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APPENDIX A

Mean values of mechanical properties of ESCOR®s/EAAs blends

Hardness values of ESCOR®s/EAAs blends

Table A1 Hardness values of ESCOR®310/EAAs.

EAA content	EAA1	EAA2	EAA4	EAA5
0	48.6	48.6	48.6	48.6
20	48.9	48.9	49.8	43.6
40	50.3	50.4	50.6	44.0
60	51.5	51	50.8	46.9
80	53.4	52.5	52.6	49.3
100	53.8	55.7	54.6	53.7

Table A2 Hardness values of ESCOR®325/EAAs.

EAA content	EAA1	EAA2	EAA4	EAA5
0	28.2	28.2	28.2	28.2
20	34.1	32.7	33.5	33.5
40	38.1	41.1	41.2	40.9
60	45.1	45.5	47.1	46.3
80	49.3	53.3	50.6	54.3
100	53.8	55.7	54.6	53.7

Table A3 Hardness values of ESCOR®320/EAAs.

EAA content	EAA1	EAA2	EAA4	EAA5
0	34.2	34.2	34.2	34.2
20	37.9	38.8	38.3	38.8
40	44.3	43.4	45.2	45.1
50	-	47.6	-	-
60	48.2	50.3	50.6	49.7
80	52.1	52.1	53.6	51.7
85	-	53.9	-	-
90	-	54.1	-	-
95	-	56.3	-	-
100	53.8	55.7	54.6	53.7

Tensile properties of ESCOR®s/EAAs blends

Maximum stress of ESCOR®s/EAAs blends

Table A4 Maximum stress of ESCOR®310/EAAs.

EAA content	EAA1	EAA2	EAA4	EAA5
0	11.116	11.116	11.116	11.116
20	12.141	11.732	12.491	11.303
40	12.117	10.967	13.091	12.496
60	13.400	13.971	14.449	13.506
80	12.452	14.907	15.313	15.333
100	15.265	15.834	15.902	16.285

Table A5 Maximum stress of ESCOR®320/EAAs.

EAA content	EAA1	EAA2	EAA4	EAA5
0	4.794	4.794	4.794	4.794
20	7.184	3.542	6.163	6.588
40	8.949	5.994	8.688	8.576
50	-	4.931	-	-
60	10.608	7.548	10.437	10.968
80	12.061	12.680	13.372	12.620
85	-	12.652	-	-
90	-	12.628	-	-
95	-	14.857	-	-
100	15.265	16.301	15.902	16.285

Table A6 Maximum stress of ESCOR®325/EAAs.

EAA content	EAA1	EAA2	EAA4	EAA5
0	4.956	4.956	4.956	4.956
20	5.895	6.270	6.329	6.050
40	7.898	9.057	7.283	8.369
60	10.554	11.611	11.119	11.351
80	12.571	11.431	13.458	15.150
100	15.265	15.834	15.902	16.285

Young's modulus of ESCOR®s/EAAs blends

Table A7 Young's modulus of ESCOR®310/EAAs.

EAA content	EAA1	EAA2	EAA4	EAA5
0	137.146	137.146	137.146	137.146
20	263.272	157.750	195.012	281.019
40	329.098	173.502	209.649	215.259
60	358.310	265.004	270.945	175.040
80	385.681	249.242	324.759	151.397
100	615.485	207.250	393.040	272.79

Table A8 Young's modulus of ESCOR®320/EAAs.

EAA content	EAA1	EAA2	EAA4	EAA5
0	18.137	18.137	18.137	18.137
20	64.739	32.046	59.153	59.887
40	142.136	51.741	122.399	107.949
50	-	60.192	-	-
60	241.774	81.003	191.239	161.385
80	376.065	153.702	264.973	151.202
85	-	140.959	-	-
90	-	194.897	-	-
95	-	196.395	-	-
100	615.485	456.470	393.040	272.79

Table A10 Young's modulus of ESCOR®325/EAAs.

EAA content	EAA1	EAA2	EAA4	EAA5
0	34.803	34.803	34.803	34.803
20	41.585	66.194	75.101	56.736
40	114.528	173.579	137.318	119.038
60	337.838	326.574	243.723	202.864
80	386.996	361.888	345.208	321.580
100	615.485	456.470	393.040	272.79

Gloss properties of ESCOR®s/EAAs blends

Gloss value at 20° of ESCOR®s/EAAs blends

Table A11 Gloss value at 20° of ESCOR®310/EAAs.

EAA content	EAA1	EAA2	EAA4	EAA5
0	73.0	73.0	73.0	73.0
20	65.2	63.3	70.9	60.1
40	61.9	67.9	66.2	71.8
60	63.2	72.1	65.2	73.2
80	66.8	66.6	63.7	75.5
100	71.6	62.4	67.0	75.2

Table A12 Gloss value at 20° of ESCOR®320/EAAs.

EAA content	EAA1	EAA2	EAA4	EAA5
0	74.2	74.2	74.2	74.2
20	52.6	36.8	61.5	63.7
40	53.0	53.3	61.4	61.5
50	-	50.3	-	-
60	61.3	49.9	61.5	63.1
80	62.7	50.4	62.8	70.3
85	-	51.1	-	-
90	-	56.0	-	-
95	-	56.5	-	-
100	71.6	62.4	67.0	75.2

Table A13 Gloss value at 20° of ESCOR®325/EAAs.

EAA content	EAA1	EAA2	EAA4	EAA5
0	65.4	65.4	65.4	65.4
20	42.5	45.5	54.5	47.7
40	45.7	48.3	54.1	51.5
60	47.7	56.2	55.2	58.5
80	50.4	62.4	59.7	65.9
100	71.6	62.4	67.0	75.2

Gloss value at 60° of ESCOR®s/EAAs blends

Table A14 Gloss value at 60° of ESCOR®310/EAAs.

EAA content	EAA1	EAA2	EAA4	EAA5
0	93.3	93.3	93.3	93.3
20	81.0	84	88.7	81.0
40	80.1	83.8	84.2	87.6
60	81.0	87.0	82.4	89.1
80	83.1	81.8	80.7	90.9
100	86.7	82.6	83.0	80.1

Table A15 Gloss value at 60° of ESCOR®320/EAAs.

EAA content	EAA1	EAA2	EAA4	EAA5
0	96.7	96.7	96.7	96.7
20	70.3	59.5	78.2	80.1
40	72.3	76.4	79.5	80.6
50	-	75.2	-	-
60	80.1	71.3	80.6	81.4
80	81.2	76.8	81.7	84.9
85	-	74.4	-	-
90	-	77.0	-	-
95	-	79.5	-	-
100	86.7	82.6	83.0	80.1

Table A16 Gloss value at 60° of ESCOR®325/EAAs.

EAA content	EAA1	EAA2	EAA4	EAA5
0	93.3	93.3	93.3	93.3
20	71.6	76.9	78.2	76.7
40	71.5	73.3	78.8	73.3
60	71.5	77.3	76.3	80.7
80	72.9	81.0	79.0	82.4
100	86.7	82.6	83.0	80.1

APPENDIX B

Rheological properties of ESCOR®320/EAA®2 blends

Table B1 Rheological properties (G', dyn/cm^2) of ESCOR®320/ EAA®2.

Freq (rad/s)	EAA content					
	0	20	40	60	80	100
0.1	12142.6	-	30235.7	641000	-	-
0.15849	17445.3	19023.1	35661	453000	-	-
0.25119	24922.6	25244.0	34398.2	509000	-	-
0.39811	34692.4	35084.1	57840	450000	535000	35703.4
0.63096	47734.8	46648.4	73291.5	436000	-	47831.5
1	64532.9	62767.2	86524	536000	544000	65728.1
1.58489	86609.4	84451.1	101000	-	499000	86010.4
2.51189	115000	111000	135000	551000	524000	112000
3.98107	151000	145000	170000	572000	557000	148000
6.30957	196000	188000	217000	635000	608000	192000
10	250000	241000	278000	681000	652000	249000
15.8489	318000	306000	349000	758000	701000	317000
25.1189	400000	388000	438000	826000	785000	409000
39.8107	502000	488000	545000	917000	872000	511000
63.0957	626000	611000	680000	1030000	971000	635000
100	786000	764000	832000	1130000	1080000	789000

Table B2 Rheological properties (G", dyn/cm^2) of ESCOR$^®$320/ EAA$^®$2.

Freq (rad/s)	EAA content					
	0	20	40	60	80	100
0.1	21819.4	-	47583.4	335000	-	-
0.15849	28766.3	27808.4	56993.2	341000	-	-
0.25119	37624.8	36812.5	65761.2	-	-	-
0.39811	48728.8	45416.9	80597.6	395000	186000	52306.6
0.63096	62232.7	58843.6	104000	261000	-	65089
1	79143.9	76877.1	114000	133000	127000	82529.7
1.58489	100000	97448.3	127000	-	105000	103000
2.51189	126000	121000	157000	0.26447	149000	128000
3.98107	158000	151000	187000	0.31328	150000	160000
6.30957	197000	187000	224000	0.32692	188000	197000
10	241000	229000	271000	0.35983	224000	242000
15.8489	295000	280000	324000	0.3725	260000	297000
25.1189	359000	342000	388000	0.40243	308000	362000
39.8107	435000	414000	461000	0.41901	365000	433000
63.0957	529000	502000	548000	0.43842	433000	524000
100	642000	608000	650000	0.47713	502000	631000

Table B3 Rheological properties (tan δ) of ESCOR®320/ EAA®2.

Freq (rad/s)	EAA content					
	0	20	40	60	80	100
0.1	1.79693	-	1.57375	0.52271	-	-
0.15849	1.64894	1.46182	1.59819	0.75266	-	-
0.25119	1.50967	1.45827	1.91176	-	-	-
0.39811	1.40459	1.29452	1.39346	0.7762	0.34768	1.46503
0.63096	1.30372	1.26143	1.42161	0.5806	-	1.3608
1	1.22641	1.2248	1.31765	0.24854	0.23408	1.25562
1.58489	1.15533	1.1539	1.25303	-	0.20966	1.19528
2.51189	1.09732	1.0895	1.16898	0.26447	0.27552	1.14454
3.98107	1.04746	1.03753	1.09778	0.31328	0.27003	1.08045
6.30957	1.00187	0.99437	1.03283	0.32692	0.30927	1.02619
10	0.96478	0.95182	0.97727	0.35983	0.34281	0.9758
15.8489	0.9294	0.91334	0.92694	0.3725	0.37118	0.93476
25.1189	0.89806	0.88126	0.88451	0.40243	0.39216	0.88537
39.8107	0.86741	0.84803	0.84457	0.41901	0.41872	0.84715
63.0957	0.8443	0.82115	0.80617	0.43842	0.44625	0.82472
100	0.81599	0.7954	0.78115	0.47713	0.46402	0.79981

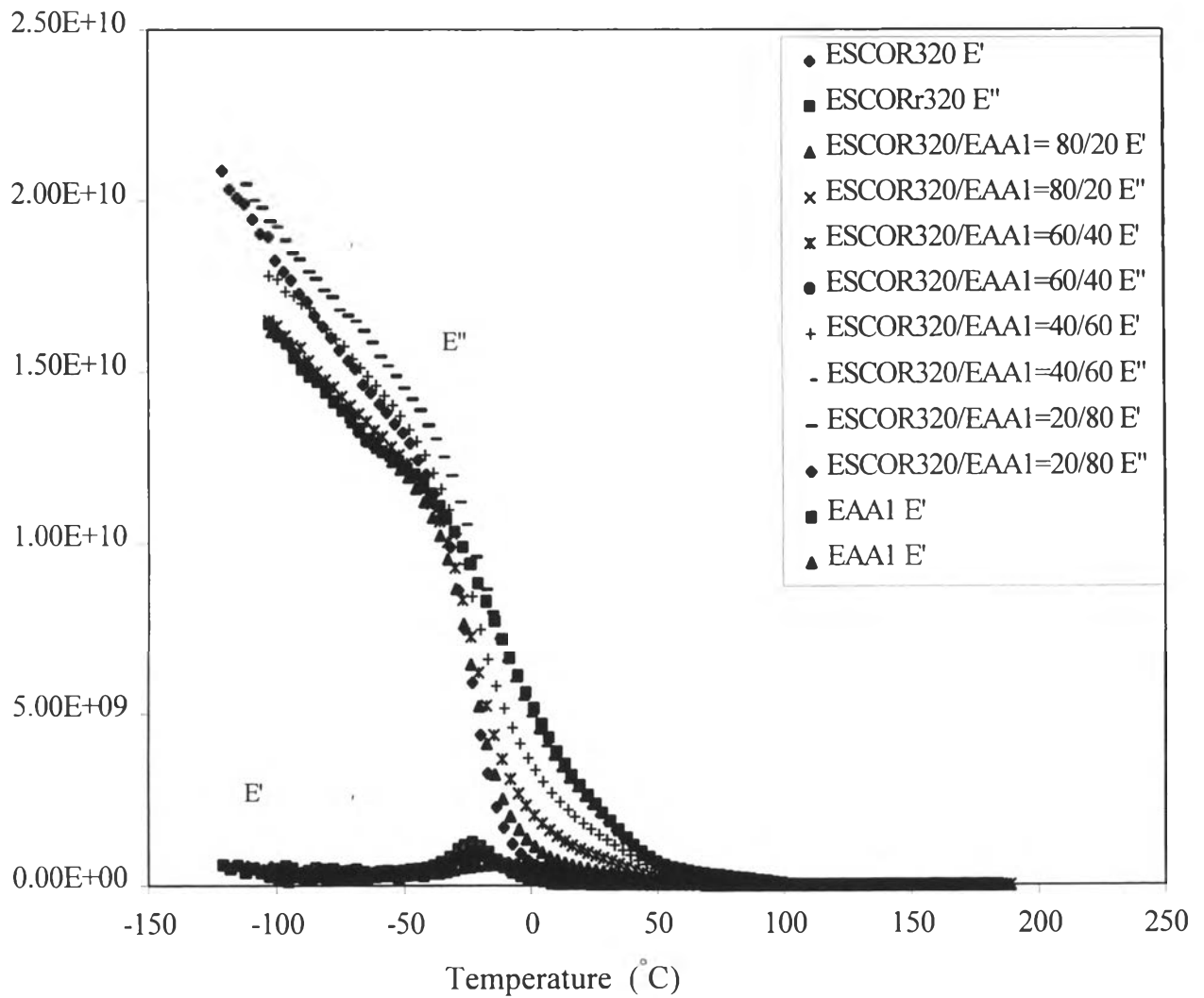**Dynamic mechanical properties of ESCOR®320/EAAs blends**

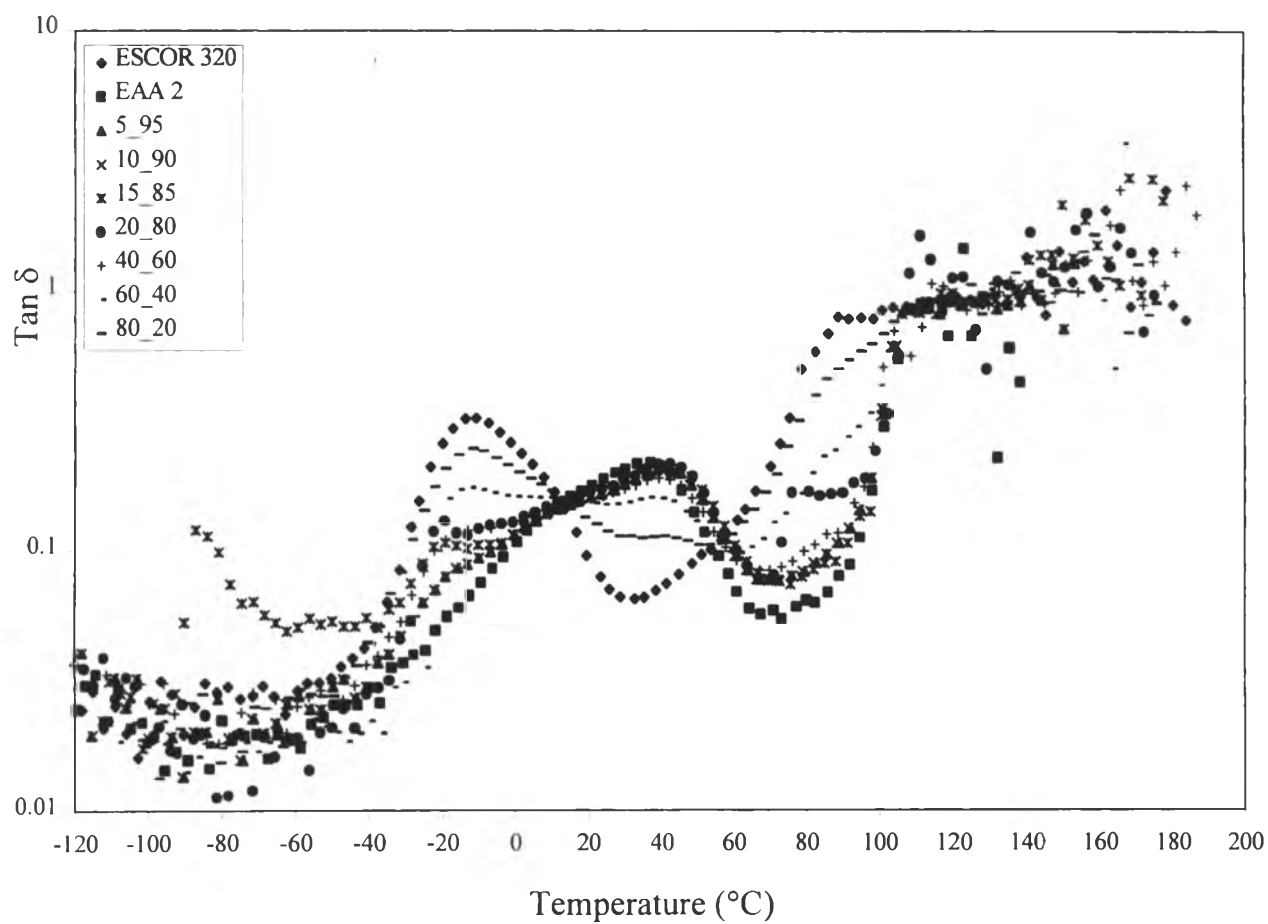**Figure C1** Dynamic mechanical properties (G' and G") of ESCOR®320/
EAA® 1.

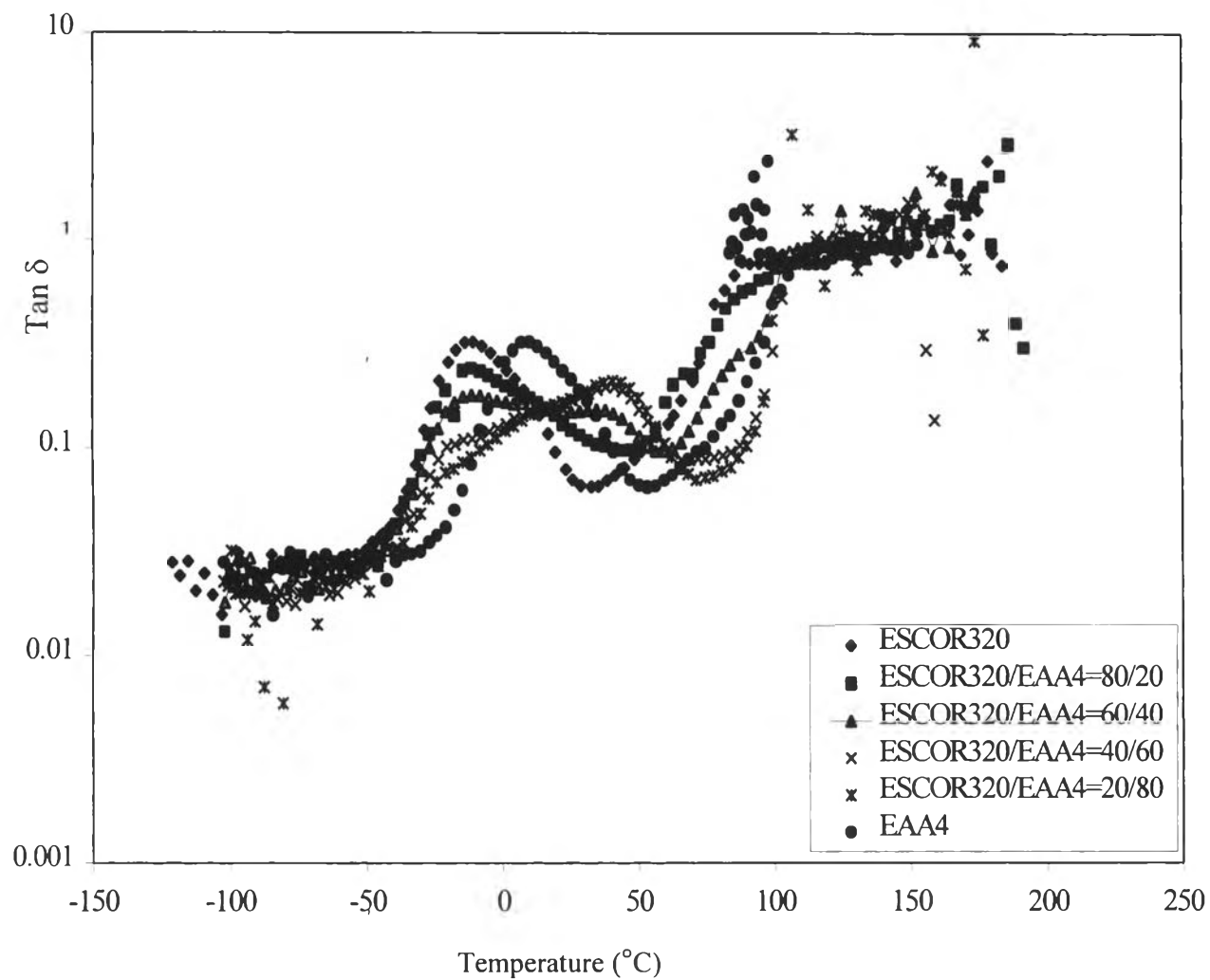**Figure C2** Dynamic mechanical properties (G' and G") of ESCOR®320/ EAA® 2.

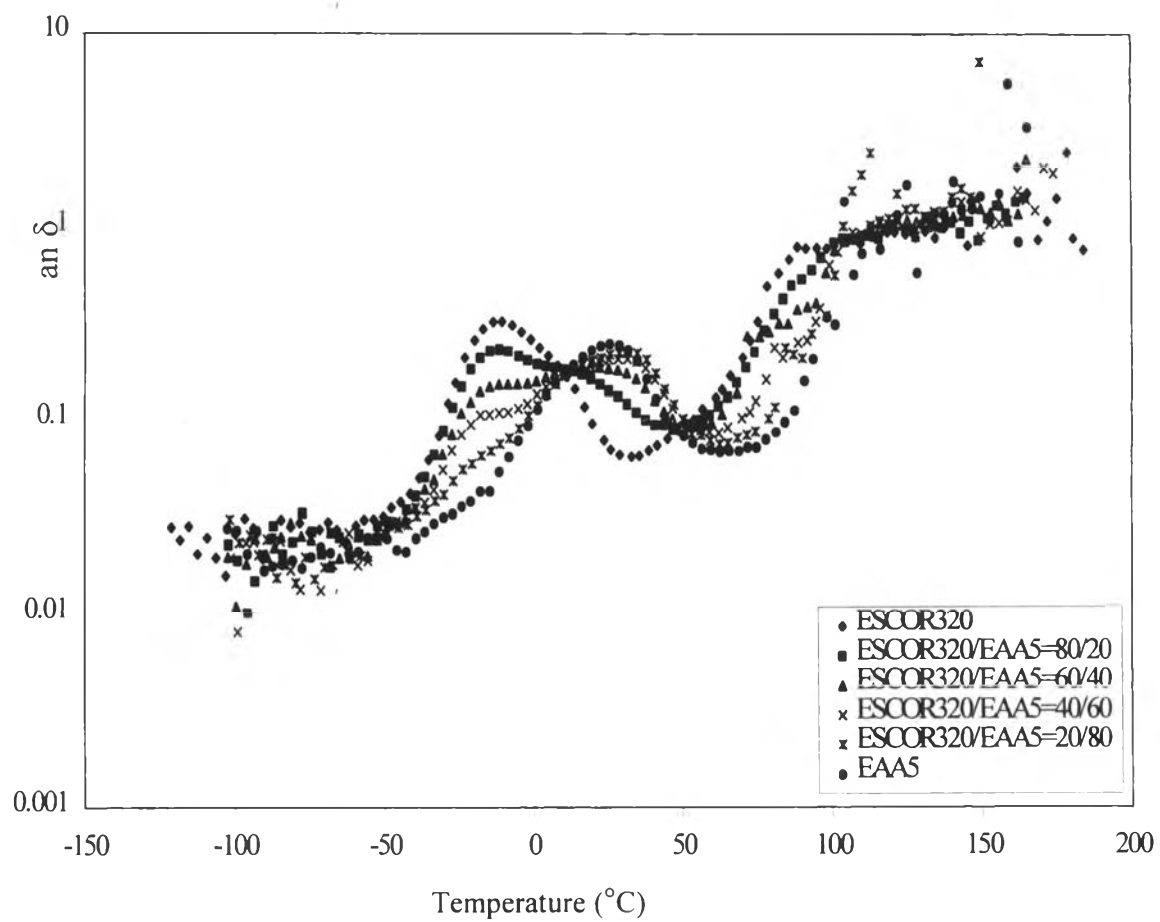**Figure C3** Dynamic mechanical properties (G' and G") of ESCOR®320/
EAA® 4.

Figure C4 Dynamic mechanical properties (G' and G") of ESCOR®320/ EAA® 5.

APPENDIX D

General properties of ESCOR® terpolymer

Table D1 General properties of ESCOR® 310 (Acid terpolymer for adhesive and polymer modification).

Resin Properties	Test Based On	Unit (SI)	Typical Value[1]
Melt Index	Exxon Method	g/10 min	6.0
Density	Exxon Method	g/cm3	0.941
Acid Number	Exxon Method	Mg KOH/g polymer	45
Melting Temperature	Exxon Method	°F (°C)	201 (94)
Crystallization Temperature	Exxon Method	°F (°C)	165 (74)
Physical Properties[2]			
Young's Modulus	ASTM D-638	Psi (Mpa)	2700 (19)
Flex Modulus	ASTM D-790	Psi (Mpa)	8650 (60)
Vicat Softening Point	ASTM D-1525	°F (°C)	161 (66)
Tensile Strength[3] @ yield	ASTM D-638	Psi (Mpa)	480 (3.3)
@ break			2100 (14)
Elongation[3] @ break	ASTM D-638	%	570
Hardness, 15s shore A	ASTM D-2240	-	90
shore D			41

1. Values are typical and should not be interpreted as specifications.

2. Physical properties were measured on compression molded specimens.

3. Tensile testing was conducted as a crosshead speed of 2 in/min.

FDA Status

ESCOR® 325 terpolymer complies with FDA regulation 21 CFR 175.105 (a) (1) "Adhesive" and may be safely used as a component of non-alcoholic food (2). ESCOR® 325 terpolymer also complies with 21 CFR 176.180 (b) (2) "Components of paper and paperboard in contact with dry food" and may be safely used as a component of paper and paper board packaging articles for dry foods.

Table D2   General properties of ESCOR® 320 (Acid terpolymer for film and extrusion coating applications).

Resin Properties	Test Based On	Unit (SI)	Typical Value[1]
Melt Index	Exxon Method	g/10 min	5.0
Density	Exxon Method	g/cm3	0.953
Acid Number	Exxon Method	Mg KOH/g polymer	45
Melting Temperature	Exxon Method	°F (°C)	169 (76)
Physical Properties[2]			
Tensile Strength MD	ASTM D-882	Psi (Mpa)	2800 (19)
TD			2500 (17)
Elongation MD	ASTM D-882	%	390
TD			17

1. Values are typical and should not be interpreted as specifications.

2. Film obtained on a 2.5 inch blown film line with 2:1 blow-up ratio and melt temperature of 320-380°F (160-195°C).

FDA Status

ESCOR® 320 terpolymer complies with FDA regulation 21 CFR 175.105 (a) (1) "Adhesive" and may be safely used as a component of non-alcoholic food (2). ESCOR® 325 terpolymer also complies with 21 CFR 176.180 (b) (2)

"Components of paper and paperboard in contact with dry food" and may be safely used as a component of paper and paper board packaging articles for dry foods.

Table D3   General properties of ESCOR® 325 (Acid terpolymer for speciality and polymer modification).

Resin Properties	Test Based On	Unit (SI)	Typical Value[1]
Melt Index	Exxon Method	g/10 min	20
Density	Exxon Method	g/cm3	0.950
Acid Number	Exxon Method	Mg KOH/g polymer	45
Melting Temperature	Exxon Method	°F (°C)	163 (73)
Crystallization Temperature	Exxon Method	°F (°C)	120 (49)
Physical Properties[2]			
Flex Modulus	ASTM D-790	Psi (Mpa)	2000 (14)
Vicat Softening Point	ASTM D-1525	°F (°C)	104 (40)
Tensile Strength[3] @ break	ASTM D-638	Psi (Mpa)	630 (4.3)
Elongation[3] @ break	ASTM D-638	%	725
Tensile Impact 23°C	ASTM D-1822	ft.ib/in^2 (kJ/m^2)	280(590)
-40°C			190(400)
Hardness, 15s shore A	ASTM D-2240	-	78
shore D			23

1. Values are typical and should not be interpreted as specifications.

2. Physical properties were measured on compression molded specimens.

3. Tensile testing was conducted as a crosshead speed of 2 in/min.

FDA Status

ESCOR® 325 terpolymer complies with FDA regulation 21 CFR 175.105 (a) (1) "Adhesive" and may be safely used as a component of non-alcoholic food (2). ESCOR® 325 terpolymer also complies with 21 CFR 176.180 (b) (2) "Components of paper and paperboard in contact with dry food" and may be safely used as a component of paper and paper board packaging articles for dry foods.

CURRICULUM VITAE

Name: Ms. Worakanya Visitsart

Date of Birth: December 29, 1977

Nationality: Thai

University Education:

1994-1997   Bachelor of Science Degree in Packaging Technology,
Kasetsart University, Bangkok, Thailand.