Supporting Information

Tuning the properties of polysulfides using functionalised cardanol crosslinkers

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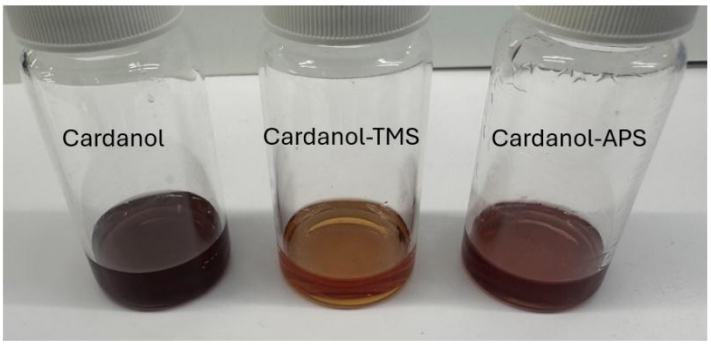


Figure S1. Appearance of the cardanol-based crosslinkers, C (left), C_{TMS} (middle), and C_{APS} (right)

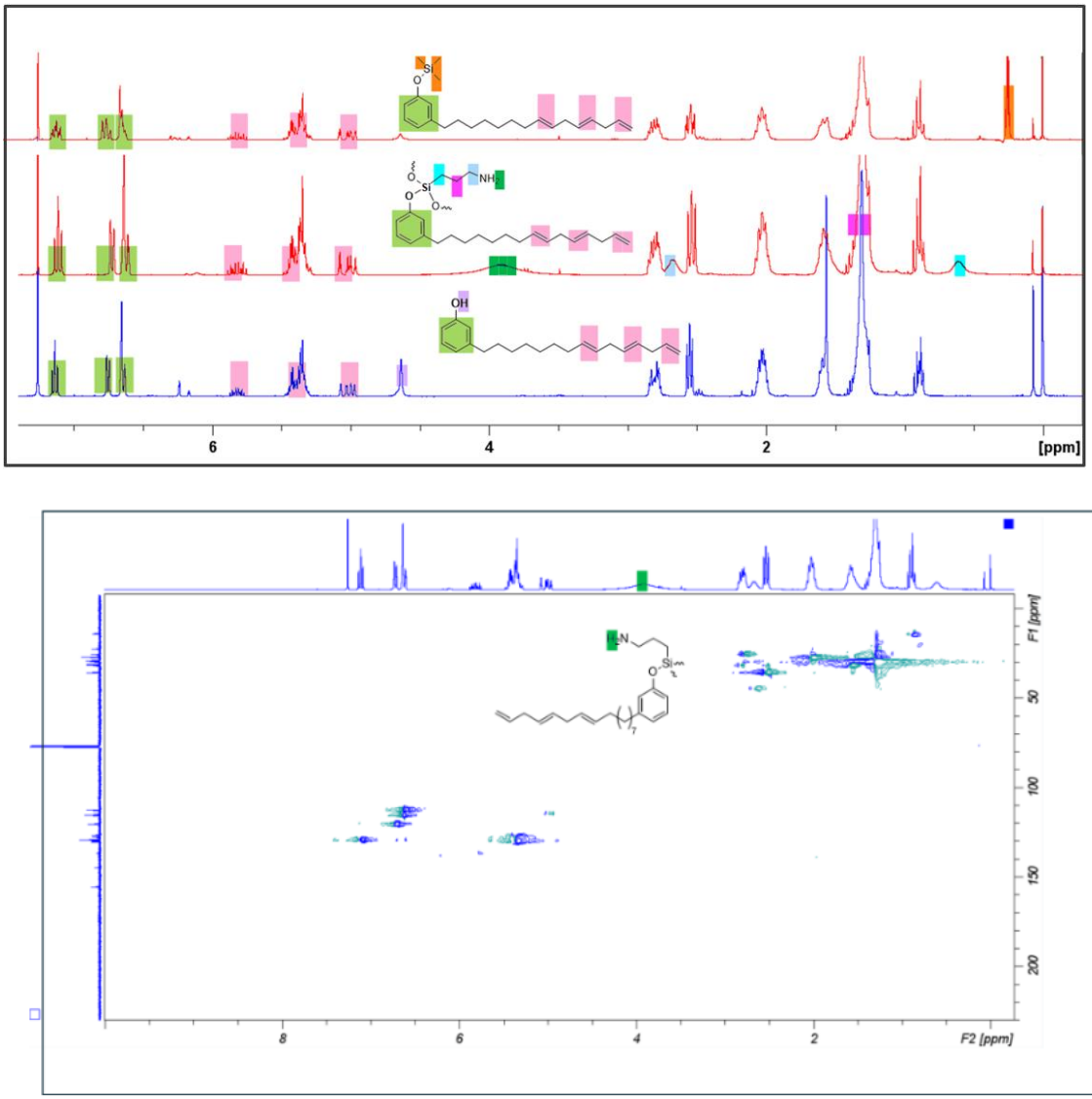


Figure S2. ^{1}H NMR spectra of cardanol-based crosslinkers, C (bottom), C_{APS} (middle) and C_{TMS} (top), in $CDCl_3$, and ^{1}H–^{13}C HSQC NMR spectra to further confirm the identification of the protons attached to the amine group in Cardanol-APS.

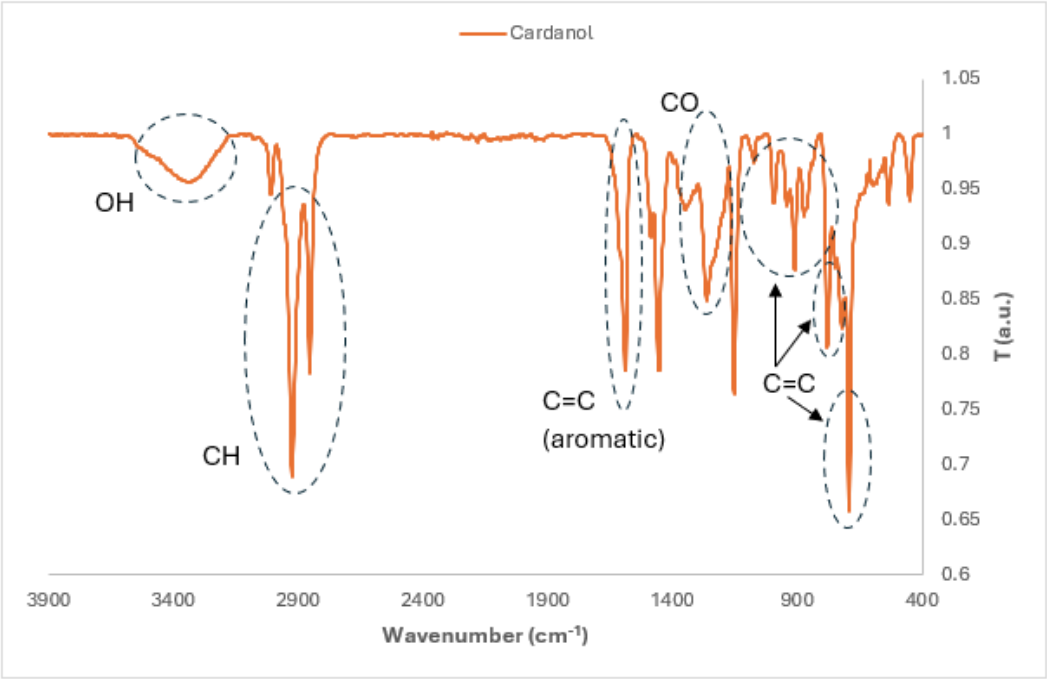


Figure S3. FT-IR spectrum of Cardanol

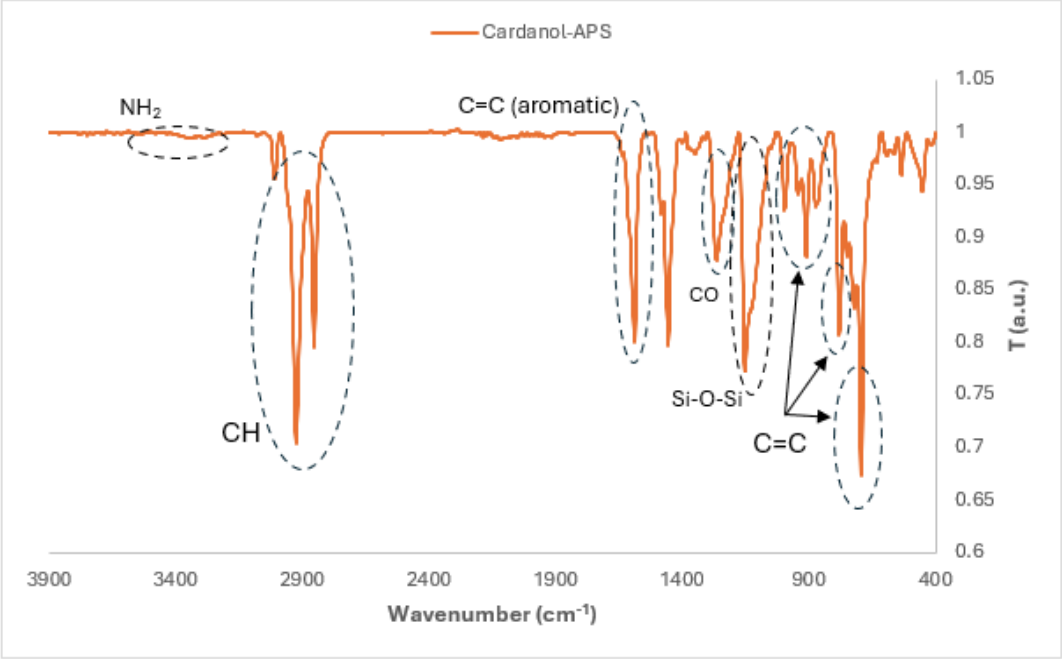


Figure S4. FT-IR spectrum of Cardanol-APS

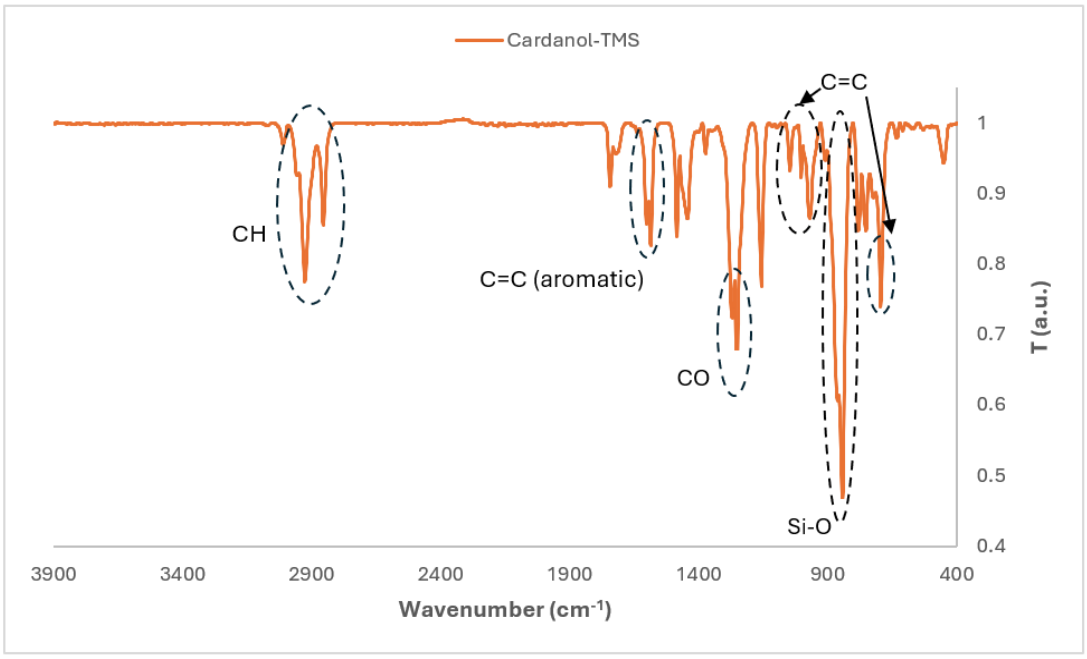


Figure S5. FT-IR spectrum of Cardanol-TMS

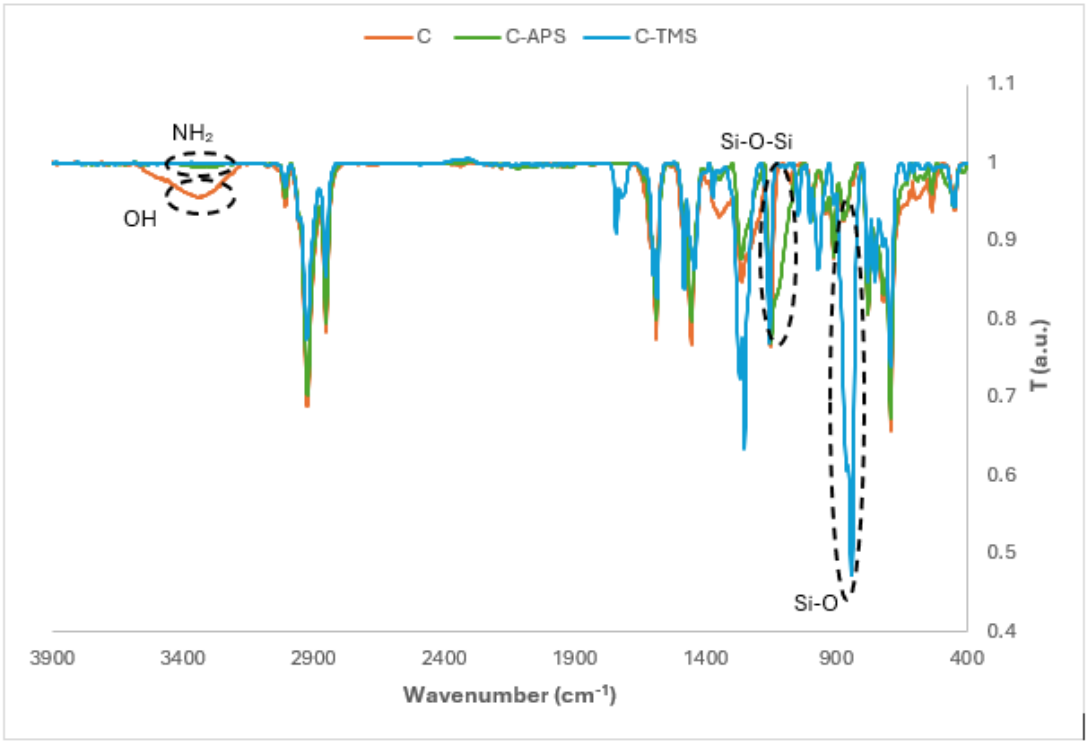


Figure S6. FT-IR spectra combined of Cardanol (orange), Cardanol-APS (green), Cardanol-TMS (blue)

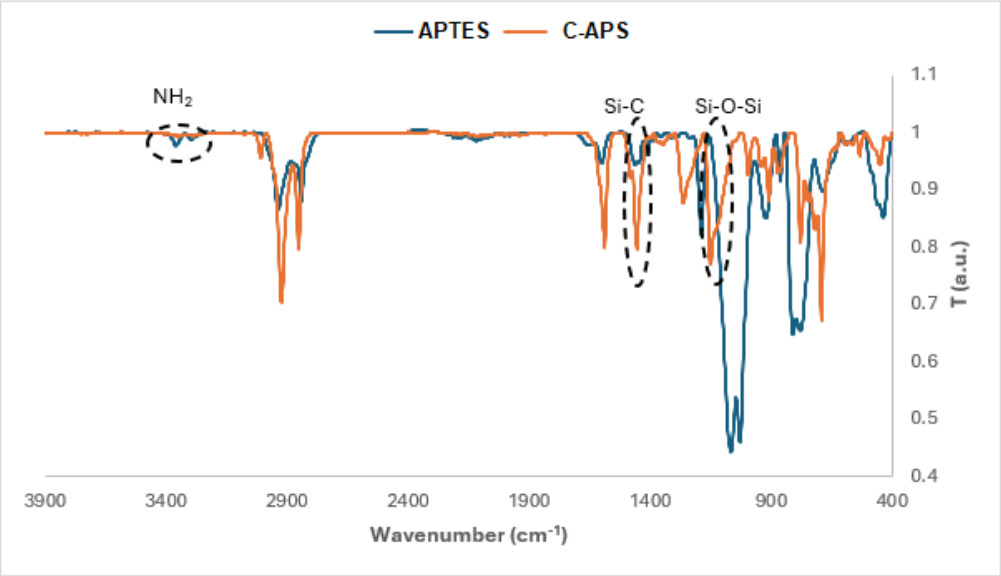


Figure S7. FT-IR spectra of APTES (orange) and Cardanol-APS (blue)

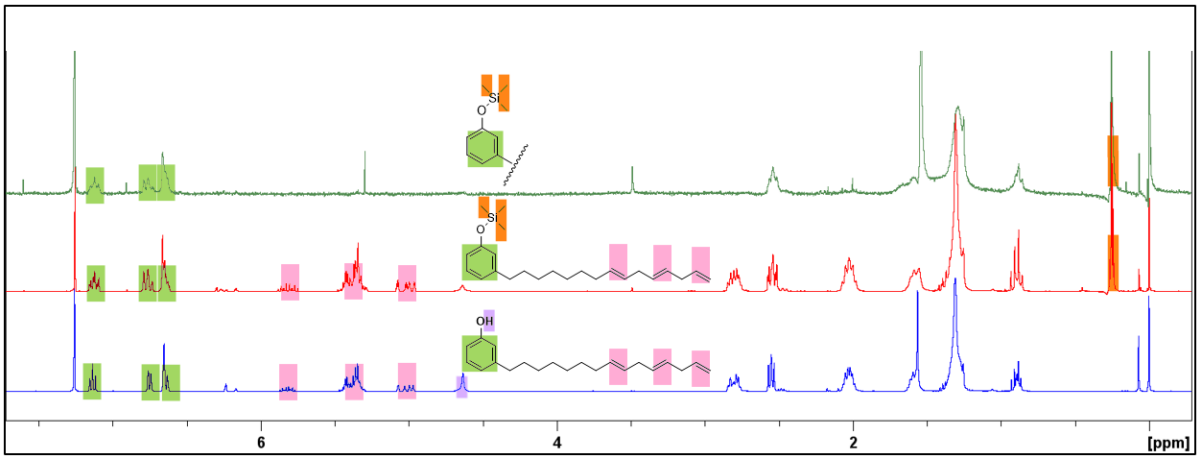


Figure S8. Stacked ^{1}H NMR spectra of Cardanol (blue), Cardanol-TMS (red), and poly-(S-r-C_{TMS}) (green) in $CDCl_3$

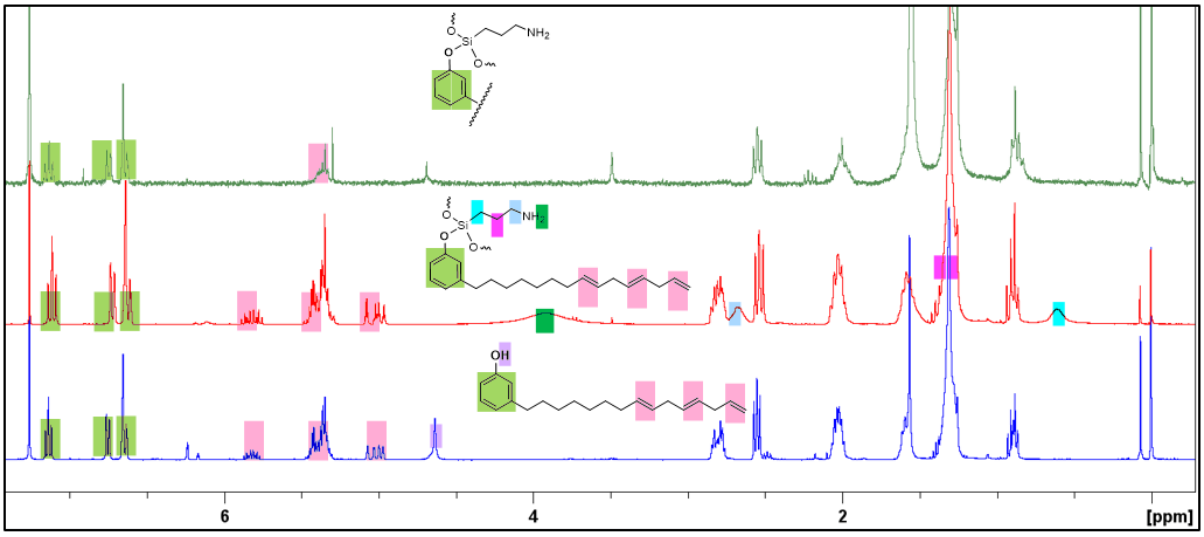


Figure S9. Top: Stacked ^{1}H NMR spectra of Cardanol (blue), Cardanol-APS (red), and poly-(S-r-C_{APS}) (green), in $CDCl_3$.

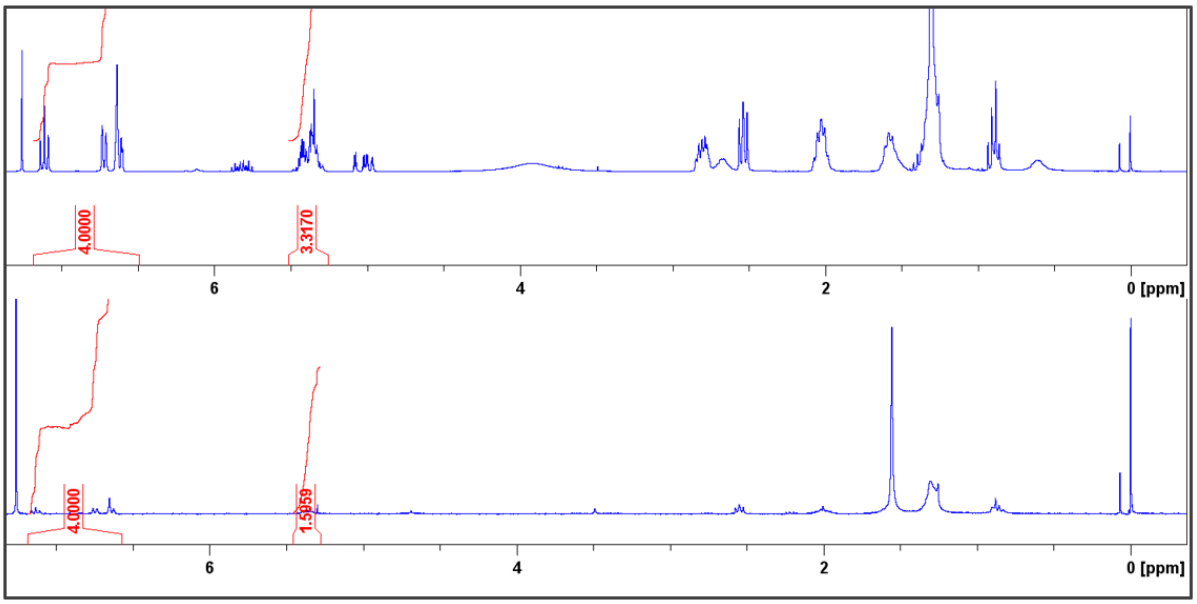


Figure S10. Comparison of vinyl peak integrations at 5.30 ppm for Cardanol-APS (top) and poly-(S-r-C_{APS}) (bottom), in $CDCl_3$

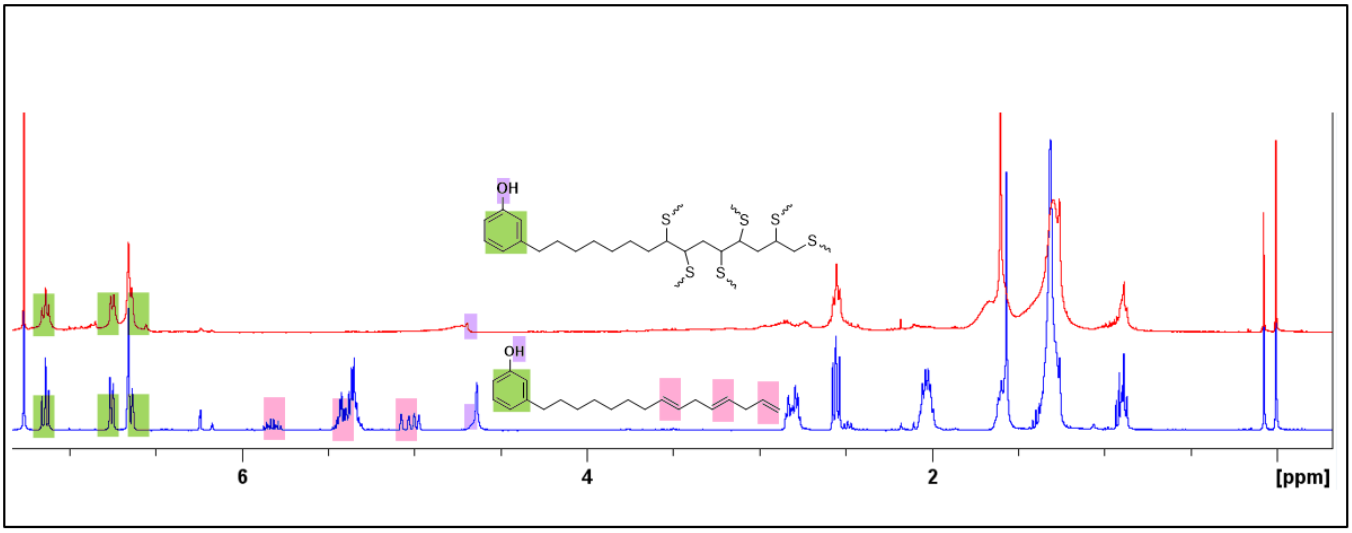


Figure S11. Stacked ^{1}H NMR spectra of Cardanol (blue) and poly-(S-r-C) (red), in $CDCl_3$

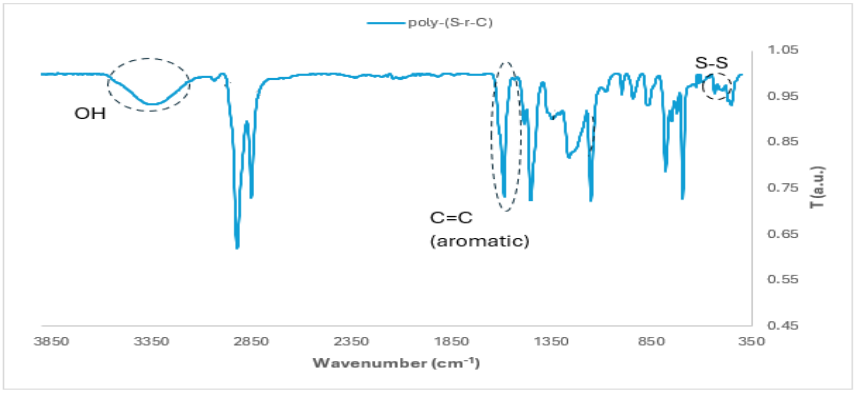


Figure S12. FT-IR spectrum of poly-(S-r-C) showing the presence of hydroxyl group after polymerisation

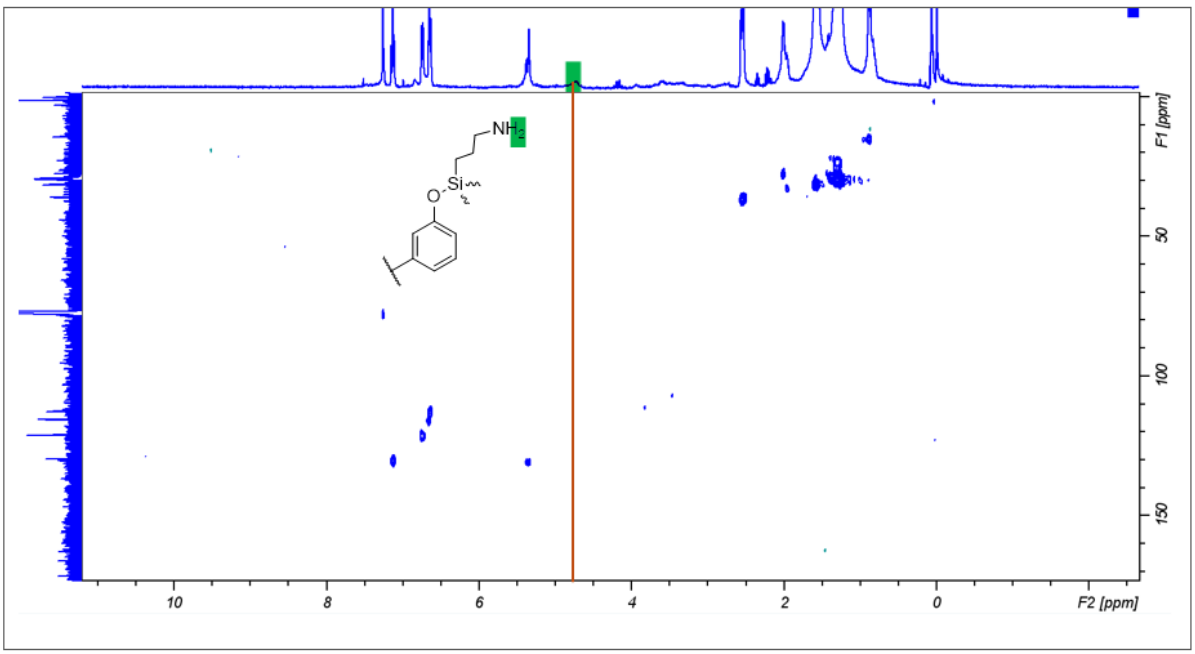
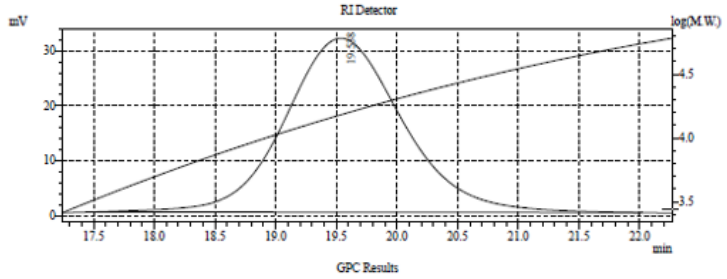


Figure S13. ^{1}H-^{13}C HSQC NMR of poly-(S-r-C_{APS})



Mv/Mn

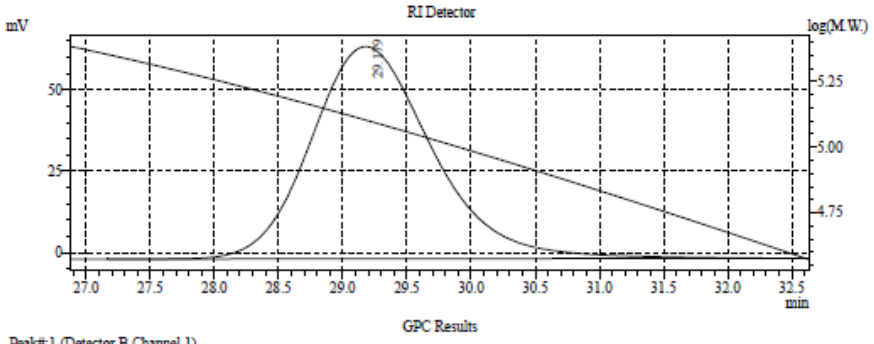
Peak#:1 (Detector B Channel 1)
[Average Molecular Weight]

Number Average Molecular Weight(Mn)	14672
Weight Average Molecular Weight(Mw)	16261
Z Average Molecular Weight(Mz)	18020
Z+1 Average Molecular Weight(Mz1)	20110
Viscosity Average Molecular Weight(Mv)	0
Mw/Mn	1.10833
Mv/Mn	0.00000

Detector B Channel 1
[Average Molecular Weight(Total)]

Number Average Molecular Weight(Mn)	14672
Weight Average Molecular Weight(Mw)	16261
Z Average Molecular Weight(Mz)	18020
Z+1 Average Molecular Weight(Mz1)	20110
Viscosity Average Molecular Weight(Mv)	0
Mw/Mn	1.10833
Mv/Mn	0.00000

Figure S14. Representative GPC chromatogram from a single injection of poly-(S-r-C) in THF.



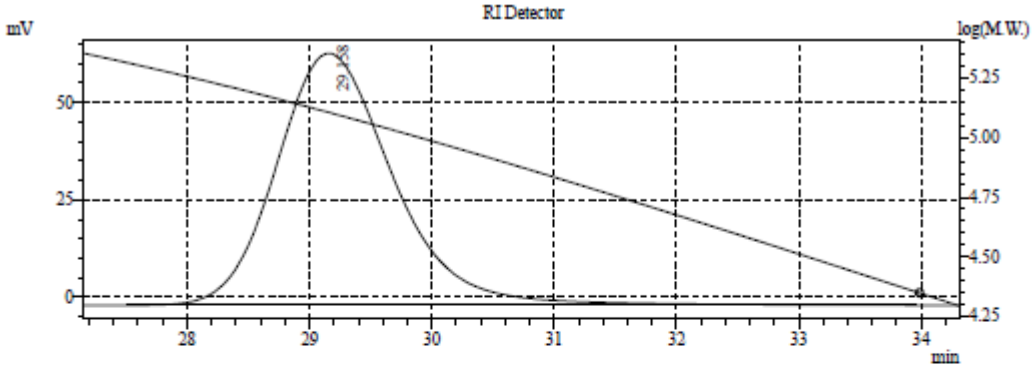
Peak#:1 (Detector B Channel 1)
[Average Molecular Weight]

Number Average Molecular Weight(Mn)	120661
Weight Average Molecular Weight(Mw)	123941
Z Average Molecular Weight(Mz)	126824
Z+1 Average Molecular Weight(Mz1)	129443
Viscosity Average Molecular Weight(Mv)	0
Mw/Mn	1.02719
Mv/Mn	0.00000

Detector B Channel 1
[Average Molecular Weight(Total)]

Number Average Molecular Weight(Mn)	120661
Weight Average Molecular Weight(Mw)	123941
Z Average Molecular Weight(Mz)	126824
Z+1 Average Molecular Weight(Mz1)	129443
Viscosity Average Molecular Weight(Mv)	0
Mw/Mn	1.02719
Mv/Mn	0.00000

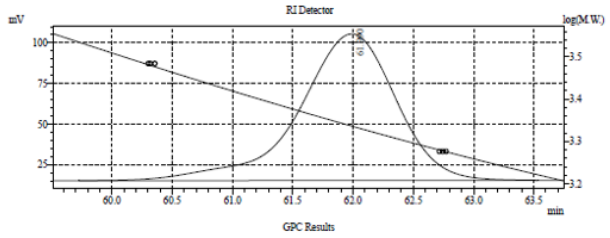
Figure S15. Representative GPC chromatogram from a single injection of poly-(S-r-C_{APS}) in THF.



GPC Results

Peak#:1 (Detector B Channel 1)	
[Average Molecular Weight]	
Number Average Molecular Weight(Mn)	120154
Weight Average Molecular Weight(Mw)	124246
Z Average Molecular Weight(Mz)	127448
Z+1 Average Molecular Weight(Mz1)	130203
Viscosity Average Molecular Weight(Mv)	0
Mw/Mn	1.03406
Mv/Mn	0.00000
Detector B Channel 1	
[Average Molecular Weight(Total)]	
Number Average Molecular Weight(Mn)	120154
Weight Average Molecular Weight(Mw)	124246
Z Average Molecular Weight(Mz)	127448
Z+1 Average Molecular Weight(Mz1)	130203
Viscosity Average Molecular Weight(Mv)	0
Mw/Mn	1.03406
Mv/Mn	0.00000

Figure S16. Representative GPC chromatogram from a single injection of poly-(S-r-C_{TMS}) in THF.



GPC Results

Peak#:1 (Detector B Channel 1)	
[Average Molecular Weight]	
Number Average Molecular Weight(Mn)	2200
Weight Average Molecular Weight(Mw)	2215
Z Average Molecular Weight(Mz)	2232
Z+1 Average Molecular Weight(Mz1)	2250
Viscosity Average Molecular Weight(Mv)	0
Mw/Mn	1.00692
Mv/Mn	0.00000
Detector B Channel 1	
[Average Molecular Weight(Total)]	
Number Average Molecular Weight(Mn)	2200
Weight Average Molecular Weight(Mw)	2215
Z Average Molecular Weight(Mz)	2232
Z+1 Average Molecular Weight(Mz1)	2250
Viscosity Average Molecular Weight(Mv)	0
Mw/Mn	1.00692

Figure S17. Representative GPC chromatogram from a single injection of the C_{APS} monomer in THF.

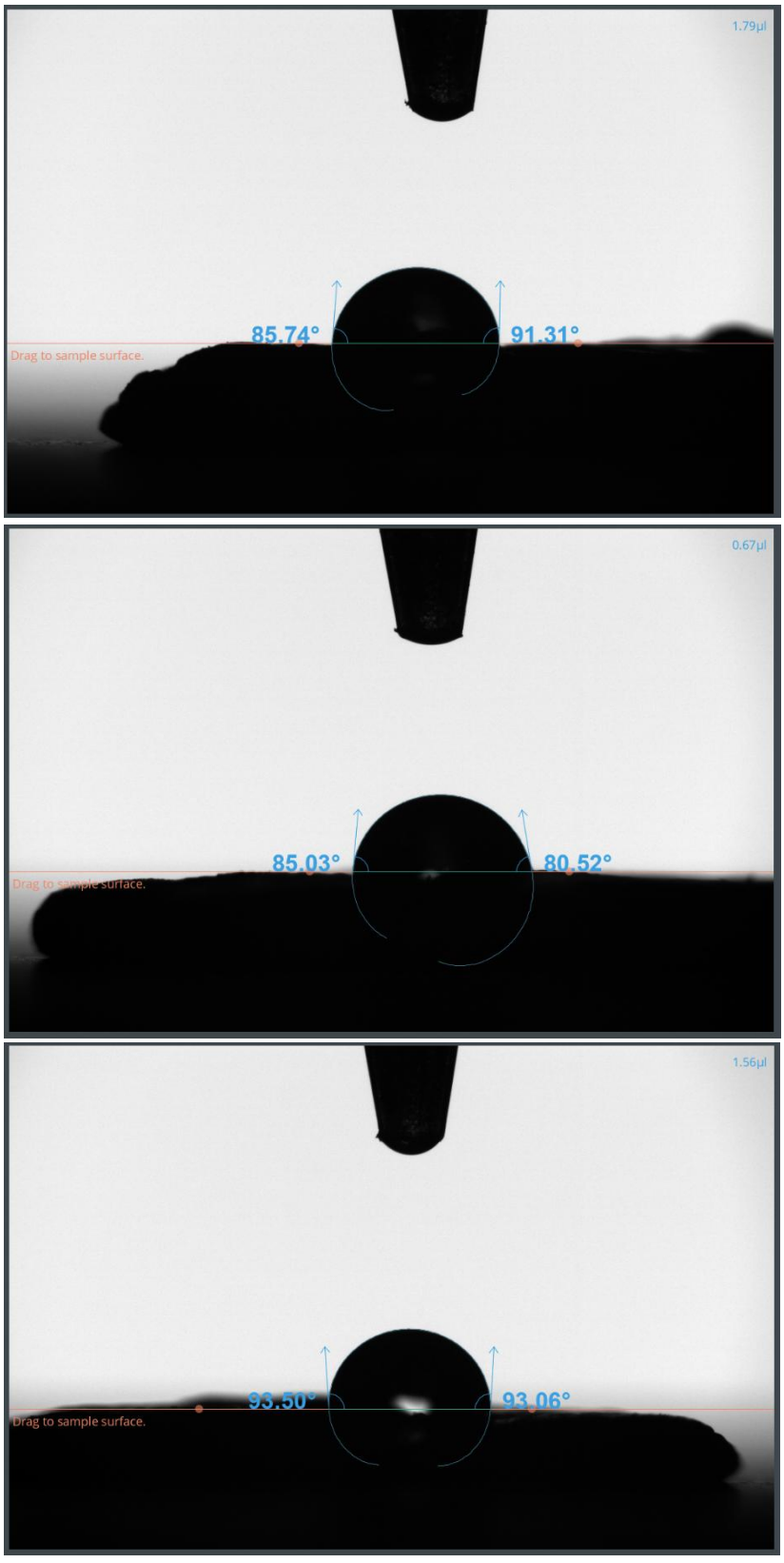


Figure S18. Images of contact angles for the cardanol-based polysulfides poly-(S-r-C) (top), poly-(S-r-C_{APS}) (middle), poly-(S-r-C_{TMS}) (bottom). Final values are the mean of three measurements per sample.

Table S1. Solubility profile of cardanol-based polysulfides in common solvents

Solvent	poly-(S-*r*-C)	poly-(S-*r*-C_{APS})	poly-(S-*r*-C_{TMS})
Water	Insoluble	Insoluble	Insoluble
Toluene	Soluble	Soluble	Soluble
THF	Soluble	Soluble	Soluble
Ethyl Acetate	Soluble	Soluble	Soluble
Acetone	Soluble	Soluble	Soluble
Chloroform ($CHCl_3$)	Soluble	Soluble	Soluble
DCM	Soluble	Soluble	Soluble
DMF	Soluble	Soluble	Soluble
ACN (Acetonitrile)	Soluble	Insoluble	Insoluble
Methanol	Insoluble	Soluble	Insoluble
Ethanol	Soluble	Soluble	Insoluble
Hexane	Insoluble	Insoluble	Soluble

Table S2. EDX data resulted from SEM analysis.

	poly-(S-*r*-C)	poly-(S-*r*-C_{APS})	poly-(S-*r*-C_{TMS})
Weight C (%)	68.52	63.49	67.04
Weight S (%)	31.48	32.68	28.65
Weight Si (%)	0	3.7	4.3
Weight N (%)	0	0.13	0

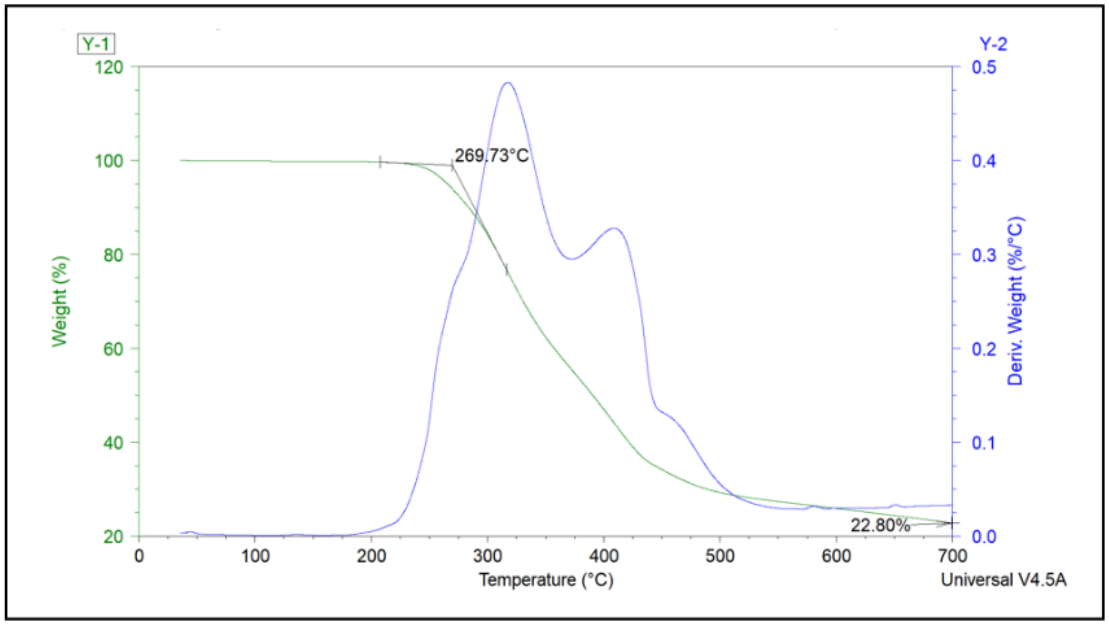


Figure S19. Thermogravimetric analysis (TGA) thermograms of poly-(S-r-C) (green) and its corresponding DTG curve (blue).

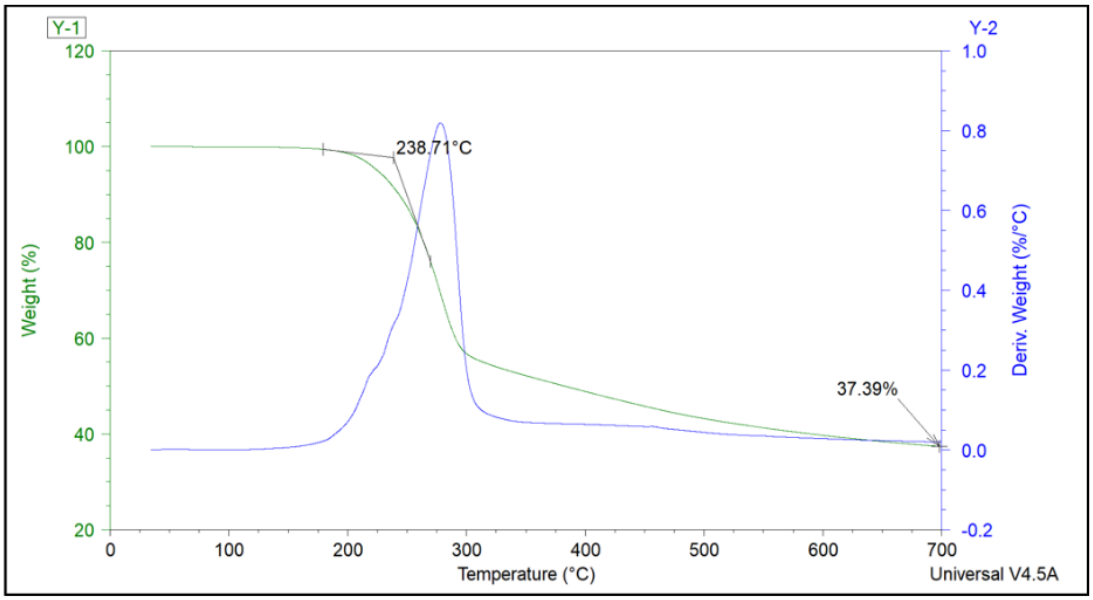


Figure S20. Thermogravimetric analysis (TGA) thermograms of poly-(S-r-C_{APS}) (green) and its corresponding DTG curve (blue).

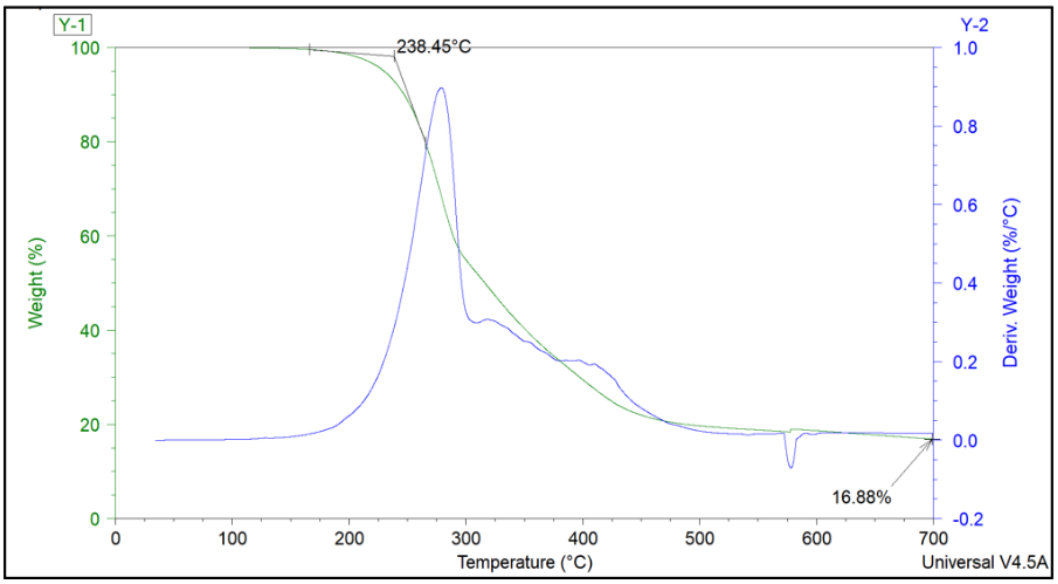


Figure S21. Thermogravimetric analysis (TGA) thermograms of poly-(S-r-C_{TMS}) (green) and its corresponding DTG curve (blue).

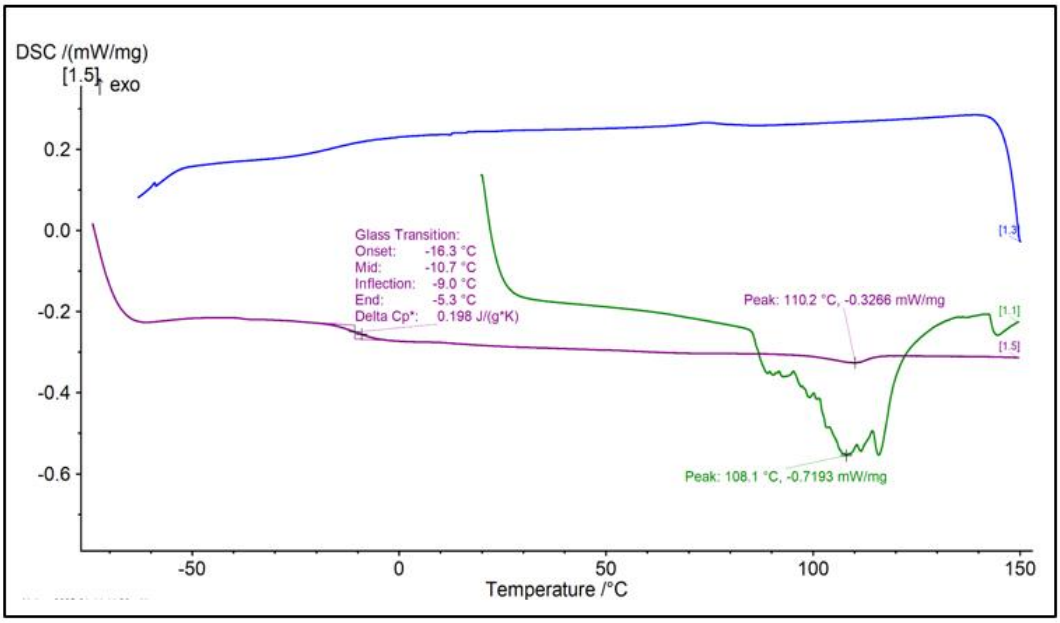


Figure S22. DSC thermogram of poly-(S-r-C)

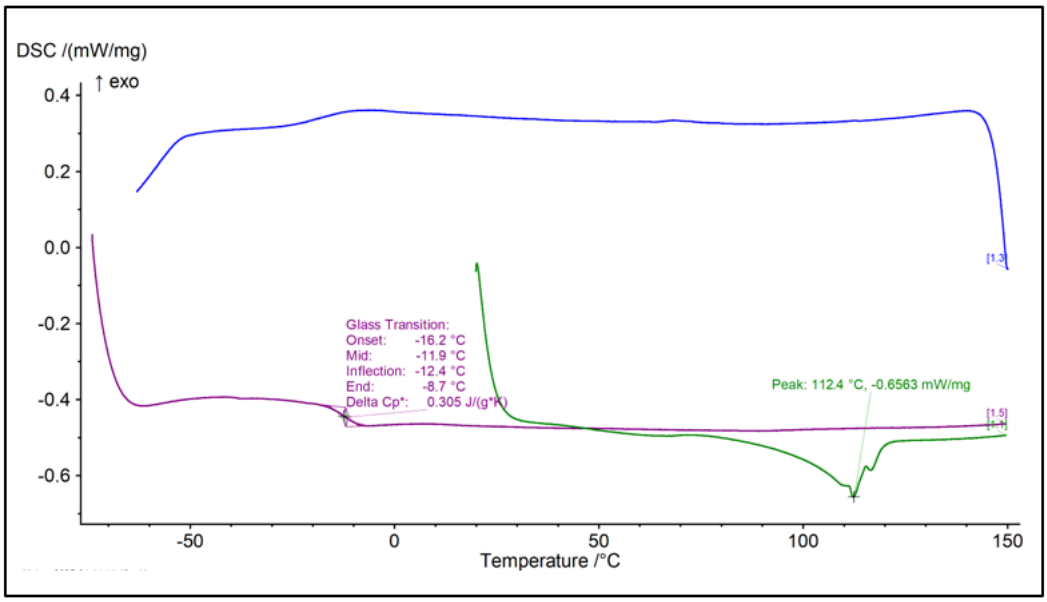


Figure S23. DSC thermogram of poly-(S-r-C_{APS})

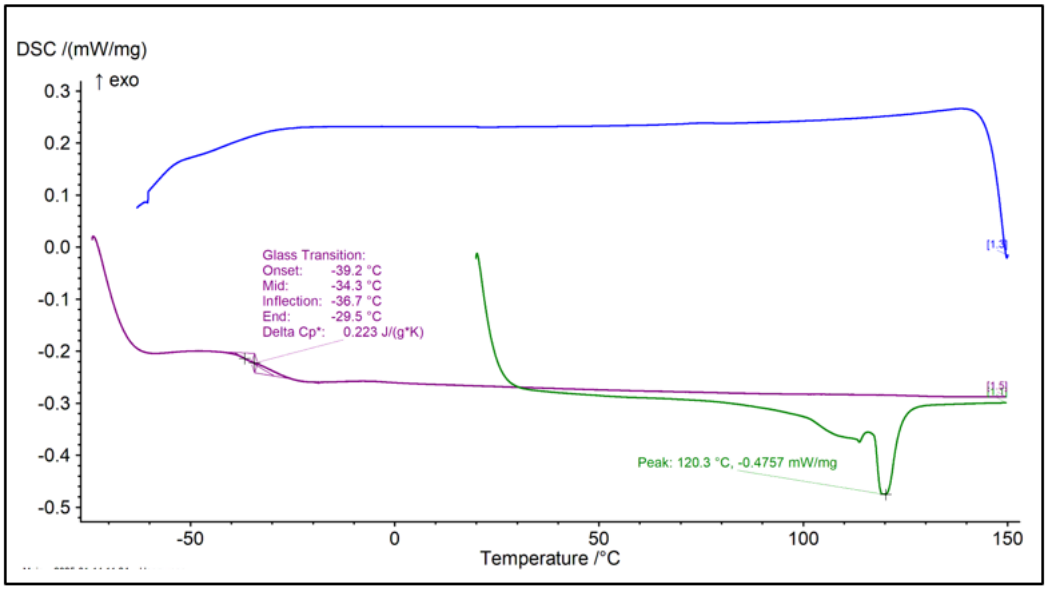


Figure S24. DSC thermogram of poly-(S-r-C_{TMS})