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APPENDIX A

The Viscosity Average Molecular Weight ($\overline{M}_v$) of a 1 mm Thick PMMA Sheet Substrate

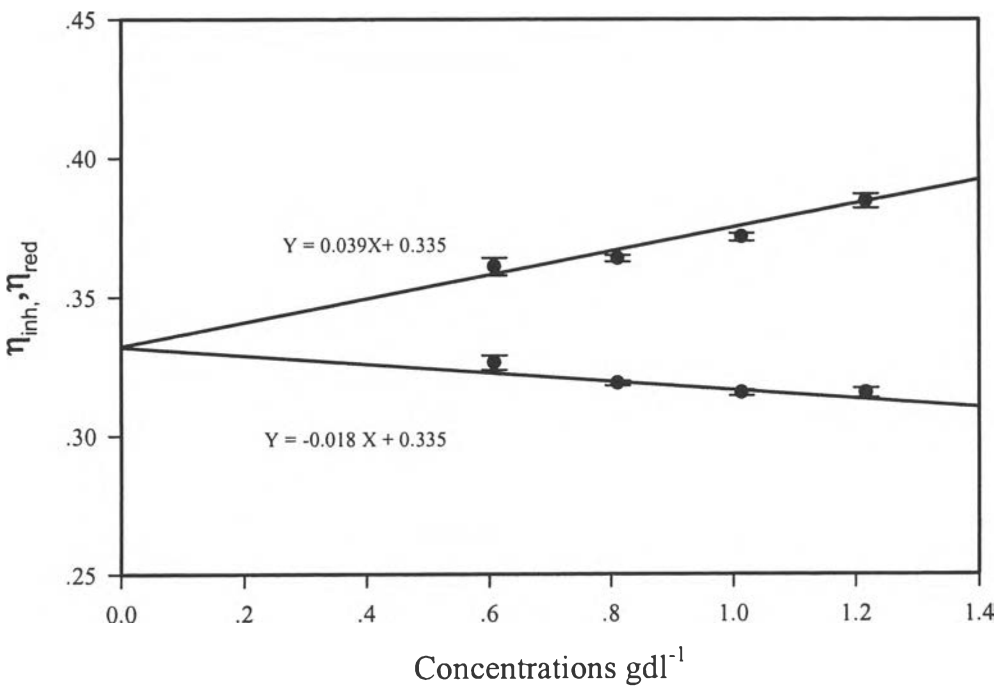


Figure A1 Huggins plot of η_{inh} and η_{red} against concentration of dilute solution of PMMA in toluene.

From Mark-Houwick equation;

M_v $= K(\eta)^a$

$= 7x10^6x(0.335)^{0.71}$;where K = 7 and a =0.71 for toluene solvent*

=3,220,177

$=3.2x10^6$ g/mol

*Blue, P.J. (1992). ASM handbook: Fricition lubication and wear technology. USA:ASM

APPENDIX B

Characterization of Ligand

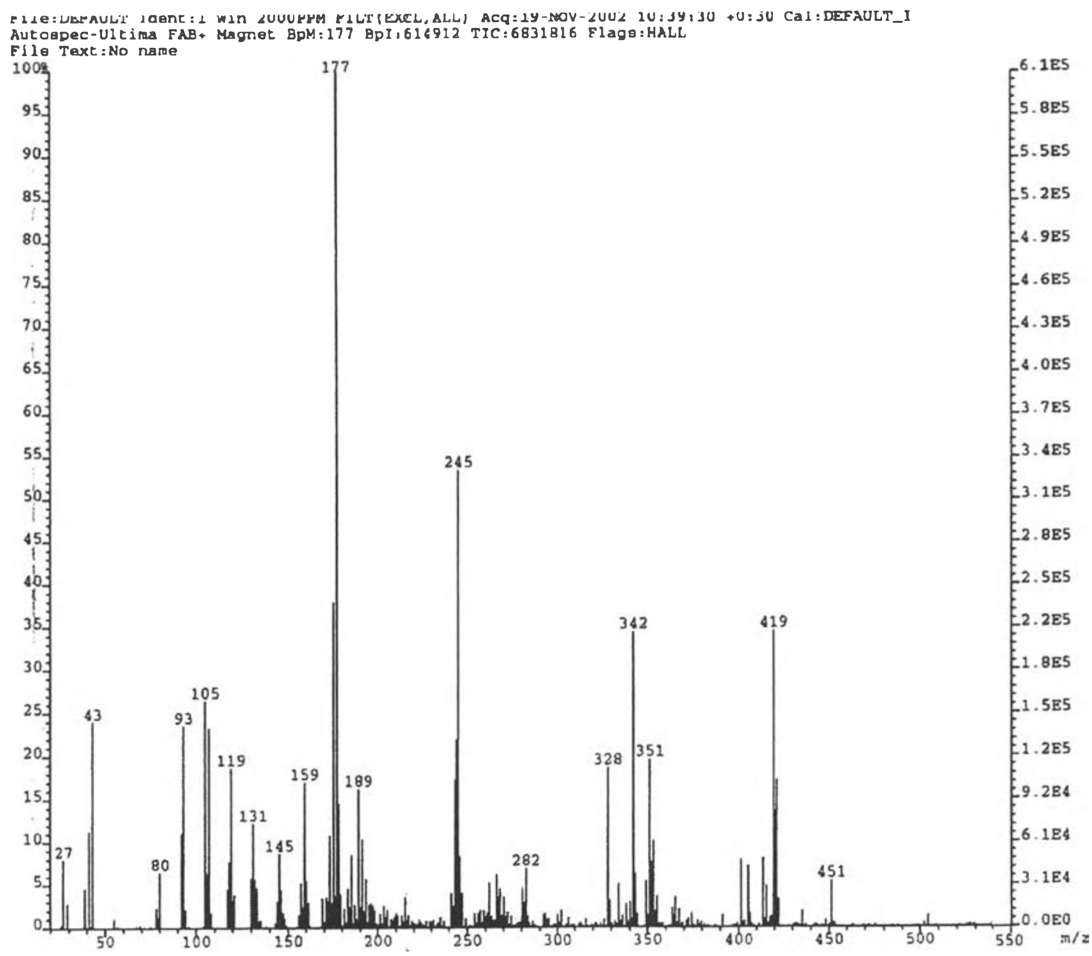


Figure B1 Mass spectrum of N-^{n}pentyl-2-pyridylmethanimine.

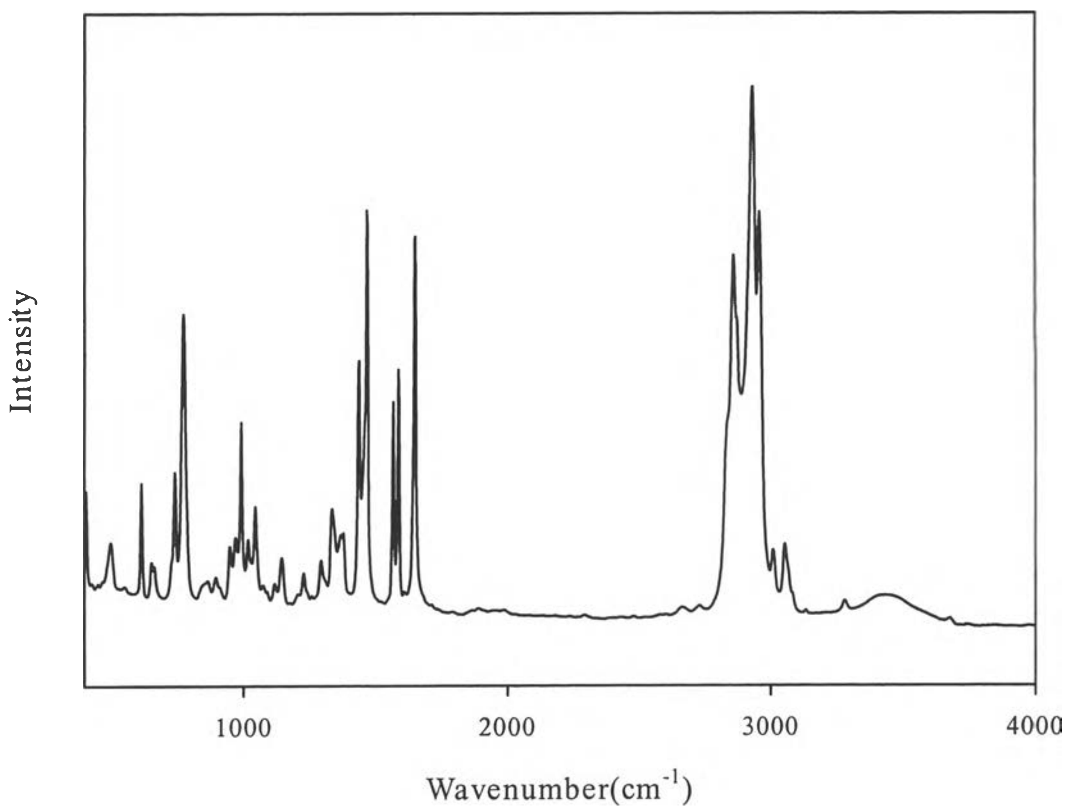


Figure B2 FTIR spectrum of N-^{n}pentyl-2-pyridylmethanimine.

APPENDIX C

Chemical Amounts Used for Polymerization

Table C1 Typical recipe for polymerization

Chemicals	Amounts
Monomer	4.68×10^{-2} mole
Initiator	0.069 ml
Catalyst	0.067 g
Co-catalyst	0.0321 g
Solvent	5 ml

Table C2 Chemical amounts used of polymerization

%mole FMA	MMA monomer (g)	FMA monomer (g)	Ligand (μl)	Initiator (μl)	Catalyst (g)	Co-catalyst (g)	Toluene (ml)
0	25.2750	0.0000	865	335	0.335	0.1605	25
0.05	23.3883	0.0622	865	335	0.335	0.1605	25
0.1	23.3765	0.1245	865	335	0.335	0.1605	25
0.2	23.3532	0.2490	865	335	0.335	0.1605	25
0.5	23.2830	0.6224	865	335	0.335	0.1605	25
0.7	23.2362	0.8714	865	335	0.335	0.1605	25
1	23.1660	1.2450	865	335	0.335	0.1605	25
10	14.7420	8.7143	606	235	0.2345	0.1124	17.5
20	11.2320	14.9385	519	201	0.201	0.0963	15

Calculation example

At 0.1% mole FMA

FMA (g) = mole fraction of FMA×Molecular weight×4.68×10^{-2} × Multiplying factor

= $0.1/100\times532\times4.68\times10^{-2}\times5$

= 0.1245

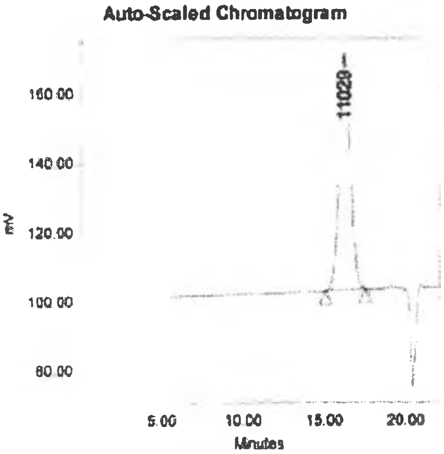
APPENDIX D

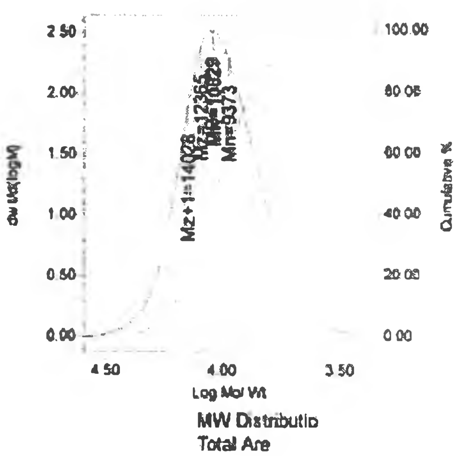
Molecular Characteristic of PFMA-co-PMMA By Using Gel Permeation Chromatography

Sample Information

SampleName	A	Sample Type	Broad Unknown
Vial	1	Date Acquired	27/02/2003 10:50:44 AM
Injection	1	Acq Method Set	MethR_THF_30C_1
Injection Volume	100.00 ul	Processing Method	R_THF_30C_1
Channel	SATIN	Date Processed	27/02/2003 1:55:06 PM
Run Time	22.0 Minutes		

Auto-Scaled Chromatogram





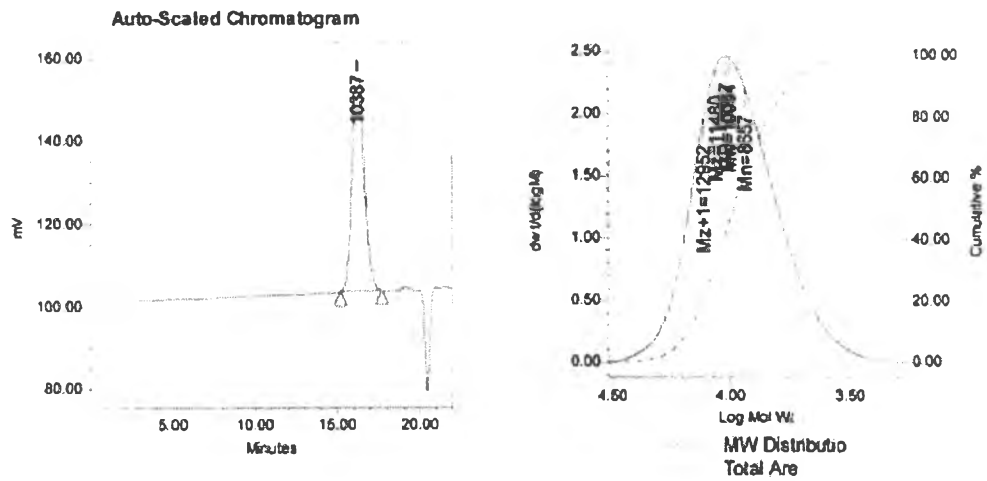
Peak Results

	Name	Mn	Mw	MP	Mz	Mz+1	Polydispersity
1	Peak1	9373	10827	11029	12365	14028	1.155080

Figure D1 Raw data of molecular weight characteristic determination of 0_FMA.

Sample Information

SampleName	B	Sample Type	Broad Unknown
Vial	2	Date Acquired	27/02/2003 11:22:54 AM
Injection	1	Acq Method Set	MethR_THF_30C_1
Injection Volume	100.00 ul	Processing Method	R_THF_30C_1
Channel	SATIN	Date Processed	27/02/2003 1:55:21 PM
Run Time	22.0 Minutes		



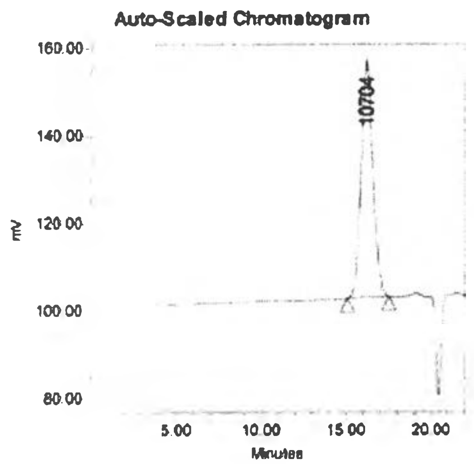
Peak Results

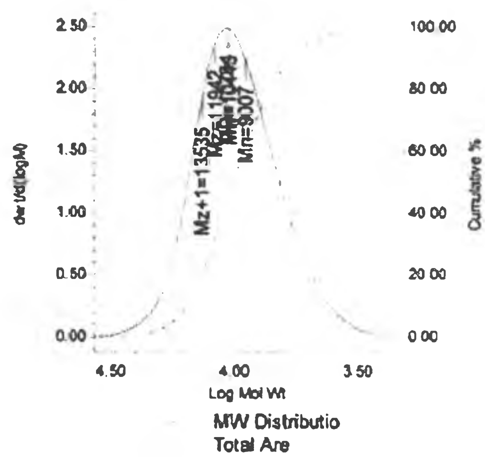
	Name	Mn	Mw	MP	Mz	Mz+1	Polydispersity
1	Peak1	8657	10054	10387	11480	12952	1.161320

Figure D2 Raw data of molecular weight characteristic determination of 01_FMA.

Sample Information

SampleName	C	Sample Type	Broad Unknown
Vial	3	Date Acquired	27/02/2003 11:48:36 AM
Injection	1	Acq Method Set	MethR_THF_30C_1
Injection Volume	100.00 ul	Processing Method	R_THF_30C_1
Channel	SATIN	Date Processed	27/02/2003 1:55:32 PM
Run Time	22.0 Minutes		





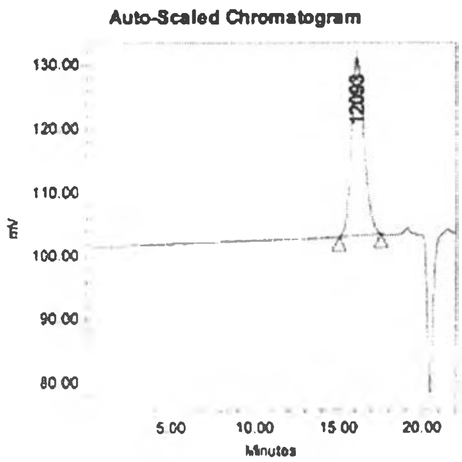
Peak Results

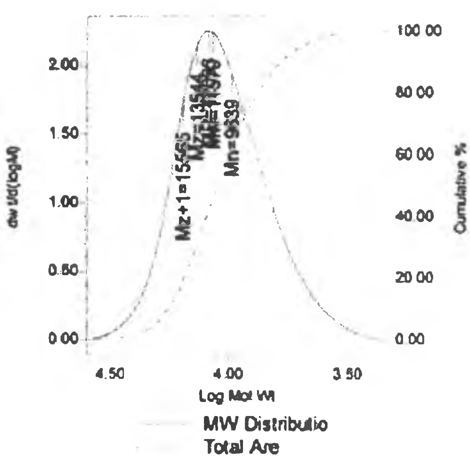
	Name	Mn	Mw	MP	Mz	Mz+1	Polydispersity
1	Peak1	9007	10443	10704	11942	13535	1.159482

Figure D3 Raw data of molecular weight characteristic determination of 1_FMA.

Sample Information

SampleName	D	Sample Type	Broad Unknown
Vial	4	Date Acquired	27/02/2003 12:14:18 PM
Injection	1	Acq Method Set	MethR_THF_30C_1
Injection Volume	100.00 ul	Processing Method	R_THF_30C_1
Channel	SATIN	Date Processed	27/02/2003 1:55:40 PM
Run Time	22.0 Minutes		





Peak Results

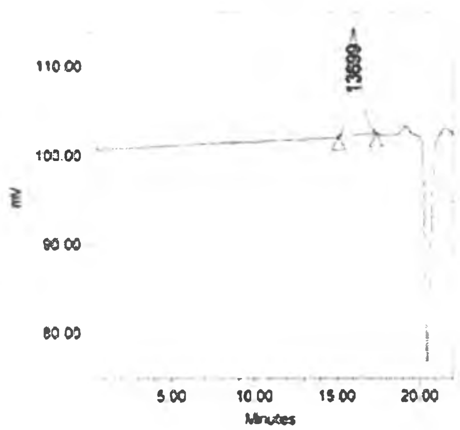
	Name	Mn	Mw	MP	Mz	Mz+1	Polydispersity
1	Peak1	9839	11570	12093	13544	15565	1.200345

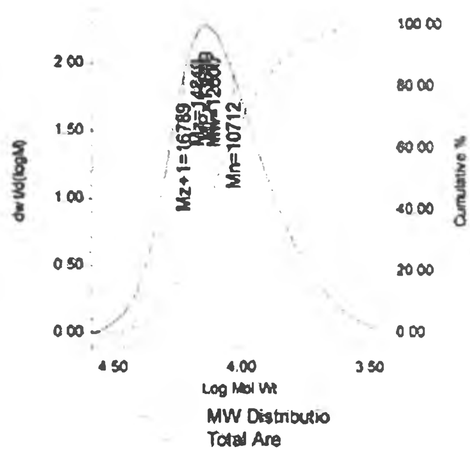
Figure D4 Raw data of molecular weight characteristic determination of 10_FMA.

Sample Information

SampleName	E	Sample Type	Broad Unknown
Vial	5	Date Acquired	27/02/2003 12:40:02 PM
Injection	1	Acq Method Set	MethR_THF_30C_1
Injection Volume	100.00 ul	Processing Method	R_THF_30C_1
Channel	SATIN	Date Processed	27/02/2003 1:55:49 PM
Run Time	22.0 Minutes		

Auto-Scaled Chromatogram





Peak Results

	Name	Mn	Mw	MP	Mz	Mz+1	Polydispersity
1	Peak1	10712	12800	13699	14840	16789	1.195001
2	*Peak*						

Figure D5 Raw data of molecular weight characteristic determination of 20_FMA.

APPENDIX E

[1]H-NMR Spectra of PFMA-co-PMMA Copolymer

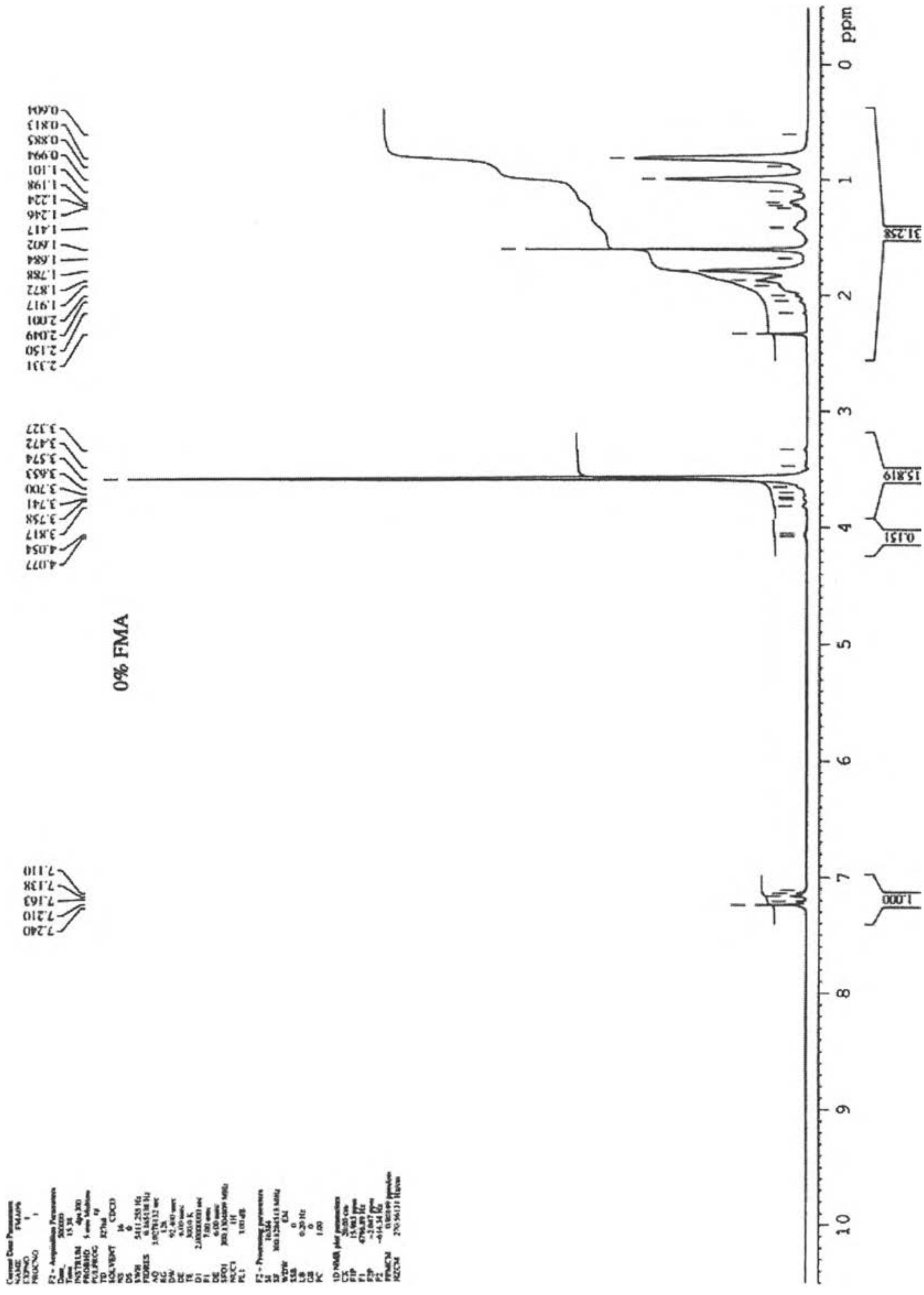


Figure E1 [1]H-NMR spectrum of 0_FMA.

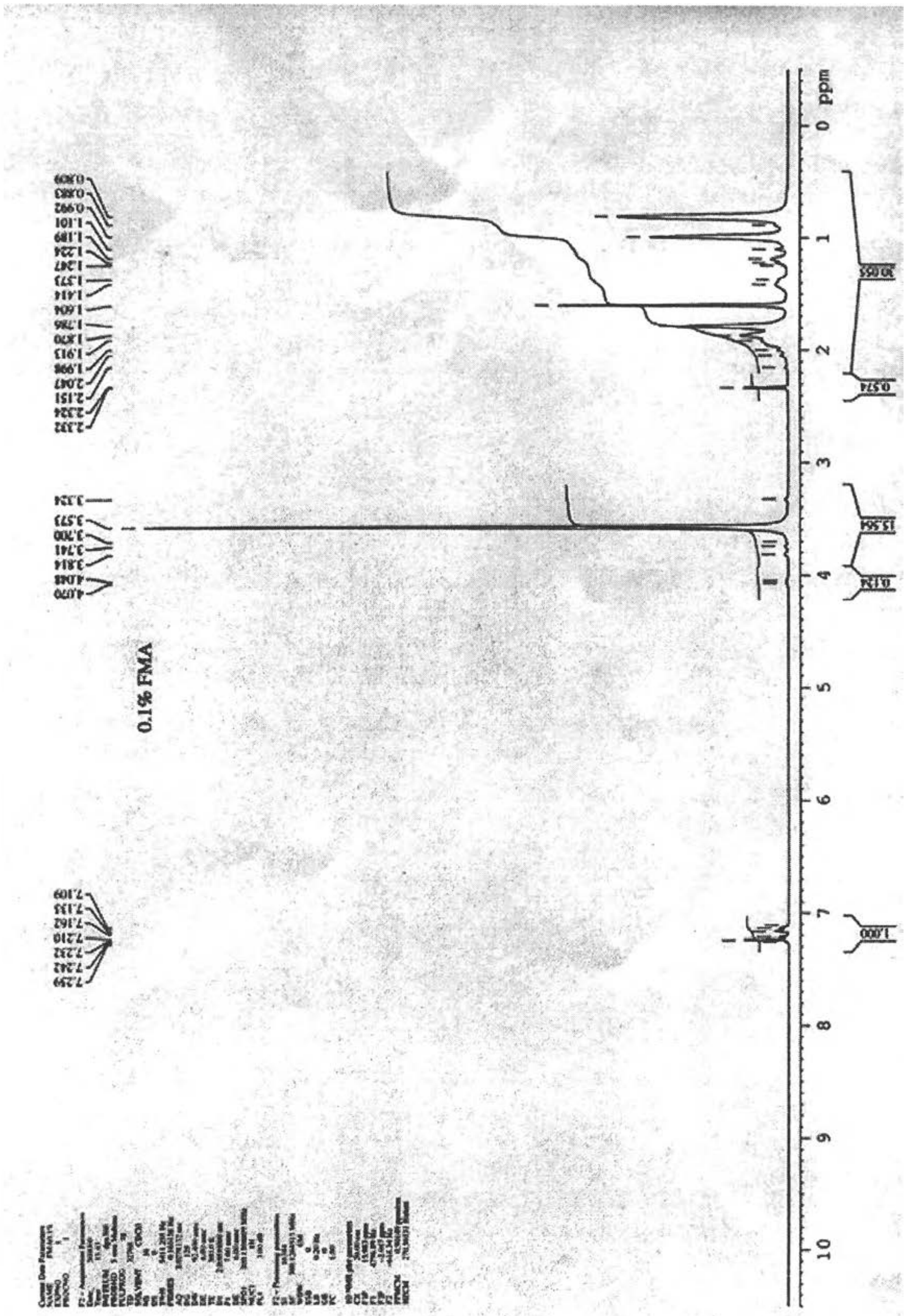


Figure E2 ^{1}H-NMR spectrum of 01_FMA.

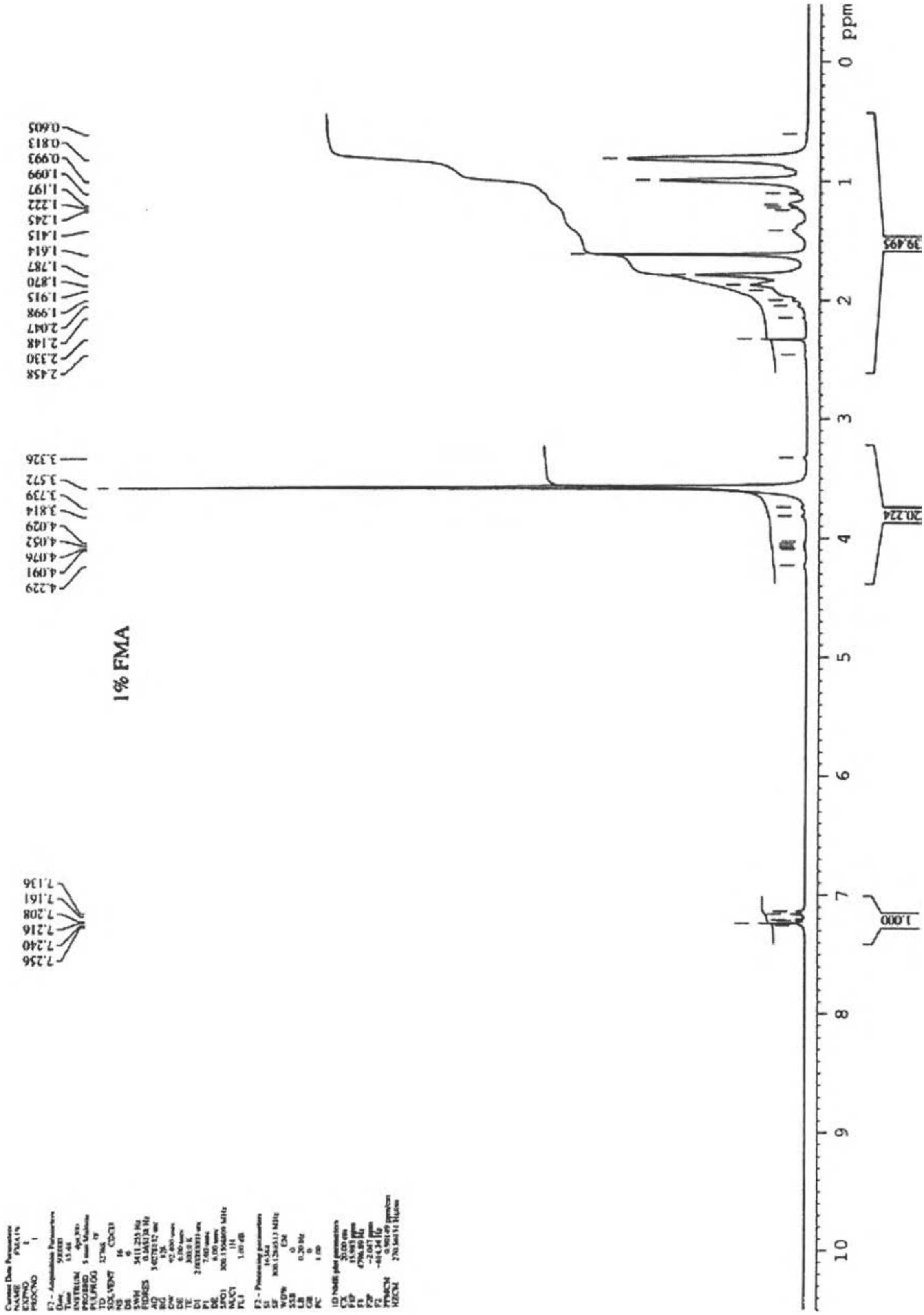


Figure E3 ^{1}H-NMR spectrum of 1_FMA.

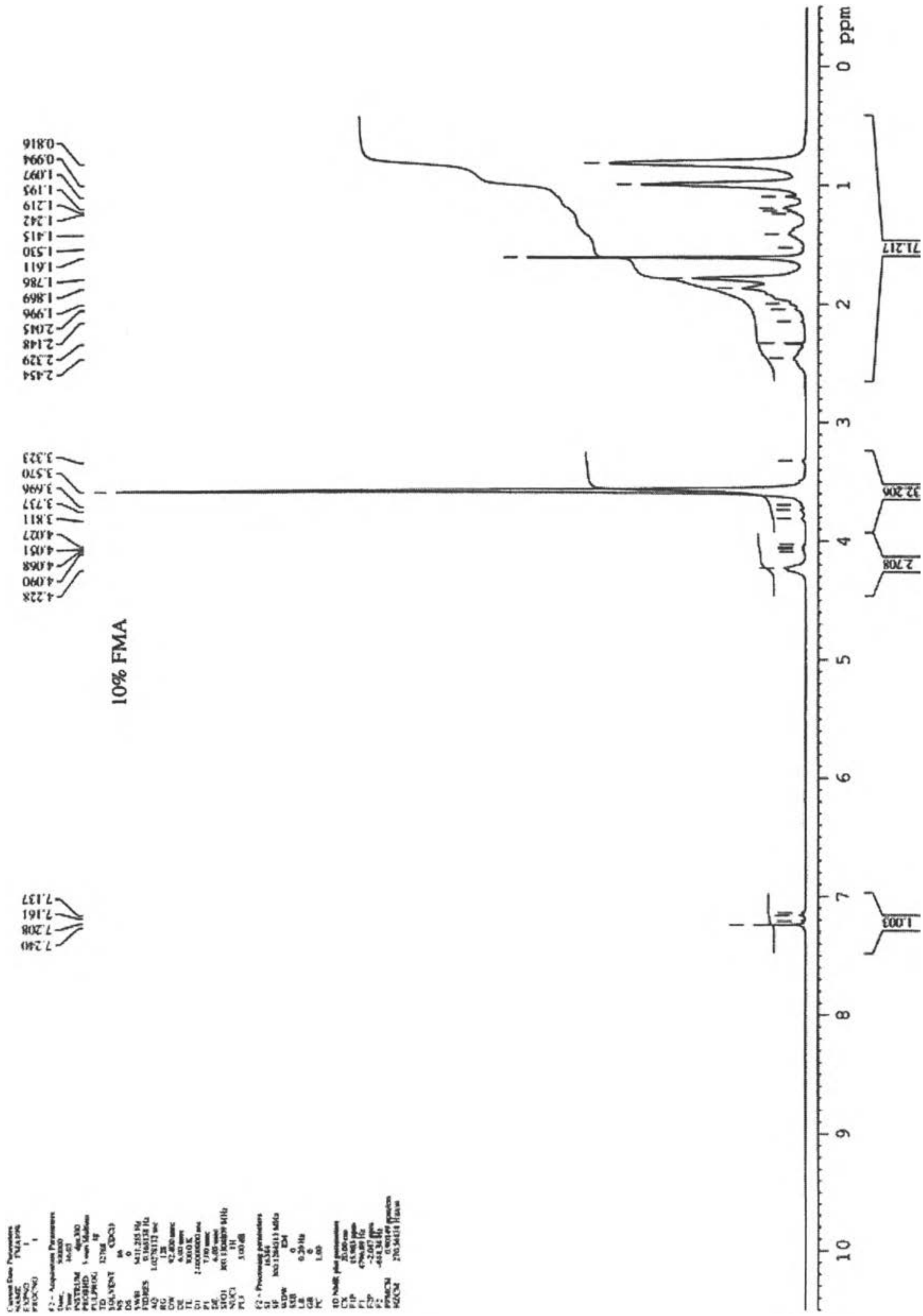


Figure E4 ^{1}H-NMR spectrum of 10_FMA

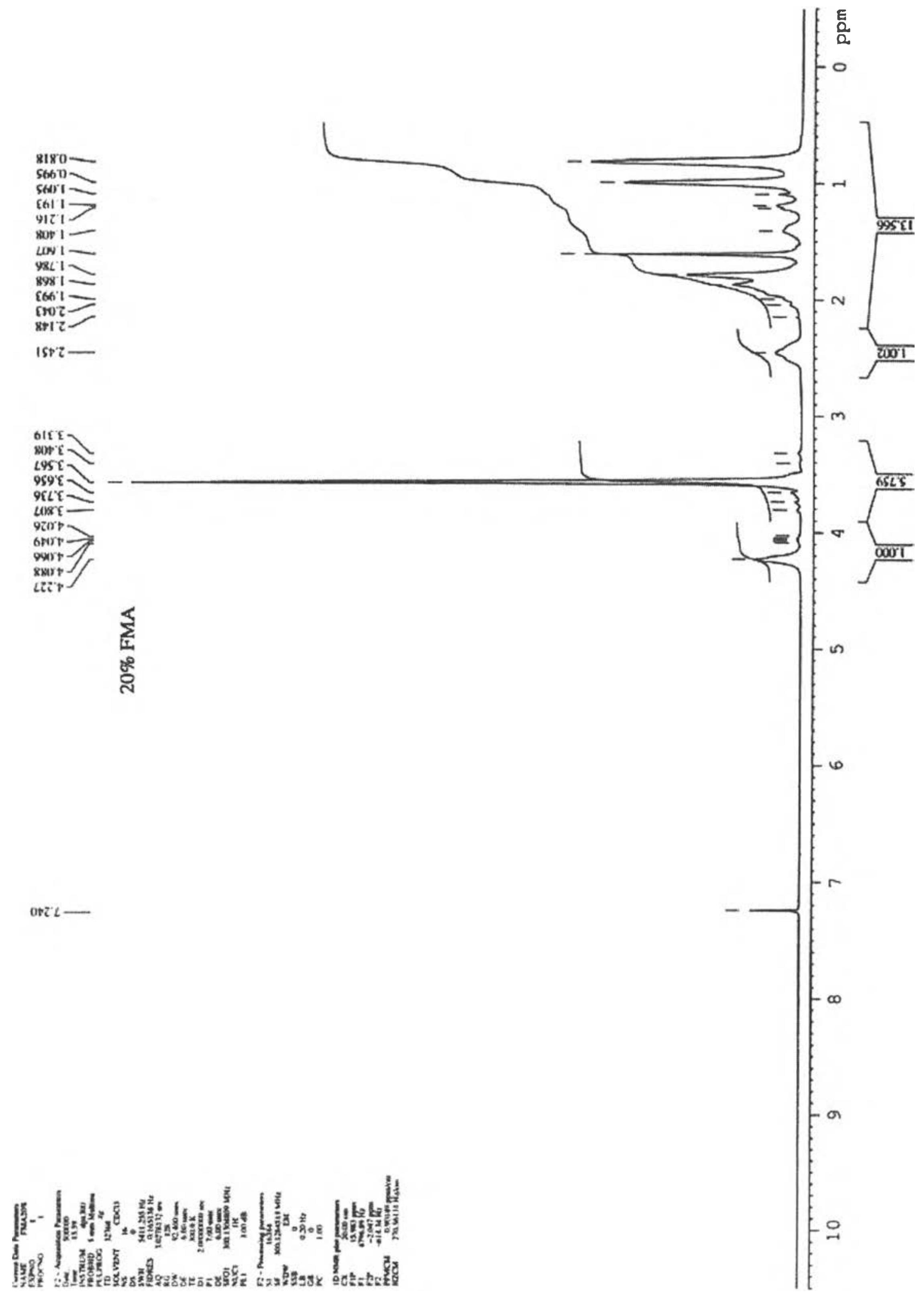


Figure E5 ^{1}H-NMR spectrum of 2 0_FMA

Figure E5 ^{1}H-NMR spectrum of 2 0_FMA

Table E1 Calculation of FMA/MMA mole ratio by using ^{1}H-NMR

Sample Name	Integral Intensity		%FMA Ratio
	$-COOCH_3$ (3.567ppm) (PMMA)	$-CF_2-CH_2-O-$ (4.227ppm) (PFMA)	
FMA_0	4.05	0	0
FMA_01	4.15	0	0
FMA_1	4.6	0.04	1.29
FMA_10	3.7	0.28	10.19
FMA_20	3.8	0.65	20.42

Calculation example

For 20_FMA; $\%FMA = \dfrac{0.65}{(2/3\times 3.8)+0.65}\times 100$

$= 20.42\%$ FMA by mole

APPENNDIX F

The effect of FMA/MMA Mole Ratio in PFMA-co-PMMA Copolymer on Wettability and Surface Tension

Table F1 The effect of %FMA in PFMA-co-PMMA copolymer on advancing contact angle by using water as the probe

%FMA	Sample Number					Average	STDEV.
	1	2	3	4	5		
0.00	72.3	70.5	70.1	70.9	71.3	71.0	0.8
0.05	78.5	76.2	76.0	75.7	82.4	77.7	2.8
0.10	73.7	73.6	77.7	74.4	75.7	75.0	1.7
0.20	73.7	67.9	76.2	70.6	70.3	71.7	3.2
0.50	79.5	80.9	79.0	78.6	77.4	79.1	1.3
0.70	80.1	80.3	77.1	77.6	77.9	78.6	1.5
1.00	84.1	82.9	84.3	80.8	82.6	82.9	1.4
10.00	99.5	100.6	96.6	99.2	101.2	99.4	1.8
20.00	118.1	110.9	117.3	113.3	113.9	114.7	3.0

Table F2 The effect of %FMA in PFMA-co-PMMA copolymer on receding contact angle by using water as the probe

%FMA	Sample Number					Average	STDEV.
	1	2	3	4	5		
0.00	58.8	58.1	58.5	59.4	60.6	59.1	1.0
0.05	62.7	62.2	63.8	61.2	62.5	62.5	0.9
0.10	60.1	58.6	62.3	59.4	61.5	60.4	1.5
0.20	58.2	61.3	60.9	58.7	60.4	59.9	1.4
0.50	65.5	64.0	63.4	65.9	64.1	64.6	1.1
0.70	68.7	65.3	66.7	63.2	63.8	65.5	2.2
1.00	68.7	65.3	66.7	63.2	63.8	65.5	2.2
10.00	85.0	83.4	85.3	83.7	82.1	83.9	1.3
20.00	90.1	91.9	90.7	91.9	89.3	90.8	1.1

Table F3 The effect of %FMA in PFMA-co-PMMA copolymer on advancing contact angle by using ethylene glycol as the probe

%FMA	Sample Number					Average	STDEV.
	1	2	3	4	5		
0.00	50.3	48.55	48.7	51.95	55.3	51.0	2.8
0.05	62.65	59.85	59.95	62.9	57.5	60.6	2.2
0.10	48.5	52.85	50.55	51.95	52.75	51.3	1.8
0.20	54	55.7	52.5	53.05	51.05	53.3	1.7
0.50	59.9	57.05	61.95	61.2	63.4	60.7	2.4
0.70	58.05	59.4	61.95	63.2	59.8	60.5	2.1
1.00	65.25	62.75	66.6	66.9	65.4	65.4	1.6
10.00	85.55	88.1	82.65	82.55	82.5	84.3	2.5
20.00	92	93.5	91.35	91.25	91.6	91.9	0.9

Table F4 The effect of %FMA in PFMA-co-PMMA copolymer on receding contact angle by using ethylene glycol as the probe

%FMA	Sample Number					Average	STDEV.
	1	2	3	4	5		
0.00	45.05			38.05	41.2	41.4	3.5
0.05	47.35	46	44.15	48.75		46.6	2.0
0.10	38.05	40.8	37.6	38.05	39.5	38.8	1.3
0.20	42.45	42.6	43.8	45.45	43.8	43.6	1.2
0.50	47.3	51.05	49.3	49.45	48.2	49.1	1.4
0.70	44.05	48.15	49.25	56.5	51.05	49.8	4.5
1.00	56.8	53.2	57.1	53.9	52	54.6	2.3
10.00	76.55	76.3	75.85	70.2	73.2	74.4	2.7
20.00	80.75	81.85	80.85	83.05	83.75	82.1	1.3

Table F5 The effect of %FMA in PFMA-co-PMMA copolymer on advancing contact angle by using diiodomethane as the probe

%FMA	Sample Number					Average	STDEV.
	1	2	3	4	5		
0.00	28.6	34.5	32.2	36.0	39.6	34.2	4.1
0.05	54.7	40.6	43.4	41.1	43.2	44.6	5.8
0.10	35.2	36.0	37.7	33.2	32.6	34.9	2.1
0.20	41.4	42.6	40.8	41.5	42.9	41.8	0.9
0.50	49.1	51.5	52.4	53.9	50.0	51.4	1.9
0.70	49.9	58.1	54.8	52.2	56.1	54.2	3.2
1.00	53.6	57.5	53.0	55.7	54.0	54.7	1.8
10.00	83.0	86.5	85.1	81.1	81.7	83.5	2.3
20.00	83.2	88.3	86.0	88.1	86.7	86.4	2.1

Table F6 The effect of %FMA in PFMA-co-PMMA copolymer on receding contact angle by using diiodomethane as the probe

%FMA	Sample Number					Average	STDEV.
	1	2	3	4	5		
0.00	17.5	21.2	21.5	20.7	25.1	21.2	2.7
0.05	39.2	27.7	25.0	26.0	27.6	29.1	5.8
0.10	20.5	24.3	26.2	24.4	21.6	23.4	2.3
0.20	23.2	30.4	28.4	22.8	27.5	26.5	3.3
0.50	34.3	38.3	36.3	36.4	37.0	36.4	1.5
0.70	31.0	32.4	39.5	38.0	40.0	36.1	4.2
1.00	31.0	32.4	39.5	38.0	40.0	36.1	4.2
10.00	60.8	63.3	59.9	57.2	62.7	60.8	2.4
20.00	60.2	59.5	65.6	69.2	66.2	64.1	4.1

Table F7 Surface energy components calculation results : data series 1

%FMA	Advancing contact angle (θ)			γ_{LW}	γ^{+}	γ^{-}	γ_{AB}	γ_{total}
	Diiodomethane	Water	Ethylene glycol					
0.00	50.3	72.3	28.6	34.1	2.2	6.4	7.5	41.6
0.05	62.7	78.5	54.7	27.0	0.7	9.0	5.0	32.0
0.10	48.5	73.7	35.2	35.1	1.4	6.5	6.1	41.2
0.20	54.0	73.7	41.4	32.0	1.2	8.5	6.4	38.4
0.50	59.9	79.5	49.1	28.6	1.2	6.2	5.4	34.0
0.70	58.1	80.1	49.9	29.7	1.0	5.9	4.8	34.5
1.00	65.3	84.1	53.6	25.5	1.4	4.4	5.0	30.5
10.00	85.6	99.5	83.0	14.7	0.3	3.8	2.0	16.7
20.00	92.0	118.1	83.2	11.8	1.9	0.5	2.0	13.8

Table F8 Surface energy components calculation results : data series 2

%FMA	Advancing contact angle (θ)			γ_{LW}	γ^{+}	γ^{-}	γ_{AB}	γ_{total}
	Diiodomethane	Water	Ethylene glycol					
0.00	34.5	70.5	48.6	42.3	0.0	12.9	0.2	42.4
0.05	40.6	76.2	59.9	39.3	0.1	7.6	2.1	41.4
0.10	36.0	73.6	52.9	41.6	0.0	9.9	0.9	42.5
0.20	42.6	67.9	55.7	38.3	0.1	15.3	2.3	40.6
0.50	51.5	80.9	57.1	33.4	0.1	7.2	1.7	35.1
0.70	58.1	80.3	59.4	29.7	0.2	8.9	2.4	32.1
1.00	57.5	82.9	62.8	30.0	0.1	7.9	1.3	31.3
10.00	86.5	100.6	88.1	14.3	0.0	4.8	0.9	15.2
20.00	88.3	110.9	93.5	13.4	0.0	1.1	0.4	13.9

Table F9 Surface energy components calculation results : data series 3

%FMA	Advancing contact angle (θ)			γ_{LW}	γ^{+}	γ^{-}	γ_{AB}	γ_{total}
	Diiodomethane	Water	Ethylene glycol					
0.00	32.2	70.1	48.7	43.3	0.0	12.1	0.7	44.0
0.05	43.4	76.0	60.0	37.9	0.1	8.8	1.8	39.6
0.10	37.7	77.7	50.6	40.7	0.0	7.2	0.9	41.6
0.20	40.8	76.2	52.5	39.2	0.0	9.2	0.6	39.8
0.50	52.4	79.0	62.0	32.9	0.0	10.6	0.2	33.1
0.70	54.8	77.1	62.0	31.5	0.0	13.1	0.0	31.6
1.00	53.0	84.3	66.6	32.6	0.0	6.1	0.8	33.4
10.00	85.1	96.6	82.7	15.0	0.2	5.6	2.0	17.0
20.00	86.0	117.3	91.4	14.5	0.2	0.0	0.1	14.6

Table F10 Surface energy components calculation results : data series 4

FMA	Advancing contact angle (θ)			γ_{LW}	γ^+	γ^-	γ_{AB}	γ_{total}
	Diiodomethane	Water	Ethylene glycol					
0.00	36.0	70.9	52.0	41.6	0.0	11.8	1.2	42.8
0.05	41.1	75.7	62.9	39.1	0.3	6.9	3.1	42.1
0.10	33.2	74.4	52.0	42.8	0.0	8.7	0.8	43.6
0.20	41.5	70.6	53.1	38.9	0.0	14.1	0.6	39.5
0.50	53.9	78.6	61.2	32.1	0.0	11.1	0.4	32.5
0.70	52.2	77.6	63.2	33.0	0.0	10.7	1.1	34.1
1.00	55.7	80.8	66.9	31.0	0.0	9.1	1.2	32.2
10.00	81.1	99.2	82.6	16.9	0.1	3.7	1.3	18.2
20.00	88.1	113.3	91.3	13.6	0.2	0.3	0.4	14.0

Table F11 Surface energy components calculation results : data series 5

FMA	Advancing contact angle (θ)			γ_{LW}	γ^{+}	γ^{-}	γ_{AB}	γ_{total}
	Diiodomethane	Water	Ethylene glycol					
0	39.6	71.3	55.3	39.80	0.07	11.71	1.78	41.58
0.05	43.2	82.4	57.5	37.96	0.00	5.79	0.26	38.22
0.1	32.6	75.65	52.75	43.11	0.03	7.61	0.89	44.00
0.2	42.85	70.3	51.05	38.14	0.00	14.86	0.54	38.68
0.5	50	77.4	63.4	34.26	0.07	9.61	1.64	35.90
0.7	56.05	77.85	59.8	30.83	0.05	11.36	1.47	32.30
1	53.95	82.6	65.4	32.03	0.01	7.87	0.53	32.56
10	81.7	101.2	82.5	16.62	0.18	2.58	1.38	17.99
20	86.65	113.85	91.6	14.21	0.12	0.21	0.32	14.53

Surface tension calculation

From van Oss-Good Theory (Brostow, 2003)

$$\gamma_{l1}(1-\cos\theta_1) = 2(\sqrt{\gamma_s^{LW}\gamma_{l1}^{LW}} + \sqrt{\gamma^{+}_{s}\gamma^{-}_{l1}} + \sqrt{\gamma^{-}_{s}\gamma^{+}_{l1}}) \quad (1)$$

$$\gamma_{l2}(1-\cos\theta_2) = 2(\sqrt{\gamma_s^{LW}\gamma_{l2}^{LW}} + \sqrt{\gamma^{+}_{s}\gamma^{-}_{l2}} + \sqrt{\gamma^{-}_{s}\gamma^{+}_{l2}}) \quad (2)$$

$$\gamma_{l3}(1-\cos\theta_3) = 2(\sqrt{\gamma_s^{LW}\gamma_{l3}^{LW}} + \sqrt{\gamma^{+}_{s}\gamma^{-}_{l3}} + \sqrt{\gamma^{-}_{s}\gamma^{+}_{l3}}) \quad (3)$$

where,

γ^{LW} = Liftshitz-vander Waals component of the surface tension due to the dispersion force

γ^{+} = (Lewis) acid parameter of the surface tension

γ^{-} = (Lewis) base parameter of the surface tension

l_1, l_2, l_3 = diiodomethane, water and glycerol respectively

θ_1, θ_2 and θ_3 = contact angles of diiodomethane, water and ethylene glycol on solid, s, surface respectively

APPENDIX G

EDS Data and %FMA Calculations

Table G1 EDS data

Elements	Sample Name	Sample Number					AVE.	After calculation		Theoretical Value	
		1	2	3	4	5		C:O:F	%mole FMA	C:O:F	%mole FMA
C	0_FMA	70.17	69.75	70.82	69.71	70.02	70.09			71.4286	0
O		29.64	30.36	28.84	30.42	29.72	29.80			28.5714	
F		0.19	-0.11	0.34	-0.13	0.26	0.11			0	
C	01_FMA	70.47	69.44	70.46	70.19	70.19	70.15	71.2131	0.18	71.3086	0.1
O		28.75	30.15	29.21	29.62	29.62	29.47	28.4034		28.4779	
F		0.77	0.41	0.33	0.18	0.18	0.37	0.38345		0.21358	
C	1_FMA	69.33	69.38	68.65	68.03	71.54	69.39	69.7073	1.5	70.2628	1
O		27.85	27.68	27.87	28.99	24.84	27.45	27.2294		27.6625	
F		2.82	2.93	3.48	2.98	3.62	3.17	3.06331		2.07469	
C	10_FMA	63.08	64.47	63.94	56.26	63.63	62.28	62.1625	10.3	62.3656	10
O		20.59	19.33	20.29	25.4	20.4	21.20	21.347		21.5054	
F		16.33	16.2	15.76	18.34	15.97	16.52	16.4906		16.129	
C	20_FMA	58.67	60.61	59.45	59.49	55.03	58.65	56.8092	20.2	56.8966	20
O		15.04	14.22	15.06	13.85	18.29	15.29	17.1733		17.2414	
F		26.29	25.17	25.49	26.66	26.68	26.06	26.0175		25.8621	

Table G2 %FMA calculations

Elements	Number of atom			%atom		
	100%FMA	100%MMA	20%FMA	100%FMA	100%MMA	20%FMA
C	13	5	6.6	43.3333	71.4286	56.8965
O	2	2	2	6.6667	28.5714	17.2413
F	15	0	3	50.0000	0.0000	25.8620
Tot.	30	7	11.6	100.0000	100.0000	100.0000

Example for %FMA calculation

This work is based on trial and error; by using Microsoft Excel program

At 20%FMA mole

Number of atoms: $C = (0.2\times13) + (0.8\times5) = 6.6$

$O= (0.2\times 2) + (0.8\times 2) = 2$

$F= (0.2\times15) + (0.8\times 0) = 3$

%Atom; $C = (6.6/11.6) \times 100 = 56.8965$ %

$O = (2/11.6) \times 100 = 17.24138$ %

$F = (3/11.6) \times 100 = 25.8620$ %

Raw data from EDS shows % atom, we proceeded next to find %FMA which is nearest to the data from EDS results.

APPENNDIX H

The Effect of FMA/MMA Mole Ratio in PFMA-co-PMMA Copolymer on Kinetic Friction Coefficient By Using TE-79 Multi-Axis Tribometer

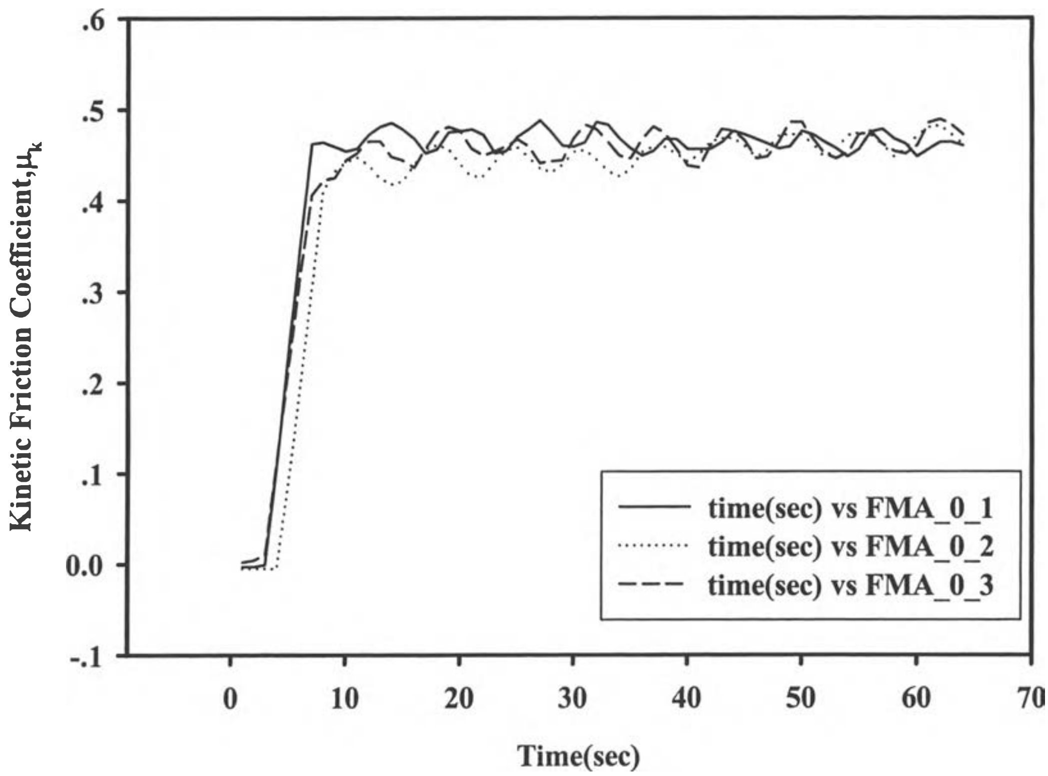


Figure H1 Friction characteristic of PFMA-co-PMMA(@ FMA_0) thin film coating deposited on 1 mm thick PMMA sheet.

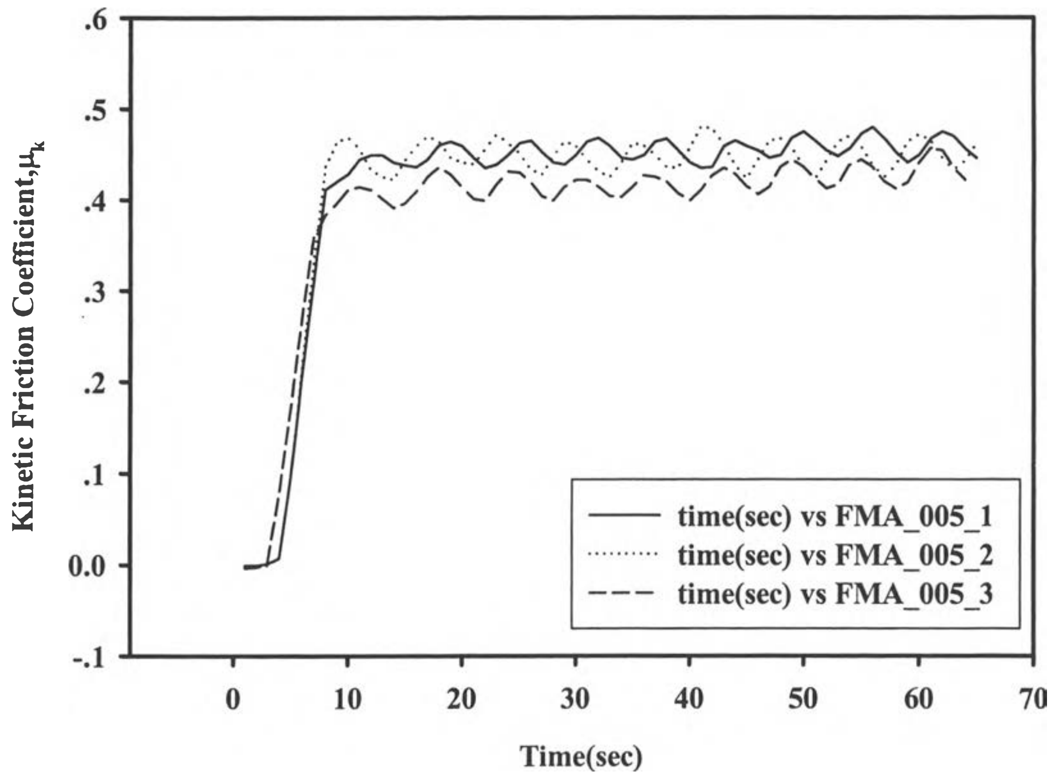


Figure H2 Friction characteristic of PFMA-co-PMMA(@ FMA_005) thin film coating deposited on 1 mm thick PMMA sheet .

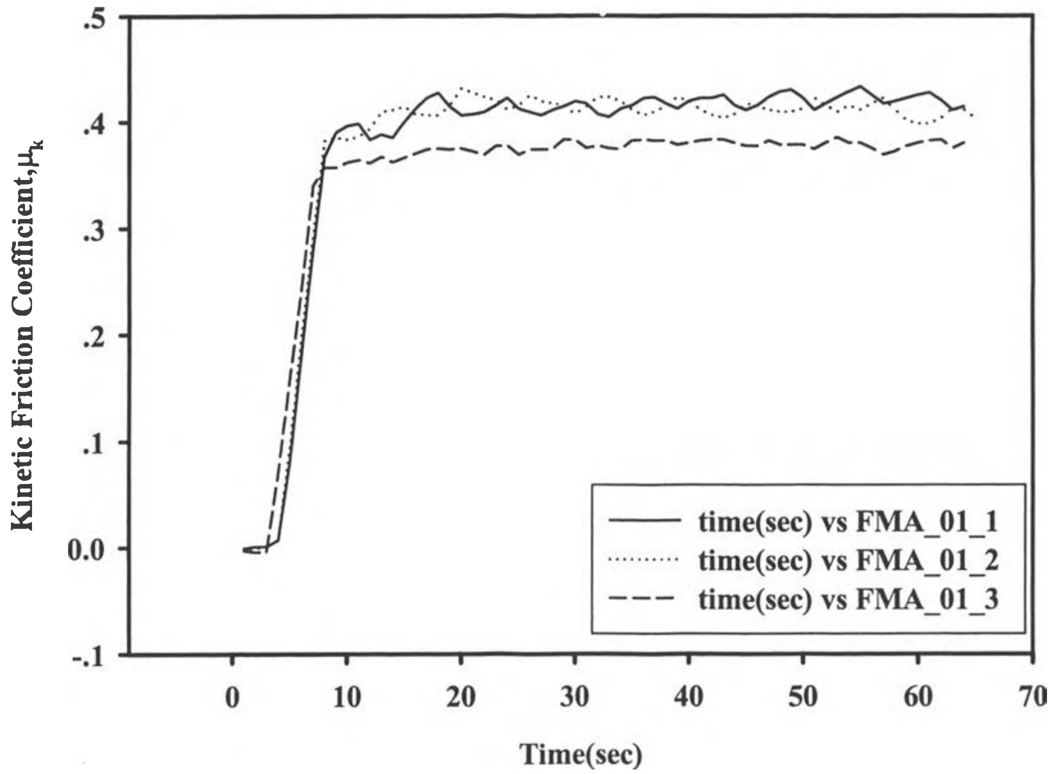


Figure H3 Friction characteristic of PFMA-co-PMMA(@ FMA_01) thin film coating deposited on 1 mm thick PMMA sheet .

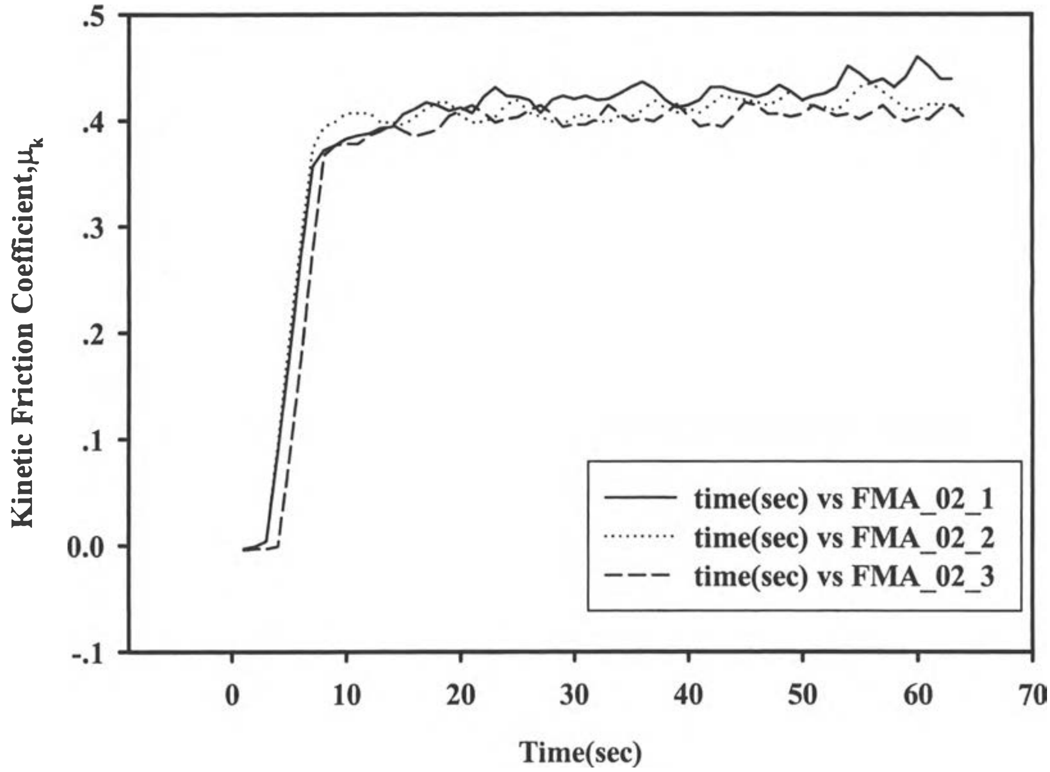


Figure H4 Friction characteristic of PFMA-co-PMMA(@ FMA_02) thin film coating deposited on 1 mm thick PMMA sheet .

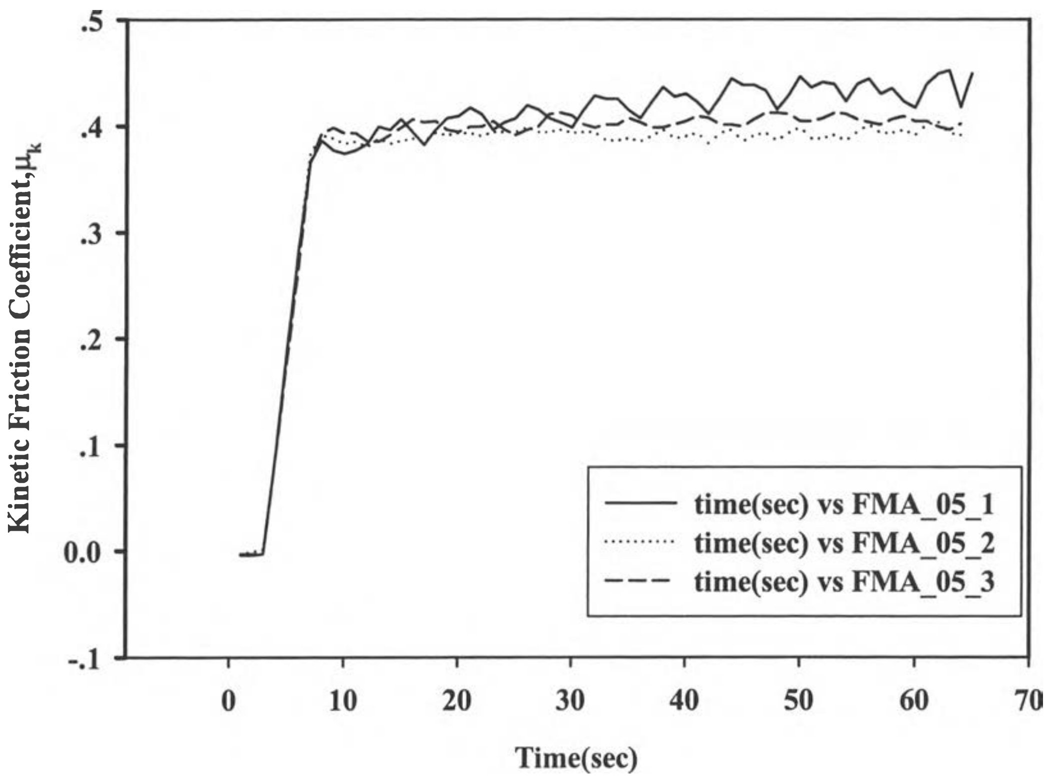


Figure H5 Friction characteristic of PFMA-co-PMMA(@ FMA_05) thin film coating deposited on 1 mm thick PMMA sheet .

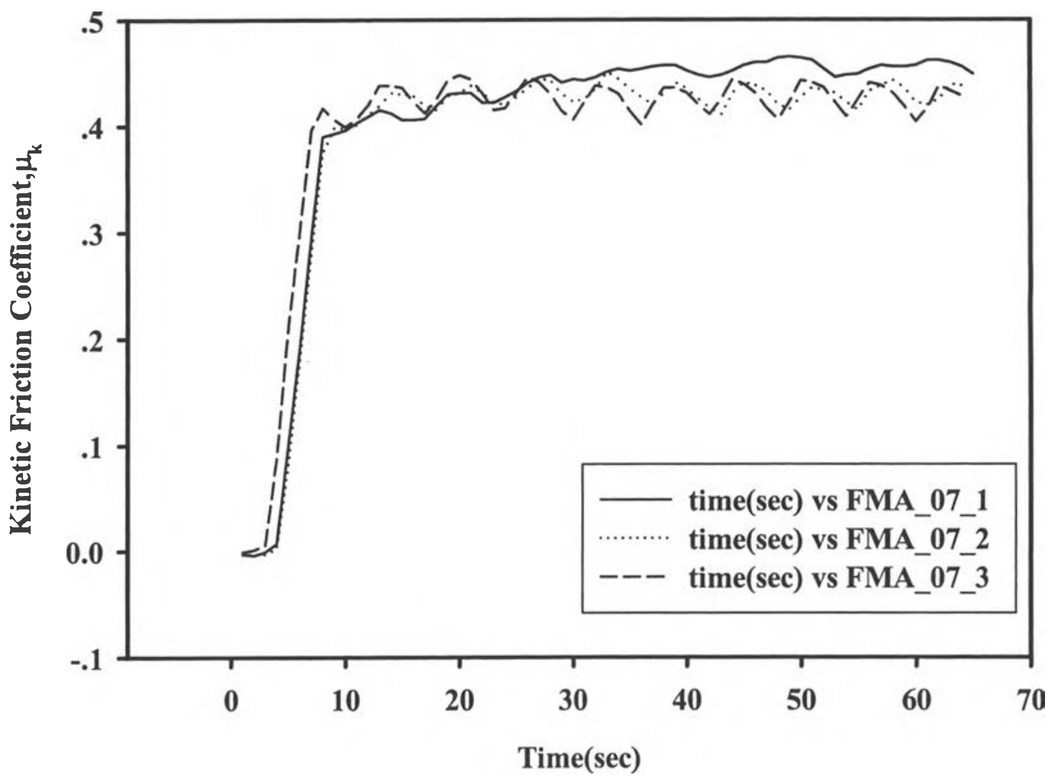


Figure H6 Friction characteristic of PFMA-co-PMMA(@ FMA_07) thin film coating deposited on 1 mm thick PMMA sheet .

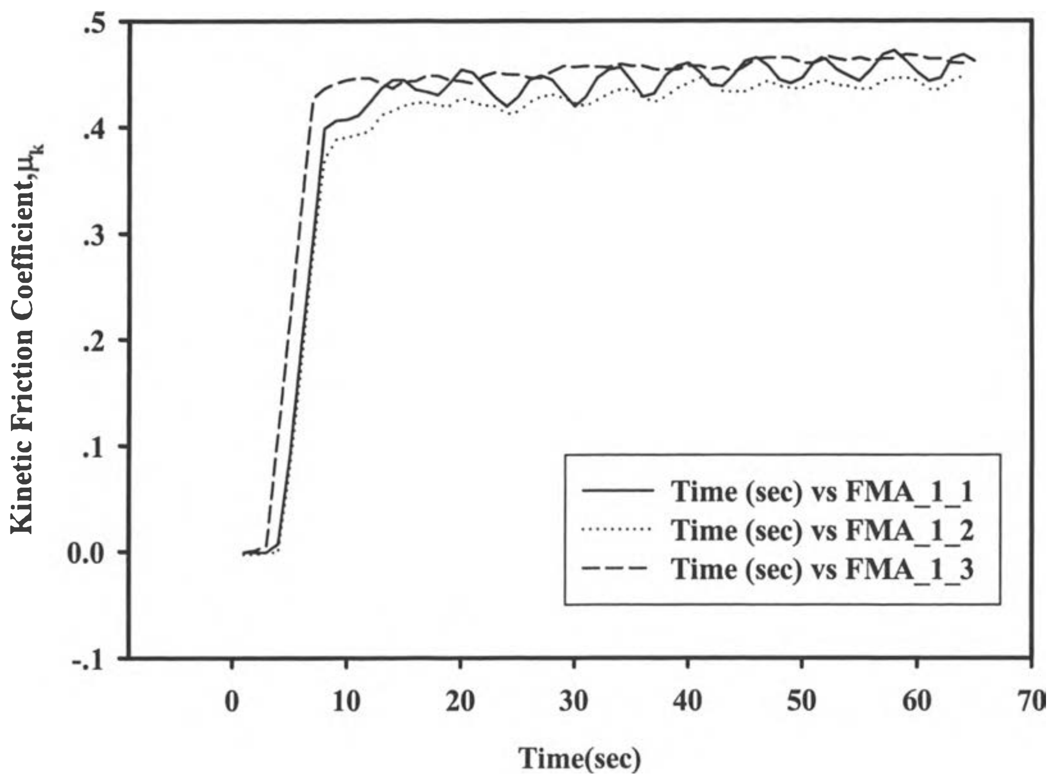


Figure H7 Friction characteristic of PFMA-co-PMMA(@ FMA_1) thin film coating deposited on 1 mm thick PMMA sheet .

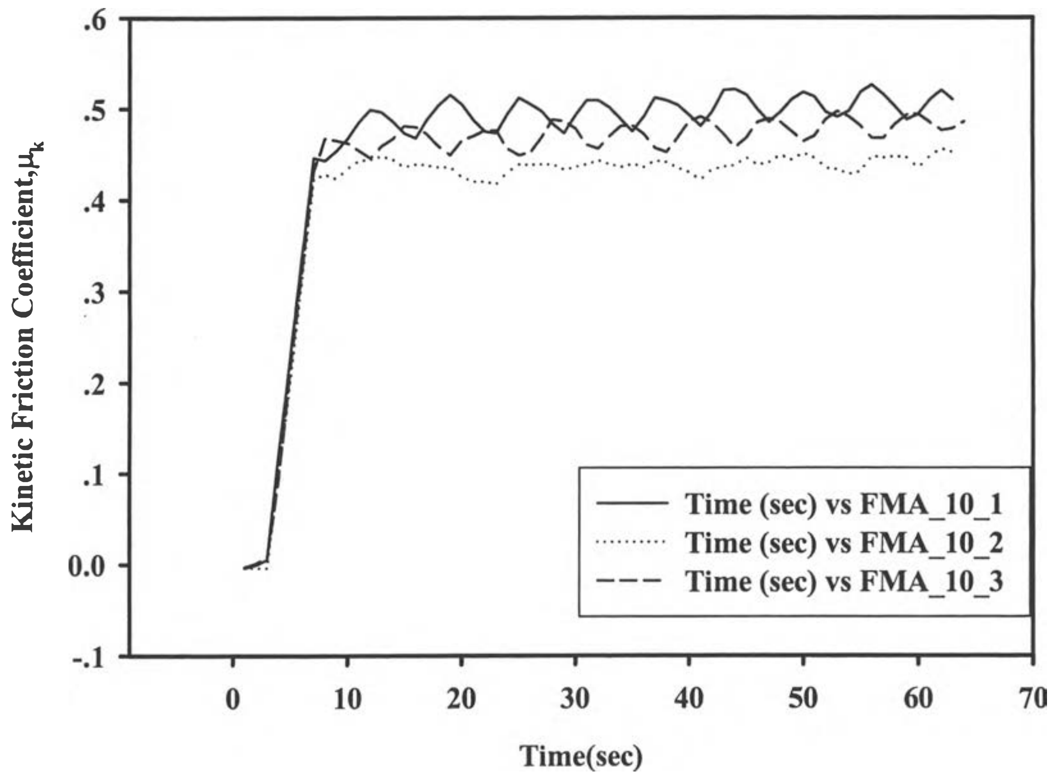


Figure H8 Friction characteristic of PFMA-co-PMMA(@ FMA_10) thin film coating deposited on 1 mm thick PMMA sheet .

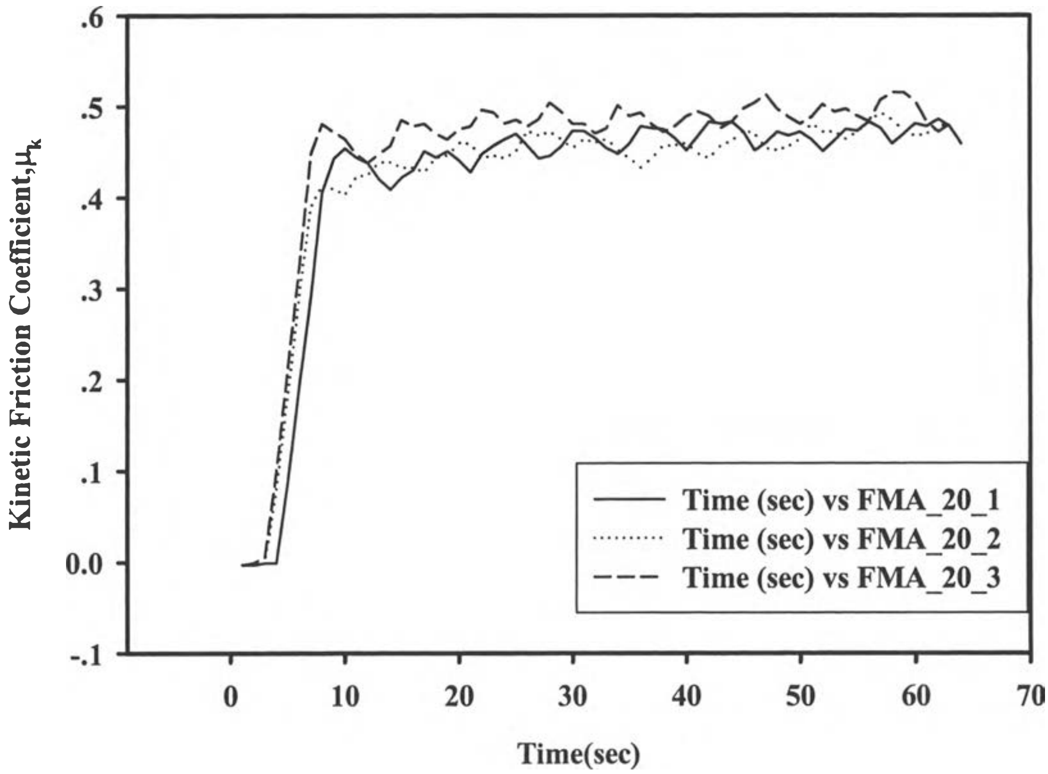


Figure H9 Friction characteristic of PFMA-co-PMMA(@ FMA_20) thin film coating deposited on 1 mm thick PMMA sheet .

APPENNDIX I

The Effect of FMA/MMA Mole Ratio in PFMA-co-PMMA Copolymer on Kinetic Friction Coefficient by Using Davenport Friction Testing Apparatus

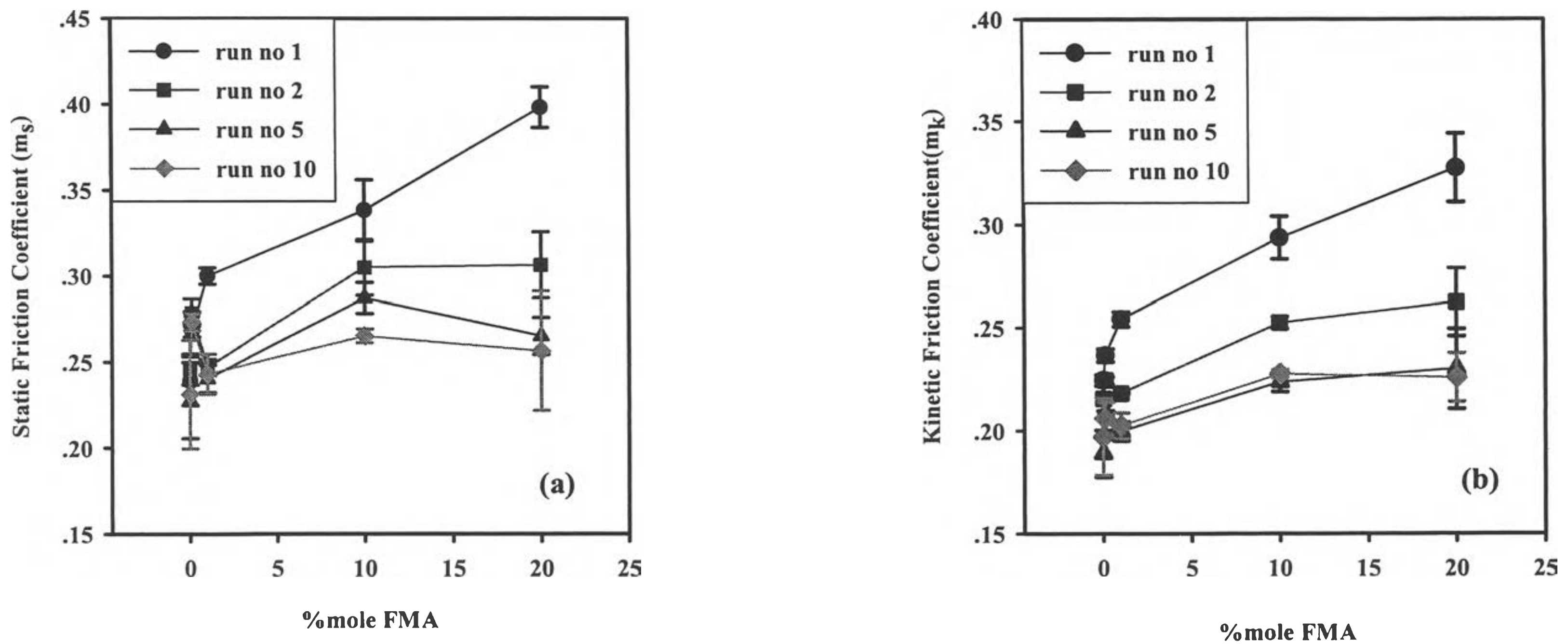


Figure I1 Effect of pass number on friction characteristic of PFMA-co-PMMA thin film coating deposited on 1 mm thick PMMA sheet by using Davenport Friction Testing Apparatus (a)static friction coefficient (b) kinetic friction coefficient.

Table I1 Effect of %Mole FMA on pass number on friction characteristic of PFMA-co-PMMA thin film coating deposited on 1 mm thick PMMA sheet by using Davenport Friction Testing Apparatus: 1st pass

Sample name	Sample number	Weight (g)	Friction force at different distances(g)						Friction coefficient(μ)						
			0 cm	3 cm	6 cm	9 cm	12 cm	15 cm	μ_s	μ_{k1}	μ_{k2}	μ_{k3}	μ_{k4}	μ_{k5}	μ_{kave}
FMA_0	1	4.85	45	44	45	48	48	44	0.22	0.22	0.22	0.24	0.24	0.22	0.23
	2	4.83	54	42	48	48	46	46	0.27	0.21	0.24	0.24	0.23	0.23	0.23
	3	5.05	46	40	44	46	48	44	0.23	0.20	0.22	0.23	0.24	0.22	0.22
FMA_01	1	4.67	53	46	50	48	46	48	0.26	0.23	0.25	0.24	0.23	0.24	0.24
	2	5.66	56	52	48	48	48	50	0.28	0.26	0.24	0.24	0.24	0.25	0.24
	3	4.67	54	42	50	46	46	50	0.27	0.21	0.25	0.23	0.23	0.25	0.23
FMA_1	1	5.57	59	56	54	52	53	50	0.29	0.28	0.27	0.26	0.26	0.25	0.26
	2	4.49	61	50	54	50	50	48	0.30	0.25	0.27	0.25	0.25	0.24	0.25
	3	4.61	62	50	52	54	50	48	0.31	0.25	0.26	0.27	0.25	0.24	0.25
FMA_10	1	4.34	68	54	60	54	56	52	0.34	0.27	0.30	0.27	0.28	0.26	0.27
	2	4.49	75	64	62	62	58	56	0.37	0.32	0.31	0.31	0.29	0.28	0.30
	3	4.21	62	63	70	58	60	60	0.31	0.31	0.35	0.29	0.30	0.30	0.31
FMA_20	1	4.53	77	60	64	66	62	60	0.38	0.30	0.32	0.33	0.31	0.30	0.31
	2	5.55	86	80	76	72	72	66	0.42	0.39	0.37	0.35	0.35	0.33	0.36
	3	4.39	79	60	62	60	70	64	0.39	0.30	0.31	0.30	0.35	0.32	0.31
1mm thick PMMA	1	5.96	63	58	56	56	54	52	0.31	0.29	0.28	0.28	0.27	0.26	0.27
	2	6.24	52	48	47	50	48	48	0.26	0.24	0.23	0.25	0.24	0.24	0.24
	3	4.61	62	48	56	50	48	48	0.31	0.24	0.28	0.25	0.24	0.24	0.25

Table I2 Effect of %Mole FMA on pass number on friction characteristic of PFMA-co-PMMA thin film coating deposited on 1 mm thick PMMA sheet by using Davenport Friction Testing Apparatus: 2^{nd} pass

Sample name	Sample number	Weight (g)	Friction force at different distances(g)						Friction coefficient(μ)						
			0 cm	3 cm	6 cm	9 cm	12 cm	15 cm	μ_s	μ_{k1}	μ_{k2}	μ_{k3}	μ_{k4}	μ_{k5}	μ_{kave}
FMA_0	1	4.85	49	38	40	44	43	38	0.24	0.19	0.20	0.22	0.21	0.19	0.20
	2	4.83	53	46	44	50	50	46	0.26	0.23	0.22	0.25	0.25	0.23	0.23
	3	5.05	47	40	42	54	40	39	0.23	0.20	0.21	0.27	0.20	0.19	0.21
FMA_01	1	4.67	59	46	42	46	46	46	0.29	0.23	0.21	0.23	0.23	0.23	0.22
	2	5.66	57	42	48	42	46	47	0.28	0.21	0.24	0.21	0.23	0.23	0.22
	3	4.67	53	48	46	46	44	46	0.26	0.24	0.23	0.23	0.22	0.23	0.23
FMA_1	1	5.57	51	40	48	40	44	44	0.25	0.20	0.24	0.23	0.22	0.22	0.22
	2	4.49	48	42	38	44	48	48	0.24	0.21	0.19	0.22	0.24	0.24	0.22
	3	4.61	50	44	44	48	42	42	0.25	0.22	0.22	0.24	0.21	0.21	0.22
FMA_10	1	4.34	57	42	54	46	54	54	0.28	0.21	0.27	0.23	0.27	0.27	0.25
	2	4.49	68	56	48	50	48	52	0.34	0.28	0.24	0.25	0.24	0.26	0.25
	3	4.21	60	52	50	56	52	50	0.30	0.26	0.25	0.28	0.26	0.25	0.26
FMA_20	1	4.53	55	44	48	38	50	52	0.27	0.22	0.24	0.19	0.25	0.26	0.23
	2	5.55	63	52	58	58	52	58	0.31	0.26	0.29	0.29	0.26	0.29	0.27
	3	4.39	68	58	56	58	54	60	0.34	0.29	0.28	0.29	0.27	0.30	0.28
1mm thick PMMA	1	5.96	65	50	46	56	56	54	0.32	0.25	0.23	0.28	0.28	0.27	0.26
	2	6.24	63	56	54	56	57	56	0.31	0.28	0.27	0.28	0.28	0.28	0.27
	3	4.61	51	40	40	48	46	50	0.25	0.20	0.20	0.24	0.23	0.25	0.22

Table I3 Effect of %Mole FMA on pass number on friction characteristic of PFMA-co-PMMA thin film coating deposited on 1 mm thick PMMA sheet by using Davenport Friction Testing Apparatus: 5th pass

Sample name	Sample number	Weight (g)	Friction force at different distances(g)						Friction coefficient(μ)						
			0 cm	3 cm	6 cm	9 cm	12 cm	15 cm	μ_s	μ_{k1}	μ_{k2}	μ_{k3}	μ_{k4}	μ_{k5}	μ_{kave}
FMA_0	1	4.85	38	30	36	35	30	38	0.19	0.15	0.18	0.17	0.15	0.19	0.17
	2	4.83	54	40	44	42	40	42	0.27	0.20	0.22	0.21	0.20	0.21	0.21
	3	5.05	46	40	40	42	36	38	0.23	0.20	0.20	0.21	0.18	0.19	0.19
FMA_01	1	4.67	56	41	44	44	40	41	0.28	0.20	0.22	0.22	0.20	0.20	0.21
	2	5.66	57	40	42	50	40	42	0.28	0.20	0.21	0.25	0.20	0.21	0.21
	3	4.67	57	38	44	46	38	42	0.28	0.19	0.22	0.23	0.19	0.21	0.21
FMA_1	1	5.57	46	38	40	42	38	38	0.22	0.19	0.20	0.20	0.19	0.19	0.19
	2	4.49	50	40	44	43	41	40	0.25	0.20	0.22	0.19	0.20	0.20	0.20
	3	4.61	50	44	46	41	38	40	0.25	0.22	0.23	0.20	0.19	0.20	0.21
FMA_10	1	4.34	56	44	50	42	44	44	0.28	0.22	0.25	0.21	0.22	0.22	0.22
	2	4.49	60	48	46	48	45	48	0.30	0.24	0.23	0.24	0.22	0.24	0.23
	3	4.21	67	42	46	48	42	40	0.33	0.21	0.23	0.24	0.21	0.20	0.22
FMA_20	1	4.53	50	34	40	40	36	40	0.25	0.17	0.20	0.22	0.18	0.20	0.19
	2	5.55	54	50	56	54	44	50	0.27	0.25	0.28	0.21	0.22	0.25	0.24
	3	4.39	57	57	52	52	51	49	0.28	0.28	0.26	0.26	0.25	0.24	0.26
1mm thick PMMA	1	5.96	55	30	36	35	30	38	0.27	0.15	0.18	0.17	0.15	0.19	0.17
	2	6.24	52	40	44	42	40	42	0.25	0.20	0.22	0.21	0.20	0.21	0.20
	3	4.61	49	40	40	42	36	38	0.24	0.20	0.20	0.21	0.18	0.19	0.19

Table I4 Effect of %Mole FMA on pass number on friction characteristic of PFMA-co-PMMA thin film coating deposited on 1 mm thick PMMA sheet by using Davenport Friction Testing Apparatus: 10th pass

Sample name	Sample number	Weight (g)	Friction force at different distances(g)						Friction coefficient(μ)						
			0 cm	3 cm	6 cm	9 cm	12 cm	15 cm	μ_s	μ_{k1}	μ_{k2}	μ_{k3}	μ_{k4}	μ_{k5}	μ_{kave}
FMA_0	1	4.85	38	32	34	36	30	30	0.19	0.16	0.15	0.15	0.16	0.19	0.16
	2	4.83	59	44	50	45	41	44	0.29	0.22	0.20	0.22	0.22	0.29	0.22
	3	5.05	43	45	40	48	40	39	0.21	0.22	0.20	0.19	0.21	0.21	0.22
FMA_01	1	4.67	56	38	40	39	42	42	0.28	0.19	0.21	0.21	0.20	0.28	0.19
	2	5.66	56	40	41	36	41	42	0.28	0.20	0.20	0.21	0.20	0.28	0.20
	3	4.67	53	44	47	45	43	45	0.26	0.22	0.21	0.22	0.22	0.26	0.22
FMA_1	1	5.57	50	39	42	39	39	38	0.25	0.19	0.19	0.19	0.20	0.25	0.19
	2	4.49	45	38	40	41	40	37	0.22	0.19	0.20	0.18	0.20	0.22	0.19
	3	4.61	53	44	46	44	41	42	0.26	0.22	0.20	0.21	0.21	0.26	0.22
FMA_10	1	4.34	52	44	46	46	44	46	0.26	0.22	0.22	0.23	0.22	0.26	0.22
	2	4.49	54	48	48	47	42	45	0.27	0.24	0.21	0.22	0.23	0.27	0.24
	3	4.21	55	50	46	50	44	43	0.27	0.25	0.22	0.21	0.23	0.27	0.25
FMA_20	1	4.53	46	42	45	41	41	41	0.23	0.21	0.20	0.20	0.21	0.23	0.21
	2	5.55	44	46	50	44	40	43	0.22	0.23	0.20	0.21	0.22	0.22	0.23
	3	4.39	66	50	50	48	52	51	0.33	0.25	0.26	0.25	0.25	0.33	0.25
1mm thick PMMA	1	5.96	58.2	43	52	48	46	46	0.29	0.21	0.23	0.23	0.23	0.29	0.21
	2	6.24	56.2	38	46	44	46	46	0.28	0.19	0.23	0.23	0.22	0.28	0.19
	3	4.61	53.2	46	40	46	42	44	0.26	0.23	0.21	0.22	0.22	0.26	0.23

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