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APPENDICES

Appendix A Experimental Data

Table A1 Adsorption of DBSA on cotton at different concentrations of NaCl, using 5.0 mM DBSA at 30 °C for 24 h

Concentration of NaCl (M)	Adsorption of DBSA (μmol/g cotton)
0.000	6.060
0.025	10.325
0.050	15.685
0.075	18.511
0.100	19.612
0.125	22.730
0.150	23.191
0.200	24.957
0.300	26.457

Table A2 Adsorption rate of DBSA on cotton at 30 ºC, using 5 mM DBSA, without NaCl

Time (h)	Adsorption of DBSA (μmol/g cotton)
0	0.000
1	4.375
2	4.804
3	5.443
4	5.608
6	5.666
8	5.776
10	5.924
12	5.917
15	5.892
18	5.928
24	5.892
48	5.993
72	6.024

Table A3 Adsorption rate of DBSA on cotton at 50 °C, using 5 mM DBSA, without NaCl

Time (h)	Adsorption of DBSA (μmol/g cotton)
0	0.000
0.25	2.314
0.5	3.103
1	4.648
2	5.309
4	5.532
6	5.581
8	5.608
10	5.591
15	5.454
24	5.619

Table A4 Adsorption rate of DBSA on cotton at 70 °C, using 5 mM DBSA, without NaCl

Time (min)	Adsorption of DBSA (μmol/g cotton)
0	0.000
5	2.911
10	3.765
15	4.374
30	5.089
45	5.375
60	5.340

Table A5 Adsorption of DBSA on cotton at different DBSA concentrations, using 0.15 M NaCl at 30 °C

Concentration of DBSA at equilibrium (mM)	Adsorption of DBSA (μmol/g cotton)
0.037	1.066
0.065	2.223
0.206	6.338
0.421	11.436
0.697	17.238
1.051	18.173
1.357	18.793
1.718	19.486
4.842	20.661
10.103	21.083

Table A6 Adsorption of DBSA on cotton at different DBSA concentrations, using 0.15 M NaCl at 70 °C

Concentration of DBSA at equilibrium (mM)	Adsorption of DBSA (μmol/g cotton)
0.036	0.630
0.072	1.131
0.222	4.149
0.465	7.328
0.742	7.211
1.049	7.273
1.365	7.553
1.679	7.387
4.674	7.822

Table A7 Adsorption of DBSA on cotton in the presence of 0.6 mM HAB at different DBSA concentrations, using 0.15 M NaCl at 70 °C

Concentration of DBSA at equilibrium (mM)	Adsorption of DBSA (μmol/g cotton)
0.143	0.450
0.239	0.912
0.405	1.994
0.594	3.718
0.772	4.363
0.976	4.396
1.189	4.442
1.596	4.602
1.942	4.455

Table A8 Adsolubilization of HAB and adsorption of DBSA on cotton fabric versus adsolubilization time at 70 °C after 1 h-surfactant equilibrium adsorption, using 0.6 mM HAB, 1.2 mM DBSA, 0.15 M NaCl

Adsolubilization time (h)	Adsolubilization of HAB (μmol/g cotton)	Adsorption of DBSA (μmol/g cotton)
0	0.000	7.273
0.25	0.928	5.741
0.5	1.424	5.215
1	1.721	4.985
2	1.835	4.471
4	2.127	4.555
6	2.141	4.336

Table A9 Relative erythemal spectral effectiveness at wavelength 280-400 nm

wavelength	E	wavelength	E	wavelength	E
280	1.00E+00	320	8.55E-03	360	4.84E-04
282	1.00E+00	322	5.55E-03	362	4.52E-04
284	1.00E+00	324	3.60E-03	364	4.22E-04
286	1.00E+00	326	2.33E-03	366	3.94E-04
288	1.00E+00	328	1.51E-03	368	3.67E-04
290	1.00E+00	330	1.36E-03	370	3.43E-04
292	1.00E+00	332	1.27E-03	372	3.20E-04
294	1.00E+00	334	1.19E-03	374	2.99E-04
296	1.00E+00	336	1.11E-03	376	2.79E-04
298	1.00E+00	338	1.04E-03	378	2.60E-04
300	6.49E-01	340	9.66E-04	380	2.43E-04
302	4.21E-01	342	9.02E-04	382	2.26E-04
304	2.73E-01	344	8.41E-04	384	2.11E-04
306	1.77E-01	346	7.85E-04	386	1.97E-04
308	1.15E-01	348	7.33E-04	388	1.84E-04
310	7.45E-02	350	6.84E-04	390	1.72E-04
312	4.83E-02	352	6.38E-04	392	1.60E-04
314	3.13E-02	354	5.96E-04	394	1.50E-04
316	2.03E-02	356	5.56E-04	396	1.40E-04
318	1.32E-02	358	5.19E-04	398	1.30E-04
				400	1.22E-04

Table A10 Solar spectral irradiance at wavelength 280-400 nm

wavelength	S (W/m^2nm)	wavelength	S (W/m^2nm)	wavelength	S (W/m^2nm)
280	4.12E-07	320	3.14E-01	360	5.64E-01
282	2.37E-07	322	3.32E-01	362	6.00E-01
284	3.14E-07	324	3.61E-01	364	6.48E-01
286	4.06E-07	326	4.45E-01	366	7.18E-01
288	6.47E-07	328	5.01E-01	368	7.62E-01
290	3.09E-06	330	5.32E-01	370	7.66E-01
292	2.85E-05	332	5.33E-01	372	7.50E-01
294	2.92E-04	334	5.23E-01	374	6.61E-01
296	1.28E-03	336	5.04E-01	376	6.66E-01
298	3.37E-03	338	4.99E-01	378	7.46E-01
300	8.64E-03	340	5.39E-01	380	7.54E-01
302	2.36E-02	342	5.59E-01	382	6.42E-01
304	4.35E-02	344	5.35E-01	384	5.85E-01
306	7.19E-02	346	5.34E-01	386	6.26E-01
308	9.68E-02	348	5.37E-01	388	6.72E-01
310	1.34E-01	350	5.59E-01	390	7.57E-01
312	1.75E-01	352	5.89E-01	392	7.16E-01
314	2.13E-01	354	6.13E-01	394	6.55E-01
316	2.43E-01	356	6.06E-01	396	6.81E-01
318	2.79E-01	358	5.38E-01	398	8.01E-01
				400	1.01E+00

Table A11 UPF and % UV blocking of treated cotton fabrics, and amount of polymer extracted at different HAB concentrations, using 0.6 mM DBSA and 0.15 M NaCl

Concentration of HAB (mM)	UPF	% UVA blocking	% UVB blocking	Amount of Polymer (mg/g cotton)
0.0	4.02	70.48	77.98	0.00
0.6	11.10	85.23	92.86	1.60
0.9	32.91	93.26	97.53	5.42
1.2	41.33	94.86	98.11	6.74
1.5	48.15	95.69	98.54	9.39
1.8	61.62	96.31	98.55	10.92
2.4	66.90	96.73	98.74	12.85
3.0	69.34	97.27	98.55	15.43
4.0	71.21	97.18	98.74	13.78
5.0	68.89	97.31	98.67	15.34

Table A12 UPF of the coated cotton before and after washing at 70 °C for 3 times, 10 min/time, of the coated cotton using different DBSA concentrations, 1.2 mM HAB and 0.15 M NaCl.

Concentration of DBSA (mM)	UPF before washing	UPF after washing
0.0	36.64	11.74
0.3	42.32	33.67
0.6	43.86	42.15
1.2	21.54	15.90
2.0	16.57	12.68
5.0	13.88	7.87

Table A13 % UV-A blocking and UPF of the coated cotton at different UV exposure time, using 1.2 mM HAB, 0.6 mM DBSA and 0.15 M NaCl

Concentration of HAB (mM)	% UVA blocking
0	41.45
1	43.48
2	43.46
4	42.09
8	43.46
24	42.09

Table A14 Adsolubilization of BEM and HAB in the single system, using 0.25 mM BEM or 0.25 mm HAB, 0.6 mM DBSA and 0.15M NaCl at 70 °C

Adsolubilization time (h)	Adsolubilization of BEM (μmol/g cotton)	Adsolubilization of HAB (μmol/g cotton)
0.0	0.000	0.000
0.25	1.1818	0.5490
0.5	1.8455	0.6117
1.0	1.9460	0.7900
1.5	2.0813	0.9462
2.0	2.2437	0.9611
3.0	2.2177	0.9520
4.0	2.2321	0.9539
5.0	2.3799	0.9500

Table A15 Adsolubilization of BEM and HAB in the the comonomer system, using 0.25 mM BEM and 0.25 mm HAB, 0.6 mM DBSA and 0.15M NaCl at 70 °C

Adsolubilization time (h)	Adsolubilization of BEM (μmol/g cotton)	Adsolubilization of HAB (μmol/g cotton)
0.0	0.000	0.000
0.25	2.663	0.549
0.50	2.895	1.327
0.75	3.712	1.492
1.0	3.600	1.652
1.5	3.655	1.697
2.0	4.027	1.924
3.0	3.880	1.935
4.0	3.751	1.787
5.0	3.823	2.005

Table A16 The % conversion of the comonomer system , using 1.5 mM BEM and 1.5 mM HAB, 1.5 mM ammonium persulfate, 0.6 mM DBSA, and 0.15M NaCl

Polymerization time (h)	% Conversion of BEM	% Conversion of HAB
0.0	0.00	0.00
0.5	0.31	1.95
1.0	0.99	4.96
2.0	1.03	10.20
3.0	6.21	29.24
4.0	20.67	42.58

Table A17 The peak integrals at wavenumber of 1730 cm^{-1} and 1760 cm^{-1} of FTIR spectra of poly(BEM)-poly(HAB) mixtures with different compositions

Mole fraction of BEM	Peak integral at 1730 cm^{-1}	Peak integral at 1760 cm^{-1}	Peak ratio 1730 cm^{-1}/1760 cm^{-1}
0.15	0.78141	2.95448	0.2645
0.30	2.93567	5.09428	0.5763
0.45	6.17401	6.61293	0.9336
0.60	9.97107	8.15801	1.2222
0.75	18.79710	11.7965	1.5934

Table A18 Fineman-Ross and Kelen Tüdos parameters for copolymerization of BEM and HAB

Mole ratio (BEM/HAB)		Fineman-Ross		Kelen-Tüdos	
in feed X	in copolymer Y	(X^2/Y)	X(Y-1)/Y	$\xi = (X^2/Y)/(Y^2/Y+\alpha)$	$\eta = [X(Y-1)/Y]/(X^2/Y+\alpha)$
0.176	0.269	0.1157	-0.4791	0.1499	-0.6206
0.429	0.494	0.3718	-0.4390	0.3616	-0.4270
0.818	0.820	0.8161	-0.1793	0.5543	-0.1218
1.500	1.209	1.8617	0.2589	0.7394	0.1028
3.000	2.417	3.7231	1.7590	0.8501	0.4016

Table A19 Mole fraction of BEM in feed monomers and in copolymer

Mole fraction of BEM in feed F_1	Mole fraction of BEM in copolymer f_1
0.150	0.212
0.300	0.331
0.450	0.451
0.600	0.547
0.750	0.707

Table A20 Amount of polymer extracted from the fabrics coated by homopolymer at different monomer concentrations .

Concentration of monomer (mM)	Amount of Polymer (mg/g cotton)	
	poly(BEM)	poly(HAB)
0.0	0.000	0.000
0.5	0.312	0.586
1.0	3.067	5.835
1.5	4.126	9.900
2.0	4.850	12.356
2.5	6.248	12.992
3.0	7.204	14.689

Table A21 UPF of the fabrics coated by poly(BEM), poly(HAB) and copolymer at different monomer concentrations

BEM (mM)	UPF poly(BEM)	HAB (mM)	UPF poly(HAB)	UPF Summary	UPF copolymer
0.0		3.0	71.90		
0.5	6.60	2.5	65.06	71.66	69.12
1.0	36.83	2.0	62.47	99.30	86.02
1.5	48.59	1.5	52.92	101.51	97.34
2.0	55.42	1.0	32.62	88.04	78.88
2.5	63.00	0.5	5.15	68.15	69.74
3.0	72.67	0.0			

Table A22 UPF of treated cotton fabrics at different amounts of DMAC used in the polymerization process, using 5 %vol VTES and 2.0 mM BEM.

Amount of DMAC (mL in 35 mL)	UPF
5.0	82.16
10.0	79.76
17.5	54.17
25.0	20.77
30.0	13.59

Table A23 UPF of treated cotton fabrics, using different VTES concentrations, 2.0 mM BEM and 17.5 mL of DMAC

Concentration of VTES (%)	UPF
0	36.59
1	37.60
2	43.97
5	56.37
10	60.86
15	62.60

Table A24 UPF of treated cotton fabrics, using different BEM concentrations, 5% VTES and 17.5 mL of DMAC

Concentration of BEM (mM)	UPF
0	4.02
1	36.94
2	54.17
4	60.77
6	69.84
8	76.50
10	76.80

Table A25 UPF of treated cotton fabrics treated by 5 %vol VTES and 4.0 mM BEM after washing at 30 °C, 30 rpm and 30 min/time

Number of washing	UPF
0	60.47
1	57.93
2	60.47
3	57.18
4	57.93
5	58.71
6	62.28
7	60.00
8	64.26
9	59.11
10	60.97

Table A26 Water contact angle of VTES-treat cotton at 15 s and 25 s

% VTES	5%		10%		15%	
Time (s)	15 s	25 s	15 s	25 s	15 s	25 s
Contact angle	141.3	141.0	158.5	157.5	154.0	153.7
	145.5	144.7	145.5	142.2	150.9	150.4
	135.0	133.0	139.0	137.1	155.7	155.0
	137.0	132.0	151.8	150.5	141.5	141.0
	132.8	123.9	137.8	136.4	152.5	152.2
Average	138.3	134.9	146.5	144.7	150.9	150.5

Table A27 Water contact angle of VTES/BEM-treat cotton at 15 s, using 2.0 mM BEM

% VTES	5%	10%	15%
Contact angle	83.3	131.9	125.5
	107.9	127.5	127.3
	124.1	120.6	126.2
	105.7	123.1	126.1
	104.4	125.5	130.5
Average	105.1	125.7	127.1

Table A28 Adsorption of DBSA on HAB-treated cotton at different DBSA concentrations, using 0.15 M NaCl at 30 °C

Concentration of DBSA at equilibrium (mM)	Adsorption of DBSA (μmol/g cotton)
0.06	2.08
0.16	6.57
0.38	10.69
0.66	11.59
0.93	13.19
1.23	13.07
1.70	14.45
3.60	14.51

Table A29 UPF of Msi-treated and HAB/MSi-treated cotton fabrics, using different MSi concentrations, 1.5 mM HAB, 0.6 mM DBSA and 0.15 M NaCl

Concentration of MSi (mM)	UPF of MSi-treated fabric	UPF of HAB/MSi-treated fabric
0.0	4.02	48.15
1.0	3.68	38.58
2.0	4.00	38.52
3.0	3.63	41.23
4.0	3.64	38.54
5.0	3.73	39.97
7.0	3.84	41.01
10.0	3.70	40.30

Table A30 Contact angle of the cotton fabric treated by 2.0 mM MSi, using 0.6 mM DBSA and 0.15 M NaCl

Time (min)	Contact angle (°)	Time (min)	Contact angle (°)	Time (min)	Contact angle (°)
0.00	96.7	0.400	91.6	0.825	71.3
0.01	96.7	0.425	90.9	0.850	68.4
0.025	97.1	0.450	90.2	0.875	67.7
0.050	95.5	0.475	89.1	0.883	67.0
0.075	95.7	0.500	88.8	0.891	66.5
0.100	95.4	0.525	86.8	0.900	65.6
0.125	94.7	0.550	85.9	0.925	64.2
0.150	94.5	0.575	85.6	0.950	63.8
0.175	94.7	0.600	84.0	0.975	62.3
0.200	93.9	0.625	82.1	1.000	60.9
0.225	94.3	0.650	81.5	1.025	60.4
0.250	93.1	0.675	80.8	1.150	56.2
0.275	93.0	0.700	78.4	1.175	42.3
0.300	93.7	0.725	77.7	1.200	30.1
0.325	93.3	0.750	75.6	1.225	12.7
0.350	93.0	0.775	73.9	1.250	0
0.375	92.8	0.800	72.3		

Table A31 Contact angle of the cotton fabric treated by 3.0 mM MSi, using 0.6 mM DBSA and 0.15 M NaCl

Time (min)	Contact angle (°)	Time (min)	Contact angle (°)	Time (min)	Contact angle (°)	Time (min)	Contact angle (°)
0	97.60	1.33	92.70	2.58	91.50	3.83	90.20
0.08	97.20	1.42	92.50	2.67	91.15	3.92	90.25
0.17	97.00	1.50	92.65	2.75	91.25	4.00	90.35
0.25	96.70	1.58	92.35	2.83	90.95	4.08	90.20
0.33	96.25	1.67	92.30	2.92	90.90	4.17	90.08
0.42	96.50	1.75	92.40	3.00	90.75	4.25	89.90
0.50	96.25	1.83	92.20	3.08	90.40	4.33	89.85
0.58	96.00	1.92	91.90	3.17	90.85	4.42	89.90
0.67	95.75	2.00	92.05	3.25	90.85	4.50	89.85
0.75	95.50	2.08	91.95	3.33	90.80	4.58	89.80
0.83	94.95	2.17	92.05	3.42	90.60	4.67	89.55
0.92	94.75	2.25	92.05	3.50	90.75	4.75	89.50
1.00	94.70	2.33	91.55	3.58	90.45	4.83	89.45
1.08	93.70	2.42	91.50	3.67	90.55	4.92	89.35
1.17	93.30	2.50	91.60	3.75	90.20	5.00	89.30
1.25	93.05						

Table A32 Contact angle of the cotton fabric treated by 4.0 mM MSi, using 0.6 mM DBSA and 0.15 M NaCl

Time (min)	Contact angle (°)	Time (min)	Contact angle (°)	Time (min)	Contact angle (°)	Time (min)	Contact angle (°)
0	102.26	1.33	97.66	2.58	94.58	3.83	94.67
0.08	101.62	1.42	97.36	2.67	94.32	3.92	94.72
0.17	100.36	1.50	97.10	2.75	94.20	4.00	94.70
0.25	100.14	1.58	97.00	2.83	94.56	4.08	94.95
0.33	99.86	1.67	97.02	2.92	94.30	4.17	94.20
0.42	99.66	1.75	96.68	3.00	94.04	4.25	94.20
0.50	99.62	1.83	96.44	3.08	93.98	4.33	94.37
0.58	99.54	1.92	96.28	3.17	93.88	4.42	94.22
0.67	99.04	2.00	96.12	3.25	94.12	4.50	94.15
0.75	99.12	2.08	95.92	3.33	93.82	4.58	93.92
0.83	98.76	2.17	95.80	3.42	94.40	4.67	93.75
0.92	98.42	2.25	95.40	3.50	94.26	4.75	93.92
1.00	98.16	2.33	95.22	3.58	93.96	4.83	94.00
1.08	97.96	2.42	95.30	3.67	93.96	4.92	93.85
1.17	97.84	2.50	94.64	3.75	94.52	5.00	93.32
1.25	97.56						

Table A33 Contact angle of the cotton fabric treated by 5.0 mM MSi, using 0.6 mM DBSA and 0.15 M NaCl

Time (min)	Contact angle (°)	Time (min)	Contact angle (°)	Time (min)	Contact angle (°)	Time (min)	Contact angle (°)
0	104.35	1.33	101.18	2.58	100.91	3.83	101.03
0.08	103.95	1.42	101.27	2.67	100.48	3.92	100.56
0.17	103.28	1.50	101.50	2.75	100.60	4.00	100.90
0.25	102.77	1.58	101.33	2.83	100.61	4.08	100.88
0.33	102.58	1.67	100.95	2.92	100.68	4.17	100.71
0.42	102.24	1.75	101.25	3.00	101.11	4.25	100.61
0.50	101.70	1.83	101.11	3.08	101.10	4.33	100.93
0.58	101.74	1.92	101.27	3.17	100.68	4.42	100.86
0.67	101.45	2.00	101.41	3.25	100.96	4.50	100.66
0.75	100.97	2.08	101.81	3.33	100.55	4.58	99.60
0.83	101.13	2.17	101.38	3.42	101.21	4.67	100.73
0.92	101.90	2.25	101.68	3.50	101.08	4.75	99.40
1.00	101.70	2.33	100.65	3.58	100.85	4.83	100.68
1.08	101.78	2.42	100.95	3.67	101.36	4.92	98.783
1.17	101.51	2.50	100.78	3.75	100.98	5.00	99.30
1.25	101.23						

Table A34 Contact angle of the cotton fabric treated by 7.0 mM MSi, using 0.6 mM DBSA and 0.15 M NaCl

Time (min)	Contact angle (°)	Time (min)	Contact angle (°)	Time (min)	Contact angle (°)	Time (min)	Contact angle (°)
0	108.94	1.33	105.85	2.58	104.82	3.83	104.20
0.08	108.66	1.42	105.55	2.67	104.92	3.92	103.85
0.17	108.36	1.50	105.57	2.75	104.90	4.00	103.92
0.25	108.14	1.58	105.52	2.83	104.50	4.08	104.05
0.33	107.92	1.67	105.52	2.92	104.60	4.17	103.82
0.42	107.60	1.75	105.20	3.00	104.75	4.25	103.87
0.50	107.28	1.83	105.15	3.08	104.55	4.33	103.72
0.58	107.00	1.92	105.22	3.17	104.55	4.42	103.67
0.67	107.08	2.00	105.42	3.25	104.30	4.50	103.77
0.75	106.72	2.08	105.22	3.33	104.37	4.58	103.60
0.83	107.08	2.17	105.15	3.42	104.30	4.67	103.57
0.92	106.88	2.25	105.10	3.50	104.35	4.75	103.47
1.00	106.48	2.33	105.07	3.58	104.00	4.83	103.45
1.08	106.26	2.42	105.02	3.67	104.12	4.92	103.30
1.17	105.62	2.50	104.85	3.75	104.17	5.00	103.30
1.25	105.82						

Table A35 Contact angle of the cotton fabric treated by 10.0 mM MSi, using 0.6 mM DBSA and 0.15 M NaCl

Time (min)	Contact angle (°)	Time (min)	Contact angle (°)	Time (min)	Contact angle (°)	Time (min)	Contact angle (°)
0	113.30	1.33	112.14	2.58	111.46	3.83	110.54
0.08	113.16	1.42	111.96	2.67	111.28	3.92	110.44
0.17	113.06	1.50	112.02	2.75	111.26	4.00	110.38
0.25	112.70	1.58	111.74	2.83	111.34	4.08	110.48
0.33	112.64	1.67	111.80	2.92	111.24	4.17	110.32
0.42	112.66	1.75	111.86	3.00	111.34	4.25	110.38
0.50	112.60	1.83	111.72	3.08	110.96	4.33	110.10
0.58	112.50	1.92	111.60	3.17	111.04	4.42	110.34
0.67	112.44	2.00	111.44	3.25	110.90	4.50	110.12
0.75	112.32	2.08	111.52	3.33	110.90	4.58	109.96
0.83	112.40	2.17	111.72	3.42	110.76	4.67	109.70
0.92	112.28	2.25	111.52	3.50	110.76	4.75	109.78
1.00	112.24	2.33	111.70	3.58	110.76	4.83	109.68
1.08	112.10	2.42	111.52	3.67	110.64	4.92	109.48
1.17	112.04	2.50	111.52	3.75	110.28	5.00	109.56
1.25	112.16						

Table A36 Contact angle of the cotton fabric treated by 1.5 mM HAB and 2.0 mM MSi, using 0.6 mM DBSA and 0.15 M NaCl

Time (min)	Contact angle (°)	Time (min)	Contact angle (°)	Time (min)	Contact angle (°)	Time (min)	Contact angle (°)
0	104.44	1.33	101.26	2.58	96.74	3.83	94.72
0.08	103.40	1.42	100.36	2.67	96.38	3.92	94.68
0.17	102.86	1.50	100.22	2.75	96.11	4.00	95.06
0.25	102.96	1.58	100.58	2.83	95.72	4.08	94.46
0.33	102.38	1.67	99.82	2.92	95.66	4.17	94.50
0.42	102.38	1.75	99.20	3.00	95.70	4.25	94.56
0.50	102.36	1.83	98.94	3.08	95.70	4.33	94.26
0.58	102.24	1.92	98.90	3.17	95.54	4.42	93.82
0.67	102.20	2.00	98.64	3.25	95.60	4.50	93.44
0.75	101.98	2.08	98.34	3.33	95.42	4.58	92.96
0.83	101.88	2.17	98.16	3.42	95.42	4.67	93.46
0.92	101.80	2.25	98.00	3.50	95.04	4.75	93.24
1.00	101.86	2.33	97.80	3.58	94.88	4.83	92.86
1.08	101.68	2.42	97.84	3.67	94.86	4.92	92.64
1.17	101.20	2.50	96.92	3.75	94.78	5.00	92.78
1.25	101.08						

Table A37 Contact angle of the cotton fabric treated by 1.5 mM HAB and 3.0 mM MSi, using 0.6 mM DBSA and 0.15 M NaCl

Time (min)	Contact angle (°)	Time (min)	Contact angle (°)	Time (min)	Contact angle (°)	Time (min)	Contact angle (°)
0	107.67	1.33	102.14	2.58	101.05	3.83	98.45
0.08	106.01	1.42	102.78	2.67	100.82	3.92	97.68
0.17	105.10	1.50	102.54	2.75	100.45	4.00	98.08
0.25	105.41	1.58	102.57	2.83	100.34	4.08	97.44
0.33	105.44	1.67	101.72	2.92	100.40	4.17	96.61
0.42	104.91	1.75	102.24	3.00	100.14	4.25	96.58
0.50	104.72	1.83	102.07	3.08	100.07	4.33	96.55
0.58	104.17	1.92	101.28	3.17	99.97	4.42	95.88
0.67	104.45	2.00	101.68	3.25	99.67	4.50	95.50
0.75	104.42	2.08	101.72	3.33	99.51	4.58	95.43
0.83	104.30	2.17	101.80	3.42	99.24	4.67	95.17
0.92	104.08	2.25	101.45	3.50	99.02	4.75	95.37
1.00	103.74	2.33	101.47	3.58	98.82	4.83	95.21
1.08	102.97	2.42	101.21	3.67	98.48	4.92	95.35
1.17	103.18	2.50	101.04	3.75	98.37	5.00	95.18
1.25	103.35						

Table A38 Contact angle of the cotton fabric treated by 1.5 mM HAB and 4.0 mM MSi, using 0.6 mM DBSA and 0.15 M NaCl

Time (min)	Contact angle (°)	Time (min)	Contact angle (°)	Time (min)	Contact angle (°)	Time (min)	Contact angle (°)
0	111.46	1.33	108.41	2.58	106.24	3.83	102.94
0.08	111.08	1.42	108.35	2.67	106.17	3.92	102.67
0.17	110.98	1.50	108.18	2.75	106.10	4.00	102.55
0.25	110.38	1.58	108.10	2.83	105.87	4.08	102.37
0.33	109.92	1.67	107.88	2.92	105.80	4.17	102.15
0.42	109.75	1.75	107.79	3.00	105.42	4.25	102.15
0.50	109.63	1.83	107.61	3.08	104.80	4.33	101.88
0.58	109.50	1.92	107.35	3.17	104.31	4.42	101.62
0.67	109.33	2.00	107.29	3.25	104.18	4.50	101.46
0.75	109.18	2.08	107.19	3.33	103.96	4.58	101.36
0.83	108.99	2.17	106.96	3.42	103.62	4.67	101.55
0.92	109.18	2.25	106.82	3.50	103.61	4.75	100.37
1.00	108.72	2.33	106.80	3.58	103.40	4.83	99.97
1.08	108.60	2.42	106.47	3.67	103.29	4.92	100.12
1.17	108.74	2.50	106.41	3.75	102.99	5.00	99.90
1.25	108.69						

Table A39 Contact angle of the cotton fabric treated by 1.5 mM HAB and 5.0 mM MSi, using 0.6 mM DBSA and 0.15 M NaCl

Time (min)	Contact angle (°)	Time (min)	Contact angle (°)	Time (min)	Contact angle (°)	Time (min)	Contact angle (°)
0	115.39	1.33	111.17	2.58	108.60	3.83	107.09
0.08	115.04	1.42	110.98	2.67	108.59	3.92	106.96
0.17	114.68	1.50	110.90	2.75	108.99	4.00	107.16
0.25	114.23	1.58	110.61	2.83	108.38	4.08	106.70
0.33	114.01	1.67	110.89	2.92	108.64	4.17	107.15
0.42	114.00	1.75	110.42	3.00	108.25	4.25	106.87
0.50	113.82	1.83	110.59	3.08	108.22	4.33	106.41
0.58	113.73	1.92	110.01	3.17	107.89	4.42	106.46
0.67	113.38	2.00	109.83	3.25	107.91	4.50	106.22
0.75	113.02	2.08	109.52	3.33	107.78	4.58	105.98
0.83	112.27	2.17	110.16	3.42	107.72	4.67	106.02
0.92	112.15	2.25	109.55	3.50	107.62	4.75	105.87
1.00	111.95	2.33	109.28	3.58	107.52	4.83	105.35
1.08	111.33	2.42	109.06	3.67	107.17	4.92	105.20
1.17	111.55	2.50	109.49	3.75	107.31	5.00	104.91
1.25	111.28						

Table A40 Contact angle of the cotton fabric treated by 1.5 mM HAB and 7.0 mM MSi, using 0.6 mM DBSA and 0.15 M NaCl

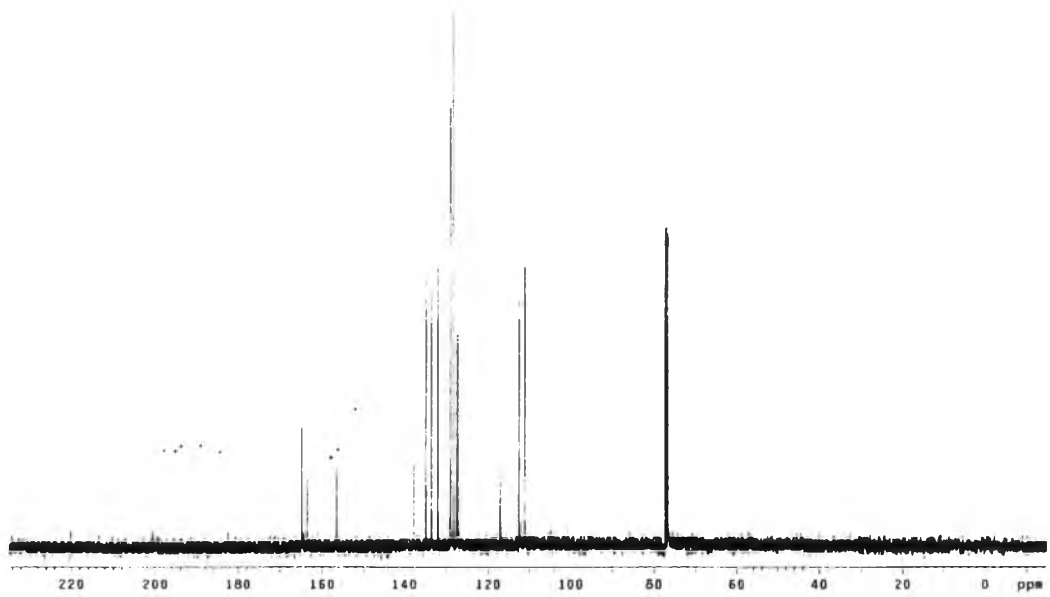
Time (min)	Contact angle (°)	Time (min)	Contact angle (°)	Time (min)	Contact angle (°)	Time (min)	Contact angle (°)
0	117.27	1.33	116.41	2.58	115.81	3.83	115.52
0.08	117.12	1.42	116.57	2.67	116.07	3.92	115.67
0.17	117.14	1.50	116.31	2.75	115.74	4.00	115.38
0.25	116.88	1.58	116.62	2.83	115.72	4.08	115.41
0.33	116.75	1.67	116.24	2.92	115.68	4.17	115.68
0.42	116.75	1.75	116.27	3.00	115.91	4.25	115.31
0.50	116.90	1.83	116.17	3.08	115.74	4.33	115.20
0.58	116.70	1.92	116.22	3.17	116.01	4.42	115.22
0.67	116.62	2.00	116.30	3.25	115.85	4.50	115.31
0.75	116.82	2.08	116.20	3.33	115.60	4.58	115.20
0.83	116.82	2.17	116.14	3.42	115.78	4.67	115.05
0.92	116.68	2.25	115.78	3.50	115.55	4.75	114.84
1.00	116.77	2.33	116.15	3.58	115.67	4.83	114.98
1.08	116.57	2.42	116.11	3.67	115.57	4.92	114.95
1.17	116.54	2.50	116.01	3.75	115.65	5.00	114.91
1.25	116.62						

Table A41 Contact angle of the cotton fabric treated by 1.5 mM HAB and 10.0 mM MSi, using 0.6 mM DBSA and 0.15 M NaCl

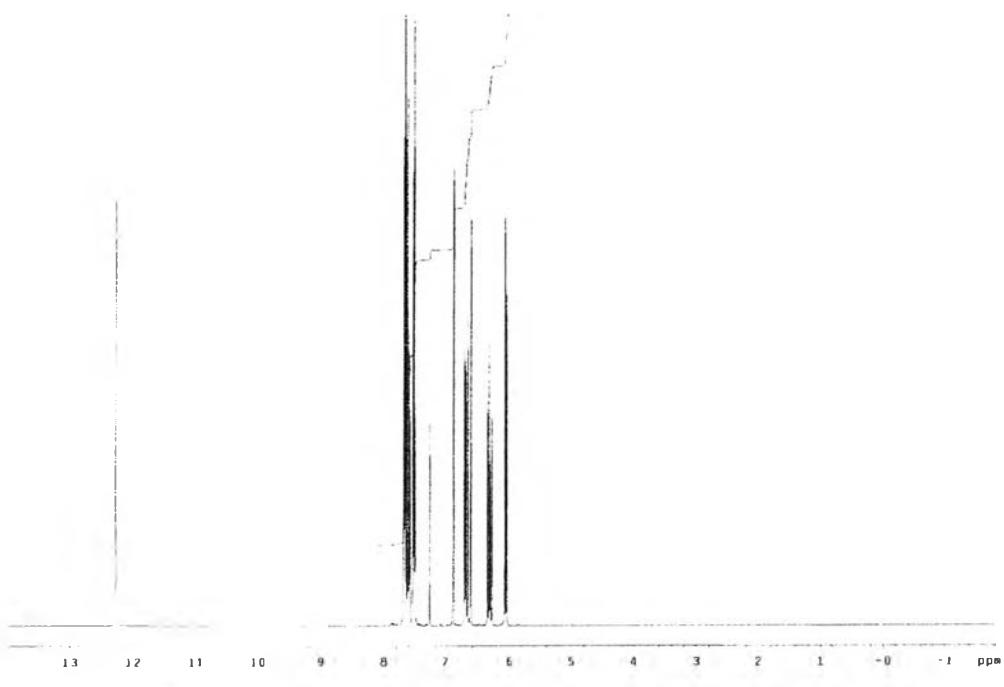
Time (min)	Contact angle (°)	Time (min)	Contact angle (°)	Time (min)	Contact angle (°)	Time (min)	Contact angle (°)
0	119.95	1.33	118.78	2.58	118.24	3.83	117.80
0.08	119.70	1.42	118.82	2.67	118.19	3.92	117.60
0.17	119.47	1.50	118.87	2.75	118.16	4.00	117.80
0.25	119.27	1.58	118.68	2.83	118.10	4.08	117.78
0.33	119.32	1.67	118.62	2.92	118.03	4.17	117.55
0.42	119.21	1.75	118.52	3.00	118.00	4.25	117.56
0.50	119.25	1.83	118.48	3.08	118.00	4.33	117.67
0.58	119.19	1.92	118.42	3.17	117.73	4.42	117.37
0.67	119.09	2.00	118.43	3.25	117.99	4.50	117.56
0.75	119.13	2.08	118.35	3.33	117.84	4.58	117.45
0.83	118.85	2.17	118.36	3.42	117.85	4.67	117.33
0.92	118.95	2.25	118.42	3.50	117.75	4.75	117.32
1.00	118.95	2.33	118.37	3.58	117.87	4.83	117.18
1.08	118.80	2.42	118.30	3.67	117.73	4.92	117.21
1.17	118.87	2.50	118.25	3.75	117.63	5.00	116.73
1.25	118.85						

Appendix B NMR Spectra

B1 ^{13}C NMR of HAB



B2 ^{1}H NMR of HAB



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Publications:

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