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Tuning the Spectral, Thermal and Fluorescent Properties of Conjugated Polymers via Random Copolymerization of Hole Transporting Monomers by Sapana Jadoun[a], Syed Marghoob Ashraf[a†], and Ufana Riaz[a*]

Table S1 Recipe for synthesis of homopolymers and copolymers of PCz,POPD

Copolymer molar ratio (PCz:POPD)	Amount of Cz taken (g)	Amount of OPD taken (g)	Color of synthesized polymer	Yield (%)	η	M_v (viscosity average molar mass)
100:0	1	--	Light green	98.23	0.16	4320
0:100	--	1	Dark brown	69.03	0.35	6583
90:10	2.50	0.17	Light creamish	93.00	0.20	4828
70:30	2.50	0.69	Dark creamish	91.23	0.28	4348
60:40	2.50	1.07	Light brown	82.26	0.16	2484
50:50	2.50	1.61	Brown	92.21	0.17	4811
40:60	2.50	2.41	Brownish Black	77.80	0.28	4348
30:70	2.50	3.75	Brownish Black	64.32	0.32	4969
10:90	2.50	14.55	Brownish Black	51.61	0.36	7327

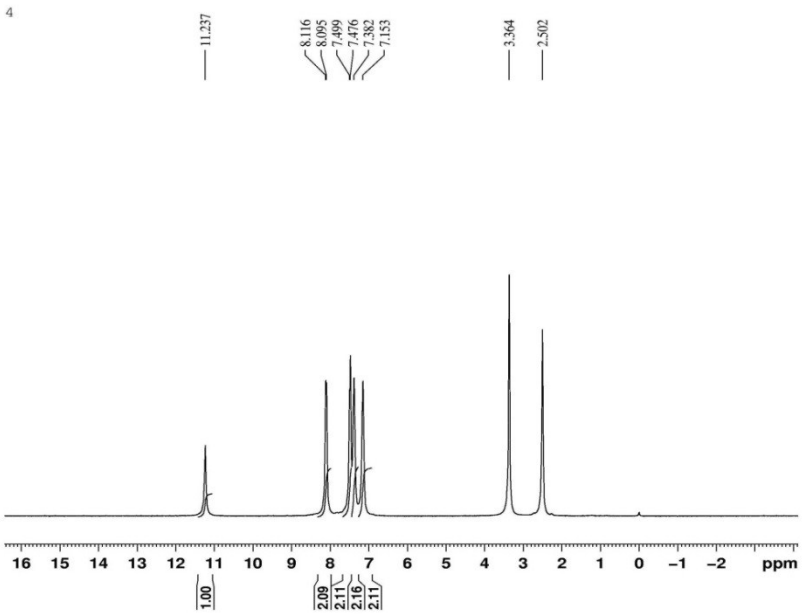
Table S2 Solubility of homopolymers and copolymers in different polar solvents

Polymer/copolymer	NMP	DMSO	THF	Ethanol	Acetone
POPD	ES (DY)	ES (DY)	ES (BY)	ES (Y)	ES (Y)
PCz	ES (PY)	ES (PY)	ES (BY)	IS(Y)	IS (Y)
PCz: POPD-90:10	ES (PY)	ES (PY)	ES (BY)	IS (Y)	IS (Y)
PCz: POPD-30:70	ES (BY)	ES (PY)	ES (BY)	IS (Y)	IS (Y)
PCz: POPD-60:10	ES (BY)	ES (PY)	ES (BY)	IS (Y)	IS (Y)
PCz: POPD-50:50	ES (BY)	ES (BY)	ES (BY)	S (Y)	S (Y)
PCz: POPD-40:60	ES (BY)	ES (BY)	ES (BY)	S (Y)	S (Y)
PCz: POPD-30:70	ES (BY)	ES (BY)	ES (BY)	S (Y)	S (Y)
PCz: POPD-10:90	ES (DY)	ES (DY)	ES (BY)	S (Y)	S (Y)

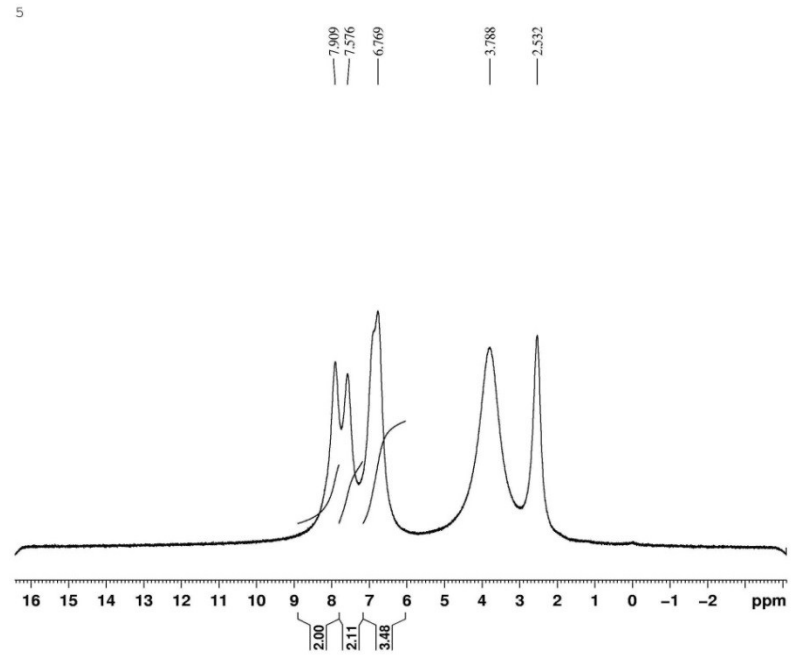
ES- Easily soluble; S- soluble; IS- insoluble.
The letters in the parentheses indicate the color of solution- DY-dark yellow; PY pale yellow; BY-bright yellow; Yellow

Table S3 CHN values of copolymers of PCz and POPD

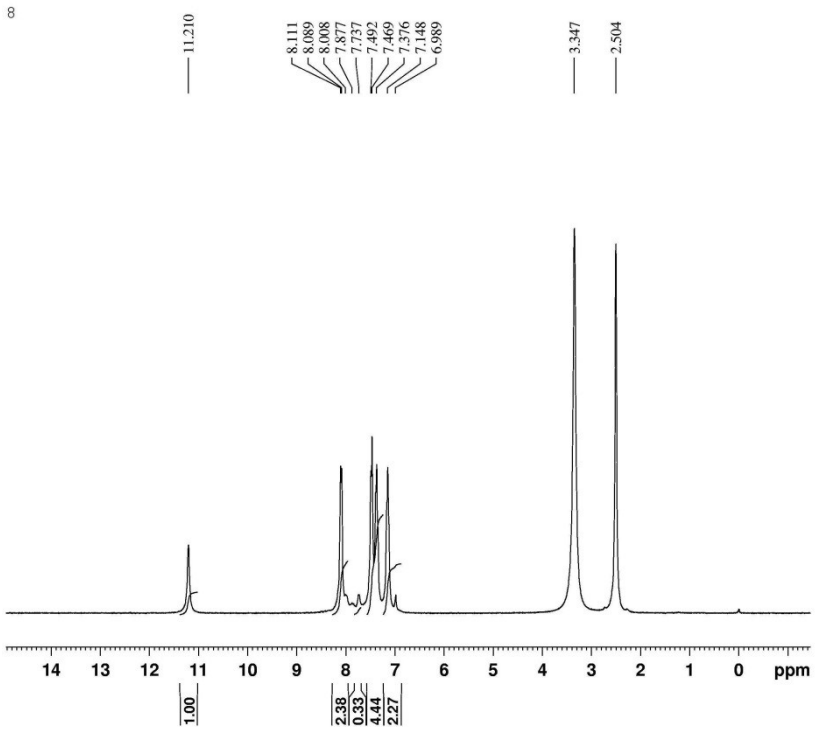
Sample	Mass of C %		Mass of H %		Mass of N %	
	Calculated	Found	Calculated	Found	Calculated	Found
PCz:POPD (90:10)	84.25	75.41z	4.18	4.94	9.69 (75:25)	8.80
PCz:POPD (70:30)	77.67	77.73	4.06	4.97	10.76 (65:35)	9. 90
PCz:POPD (60:40)	74.82	79.81	4.02	4.99	10.16 (55:45)	10.30
PCz:POPD (50:50)	71.50	72.42	3.97	5.08	13.75 (50:50)	12.35
PCz:POPD (40:60)	74.43	75.08	4.28	5.11	16.37 (45:55)	15.17
PCz:POPD (30:70)	79.52	79.70	7.04	5.13	17.20 (40:60)	15.80
PCz:POPD (10:90)	56.48	58.31	3.70	4.40	18.23 (35:65)	16.95


4
11.237
8.116
8.095
7.499
7.476
7.382
7.153
3.364
2.502
16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 −1 −2 ppm
1.00
2.09
2.11
2.16
2.11

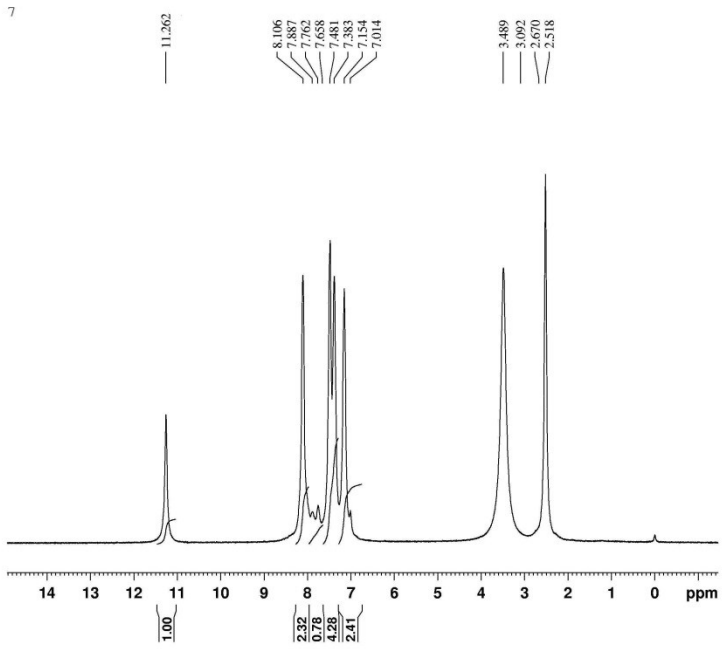
(a)


5
7.909
7.576
6.769
3.788
2.532
16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 −1 −2 ppm
2.00
2.11
3.48

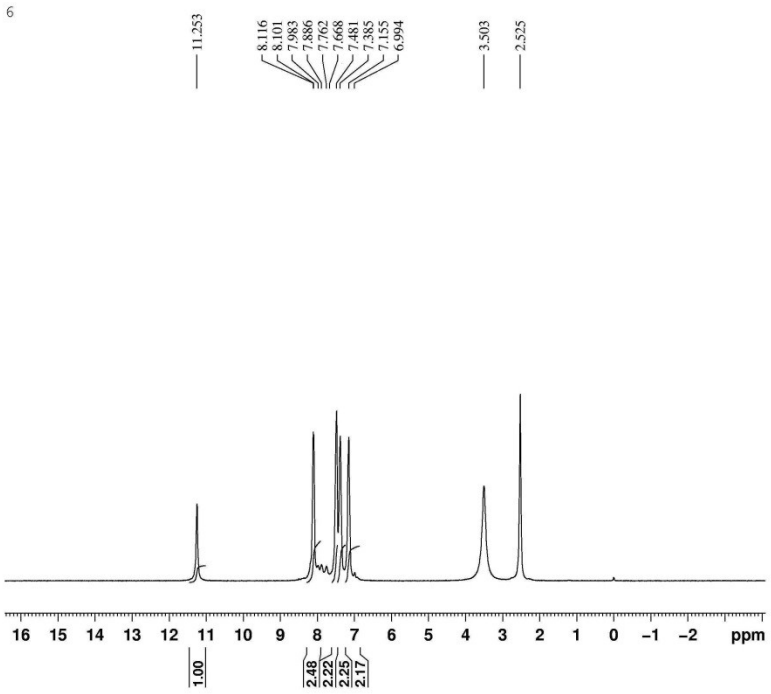
(b)


8
11.210
8.111
8.089
8.008
7.877
7.737
7.492
7.469
7.376
7.148
6.989
3.347
2.504
14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 ppm
1.00
2.38
0.33
4.44
2.27

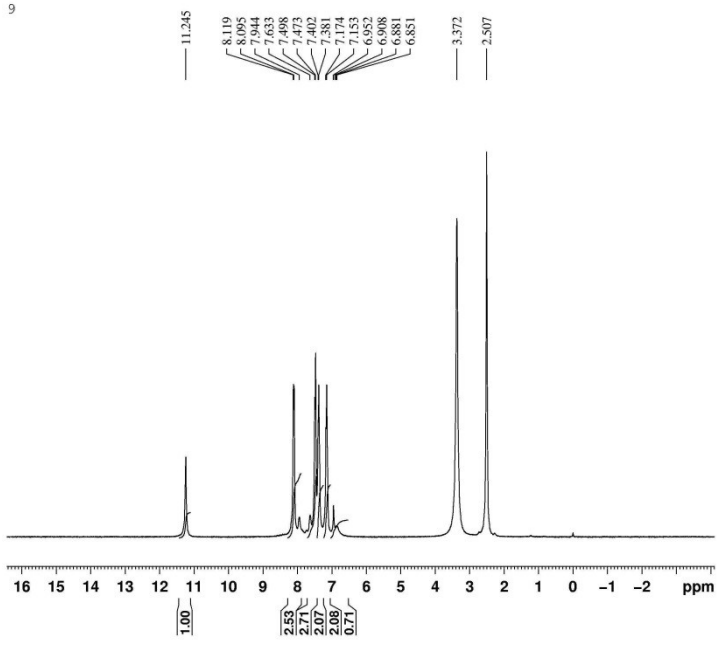
(c)


7
11.262
8.106
7.887
7.762
7.658
7.481
7.383
7.154
7.014
3.489
3.092
2.670
2.518
14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 ppm
1.00
2.32
0.78
4.28
2.41

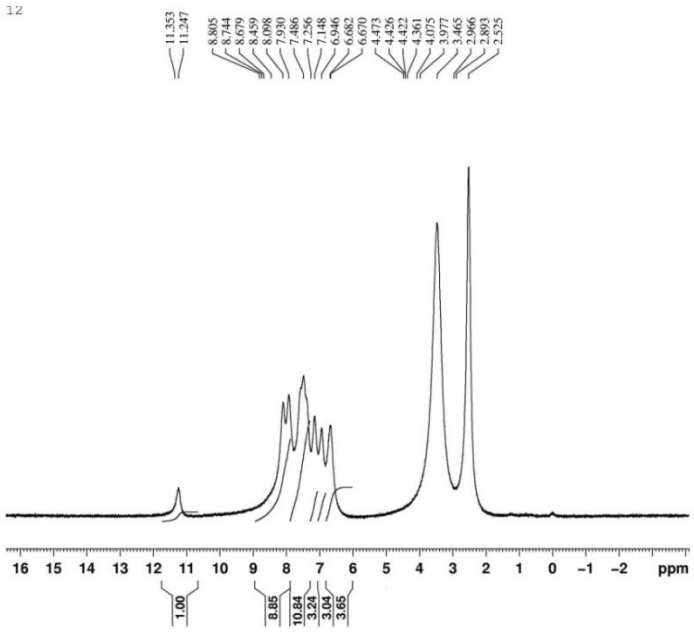
(d)


6
11.253
8.116
8.101
7.983
7.886
7.762
7.668
7.481
7.385
7.155
6.994
3.503
2.525
16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 −1 −2 ppm
1.00
2.48
2.22
2.25
2.17

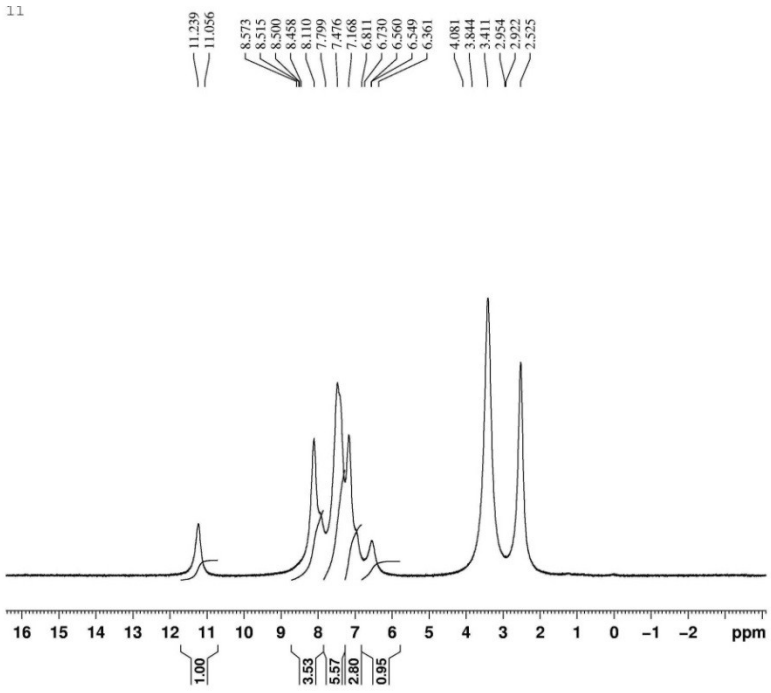
(e)


9
11.245
8.119
8.095
7.944
7.633
7.498
7.473
7.402
7.381
7.174
7.153
6.952
6.908
6.881
6.851
3.372
2.507
16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 −1 −2 ppm
1.00
2.53
2.71
2.07
2.08
0.71

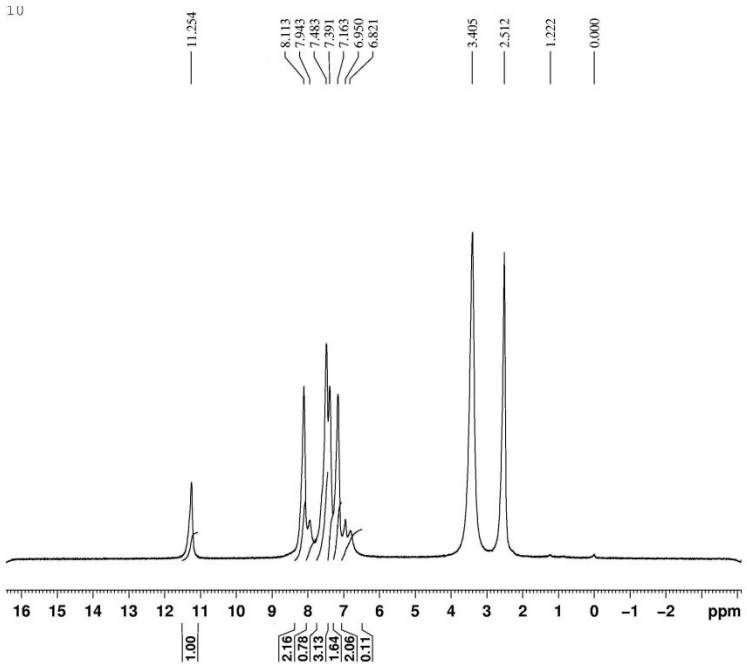
(f)


12
11.353
11.247
8.805
8.744
8.679
8.459
8.098
7.930
7.486
7.256
7.148
6.946
6.682
6.670
4.473
4.426
4.422
4.361
4.075
3.977
3.465
3.066
2.993
2.525
16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 −1 −2 ppm
1.00
6.85
10.84
3.24
3.04
3.65

(g)


11
11.239
11.056
8.573
8.515
8.500
8.458
8.110
7.799
7.476
7.168
6.811
6.730
6.560
6.549
6.361
4.081
3.844
3.411
2.954
2.922
2.525
16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 −1 −2 ppm
1.00
3.53
5.57
2.80
0.95

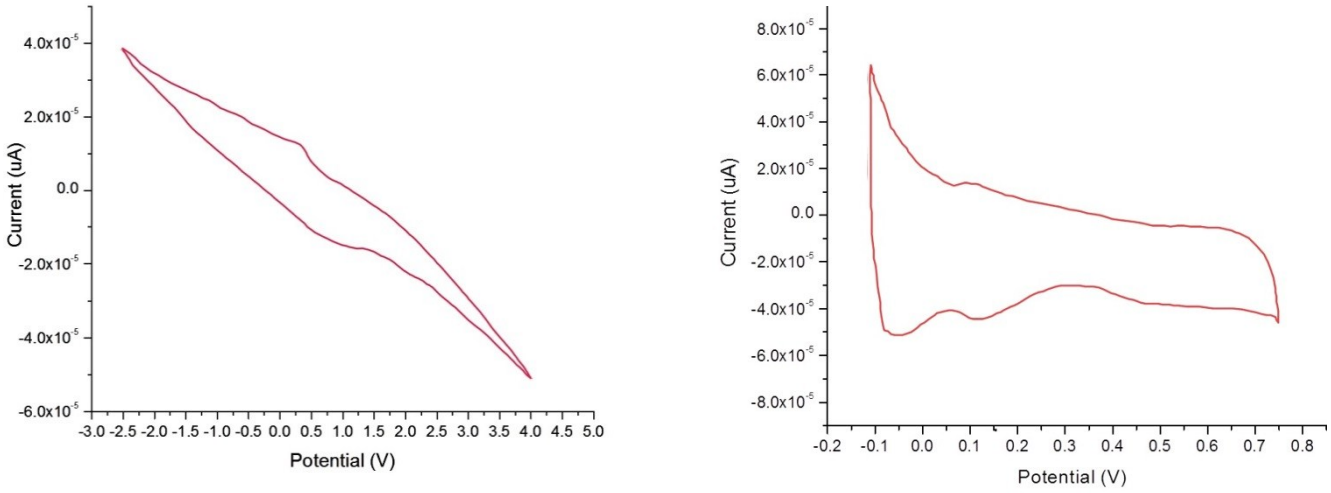
(h)



(i)

Figure S1 ^{1}H-NMR spectra of (a) PCZ, (b) POPD,(c) PCz:POPD-10:90, (d) PCz:POPD-30:70, (e) PCz:POPD-40:60,(f) PCz:POPD-50:50,(g) PCz:POPD-60:40,(h) PCz:POPD-70:30,(i) PCz:POPD-90:10

Figure S2 Fineman Ross plot of copolymers of PCz and POPD taken in different moalr ratios



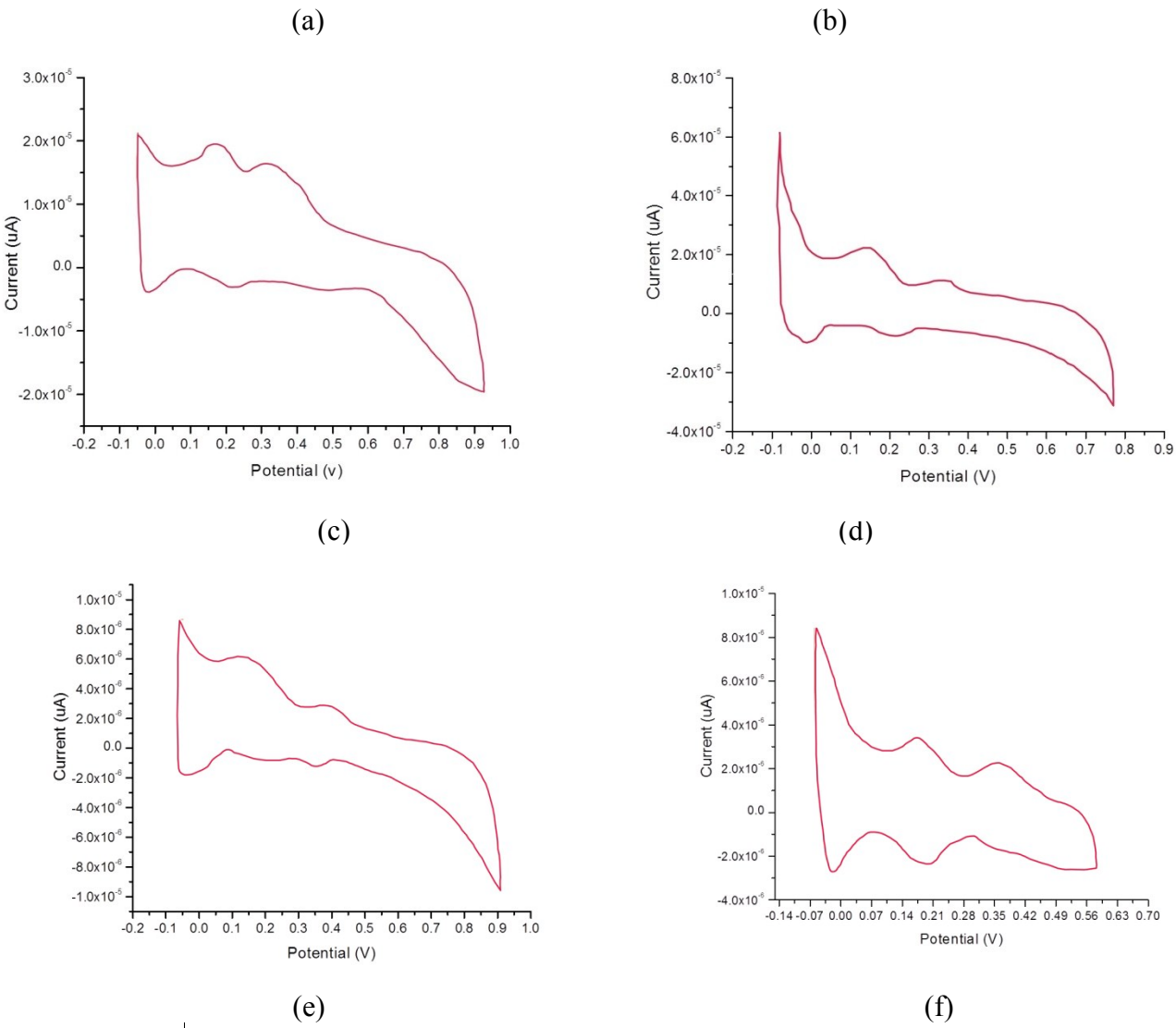
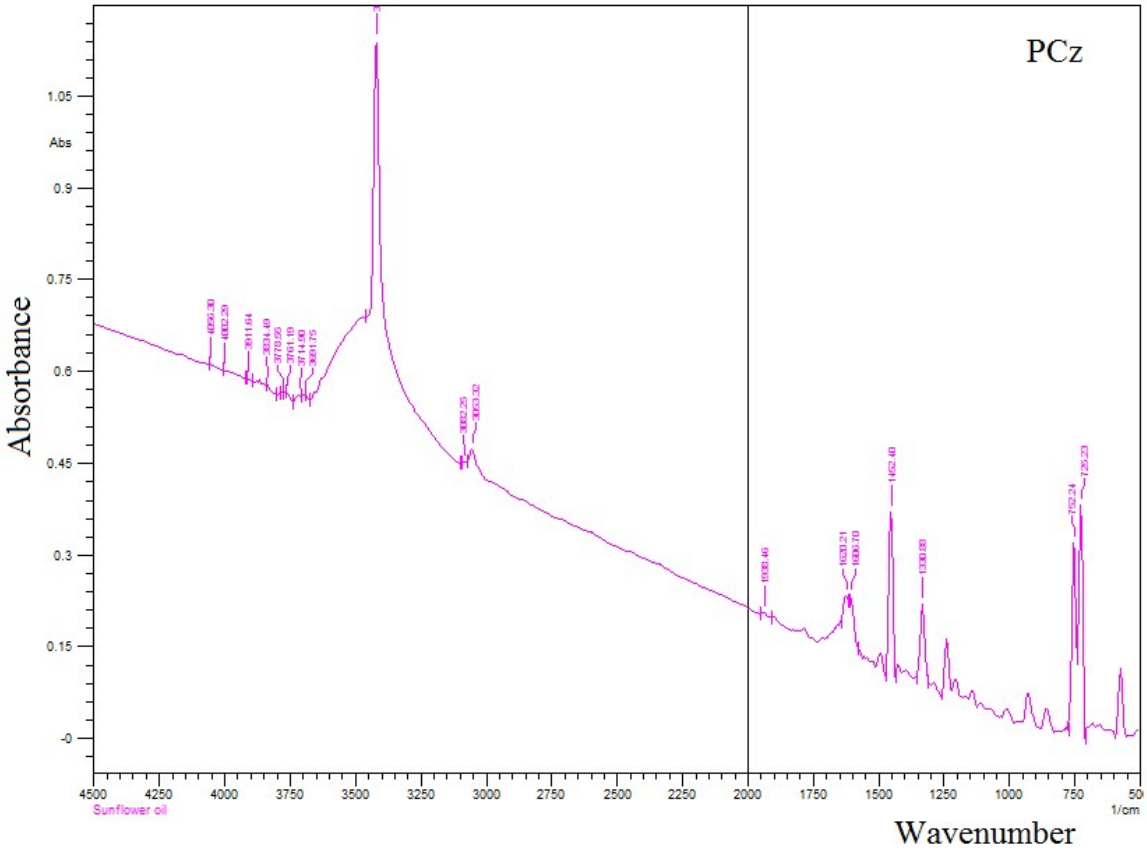
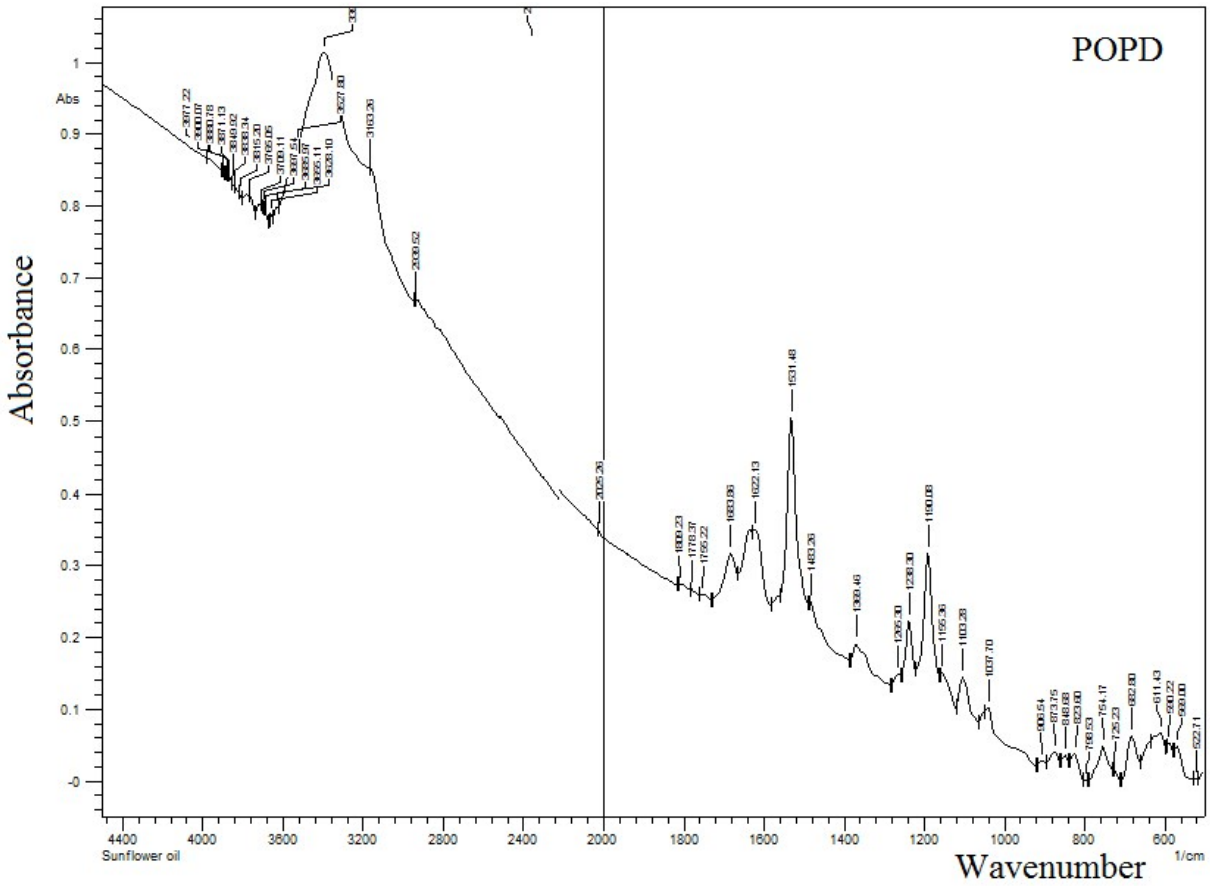


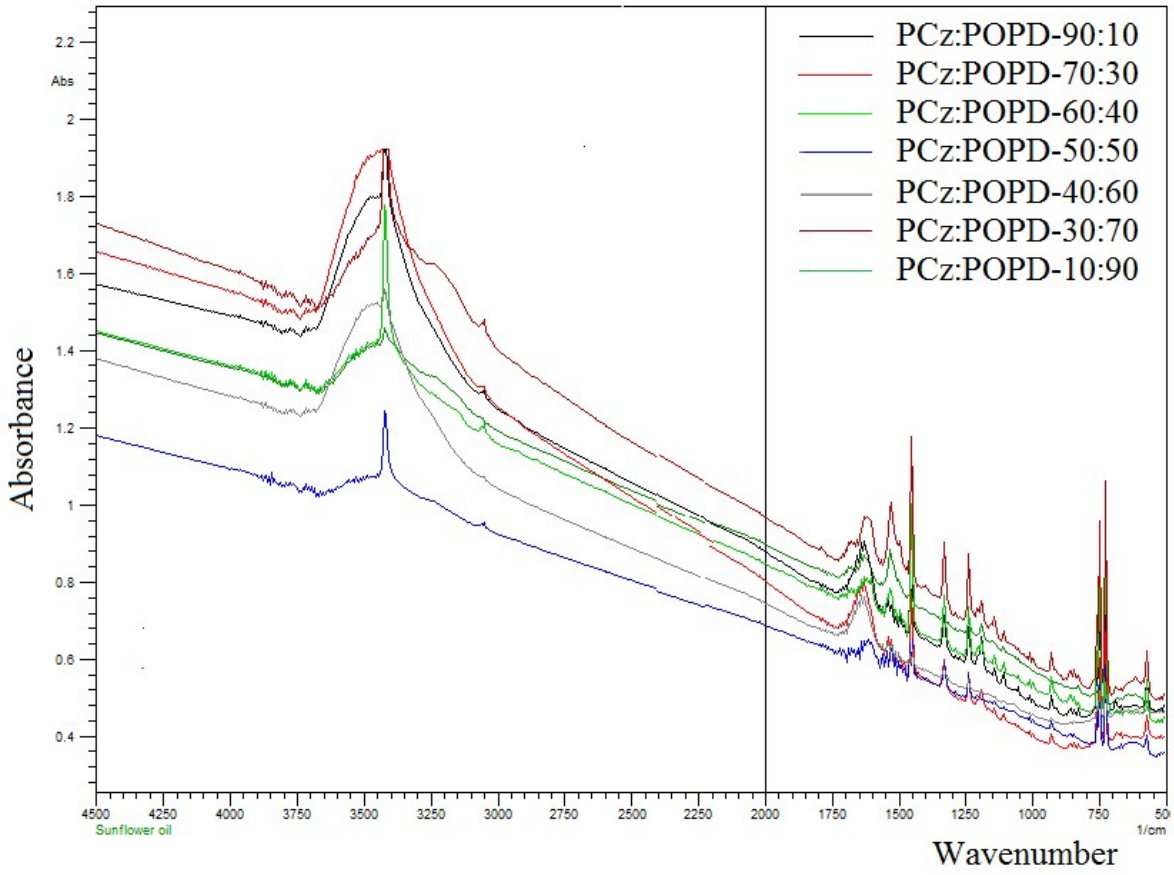
Figure S3 Cyclic voltammograms of (a) PCz,(b) POPD, (c) PCz:POPD-10:90, (d) PCz:POPD-40:60,(e) PCz:POPD-60:40,(f) PCz:POPD-70:30


PCz
Absorbance
Abs
1.05
0.9
0.75
0.6
0.45
0.3
0.15
-0
4500
4250
4000
3750
3500
3250
3000
2750
2500
2250
2000
1750
1500
1250
1000
750
50
1/cm
Sunflower oil
Wavenumber
4056.30
4002.29
3911.64
3834.49
3778.55
3761.19
3714.90
3681.75
3012.25
3003.32
1938.46
1633.21
1600.70
1462.40
1380.88
792.24
725.23

(a)


POPD
Absorbance
Abs
Wavenumber
1/cm
Sunflower oil
3627.80
3163.26
2039.52
2025.26
1800.23
1776.37
1755.22
1683.86
1622.13
1531.48
1483.26
1369.46
1305.30
1238.30
1160.08
1105.36
1103.28
1037.70
906.54
873.75
846.88
823.90
798.53
754.17
725.23
682.80
611.43
580.22
560.00
522.71

(b)



(c)

Figure S4 FTIR spectra of (a) PCz,(b) POPD and (c) copolymers of PCz:POPD

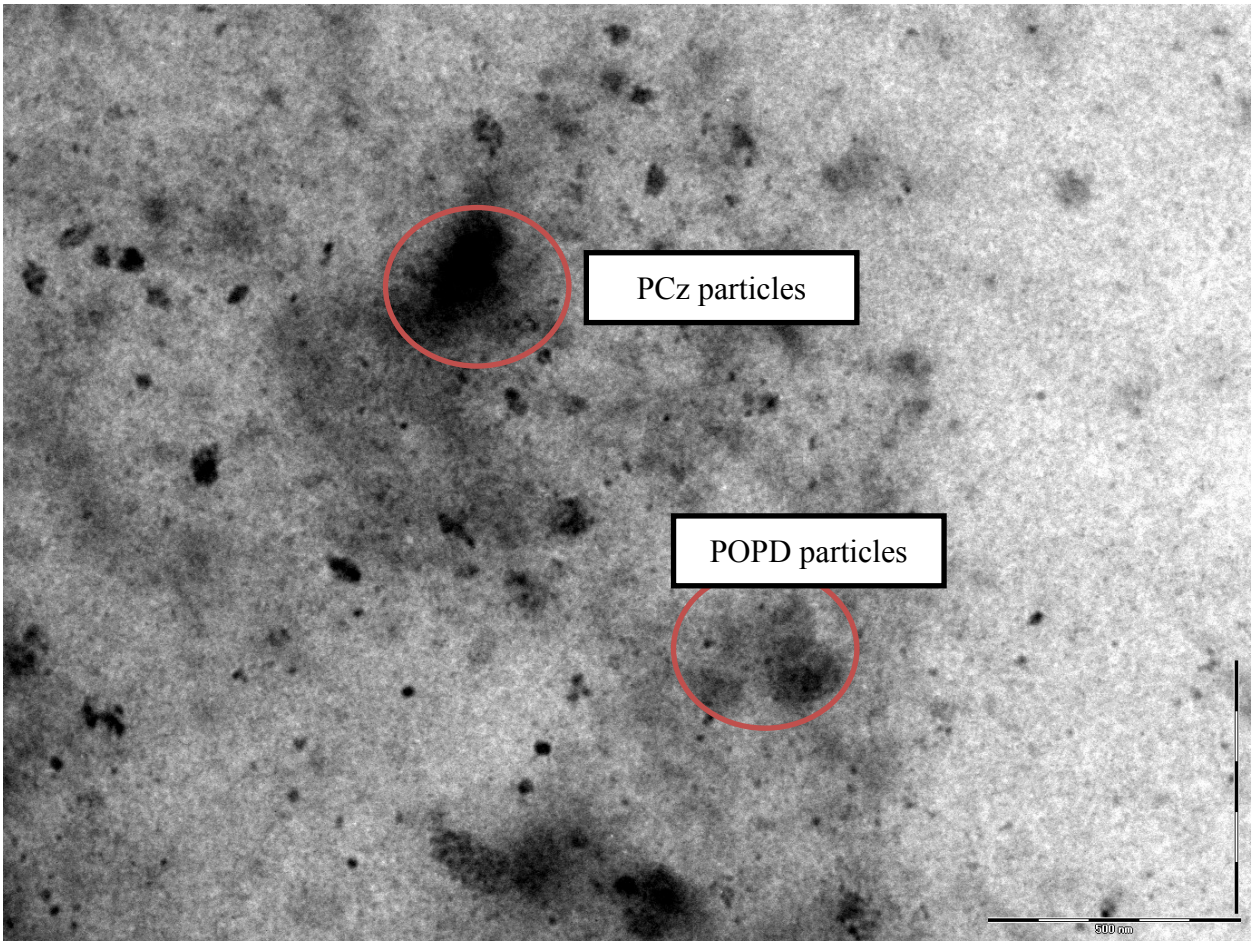
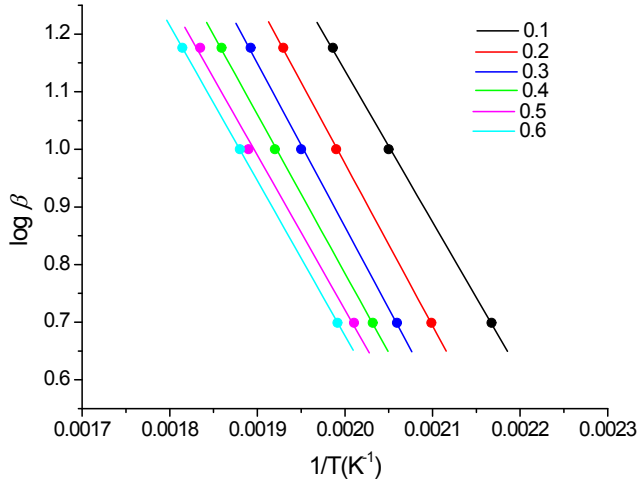
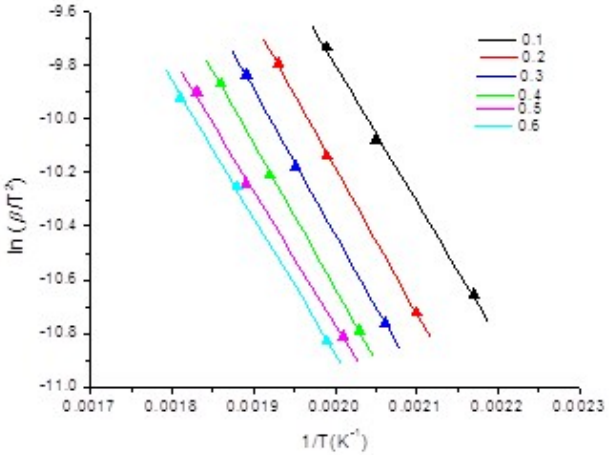


Figure S5 TEM of mixture of PCz and POPD

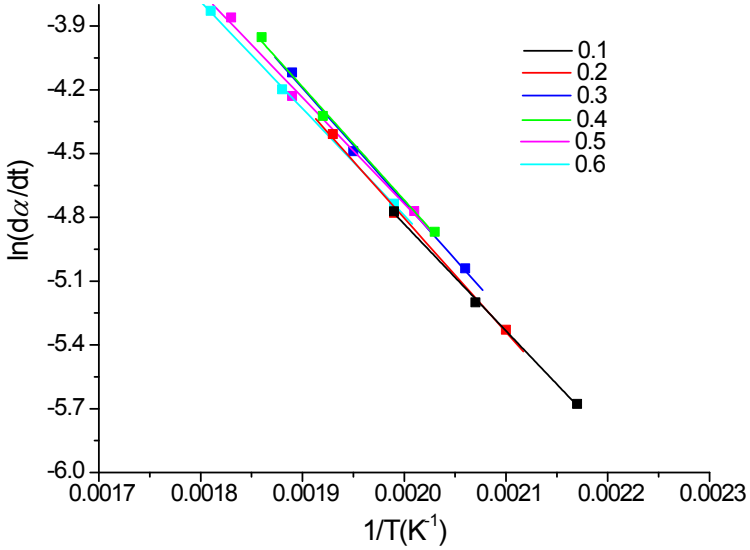
(A)



(a)



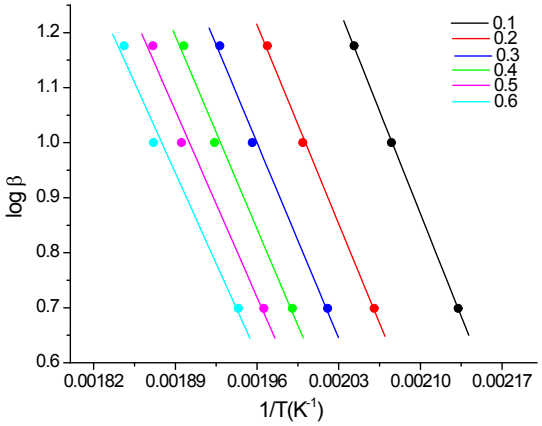
(b)



(c)

Figure S6 (A) Plots of (a) F-W-O method (b) Vyazokovin method (c) Friedman method of PCz at 5 °,10 ° and 15° heating rates with conversion rate (α) 0.1,0.2,0.3,0.4,0.5,0.6

(B)



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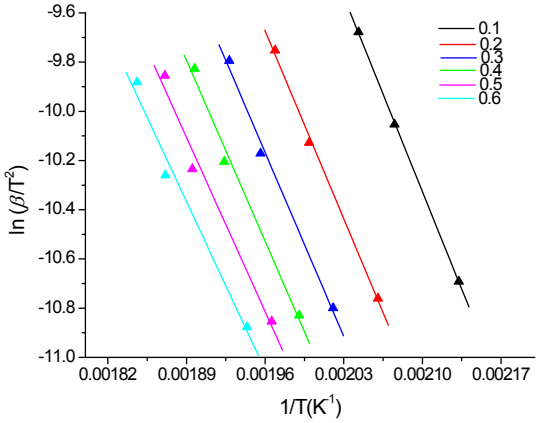
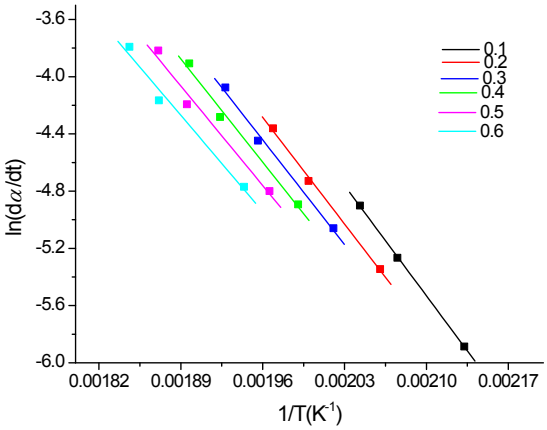


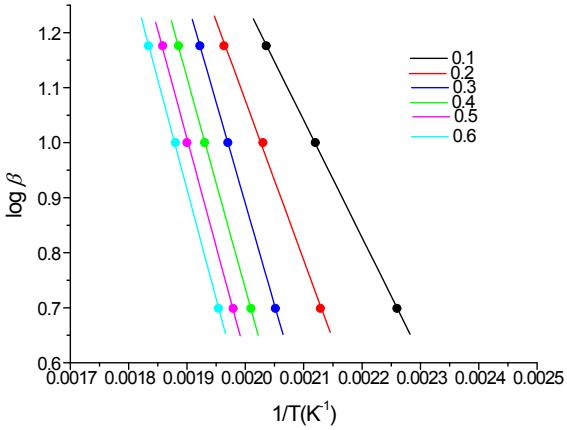
(b)



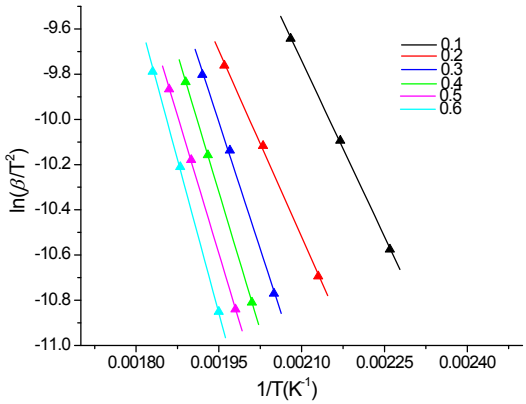
(c)

Figure S6 (B) Plots of (a) F-W-O method (b) Vyazokovin method (c) Friedman method of POPD at 5 °,10 ° and 15° heating rates with conversion rate (α) 0.1,0.2,0.3,0.4,0.5 and 0.6

(C)



(a)



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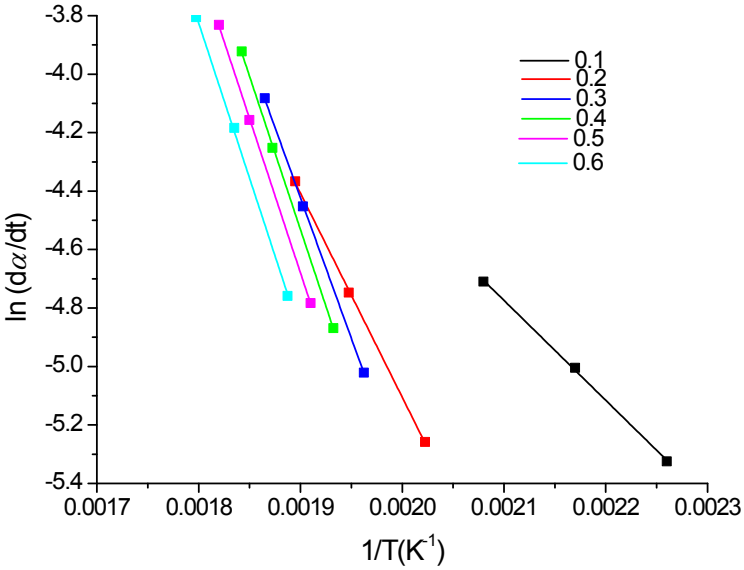
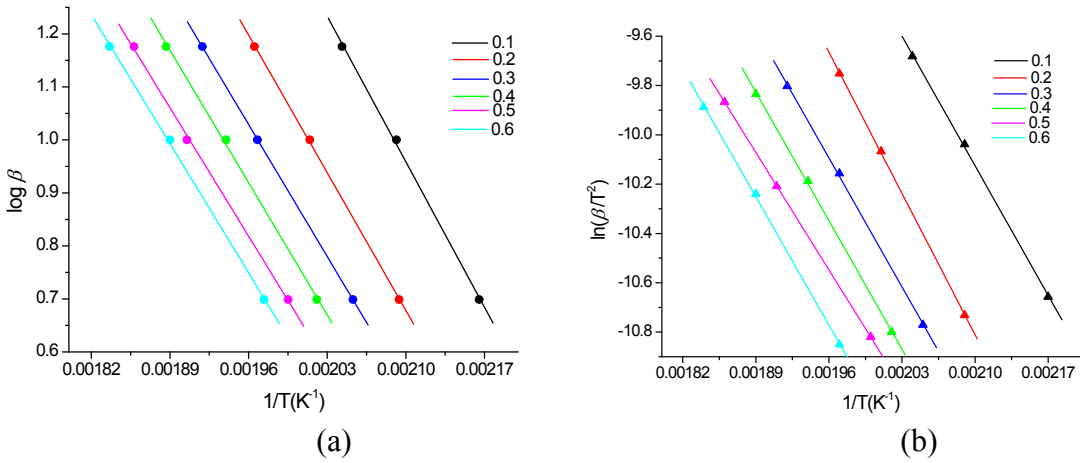


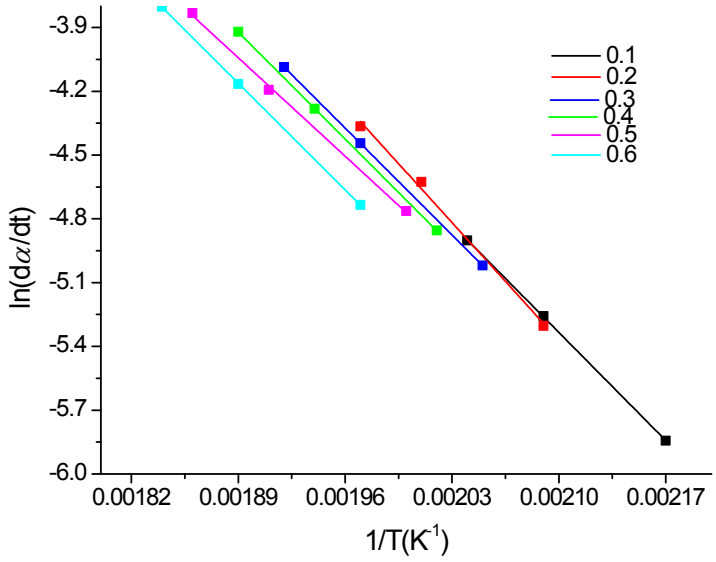
(c)

Figure S6 (C) Plots of (a) F-W-O method (b) Vyazokovin method (c) Friedman method of PCz:POPD-90:10 at 5 °,10 ° and 15° heating rates with conversion rate (α) 0.1, 0.2, 0.3, 0.4, 0.5 and 0.6

(D)



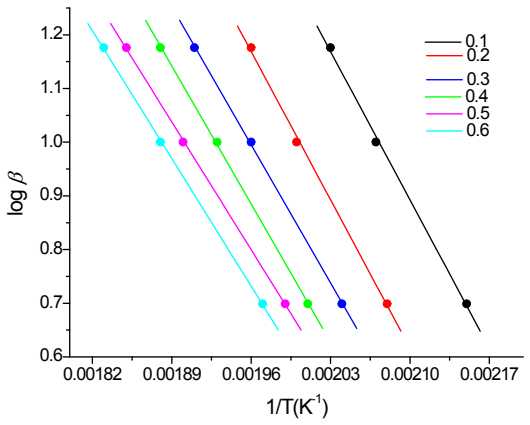
(a) (b)



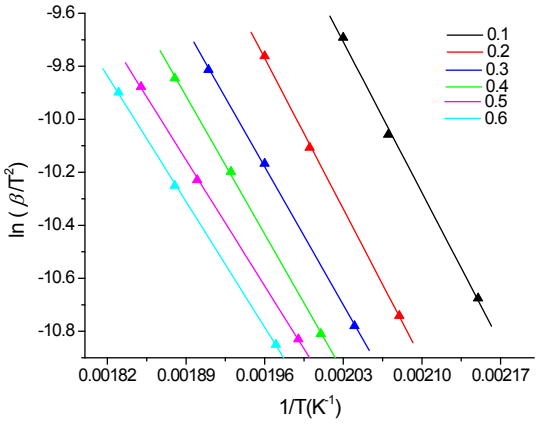
(c)

Figure S6 (D) Plots of (a) F-W-O method (b) Vyazokovin method (c) Friedman method of PCz:POPD-70:30 at 5 °,10 ° and 15° heating rates with conversion rate (α) 0.1, 0.2, 0.3,0.4, 0.5 and 0.6

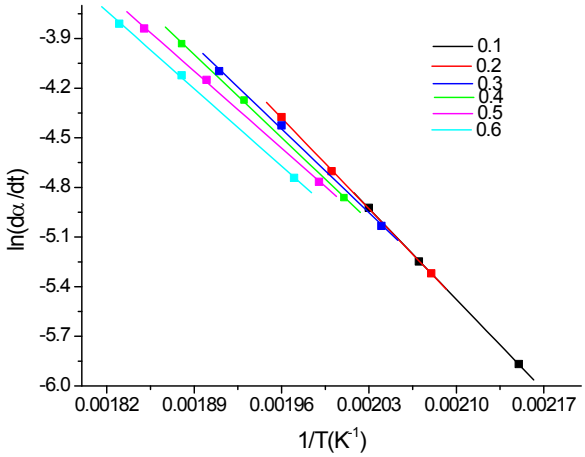
(E)



(a)



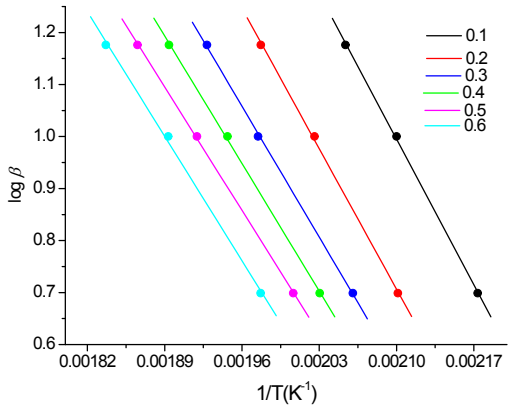
(b)



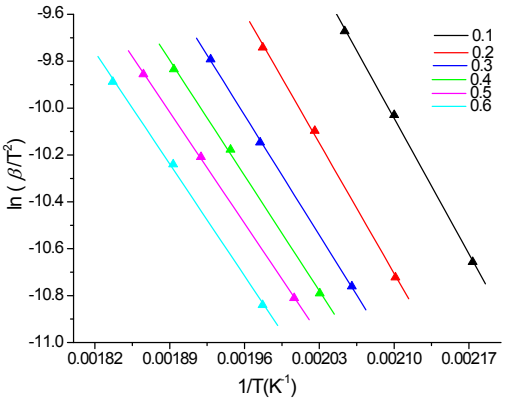
(c)

Figure S6 (E) Plots of (a) F-W-O method (b) Vyazokovin method (c) Friedman method of PCz:POPD-60:40 at 5 °,10 ° and 15° heating rates with conversion rate (α) 0.1,0.2,0.3,0.4,0.5, and 0.6

(F)



(a)



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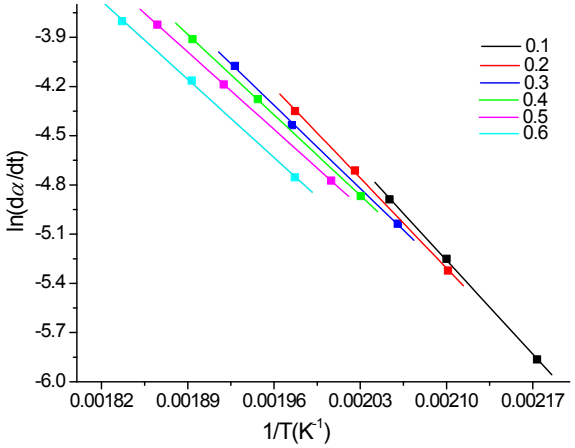


(c)

Figure S6 (F) Plots of (a) F-W-O method (b) Vyazokovin method (c) Friedman method of PCz:POPD-50:50 at 5 °,10 ° and 15° heating rates with conversion rate (α) 0.1, 0.2 ,0.3, 0.4, 0.5, and 0.6

(G)

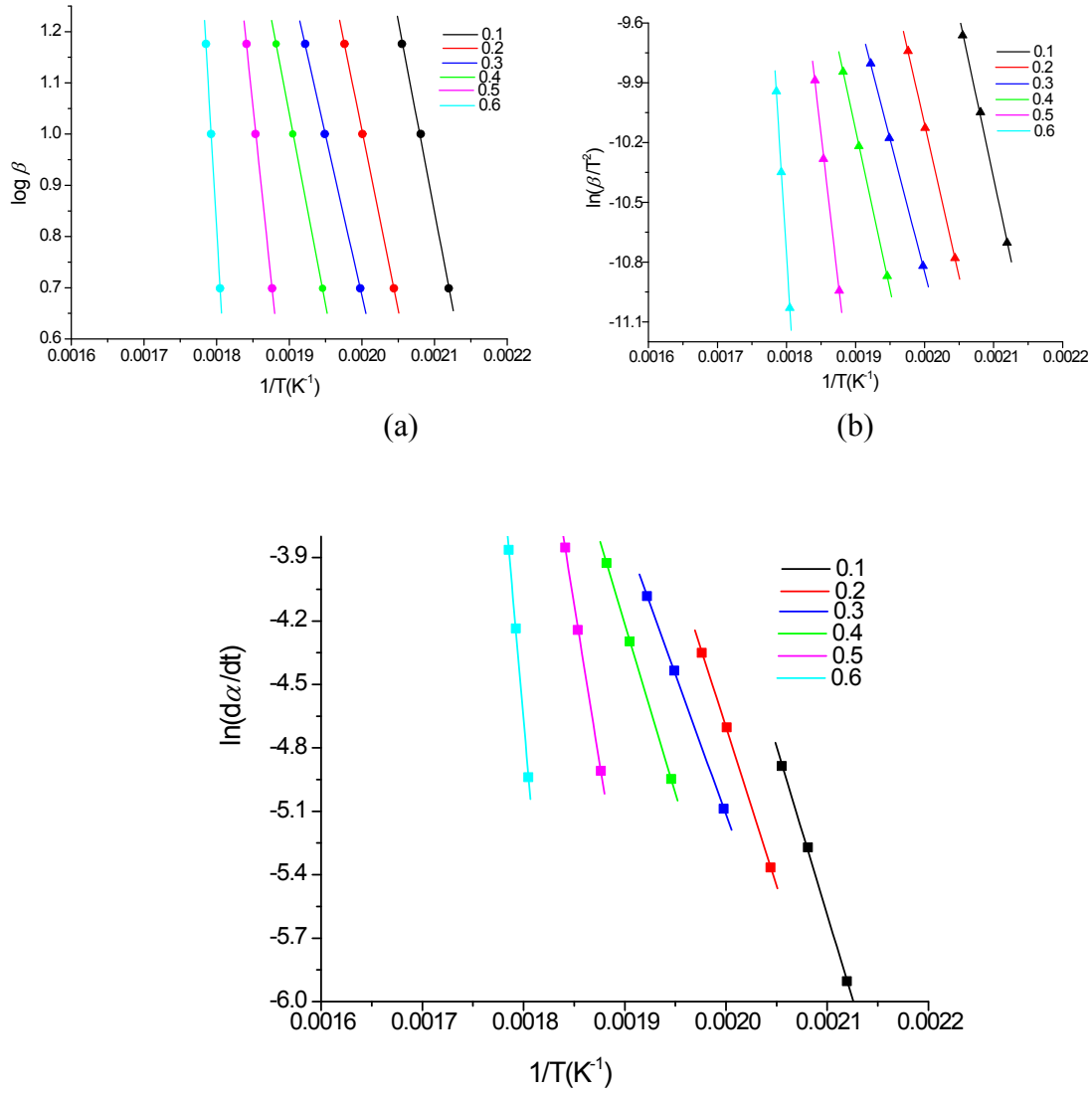
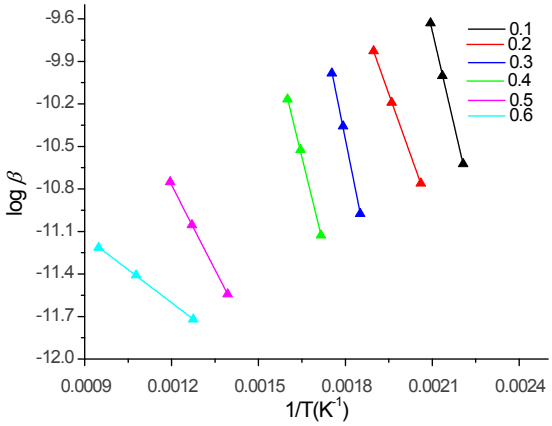
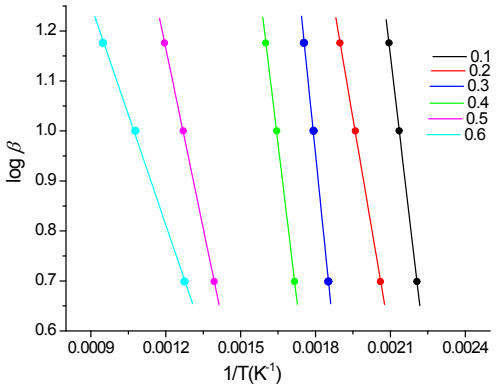


Figure S6 (G) Plots of (a) F-W-O method (b) Vyazokovin method (c) Friedman method of PCz:POPD-40:60 at 5 °,10 ° and 15° heating rates with conversion rate (α) 0.1, 0.2 ,0.3, 0.4, 0.5, and 0.6

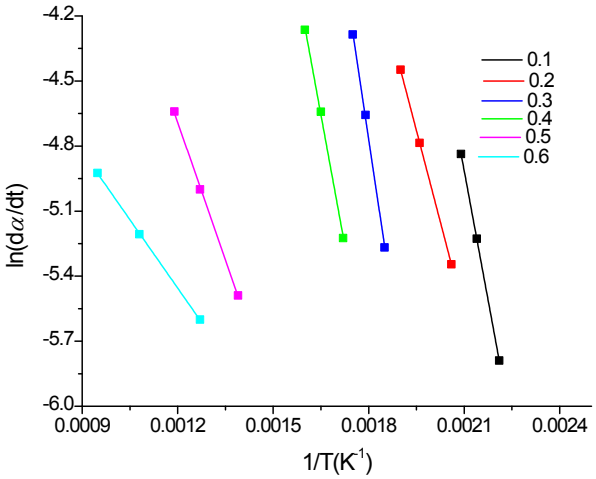
(H)



(a)



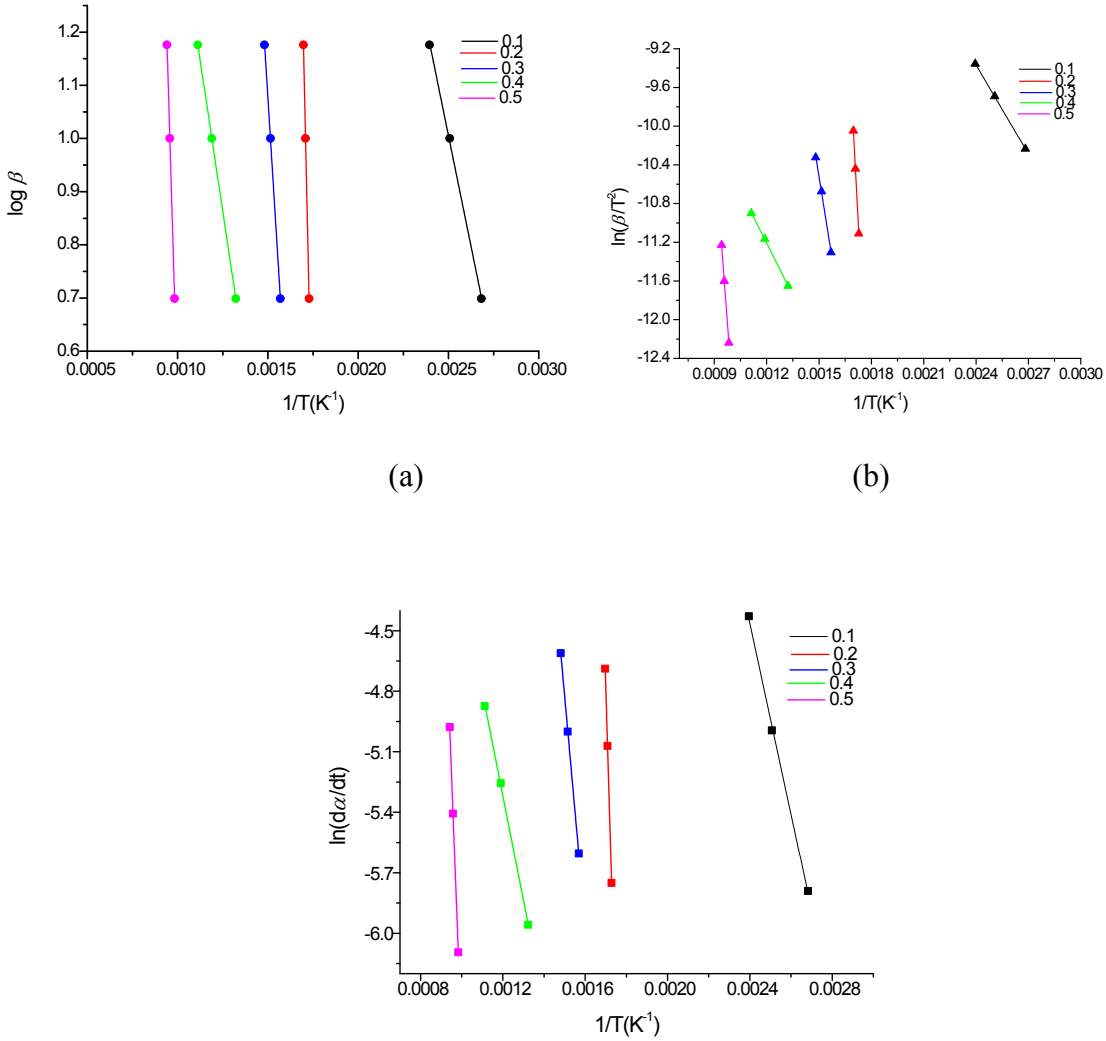
(b)



(c)

Figure S6 (H) Plots of (a) F-W-O method (b) Vyazokovin method (c) Friedman method of PCz:POPD-30:70 at 5 °,10 ° and 15° heating rates with conversion rate (α) 0.1, 0.2 ,0.3, 0.4, 0.5, and 0.6

(I)



(a) (b)

(c)

Figure S6 (I) Plots of (a) F-W-O method (b) Vyazokovin method (c) Friedman method of PCz:POPD-10:90 at 5 °,10 ° and 15° heating rates with conversion rate (α) 0.1, 0.2 ,0.3, 0.4, 0.5, and 0.6