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จุฬาลงกรณ์มหาวิทยาลัย



APPENDICES

ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย



APPENDIX A

ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

PMPC brushes grown from Silicon-supported α -Bromoisobutyrate Monolayer

Table A-1 Average thickness of PMPC brushes versus polymerization time in the presence of “added” initiator

Time (h)	Average thickness (Å)			
	MeOH:H ₂ O (4:1)		MeOH	
	targeted DP 200	targeted DP 50	targeted DP 200	targeted DP 50
0	0	0	0	0
0.5	5 ± 1.20	1.8 ± 0.95	4.2 ± 1.05	1.5 ± 0.47
1	12.3 ± 0.78	3.5 ± 1.24	8.5 ± 0.95	3.0 ± 0.96
3	26.8 ± 0.54	5.3 ± 0.74	17.3 ± 1.25	4.7 ± 0.52
5	41.8 ± 1.32	7.0 ± 1.54	33.4 ± 1.54	6.0 ± 1.34
12	64.4 ± 1.54	9.5 ± 1.25	52.6 ± 1.09	8.5 ± 1.02

Table A-2 Average thickness of PMPC brushes versus polymerization time using different [CuBr]/[CuBr₂] ratios at targeted DP of 200 using methanol:water = 4:1 (v/v) as a solvent.

Time (min)	Average thickness (Å)		
	[CuBr]:[CuBr ₂] ratio		
	1 : 0	1 : 0.1	1 : 0.5
0	0	0	0
0.5	20 ± 1.25	12 ± 1.32	2 ± 0.52
1	44 ± 0.87	22 ± 1.78	4 ± 0.23
3	65 ± 0.66	38 ± 0.65	5 ± 0.54
5	66 ± 1.24	60 ± 1.42	9 ± 0.54
12	70 ± 1.25	90 ± 0.65	17 ± 0.68

Table A-3 Average thickness, water contact angle, molecular weight (\overline{M}_n and \overline{M}_w) and molecular weight distribution ($\overline{M}_w/\overline{M}_n$) of free PMPC for targeted DP = 50 produced in methanol:water = 4:1 (v/v) as a function of polymerization time.

Time (h)	\overline{M}_w	\overline{M}_n	$\overline{M}_w / \overline{M}_n$	Average thickness (Å)	θ_A/θ_R (°)
0	0	0	-	1.8 ± 0.95	$73 \pm 0.45 / 64 \pm 0.65$
0.5	5718	5105	1.12	3.5 ± 1.24	$55 \pm 0.37 / 37 \pm 0.46$
1	9673	7728	1.25	5.3 ± 0.74	$26 \pm 0.35 / 15 \pm 0.56$
3	11739	9271	1.27	7.0 ± 1.54	$25 \pm 0.35 / 1$
5	13548	10507	1.29	9.5 ± 1.25	$26 \pm 1.02 / 1$
12	24210	18623	1.30	1.8 ± 0.95	$23 \pm 1.10 / 1$

Table A-4 Average thickness, water contact angle, molecular weight (\overline{M}_n) and molecular weight distribution ($\overline{M}_w/\overline{M}_n$) of free PMPC for targeted DP = 200 produced in methanol:water = 4:1 (v/v) as a function of polymerization time.

Time (h)	\overline{M}_w	\overline{M}_n	$\overline{M}_w / \overline{M}_n$	Average thickness (Å)	θ_A/θ_R (°)
0	0	0	-	0	$73 \pm 0.45 / 64 \pm 0.65$
0.5	13487	10351	1.30	5.0 ± 1.20	$25 \pm 0.33 / 18 \pm 0.46$
1	32236	24248	1.33	12.3 ± 0.78	$23 \pm 0.55 / 1$
3	45153	34733	1.30	26.8 ± 0.54	$22 \pm 0.55 / 1$
5	47463	38588	1.23	41.8 ± 1.32	$22 \pm 1.02 / 1$
12	56903	50806	1.12	64.4 ± 1.54	$20 \pm 1.02 / 1$

Table A-5 Average thickness, water contact angle, molecular weight (\overline{M}_n) and molecular weight distribution ($\overline{M}_w/\overline{M}_n$) of free Pt-BMA for targeted DP = 200 produced in toluene at 90°C as a function of polymerization time.

Time (h)	M_w	M_n	M_w / M_n	Average thickness (Å)	θ_A/θ_R (°)
0	0	0	-	0	73±0.45 / 64±0.65
0.5	1857	1606	1.15	6.7 ± 1.03	90±1.56 / 58±1.06
1	2820	2314	1.21	12.6 ± 0.97	90±1.55 / 63±1.10
3	5934	3860	1.28	18.8 ± 0.65	92±0.78 / 72±1.22
5	9797	8727	1.12	29.3 ± 1.25	94±0.78 / 77±0.78
12	16944	13364	1.27	52.0 ± 1.34	100±1.56 / 80±0.98

ศูนย์วิทยทรัพยากร
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APPENDIX B

ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

Silicon-supported Mixed Tris(TMS)/silanol Monolayer

Table B-1 Average thickness of tris(TMS) monolayer as a function of reaction time calculated from ellipsometric data and advancing and receding water contact angle as a function of time (days)

Time (days)	Average thickness (Å)	θ_A/θ_R (°)
0	0	$29 \pm 1.75 / 15 \pm 1.93$
0.5	8.2 ± 1.34	$61.60 \pm 1.65 / 42.90 \pm 1.78$
1	12.5 ± 1.50	$73.30 \pm 1.29 / 64.53 \pm 1.75$
2	15.4 ± 1.25	$80.63 \pm 1.14 / 71.15 \pm 1.43$
3	19.1 ± 1.50	$86.48 \pm 1.05 / 77.88 \pm 1.64$
4	20.8 ± 1.53	$91.57 \pm 1.03 / 81.58 \pm 1.53$

Silicon-supported mixed tris(TMS)/ α -bromoisobutyrate (n = 3) monolayer

Table B-2 Average thickness of silicon-supported mixed tris(TMS)/ α -bromoisobutyrate (n = 3) monolayer using 1 - 4 days of reaction

Time (days)	Average thickness (Å)			
	0% tris	66% tris	75% tris	82% tris
0	-	12.5 ± 1.50	15.4 ± 1.25	19.1 ± 1.50
1	9.25 ± 0.94	9.8 ± 0.50	11.6 ± 0.46	14.0 ± 0.45
2	-	12.4 ± 0.78	19 ± 2.14	16.2 ± 1.22
3	-	19.0 ± 1.87	25.8 ± 2.02	23.7 ± 1.23
4	-	24.0 ± 1.39	26.0 ± 0.56	25.0 ± 1.40

Table B-3 Average advancing and receding water contact angles of silicon-supported mixed tris(TMS)/ α -bromoisobutyrate ($n = 3$) monolayer using 1 - 4 days of reaction.

Time (days)	θ_A/θ_R (°)			
	0% tris	66% tris	75% tris	82% tris
0	-	73.3 \pm 1.29 / 64.53 \pm 1.75	80.6 \pm 1.14 / 71.2 \pm 1.43	86.48 \pm 1.05 / 77.88 \pm 1.64
1	73 \pm 0.45 / 64 \pm 0.65	76.7 \pm 1.03 / 64.5 \pm 1.54	80.3 \pm 1.23 / 70.8 \pm 1.02	86.5 \pm 1.02 / 77.9 \pm 0.45
2	-	75 \pm 0.78 / 61.3 \pm 1.50	80 \pm 0.98 / 61.3 \pm 1.02	84.3 \pm 0.89/ 74.8 \pm 1.12
3	-	73.8 \pm 1.87 / 56.3 \pm 0.98	76.7 \pm 0.78 / 56.3 \pm 1.43	79 \pm 1.33 / 65.85 \pm 0.88
4	-	72.6 \pm 0.78 / 52.3 \pm 1.56	75.2 \pm 0.78 / 54.9 \pm 1.55	79.65 \pm 1.33 / 63.6 \pm 1.12

PMPC brushes grown from silicon-supported mixed tris(TMS)/ α -bromoisobutyrate monolayer

Table B-4 Average thickness of PMPC brushes grown from silicon-supported mixed tris(TMS)/ α -bromoisobutyrate ($n = 3$) monolayer using methanol and water.

Time (h)	Average thickness (Å)		θ_A/θ_R (°)
	Water	MeOH	
0	38.5 \pm 1.25	34.0 \pm 0.87	20 \pm 1.02 / 1
1	42.5 \pm 1.56	46.6 \pm 1.04	60.8 \pm 1.24 / 41.9 \pm 0.56
3	34.2 \pm 0.98	42.5 \pm 1.23	74 \pm 1.56 / 44.6 \pm 0.78
5	16 \pm 1.12	39.7 \pm 0.88	76.9 \pm 0.98 / 54.3 \pm 0.56
12	11.5 \pm 1.36	32.0 \pm 1.31	76.3 \pm 1.12 / 57.1 \pm 1.05

Table B-5 Average thickness of PMPC brushes grown from silicon-supported mixed tris(TMS)/ α -bromoisobutyrate monolayer having 82% tris(TMS) coverage versus grafting time of initiator in methanol for 5 h

Time (days)	Average thickness (Å)		
	n_3	n_6	n_{10}
0	25.0 ± 1.40	25.0 ± 1.40	25.0 ± 1.40
1	23.3 ± 0.55	24.4 ± 0.58	26.0 ± 0.45
2	26.7 ± 0.57	30.7 ± 0.65	33.0 ± 0.65
3	32.0 ± 0.68	38.0 ± 0.66	38.8 ± 0.65
4	34.2 ± 0.74	41.6 ± 0.55	43.0 ± 0.65

Table B-6 Average thickness of PMPC brushes grown from silicon-supported mixed tris(TMS)/ α -bromoisobutyrate monolayer having 82% tris(TMS) coverage (I = 4 days) versus polymerization time in methanol

Time (days)	Average thickness (Å)		
	n_3	n_6	n_{10}
0	25.0 ± 1.40	25.0 ± 1.40	25.0 ± 1.40
1	20.7 ± 0.55	22.7 ± 0.45	26.0 ± 0.55
3	22.6 ± 0.55	24.6 ± 0.78	36.0 ± 0.64
5	34.2 ± 0.65	41.6 ± 0.76	43.0 ± 0.58

Table B-7 Average thickness of Pt-BMA brushes grown from silicon-supported mixed tris(TMS)/ α -bromoisobutyrate monolayer using toluene as a solvent for 5 h calculated from ellipsometric data and advancing and receding water contact angle as a function of time.

% tris(TMS) coverage	Average thickness (Å)	θ_A/θ_R (°)
0	29.3 ± 1.56	$90 \pm 1.78 / 70 \pm 0.58$
1	20.0 ± 1.78	$94 \pm 1.65 / 77 \pm 0.78$
3	17.1 ± 1.56	$92 \pm 1.86 / 92 \pm 0.55$
5	12.3 ± 1.55	$94 \pm 1.65 / 77 \pm 0.55$
12	8.0 ± 1.68	$97 \pm 1.65 / 80 \pm 0.64$

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