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APPENDIX

Appendix A Conventional Degumming

Condition: Silk samples is treated with alkaline solution (10 g/l. soap and 2 g/l. sodium carbonate in a liquor ratio of 1:30 (silk (g): alkaline solution (mL))). Temperature 90-95 °C for 45 min.

Batch# 1

Sample No.	Weight before degumming (gram)					Average	SD	Weight after degumming (gram)					Average	SD	% Weight loss
1	0.2619	0.2618	0.262	0.2620	0.2618	0.2619	0.0001	0.1948	0.1948	0.1946	0.1947	0.1946	0.1947	0.0001	25.66
2	0.2684	0.2684	0.2683	0.2683	0.2684	0.2684	0.0001	0.2066	0.2067	0.2065	0.2066	0.2065	0.2066	0.0001	23.02
3	0.3239	0.3240	0.3238	0.3239	0.3240	0.3059	0.0002	0.2383	0.2384	0.2383	0.2386	0.2388	0.2385	0.0002	22.04
4	0.3301	0.3300	0.3301	0.3300	0.3301	0.3301	0.0001	0.2471	0.2472	0.247	0.2476	0.2471	0.2472	0.0002	25.10
5	0.2170	0.2169	0.2169	0.2170	0.2169	0.2169	0.0001	0.1628	0.1625	0.1624	0.1719	0.1719	0.1663	0.0051	23.34

Batch#2

Sample No	Weight before degumming					Average	SD	Weight after degumming					Average	SD	% Weight loss
1	0.2577	0.2579	0.2579	0.258	0.2579	0.2579	0.0001	0.1925	0.1924	0.1924	0.1925	0.1925	0.1925	0.0001	25.37
2	0.2898	0.2896	0.2896	0.2895	0.2897	0.2896	0.0001	0.2152	0.2151	0.2152	0.2151	0.2151	0.2151	0.0001	25.72
3	0.2426	0.2427	0.2428	0.2428	0.2428	0.2427	0.0001	0.1848	0.1851	0.1851	0.1851	0.1849	0.1850	0.0001	23.79
4	0.2531	0.2534	0.2532	0.2534	0.2534	0.2533	0.0001	0.1917	0.1917	0.1919	0.1921	0.192	0.1919	0.0002	24.25
5	0.2267	0.2267	0.2266	0.2267	0.2265	0.2266	0.0001	0.1716	0.1719	0.1717	0.1719	0.1719	0.1718	0.0001	24.20

Batch#3

Sample No	Weight before degumming					Average	SD	Weight after degumming					Average	SD	% Weight loss
1	0.287	0.2868	0.2872	0.2869	0.2872	0.2870	0.0002	0.2172	0.2175	0.2173	0.2173	0.2173	0.2173	0.0001	24.28
2	0.3061	0.3059	0.3058	0.3059	0.306	0.3059	0.0001	0.2351	0.2351	0.2352	0.2351	0.2351	0.2351	0.0000	23.15
3	0.2794	0.2794	0.2791	0.2795	0.2794	0.2794	0.0002	0.2126	0.2126	0.2025	0.2125	0.2126	0.2124	0.0045	23.97
4	0.2795	0.2791	0.2793	0.2796	0.2795	0.2794	0.0002	0.2088	0.2089	0.2088	0.209	0.2088	0.2089	0.0001	25.25
5	0.2354	0.2354	0.2354	0.2353	0.2353	0.2354	0.0001	0.1748	0.1749	0.1747	0.1748	0.1746	0.1748	0.0001	25.75

Batch#4

Sample No	Weight before degumming					Average	SD	Weight after degumming					Average	SD	% Weight loss
1	0.2753	0.2751	0.2752	0.2752	0.2754	0.2752	0.0001	0.2094	0.2092	0.2091	0.2095	0.2092	0.2093	0.0002	23.96
2	0.2622	0.2622	0.2624	0.2623	0.2623	0.2623	0.0001	0.1997	0.1999	0.1999	0.1997	0.1999	0.1998	0.0001	23.81
3	0.3651	0.3652	0.3653	0.3654	0.3653	0.3653	0.0001	0.2809	0.281	0.2813	0.281	0.2813	0.2811	0.0002	23.04
4	0.2352	0.2349	0.2349	0.235	0.2349	0.2350	0.0001	0.1807	0.1806	0.1808	0.1807	0.1809	0.1807	0.0001	23.08
5	0.2214	0.2213	0.2216	0.2217	0.2215	0.2215	0.0002	0.1691	0.1692	0.1693	0.1692	0.1693	0.1692	0.0001	23.60

Batch#5

Sample No.	Weight before degumming					Average	SD	Weight after degumming					Average	SD	% Weight loss
1	0.2524	0.2525	0.2519	0.2523	0.2521	0.2522	0.0002	0.1929	0.1929	0.1932	0.193	0.193	0.1930	0.0001	23.44
2	0.2543	0.2543	0.2547	0.2545	0.2545	0.2545	0.0002	0.1965	0.1963	0.1961	0.1962	0.1963	0.1963	0.0001	22.87
3	0.2749	0.2748	0.2749	0.2748	0.2748	0.2748	0.0001	0.2049	0.205	0.205	0.2049	0.205	0.2050	0.0001	25.40
4	0.2275	0.2267	0.2274	0.2269	0.2271	0.2271	0.0003	0.1748	0.1751	0.1752	0.1751	0.1749	0.175	0.0002	22.99

Sample	Breaking Strength (N)	Elongation (%)	Sample	Breaking Strength (N)	Elongation (%)
Raw silk	6.706	30.2	Conventional degummed	5.165	20.6
	6.939	32.0		5.249	21.5
	7.637	30.5		5.726	22.9
	7.099	33.1		5.333	21.7
	7.202	33.1		5.611	22.0
	7.446	33.1		5.558	22.5
	7.259	32.7		5.630	23.2
	7.248	33.6		5.833	22.5
	7.675	32.5		5.623	21.9
	6.866	32.1		5.409	20.8
	6.813	30.7		5.360	22.2
	7.301	30.8		5.749	22.1
	7.309	30.6		5.249	20.7
	7.191	30.9		5.211	21.5
	7.057	31.7		5.504	22.6
	6.943	32.2		5.737	22.4
	7.416	30.5		5.634	21.8
	7.423	30.9		5.413	20.8
	7.011	29.0		5.768	23.2
	7.263	31.4		5.737	23.7
	6.897	27.5		5.692	24.9
	7.042	32.8		5.386	22.4
	7.217	32.2		5.424	22.7
	6.924	31.2		5.581	20.6
	7.614	31.4		5.424	20.8
	7.118	27.3		5.680	21.8
	6.927	30.6		5.901	22.7
	6.878	32.4		5.268	21.3
	7.298	31.6		5.699	20.7
	7.652	32.5		5.661	22.3
	7.145	32.3		5.974	22.9
	7.355	30.5		5.161	20.2
	6.897	29.6		5.341	20.6
	7.107	30.1		5.329	20.8
	6.752	28.8		5.692	21.8
	6.680	29.8		5.341	19.7
	7.217	31.5		5.482	21.2
	6.859	32.5		5.554	21.2
	6.653	29.3		5.470	22.5
	6.893	32.7		5.650	22.2
	7.282	33.9		5.672	21.2
	6.721	28.7		5.329	21.2
	7.210	31.5		5.653	23.0
	7.275	29.9		5.680	23.3
	6.748	30.4		5.341	23.1
	7.465	31.1		5.302	19.4
	7.175	32.1		5.527	21.8
	6.954	27.9		5.589	22.8
	6.870	30.4		5.337	22.1
	7.088	29.8		5.520	21.8
Average	7.114	31.1	Average	5.523	21.9
SD	0.270	1.5	SD	0.197	1.1

Appendix B Plasma Treatment: Varying Discharge Power

Condition: Varying discharge at 60, 250, 1000 and 2000 (Watt)
 Fix exposure time at 5 (min), flow rate at 500 (cc/min), temperature
 at 25°C, oxygen gas and electrode distance at 3.5 cm.

Identified code: S = Sample No.
 (S1 = sample number 1, S2 = sample number 2)
 W = Discharge power
 (W1 = 60, W2 = 250, W3 = 1000 and W4 = 2000)
 M = Time
 (M1 = 5, M2 = 10 and M3 = 15 min)
 F = Flow rate
 (F1 = 500, F2 = 250 and F3 = 1000 cc/min)
 T = Temperature
 (T1 = 25, T2 = 50 and T3 = 75 °C)

Discharge Power at 60 (Watt)

1st

Sample code	Average weight before	Average weight after	% weight loss	% Average weight loss
S1W1M1F1T1	0.3040	0.2952	2.91	2.54 ± 0.21
S2W1M1F1T1	0.3438	0.3354	2.45	
S3W1M1F1T1	0.3234	0.3152	2.54	
S4W1M1F1T1	0.3500	0.3408	2.63	
S5W1M1F1T1	0.3534	0.3452	2.34	
S6W1M1F1T1	0.3507	0.3426	2.29	
S7W1M1F1T1	0.3265	0.3178	2.66	

2nd

Sample code	Average weight before	Average weight after	% weight loss	% Average weight loss
S1W1M1F1T1	0.3454	0.3364	2.56	2.71 ± 0.25
S2W1M1F1T1	0.3487	0.3394	2.68	
S3W1M1F1T1	0.3400	0.3301	2.97	
S4W1M1F1T1	0.3463	0.3363	2.93	
S5W1M1F1T1	0.3418	0.3315	2.89	
S6W1M1F1T1	0.3491	0.3394	2.70	
S7W1M1F1T1	0.3618	0.3536	2.25	

Discharge Power at 250 (Watt)

1st

Sample code	Average weight before	Average weight after	% weight loss	% Average weight loss
S1W2M1F1T1	0.3453	0.3335	3.42	3.27 ± 0.13
S2W2M1F1T1	0.3626	0.3510	3.22	
S3W2M1F1T1	0.3638	0.3523	3.15	
S4W2M1F1T1	0.3119	0.3013	3.40	
S5W2M1F1T1	0.3666	0.3541	3.40	
S6W2M1F1T1	0.3755	0.3638	3.11	
S7W2M1F1T1	0.3535	0.3422	3.19	

2nd

Sample code	Average weight before	Average weight after	% weight loss	% Average weight loss
S1W2M1F1T1	0.3208	0.3093	3.61	3.49 ± 0.20
S2W2M1F1T1	0.3354	0.3241	3.37	
S3W2M1F1T1	0.3326	0.3220	3.16	
S4W2M1F1T1	0.3206	0.3086	3.76	
S5W2M1F1T1	0.3586	0.3460	3.52	
S6W2M1F1T1	0.3380	0.3258	3.60	
S7W2M1F1T1	0.3370	0.3255	3.41	

Discharge Power at 1000 (Watt)

1st

Sample code	Average weight before	Average weight after	% weight loss	% Average weight loss
S1W3M1F1T1	0.3527	0.3345	5.18	5.24 ± 0.18
S2W3M1F1T1	0.3412	0.3220	5.63	
S3W3M1F1T1	0.3276	0.3103	5.28	
S4W3M1F1T1	0.3439	0.3263	5.12	
S5W3M1F1T1	0.3320	0.3151	5.10	
S6W3M1F1T1	0.3462	0.3284	5.16	
S7W3M1F1T1	0.3579	0.3393	5.20	

2nd

Sample code	Average weight before	Average weight after	% weight loss	% Average weight loss
S1W3M1F1T1	0.3460	0.3260	5.76	5.26 ± 0.29
S2W3M1F1T1	0.3649	0.3460	5.20	
S3W3M1F1T1	0.3446	0.3255	5.52	
S4W3M1F1T1	0.2965	0.2817	5.00	
S5W3M1F1T1	0.3500	0.3315	5.28	
S6W3M1F1T1	0.3605	0.3424	5.03	
S7W3M1F1T1	0.3404	0.3234	5.01	

Discharge Power at 2000 (Watt)

1st

Sample code	Average weight before	Average weight after	% weight loss	% Average weight loss
S1W4M1F1T1	0.3284	0.3076	6.33	6.33 ± 0.12
S2W4M1F1T1	0.3269	0.3060	6.41	
S3W4M1F1T1	0.3950	0.3694	6.47	
S4W4M1F1T1	0.3557	0.3337	6.19	
S5W4M1F1T1	0.3384	0.3175	6.17	
S6W4M1F1T1	0.3047	0.2855	6.29	
S7W4M1F1T1	0.3271	0.3061	6.44	

2nd

Sample code	Average weight before	Average weight after	% weight loss	% Average weight loss
S1W4M1F1T1	0.3100	0.2900	6.45	6.29 ± 0.08
S2W4M1F1T1	0.3743	0.3505	6.35	
S3W4M1F1T1	0.3261	0.3055	6.32	
S4W4M1F1T1	0.3648	0.3420	6.25	
S5W4M1F1T1	0.3293	0.3088	6.22	
S6W4M1F1T1	0.3502	0.3283	6.24	
S7W4M1F1T1	0.3347	0.3139	6.23	

Sample Code	Breaking Strength (N)	Elongation (%)
WIMIFIT1	7.015	27.1
	7.275	28.6
	7.011	29.0
	6.824	27.6
	7.034	28.7
	7.023	28.6
	6.756	29.4
	7.332	29.4
	6.744	28.5
	7.050	28.9
	7.324	28.5
	6.813	28.8
	7.359	28.3
	6.756	29.0
	6.924	32.0
	7.272	29.4
	6.641	30.1
	7.339	31.3
	6.989	28.9
	6.809	27.4
	7.351	29.7
	6.599	28.5
	6.645	25.8
	7.126	28.9
	7.107	29.7
	6.912	28.7
	7.202	28.7
	6.618	28.0
	7.133	29.2
	6.699	30.8
	6.577	27.9
	6.916	28.8
	6.702	29.1
	6.748	29.4
	7.019	28.1
	6.95	29.8
	6.592	25.9
	6.737	26.8
	6.817	29.3
	6.741	27.6
	6.744	27.8
	6.747	24.4
	6.657	27.6

Sample Code	Breaking Strength (N)	Elongation (%)
W1M1F1T1	6.962	30.6
	6.672	27.8
	7.034	27.0
	7.041	28.6
	6.712	28.6
	6.695	25.6
	6.886	26.4
Average	6.913	28.5
SD	0.231	1.4

Sample Code	Breaking Strength (N)	Elongation (%)
W2M1F1T1	6.969	28.1
	7.004	26
	6.947	26.6
	6.748	25.4
	6.542	23.8
	7.141	26.4
	6.874	28
	7.168	29.2
	6.775	26.1
	6.821	28.9
	7.015	29.1
	7.252	28.8
	7.088	27.4
	7.103	26.5
	7.153	27.4
	6.596	28.7
	6.969	30.8
	6.786	26.1
	7.069	27.6
	7.072	27.1
	7.069	27.6
	6.592	25.6
	7.172	29.5
	7.236	27.7
	6.477	26.6
	7.153	25.1
	6.893	29.9
	7.233	29.5

Sample Code	Breaking Strength (N)	Elongation (%)
W2M1F1T1	6.969	28.1
	6.382	27.3
	7.008	30.5
	6.424	24.1
	6.947	28.8
	6.985	28
	7.046	27.6
	6.863	28.9
	6.367	27.3
	6.512	26.6
	6.756	26.6
	6.741	24.4
	6.783	30.8
	6.882	27.5
	6.733	29.6
	6.878	24.5
	7.011	27.3
	6.577	31.2
	7.153	28.7
	6.763	27.9
	7.019	28.4
	6.859	26.4
Average	6.882	27.5
SD	0.242	1.8

Sample Code	Breaking Strength (N)	Elongation (%)
W3M1F1T1	6.863	27.6
	6.428	27.1
	6.439	25.4
	6.832	27.1
	6.882	28.9
	6.924	27.4
	6.390	26.9
	6.481	22.7
	6.622	26.1
	6.863	27.4
	7.034	28.4
	6.493	25.9
	6.775	27.2

Sample Code	Breaking Strength (N)	Elongation (%)
W3M1FIT1	6.863	27.6
	6.393	25.6
	6.485	29.4
	6.498	26.2
	6.676	29.4
	7.008	29.2
	6.939	27.1
	6.325	23.7
	6.302	26.3
	6.439	26.1
	6.702	29.6
	6.516	22.6
	7.065	28.2
	6.538	31.3
	6.818	29.9
	6.686	26.1
	6.927	27.2
	6.363	25.4
	6.818	29.1
	6.868	25.3
	6.918	29.1
	6.738	28.7
	6.85	27.5
	6.863	27.0
	6.683	25.6
	7.261	27.7
	6.940	27.4
	6.691	26.3
	6.942	28.0
	6.770	26.0
	7.230	27.4
	6.946	28.0
	6.927	26.2
	6.986	25.0
	7.057	27.0
	7.019	28.3
	7.038	26.2
Average	6.760	27.1
SD	0.243	1.8

Sample Code	Breaking Strength (N)	Elongation (%)
W4M1F1T1	7.263	27.7
	7.111	27.7
	7.074	24.1
	6.947	27.2
	6.966	26.4
	7.017	26.4
	6.809	26.9
	6.677	25.8
	7.034	26.6
	7.229	27.8
	7.015	27.1
	6.699	27
	6.893	29
	6.866	26.6
	6.87	27.1
	7.179	26.7
	7.225	27.8
	6.477	25
	7.027	25.7
	6.908	26.5
	7.282	25.9
	6.809	25
	6.556	29.5
	6.687	25.7
	6.943	28
	6.504	28.3
	7.145	31.5
	6.897	28.2
	6.427	25.8
	7.309	26.1
	5.688	25.3
	7.047	26.1
	6.027	26.1
	7.049	27.6
	6.099	27.6
	6.251	27.2
	7.008	27.3
	6.016	26.5
	7.046	27.9
	6.748	26.8
	5.768	23.6
	6.036	25
	7.088	29.9
	6.428	25.5

Sample Code	Breaking Strength (N)	Elongation (%)
W4M1F1T1	6.58	26.6
	6.37	26.4
	6.599	26.7
	7.083	28.6
	6.247	27.7
	6.371	24.6
Average	6.748	26.8
SD	0.411	1.5

Appendix C Plasma Treatment: Varying Exposure Time

Condition: Varying exposure time at 5, 10 and 15 (min)

Fix Discharge power at 1000 and 2000 (Watt), flow rate at 500 (cc/min), temperature at 25°C, oxygen gas and electrode distance at 3.5 cm.

Time: 5 min

Discharge Power at 1000 (Watt)

1st

Sample code	Average weight before	Average weight after	% weight loss	% Average weight loss
S1W3M1F1T1	0.3527	0.3345	5.18	5.24 ± 0.18
S2W3M1F1T1	0.3412	0.3220	5.63	
S3W3M1F1T1	0.3276	0.3103	5.28	
S4W3M1F1T1	0.3439	0.3263	5.12	
S5W3M1F1T1	0.3320	0.3151	5.10	
S6W3M1F1T1	0.3462	0.3284	5.16	
S7W3M1F1T1	0.3579	0.3393	5.20	

2nd

Sample code	Average weight before	Average weight after	% weight loss	% Average weight loss
S1W3M1F1T1	0.3460	0.3260	5.76	5.26 ± 0.29
S2W3M1F1T1	0.3649	0.3460	5.20	
S3W3M1F1T1	0.3446	0.3255	5.52	
S4W3M1F1T1	0.2965	0.2817	5.00	
S5W3M1F1T1	0.3500	0.3315	5.28	
S6W3M1F1T1	0.3605	0.3424	5.03	
S7W3M1F1T1	0.3404	0.3234	5.01	

Discharge Power at 2000 (Watt)

1st

Sample code	Average weight before	Average weight after	% weight loss	% Average weight loss
S1W4M1F1T1	0.3284	0.3076	6.33	6.33 ± 0.12
S2W4M1F1T1	0.3269	0.3060	6.41	
S3W4M1F1T1	0.3950	0.3694	6.47	
S4W4M1F1T1	0.3557	0.3337	6.19	
S5W4M1F1T1	0.3384	0.3175	6.17	
S6W4M1F1T1	0.3047	0.2855	6.29	
S7W4M1F1T1	0.3271	0.3061	6.44	

2nd

Sample code	Average weight before	Average weight after	% weight loss	% Average weight loss
S1W4M1F1T1	0.3100	0.2900	6.45	6.29 ± 0.08
S2W4M1F1T1	0.3743	0.3505	6.35	
S3W4M1F1T1	0.3261	0.3055	6.32	
S4W4M1F1T1	0.3648	0.3420	6.25	
S5W4M1F1T1	0.3293	0.3088	6.22	
S6W4M1F1T1	0.3502	0.3283	6.24	
S7W4M1F1T1	0.3347	0.3139	6.23	

Time: 10 min

Discharge Power at 1000 (Watt)

1st

Sample code	Average weight before	Average weight after	% weight loss	% Average weight loss
S1W3M2F1T1	0.3502	0.3217	8.13	7.99 ± 0.26
S2W3M2F1T1	0.3581	0.3279	8.43	
S3W3M2F1T1	0.3507	0.3222	8.13	
S4W3M2F1T1	0.3392	0.3121	8.00	
S5W3M2F1T1	0.3860	0.3559	7.78	
S6W3M2F1T1	0.3621	0.3342	7.72	
S7W3M2F1T1	0.3336	0.3077	7.76	

2nd

Sample code	Average weight before	Average weight after	% weight loss	% Average weight loss
S1W3M2F1T1	0.3737	0.3432	8.16	7.60 ± 0.31
S2W3M2F1T1	0.3571	0.3293	7.77	
S3W3M2F1T1	0.3480	0.3213	7.67	
S4W3M2F1T1	0.3693	0.3414	7.56	
S5W3M2F1T1	0.3105	0.2873	7.46	
S6W3M2F1T1	0.3615	0.3355	7.20	
S7W3M2F1T1	0.3450	0.3195	7.39	

Discharge Power at 2000 (Watt)

1st

Sample code	Average weight before	Average weight after	% weight loss	% Average weight loss
S1W4M2F1T1	0.3442	0.3112	9.58	9.31 ± 0.19
S2W4M2F1T1	0.3609	0.3266	9.51	
S3W4M2F1T1	0.3561	0.3233	9.21	
S4W4M2F1T1	0.3511	0.3183	9.34	
S5W4M2F1T1	0.3737	0.3394	9.17	
S6W4M2F1T1	0.3500	0.3184	9.05	
S7W4M2F1T1	0.3425	0.3106	9.33	

2nd

Sample code	Average weight before	Average weight after	% weight loss	% Average weight loss
S1W4M2F1T1	0.3557	0.3218	9.55	9.02 ± 0.20
S2W4M2F1T1	0.3645	0.3309	9.22	
S3W4M2F1T1	0.3538	0.3222	8.92	
S4W4M2F1T1	0.3991	0.3626	9.14	
S5W4M2F1T1	0.3567	0.3253	8.80	
S6W4M2F1T1	0.3447	0.3142	8.85	
S7W4M2F1T1	0.3713	0.3392	8.65	

Time: 15 min

Discharge Power at 1000 (Watt)

1st

Sample code	Average weight before	Average weight after	% weight loss	% Average weight loss
S1W3M2F1T1	0.3711	0.3359	9.49	8.74 ± 0.46
S2W3M2F1T1	0.3509	0.3196	8.94	
S3W3M2F1T1	0.3719	0.3392	8.79	
S4W3M2F1T1	0.3431	0.3125	8.93	
S5W3M2F1T1	0.3419	0.3126	8.57	
S6W3M2F1T1	0.3367	0.3082	8.46	
S7W3M2F1T1	0.3690	0.3395	8.00	

2nd

Sample code	Average weight before	Average weight after	% weight loss	% Average weight loss
S1W3M2F1T1	0.3550	0.3232	8.95	8.49 ± 0.30
S2W3M2F1T1	0.3561	0.3250	8.74	
S3W3M2F1T1	0.3128	0.2861	8.52	
S4W3M2F1T1	0.3527	0.3231	8.41	
S5W3M2F1T1	0.4012	0.3670	8.53	
S6W3M2F1T1	0.3712	0.3412	8.09	
S7W3M2F1T1	0.3954	0.3631	8.16	

Discharge Power at 2000 (Watt)

1st

Sample code	Average weight before	Average weight after	% weight loss	% Average weight loss
S1W4M2F1T1	0.3540	0.3178	10.23	10.08 ± 0.11
S2W4M2F1T1	0.3576	0.3216	10.08	
S3W4M2F1T1	0.3384	0.3046	9.99	
S4W4M2F1T1	0.3635	0.3269	10.08	
S5W4M2F1T1	0.2604	0.2342	10.06	
S6W4M2F1T1	0.3625	0.3255	10.20	
S7W4M2F1T1	0.3994	0.3597	9.93	

2nd

Sample code	Average weight before	Average weight after	% weight loss	% Average weight loss
S1W4M2F1T1	0.3406	0.3065	10.02	10.8 ± 0.12
S2W4M2F1T1	0.3361	0.3024	10.03	
S3W4M2F1T1	0.3479	0.3120	10.30	
S4W4M2F1T1	0.3493	0.3143	10.02	
S5W4M2F1T1	0.3406	0.3064	10.03	
S6W4M2F1T1	0.3656	0.3292	9.97	
S7W4M2F1T1	0.3649	0.3277	10.22	

Sample Code	Breaking Strength (N)	Elongation (%)
W3M2F1T1	6.756	24.7
	6.729	21.6
	6.725	22
	6.996	22.2
	6.966	22.2
	6.68	24.8
	6.912	23.9
	6.931	24.4
	6.889	24.1
	6.954	24.7
	7.004	22.6
	7	23.9
	6.477	21.7
	7.03	23.6
	6.229	23
	6.901	26.7
	6.649	22.6
	6.783	21.4
	6.981	24.4
	6.695	25.7
	6.066	24.7
	6.916	23.8
	6.824	26.4
	6.009	23.5
	6.729	25.6
	7.076	23.7
	6.584	24.5
	6.828	22.7
	7.027	26.7
	6.596	26.7
	6.386	21.5
	6.443	23.9
	6.497	24.8
	6.298	22
	6.542	23.1
	6.58	25.2
	7.022	24.4
	7.014	26.4
	6.683	24.7
	6.714	26.9
	6.76	27.4
	6.737	27
	6.443	24.8
	7.061	26.6

Sample Code	Breaking Strength (N)	Elongation (%)
W3M2F1T1	6.599	26.4
	6.802	26.8
	6.947	26
	7.122	27.9
	6.632	22.2
	6.653	25.7
Average	6.738	24.4
SD	0.259	1.8

Sample Code	Breaking Strength (N)	Elongation (%)
W3M3F1T1	6.214	20.4
	7.221	20.7
	6.763	20.3
	7.053	24
	6.626	21.1
	7.454	22.8
	6.725	21
	6.855	21.5
	6.34	20.2
	6.456	21
	6.606	20.9
	6.668	22.2
	6.519	18.5
	6.666	21.9
	6.783	20.8
	6.256	15.9
	6.317	20.5
	6.669	16.4
	6.561	22.6
	6.649	22.5
	6.508	21.4
	6.674	22.6
	6.635	21.6
	6.653	23.6
	6.678	23.6
	6.535	24.3

Sample Code	Breaking Strength (N)	Elongation (%)
W3M3F1T1	6.374	21.3
	6.58	21.4
	6.737	22.6
	6.715	24.4
	6.554	23.2
	6.554	24
	6.516	21.9
	6.744	21.4
	6.325	21.2
	6.656	20
	6.855	21.5
	6.374	21.3
	6.744	21.4
	6.655	21.5
	6.496	21.9
	6.515	21.2
	6.508	21.4
	6.456	21
	6.653	23.6
	6.296	21.9
	6.556	21
	7.091	20.7
	6.768	21.7
	6.756	22
Average	6.631	21.5
SD	0.234	1.6

Sample Code	Breaking Strength (N)	Elongation (%)
W4M2F1T1	6.535	23.2
	7.393	22.7
	6.195	18.5
	7.214	22.5
	7.183	21.6
	6.405	21.2
	6.882	21.1
	7.275	22.9
	6.771	19.1
	6.447	23.2
	6.809	20.9
	6.775	23.1
	7.011	23.7
	6.145	21.5
	6.828	23.1
	6.824	23.1
	6.653	24.3
	7.187	22.2
	6.939	22.6
	6.71	23.9
	7.011	23.5
	6.683	23.8
	6.92	24.1
	6.627	22.2
	6.464	22.4
	6.58	24
	7.095	22.4
	6.65	24.7
	6.882	23.2
	6.451	22.2
	6.256	23.4
	6.281	25.8
	6.66	23.5
	6.55	22.4
	7.106	24.8
	6.621	23.8
	6.549	23.8
	7.053	24.4
	6.345	23
	6.391	23.2
	6.569	25.5
	7.072	26.6
	6.42	20.4
	6.447	24.5

Sample Code	Breaking Strength (N)	Elongation (%)	
W4M2F1T1	6.596	20.8	
	7.044	23.8	
	6.599	22.6	
	7.034	25.5	
	6.308	22.1	
	6.502	21.4	
	Average	6.719	23.0
	SD	0.309	1.6

Sample Code	Breaking Strength (N)	Elongation (%)
W4M3F1T1	5.833	13.5
	6.779	17.8
	6.603	19.4
	6.542	17.4
	6.687	18.5
	7.076	20
	6.317	18.1
	6.602	19.5
	6.187	14.9
	6.462	18.7
	6.439	17.7
	6.493	19
	6.42	18.4
	6.844	20
	6.942	19
	7.095	18.1
	7.099	19.9
	6.409	18.8
	6.313	19.6
	6.71	19.4
6.866	20.1	
6.059	19.9	
6.737	22.1	
6.351	18.2	
5.756	16.1	
6.592	18.3	

Sample Code	Breaking Strength (N)	Elongation (%)
W4M3F1T1	6.657	21
	6.76	20.7
	6.187	18.7
	6.954	20.6
	6.989	20.2
	6.302	18.6
	6.756	22.1
	6.779	21.2
	5.577	17
	6.92	21.8
	6.939	21.3
	6.866	21.4
	6.969	21.4
	7.122	21.7
	7.21	21.9
	6.504	20.3
	6.592	20.8
	7.271	19.9
	6.588	19.8
	6.283	20.3
	5.844	17.6
	6.927	21
	6.214	21.5
	6.66	21
Average	6.602	19.48
SD	0.386	1.82

Appendix D Plasma Treatment: Varying Flow Rate

Condition: Varying exposure time at 250, 500 and 1000 (min)
 Fix Discharge power at 2000 (Watt), exposure time at 10 (min),
 temperature at 25°C, oxygen gas and electrode distance at 3.5 cm.

Flow rate at 250 (cc/min)

1st

Sample code	Average weight before	Average weight after	% weight loss	% Average weight loss
S1W4M2F2T1	0.3435	0.3185	7.26	7.32 ± 0.24
S2W4M2F2T1	0.3531	0.3256	7.81	
S3W4M2F2T1	0.3934	0.3643	7.39	
S4W4M2F2T1	0.3594	0.3335	7.21	
S5W4M2F2T1	0.3892	0.3610	7.23	
S6W4M2F2T1	0.3793	0.3516	7.31	
S7W4M2F2T1	0.3532	0.3283	7.06	

2nd

Sample code	Average weight before	Average weight after	% weight loss	% Average weight loss
S1W4M2F2T1	0.3726	0.3461	7.11	7.26 ± 0.19
S2W4M2F2T1	0.3534	0.3282	7.12	
S3W4M2F2T1	0.3762	0.3479	7.53	
S4W4M2F2T1	0.3847	0.3560	7.46	
S5W4M2F2T1	0.3665	0.3405	7.09	
S6W4M2F2T1	0.3663	0.3391	7.40	
S7W4M2F2T1	0.3546	0.3294	7.10	

Flow rate at 500 (cc/min)

1st

Sample code	Average weight before	Average weight after	% weight loss	% Average weight loss
S1W4M2F1T1	0.3442	0.3112	9.58	9.31 ± 0.19
S2W4M2F1T1	0.3609	0.3266	9.51	
S3W4M2F1T1	0.3561	0.3233	9.21	
S4W4M2F1T1	0.3511	0.3183	9.34	
S5W4M2F1T1	0.3737	0.3394	9.17	
S6W4M2F1T1	0.3500	0.3184	9.05	
S7W4M2F1T1	0.3425	0.3106	9.33	

2nd

Sample code	Average weight before	Average weight after	% weight loss	% Average weight loss
S1W4M2F1T1	0.3557	0.3218	9.55	9.02 ± 0.20
S2W4M2F1T1	0.3645	0.3309	9.22	
S3W4M2F1T1	0.3538	0.3222	8.92	
S4W4M2F1T1	0.3991	0.3626	9.14	
S5W4M2F1T1	0.3567	0.3253	8.80	
S6W4M2F1T1	0.3447	0.3142	8.85	
S7W4M2F1T1	0.3713	0.3392	8.65	

Flow rate at 1000 (cc/min)

1st

Sample code	Average weight before	Average weight after	% weight loss	% Average weight loss
S1W4M2F3T1	0.3316	0.3004	9.43	9.40 ± 0.20
S2W4M2F3T1	0.3838	0.3466	9.70	
S3W4M2F3T1	0.3797	0.3443	9.30	
S4W4M2F3T1	0.3988	0.3604	9.61	
S5W4M2F3T1	0.3650	0.3307	9.40	
S6W4M2F3T1	0.3494	0.3172	9.23	
S7W4M2F3T1	0.4112	0.3736	9.15	

2nd

Sample code	Average weight before	Average weight after	% weight loss	% Average weight loss
S1W4M2F3T1	0.3111	0.2823	9.26	9.15 ± 0.15
S2W4M2F3T1	0.4312	0.3923	9.03	
S3W4M2F3T1	0.3604	0.3273	9.20	
S4W4M2F3T1	0.3429	0.3120	9.02	
S5W4M2F3T1	0.3677	0.3336	9.28	
S6W4M2F3T1	0.3522	0.3203	9.06	
S7W4M2F3T1	0.3708	0.3366	9.23	

Sample Code	Breaking Strength (N)	Elongation (%)
W4M2F2T1	6.748	21.8
	6.557	24.6
	6.58	22.0
	6.454	22.1
	6.489	23.5
	6.989	23.4
	6.981	23.6
	7.088	22.7
	7.130	24.4
	6.413	22.9
	6.924	22.0
	6.512	22.7
	6.859	24.8
	6.397	25.3
	7.015	24.1
	7.038	24.0
	6.653	19.6
	6.813	26.0
	6.527	23.4
	6.962	25.2
	6.939	24.3
	6.744	25.7
	6.809	25.2
	6.618	25.0
	6.996	26.9
	6.851	23.3
	7.011	25.0
	6.821	24.7
	6.58	22.6
	6.84	26.1
	6.718	25.0
	6.516	25.1
	6.546	24.2
	6.981	25.7
	6.699	25.2
	6.821	24.8
	6.748	28.4
	6.580	26.4
	6.760	25.0
	6.882	24.1
	7.099	25.5
	6.783	24.1
	7.099	25.6
	6.409	21.6

Sample Code	Breaking Strength (N)	Elongation (%)
W4M2F2T1	6.790	22.8
	6.950	26.2
	6.325	23.3
	6.874	25.2
	6.622	24.8
	6.748	23.2
Average	6.766	24.3
SD	0.214	1.58

Sample Code	Breaking Strength (N)	Elongation (%)
W4M2F3T1	7.316	25.8
	6.401	23.3
	6.519	23.8
	6.677	21.0
	6.634	23.1
	6.683	22.8
	6.519	21.5
	6.660	23.3
	6.405	21.1
	6.390	22.2
	6.418	21.0
	6.904	23.6
	6.550	20.6
	6.306	23.2
	6.203	19.4
	6.218	22.8
	6.691	23.0
	6.683	21.8
	6.618	23.2
	7.204	22.9
	6.365	20.6
	6.493	23.7
	6.985	22.2
	6.874	23.3
	6.927	24.9
	6.894	20.8
	6.767	23.0
	6.428	21.7
	6.565	22.2
	6.42	23.6

11

Sample Code	Breaking Strength (N)	Elongation (%)
W4M2F3T1	6.379	23.2
	6.55	23.6
	6.298	21.3
	6.923	23.4
	6.958	24.2
	6.999	21.3
	6.805	24.1
	6.807	23.9
	7.395	25.6
	6.445	23.9
	6.938	23.3
	7.398	25.2
	7.413	25.0
	6.989	22.9
	6.771	23.1
	6.429	23.5
	6.367	23.4
	6.974	24.3
	6.745	21.5
	6.927	23.7
Average	6.705	22.9
SD	0.313	1.4

Appendix E Plasma Treatment: Varying Temperature

Condition: Varying temperature at 25, 50 and 75 (°C)

Fix Discharge power at 2000 (Watt), exposure time at 10 (min), flow rate at 500 (cc/min) oxygen gas and electrode distance at 3.5 cm.

Temperature at 25 (°C)

1st

Sample code	Average weight before	Average weight after	% weight loss	% Average weight loss
S1W4M2F1T1	0.3442	0.3112	9.58	9.31 ± 0.19
S2W4M2F1T1	0.3609	0.3266	9.51	
S3W4M2F1T1	0.3561	0.3233	9.21	
S4W4M2F1T1	0.3511	0.3183	9.34	
S5W4M2F1T1	0.3737	0.3394	9.17	
S6W4M2F1T1	0.3500	0.3184	9.05	
S7W4M2F1T1	0.3425	0.3106	9.33	

2nd

Sample code	Average weight before	Average weight after	% weight loss	% Average weight loss
S1W4M2F1T1	0.3557	0.3218	9.55	9.02 ± 0.20
S2W4M2F1T1	0.3645	0.3309	9.22	
S3W4M2F1T1	0.3538	0.3222	8.92	
S4W4M2F1T1	0.3991	0.3626	9.14	
S5W4M2F1T1	0.3567	0.3253	8.80	
S6W4M2F1T1	0.3447	0.3142	8.85	
S7W4M2F1T1	0.3713	0.3392	8.65	

Temperature at 50 (°C)

1st

Sample code	Average weight before	Average weight after	% weight loss	% Average weight loss
S1W4M2F2T2	0.3445	0.3145	8.71	8.34 ± 0.25
S2W4M2F2T2	0.3176	0.2911	8.35	
S3W4M2F2T2	0.3399	0.3110	8.49	
S4W4M2F2T2	0.3561	0.3265	8.31	
S5W4M2F2T2	0.3121	0.2863	8.28	
S6W4M2F2T2	0.3313	0.3043	8.16	
S7W4M2F2T2	0.3130	0.2883	7.91	

2nd

Sample code	Average weight before	Average weight after	% weight loss	% Average weight loss
S1W4M2F2T2	0.3412	0.3126	8.38	8.40 ± 0.28
S2W4M2F2T2	0.3453	0.3158	8.54	
S3W4M2FT2	0.3500	0.3209	8.33	
S4W4M2F2T2	0.3539	0.3255	8.01	
S5W4M2F2T2	0.3180	0.2903	8.72	
S6W4M2F2T2	0.3259	0.2989	8.31	
S7W4M2F2T2	0.3442	0.3169	7.93	

Temperature at 75 (°C)

1st

Sample code	Average weight before	Average weight after	% weight loss	% Average weight loss
S1W4M2F3T3	0.3390	0.3029	10.65	10.39 ± 0.29
S2W4M2F3T3	0.3500	0.3138	10.32	
S3W4M2F3T3	0.3560	0.3185	10.52	
S4W4M2F3T3	0.3353	0.3003	10.43	
S5W4M2F3T3	0.3401	0.3038	10.67	
S6W4M2F3T3	0.2930	0.2627	10.33	
S7W4M2F3T3	0.3429	0.3093	9.80	

2nd

Sample code	Average weight before	Average weight after	% weight loss	% Average weight loss
S1W4M2F3T3	0.3288	0.2949	10.32	10.25 ± 0.23
S2W4M2F3T3	0.3147	0.2824	10.28	
S3W4M2F3T3	0.3214	0.2888	10.13	
S4W4M2F3T3	0.3330	0.2978	10.57	
S5W4M2F3T3	0.3318	0.2971	10.47	
S6W4M2F3T3	0.3235	0.2914	9.93	
S7W4M2F3T3	0.3248	0.2921	10.06	

Sample Code	Breaking Strength (N)	Elongation (%)
W4M2F1T2	6.371	21.1
	6.554	23.2
	6.126	20.2
	6.554	22.0
	6.210	20.8
	6.763	23.8
	6.611	23.7
	6.123	19.2
	6.397	21.5
	6.744	23.0
	6.626	21.8
	6.378	20.9
	6.546	22.8
	6.153	18.5
	6.481	23.5
	6.245	20.0
	6.390	21.1
	6.588	22.4
	6.859	19.6
	6.832	21.4
	6.809	19.9
	6.248	20.1
	6.626	23.3
	6.824	23.2
	6.329	20.1
	6.790	24.2
	6.126	20.8
	6.283	23.5
	6.237	19.4
	6.706	22.6
	6.505	23.5
	6.535	22.1
	6.725	24.3
	6.413	22.4
	6.615	25.0
	6.523	22.4
	6.634	18.9
	6.504	19.6
	6.489	19.2
	6.855	23.2
	6.660	21.1
	6.737	22.7
	6.866	24.3
	6.310	23.1

Sample Code	Breaking Strength (N)	Elongation (%)
W4M2F1T2	6.450	22.8
	6.630	22.3
	6.832	22.7
	6.348	22.8
	6.439	24.4
	6.302	20.3
Average	6.519	21.9
SD	0.219	1.69

Sample Code	Breaking Strength (N)	Elongation (%)
W4M2F1T3	6.115	16.4
	6.168	17.6
	6.145	16.4
	6.302	18.4
	6.477	18.3
	5.322	15.9
	5.993	16.9
	5.886	18.2
	5.924	16.7
	5.478	16.0
	5.966	17.7
	6.424	20.2
	6.344	18.8
	6.176	17.8
	6.077	19.9
	6.248	19.2
	6.023	17.7
	5.585	18.9
	5.939	16.1
	5.981	16.7
	5.486	16.9
	6.104	16.8
	5.779	16.7
	5.749	15.9
	5.981	16.9
	5.909	16.7
	6.283	16.8
	5.829	19.5

Sample Code	Breaking Strength (N)	Elongation (%)
W4M2F1T3	6.529	17.7
	6.135	15.5
	5.983	15.9
	6.153	15.8
	6.207	17.7
	6.020	15.6
	5.703	16.8
	6.134	20.2
	5.943	19.2
	6.379	22.5
	5.825	22.0
	6.47	21.8
	6.111	19.8
	6.050	22.6
	6.302	21.3
	5.789	19.8
	5.689	16.7
	5.585	18.9
	5.772	16.3
	5.772	16.3
	5.806	16.1
	5.798	18.9
Average	5.997	17.9
SD	0.274	1.9

Appendix F Color Strength (K/S Value)

Wave length (nm)	Raw silk	Conventional method	W1M1F1	W2M1F1	W3M1F1	W4M1F1
400	1.28	0.07	1.36	1.24	1.17	1.12
410	1.25	0.07	1.33	1.23	1.15	1.12
420	1.31	0.06	1.33	1.24	1.18	1.2
430	1.29	0.06	1.28	1.21	1.14	1.17
440	1.29	0.06	1.29	1.21	1.14	1.17
450	1.39	0.06	1.39	1.32	1.24	1.25
460	1.52	0.06	1.51	1.44	1.35	1.36
470	1.63	0.06	1.61	1.54	1.46	1.47
480	1.81	0.06	1.79	1.71	1.63	1.62
490	2.08	0.07	2.04	1.94	1.85	1.82
500	2.29	0.07	2.27	2.2	2.09	2.03
510	2.55	0.07	2.53	2.43	2.34	2.31
520	2.72	0.07	2.69	2.55	2.51	2.45
530	2.82	0.07	2.78	2.64	2.58	2.50
540	2.85	0.07	2.81	2.69	2.60	2.51
550	2.87	0.06	2.78	2.69	2.63	2.48
560	2.84	0.05	2.78	2.61	2.63	2.47
570	2.16	0.04	2.08	1.92	1.92	1.83
580	1.54	0.03	1.47	1.35	1.35	1.28
590	0.95	0.03	0.92	0.86	0.83	0.8
600	0.54	0.03	0.54	0.51	0.46	0.46
610	0.31	0.02	0.32	0.31	0.26	0.27
620	0.26	0.02	0.26	0.27	0.21	0.23
630	0.22	0.02	0.23	0.24	0.18	0.19
640	0.20	0.02	0.21	0.22	0.16	0.18
650	0.19	0.02	0.19	0.21	0.15	0.17

Wave length (nm)	Raw silk	Conventional method	W1M1F1	W2M1F1	W3M1F1	W4M1F1
660	0.18	0.02	0.19	0.21	0.15	0.16
670	0.18	0.02	0.18	0.20	0.15	0.16
680	0.17	0.02	0.18	0.20	0.14	0.16
690	0.16	0.02	0.17	0.19	0.13	0.15
700	0.16	0.02	0.17	0.19	0.13	0.15

Wave length (nm)	W3M2F1	W3M3F1	W4M2F1	W4M3F1
400	1.01	0.91	0.87	0.61
410	1.05	0.85	0.87	0.59
420	1.06	0.84	0.86	0.57
430	1.04	0.80	0.84	0.55
440	1.03	0.78	0.85	0.54
450	1.10	0.82	0.90	0.57
460	1.20	0.87	0.97	0.6
470	1.27	0.92	1.03	0.63
480	1.42	1.00	1.14	0.68
490	1.62	1.12	1.3	0.76
500	1.79	1.22	1.45	0.83
510	1.99	1.34	1.62	0.91
520	2.14	1.42	1.70	0.96
530	2.18	1.44	1.74	0.97
540	2.19	1.43	1.74	0.96
550	2.20	1.44	1.73	0.96
560	2.20	1.43	1.71	0.93
570	1.62	1.11	1.22	0.67
580	1.15	0.83	0.84	0.48

Wave length (nm)	W3M2F1	W3M3F1	W4M2F1	W4M3F1
590	0.72	0.56	0.51	0.31
600	0.42	0.35	0.29	0.2
610	0.24	0.23	0.18	0.14
620	0.2	0.21	0.16	0.13
630	0.17	0.18	0.14	0.12
640	0.15	0.17	0.13	0.12
650	0.14	0.16	0.12	0.11
660	0.14	0.15	0.12	0.10
670	0.13	0.16	0.11	0.10
680	0.13	0.15	0.11	0.10
690	0.12	0.14	0.10	0.10
700	0.12	0.13	0.10	0.09

Wave length (nm)	W4M2F2	W4M2F3	W4M2F1T2	W4M2F1T3
400	0.98	0.83	1.13	1.02
410	1.00	0.83	1.13	1.06
420	1.03	0.82	1.19	1.07
430	0.99	0.81	1.18	1.05
440	0.99	0.82	1.18	1.04
450	1.07	0.87	1.26	1.20
460	1.12	0.94	1.37	1.30
470	1.20	1.00	1.48	1.28
480	1.34	1.11	1.63	1.43
490	1.52	1.26	1.83	1.63
500	1.68	1.42	2.05	1.8
510	1.88	1.58	1.32	2.00

Wave length (nm)	W4M2F2	W4M2F3	W4M2F1T2	W4M2F1T3
520	2.03	1.68	2.46	2.15
530	2.06	1.71	2.51	2.19
540	2.06	1.71	2.53	2.20
550	2.06	1.70	2.49	2.30
560	2.07	1.68	2.48	2.30
570	1.51	1.19	1.84	1.63
580	1.05	0.81	1.29	1.16
590	0.65	0.48	0.81	1.17
600	0.36	0.26	0.47	0.43
610	0.21	0.18	0.28	0.25
620	0.18	0.16	0.24	0.21
630	0.15	0.15	0.2	0.18
640	0.14	0.10	0.19	0.16
650	0.13	0.12	0.18	0.15
660	0.12	0.12	0.17	0.15
670	0.12	0.11	0.17	0.14
680	0.12	0.11	0.17	0.14
690	0.11	0.10	0.16	0.13
700	0.11	0.10	0.16	0.13

Appendix G Plasma and Conventional Treatment

The objective of this additional experiment was to address the final results of about 10% degumming efficiency by plasma if hot water or mind solution could further remove sericin. The condition of plasma was discharge power at 2000 (Watt), exposure time at 10 (min), oxygen gas at 500 cc/min, temperature at 25°C and electrode distance at 23.5 cm. The average weight loss of silk fibers by plasma was 5.31 ± 0.15 . After that the treated silk fiber were further treated for varying time at 10, 20,30 and 45 min using fixed concentration of degumming agent to study the effect of time treatment. In order to study the effect of concentration, 4 different concentrations were varied which were 0% (water), 10%, 50% and 100% (conventional) and also by fixing the time treatment at 45 min.

Varying time treatment

Fix concentration by following the concentration of the conventional method: Silk samples are treated with alkaline solution (10 g/L soap and 2 g/L sodium carbonate in a liquor ratio of 1:30 (silk (g): alkaline solution (mL)))

45 min

Sample number	Average weight before	Average weight after	% weight loss	% Average weight loss
1	0.2890	0.2294	20.64	19.80 ± 0.69
2	0.3205	0.2601	18.83	
3	0.3328	0.2680	19.47	
4	0.3009	0.2402	20.19	
5	0.3289	0.2636	19.86	

30 min

Sample number	Average weight before	Average weight after	% weight loss	% Average weight loss
1	0.3070	0.2423	21.07	19.53 ± 1.16
2	0.3543	0.2884	18.61	
3	0.3086	0.2509	18.71	
4	0.3015	0.2397	20.49	
5	0.3022	0.2455	18.76	

20 min

Sample number	Average weight before	Average weight after	% weight loss	% Average weight loss
1	0.3191	0.2549	20.11	19.64 ± 1.44
2	0.3131	0.2508	19.89	
3	0.3130	0.2562	18.14	
4	0.3206	0.2511	21.68	
5	0.3505	0.2861	18.36	

10 min

Sample number	Average weight before	Average weight after	% weight loss	% Average weight loss
1	0.3635	0.2939	19.15	19.82 ± 0.71
2	0.3537	0.2842	19.67	
3	0.3619	0.2922	19.25	
4	0.3000	0.2374	20.88	
5	0.3298	0.2633	20.15	

Varying concentration of degumming agent

Fix time treatment: 45 min

0 % (Pure Water)

Sample number	Average weight before	Average weight after	% weight loss	% Average weight loss
1	0.3210	0.3087	3.82	3.61 ± 0.18
2	0.3300	0.3186	3.45	
3	0.3305	0.3185	3.62	
4	0.3098	0.2987	3.57	
5	0.3388	0.3256	3.89	

10 %

Sample number	Average weight before	Average weight after	% weight loss	% Average weight loss
1	0.3463	0.2759	20.35	19.77 ± 0.44
2	0.3307	0.2659	19.61	
3	0.3277	0.2624	19.94	
4	0.3009	0.2433	19.16	
5	0.3120	0.2503	19.78	

50%

Sample number	Average weight before	Average weight after	% weight loss	% Average weight loss
1	0.4118	0.3322	19.33	19.75 ± 0.58
2	0.3215	0.2552	20.62	
3	0.3233	0.2597	19.69	
4	0.3218	0.2595	19.36	
5	0.3472	0.2766	20.32	

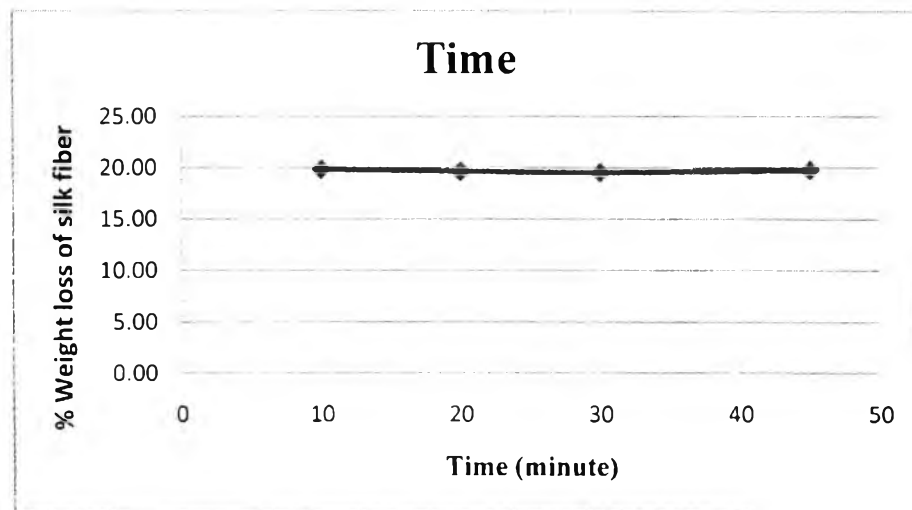


Figure G1 Effect of time treatment on silk fiber weight loss (Fix concentration by following the concentration of the conventional method).

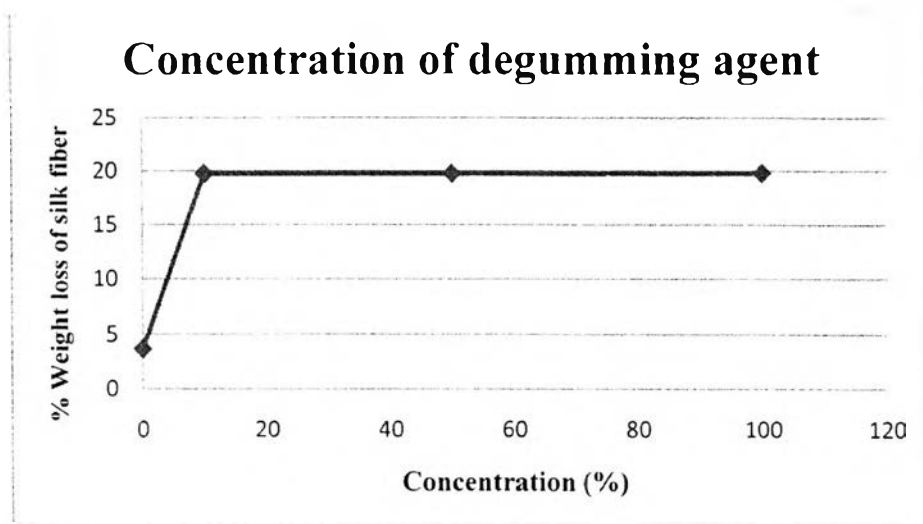


Figure G2 Effect of concentration of degumming agent on silk fiber weight loss (Fix time treatment at 45 min).

Initially, the average weight loss of silk fibers by plasma treated was 5.31 ± 0.15 %. The additional average weight loss of 10, 20, 30 and 45 min were $19.82 \pm$

0.71 %, 19.64 ± 1.44 %, 19.53 ± 1.16 % and 19.80 ± 0.69 % respectively which was added up to total weight loss of 25.13 ± 0.86 %, 24.95 ± 1.59 %, 24.84 ± 1.31 % and 25.11 ± 0.84 % respectively. The additional average weight loss of 0 %, 10 %, 25 % and 100 % concentration of degumming agent were 3.61 ± 0.18 %, 19.77 ± 0.44 %, 19.75 ± 0.58 % and 19.80 ± 0.69 % respectively which was added to the initial result of plasma treatment to obtain the total average weight loss of 8.92 ± 0.33 %, 25.08 ± 0.59 %, 25.06 ± 0.90 % and 25.11 ± 0.84 %. The mind solution (10% degumming solution) and 10 min was the minimized condition to further provide the additional average weight loss which was added to the initial result by plasma treatment and yielded the total average weight loss of 25.13 ± 0.86 % and 25.08 ± 0.59 %.

Example for calculation of 50 % of the alkaline solution

Conventional method: Silk samples are treated with alkaline solution (10 g/L soap and 2 g/L sodium carbonate in a liquor ratio of 1:30 (silk (g): alkaline solution (mL)))

For 100 % of the alkaline solution: Weight of silk is 1.7259 g so from the liquor ration of 1:30 then the water was used 51.777 mL, the soap was used 0.5177 g and the sodium carbonate was used 0.1035 g.

Then for 50 % of alkaline solution: Weight of silk is 1.7259, water was used 51.777 mL, the soap was used 0.2589 g and the sodium carbonate was used 0.0518 g.

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