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## APPENDICES

### Appendix A Polymer Solution Properties

For polymer solutions to study effects of solvent electrical conductivity on morphology of electrospun fibers, chloroform was used as a solvent. Raw data of electrical conductivity at 25°C depended on PHB and PHBV solution were shown in Table A1

**Table A1** Raw data of electrical conductivity at 25°C of PHB and PHBV solution

Polymer Solution	Concentration (wt.%)	Electrical Conductivity ( $\mu\text{s}/\text{cm}$ )				
		1	2	3	Average	SD.
PHB	10	0.060	0.070	0.060	0.063	0.006
	12	0.070	0.070	0.070	0.070	0.000
	14	0.070	0.070	0.070	0.070	0.000
	16	0.070	0.070	0.070	0.070	0.000
PHBV	10	0.060	0.050	0.050	0.053	0.006
	12	0.070	0.060	0.060	0.063	0.006
	14	0.070	0.070	0.070	0.070	0.000
	16	0.080	0.070	0.080	0.077	0.006

Molecular weight has a significant on the rheological properties such as viscosity, surface tension, conductivity and dielectric strength. As shown raw data in Table A.2, viscosity of polymer solution was varied by PHB and PHBV concentration (at molecular weight of 300,000 g/mol (PHB) and 680,000 g/mol(PHBV)).

**Table A2** Viscosity of polymer solution varied by PHB and PHBV concentration

Polymer Solution	Concentration (wt.%)	Electrical Conductivity ( $\mu\text{s}/\text{cm}$ )				
		1	2	3	Average	SD.
PHB	4	23.80	24.70	25.60	24.70	0.90
	6	88.20	76.00	66.40	76.87	10.93
	8	162.00	173.00	193.00	176.00	15.72
	10	366.00	423.00	310.00	366.33	56.50
	12	702.00	593.00	606.00	633.67	59.53
	14	1159.00	1287.00	1181.00	1209.00	68.44
	16	1822.00	1606.00	1976.00	1801.33	185.86
	18	2921.00	2815.00	3027.00	2921.00	106.00
	20	3179.00	3471.00	3904.00	3518.00	364.78
PHBV	4	19.00	19.00	19.00	19.00	0.00
	6	52.00	51.00	53.00	52.00	1.00
	8	160.00	157.00	155.00	157.33	2.52
	10	235.00	483.00	360.00	359.33	124.00
	12	395.00	1020.00	710.00	708.33	312.50
	14	753.00	760.00	755.00	756.00	3.61
	16	1530.00	1800.00	1765.00	1698.33	146.83
	18	3005.00	3000.00	2897.00	2967.33	60.96
	20	3765.00	7667.00	6542.00	5991.33	2008.44

## Appendix B Contact Angle

Wettability was examined by measuring contact angles. The contact angles were measured for the films and electrospun ultrafine fiber meshes with a sessile drop method using a Contact Angle Meter. Distilled water of approximately 40  $\mu$ l was gently plated on the surface of the specimens. At least ten readings on different parts of the specimens were averaged for data collecting as shown in Table B1.

**Table B1** Contact angle of solution-cast films

No. of sample	Solution-cast films (°)				
	PHBV content (wt.%)				
	0	25	50	75	100
1	67.00	78.00	68.00	74.00	70.00
2	68.00	75.50	67.00	77.00	77.00
3	70.00	76.00	76.00	73.00	73.00
4	69.00	74.50	74.00	77.00	75.00
5	68.00	77.00	80.00	73.00	71.00
6	65.00	75.00	78.00	72.00	72.50
7	66.00	77.00	76.00	78.00	72.00
8	70.50	75.00	77.00	77.00	70.00
9	72.00	75.00	77.00	73.00	75.50
10	68.00	79.00	75.00	76.00	76.00
11	67.00	80.00	79.00	76.50	74.50
12	66.00	80.00	75.00	72.00	74.00
Avg	68.04	76.83	75.17	74.88	73.38
SD.	2.05	2.00	3.97	2.24	2.34



**Table B2** Contact angle of electrospun scaffolds

No. of sample	Electrospun scaffolds (°)				
	PHBV content (wt.%)				
	0	25	50	75	100
1	118.00	122.00	123.00	119.00	114.00
2	117.00	121.50	120.00	118.00	119.00
3	116.00	124.00	123.00	119.00	120.00
4	114.00	123.00	122.00	121.00	116.00
5	111.00	124.00	121.00	120.00	120.00
6	112.00	121.50	123.00	116.00	114.00
7	112.00	120.00	126.00	119.00	118.50
8	111.00	122.00	120.00	121.00	120.00
9	118.00	122.00	119.00	118.00	120.00
10	117.00	119.00	120.00	118.50	118.00
11	120.00	121.00	121.50	118.50	114.00
12	120.00	119.00	118.00	114.00	116.00
Avg	115.50	121.58	121.38	118.50	117.46
SD.	3.37	1.66	2.19	1.97	2.52

### Appendix C Mechanical Evaluation

Results of mechanical testing of the solution-cast films and electrospun scaffolds from various blends of PHBV component were presented in Table C1, Table C2, and Table C3.

**Table C1** Tensile Strength of solution-cast films

No. of sample	Solution-cast films (MPa)				
	PHBV content (wt.%)				
	0	25	50	75	100
1	31.59	29.36	24.38	23.17	31.15
2	32.48	27.37	23.80	23.55	30.88
3	32.57	27.69	23.82	24.57	32.09
4	29.63	28.73	22.37	22.02	32.35
5	29.65	31.76	27.89	22.99	33.01
6	33.78	29.18	24.52	22.22	33.33
7	30.77	27.35	23.38	21.01	30.21
8	32.97	26.05	23.73	24.92	31.63
9	31.09	27.04	23.10	22.84	38.05
10	31.69	28.16	30.04	23.56	32.89
Avg	31.62	28.27	24.70	23.08	32.56
SD.	1.37	1.59	2.38	1.17	2.17

**Table C2** Tensile Strength of electrospun scaffolds

No. of sample	Electrospun scaffolds(MPa)				
	PHBV content (wt.%)				
	0	25	50	75	100
1	1.53	2.26	2.30	1.83	1.98
2	1.64	2.44	2.33	1.55	1.86
3	1.67	2.20	2.24	1.64	1.82
4	1.65	2.83	2.27	1.55	1.97
5	1.63	2.83	2.00	1.62	1.72
6	1.57	2.31	2.24	1.51	1.52
7	1.52	2.38	2.39	1.64	1.57
8	1.52	2.46	2.35	1.55	1.61
9	1.63	2.25	2.13	1.95	1.85
10	1.66	2.41	2.35	1.42	1.70
Avg	1.60	2.44	2.26	1.62	1.76
SD.	0.06	0.21	0.11	0.15	0.15

**Table C3** Young's Modulus of solution-cast films

No. of sample	Solution-cast films (MPa)				
	PHBV content (wt.%)				
	0	25	50	75	100
1	1235.11	950.91	893.42	782.71	1418.05
2	1551.00	1198.70	838.05	654.59	1148.31
3	1484.55	1190.00	953.40	582.85	1134.29
4	1575.49	776.51	1039.16	938.81	1362.00
5	1324.98	735.03	705.17	857.15	1154.90
6	1241.06	935.78	1027.40	966.87	1497.46
7	1408.00	1088.24	641.27	663.52	1301.94
8	1222.68	1427.00	900.15	1000.52	1428.72
9	1578.58	992.24	1227.26	657.32	1325.04
10	1412.38	1076.14	1342.57	1035.81	1418.01
Avg	1403.38	1037.06	956.78	814.01	1318.87
SD.	142.30	206.70	215.50	167.27	131.59

**Table C4** Young's Modulus of electrospun scaffolds

No. of sample	Electrospun scaffolds(MPa)				
	PHBV content (wt.%)				
	0	25	50	75	100
1	142.90	119.38	172.70	99.86	105.87
2	139.53	146.34	166.35	71.80	131.18
3	145.32	207.24	174.92	62.69	121.61
4	157.84	157.38	107.93	80.37	124.97
5	144.05	126.82	137.10	177.93	120.29
6	140.43	140.60	132.90	89.78	110.35
7	146.39	172.41	147.30	102.09	136.59
8	156.20	136.18	151.21	88.73	123.36
9	152.90	138.08	128.78	282.33	142.65
10	147.08	130.59	169.54	327.22	140.40
Avg	147.26	147.50	148.87	138.28	125.73
SD.	6.03	24.61	21.12	88.94	11.54

**Table C5** Elongation at break of solution-cast films

No. of sample	Solution-cast films (%)				
	PHBV content (wt.%)				
	0	25	50	75	100
1	3.95	5.26	5.88	4.99	4.40
2	3.78	6.36	6.61	5.57	4.68
3	3.86	6.53	7.87	5.13	5.24
4	3.61	6.27	6.89	4.42	4.51
5	3.40	6.71	6.57	4.51	4.21
6	3.61	7.28	7.26	5.26	4.37
7	3.88	6.55	6.47	5.31	4.26
8	3.63	6.10	6.15	5.43	4.53
9	3.17	5.65	6.51	4.81	4.82
10	3.37	7.02	4.93	5.91	4.95
Avg	3.63	6.37	6.51	5.13	4.60
SD.	0.25	0.60	0.79	0.46	0.33

**Table C6** Elongation at break of electrospun scaffolds

No. of sample	Electrospun scaffolds(%)				
	PHBV content (wt.%)				
	0	25	50	75	100
1	2.66	3.28	4.04	6.78	3.48
2	1.17	4.30	5.10	7.19	3.99
3	1.77	3.30	6.56	5.72	4.65
4	2.01	5.30	6.52	7.90	3.97
5	2.47	4.39	5.04	7.01	2.21
6	3.02	3.59	4.53	6.35	2.22
7	2.30	3.62	4.72	6.34	3.15
8	3.72	3.88	4.46	6.78	3.33
9	1.99	4.69	4.88	5.86	3.42
10	1.60	5.02	5.43	6.77	3.15
Avg	2.27	4.14	5.13	6.67	3.36
SD.	0.74	0.68	0.80	0.61	0.72

### Appendix D Cell Study

Indirect cytotoxic evaluation of fibrous scaffolds from electrospun mats of PHB and PHBV and their blend fibers based on viability of human osteoblasts (SaOS2) and mouse fibroblasts (L929).

**Table D1** Raw data of Indirect Cytotoxicity (Measured 2 times: I= 1<sup>st</sup>, II=2<sup>nd</sup>)

No.	Absorbance							
	Control (DMEM)				PHB fiber			
	SaOS2		L929		SaOS2		L929	
	I	II	I	II	I	II	I	II
1	0.174	0.165	0.486	0.459	0.180	0.220	0.588	0.612
2	0.173	0.176	0.468	0.473	0.206	0.213	0.593	0.603
3	0.164	0.177	0.468	0.485	0.208	0.243	0.590	0.594
4	0.166	0.153	0.490	0.453	0.199	0.267	0.609	0.582
5	0.157	0.166	0.460	0.491	0.210	0.189	0.576	0.570
6	0.177	0.170	0.456	0.486	0.160	0.177	0.588	0.591
Avg	0.169	0.168	0.471	0.475	0.194	0.218	0.591	0.592
SD.	0.008	0.009	0.014	0.016	0.020	0.033	0.011	0.015
No.	Absorbance							
	PHB/PHBV 50/50 fiber				PHBV fiber			
	SaOS2		L929		SaOS2		L929	
	I	II	I	II	I	II	I	II
1	0.254	0.240	0.747	0.756	0.240	0.226	0.624	0.633
2	0.276	0.238	0.704	0.762	0.253	0.259	0.642	0.646
3	0.250	0.255	0.723	0.772	0.256	0.236	0.628	0.635
4	0.214	0.268	0.734	0.729	0.233	0.214	0.664	0.648
5	0.256	0.274	0.712	0.730	0.261	0.253	0.650	0.663
6	0.262	0.251	0.725	0.741	0.266	0.262	0.627	0.660
Avg	0.252	0.254	0.724	0.748	0.252	0.242	0.639	0.648
SD.	0.021	0.015	0.015	0.018	0.013	0.019	0.016	0.012



**Table D2** Raw data of SaOS2 cell adhesion on solution-cast films at 4 hr (Measured 2 times: I= 1<sup>st</sup>, II=2<sup>nd</sup>)

No.	Absorbance							
	TCPS		PHBV content (wt.%)					
			0		50		100	
	I	II	I	II	I	II	I	II
1	0.633	0.613	0.249	0.292	0.298	0.307	0.293	0.318
2	0.655	0.624	0.236	0.310	0.295	0.310	0.308	0.324
3	0.660	0.640	0.253	0.314	0.289	0.305	0.310	0.316
Avg	0.649	0.626	0.246	0.305	0.294	0.307	0.304	0.319
SD.	0.014	0.014	0.009	0.012	0.005	0.003	0.009	0.004

**Table D3** Raw data of SaOS2 cell adhesion on electrospun scaffolds at 4 hr (Measured 2 times: I= 1<sup>st</sup>, II=2<sup>nd</sup>)

No.	Absorbance							
	TCPS		PHBV content (wt.%)					
			0		50		100	
	I	II	I	II	I	II	I	II
1	0.633	0.613	0.438	0.403	0.301	0.308	0.351	0.332
2	0.655	0.624	0.411	0.400	0.308	0.320	0.366	0.339
3	0.660	0.640	0.413	0.400	0.301	0.312	0.361	0.351
Avg	0.649	0.626	0.421	0.401	0.303	0.313	0.359	0.341
SD.	0.014	0.014	0.015	0.002	0.004	0.006	0.008	0.010

**Table D4** Raw data of SaOS2 cell adhesion on solution-cast films at 16 hr  
(Measured 2 times: I= 1<sup>st</sup>, II=2<sup>nd</sup>)

No.	Absorbance							
	TCPS		PHBV content (wt.%)					
			0		50		100	
	I	II	I	II	I	II	I	II
1	0.778	0.792	0.510	0.505	0.382	0.374	0.512	0.509
2	0.760	0.785	0.504	0.508	0.375	0.388	0.517	0.495
3	0.781	0.760	0.513	0.501	0.369	0.359	0.483	0.503
Avg	0.773	0.779	0.509	0.505	0.375	0.374	0.504	0.502
SD.	0.011	0.017	0.005	0.004	0.007	0.015	0.018	0.007

**Table D5** Raw data of SaOS2 cell adhesion on electrospun scaffolds at 16 hr  
(Measured 2 times: I= 1<sup>st</sup>, II=2<sup>nd</sup>)

No.	Absorbance							
	TCPS		PHBV content (wt.%)					
			0		50		100	
	I	II	I	II	I	II	I	II
1	0.778	0.792	0.846	0.808	0.534	0.498	0.794	0.720
2	0.760	0.785	0.829	0.791	0.525	0.494	0.793	0.701
3	0.781	0.760	0.828	0.820	0.521	0.505	0.787	0.729
Avg	0.773	0.779	0.834	0.806	0.527	0.499	0.791	0.717
SD.	0.011	0.017	0.010	0.015	0.007	0.006	0.004	0.014

**Table D6** Raw data of SaOS2 cell adhesion on solution-cast films at 24 hr  
(Measured 2 times: I= 1<sup>st</sup>, II=2<sup>nd</sup>)

No.	Absorbance							
	TCPS		PHBV content (wt.%)					
			0		50		100	
	I	II	I	II	I	II	I	II
1	0.781	0.748	0.458	0.462	0.488	0.490	0.410	0.421
2	0.765	0.789	0.442	0.458	0.472	0.453	0.436	0.403
3	0.769	0.756	0.466	0.454	0.460	0.467	0.423	0.445
Avg	0.772	0.764	0.515	0.515	0.473	0.470	0.423	0.423
SD.	0.008	0.022	0.012	0.004	0.014	0.019	0.013	0.021

**Table D7** Raw data of SaOS2 cell adhesion on electrospun scaffolds at 24 hr  
(Measured 2 times: I= 1<sup>st</sup>, II=2<sup>nd</sup>)

No.	Absorbance							
	TCPS		PHBV content (wt.%)					
			0		50		100	
	I	II	I	II	I	II	I	II
1	0.781	0.748	0.458	0.462	0.488	0.490	0.410	0.421
2	0.765	0.789	0.442	0.458	0.472	0.453	0.436	0.403
3	0.769	0.756	0.466	0.454	0.460	0.467	0.423	0.445
Avg	0.772	0.764	0.515	0.515	0.473	0.470	0.423	0.423
SD.	0.008	0.022	0.012	0.004	0.014	0.019	0.013	0.021

**Table D8** Raw data of SaOS2 cell proliferation on solution-cast films at 24 hr  
(Measured 2 times: I= 1<sup>st</sup>, II=2<sup>nd</sup>)

No.	Absorbance							
	TCPS		PHBV content (wt.%)					
			0		50		100	
	I	II	I	II	I	II	I	II
1	0.781	0.748	0.458	0.462	0.488	0.490	0.410	0.421
2	0.765	0.789	0.442	0.458	0.472	0.453	0.436	0.403
3	0.769	0.756	0.466	0.454	0.460	0.467	0.423	0.445
Avg	0.772	0.764	0.515	0.515	0.473	0.470	0.423	0.423
SD.	0.008	0.022	0.012	0.004	0.014	0.019	0.013	0.021

**Table D9** Raw data of SaOS2 cell proliferation on electrospun scaffolds at 24 hr  
(Measured 2 times: I= 1<sup>st</sup>, II=2<sup>nd</sup>)

No.	Absorbance							
	TCPS		PHBV content (wt.%)					
			0		50		100	
	I	II	I	II	I	II	I	II
1	0.781	0.748	0.832	0.855	0.783	0.774	0.755	0.748
2	0.765	0.789	0.827	0.843	0.766	0.770	0.786	0.762
3	0.769	0.756	0.850	0.843	0.764	0.774	0.747	0.767
Avg	0.772	0.764	0.836	0.847	0.771	0.773	0.763	0.759
SD.	0.008	0.022	0.012	0.007	0.010	0.002	0.021	0.010

**Table D10** Raw data of SaOS2 cell proliferation on solution-cast films at 72 hr  
(Measured 2 times: I= 1<sup>st</sup>, II=2<sup>nd</sup>)

No.	Absorbance							
	TCPS		PHBV content (wt.%)					
			0		50		100	
	I	II	I	II	I	II	I	II
1	0.716	0.660	0.615	0.589	0.580	0.566	0.600	0.577
2	0.640	0.671	0.605	0.616	0.570	0.548	0.625	0.611
3	0.645	0.658	0.595	0.620	0.574	0.550	0.595	0.607
Avg	0.667	0.663	0.605	0.608	0.575	0.555	0.607	0.598
SD.	0.043	0.007	0.010	0.017	0.005	0.010	0.016	0.019

**Table D11** Raw data of SaOS2 cell proliferation on electrospun scaffolds at 72 hr  
(Measured 2 times: I= 1<sup>st</sup>, II=2<sup>nd</sup>)

No.	Absorbance							
	TCPS		PHBV content (wt.%)					
			0		50		100	
	I	II	I	II	I	II	I	II
1	0.716	0.660	0.853	0.867	0.855	0.860	0.808	0.824
2	0.640	0.671	0.908	0.880	0.830	0.877	0.812	0.806
3	0.645	0.658	0.827	0.852	0.823	0.835	0.804	0.828
Avg	0.667	0.663	0.863	0.866	0.836	0.857	0.808	0.819
SD.	0.043	0.007	0.041	0.014	0.017	0.021	0.004	0.012

**Table D12** Raw data of SaOS2 cell proliferation on solution-cast films at 120 hr  
(Measured 2 times: I= 1<sup>st</sup>, II=2<sup>nd</sup>)

No.	Absorbance							
	TCPS		PHBV content (wt.%)					
			0		50		100	
	I	II	I	II	I	II	I	II
1	0.781	0.748	0.668	0.589	0.634	0.688	0.673	0.572
2	0.765	0.789	0.642	0.656	0.690	0.700	0.603	0.636
3	0.769	0.756	0.635	0.671	0.685	0.649	0.587	0.652
Avg	0.772	0.764	0.648	0.639	0.670	0.679	0.621	0.620
SD.	0.008	0.022	0.017	0.044	0.031	0.027	0.046	0.042

**Table D13** Raw data of SaOS2 cell proliferation on electrospun scaffolds at 120 hr  
(Measured 2 times: I= 1<sup>st</sup>, II=2<sup>nd</sup>)

No.	Absorbance							
	TCPS		PHBV content (wt.%)					
			0		50		100	
	I	II	I	II	I	II	I	II
1	0.781	0.748	0.832	0.855	0.783	0.774	0.755	0.748
2	0.765	0.789	0.827	0.843	0.766	0.770	0.786	0.762
3	0.769	0.756	0.850	0.843	0.764	0.774	0.747	0.767
Avg	0.772	0.764	0.836	0.847	0.771	0.773	0.763	0.759
SD.	0.008	0.022	0.012	0.007	0.010	0.002	0.021	0.010

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