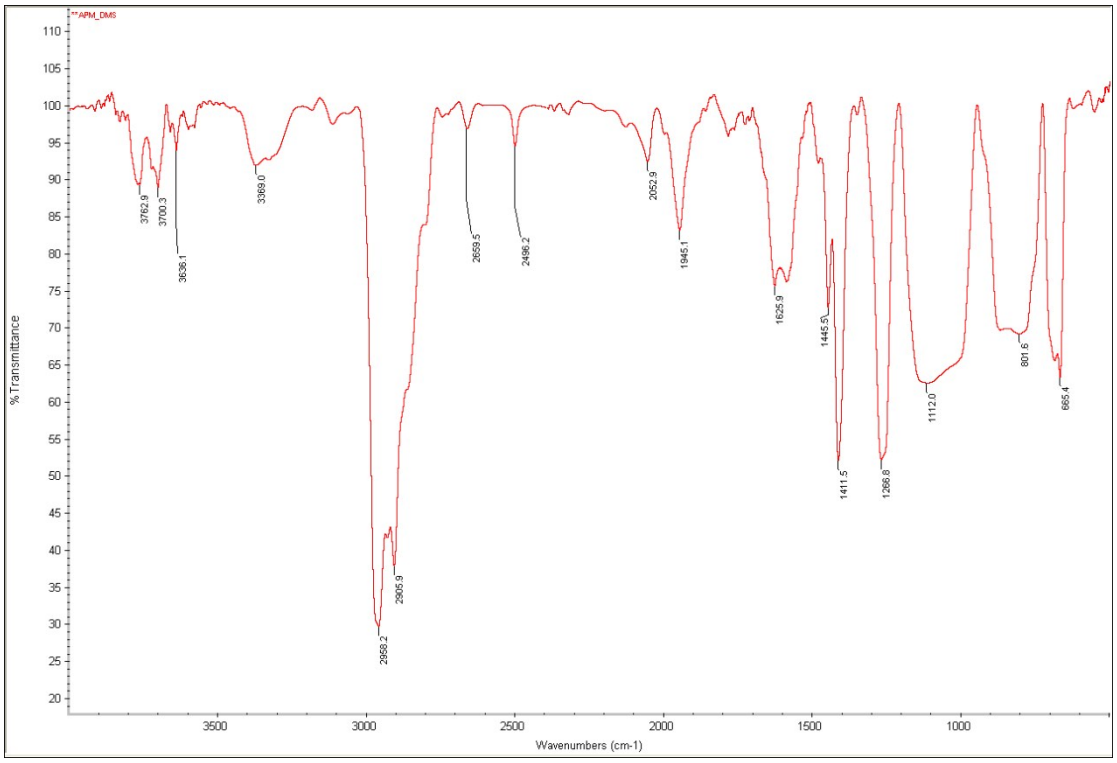
**APM_DMS
% Transmittance
Wavenumbers (cm-1)
3762.9
3700.3
3636.1
3369.0
2958.2
2905.9
2659.5
2496.2
2052.9
1945.1
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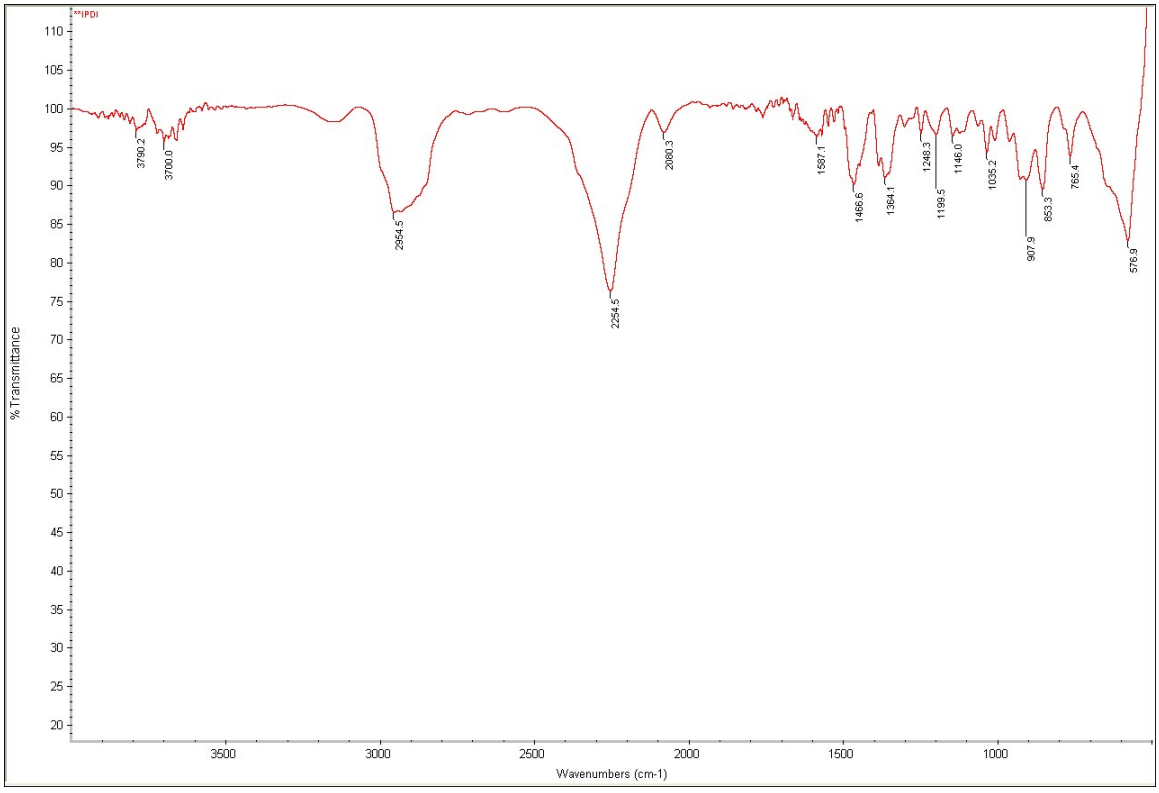
1112.0
801.6
665.4

IPDI


**IPDI
% Transmittance
Wavenumbers (cm-1)
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2080.3
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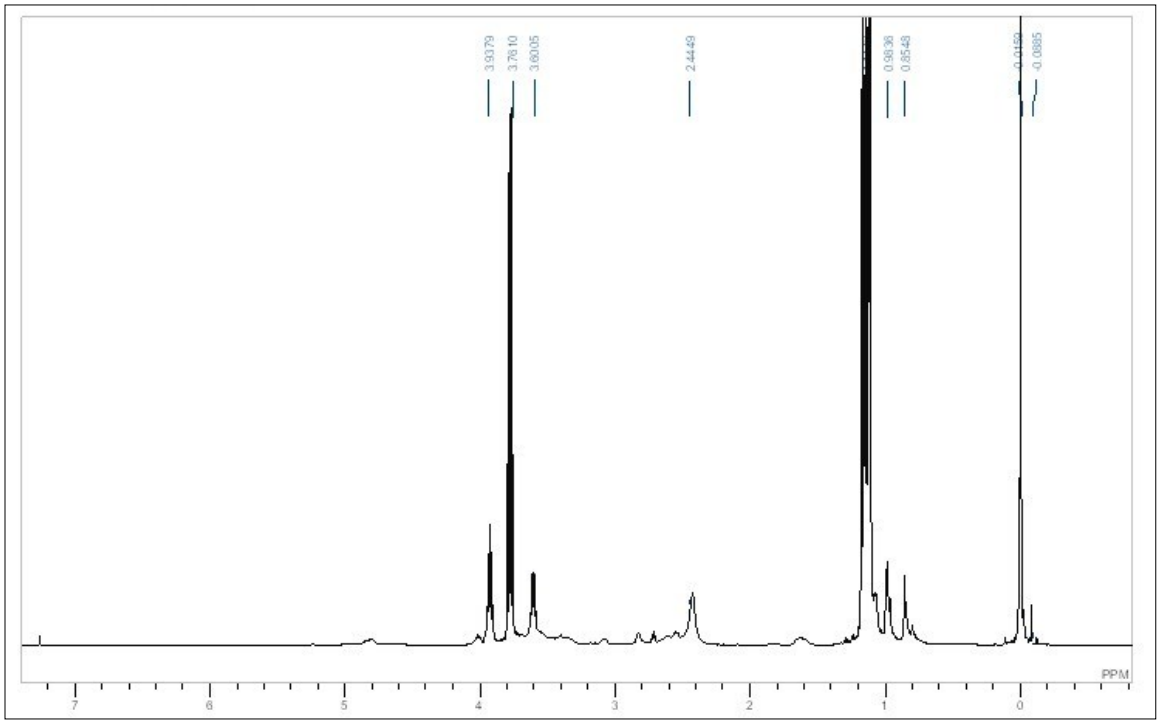
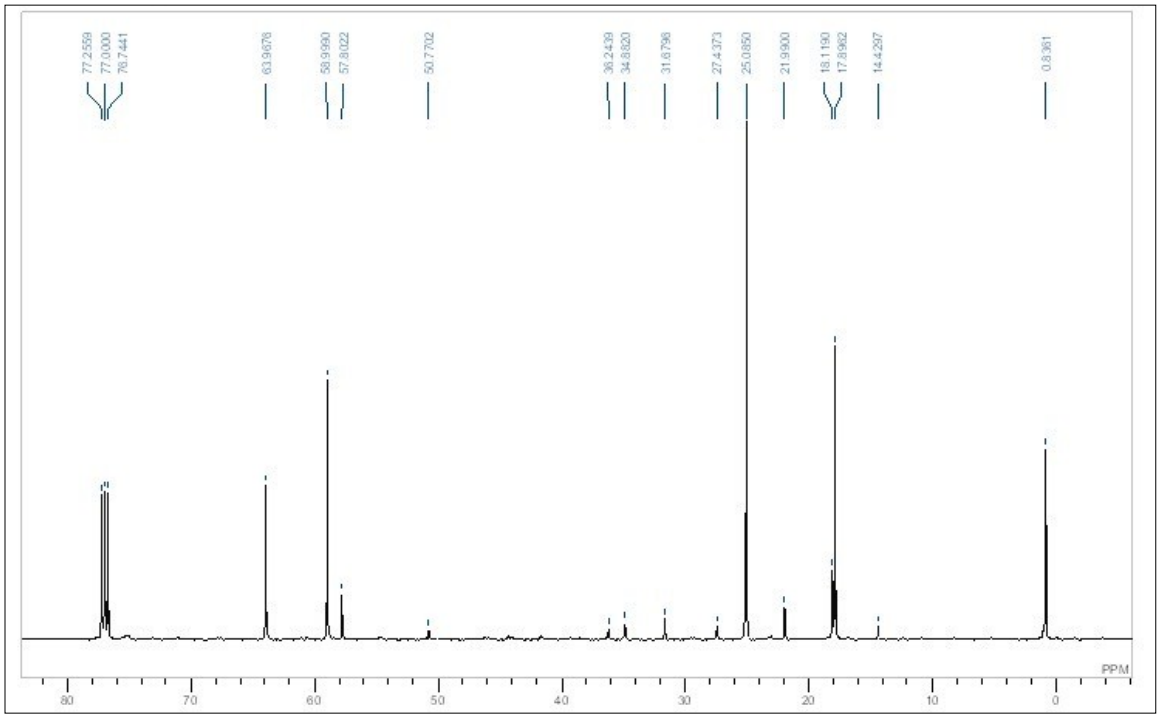
1466.6
1364.1
1248.3
1199.5
1146.0
1035.2
907.9
853.3
765.4
576.9

S3. ^{1}H-NMR and ^{13}C-NMR spectra of the precursors and the prepared hybrid coatings

C1





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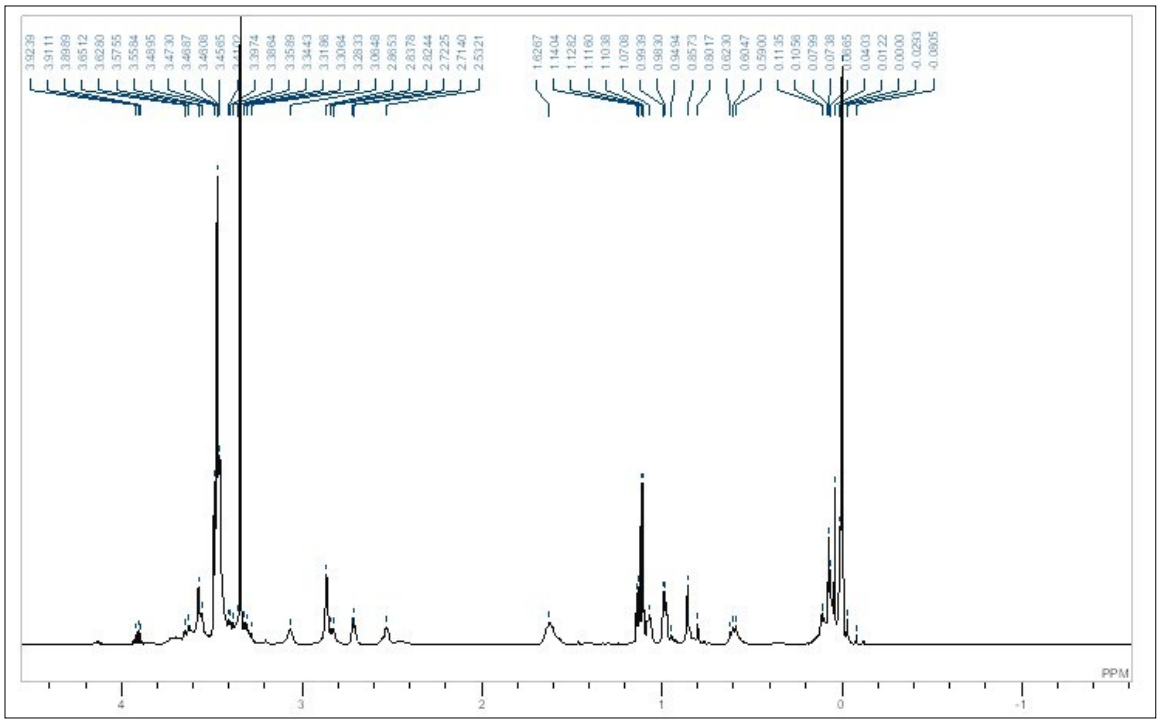
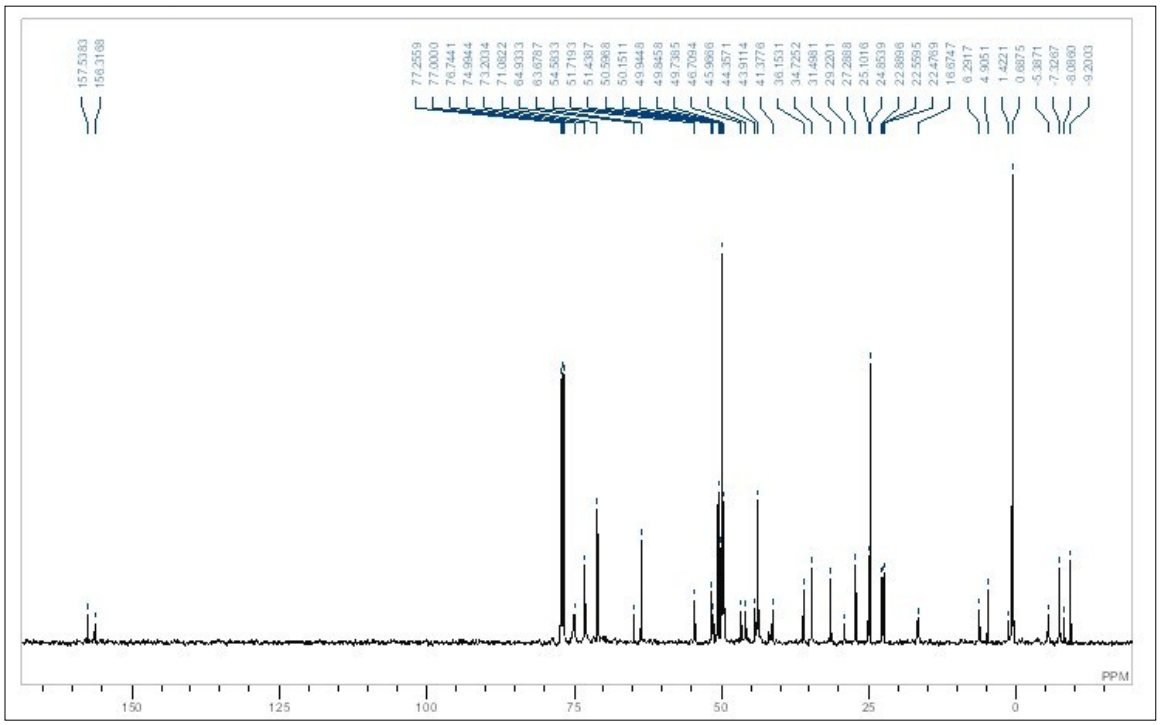
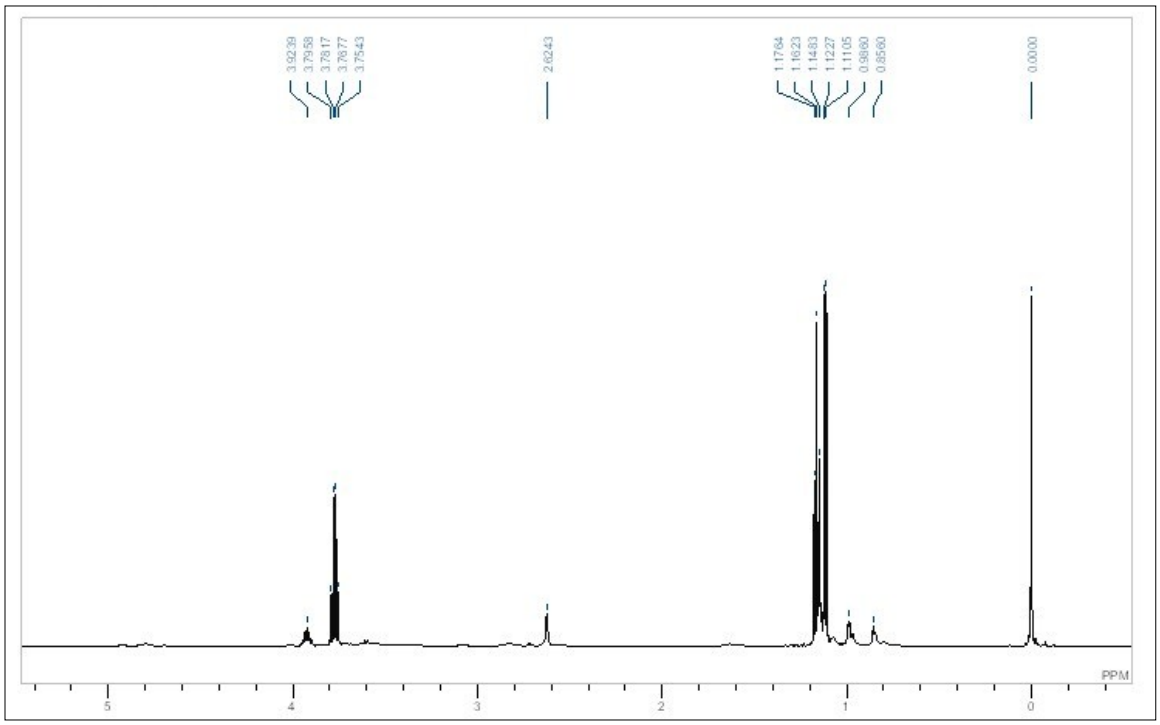




C3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0.9860
0.8560
0.0000
PPM
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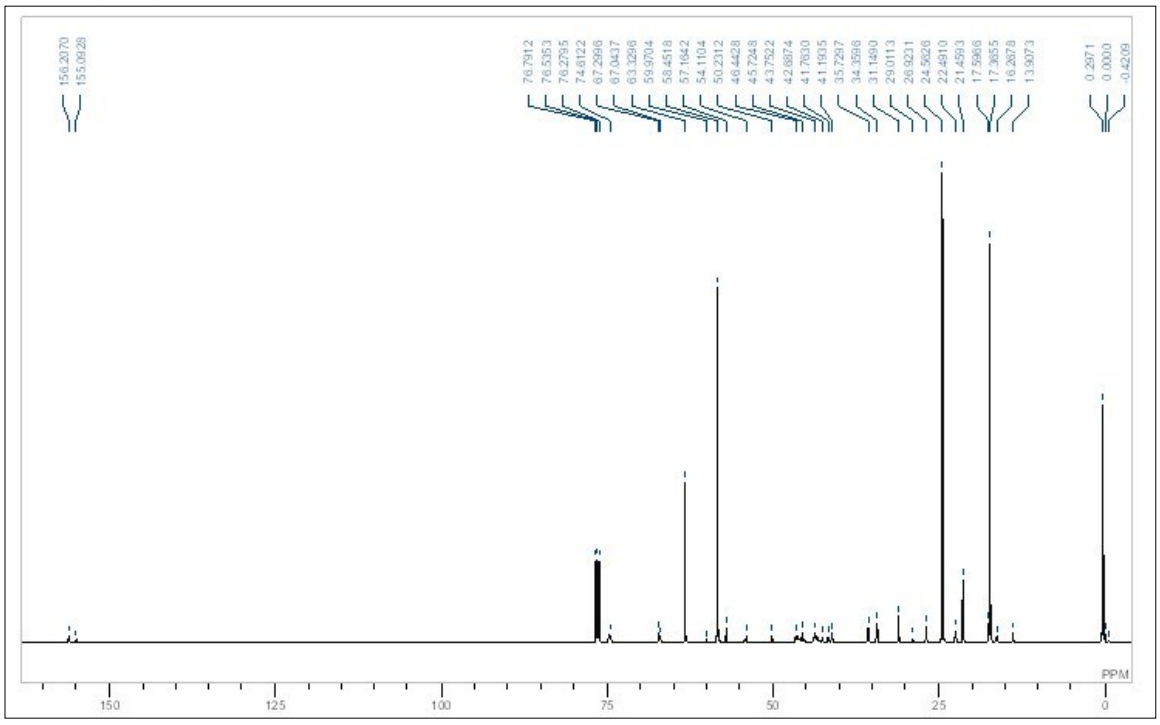
4
3
2
1
0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67.0437
63.3298
59.9704
58.4518
57.1642
54.1104
50.2312
46.4428
45.7248
43.7522
42.6874
41.7630
41.1935
35.7297
34.3998
31.1490
29.0113
26.9231
24.5626
22.4910
21.4593
17.5986
17.3655
16.2678
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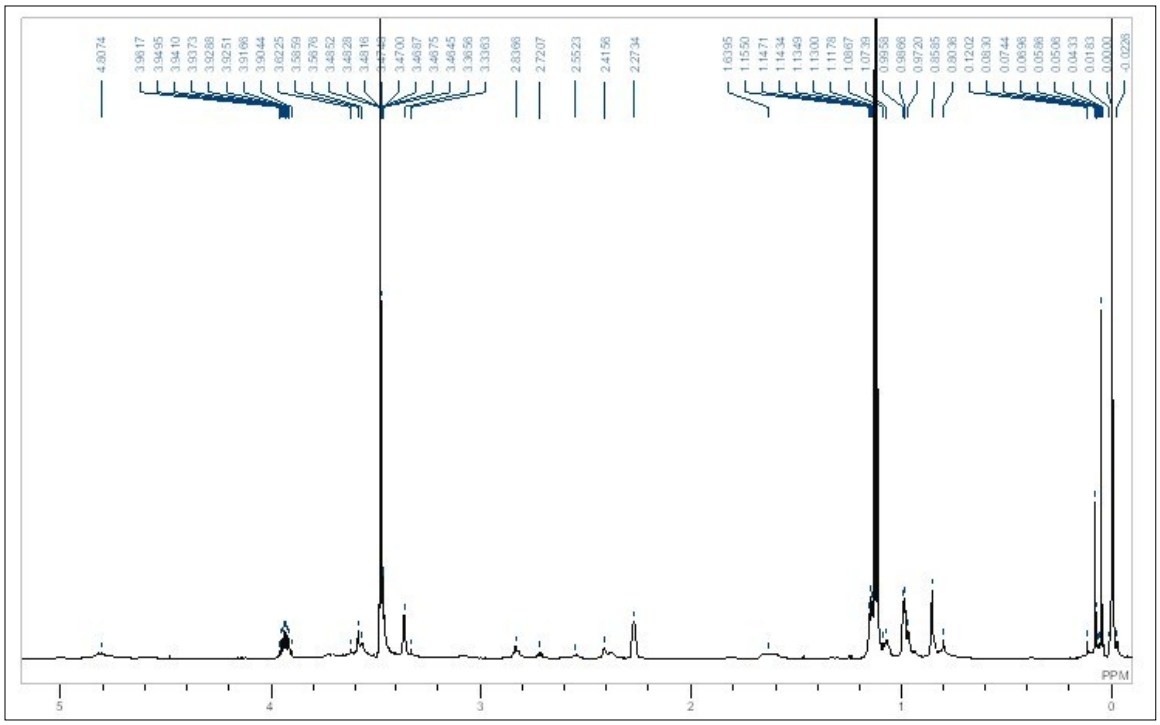
PPM
150
125
100
75
50
25
0

C5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3.9044
3.6225
3.5859
3.5676
3.4852
3.4828
3.4816
3.4748
3.4700
3.4687
3.4675
3.4645
3.3656
3.3363
2.8366
2.7207
2.5523
2.4156
2.2734
1.6395
1.1550
1.1471
1.1434
1.1349
1.1300
1.1178
1.0867
1.0739
0.9958
0.9866
0.9720
0.8585
0.8036
0.1202
0.0830
0.0744
0.0696
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0.0000
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PPM
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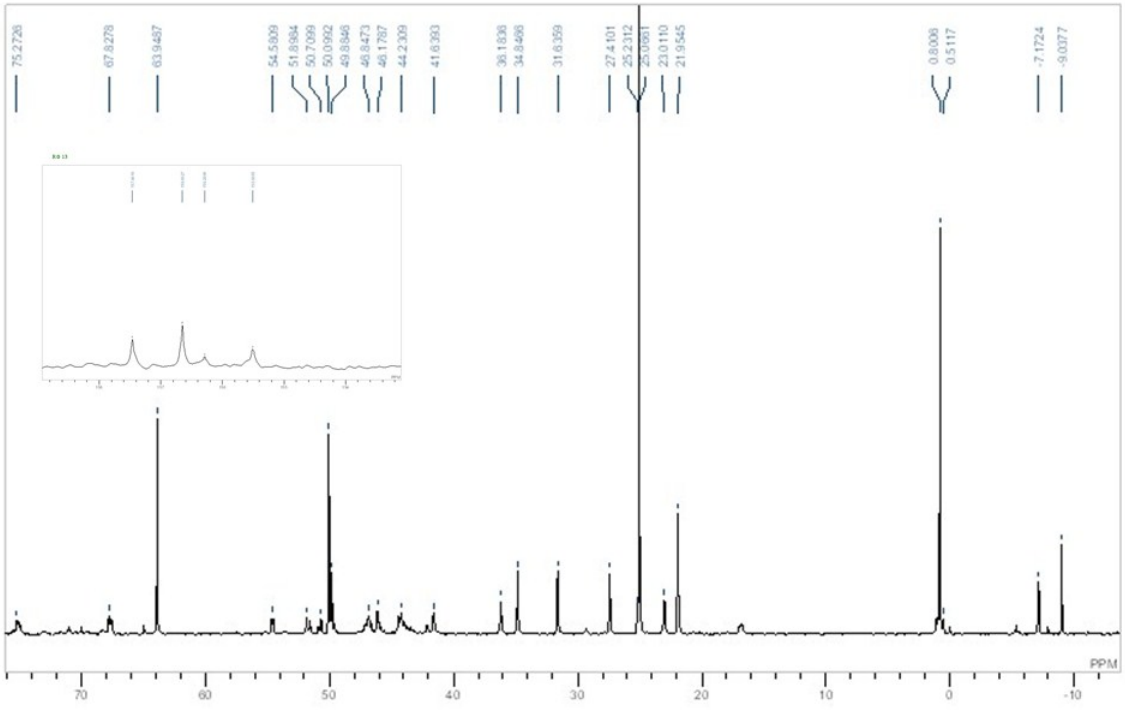
4
3
2
1
0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63.9487
54.5809
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50.0992
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46.1787
44.2309
41.6393
36.1836
34.8468
31.6359
27.4101
25.2312
25.0661
23.0110
21.9545
0.8006
0.5117
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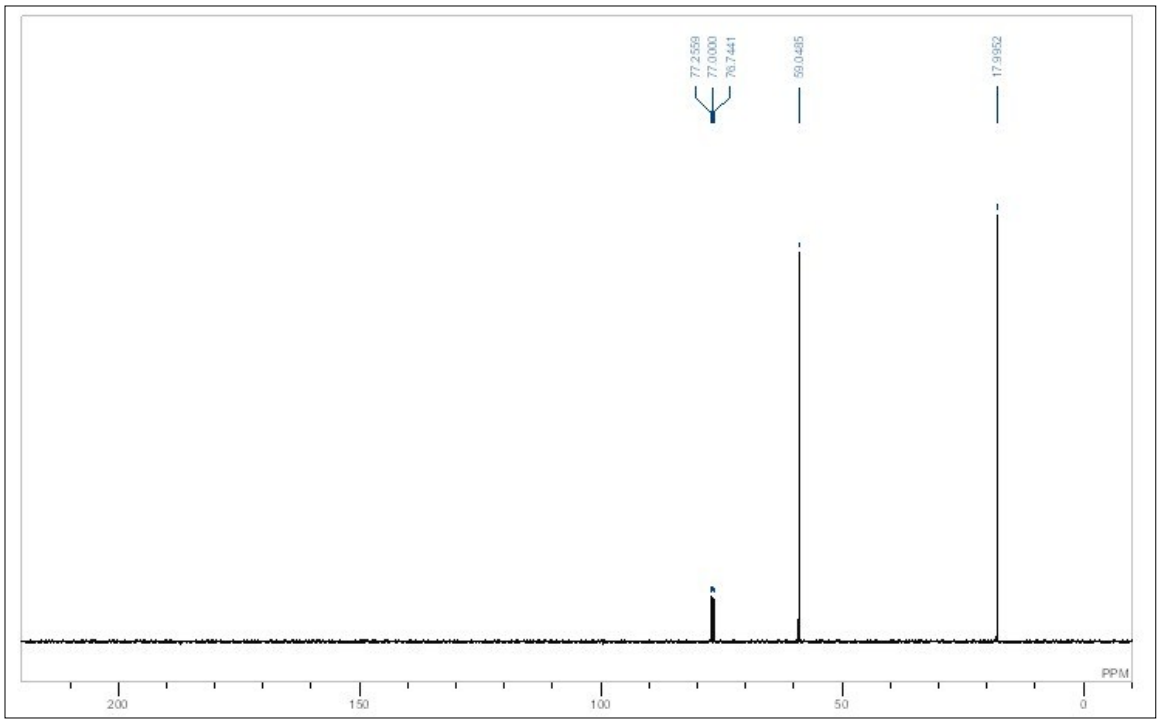
60
50
40
30
20
10
0
-10

TEOS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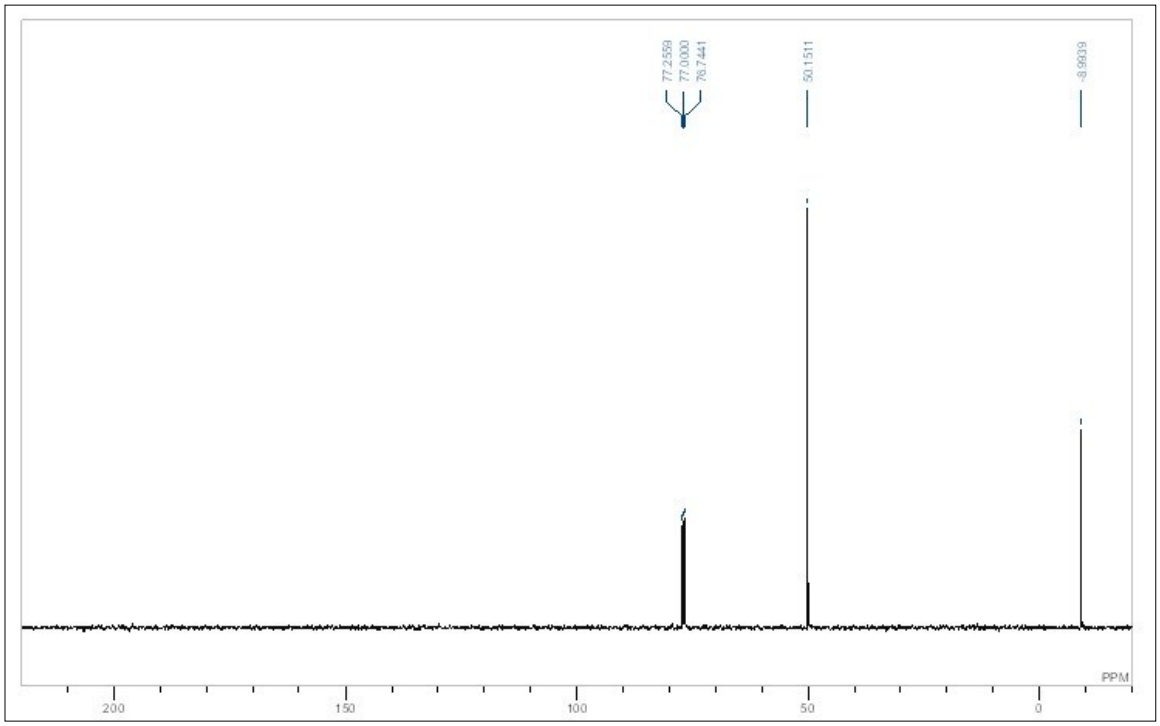
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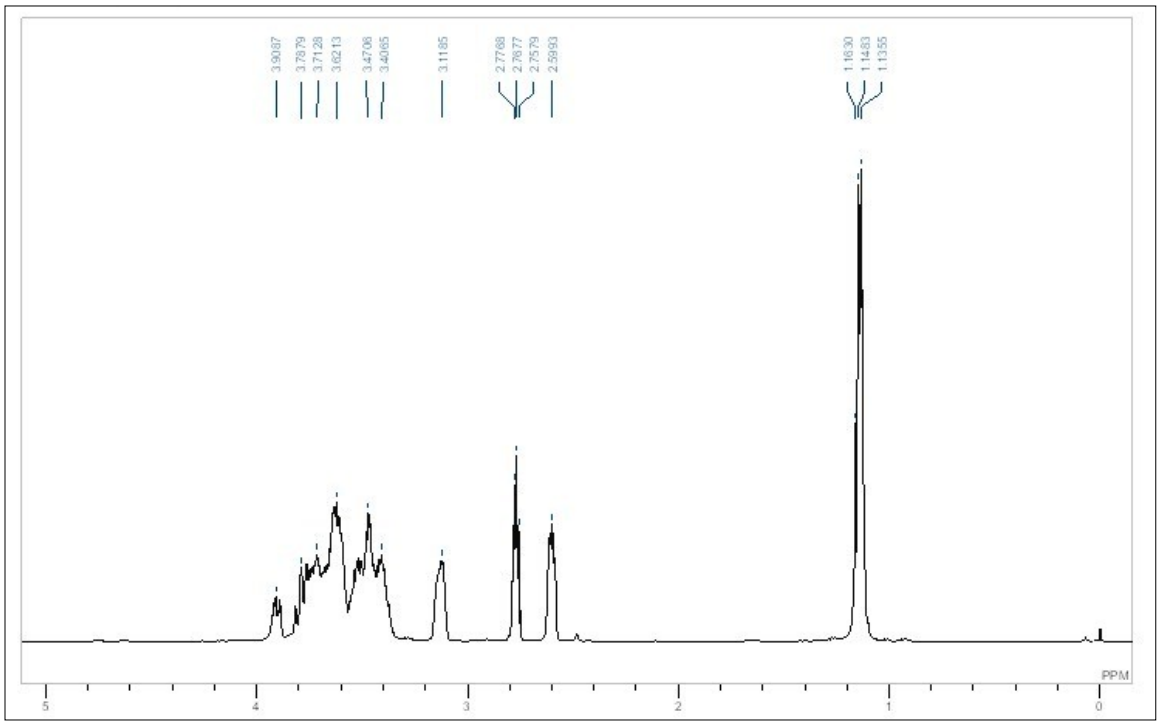
150
100
50
0

DER736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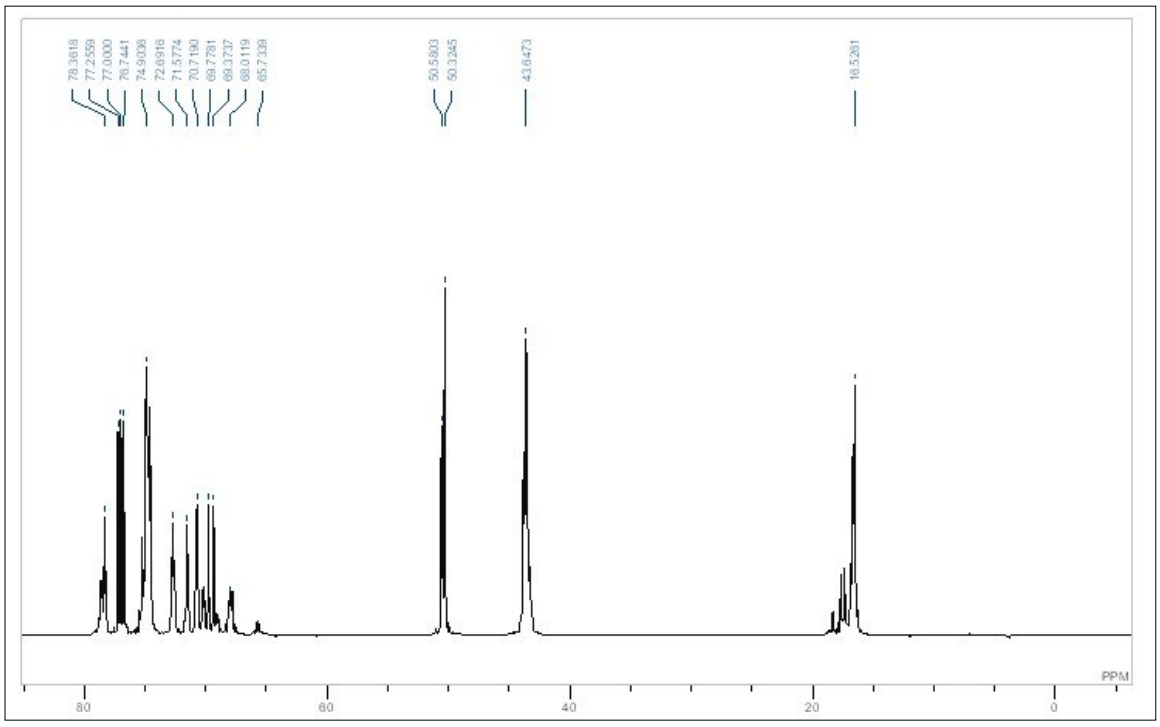
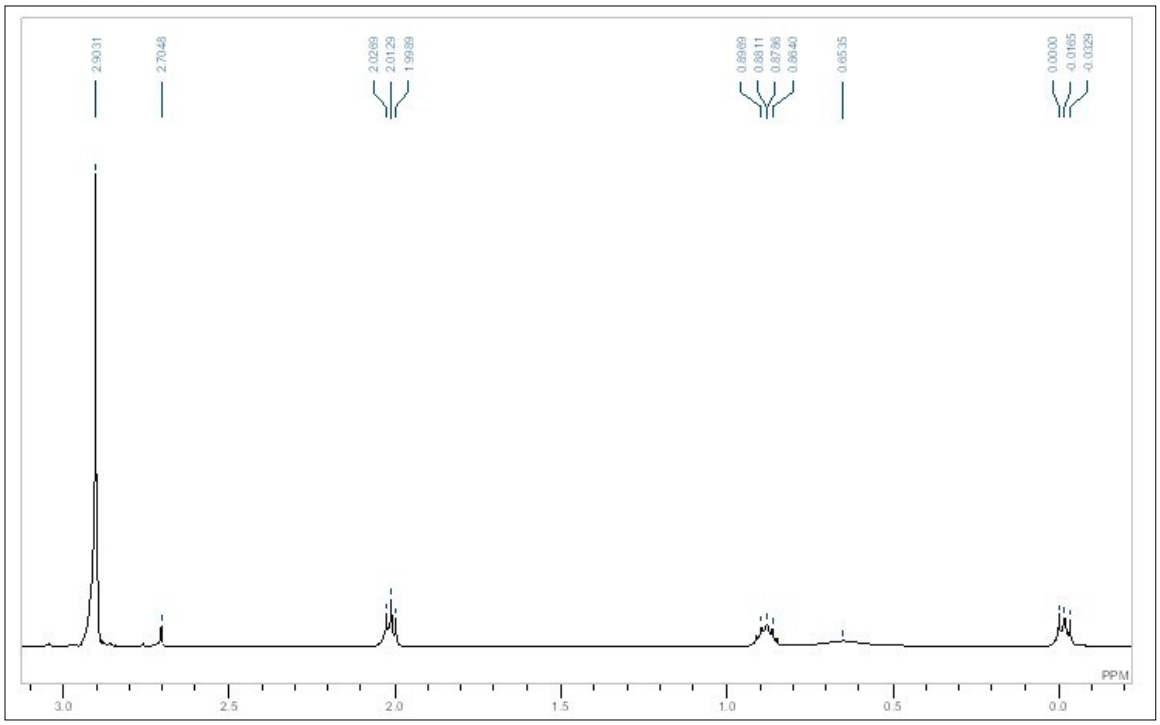
3.7128
3.6213
3.4706
3.4065
3.1185
2.7768
2.7677
2.7579
2.5993
1.1630
1.1483
1.1355
PPM
5
4
3
2
1
0


78.3618
77.2559
77.0000
76.7441
74.9036
72.6916
71.5774
70.7190
69.7781
69.3737
68.0119
65.7339
50.5803
50.3245
43.6473
16.5261
PPM
80
60
40
20
0

APTMS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2.0269
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0.8969
0.8811
0.8786
0.8640
0.6535
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-0.0329
PPM
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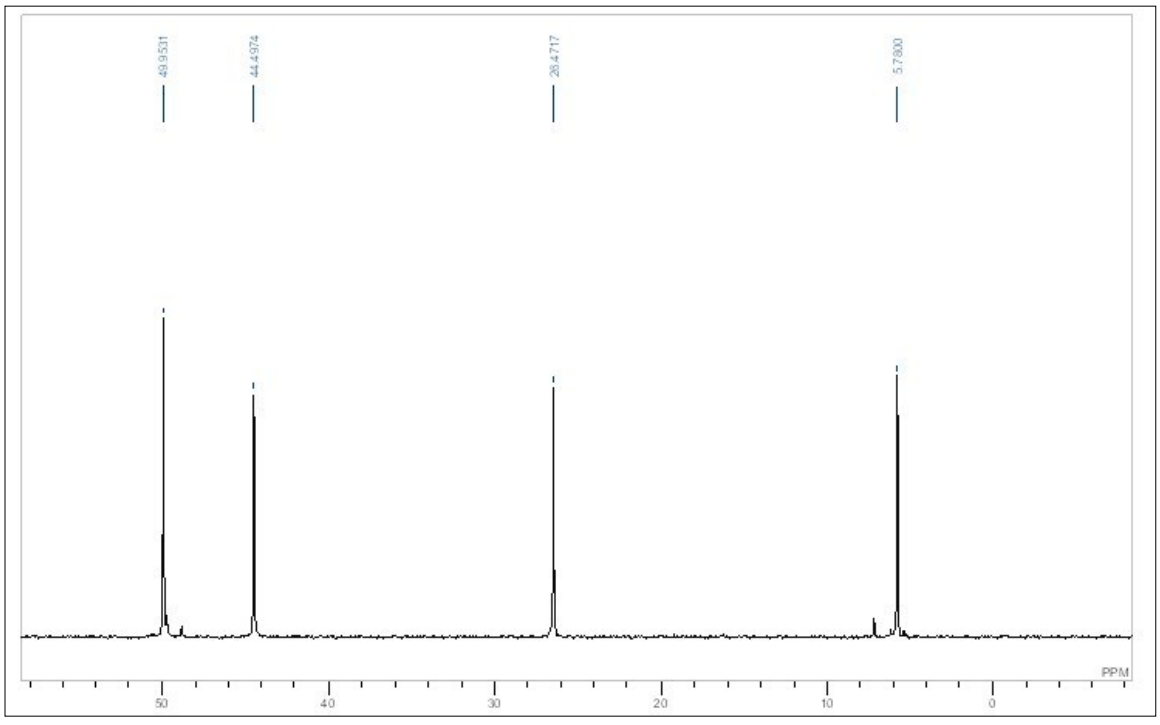
2.5
2.0
1.5
1.0
0.5
0.0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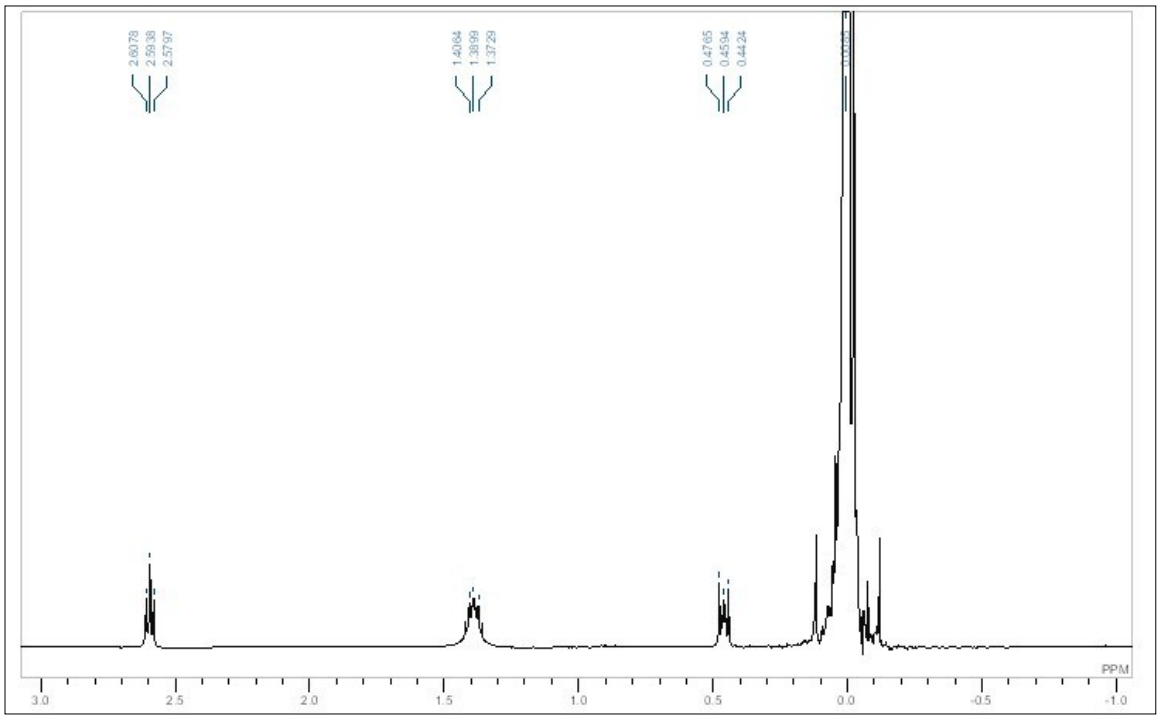
PPM
50
40
30
20
10
0

APT-PDMS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2.5938
2.5797
1.4064
1.3899
1.3729
0.4765
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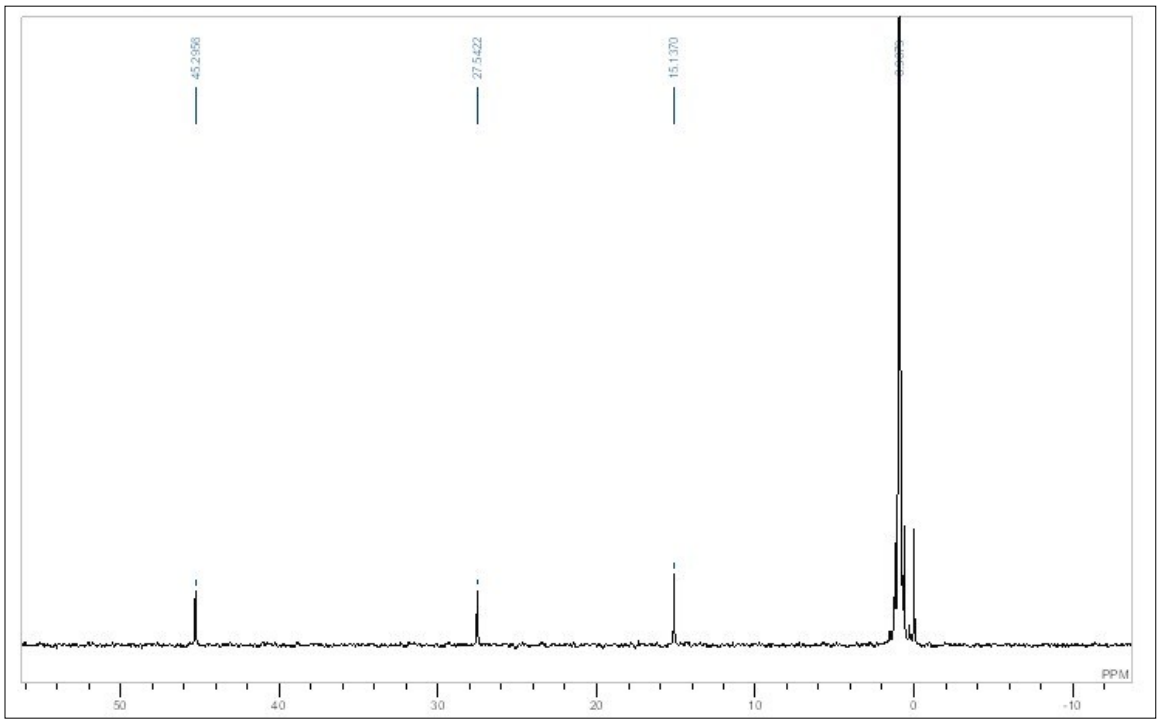
1.5
1.0
0.5
0.0
-0.5
-1.0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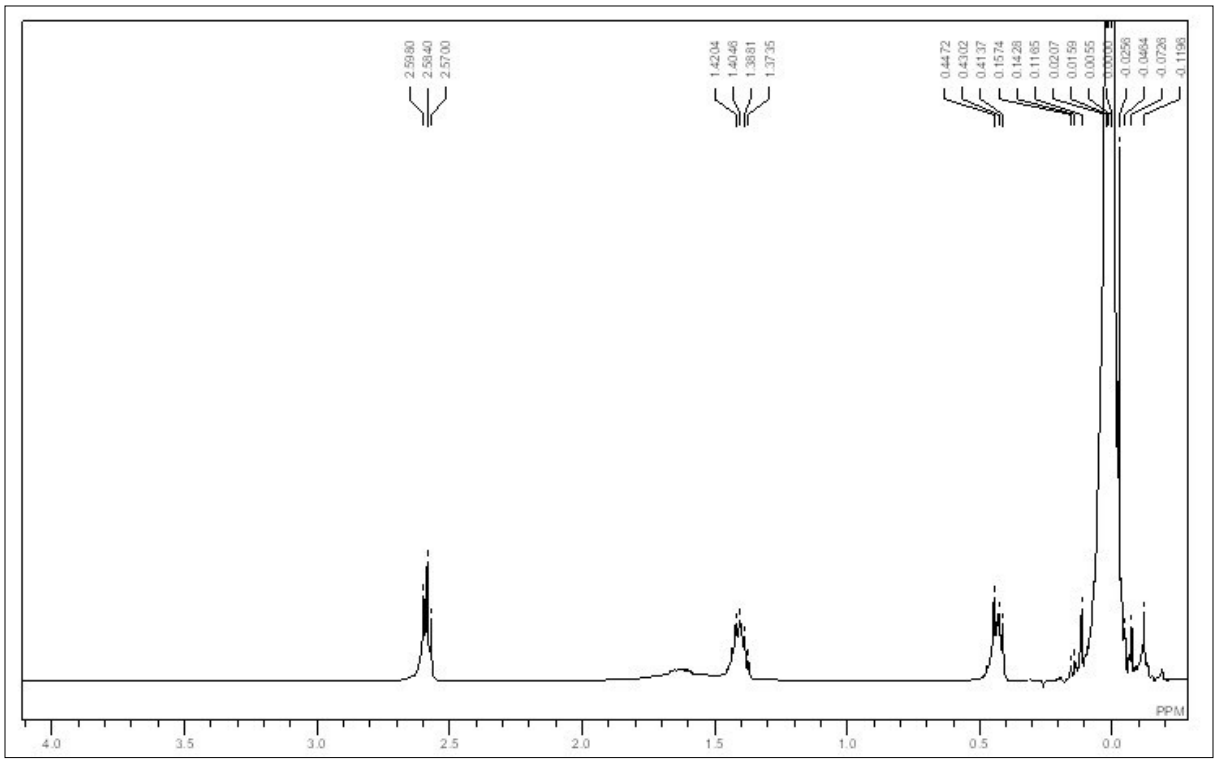
PPM
50
40
30
20
10
0
-10

APM-DMS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2.5700
1.4204
1.4046
1.3881
1.3735
0.4472
0.4302
0.4137
0.1574
0.1428
0.1165
0.0207
0.0159
0.0055
0.0000
-0.0256
-0.0464
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-0.1196
PPM
4.0
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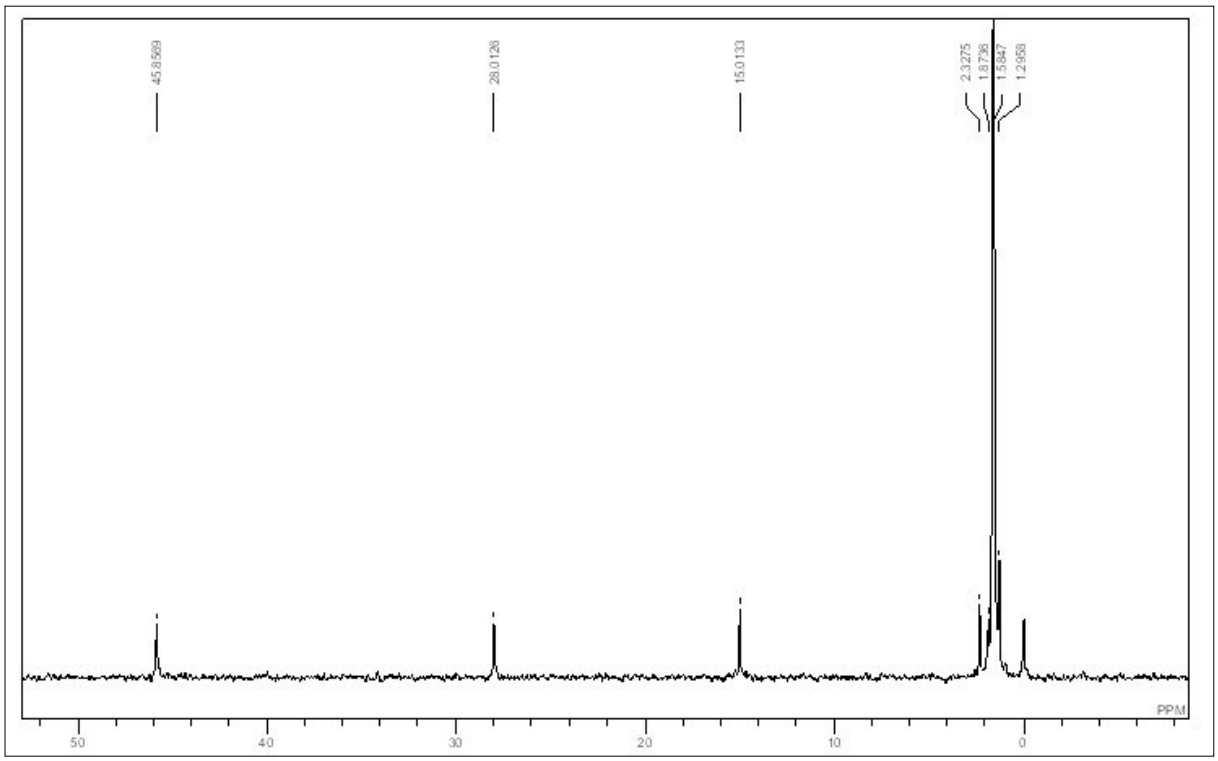
3.0
2.5
2.0
1.5
1.0
0.5
0.0


45.8569
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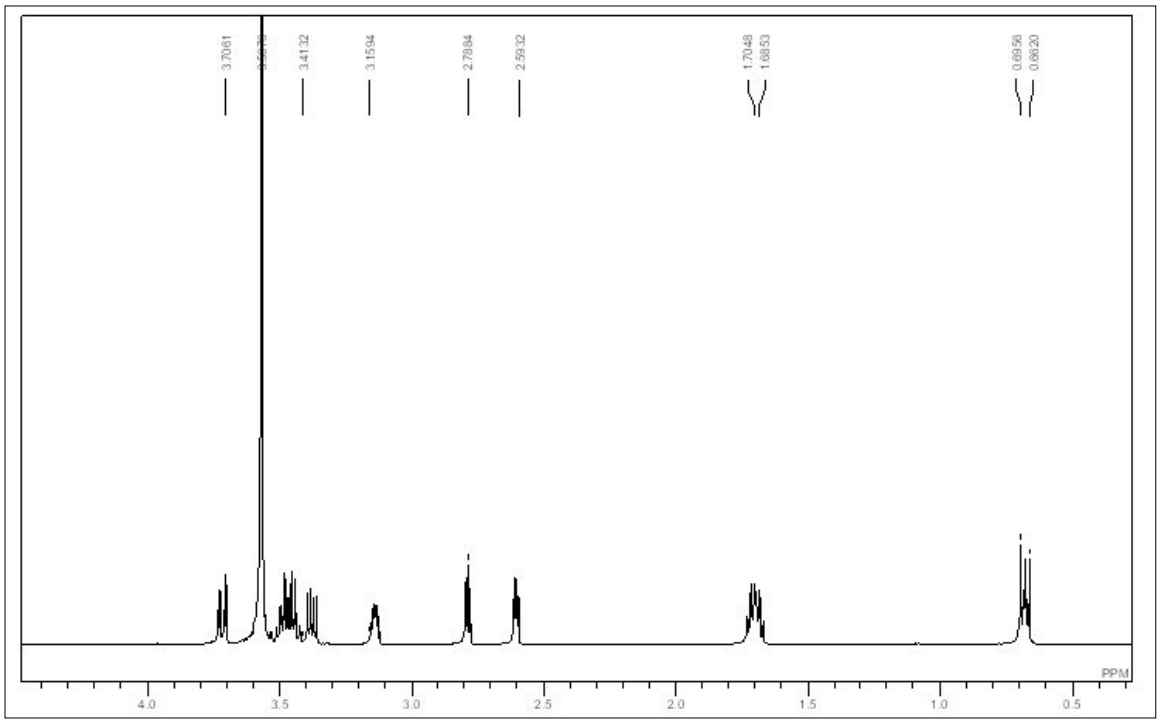
1.8706
1.5847
1.2958
PPM
50
40
30
20
10
0

GPTMS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3.1594
2.7884
2.5932
1.7048
1.6853
0.6956
0.6620
PPM
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2.5
2.0
1.5
1.0
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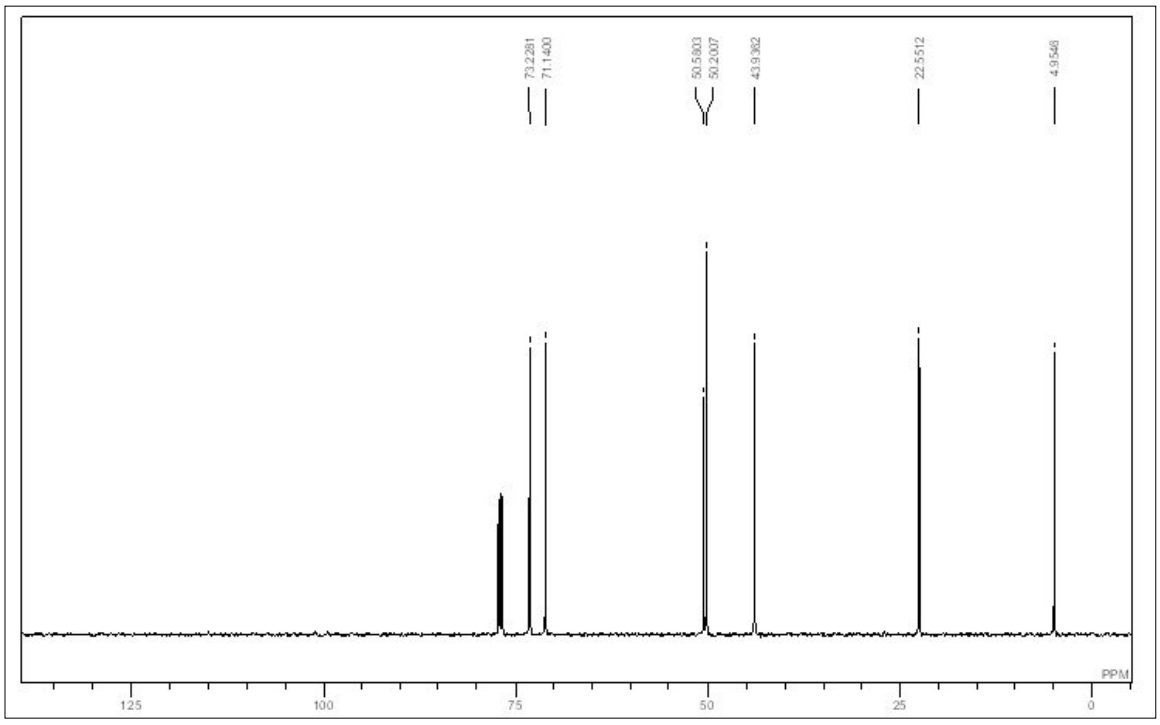
73.2281
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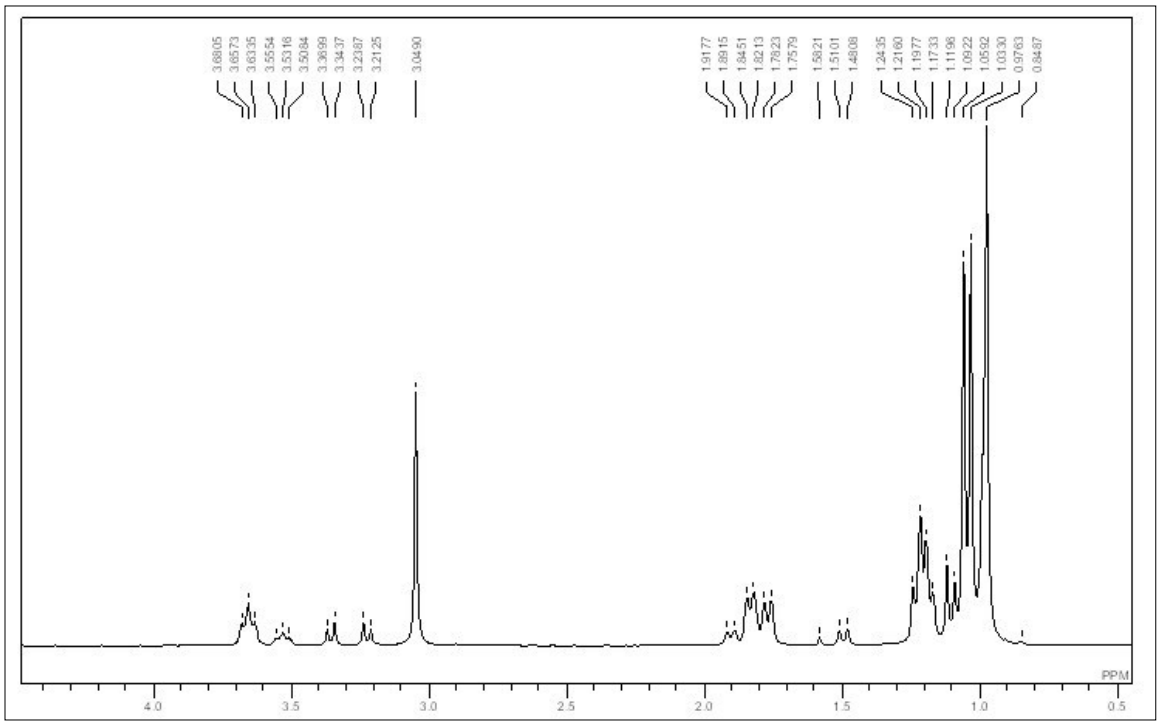
50.5803
50.2007
43.9362
22.5512
4.9546
PPM
125
100
75
50
25
0

IPDI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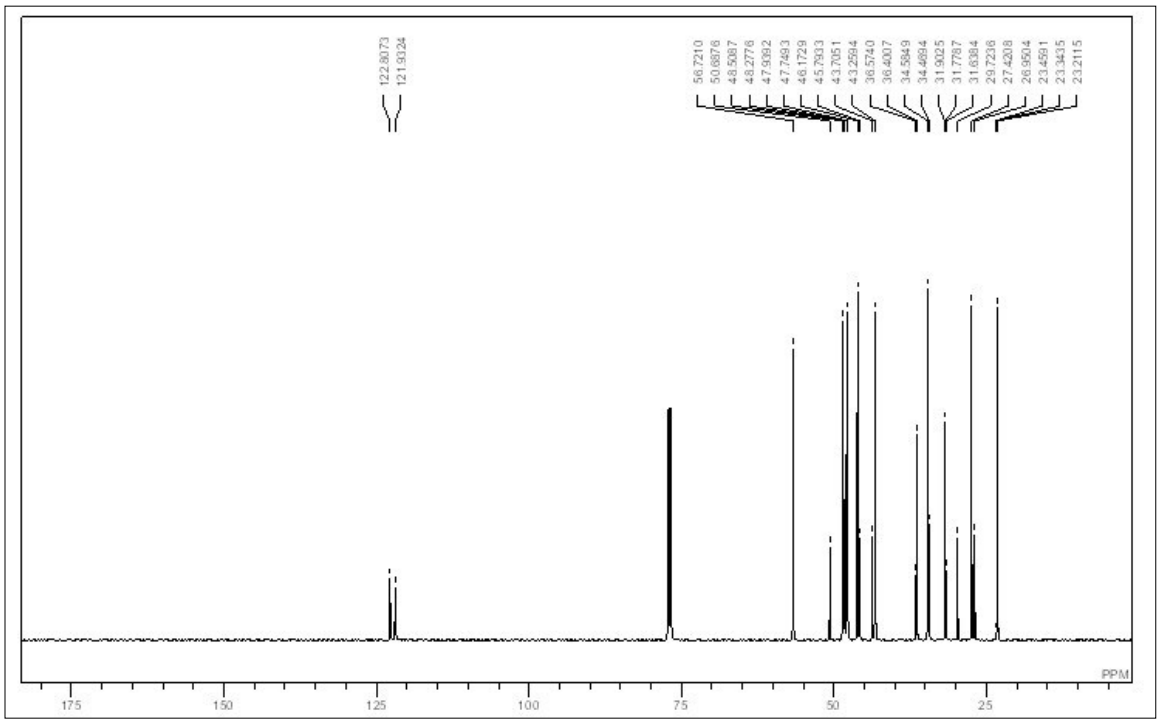
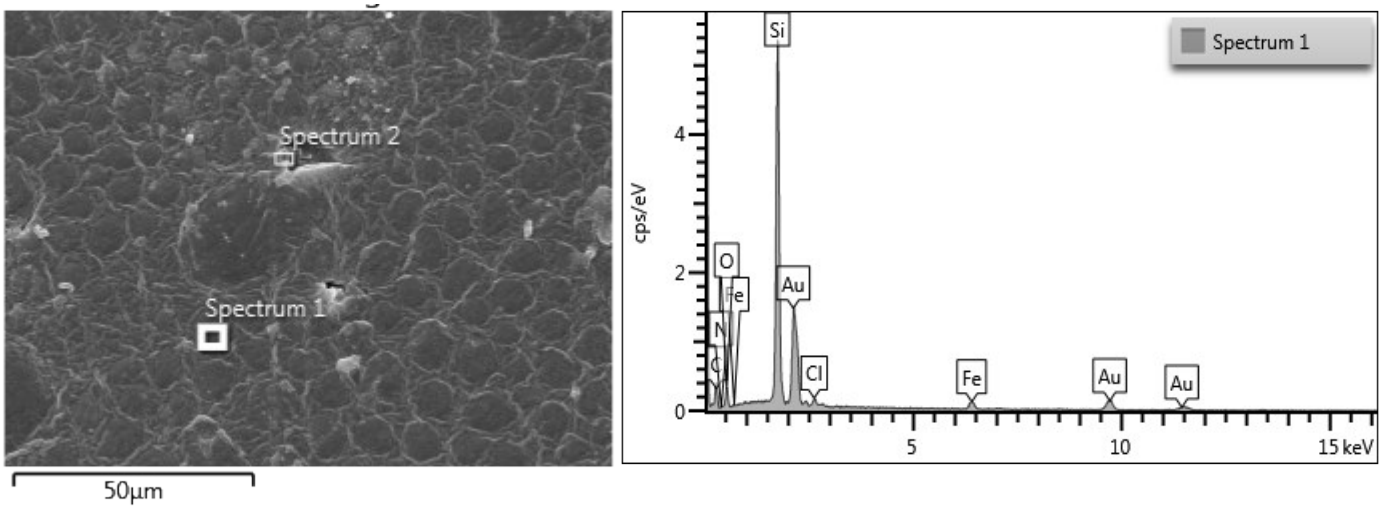
3.6335
3.5554
3.5316
3.5084
3.3699
3.3437
3.2387
3.2125
3.0490
1.9177
1.8915
1.8451
1.8213
1.7823
1.7579
1.5821
1.5101
1.4808
1.2435
1.2160
1.1977
1.1733
1.1198
1.0922
1.0592
1.0330
0.9763
0.8487
PPM
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5

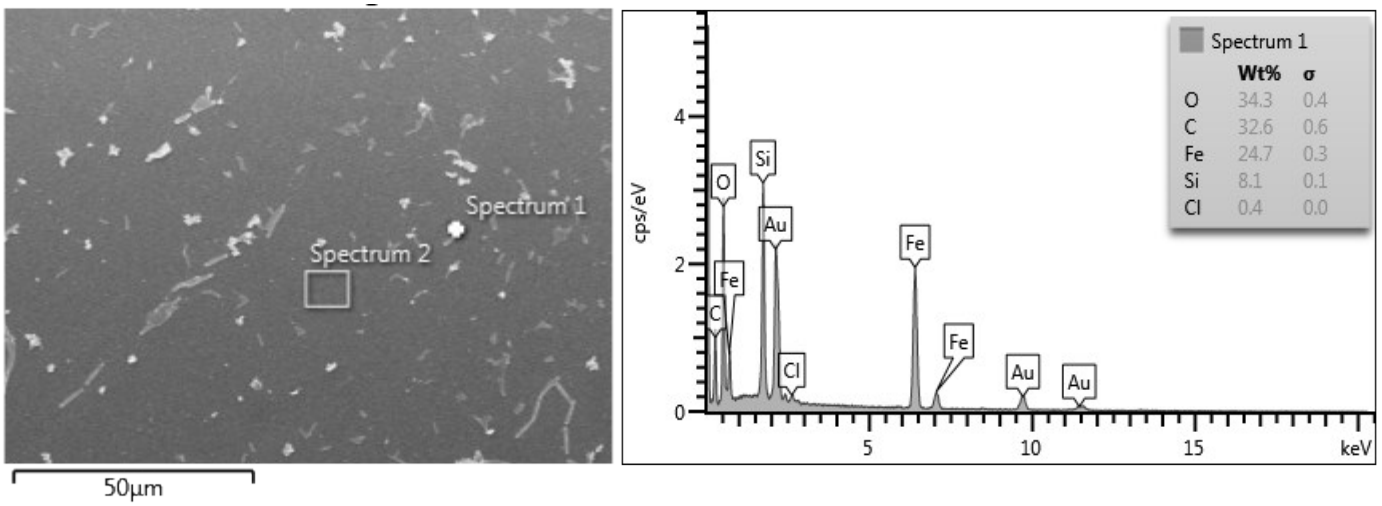

122.8073
121.9324
56.7210
50.6876
48.5087
48.2776
47.9092
47.7493
46.1729
45.7933
43.7051
43.2594
36.5740
36.4007
34.5849
34.4684
31.9025
31.7787
31.6384
29.7236
27.4208
26.9504
23.4591
23.3435
23.2115
PPM
175
150
125
100
75
50
25

S4. EDS analysis on a single-point on the hybrid coatings

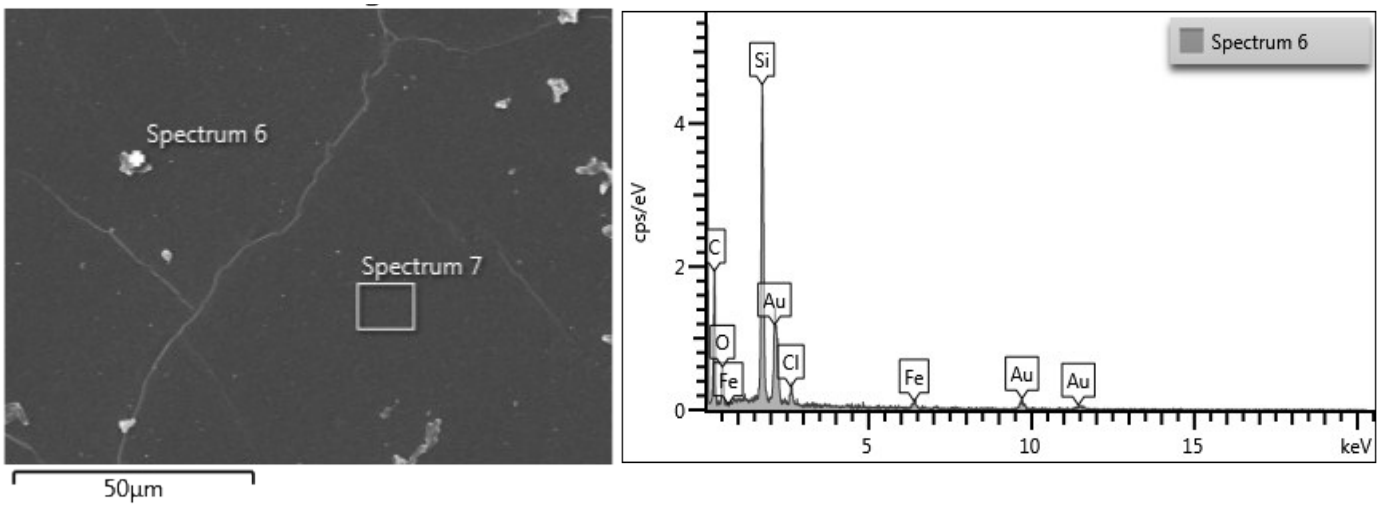
C1



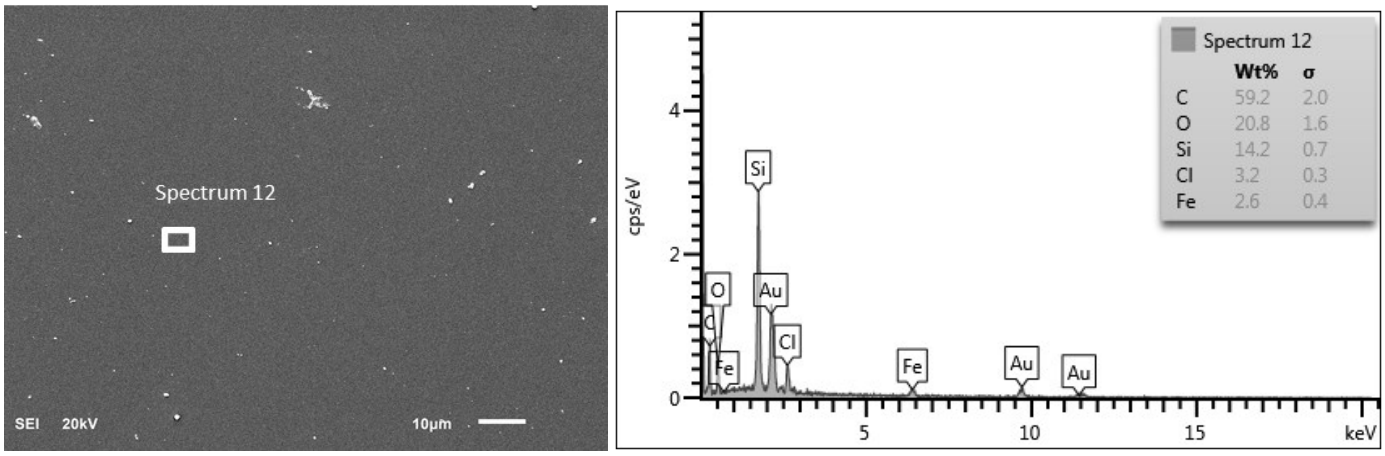
C2



C3

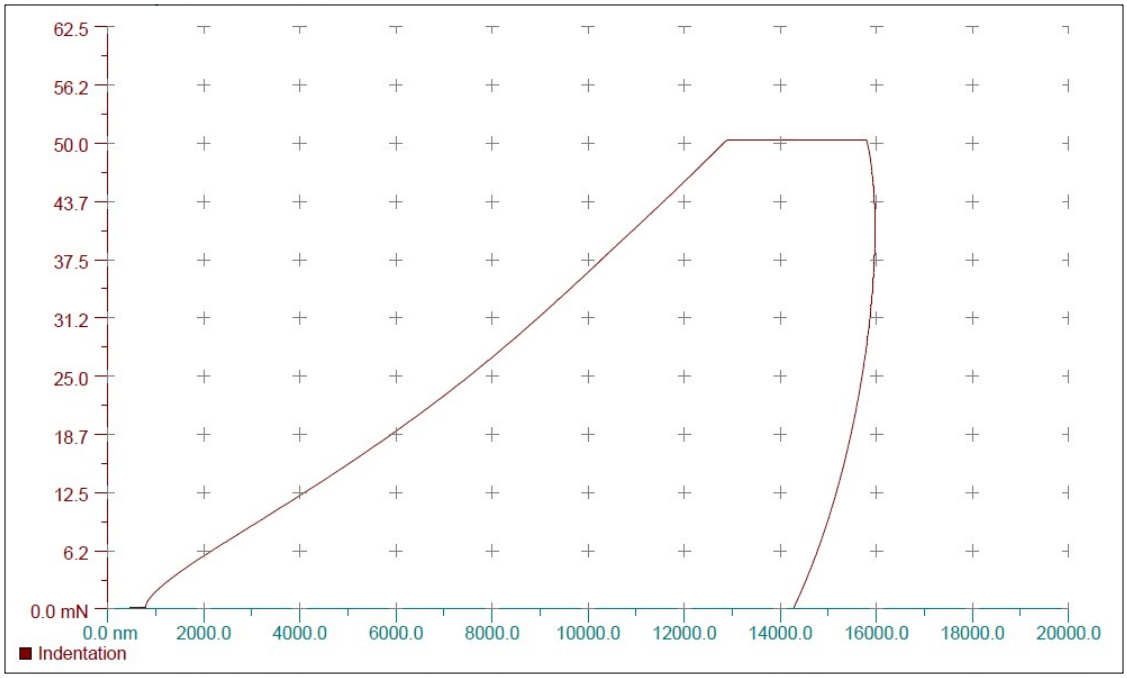

Spectrum 6
Spectrum 7
50µm
Spectrum 6
Si
C
Au
O
Cl
Fe
Fe
Au
Au
cps/eV
keV

C4

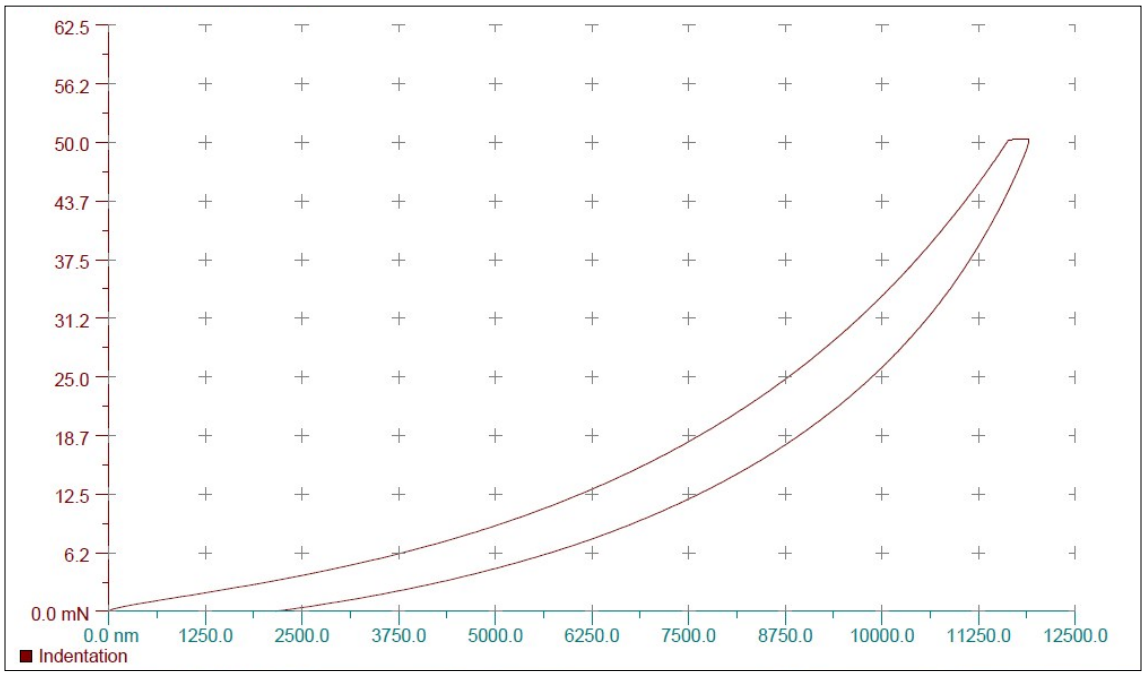

Spectrum 12
SEI 20kV
10µm
Spectrum 12
Wt% σ
C 59.2 2.0
O 20.8 1.6
Si 14.2 0.7
Cl 3.2 0.3
Fe 2.6 0.4
Si
O
C
Au
Cl
Fe
Fe
Au
Au
cps/eV
keV

S4. Loading force against penetration depth for the prepared hybrid coatings

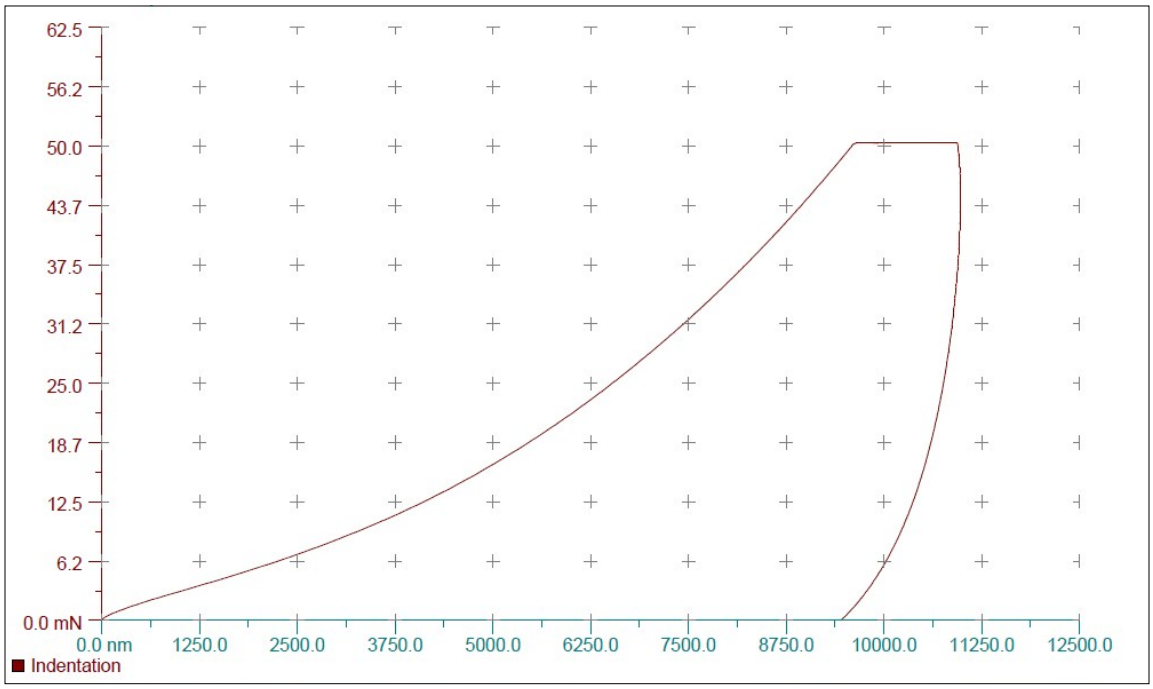
C1



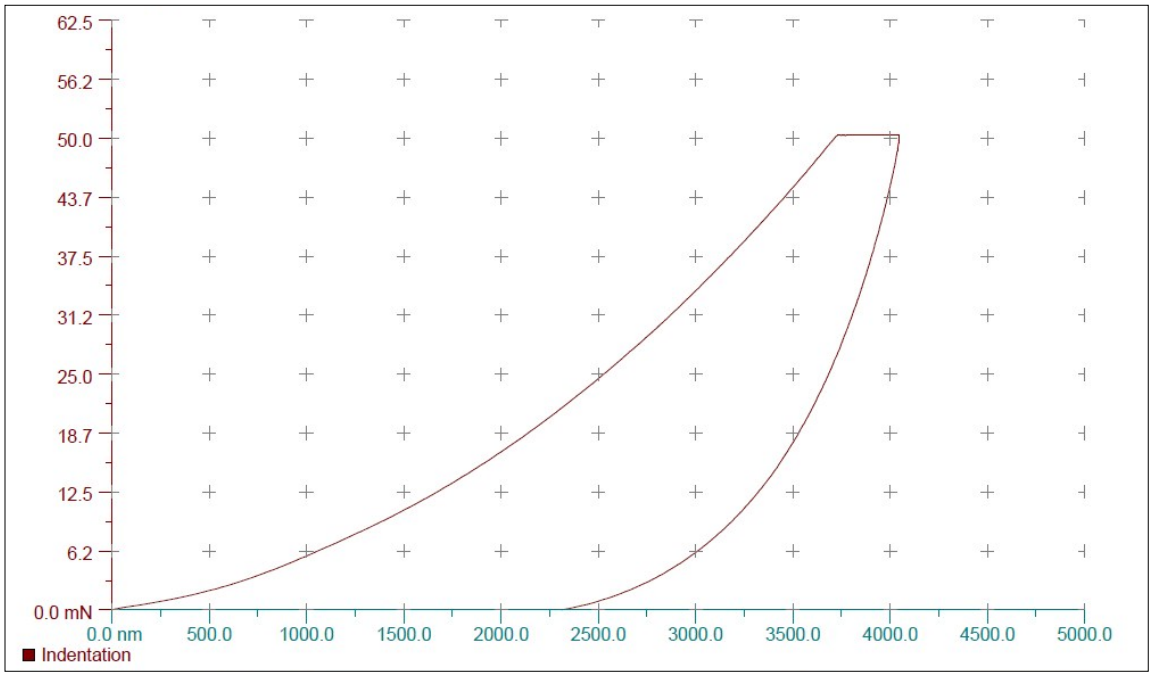
C2



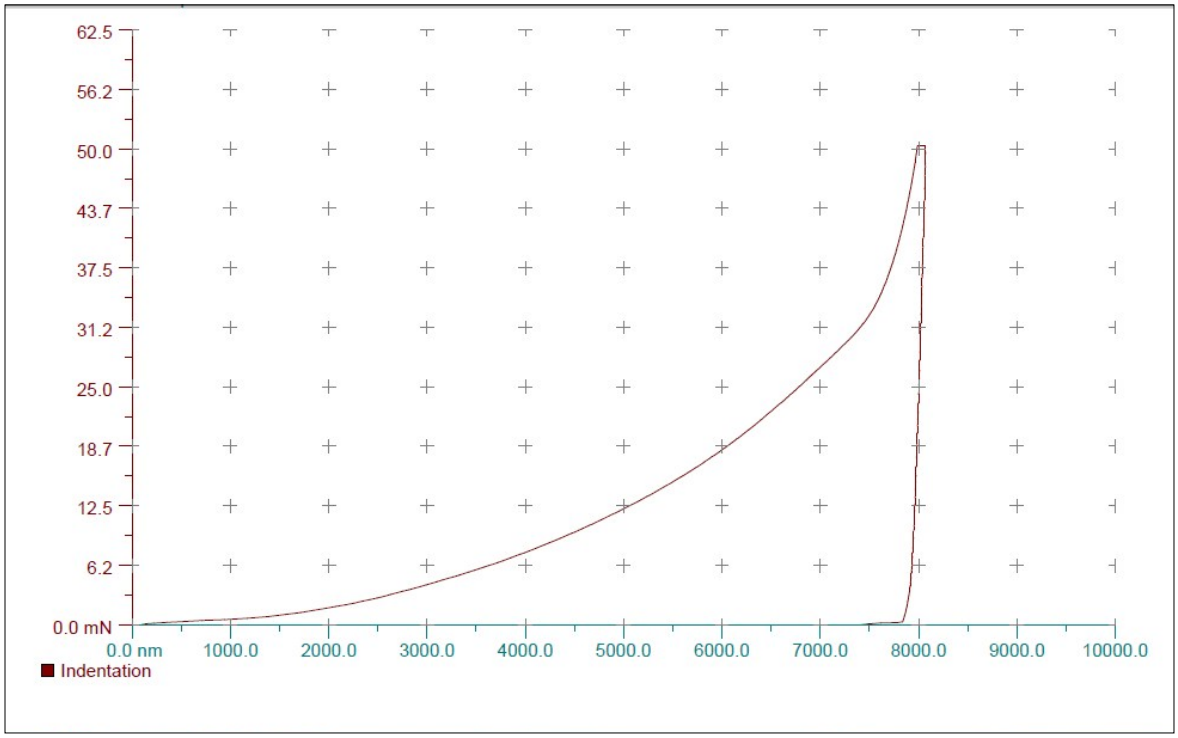
C3


62.5
56.2
50.0
43.7
37.5
31.2
25.0
18.7
12.5
6.2
0.0 mN
0.0 nm
1250.0
2500.0
3750.0
5000.0
6250.0
7500.0
8750.0
10000.0
11250.0
12500.0
Indentation

C4


62.5
56.2
50.0
43.7
37.5
31.2
25.0
18.7
12.5
6.2
0.0 mN
0.0 nm
500.0
1000.0
1500.0
2000.0
2500.0
3000.0
3500.0
4000.0
4500.0
5000.0
Indentation

C5


62.5
56.2
50.0
43.7
37.5
31.2
25.0
18.7
12.5
6.2
0.0 mN
0.0 nm
1000.0
2000.0
3000.0
4000.0
5000.0
6000.0
7000.0
8000.0
9000.0
10000.0
Indentation