Supporting Information

Self-healable covalently adaptable networks based on disulfide exchange

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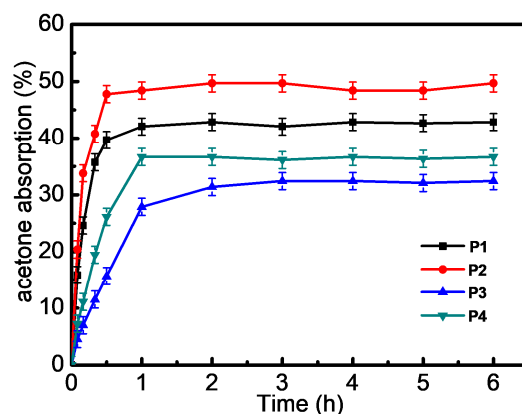## Content

1. Solvent swelling

Figure S1. Solvent swelling (acetone absorption-time diagram) of P1, P2, P3 and P4.

2. Calculating the yield of TMPTAA and PETMPA by ^{1}H NMR

2.1 Calculating the yield of trimethylolpropane tris(3-mercaptacetoacetate) (TMPTAA) by ^{1}H NMR
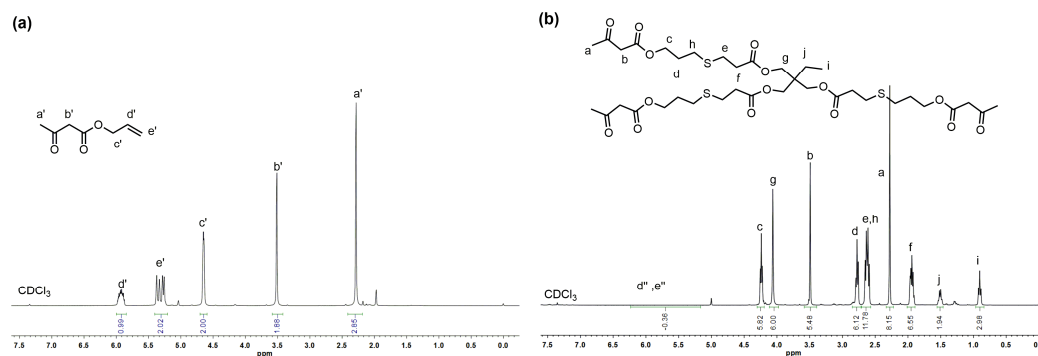

Figure S2. ^{1}H NMR Spectrum of (a) allyl acetoacetate and (b) trimethylolpropane tris(3-mercaptacetoacetate) (TMPTAA) (400 MHz, CDCl$_3$, 7.26 ppm)

    Figure S2a shows that the peak areas of c' is 4, and the peak area of d' is 0.99, the peak area of e' is 2.02; thus, the ^{1}H NMR peak areas correspond to the compound structure. Therefore, we can calculate the conversion yield on the basis of the peak area ratios. the yield of trimethylolpropane tris(3-mercaptacetoacetate) (TMPTAA) can be calculated as: W(%) = [3×A(d' + e')-A(d'' + e'')]/[3×A(d' + e')]=[3×(0.99+2.02) - 0.36] /[3×(0.99+2.02)]= 96%.

2.2 Calculating the yield of pentaerythritol tetra(3-mercaptacetoacetate) (PETMPA) by ¹H NMR
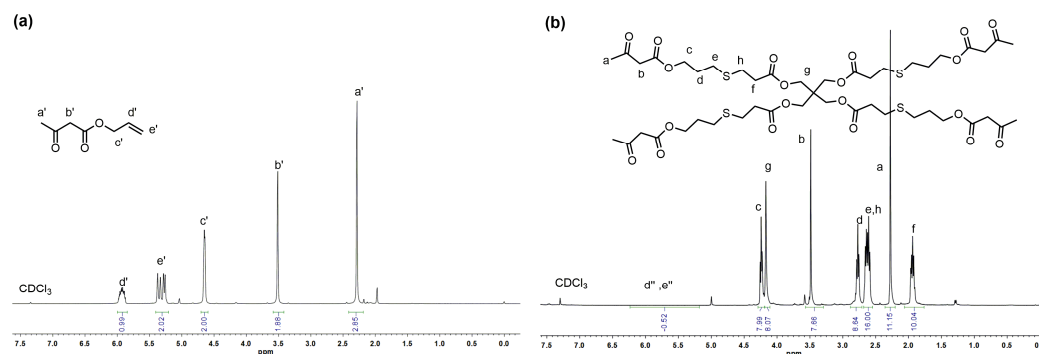

Figure S3. ¹H NMR Spectrum of (a) allyl acetoacetate and (b) pentaerythritol tetra(3-mercaptacetoacetate) (PETMPA) (400 MHz, CDCl₃, 7.26 ppm)

The yield of modified cardanol is calculated using the same method as described in section 2.1:   the yield of pentaerythritol tetra(3-mercaptopropionate) acetoacetate (PETMPA) can be calculated as: W(%) = [4×A(d' + e')-A(d'' + e'')]/[4×A(d' + e')]=[4×(0.99+2.02) - 0.52] /[4×(0.99+2.02)]= 93%.

3. ¹H NMR and ¹³C NMR Spectra
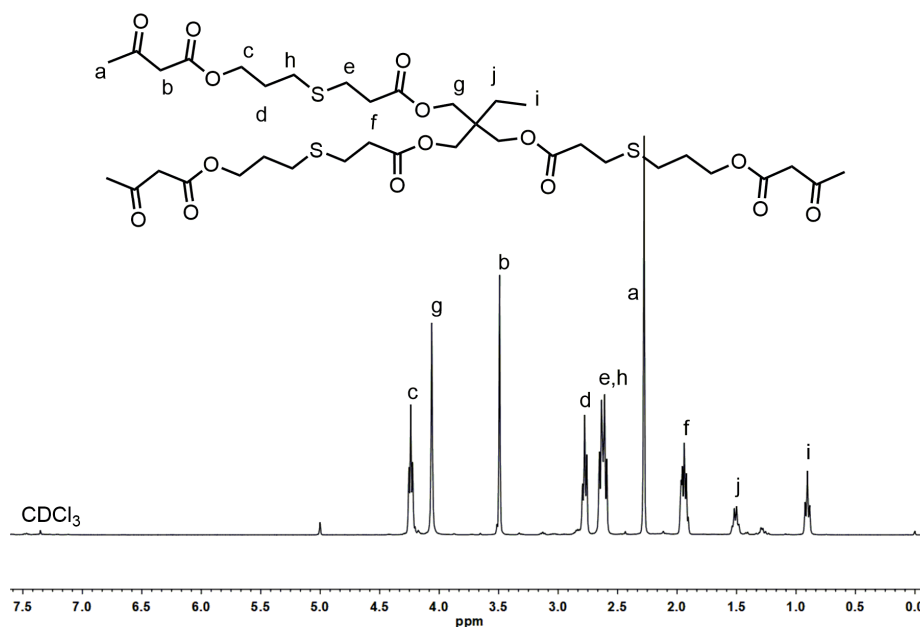
Figure S4. ^{1}H NMR Spectrum of trimethylolpropane tris(3-mercaptacetoacetate) (TMPTAA) (400 MHz, CDCl$_3$, 7.26 ppm)
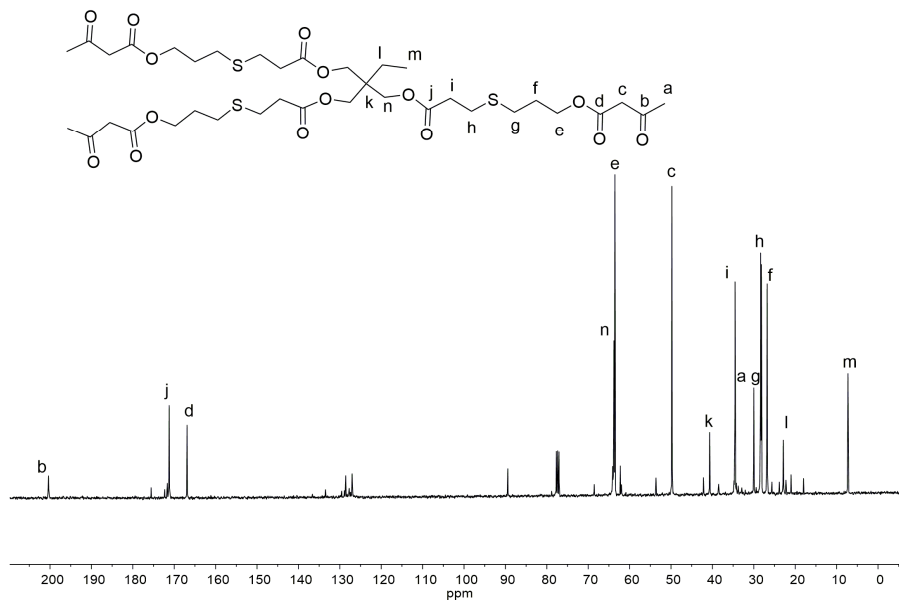

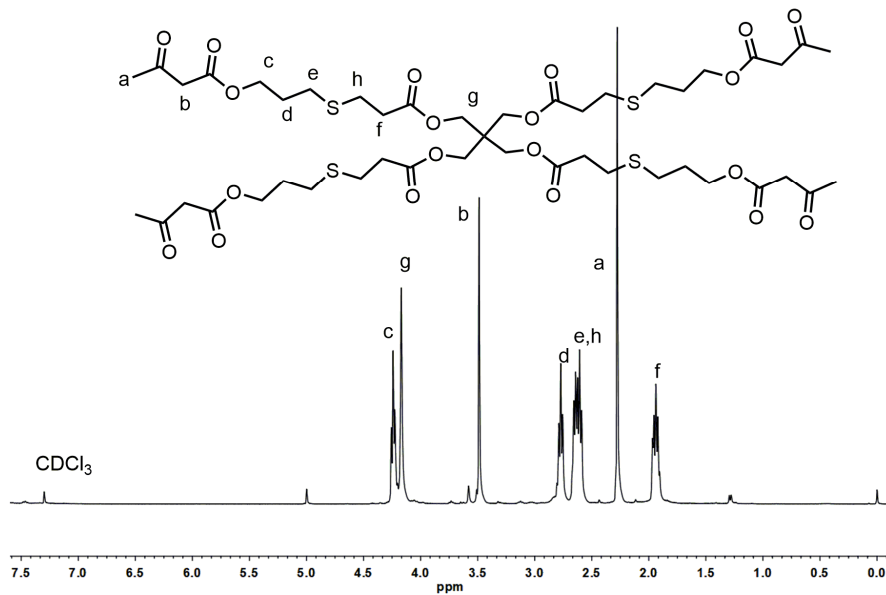**Figure S5.** ^{13}C NMR Spectrum of trimethylolpropane tris(3-mercaptacetoacetate) (TMPTAA) (100 MHz, CDCl$_3$, 77 ppm)

Figure S6. ^{1}H NMR Spectrum of pentaerythritol tetra(3-mercaptacetoacetate) (PETMPA) (400 MHz, CDCl$_3$, 7.26 ppm)
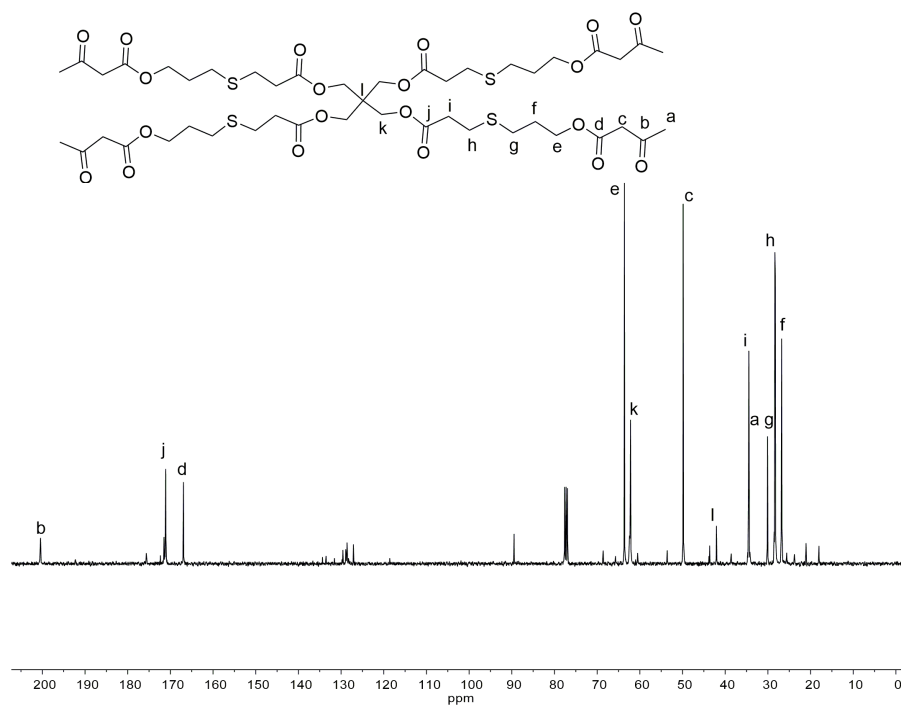
Figure S7. ^{13}C NMR Spectrum of pentaerythritol tetra(3-mercaptacetoacetate) (PETMPA) (100 MHz, CDCl$_3$, 77 ppm)