

Supporting Information for

Toughness polyurethane elastomers with high strength and rapid healing ability.

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Figure S1. ^1H NMR spectra of $\text{PU}_{3:7}$ - $\text{PU}_{7:3}$.

Figure S2. Peak fitting of FTIR spectra of $\text{PU}_{3:7}$ - $\text{PU}_{7:3}$ in the range of $1600 - 1760 \text{ cm}^{-1}$

Figure S3. GPC curves of $\text{PU}_{3:7}$ - $\text{PU}_{7:3}$.

Figure S4. UV-Vis spectra of the PU elastomers with a thickness of 0.3 mm.

Figure S5. Photograph of $\text{PU}_{5:5}$ sample.

Figure S6. Results of the cyclic tensile testing of $\text{PU}_{3:7}$ - $\text{PU}_{7:3}$.

Figure S7. Loss modulus of PU elastomers.

Figure S8. Storage modulus of PU elastomers.

Figure S9. Tensile strength and healing efficiency of $\text{PU}_{3:7} - \text{PU}_{7:3}$ at 70°C for 12 h.

Figure S10. Tensile strength and healing efficiency of $\text{PU}_{5:5}$ at 30°C for different healing time.

Figure S11. Possible mechanism for the healing efficiency less than 100%.

Table S1. Results of GPC curves of $\text{PU}_{3:7}$ - $\text{PU}_{7:3}$.

Table S2. Summarized tensile strength, strain at break and toughness of PU elastomers.

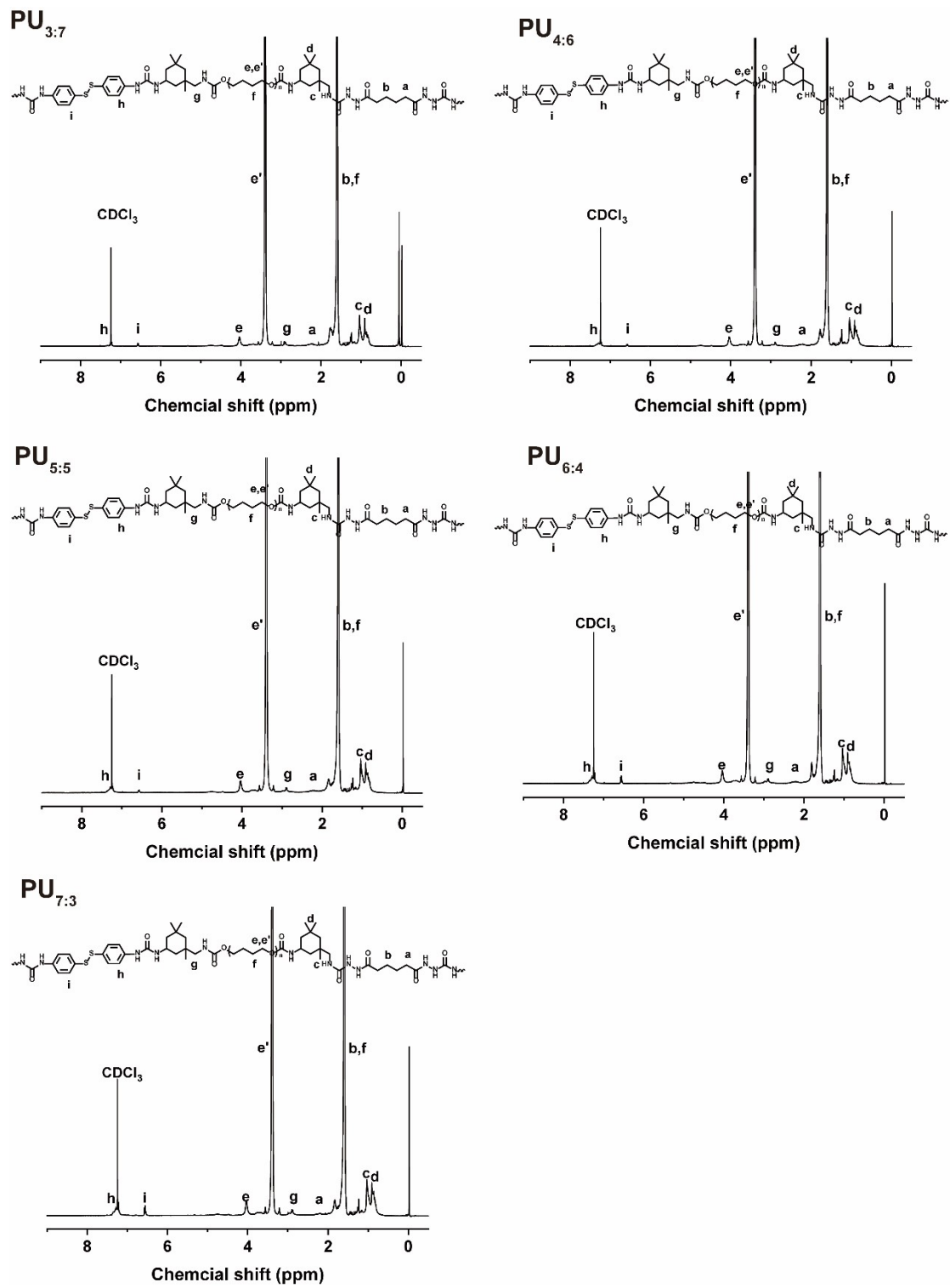


Figure S1.

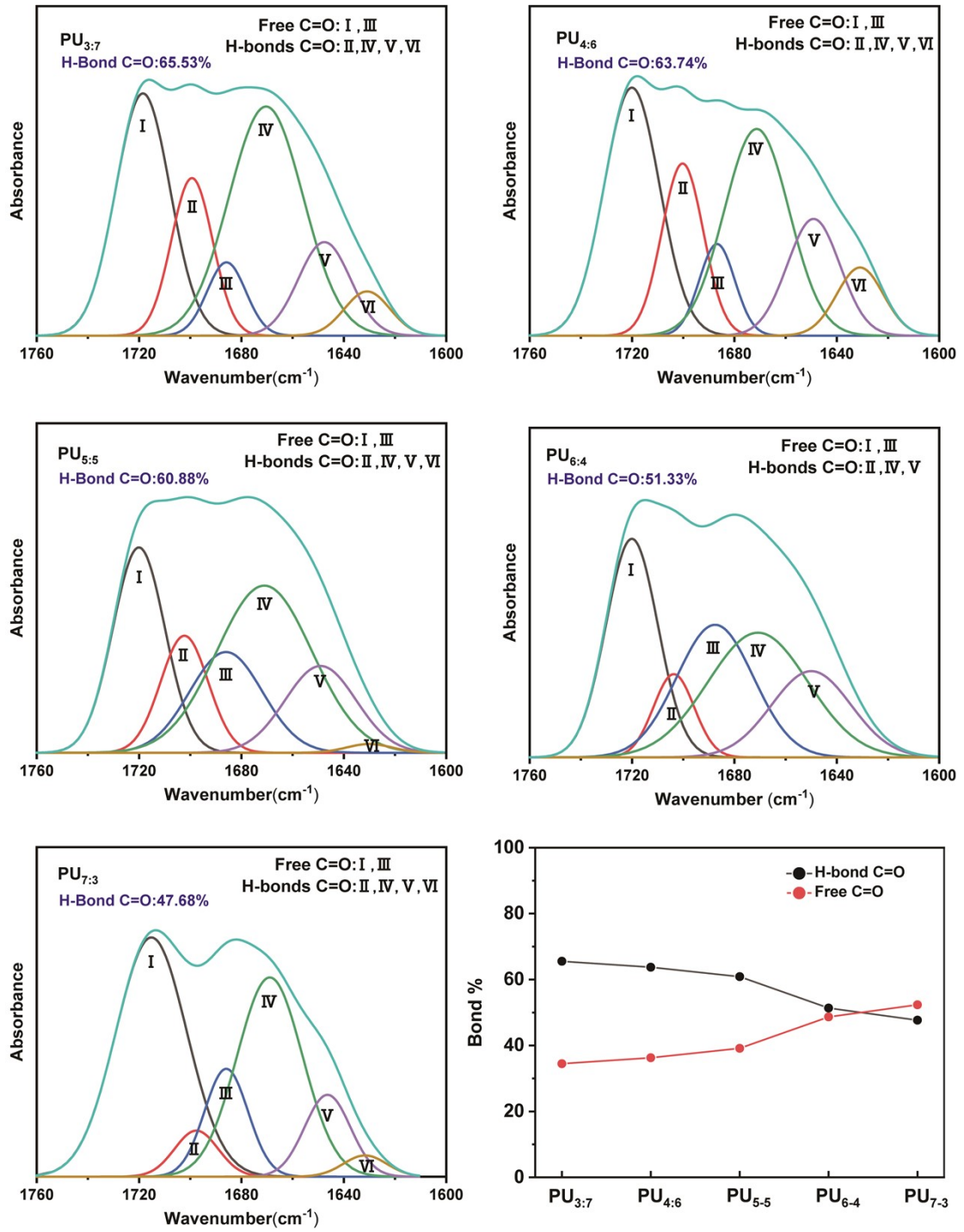


Figure S2

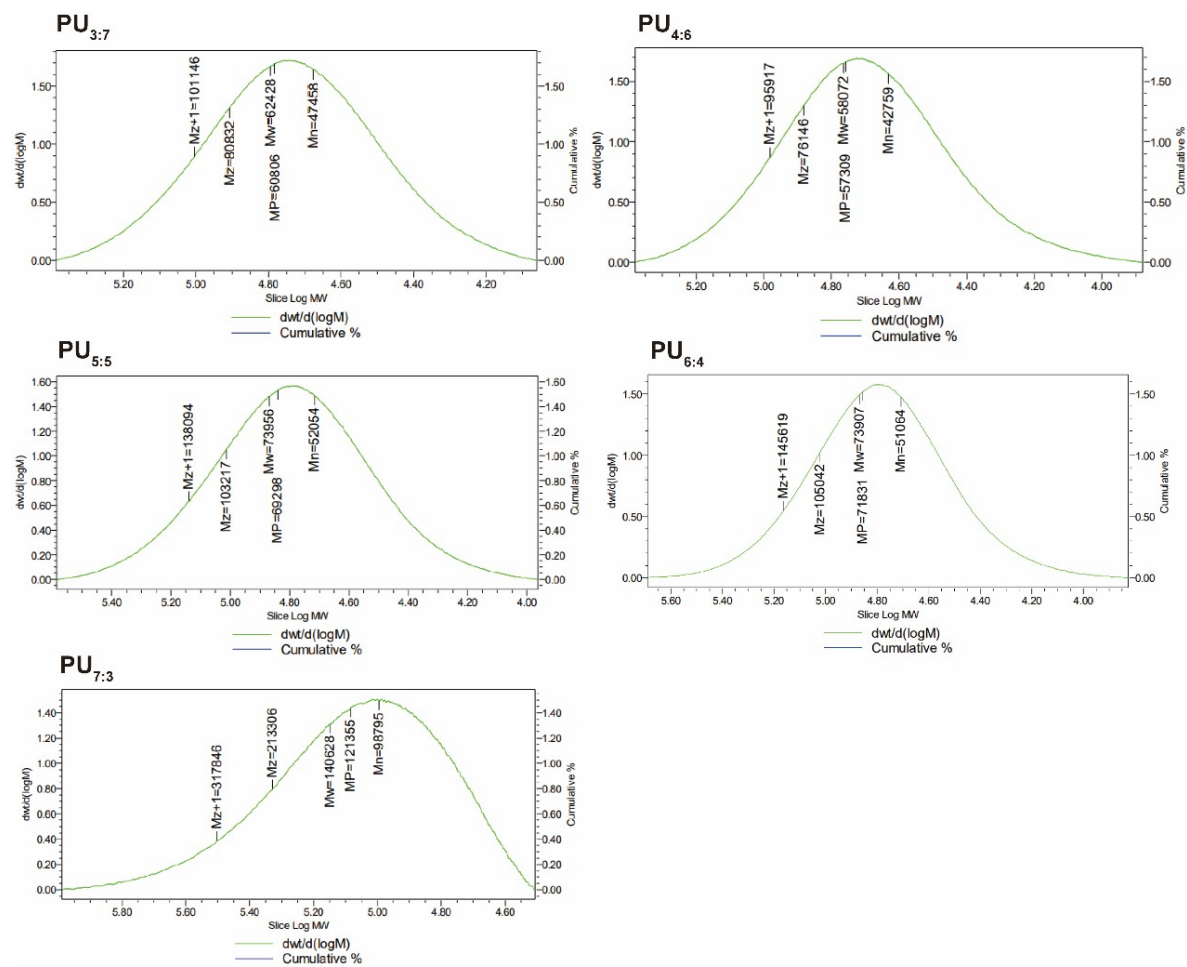


Figure S3

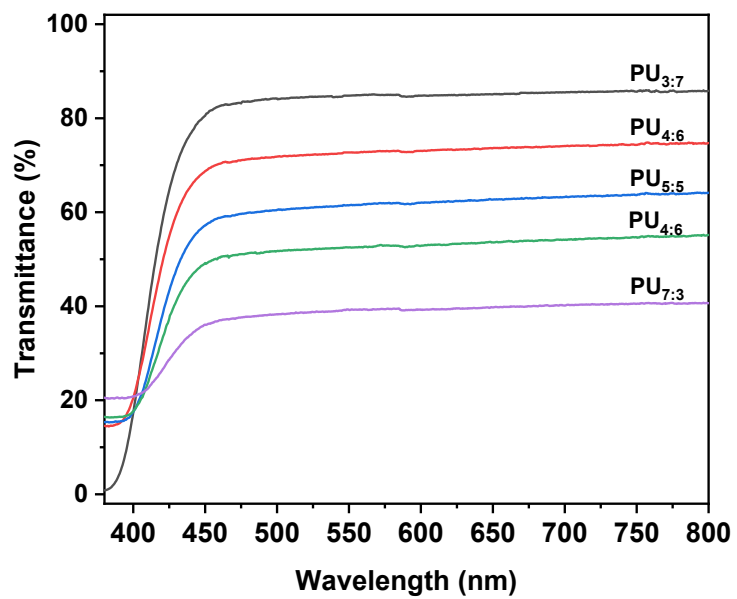


Figure S4

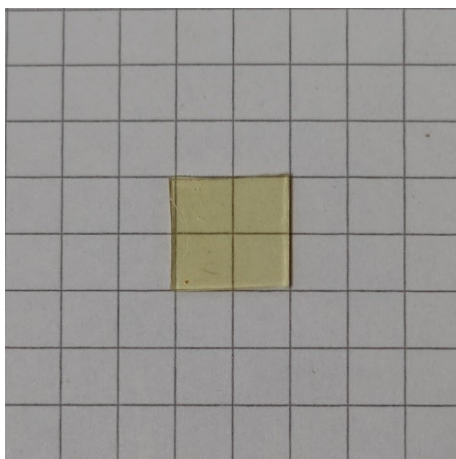


Figure S5

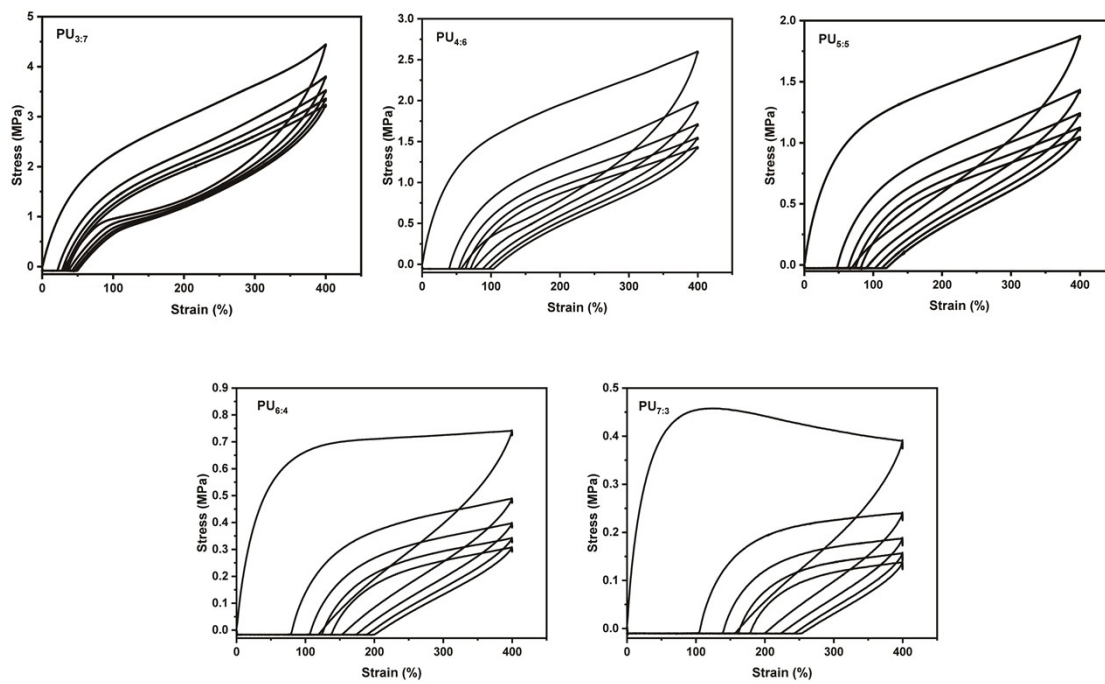


Figure S6

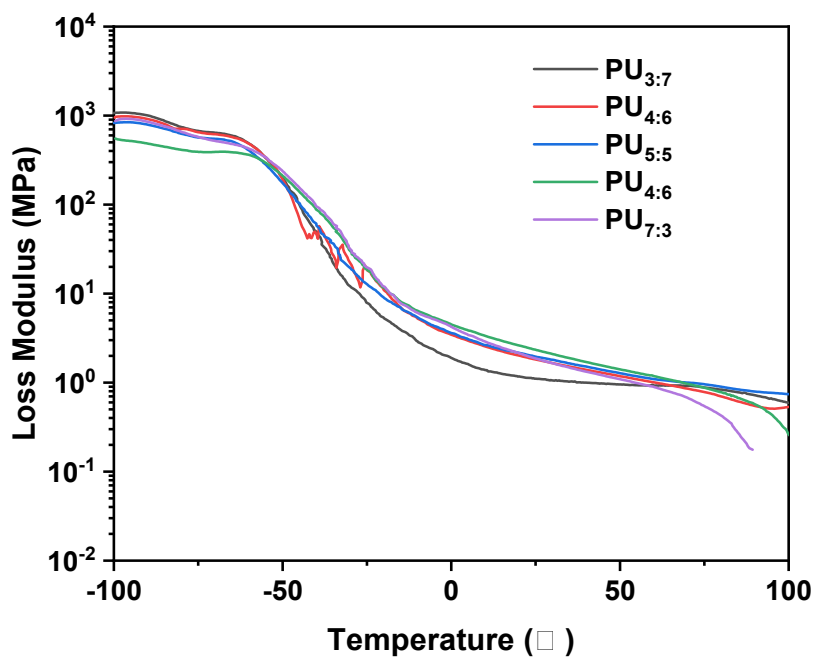


Figure S7

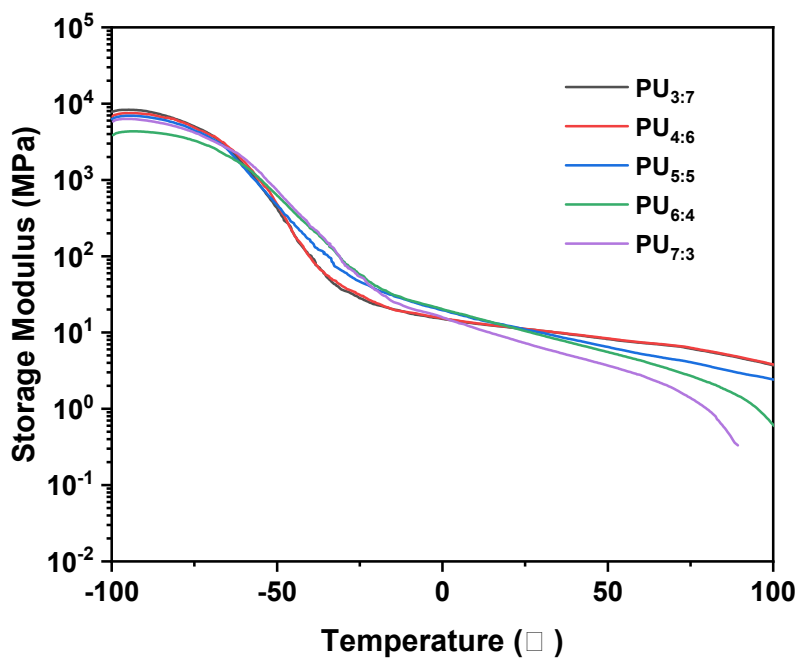


Figure S8

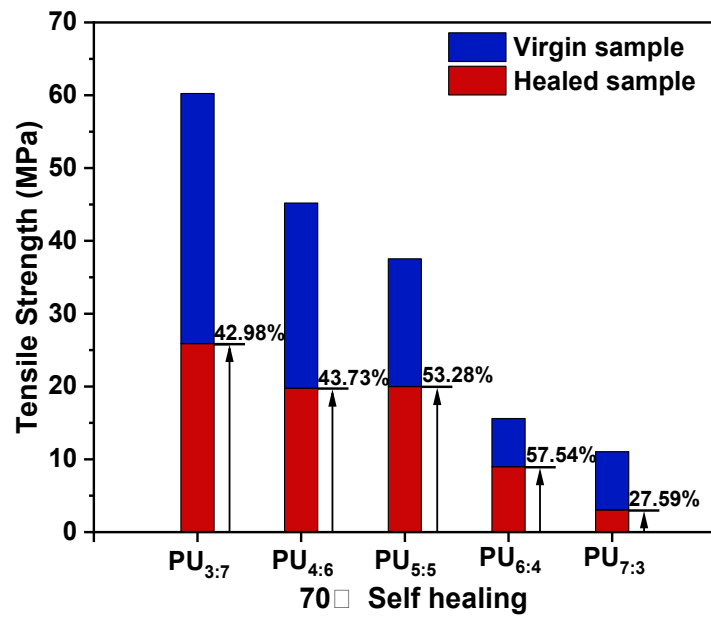


Figure S9

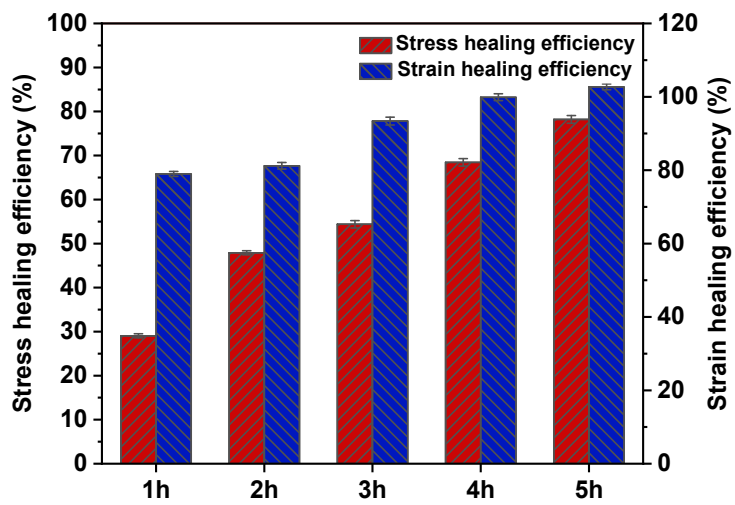


Figure S10

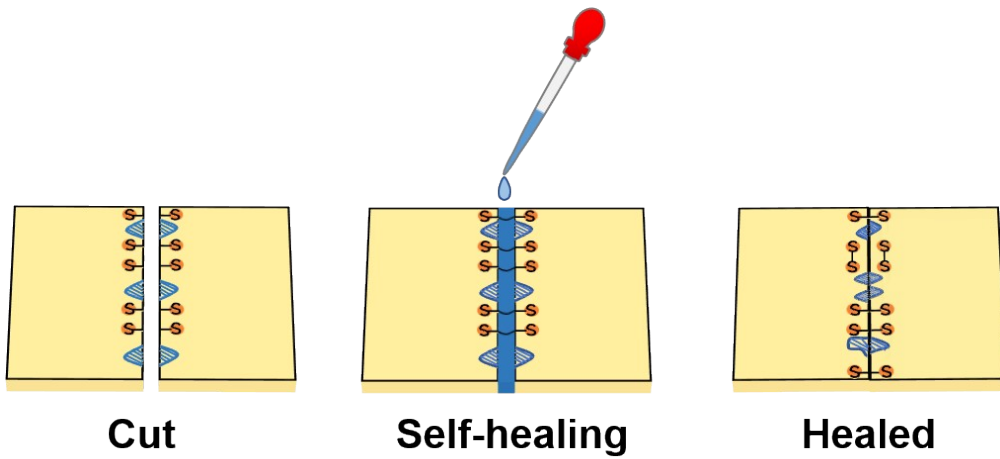


Figure S11

Table S1

Samples	M_n ($\times 10^3$ g/mol)	M_w ($\times 10^3$ g/mol)	PDI
PU _{3:7}	47.45	62.40	1.32
PU _{4:6}	42.76	58.00	1.36
PU _{5:5}	52.05	73.95	1.42
PU _{6:4}	51.06	73.90	1.45
PU _{7:3}	98.79	140.62	1.42

Table S2

Samples	Stress (MPa)	Strain at break (%)	Toughness (MJ m ⁻³)
PU _{3:7}	60.23	1398.5	257.24
PU _{4:6}	45.19	1372.9	190.14
PU _{5:5}	37.53	1352.1	158.93
PU _{6:4}	15.61	2115.1	120.70
PU _{7:3}	11.05	2209.9	92.17