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## APPENDICES

### Appendix A Size of Chitin Whiskers

**Table A1** Length data of chitin whiskers

Length (nm)						
445	792	330	557	591	391	481
576	589	437	465	443	296	449
394	532	584	255	382	413	417
368	590	466	414	626	566	358
447	416	300	356	412	339	522
402	443	215	320	526	525	348
435	463	499	352	550	604	621
325	305	171	337	745	466	306
486	836	270	362	416	598	749
344	471	272	414	557	320	384
304	480	202	951	681	535	710
311	527	374	364	566	376	464
320	969	497	475	316	350	677
590	667	461	543	301	529	601
502	939	344	465	435	451	500
630	444	285	483	496	535	545
134	981	345	396	487	348	431
489	645	217	730	710	460	375
175	754	275	603	592	566	458
262	463	425	861	669	508	992
204	707	506	428	796	430	534
493	661	328	453	674	428	292
498	530	611	833	523	455	506
599	463	552	724	971	454	583
575	352	553	593	804	549	580
550	370	335	381	421	393	530
742	969	535	715	457	691	478
427	472	422	451	726	658	517
984	439	406	554	535	815	749
371	644	312	328	422	689	306
591	750	400	403	597	345	
666	495	230	672	676	708	
473	644	394	427	561	433	
478	542	305	395	609	634	
350	792	282	347	486	755	
492	120	636	627	241	403	

**Table A2** Width data of chitin whiskers

Width (nm)						
46	25	44	21	26	24	43
32	25	30	38	52	44	39
31	31	21	30	51	31	39
22	50	26	32	31	50	24
23	42	21	28	33	18	34
23	27	19	21	33	29	39
29	44	34	27	47	13	38
38	38	28	24	18	26	41
31	29	15	36	51	25	26
32	29	20	37	26	19	40
36	28	26	26	44	18	31
38	36	22	20	57	22	36
21	12	26	26	56	27	37
24	34	10	38	43	31	52
31	34	19	36	47	22	43
26	45	19	31	32	35	53
27	43	21	27	38	21	39
35	22	26	26	66	14	26
28	23	25	37	28	27	44
24	23	26	33	44	24	40
21	39	40	22	25	24	43
19	38	34	38	23	41	31
43	27	24	26	29	38	56
54	32	21	31	37	40	46
35	43	24	57	32	34	51
20	41	19	18	23	26	26
29	49	18	43	19	31	48
25	31	44	31	31	44	38
18	12	29	40	19	44	36
34	55	22	16	31	22	43
33	17	17	22	22	18	
26	17	34	14	22	26	
27	14	30	29	19	22	
30	22	14	36	38	22	
37	25	23	22	56	35	
59	20	21	26	38	33	

## Appendix B Gel Fraction Data of AMPS-Na<sup>+</sup> Hydrogels

**Table B1** Gel fraction data of AMPS-Na<sup>+</sup> hydrogels produced from UV radiation technique

Type of hydrogels		Gel fraction (%)
30% w/w AMPS-Na <sup>+</sup>	0.1 %mol MBA	42.0886076
		50.3631961
		49.3449782
	0.5 %mol MBA	72.566372
		71.945701
		78.656126
	1 %mol MBA	89.02439
		90.09901
		89.212828
40% w/w AMPS-Na <sup>+</sup>	0.1 %mol MBA	81.638418
		80.540541
		79.831933
	0.5 %mol MBA	88.846154
		85.553471
		87.44186
	1 %mol MBA	92.682927
		95.054945
		92.44186
50% w/w AMPS-Na <sup>+</sup>	0.1 %mol MBA	87.552743
		83.678161
		87.082405
	0.5 %mol MBA	91.62234
		91.962175
		87.222222
	1 %mol MBA	95.533499
		96.252927
		96.396396

**Table B2** Gel fraction data of AMPS-Na<sup>+</sup> hydrogels produced from Gamma radiation technique

Type of hydrogels		Gel fraction (%)
30% w/w AMPS-Na <sup>+</sup>	0.1 %mol MBA	57.101449
		60.912052
		56.643357
	0.5 %mol MBA	73.6672052
		72.8129206
		81.7771084
	1 %mol MBA	93.3147632
		91.5254237
		89.0140845
40% w/w AMPS-Na <sup>+</sup>	0.1 %mol MBA	78.9877301
		82.8282828
		84.0944882
	0.5 %mol MBA	86.2745098
		92.8571429
		86.8035191
	1 %mol MBA	95.4198473
		95.6321839
		95.4887218
50% w/w AMPS-Na <sup>+</sup>	0.1 %mol MBA	86.3117871
		90.521327
		91.7448405
	0.5 %mol MBA	92.6640927
		93.1034483
		90.6735751
	1 %mol MBA	96.1227787
		96.9479354
		98.0530973



### Appendix C Preparation of Simulated Body Fluid (SBF)

Simulates body fluid (SBF) has ion concentrations nearly equal to those of human blood plasma and is buffered at pH 7.40 with 50 mM trishydroxylaminomethane and 45 mM hydrochloric acid at 36.5 °C. The reagents for preparing SBF (pH7.40) as shown in Table C1

**Table C1** Reagents for preparing SBF (pH 7.40 for 1L)

Order	Reagents	Amount (g)
1	NaCl	7.996
2	NaHCO <sub>3</sub>	0.350
3	KCl	0.224
4	K <sub>2</sub> HPO.3H <sub>2</sub> O	0.228
5	MgCl <sub>2</sub> .6H <sub>2</sub> O	0.305
6	1M HCl	40 ml
(About 90% of total amount of HCl to be added)		
7	CaCl <sub>2</sub>	0.278
8	Na <sub>2</sub> SO <sub>4</sub>	0.071
9	(CH <sub>2</sub> OH) <sub>3</sub> CNH <sub>2</sub>	6.057

**Appendix D % Swelling Data in SBF of AMPS-Na<sup>+</sup> Hydrogels and Chitin Whiskers-reinforced Hydrogels**

**Table D1 % Swelling data of 30% w/w AMPS-Na<sup>+</sup> hydrogels at various content of MBA crosslinker produced from UV radiation technique**

Time (min)	% Swelling			Time (min)	% Swelling		
	30% w/w AMPS-Na <sup>+</sup>				30% w/w AMPS-Na <sup>+</sup>		
	0.1 %mol MBA	0.5 %mol MBA	1 %mol MBA		0.1 %mol MBA	0.5 %mol MBA	1 %mol MBA
<b>10</b>	717.760	648.484	625.691	<b>180</b>	3819.112	2293.073	1644.664
	886.349	690.086	564.389		2980.634	2276.293	1440.165
	705.052	738.864	606.639		2831.789	2383.842	1614.522
<b>30</b>	1105.598	1019.913	913.833	<b>240</b>	4014.671	2541.991	1687.549
	1013.015	1081.896	703.105		3277.619	2470.689	1521.946
	978.736	1155.458	788.381		3226.526	2612.663	1681.535
<b>40</b>	1322.973	1358.874	1149.209	<b>300</b>	3751.351	2641.558	1719.960
	1282.063	1370.258	883.850		3508.412	2641.810	1557.971
	1183.789	1420.960	979.875		3319.578	2728.384	1738.796
<b>50</b>	1711.776	1527.705	1285.573	<b>1200</b>	4641.891	2721.212	1769.960
	1616.984	1597.844	1018.012		4794.603	2745.689	1711.594
	1538.105	1575.545	1143.360		4798.315	2778.165	1837.551
<b>60</b>	2156.756	1780.952	1382.213	<b>1320</b>	4585.907	2896.969	1743.280
	1852.381	1835.775	1135.196		4737.460	2719.396	1750.310
	1747.157	1782.096	1262.655		4854.315	2772.925	1825.933
<b>90</b>	2637.451	1898.701	1487.351	<b>1440</b>	4604.054	2945.887	1748.023
	2325.873	1985.344	1297.308		4695.714	2743.965	1759.006
	2174.526	1938.864	1425.103		4854.947	2798.253	1819.917
<b>120</b>	3098.648	2117.748	1535.375				
	2601.587	2136.206	1390.269				
	2507.789	2147.598	1515.767				

**Table D2** % Swelling data of 40% w/w AMPS-Na<sup>+</sup> hydrogels at various content of MBA crosslinker produced from UV radiation technique

Time (min)	% Swelling			Time (min)	% Swelling		
	40% w/w AMPS-Na <sup>+</sup>				40% w/w AMPS-Na <sup>+</sup>		
	0.1 %mol MBA	0.5 %mol MBA	1 %mol MBA		0.1 %mol MBA	0.5 %mol MBA	1 %mol MBA
<b>10</b>	650.390	456.684	479.783	<b>180</b>	2115.820	1459.358	1258.844
	640.892	588.782	446.258		2177.137	1427.884	1314.625
	575.252	582.839	470.349		2185.016	1506.240	1305.524
<b>30</b>	939.453	604.946	683.212	<b>240</b>	2289.843	1495.187	1276.353
	860.594	681.570	633.843		2422.862	1614.102	1360.714
	871.043	659.438	694.843		2372.053	1618.564	1292.633
<b>40</b>	1183.984	806.550	825.812	<b>300</b>	2397.070	1570.588	1285.018
	1093.122	835.897	794.387		2500.743	1700.961	1396.768
	1089.562	812.792	853.222		2525.589	1693.291	1295.027
<b>50</b>	1391.601	1030.614	897.292	<b>1200</b>	3087.5	1747.994	1362.454
	1345.167	971.794	906.292		3472.490	1958.012	1436.904
	1298.148	960.686	974.953		3407.912	2022.308	1327.255
<b>60</b>	1555.078	1112.967	968.411	<b>1320</b>	3131.054	1723.930	1367.870
	1465.055	1090.705	1014.285		3538.661	1976.602	1432.142
	1470.707	1046.489	1080.847		3516.161	2024.024	1322.836
<b>90</b>	1802.734	1249.732	1068.050	<b>1440</b>	3164.062	1713.502	1372.743
	1735.315	1228.685	1128.741		3584.572	1999.358	1447.108
	1726.094	1235.725	1212.707		3650	2028.549	1324.677
<b>120</b>	1976.367	1267.513	1187.725				
	1942.565	1356.570	1221.258				
	1934.006	1336.661	1014.180				

**Table D3** % Swelling data of 50% w/w AMPS-Na<sup>+</sup> hydrogels at various content of MBA crosslinker produced from UV radiation technique

Time (min)	% Swelling			Time (min)	% Swelling		
	50% w/w AMPS-Na <sup>+</sup>				50% w/w AMPS-Na <sup>+</sup>		
	0.1 %mol MBA	0.5 %mol MBA	1 %mol MBA		0.1 %mol MBA	0.5 %mol MBA	1 %mol MBA
<b>10</b>	571.694	404.710	394.787	<b>180</b>	1915.932	1250	816.606
	531.125	482.819	484.045		1824.006	1324.963	1054.700
	572.048	446.903	491.111		2123.090	1216.205	955.259
<b>30</b>	792.203	572.342	615.030	<b>240</b>	2075.423	1319.685	817.212
	795.033	630.983	556.837		2008.774	1350.954	1093.732
	891.840	615.283	527.851		2310.937	1307.246	987.111
<b>40</b>	997.118	694.444	647.393	<b>300</b>	2200.677	1388.647	968.848
	1002.317	758.883	666.666		2128.973	1437.298	1120.655
	1252.256	708.695	661.925		2421.354	1376.021	1044.888
<b>50</b>	1160.677	798.550	704.848	<b>1200</b>	2839.322	1542.270	952.363
	1174.172	881.938	759.401		2784.933	1481.204	1133.618
	1320.138	802.371	739.555		2984.722	1541.765	1068.148
<b>60</b>	1294.406	903.985	747.515	<b>1320</b>	2858.474	1545.652	953.575
	1324.668	963.142	827.065		2817.384	1513.656	1121.509
	1521.701	885.375	847.259		2997.569	1556.258	1069.333
<b>90</b>	1525.932	1027.053	786.303	<b>1440</b>	2860.508	1551.570	954.666
	1556.788	1201.174	924.643		2871.026	1521.732	1126.780
	1735.069	1012.384	876.148		2961.631	1605.928	1033.925
<b>120</b>	1708.305	1118.719	799.151				
	1611.589	1292.364	994.017				
	1897.048	1136.890	907.259				

**Table D4** % Swelling data of 3 to 8 %w/w of Chitin whiskers-reinforced 30% w/w AMPS-Na<sup>+</sup> with 0.5 mol% MBA crosslinker hydrogel produced from UV radiation technique

Time (min)	% Swelling			Time (min)	% Swelling		
	30% w/w AMPS-Na <sup>+</sup> (0.5%mol MBA)				30% w/w AMPS-Na <sup>+</sup> (0.5%mol MBA)		
	3% CW	5% CW	8% CW		3% CW	5% CW	8% CW
<b>10</b>	658.385	600.666	436.363	<b>180</b>	2109.813	2221.192	1879.237
	514.718	458.011	406.584		2529.192	2341.333	2052.727
	443.925	590.728	422.881		2231.601	2215.469	2028.806
<b>30</b>	1204.968	763.333	861.363	<b>240</b>	2248.130	2307.947	2030.932
	855.844	569.613	767.078		2564.596	2400	2114.545
	841.588	724.503	773.728		2319.913	2314.917	2082.7160
<b>40</b>	1500.621	1278	1095	<b>300</b>	2346.261	2400	2106.779
	1145.887	1075.138	1027.572		2590.683	2409.333	2166.818
	1151.401	1168.874	1022.033		2428.138	2336.464	2148.559
<b>50</b>	1841.614	1612.666	1350	<b>1200</b>	2421.028	2419.205	2174.576
	1435.064	1404.972	1296.707		2595.652	2388	2197.727
	1460.280	1526.490	1267.796		2506.926	2369.613	2204.526
<b>60</b>	1972.049	1887.333	1501.363	<b>1320</b>	2516.822	2423.841	2242.372
	1585.714	1644.198	1412.345		2600	2395.333	2217.272
	1607.009	1786.754	1422.881		2510.822	2372.375	2211.522
<b>90</b>	2076.397	2026	1614.545	<b>1440</b>	2521.962	2428.476	2256.779
	1692.207	1798.342	1545.679		2598.757	2393.333	2226.363
	1711.214	1904.635	1530.084		2530.303	2377.348	2218.930
<b>120</b>	2298.757	2121.333	1811.818				
	1910.389	1894.475	1763.786				
	1951.869	2044.370	1744.491				

**Table D5** % Swelling data of 3 to 7 %w/w of Chitin whiskers-reinforced 40% w/w AMPS-Na<sup>+</sup> with 0.1 mol% MBA crosslinker hydrogel produced from UV radiation technique

Time (min)	% Swelling			Time (min)	% Swelling		
	40% w/w AMPS-Na <sup>+</sup> (0.1%mol MBA)				40% w/w AMPS-Na <sup>+</sup> (0.1%mol MBA)		
	3% CW	5% CW	7% CW		3% CW	5% CW	7% CW
<b>10</b>	586.111	495.454	539.583	<b>180</b>	1958.333	2085.650	2195.073
	616.187	441.379	526.737		2169.791	2321.487	2348.958
	633.333	483.856	491.625		2125.539	2317.672	2354.010
<b>30</b>	586.111	822.727	1000	<b>240</b>	2223.412	2295.515	2358.128
	616.187	822.413	947.058		2433.680	2445.867	2444.270
	633.333	869.506	930.049		2428.417	2428.879	2433.689
<b>40</b>	942.361	1094.628	1257.291	<b>300</b>	2442.063	2431.390	2436.945
	916.906	1131.896	1240.641		2587.152	2547.520	2503.645
	987.698	1128.251	1256.650		2569.064	2545.258	2525.133
<b>50</b>	1240.625	1395.454	1519.270	<b>1200</b>	2627.777	2542.152	2519.704
	1270.503	1421.551	1548.128		3172.222	2828.099	2587.5
	1249.206	1383.856	1535.467		3213.309	2809.913	2641.176
<b>60</b>	1435.416	1558.264	1693.229	<b>1320</b>	3170.634	2865.470	2549.261
	1431.654	1546.982	1703.743		3218.402	2853.719	2589.583
	1452.380	1542.152	1702.955		3228.776	2827.155	2643.850
<b>90</b>	1619.791	1669.421	1826.041	<b>1440</b>	3217.857	2899.103	2561.576
	1598.920	1675.431	1840.106		3243.055	2871.487	2592.187
	1714.682	1670.852	1815.270		3216.187	2836.206	2663.636
<b>120</b>	1812.5	1937.190	2043.75				
	1793.884	1935.344	2041.711				
	1839.285	1917.040	2044.334				

**Table D6** % Swelling data of 30% w/w AMPS-Na<sup>+</sup> hydrogels at various content of MBA crosslinker produced from Gamma radiation technique

Time (min)	% Swelling			Time (min)	% Swelling		
	30% w/w AMPS-Na <sup>+</sup>				30% w/w AMPS-Na <sup>+</sup>		
	0.1 %mol MBA	0.5 %mol MBA	1 %mol MBA		0.1 %mol MBA	0.5 %mol MBA	1 %mol MBA
<b>10</b>	550.931	417.256	526.086	<b>180</b>	2406.953	2182.300	1375.362
	537.187	458.350	505.476		2633.229	2202.061	1266.428
	576.158	465.665	519.377		2506.25	2223.175	1434.449
<b>30</b>	931.366	843.584	790.821	<b>240</b>	2529.801	2395.796	1428.985
	923.125	863.917	805.714		2795.962	2562.061	1309.047
	937.086	850.858	758.851		2724.062	2307.081	1444.019
<b>40</b>	1240.683	1134.955	938.164	<b>300</b>	2729.470	2551.327	1480.676
	1206.562	1110.309	887.142		2822.049	2500	1331.4281
	1216.887	1098.497	911.244		2745.625	2413.304	1446.889
<b>50</b>	1502.484	1374.336	1021.980	<b>1200</b>	2773.841	3277.212	1479.227
	1444.062	1311.546	1001.904		2954.037	3149.690	1450.476
	1492.052	1306.223	1018.421		2795.312	2966.309	1622.009
<b>60</b>	1798.447	1520.353	1041.062	<b>1320</b>	2798.675	3309.070	1509.661
	1711.25	1489.690	1139.285		3267.391	3177.731	1488.333
	1841.059	1447.424	1182.057		3227.5	3012.660	1630.143
<b>90</b>	1979.813	1788.938	1180.917	<b>1440</b>	3240.066	3333.849	1515.700
	1853.437	1843.711	1226.904		3300	3185.154	1497.619
	1948.675	1776.824	1344.976		3277.5	3042.489	1645.215
<b>120</b>	2140.683	2100.884	1264.975				
	2047.5	2185.773	1246.190				
	2154.966	1954.291	1402.392				

**Table D7** % Swelling data of 40% w/w AMPS-Na<sup>+</sup> hydrogels at various content of MBA crosslinker produced from Gamma radiation technique

Time (min)	% Swelling			Time (min)	% Swelling		
	40% w/w AMPS-Na <sup>+</sup>				40% w/w AMPS-Na <sup>+</sup>		
	0.1 %mol MBA	0.5 %mol MBA	1 %mol MBA		0.1 %mol MBA	0.5 %mol MBA	1 %mol MBA
<b>10</b>	415.277	352.796	278.475	<b>180</b>	2031.547	1569.798	1063.228
	472.244	369.333	359.902		2274.693	1531.111	1053.733
	486.514	387.155	363.111		2138.796	1619.954	1060.139
<b>30</b>	800.793	727.516	655.007	<b>240</b>	2259.523	1641.610	1106.726
	856.530	745.555	680.844		2458.367	1611.555	1079.383
	927.800	804.587	578.671		2483.402	1688.532	1105.944
<b>40</b>	1024.801	951.006	812.406	<b>300</b>	2486.706	1684.116	1110.164
	1146.734	888.666	804.058		2555.306	1659.111	1077.597
	1124.066	986.926	656.643		2596.473	1720.642	1127.972
<b>50</b>	1185.317	1080.313	874.439	<b>1200</b>	2655.158	1693.288	1109.865
	1308.163	1018.666	843.993		2829.387	1764.222	1155.194
	1287.966	1128.669	736.888		3030.290	1735.091	1158.391
<b>60</b>	1387.5	1162.192	879.073	<b>1320</b>	2659.325	1693.736	1111.061
	1427.755	1138	893.181		2899.387	1772.666	1159.902
	1465.560	1238.073	823.076		3079.875	1751.146	1162.062
<b>90</b>	1671.825	1323.937	972.645	<b>1440</b>	2680.158	1696.868	1117.189
	1762.244	1281.111	987.5		2897.551	1778.666	1163.961
	1699.585	1406.422	912.762		3085.892	1758.256	1168.181
<b>120</b>	1819.841	1410.290	1026.307				
	1963.061	1412.222	1012.5				
	1863.278	1505.045	975.174				



**Table D8** % Swelling data of 50% w/w AMPS-Na<sup>+</sup> hydrogels at various content of MBA crosslinker produced from Gamma radiation technique

Time (min)	% Swelling			Time (min)	% Swelling		
	50% w/w AMPS-Na <sup>+</sup>				50% w/w AMPS-Na <sup>+</sup>		
	0.1 %mol MBA	0.5 %mol MBA	1 %mol MBA		0.1 %mol MBA	0.5 %mol MBA	1 %mol MBA
<b>10</b>	457.575	421.147	349.078	<b>180</b>	1778.219	1334.098	815.745
	410.035	325.686	255.245		1824.193	1215.347	893.114
	371.631	330.132	386.291		1692.021	1299.337	807.732
<b>30</b>	831.439	695.737	560.636	<b>240</b>	1886.931	1378.196	774.036
	804.659	574.959	474.262		1946.057	1264.135	920.983
	734.042	652.317	576.274		1809.219	1311.258	836.906
<b>40</b>	991.477	811.311	651.256	<b>300</b>	1963.825	1399.180	780.904
	1047.849	707.754	587.540		2013.261	1309.208	928.524
	921.808	802.980	607.205		1886.879	1325.331	848.330
<b>50</b>	1142.992	939.672	753.936	<b>1200</b>	2302.651	1426.557	791.122
	1188.888	797.899	635.081		2260.931	1384.168	943.606
	1051.241	898.344	680.140		2208.687	1467.715	850.790
<b>60</b>	1268.939	1034.754	800.837	<b>1320</b>	2320.075	1429.180	796.147
	1306.989	879.967	695.245		2273.655	1396.607	944.918
	1176.773	994.867	730.228		2243.971	1475.827	852.196
<b>90</b>	1438.825	1147.868	761.306	<b>1440</b>	2339.204	1439.180	798.157
	1519.534	1013.570	787.377		2316.129	1398.384	947.049
	1369.148	1110.099	736.028		2265.780	1477.317	857.644
<b>120</b>	1574.810	1244.754	683.752				
	1644.265	1111.308	838.360				
	1517.907	1198.178	757.293				

**Table D9** % Swelling data of 3 to 8 %w/w of Chitin whiskers-reinforced 30% w/w AMPS-Na<sup>+</sup> with 0.5 mol% MBA crosslinker hydrogel produced from Gamma radiation technique

Time (min)	% Swelling			Time (min)	% Swelling		
	30% w/w AMPS-Na <sup>+</sup> (0.5%mol MBA)				30% w/w AMPS-Na <sup>+</sup> (0.5%mol MBA)		
	3% CW	5% CW	8% CW		3% CW	5% CW	8% CW
<b>10</b>	571.541	551.452	471.951	<b>180</b>	2136.758	1931.950	1674.390
	643.373	628.301	471.481		2117.269	1923.113	1620.370
	621.235	607.943	475.103		2161.389	1944.392	1616.597
<b>30</b>	999.209	873.443	795.121	<b>240</b>	2235.573	2019.087	1732.926
	969.879	919.811	748.148		2192.771	2012.264	1672.222
	937.837	870.560	770.124		2271.042	2032.710	1678.008
<b>40</b>	1221.739	1105.809	956.097	<b>300</b>	2307.114	2077.593	1762.601
	1216.867	1124.056	935.185		2291.967	2061.792	1714.814
	1241.698	1100.934	947.302		2301.544	2076.635	1709.543
<b>50</b>	1416.205	1288.381	1125.609	<b>1200</b>	2320.158	2122.406	1783.739
	1389.959	1274.056	1070.740		2302.008	2062.735	1748.148
	1414.285	1277.570	1080.497		2385.714	2127.102	1742.738
<b>60</b>	1587.747	1420.746	1266.666	<b>1320</b>	2354.545	2144.813	1791.869
	1546.184	1420.754	1188.888		2327.710	2069.811	1790.370
	1567.181	1422.429	1190.456		2410.424	2188.317	1776.763
<b>90</b>	1702.371	1544.813	1354.878	<b>1440</b>	2362.055	2165.145	1800.813
	1646.586	1549.528	1296.666		2348.995	2084.433	1799.629
	1717.760	1539.252	1327.385		2416.988	2194.392	1781.327
<b>120</b>	1849.407	1657.261	1461.788				
	1810.441	1672.641	1401.111				
	1891.505	1669.158	1411.203				

**Table D10** % Swelling data of 3 to 7 %w/w of Chitin whiskers-reinforced 40% w/w AMPS-Na<sup>+</sup> with 0.1 mol% MBA crosslinker hydrogel produced from Gamma radiation technique

Time (min)	% Swelling			Time (min)	% Swelling		
	40% w/w AMPS-Na <sup>+</sup> (0.1%mol MBA)				40% w/w AMPS-Na <sup>+</sup> (0.1%mol MBA)		
	3% CW	5% CW	7% CW		3% CW	5% CW	7% CW
<b>10</b>	718.061	482.491	450.975	<b>180</b>	2296.916	1854.882	1842.682
	660.606	562.333	519.354		2165.800	1866.333	1838.440
	612.773	528.620	539.285		2118.613	1915.517	1870.054
<b>30</b>	1065.198	816.161	740.243	<b>240</b>	2422.907	1959.596	1926.804
	962.770	813.333	784.139		2264.935	1972.666	1940.053
	906.204	793.103	804.670		2240.875	2017.241	1922.802
<b>40</b>	1313.215	1001.346	942.439	<b>300</b>	2493.832	2025.925	1958.292
	1239.826	1045	987.365		2348.484	2035.333	1960.752
	1160.948	1026.896	1004.395		2330.656	2080.344	1957.692
<b>50</b>	1519.383	1186.868	1142.926	<b>1200</b>	2546.696	2074.074	1984.390
	1400.865	1212.666	1194.086		2406.493	2082.666	1985.483
	1363.138	1231.379	1197.802		2422.627	2124.827	1979.395
<b>60</b>	1688.105	1335.353	1329.512	<b>1320</b>	2591.629	2197.306	2069.756
	1564.502	1368	1348.118		2582.683	2203.666	2047.043
	1508.029	1363.793	1366.483		2522.992	2175.172	2054.670
<b>90</b>	1814.096	1443.434	1406.097	<b>1440</b>	2603.964	2204.040	2077.561
	1670.995	1458	1444.623		2587.878	2213.666	2071.774
	1625.547	1493.103	1456.593		2558.394	2182.758	2081.318
<b>120</b>	1952.422	1568.013	1523.902				
	1841.558	1583	1579.301				
	1778.832	1598.275	1580.769				

**Appendix E Mechanical Properties Data of AMPS-Na<sup>+</sup> Hydrogels and Chitin Whiskers-reinforced Hydrogels**

**Table E1** Mechanical Properties Data of 30% w/w AMPS-Na<sup>+</sup> hydrogels at various content of MBA crosslinker produced from UV radiation technique

Type of hydrogels		Tensile strength (MPa)	Percentage of elongation at break (%)
30% w/w AMPS-Na <sup>+</sup>	0.1 %mol MBA	No data	No data
	0.5 %mol MBA	0.022182427	180.3355176
		0.026662661	205.7401572
		0.035359347	187.7967674
		0.028984191	399.9950155
		0.036255082	238.3644653
		0.025638752	233.884778
		0.0300037	371.5198655
		0.028259406	399.9937909
		0.026521379	
	0.03157666		
	1 %mol MBA	0.04406446	160.5010036
		0.039926773	141.5165755
		0.030077459	171.2511375
		0.036078481	250.0133769
		0.055258421	132.5661702
		0.031344987	257.8138121
		0.039775789	224.4349608
		0.041581257	300.0115075
		0.041075568	177.6903384
		0.038471659	252.3630403

**Table E2** Mechanical Properties Data of 40% w/w AMPS-Na<sup>+</sup> hydrogels at various content of MBA crosslinker produced from UV radiation technique

Type of hydrogels		Tensile strength (MPa)	Percentage of elongation at break (%)
40% w/w AMPS-Na <sup>+</sup>	0.1 %mol MBA	0.037389649	774.8263939
		0.046346208	781.326832
		0.044766669	750.26783
		0.046116275	765.2378123
		0.047341215	753.278927
		0.045187787	784.1293024
		0.039181471	756.2389123
		0.036184588	784.2376892
		0.040333276	697.2719873
		684.2389272	
	0.5 %mol MBA	0.038449793	222.3837318
		0.050469614	255.6694155
		0.058392548	182.3590892
		0.079390977	168.9625897
		0.036214021	127.2723978
		0.04014997	190.3493853
		0.068462661	99.77666504
		0.063488394	160.25779
		0.044715484	333.293697
		0.063064431	193.642615
	1 %mol MBA	0.061463287	104.1441165
		0.058532844	147.5744457
		0.05626616	144.9774052
		0.062296634	119.5864916
		0.057450085	65.25418497
		0.084147389	74.77741816
0.054872761		155.6520311	
0.038620766		101.9690355	
0.066130813		116.2676174	
0.040955735	96.92164406		

**Table E3** Mechanical Properties Data of 50% w/w AMPS-Na<sup>+</sup> hydrogels at various content of MBA crosslinker produced from UV radiation technique

Type of hydrogels		Tensile strength (MPa)	Percentage of elongation at break (%)
50% w/w AMPS-Na <sup>+</sup>	0.1 %mol MBA	0.066080576	475.7836525
		0.053747488	425.1948296
		0.048667884	581.490328
		0.057308778	467.9700495
		0.054522604	580.7609633
		0.057792124	488.3923377
		0.048982446	509.7724165
		0.052683293	600.0050354
		0.048299229	420.8463597
		0.049132965	510.9904662
	0.5 %mol MBA	0.066250872	136.8593821
		0.063109985	102.1215703
		0.074305166	95.10431528
		0.057059371	75.52460504
		0.071909617	110.4340833
		0.069058758	115.1478666
		0.045003588	98.23248182
		0.080213404	107.7868242
		0.070301487	88.42630366
		0.060482594	117.42796
	1 %mol MBA	0.078639221	58.42921617
		0.069522329	75.79714689
		0.077196548	75.4516584
		0.066559411	52.15336505
		0.071492048	62.12873818
		0.068191763	67.69129906
		0.06714937	40.78124334
0.079299472	92.86312939		
0.065451268	83.36846336		
0.072340619	49.74232876		

**Table E4** Mechanical Properties Data of 30% w/w AMPS-Na<sup>+</sup> hydrogels at various content of MBA crosslinker produced from Gamma radiation technique

Type of hydrogels		Tensile strength (MPa)	Percentage of elongation at break (%)
30% w/w AMPS-Na <sup>+</sup>	0.1 %mol MBA	No data	No data
	0.5 %mol MBA	0.023772811	129.7650378
		0.02831285	144.6853513
		0.056522499	233.221787
		0.030639472	126.6859052
		0.02907602	239.7849594
		0.045125178	176.4570649
		0.033115449	161.3289576
		0.030661275	106.6955511
		0.040186016	101.0905216
		0.052784801	221.6291386
	1 %mol MBA	0.038847796	116.036174
		0.034034324	100.0978468
		0.039028323	44.83706389
		0.055850254	108.9497942
		0.040243138	181.1132774
		0.05175257	64.75370093
		0.045995907	140.9711896
		0.06239471	125.7082342
		0.046732599	136.0408192
		0.055765428	103.9174784
		0.085347184	
		0.04520466	

**Table E5** Mechanical Properties Data of 40% w/w AMPS-Na<sup>+</sup> hydrogels at various content of MBA crosslinker produced from Gamma radiation technique

Type of hydrogels		Tensile strength (MPa)	Percentage of elongation at break (%)
40% w/w AMPS-Na <sup>+</sup>	0.1 %mol MBA	0.067329407	200.0217692
		0.058457742	298.160577
		0.05839322	270.2392637
		0.04625182	284.6481059
		0.04232137	301.2211809
		0.04283922	270.9179582
		0.048352716	240.5520748
		0.04273912	236.9619291
		0.04921738	292.2723163
	0.05472368	279.539587	
	0.5 %mol MBA	0.07104361	180.3361902
		0.071272749	140.8890129
		0.056176683	127.7614421
		0.056294897	180.8992353
		0.047713148	134.895403
		0.054292086	245.6276794
		0.040229438	120.5055337
		0.050648519	82.33930236
		0.094906473	185.9676999
	0.057014023	80.05982213	
	1 %mol MBA	0.061406428	28.29999169
		0.074684569	59.92816796
		0.073996999	105.4976832
		0.07341813	97.68218451
		0.053631869	36.60809374
		0.053369555	39.38997507
		0.078476134	100.6150833
0.062609425		94.46188019	
0.06749794		65.31215306	
0.060610743	74.74541758		



**Table E6** Mechanical Properties Data of 50% w/w AMPS-Na<sup>+</sup> hydrogels at various content of MBA crosslinker produced from Gamma radiation technique

Type of hydrogels		Tensile strength (MPa)	Percentage of elongation at break (%)
50% w/w AMPS-Na <sup>+</sup>	0.1 %mol MBA	0.064893575	314.983303
		0.059102241	211.228078
		0.054947686	227.3265111
		0.052449733	264.911081
		0.061169504	279.2765568
		0.064934566	279.740431
		0.060850767	231.0918081
		0.058584004	269.0372146
		0.053716851	154.8089714
		0.067489628	184.5613853
	0.5 %mol MBA	0.088827738	132.2085858
		0.079238562	101.4028318
		0.065698867	79.45365485
		0.065048715	79.59297194
		0.068957469	122.3696663
		0.072126807	94.43853148
		0.074700452	120.1498155
		0.079277831	124.8085763
		0.06039826	144.9319813
		0.085608924	117.1746757
	1 %mol MBA	0.109216914	78.77221549
		0.077490059	71.92990084
		0.119588753	86.62252687
		0.092766719	75.08367258
		0.117200906	95.24911199
		0.099231909	80.09516384
		0.07483029	72.34394206
0.112182223	84.36977123		
0.090478177	57.25161663		
0.076584364	54.30134431		

**Table E7** Mechanical Properties Data of 3 to 8 %w/w of Chitin whiskers-reinforced 30% w/w AMPS-Na<sup>+</sup> with 0.5 mol% MBA crosslinker hydrogel produced from UV radiation technique

Type of hydrogels		Tensile strength (MPa)	Percentage of elongation at break (%)
30% w/w AMPS-Na <sup>+</sup> with 0.5%mol MBA	3% CW	0.082881617	475.6472356
		0.083916198	422.4421364
		0.079372081	470.0160542
		0.050403962	348.4985315
		0.079441649	420.1676153
		0.076220167	464.0854297
		0.057096417	379.9561744
		0.087602866	457.5722153
		0.065081596	390.9636446
		0.073223555	327.9674969
	5% CW	0.065301208	376.9132764
		0.097748952	463.576908
		0.099784989	476.6393669
		0.085664908	432.064797
		0.080786782	403.474656
		0.088444893	445.2282087
		0.081958458	349.212326
		0.089248894	391.5606724
		0.05807236	295.0436052
		0.080964026	465.2403339
	8% CW	0.080933953	325.2825024
		0.080709245	284.6873219
		0.116454521	398.6437251
		0.117497818	399.9548327
		0.091915562	342.1246927
		0.11777296	499.9717204
		0.06598811	263.4222785
0.073283187	306.2639839		
0.114087954	406.7551837		
0.103606117	365.098749		

**Table E8** Mechanical Properties Data of 3 to 7 %w/w of Chitin whiskers-reinforced 40% w/w AMPS-Na<sup>+</sup> with 0.5 mol% MBA crosslinker hydrogel produced from UV radiation technique

Type of hydrogels		Tensile strength (MPa)	Percentage of elongation at break (%)
40% w/w AMPS-Na <sup>+</sup> with 0.1%mol MBA	3% CW	0.080029294	599.9884072
		0.128873953	808.1258533
		0.10000906	618.9877834
		0.110477031	811.2828202
		0.115594686	814.0579377
		0.109514871	773.5100213
		0.113044416	816.4564964
		0.078590808	645.5411283
		0.119548652	818.6298334
	0.11435798	768.8960182	
	5% CW	0.139053402	876.2078249
		0.149136976	907.5331868
		0.142969372	899.5248982
		0.147945512	845.4451239
		0.155382771	917.9537105
		0.153557978	848.7615082
		0.152363751	992.0298146
		0.157572605	877.9082946
		0.155633834	856.6795211
	0.161472009	873.9012857	
	7% CW	0.147141555	746.0381125
		0.160019168	876.7331982
		0.164039839	644.3199886
		0.157273706	699.4806503
		0.159688303	762.8457729
		0.158835561	847.3498278
		0.171071486	877.8579421
0.16075617		900.0066807	
0.175286499		704.5350072	
0.181350712	697.8465968		

**Table E9** Mechanical Properties Data of 3 to 8 %w/w of Chitin whiskers-reinforced 30% w/w AMPS-Na<sup>+</sup> with 0.5 mol% MBA crosslinker hydrogel produced from Gamma radiation technique

Type of hydrogels		Tensile strength (MPa)	Percentage of elongation at break (%)
30% w/w AMPS-Na <sup>+</sup> with 0.5%mol MBA	3% CW	0.0651231	229.3357251
		0.094348619	280.6173503
		0.081124303	256.4927517
		0.081757291	253.8905507
		0.086534141	272.6516424
		0.096893688	276.3874257
		0.083422061	261.2970489
		0.057569517	203.5521242
		0.09884779	276.7314391
	0.092877304	319.1427714	
	5% CW	0.080508062	209.8681168
		0.085131415	207.4666187
		0.090420207	236.8080834
		0.090271726	211.2380845
		0.087782327	232.8270471
		0.092876098	238.2445359
		0.097567862	229.6038138
		0.106243635	252.7431227
		0.069270006	184.9640146
	0.085489752	222.2877253	
	8% CW	0.14400492	265.3606242
		0.148465785	269.0284698
		0.149855646	279.2373076
		0.184267676	275.9805588
		0.139771863	249.5993296
		0.058196088	120.0570449
		0.169018019	259.6819623
0.1753829		269.0395539	
0.175357887		285.5868595	
0.133770175	217.3005312		

**Table E10** Mechanical Properties Data of 3 to 7 %w/w of Chitin whiskers-reinforced 40% w/w AMPS- $\text{Na}^+$  with 0.5 mol% MBA crosslinker hydrogel produced from Gamma radiation technique

Type of hydrogels		Tensile strength (MPa)	Percentage of elongation at break (%)
40% w/w AMPS- $\text{Na}^+$ with 0.1%mol MBA	3% CW	0.113713365	425.0121295
		0.100202525	398.0896721
		0.081467787	387.429378
		0.086159914	392.141489
		0.103784	386.348934
		0.084362784	395.3478132
		0.1184934	420.3264783
		0.092346712	421.364834
		0.1043784	395.2187321
		0.0936282	386.2364781
	5% CW	0.135875429	371.4921948
		0.177857991	462.5640341
		0.16380126	450.6578696
		0.144578615	457.3190301
		0.173309736	466.0910949
		0.161567898	453.717845
		0.170863483	467.8337383
		0.152244168	439.3584741
		0.17202531	417.2062539
		0.194588883	474.7614738
	7% CW	0.174514306	431.1683946
		0.192511225	437.3231472
		0.186463748	430.778063
		0.17915157	486.9138441
		0.189926229	545.8413634
		0.217150217	477.3618229
		0.202524872	436.5249876
0.203294835		493.136588	
0.16401832		429.8090962	
0.200610733		422.0603569	

## Appendix F Release Data (% Weight loss) of Chitin Whiskers-Reinforced Hydrogels

**Table E1** Release data (% Weight loss) of Chitin whiskers-reinforced hydrogel produced from UV radiation technique

Type of hydrogels		% Weight loss after enzymatic hydrolysis				
		1 day	2 days	3 days	4 days	5 days
30% w/w AMPS-Na <sup>+</sup> with 0.5 %mol MBA	3% CW	4.879	9.395	17.517	22.399	29.882
		4.498	8.159	13.123	24.916	33.203
		6.595	7.629	17.800	27.153	30.078
		3.354	10.632	15.249	23.657	24.023
		5.451	13.104	20.918	25.894	28.710
	5% CW	5.833	15.154	21.343	23.238	32.031
		4.498	9.486	20.634	27.712	28.320
		7.357	8.541	20.351	30.229	30.468
		5.451	13.265	18.083	27.852	26.367
		5.642	14.399	16.808	22.958	36.523
	8% CW	6.786	19.286	30.697	40.715	41.210
		5.451	19.463	31.122	36.381	39.257
		7.167	14.694	32.114	34.423	41.406
		8.311	14.341	31.405	35.262	38.085
		9.454	22.818	31.972	40.576	40.234
40% w/w AMPS-Na <sup>+</sup> with 0.1 %mol MBA	3% CW	11.942	11.441	22.182	30.697	35.756
		9.674	14.645	25.089	35.090	36.396
		4.761	19.908	23.076	31.689	38.827
		9.108	16.247	26.654	35.799	44.714
		7.785	24.942	29.561	36.224	37.420
	5% CW	10.241	20.594	28.667	38.208	41.259
		9.486	22.654	33.363	37.641	37.420
		10.430	22.196	30.903	36.366	40.363
		11.375	17.162	28.667	36.507	41.643
		11.564	20.823	29.338	38.633	40.363
	7% CW	16.477	28.146	31.350	40.617	47.274
		20.068	27.002	31.127	38.775	45.866
		16.666	28.146	32.468	39.058	41.387
		18.556	29.290	28.443	39.909	47.658
		17.233	29.748	41.860	41.468	46.634

**Table E2** Release data (% Weight loss) of Chitin whiskers-reinforced hydrogel produced from Gamma radiation technique

Type of hydrogels		% Weight loss after enzymatic hydrolysis				
		1 day	2 days	3 days	4 days	5 days
30% w/w AMPS-Na <sup>+</sup> with 0.5 %mol MBA	3% CW	6.054	9.993	26.303	19.946	26.315
		6.054	7.207	20.209	25.089	26.086
		8.203	10.689	22.052	25.313	25.858
		8.789	7.033	19.501	22.182	25.400
		5.859	8.774	21.768	27.325	27.231
	5% CW	5.859	11.559	25.595	31.797	36.613
		7.031	9.818	23.185	28.443	29.519
		8.203	12.430	28.146	30.232	31.350
		9.375	11.211	26.729	32.021	33.180
		7.226	14.171	20.351	33.139	36.842
	8% CW	8.007	18.349	29.280	35.822	41.876
		9.375	21.309	39.342	37.835	40.503
		7.226	17.305	31.689	39.177	42.562
		7.617	20.612	35.799	39.177	42.791
		10.546	21.309	40.476	41.860	38.443
40% w/w AMPS-Na <sup>+</sup> with 0.1 %mol MBA	3% CW	7.629	8.252	8.286	28.064	35.011
		8.159	8.948	18.718	19.199	27.002
		7.629	10.689	12.5	25.531	32.723
		7.099	10.515	15.559	21.732	29.290
		13.104	8.774	18.352	27.304	34.324
	5% CW	10.102	16.434	21.604	29.837	36.613
		11.515	16.782	17.810	21.985	29.519
		10.985	15.912	18.713	24.012	31.350
		11.868	16.434	13.836	26.038	33.180
		12.928	14.171	17.268	30.091	36.842
	7% CW	12.045	21.831	22.687	28.824	38.215
		12.398	21.309	27.565	30.344	36.613
		11.515	17.305	23.771	32.370	46.224
		13.634	24.094	26.119	35.410	40.503
		11.868	19.568	23.952	34.650	48.054

**Appendix G Absorbance Data for Indirect Cytotoxicity Test by MTT Assay of AMPS-Na<sup>+</sup> Hydrogels and Chitin Whiskers-reinforced Hydrogels**

**Table F1** Absorbance data of AMPS-Na<sup>+</sup> hydrogels produced from UV radiation technique

Type of hydrogels		Absorbance value
30% w/w AMPS-Na <sup>+</sup>	0.1 %mol MBA	0.274
		0.271
		0.288
	0.5 %mol MBA	0.295
		0.246
		0.279
	1 %mol MBA	0.263
		0.263
		0.271
40% w/w AMPS-Na <sup>+</sup>	0.1 %mol MBA	0.281
		0.296
		0.262
	0.5 %mol MBA	0.275
		0.262
		0.257
	1 %mol MBA	0.267
		0.238
		0.27
50% w/w AMPS-Na <sup>+</sup>	0.1 %mol MBA	0.29
		0.259
		0.259
	0.5 %mol MBA	0.246
		0.239
		0.262
	1 %mol MBA	0.234
		0.226
		0.219



**Table F2** Absorbance data of Chitin whiskers-reinforced AMPS-Na<sup>+</sup> hydrogels produced from UV radiation technique

Type of hydrogels		Absorbance value
30% w/w AMPS-Na <sup>+</sup> with 0.5 %mol MBA	3% CW	0.415
		0.449
		0.401
		0.444
		0.422
	5% CW	0.351
		0.398
		0.368
		0.381
		0.356
	8% CW	0.343
		0.358
0.369		
0.384		
0.366		
40% w/w AMPS-Na <sup>+</sup> with 0.1 %mol MBA	3% CW	0.434
		0.423
		0.417
		0.447
		0.431
	5% CW	0.343
		0.386
		0.384
		0.419
		0.426
	7% CW	0.384
		0.363
		0.357
		0.377
		0.38

**Table F3** Absorbance data of AMPS-Na<sup>+</sup> hydrogels produced from Gamma radiation technique

Type of hydrogels		Absorbance value
30% w/w AMPS-Na <sup>+</sup>	0.1 %mol MBA	0.287
		0.288
		0.268
	0.5 %mol MBA	0.276
		0.261
		0.259
	1 %mol MBA	0.258
		0.245
		0.248
40% w/w AMPS-Na <sup>+</sup>	0.1 %mol MBA	0.256
		0.28
		0.263
	0.5 %mol MBA	0.255
		0.273
		0.255
	1 %mol MBA	0.277
		0.215
		0.246
50% w/w AMPS-Na <sup>+</sup>	0.1 %mol MBA	0.241
		0.268
		0.289
	0.5 %mol MBA	0.258
		0.249
		0.254
	1 %mol MBA	0.235
		0.223
		0.211

**Table F4** Absorbance data of Chitin whiskers-reinforced AMPS-Na<sup>+</sup> hydrogels produced from Gamma radiation technique

Type of hydrogels		Absorbance value
30% w/w AMPS-Na <sup>+</sup> with 0.5 %mol MBA	3% CW	0.197
		0.191
		0.193
		0.191
		0.189
	5% CW	0.185
		0.188
		0.181
		0.187
		0.18
	8% CW	0.168
		0.179
0.17		
0.165		
40% w/w AMPS-Na <sup>+</sup> with 0.1 %mol MBA	3% CW	0.186
		0.19
		0.194
		0.193
		0.204
	5% CW	0.182
		0.189
		0.182
		0.175
		0.177
	7% CW	0.171
		0.169
		0.17
		0.169
		0.168

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**Presentations :**

1. Suwanpreuksa, P; and Supaphol, P. (2011, April 26) Preparation and Characterization of Hydrogel based on 2-Acrylamido-2-Methylpropane Sulfonic Acid Sodium Salt and/or Chitin Whiskers for Biomedical Application. Poster presented at The 2<sup>nd</sup> PPC Symposium on Petroleum, Petrochemicals, and Polymers, Bangkok, Thailand.