Electronic Supplementary Information

Aqueous Lubrication and Wear Properties of Nonionic Bottle-Brush Polymers

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Table S1. Molecular weights of polymers.

Entry	Linear(P) and Bottle-brush polymer(BP)	M_n [Da]	M_w/M_n
1	PS	2,300	1.06
2	BPS	14,000	1.07
3	PHEMA	6,800	1.55
4	BPHEMA	49,300	1.48

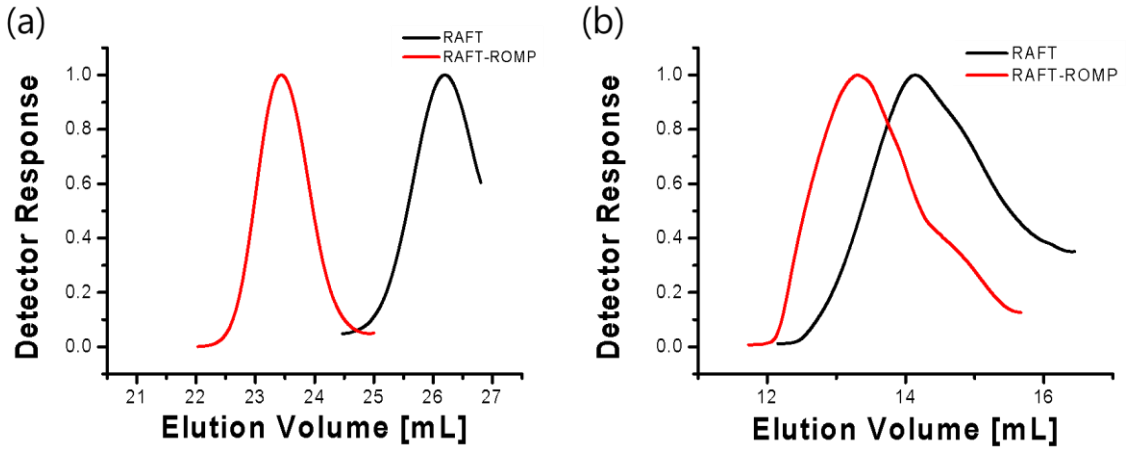

Figure S1. GPC traces of the chain extensions to BPS and BPHEMA.

Table S2. Friction coefficients of Si wafer, PHEMA, BPHEMA, and BPS.

	Friction coefficient	
	Dry	In water
Si-wafer	0.86±0.01	0.37±0.04
BPHEMA	0.73±0.02	0.27±0.04
BPS	0.46±0.15	0.30±0.15
PHEMA	0.77±0.04	0.35±0.04

Table S3. Friction coefficients of BPHEMA complexes with HA and PVA.

	Friction coefficient	
	Dry	In water
HA	0.41±0.14	0.46±0.05
HA:BPHEMA(2:1)	0.49±0.10	0.36±0.06
HA:BPHEMA(1:1)	0.56±0.06	0.36±0.03
HA:BPHEMA(1:2)	0.56±0.07	0.30±0.006

	Friction coefficient	
	Dry	In water
PVA	0.50±0.04	0.36±0.04
PVA:BPHEMA(2:1)	0.52±0.05	0.40±0.05
PVA:BPHEMA(1:1)	0.54±0.08	0.39±0.004
PVA:BPHEMA(1:2)	0.66±0.10	0.37±0.05

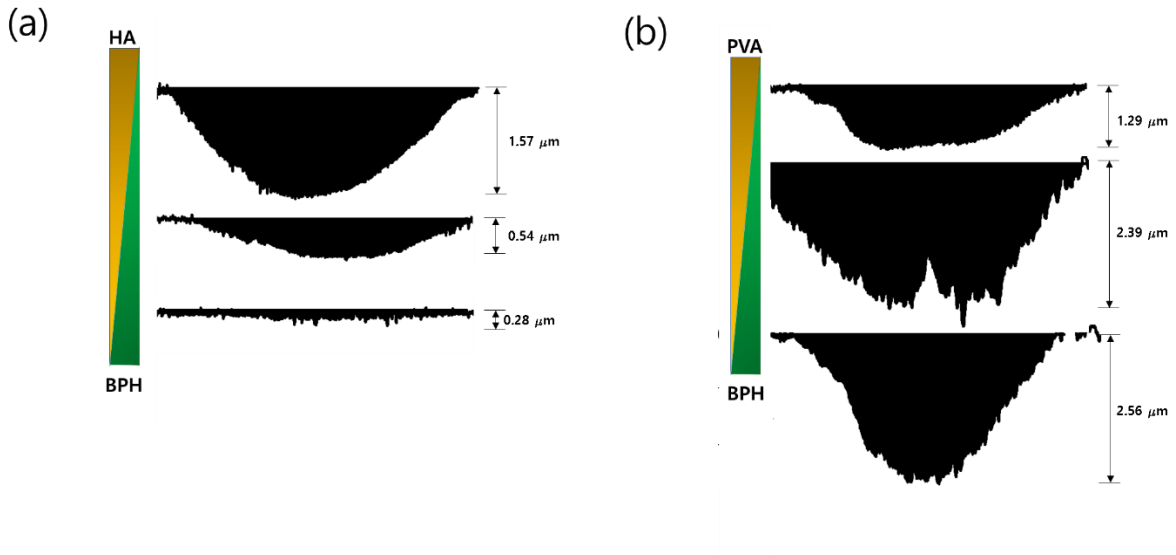

Figure S2. Depth data of BPHEMA complexes with (a) HA and (b) PVA after wear analysis.

Table S4. Glass transition temperatures of PS, PHEMA, BPS, and BPHEMA analyzed by DSC.

Sample	T_g (°C)
PS	59.3
PHEMA	69.0
BPS	73.0
BPHEMA	90.6

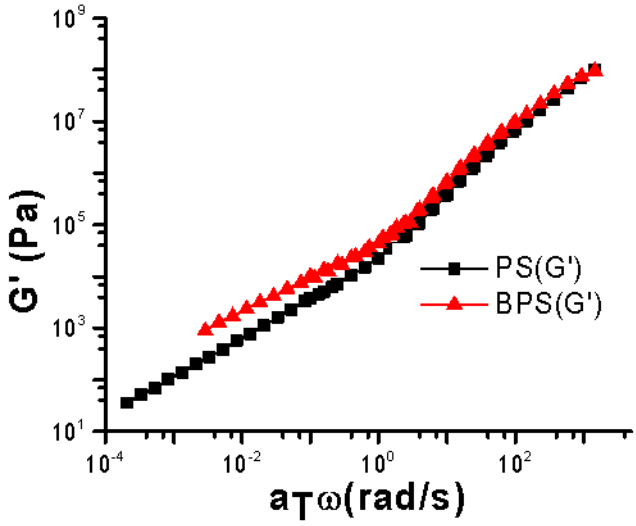

Figure S3. Storage modulus master curve of PS and BPS at $T_{ref} = T_g + 40$ °C

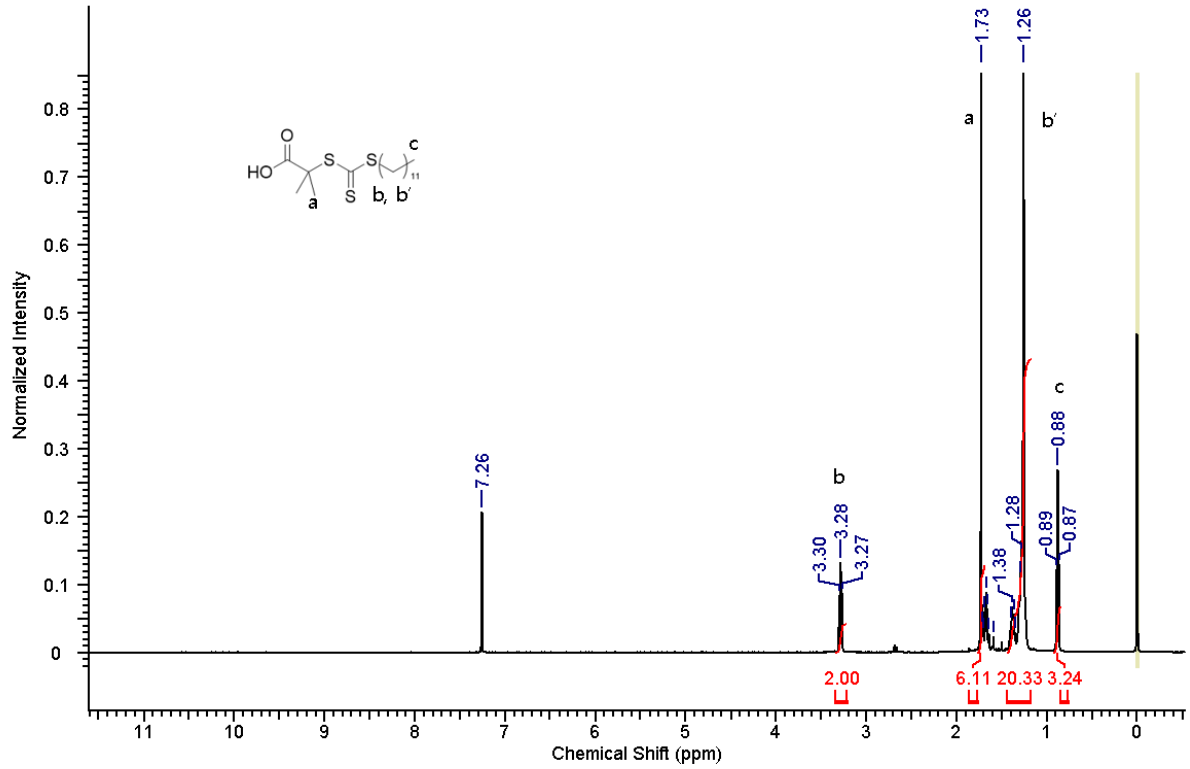

Figure S4. ^{1}H NMR spectrum of **CTA** (500 MHz, $CDCl_3$).

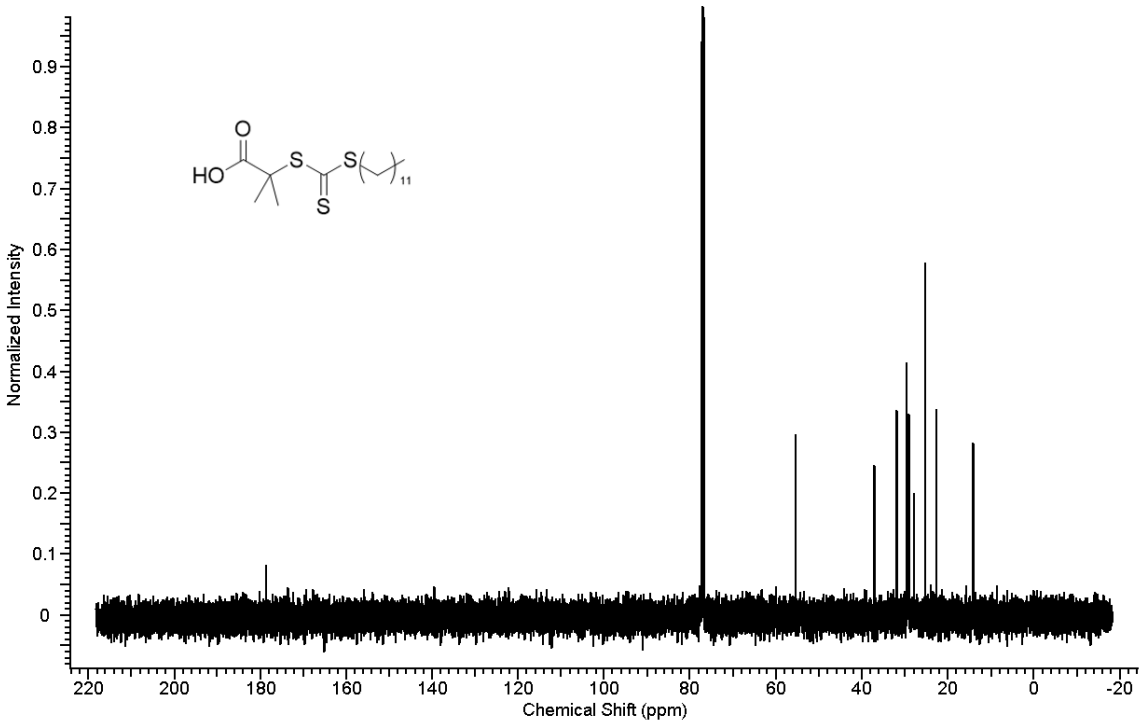

Figure S5. ^{13}C NMR spectrum of the compound **CTA** (125 MHz, $CDCl_3$).

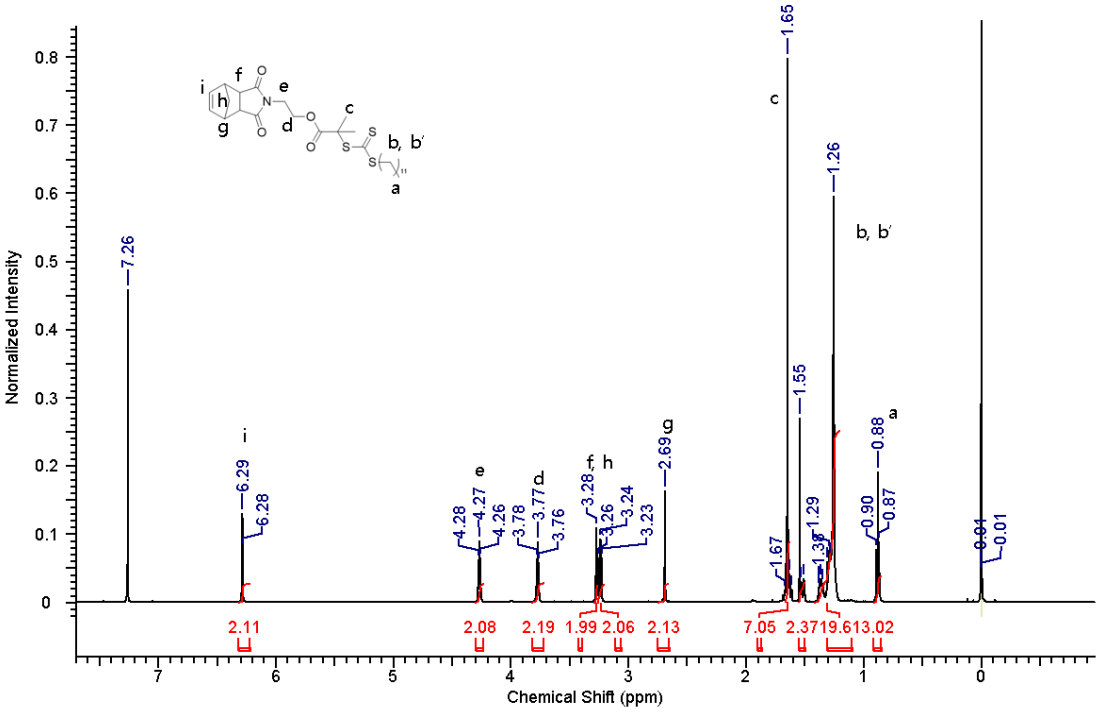

Figure S6. ^{1}H NMR spectrum of **CTA-norbornene** (500 MHz, $CDCl_3$).

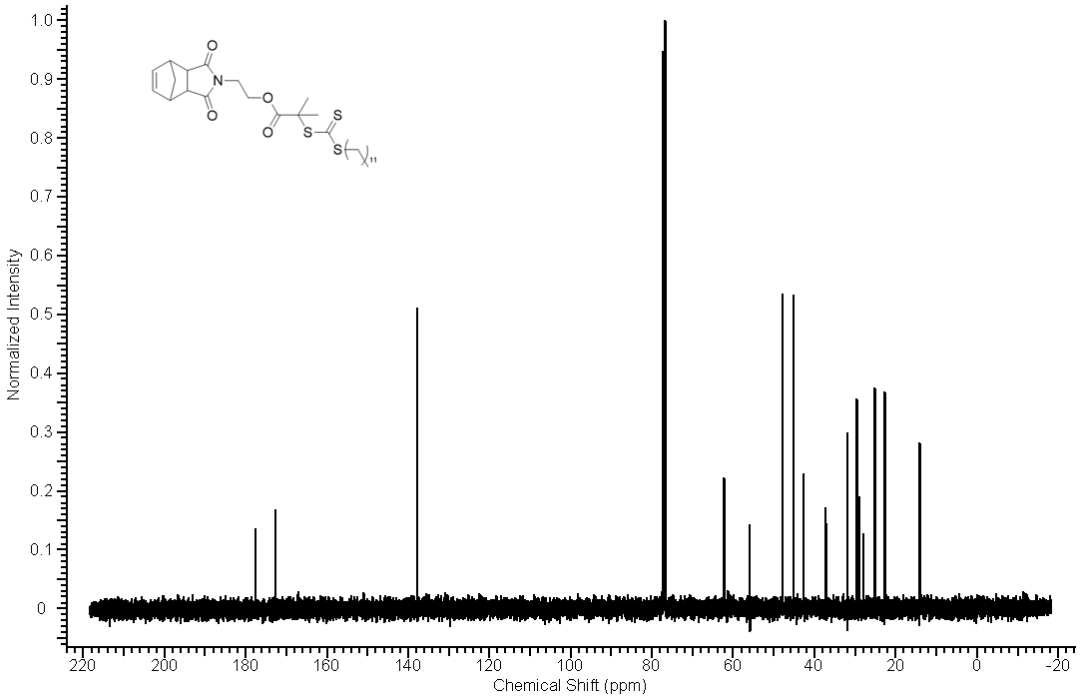

Figure S7. ^{13}C NMR spectrum of the compound **CTA-norbornene** (125 MHz, $CDCl_3$).

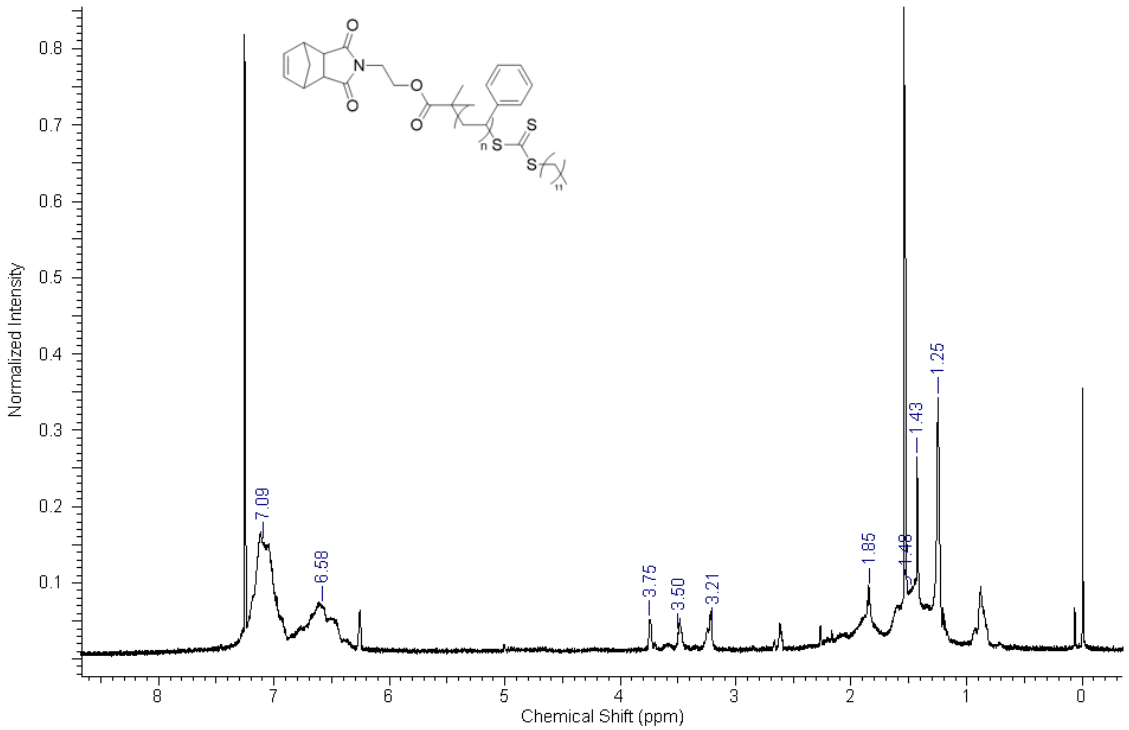

Figure S8. ^{1}H NMR spectrum of **PS** (500 MHz, $CDCL_3$).

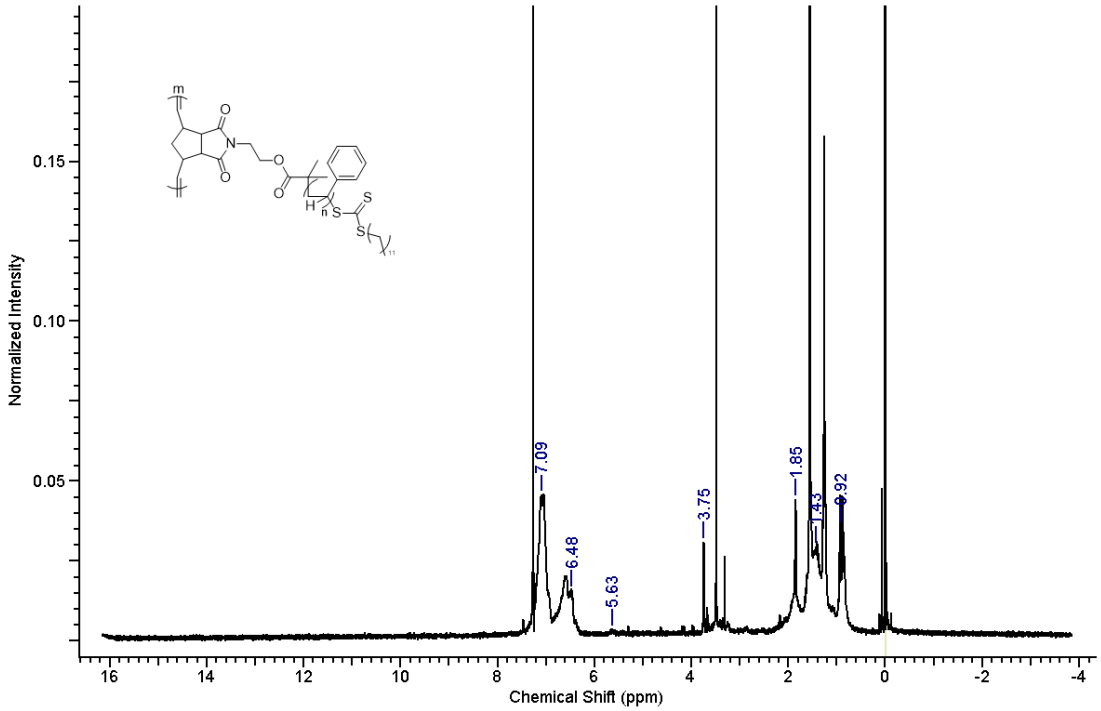

Figure S9. ^{1}H NMR spectrum of **BPS** (500 MHz, $CDCL_3$).

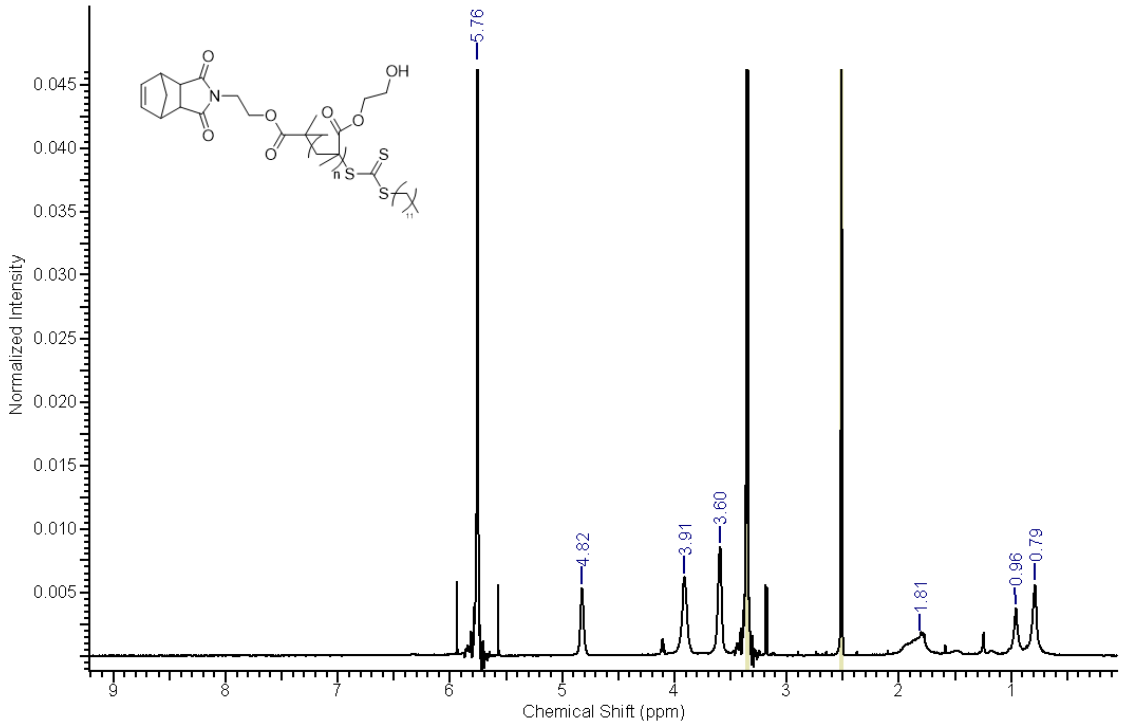

Figure S10. ^{1}H NMR spectrum of **PHEMA** (500 MHz, DMSO-d_6).

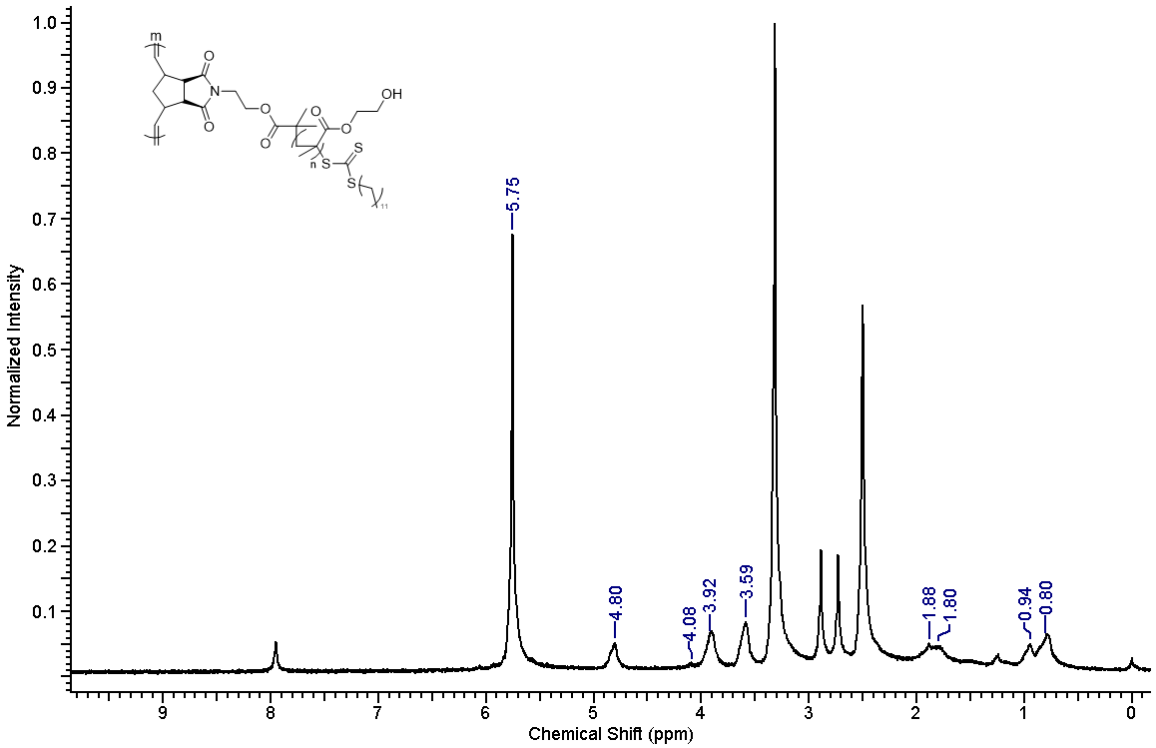

Figure 11. ^{1}H NMR spectrum of **BPHEMA** (500 MHz, DMSO-d_6).