

## APPENDICES

### APPENDIX A: Nomenclature

AFM	–	Atomic force microscopy
APPJ	–	Atmospheric Pressure Plasma Jet
ASTM	–	American Standards Testing Method
ATR	–	Attenuated Total Reflection
BPO	–	Benzoyl Peroxide
DBD	–	Dielectric Barrier Discharge
DCP	–	Dicumyl Peroxide
DMA	–	Dynamic Mechanical Analysis
DPPH	–	1,1-Diphenyl-2-picrylhydrazyl
DR	–	Draw Ratio
DSC	–	Differential Scanning Calorimetry
ENR	–	Epoxidized Natural Rubber
EVA	–	Ethylene Vinyl Acetate
FT-IR	–	Fourier Transform Infrared
FWHM	–	Full Width at Half Maximum
GPC	–	Gel Permeation Chromatography
HDPE	–	High Density Polyethylene
IPA	–	Isopropanol
LCB	–	Long Chain Branch
LDPE	–	Low Density Polyethylene
LLDPE	–	Linear Low Density Polyethylene
LNR	–	Liquid Natural Rubber
MA	–	Maleic Anhydride
MFI	–	Melt flow index
MWD	–	Molecular Weight Distribution
NMR	–	Nuclear Magnetic Resonance
NR	–	Natural Rubber
PE	–	Polyethylene
PE-g-MA	–	Polyethylene-grafted-Maleic Anhydride
PMMA	–	Polymethyl methacrylate
POM	–	Polarizing Optical Microscopy
PP	–	Polypropylene
RMS	–	Root Mean Square
SCB	–	Short Chain Branch
SEC	–	Size Exclusion Chromatography
SEM	–	Scanning Electron Microscopy

SPM	–	Scanning Probe Microscopy
TWE	–	Twin-Screw Extruder
UHMWPE	–	Ultra High Molecular Weight Polyethylene
UV	–	Ultraviolet irradiation
VLDPE	–	Very Low Density Polyethylene
XPS	–	X-ray Photoemission Spectroscopy
XRD	–	X-ray Diffraction

## APPENDIX B: Table of values for particular measurement

[Parenthesis shows the chapter to which the table is related.]

**Table I** Oxygen permeability of the uniaxial-drawn films produced via the blending system of LLDPE and rubber phase(s) [IV]

Sample	Oxygen Permeability ( $\text{cm}^3 \cdot \text{mil} / \text{m}^2 \cdot \text{d} \cdot \text{bar}$ )					
	Draw Ratio = 15			Draw Ratio = 20		
LLDPE	12136	±	21	1115	±	16
LN 80	1374	±	19	1175	±	12
LN 90	1193	±	25	1117	±	15
LEN 80	1360	±	18	1196	±	12
LEN 90	1123	±	22	1037	±	9
LMEN 80	6008	±	149	8870	±	175
LMEN 90	8046	±	243	9139	±	274

**Table II** Melt flow index of the low-dose peroxide modified LLDPE [V]

Processing Conditions			Measured MFI (g/10 min)								
Temp. (°C)	DCP (phr)	Speed ( $\text{min}^{-1}$ )	Method of Peroxide Addition								
			Method I (Mi)		Method II (Mii)		Method III (Miii)				
200	0.1	70	0.0261	±	0.0032	0.0433	±	0.0109	0.0192	±	0.0006
200	0.1	30	0.0312	±	0.0010	0.0692	±	0.0015	0.0204	±	0.0007
200	0	70	0.5508	±	0.0055	0.5508	±	0.0055	0.5508	±	0.0055
200	0.02	70	0.1352	±	0.0005	0.1885	±	0.0019	0.0349	±	0.0003
200	0	30	0.6108	±	0.0046	0.6108	±	0.0046	0.6108	±	0.0046
200	0.02	30	0.2126	±	0.0042	0.3585	±	0.0023	0.1296	±	0.0011
170	0.1	70	0.0258	±	0.0014	0.0448	±	0.0003	0.0161	±	0.0001
170	0.1	30	0.0212	±	0.0008	0.0418	±	0.0002	0.0152	±	0.0003
170	0	70	0.5037	±	0.0058	0.5037	±	0.0058	0.5037	±	0.0058
170	0.02	70	0.0989	±	0.0007	0.1190	±	0.0017	0.0338	±	0.0004
170	0	30	0.7070	±	0.0124	0.7070	±	0.0124	0.7070	±	0.0124
170	0.02	30	0.3590	±	0.0022	0.4488	±	0.0023	0.2840	±	0.0084
185	0.05	50	0.0672	±	0.0037	0.0815	±	0.0004	0.0289	±	0.0009
185	0.06	50	0.0475	±	0.0010	0.0590	±	0.0012	0.0278	±	0.0002

**Table III**  $2^3$  factorial experimental level with MFI as a response variable [VI]

Estimated Effect from $2^3$ Factorial Design : MFI as a Response Variable								Averaged MFI (g/ 10 min)
Mean	Main Effects			Two-Factor Interactions			Three-Factor Interaction	
	C	P	R	CP	CR	PR	CPR	
+	+	+	+	+	+	+	+	0.0192
+	+	+	-	+	-	-	-	0.0204
+	+	-	+	-	+	-	-	0.0349
+	+	-	-	-	-	+	+	0.1296
+	-	+	+	-	-	+	-	0.0208
+	-	+	-	-	+	-	+	0.0152
+	-	-	+	+	-	-	+	0.0338
+	-	-	-	+	+	+	-	0.2840

Estimated variance at set of center point condition

$$= s^2 = 7.40E-07$$

Thus, the variance of each effect

$$= [(1/8) + (1/8)] s^2 = 1.85E-07$$

The estimated standard error of an effect

$$= 4.30E-04$$

**Table IV** Summary of model fitting for MFI [VI]

Set	$Y_r = b_0 + b_2X_2 + b_3X_3 + b_{23}X_2X_3$						
<b>Mi</b>	<b>Y(x) =</b>	<b>0.5017</b>	<b>- 4.8247</b>	<b>X<sub>2</sub></b>	<b>- 0.005272</b>	<b>X<sub>3</sub></b>	<b>+ 0.0527 X<sub>2</sub>X<sub>3</sub></b>
	Estimated standard error	0.0940	1.3072		0.001750		0.0243
<b>Mii</b>	<b>Y(x) =</b>	<b>0.7112</b>	<b>- 6.5873</b>	<b>X<sub>2</sub></b>	<b>- 0.007738</b>	<b>X<sub>3</sub></b>	<b>+ 0.0745 X<sub>2</sub>X<sub>3</sub></b>
	Estimated standard error	0.0774	1.0983		0.001442		0.0204
<b>Miii</b>	<b>Y(x) =</b>	<b>0.4116</b>	<b>- 3.9998</b>	<b>X<sub>2</sub></b>	<b>- 0.005403</b>	<b>X<sub>3</sub></b>	<b>+ 0.0546 X<sub>2</sub>X<sub>3</sub></b>
	Estimated standard error	0.0886	1.2315		0.001649		0.0229

**Table V** Summary of model fitting for MFI: analysis of variance for the model fitted to the MFI data [VI]

Set	SST	SSR	SSE	F	F Value from Table	R <sup>2</sup>
<b>Mi</b>	0.1051	0.0900	0.0151	9.94	F <sub>0.05,3,5</sub> = 5.41	0.8564
<b>Mii</b>	0.1840	0.1674	0.0166	16.77	F <sub>0.01,3,5</sub> = 12.06	0.9096
<b>Miii</b>	0.0638	0.0504	0.0131	6.28	F <sub>0.05,3,5</sub> = 5.41	0.7902

**Table VI** Generated surface radical concentration of nitrogen-APPJ aged in ambient air with the vertical distance of 122 cm. [VII]

Test Label		201088	151066	151077	151088	101066	101077	101088	10966	10977	10988	10866	10877	10888
Gas Flow Rate (L/min)	Processing Gas (Jet)	20	15	15	15	10	10	10	10	10	10	10	10	10
	Feeding Gas	10	10	10	10	10	10	10	9	9	9	8	8	8
Pellet Velocity (m/s)		1.7733	1.1871	1.1871	1.1871	0.8376	0.8376	0.8376	0.8155	0.8155	0.8155	0.7569	0.7569	0.7569
Applied Voltage (kV)		8.8	6.6	7.7	8.8	6.6	7.7	8.8	6.6	7.7	8.8	6.6	7.7	8.8
Measured Power (W)		44	9	19	44	10	30	44	10	30	44	10	30	46
Jet Length (cm)		20.5	5.0	16.5	18.5	5.0	14.0	15.0	8.0	13.0	14.0	7.0	12.0	13.0
Residence Time	(s)	9.87E-02	1.68E-02	1.14E-01	1.31E-01	2.39E-02	1.31E-01	1.43E-01	6.13E-02	1.23E-01	1.35E-01	5.28E-02	1.19E-01	1.32E-01
	(ms)	9.87E-01	1.68E+01	1.14E-02	1.31E+02	2.39E-01	1.31E+02	1.43E-02	6.13E-01	1.23E+02	1.35E-02	5.28E+01	1.19E-02	1.32E+02
Estimated Jet Volume (cm <sup>3</sup> )		1.03E-01	2.51E-00	8.30E-00	9.30E+00	2.51E+00	7.04E+00	7.54E-00	4.02E-00	6.54E+00	7.04E+00	3.52E+00	6.03E-00	6.54E+00
Estimated Treatment Volume (cm <sup>3</sup> )		8.80E-00	1.01E-00	6.79E-00	7.79E+00	1.01E+00	5.53E+00	6.03E+00	2.51E+00	5.03E+00	5.53E+00	2.01E+00	4.53E+00	5.03E+00
Watt Density (W/cm <sup>3</sup> )		4.27E-00	3.58E+00	2.29E-00	4.73E+00	3.98E+00	4.26E+00	5.83E-00	2.49E+00	4.59E+00	6.25E+00	2.84E+00	4.97E+00	7.04E+00
Plasma Dosage (J/cm <sup>3</sup> )		4.21E-01	6.03E-02	2.60E-01	6.18E-01	9.50E-02	5.60E-01	8.36E-01	1.52E-01	5.63E-01	8.43E-01	1.50E-01	5.91E-01	9.30E-01
Total Radical Concentration	mol / cm <sup>2</sup>	2.01E-07	1.13E-07	1.81E-07	1.53E-07	2.06E-07	2.34E-07	2.25E-07	1.94E-07	2.10E-07	2.04E-07	-3.05E-08	-1.83E-08	3.42E-08
Generated on Pellet Surface	mmol / kg of pellet	3.17E+00	1.78E+00	2.85E+00	2.41E+00	3.24E+00	3.68E+00	3.54E+00	3.05E+00	3.30E+00	3.21E+00	-4.80E-01	-2.88E-01	5.39E-01

**Table VI(cont')** Generated surface radical concentration of nitrogen-APPJ aged in ambient air with the vertical distance of 122 cm. [VII]

Test Label		10766	10777	10788	9966	9977	9988	8866	8877	8888	7766	7777	7788
Gas Flow Rate (L/min)	Processing Gas (Jet)	10	10	10	9	9	9	8	8	8	7	7	7
	Feeding Gas	7	7	7	9	9	9	8	8	8	7	7	7
Pellet Velocity (m/s)		0.7207	0.7207	0.7207	0.6772	0.6772	0.6772	0.5429	0.5429	0.5429	0.4110	0.4110	0.4110
Applied Voltage (kV)		6.6	7.7	8.8	6.6	7.7	8.8	6.6	7.7	8.8	6.6	7.7	8.8
Measured Power (W)		9	28	46	8	27	46	8	20	45	9	20	45
Jet Length (cm)		7.0	11.0	12.0	5.5	8.0	11.5	6.5	8.5	10.0	6.5	7.5	8.5
Residence Time	(s)	5.55E-02	1.11E-01	1.25E-01	3.69E-02	7.38E-02	1.26E-01	6.45E-02	1.01E-01	1.29E-01	8.52E-02	1.09E-01	1.34E-01
	(ms)	5.55E+01	1.11E+02	1.25E+02	3.69E+01	7.38E+01	1.26E+02	6.45E+01	1.01E+02	1.29E+02	8.52E+01	1.09E+02	1.34E+02
Estimated Jet Volume (cm <sup>3</sup> )		3.52E+00	5.53E+00	6.03E+00	2.77E+00	4.02E+00	5.78E+00	3.27E+00	4.27E+00	5.03E+00	3.27E+00	3.77E+00	4.27E+00
Estimated Treatment Volume (cm <sup>3</sup> )		2.01E+00	4.02E+00	4.53E+00	1.26E+00	2.51E+00	4.27E+00	1.76E+00	2.77E+00	3.52E+00	1.76E+00	2.26E+00	2.77E+00
Watt Density (W/cm <sup>3</sup> )		2.56E+00	5.06E+00	7.62E+00	2.89E+00	6.71E+00	7.95E+00	2.45E+00	4.68E+00	8.95E+00	2.75E+00	5.30E+00	1.05E+01
Plasma Dosage (J/cm <sup>3</sup> )		1.42E-01	5.62E-01	9.52E-01	1.07E-01	4.96E-01	9.98E-01	1.58E-01	4.74E-01	1.15E+00	2.34E-01	5.81E-01	1.41E+00
Total Radical Concentration	mol / cm <sup>2</sup>	-7.58E-08	-1.26E-08	6.97E-09	1.42E-07	1.60E-07	1.45E-07	9.01E-08	1.12E-07	1.10E-07	7.80E-08	1.24E-07	8.96E-08
Generated on Pellet Surface	nmol / kg of pellet	-1.19E+00	-1.98E-01	1.10E-01	2.24E+00	2.53E+00	2.28E+00	1.42E+00	1.77E+00	1.73E+00	1.23E+00	1.95E+00	1.41E+00

**Table VII** Generated surface radical concentration of nitrogen-APPJ aged in ambient air with the vertical distance of 30 cm. [VII]

Test Label		201088	151066	151077	151088	101066	101077	101088	10966	10977	10988	10866	10877	10888
Gas Flow Rate (L/min)	Processing Gas (Jet)	20	15	15	15	10	10	10	10	10	10	10	10	10
	Feeding Gas	10	10	10	10	10	10	10	9	9	9	8	8	8
Pellet Velocity (m/s)		1.7733	1.1871	1.1871	1.1871	0.8376	0.8376	0.8376	0.8155	0.8155	0.8155	0.7569	0.7569	0.7569
Applied Voltage (kV)		8.8	6.6	7.7	8.8	6.6	7.7	8.8	6.6	7.7	8.8	6.6	7.7	8.8
Measured Power (W)		44	9	19	44	10	30	44	10	30	44	10	30	46
Jet Length (cm)		20.5	5.0	16.5	18.5	5.0	14.0	15.0	8.0	13.0	14.0	7.0	12.0	13.0
Residence Time	(s)	9.87E-02	1.68E-02	1.14E-01	1.31E-01	2.39E-02	1.31E-01	1.43E-01	6.13E-02	1.23E-01	1.35E-01	5.28E-02	1.19E-01	1.32E-01
	(ms)	9.87E-01	1.68E-01	1.14E-02	1.31E-02	2.39E-01	1.31E+02	1.43E-02	6.13E+01	1.23E-02	1.35E+02	5.28E+01	1.19E+02	1.32E+02
Estimated Jet Volume (cm <sup>3</sup> )		1.03E-01	2.51E-00	8.30E-00	9.30E-00	2.51E+00	7.04E+00	7.54E-00	4.02E+00	6.54E+00	7.04E+00	3.52E+00	6.03E+00	6.54E+00
Estimated Treatment Volume (cm <sup>3</sup> )		8.80E-00	1.01E-00	6.79E-00	7.79E-00	1.01E+00	5.53E+00	6.03E-00	2.51E+00	5.03E-00	5.53E-00	2.01E+00	4.53E-00	5.03E+00
Watt Density (W/cm <sup>3</sup> )		4.27E-00	3.58E+00	2.29E-00	4.73E+00	3.98E+00	4.26E+00	5.83E+00	2.49E+00	4.59E+00	6.25E+00	2.84E+00	4.97E+00	7.04E+00
Plasma Dosage (J/cm <sup>3</sup> )		4.21E-01	6.03E-02	2.60E-01	6.18E-01	9.50E-02	5.60E-01	8.36E-01	1.52E-01	5.63E-01	8.43E-01	1.50E-01	5.91E-01	9.30E-01
Total Radical Concentration	mol / cm <sup>3</sup>	1.64E-07	1.04E-07	1.55E-07	1.08E-07	1.85E-07	2.15E-07	2.13E-07	1.92E-07	2.09E-07	1.98E-07	-5.44E-08	-2.87E-08	2.75E-08
Generated on Pellet Surface	mmol / kg of pellet	2.57E-00	1.65E+00	2.44E-00	1.70E+00	2.91E+00	3.38E+00	3.35E+00	3.01E+00	3.29E+00	3.12E+00	-8.57E-01	-4.52E-01	4.33E-01



Table VII (cont') Generated surface radical concentration of nitrogen-APPJ aged in ambient air with the vertical distance of 30 cm. [VII]

Test Label		10766	10777	10788	9966	9977	9988	8866	8877	8888	7766	7777	7788
Gas Flow Rate (L/min)	Processing Gas (Jet)	10	10	10	9	9	9	8	8	8	7	7	7
	Feeding Gas	7	7	7	9	9	9	8	8	8	7	7	7
Pellet Velocity (m/s)		0.7207	0.7207	0.7207	0.6772	0.6772	0.6772	0.5429	0.5429	0.5429	0.4110	0.4110	0.4110
Applied Voltage (kV)		6.6	7.7	8.8	6.6	7.7	8.8	6.6	7.7	8.8	6.6	7.7	8.8
Measured Power (W)		9	28	46	8	27	46	8	20	45	9	20	45
Jet Length (cm)		7.0	11.0	12.0	5.5	8.0	11.5	6.5	8.5	10.0	6.5	7.5	8.5
Residence Time	(s)	5.55E-02	1.11E-01	1.25E-01	3.69E-02	7.38E-02	1.26E-01	6.45E-02	1.01E-01	1.29E-01	8.52E-02	1.09E-01	1.34E-01
	(ms)	5.55E-01	1.11E-02	1.25E-02	3.69E+01	7.38E+01	1.26E-02	6.45E+01	1.01E+02	1.29E+02	8.52E+01	1.09E+02	1.34E+02
Estimated Jet Volume (cm <sup>3</sup> )		3.52E-00	5.53E+00	6.03E-00	2.77E+00	4.02E+00	5.78E+00	3.27E+00	4.27E+00	5.03E+00	3.27E+00	3.77E+00	4.27E+00
Estimated Treatment Volume (cm <sup>3</sup> )		2.01E-00	4.02E+00	4.53E+00	1.26E+00	2.51E+00	4.27E+00	1.76E+00	2.77E+00	3.52E+00	1.76E+00	2.26E+00	2.77E+00
Watt Density (W/cm <sup>3</sup> )		2.56E+00	5.06E+00	7.62E+00	2.89E+00	6.71E+00	7.95E+00	2.45E+00	4.68E+00	8.95E+00	2.75E+00	5.30E+00	1.05E+01
Plasma Dosage (J/cm <sup>3</sup> )		1.42E-01	5.62E-01	9.52E-01	1.07E-01	4.96E-01	9.98E-01	1.58E-01	4.74E-01	1.15E+00	2.34E-01	5.81E-01	1.41E+00
Total Radical Concentration	mol / cm <sup>2</sup>	-1.42E-07	-1.19E-07	-3.02E-09	1.19E-07	1.56E-07	1.24E-07	8.47E-08	8.56E-08	8.53E-08	5.58E-08	7.72E-08	5.93E-08
Generated on Pellet Surface	mmol / kg of pellet	-2.24E+00	-1.88E+00	-4.75E-02	1.87E+00	2.45E+00	1.94E+00	1.33E+00	1.35E+00	1.34E+00	8.78E-01	1.21E+00	9.32E-01

**Table VIII** Concentration of radicals generated on the LLDPE surface treated via DBD. [VII-VIII]

Voltage Applied to DBD (kV)	Treatment Time (s)	Aging Time in Ambient Air	Radical Concentration Generated on the Treated LLDPE Surface					
			(mol/cm <sup>3</sup> )			(mmol/kg of pellet)		
				+			+	
7.6	0.2	0.2 s	1.22E-07	+	6.90E-09	1.92E+00	+	1.09E-01
8.3	0.2	0.2 s	1.40E-07	+	1.11E-08	2.20E+00	+	1.74E-01
9.0	0.2	0.2 s	1.32E-07	+	6.57E-09	2.08E+00	+	1.03E-01
8.3	5	5 s	1.26E-07	+	2.82E-09	1.98E+00	+	4.44E-02
8.3	5	10 s	1.32E-07	+	5.44E-09	2.07E+00	+	8.56E-02
8.3	5	30 s	1.27E-07	+	1.26E-08	1.99E+00	+	1.98E-01
8.3	5	10 min	1.25E-07	+	7.12E-09	1.97E+00	+	1.12E-01
8.3	10	5 s	1.24E-07	+	6.84E-09	1.96E+00	+	1.08E-01
8.3	10	10 s	1.28E-07	+	2.02E-09	2.02E+00	+	3.18E-02
8.3	10	30 s	1.31E-07	+	3.04E-09	2.06E+00	+	4.78E-02
8.3	10	10 min	1.25E-07	+	2.15E-09	1.97E+00	+	3.39E-02
8.3	15	5 s	1.33E-07	+	2.72E-09	2.09E+00	+	4.27E-02
8.3	15	10 s	1.42E-07	+	1.48E-08	2.23E+00	+	2.33E-01
8.3	15	30 s	1.21E-07	+	7.20E-09	1.91E+00	+	1.13E-01
8.3	15	10 min	9.87E-08	+	1.36E-08	1.55E+00	+	2.14E-01
8.3	30	5 s	1.92E-07	+	1.06E-08	3.03E+00	+	1.66E-01
8.3	30	10 s	2.35E-07	+	6.35E-09	3.70E+00	+	9.99E-02
8.3	30	30 s	1.67E-07	+	9.33E-09	2.63E+00	+	1.47E-01
8.3	30	10 min	1.37E-07	+	4.27E-09	2.15E+00	+	6.73E-02
8.3	60	5 s	1.26E-07	+	5.31E-09	1.98E+00	+	8.36E-02
8.3	60	10 s	2.01E-07	+	6.54E-09	3.16E+00	+	1.03E-01
8.3	60	30 s	1.66E-07	+	5.12E-09	2.61E+00	+	8.06E-02
8.3	60	10 min	1.49E-07	+	4.67E-09	2.34E+00	+	7.36E-02
9.0	5	5 s	1.94E-07	+	4.42E-09	3.05E+00	+	6.96E-02
9.0	10	5 s	1.69E-07	+	7.47E-09	2.65E+00	+	1.18E-01
9.0	15	5 s	1.71E-07	+	1.59E-08	2.69E+00	+	2.50E-01
9.0	30	5 s	1.87E-07	+	5.11E-09	2.94E+00	+	8.05E-02
9.0	60	5 s	1.15E-07	+	4.34E-09	1.82E+00	+	6.83E-02

**Table IX** Measured density, DSC analysis, oxygen permeability and MFI of LLDPE bulk modified with various methods. [IX]

Reactive Processing Parameters		Density (g/cm <sup>3</sup> )	DSC Measurement				Oxygen Permeability (cm <sup>3</sup> .mil/m <sup>2</sup> .d.bar)	MFI (g/10 min)
DBD (kV)	DCP (pbr)		T <sub>m</sub> (°C)	T <sub>c</sub> (°C)	ΔH (J/g)	% Crystallinity (%)		
0	0	0.912 ± 0.002	123	106	183	63	6214 ± 37	2.02 ± 0.02
0	0.02	0.905 ± 0.004	123	106	172	59	9040 ± 146	0.62 ± 0.01
0	0.06	0.900 ± 0.003	125	104	133	46	7694 ± 127	0.13 ± 0.00
0	0.10	0.867 ± 0.004	123	105	86	30	9056 ± 198	0.05 ± 0.00
8.3	0	0.915 ± 0.004	123	104	201	69	1089 ± 19	1.57 ± 0.02
8.3	0.02	0.900 ± 0.004	122	107	110	38	2408 ± 32	0.70 ± 0.00
8.3	0.06	0.900 ± 0.002	124	108	123	42	7824 ± 182	0.16 ± 0.00
8.3	0.10	0.869 ± 0.006	120	108	105	36	9183 ± 26	0.05 ± 0.00
9.0	0	0.901 ± 0.004	122	103	132	45	1135 ± 42	1.69 ± 0.01
9.0	0.02	0.882 ± 0.004	122	106	105	36	2138 ± 15	0.77 ± 0.00
9.0	0.06	0.896 ± 0.005	123	107	117	40	8665 ± 53	0.16 ± 0.00
9.0	0.10	0.882 ± 0.004	121	108	120	41	9518 ± 64	0.09 ± 0.00

**Table IX (cont')** Tensile properties and measured melt strength of LLDPE bulk modified with various methods. [IX]

Reactive Processing Parameters		Tensile Properties				Melt Strength		
DBD	DCP	Yield Strength	Ultimate Strength	% Strain at Ultimate Strength	Young's Modulus	at 190 °C	at 200 °C	at 210 °C
(kV)	(phr)	(MPa)	(MPa)	(%)	(MPa)	(cN)	(cN)	(cN)
0	0	11.4 ± 0.3	21.3 ± 0.5	1264 ± 38	100.2 ± 2.7	15.4 ± 0.2	34.1 ± 0.7	40.5 ± 0.4
0	0.02	12.1 ± 0.2	29.3 ± 0.3	1874 ± 28	123.5 ± 2.4	4.9 ± 0.1	10.3 ± 0.1	17.5 ± 0.2
0	0.06	11.7 ± 0.4	25.2 ± 0.7	1543 ± 60	118.0 ± 7.2	5.6 ± 0.2	11.2 ± 0.1	19.5 ± 0.3
0	0.10	12.4 ± 0.5	31.8 ± 0.8	1138 ± 66	146.3 ± 6.9	9.3 ± 0.1	17.8 ± 0.2	24.7 ± 0.2
8.3	0	16.7 ± 1.3	42.2 ± 1.5	1638 ± 128	204.1 ± 14.2	22.1 ± 0.9	36.2 ± 0.8	42.0 ± 0.6
8.3	0.02	12.6 ± 0.3	26.5 ± 0.5	1732 ± 42	126.5 ± 3.4	18.7 ± 0.8	41.2 ± 0.3	43.5 ± 0.3
8.3	0.06	11.8 ± 0.2	27.4 ± 0.4	1665 ± 31	134.8 ± 2.8	8.5 ± 0.2	13.2 ± 0.1	16.3 ± 0.2
8.3	0.10	10.7 ± 0.3	24.4 ± 0.6	1955 ± 49	106.8 ± 3.7	10.6 ± 0.1	19.7 ± 0.1	27.6 ± 0.3
9.0	0	17.3 ± 1.0	49.2 ± 1.1	2200 ± 93	166.2 ± 14.1	16.4 ± 0.0	39.0 ± 0.5	47.2 ± 1.0
9.0	0.02	11.4 ± 0.0	24.7 ± 0.1	1638 ± 5	147.3 ± 8.3	7.4 ± 0.0	12.4 ± 0.2	22.5 ± 0.2
9.0	0.06	11.9 ± 0.6	48.0 ± 1.1	1312 ± 91	153.0 ± 11.2	8.1 ± 0.0	17.3 ± 0.2	20.3 ± 0.1
9.0	0.10	10.5 ± 0.4	23.2 ± 0.8	1704 ± 71	88.0 ± 1.3	11.4 ± 0.2	21.5 ± 0.3	29.4 ± 0.3

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