Electronic Supplementary Material (ESI) for Polymer Chemistry.

Supporting Information

Molecularly Engineered Dual-Crosslinked Elastomer Vitrimers with Superior Strength, Improved Creep Resistance, and Retained Malleability

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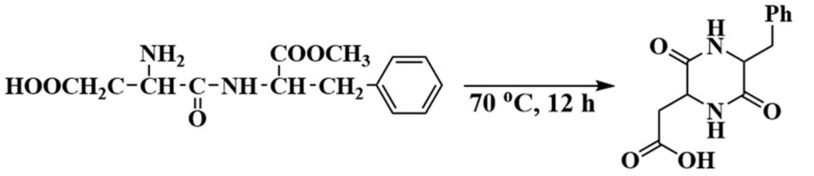
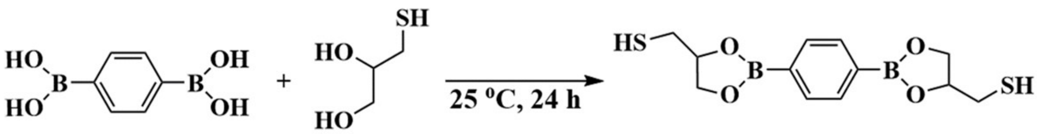


Scheme S1. Synthesis of DKP.



Sche

me S2. Synthesis of BDB.

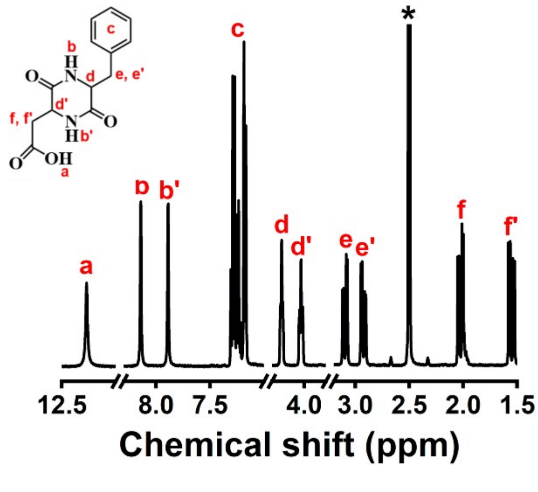


Figure S1. The [1]H NMR spectrum of DKP. *: DMSO-d_6.

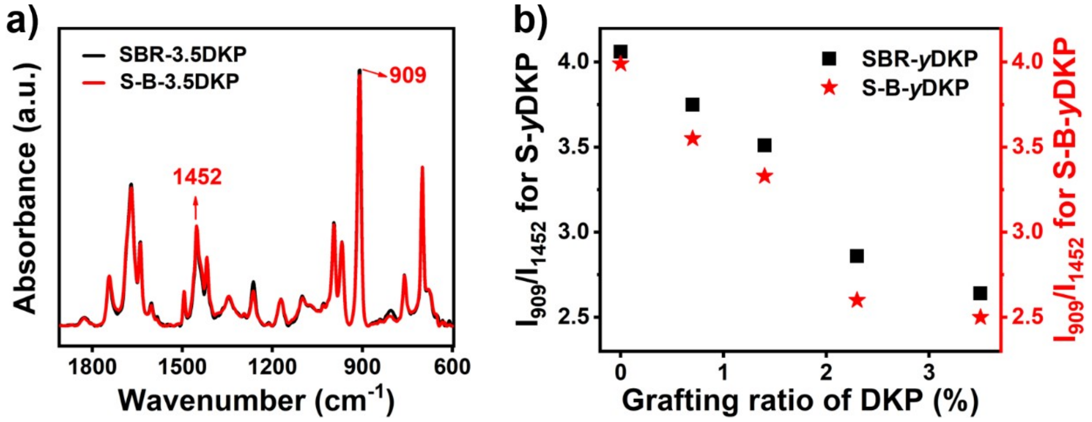


Figure S2. (a) The FTIR spectra of SBR-3.5DKP and S-B-3.5DKP; (b) The peak intensity ratio (I_{908}/I_{1452}) for SBR-*y*DKP and S-B-*y*DKP.

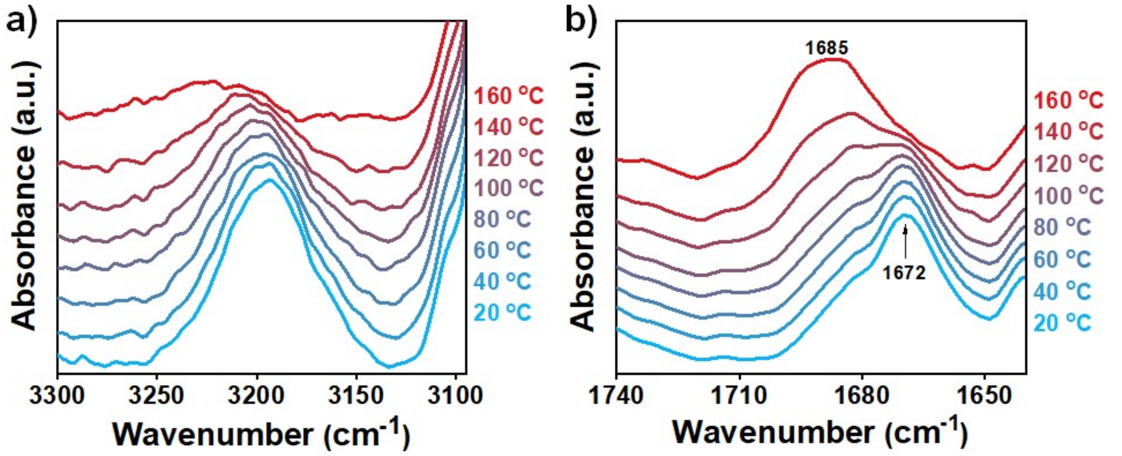


Figure S3. As in Figure 2 except the spectra were recorded as a function of decreasing temperature from 160 to 20 ^{o}C.

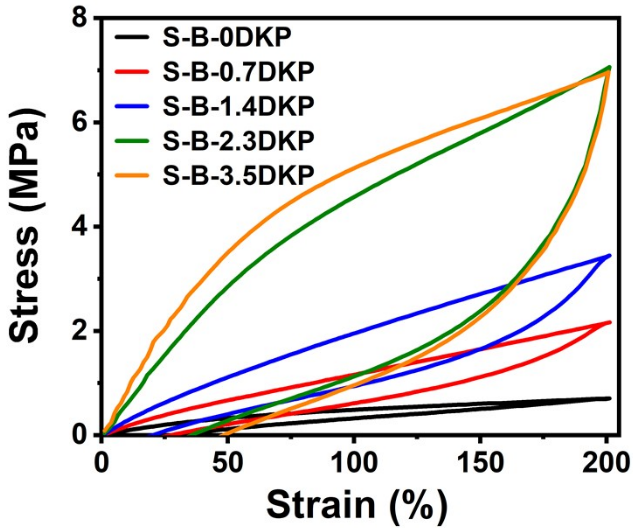


Figure S4. The first loading–unloading cycle of S-B-*y*DKP.

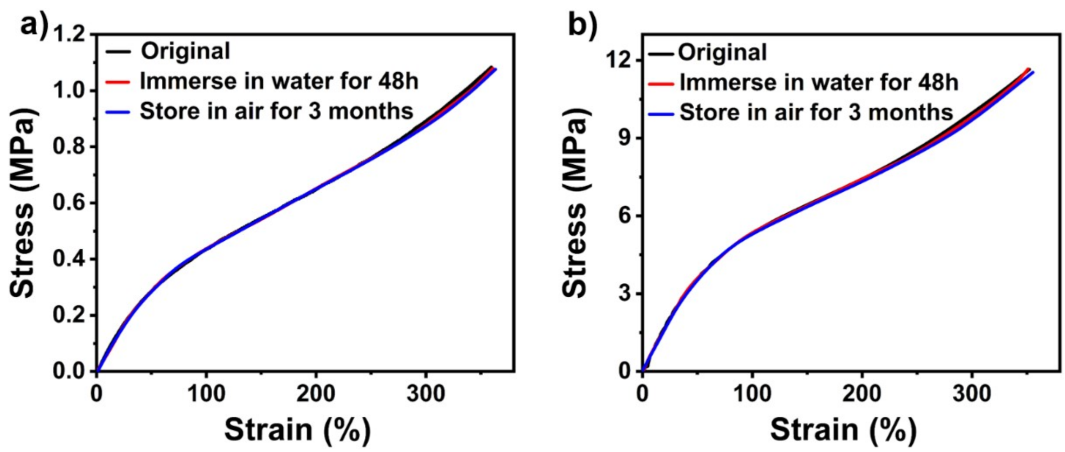


Figure S5. The stress-strain curves for original and water soaked (a) S-B-0DKP and (b) S-B-3.5DKP.

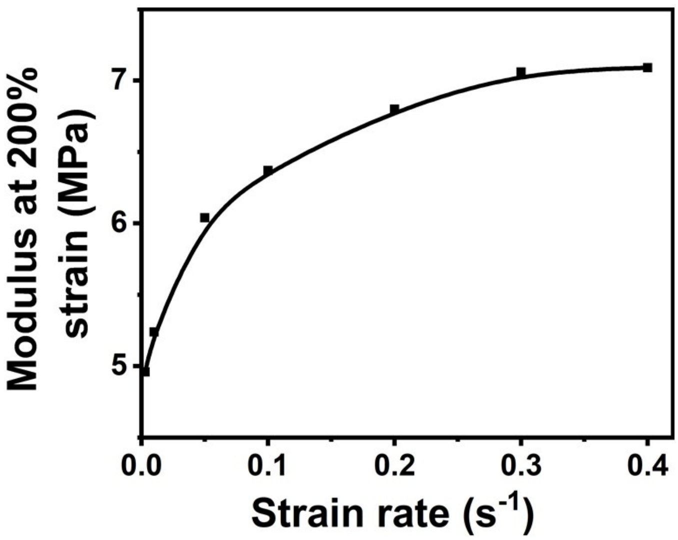


Figure S6. The modulus at 200% strain for S-B-3.5DKP at different strain rates.

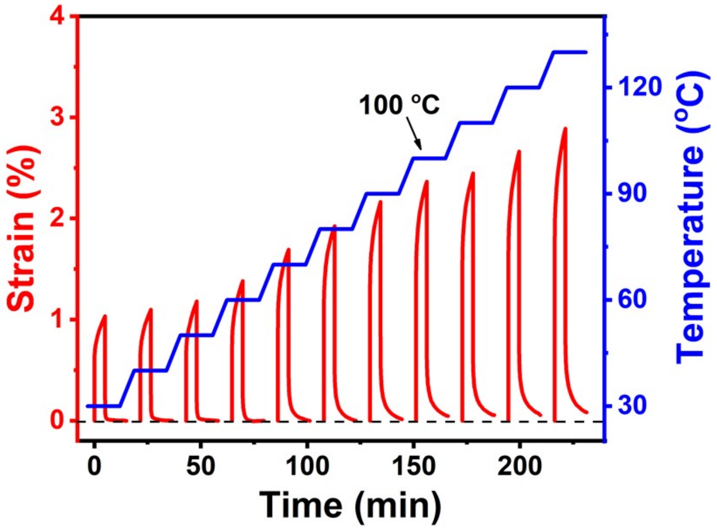


Figure S7. Cyclic strain/recovery profiles of S-B-1.4DKP during heating process with a stress of 0.03 MPa.

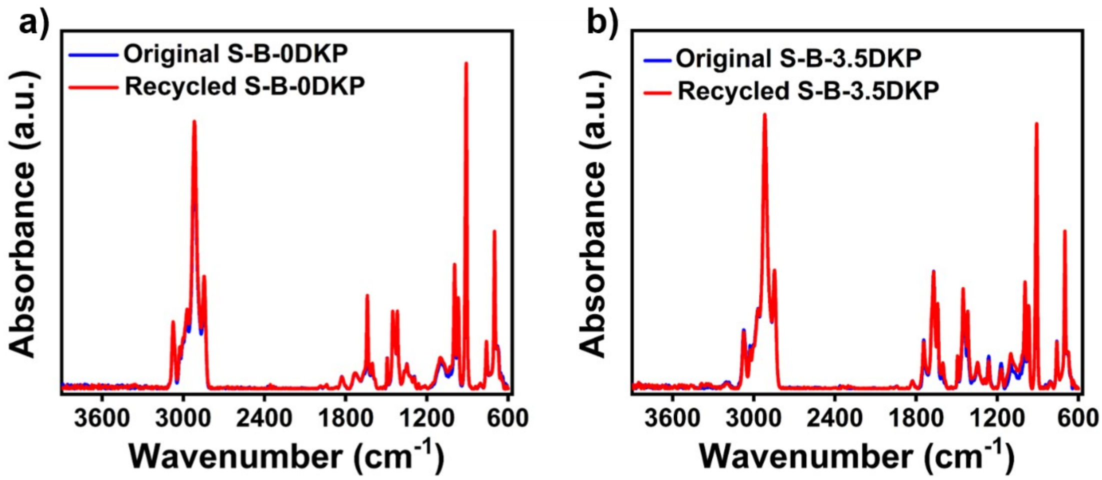


Figure S8. The FTIR spectra of original and recycled (a) S-B-0DKP and (b) S-B-3.5DKP.

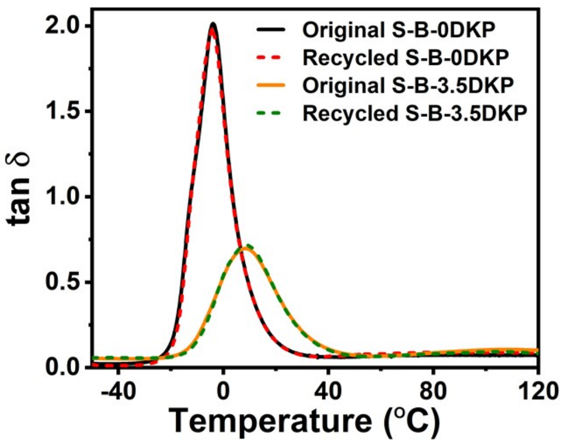


Figure S9. Temperature dependence of original and recycled (a) S-B-0DKP and (b) S-B-3.5DKP.

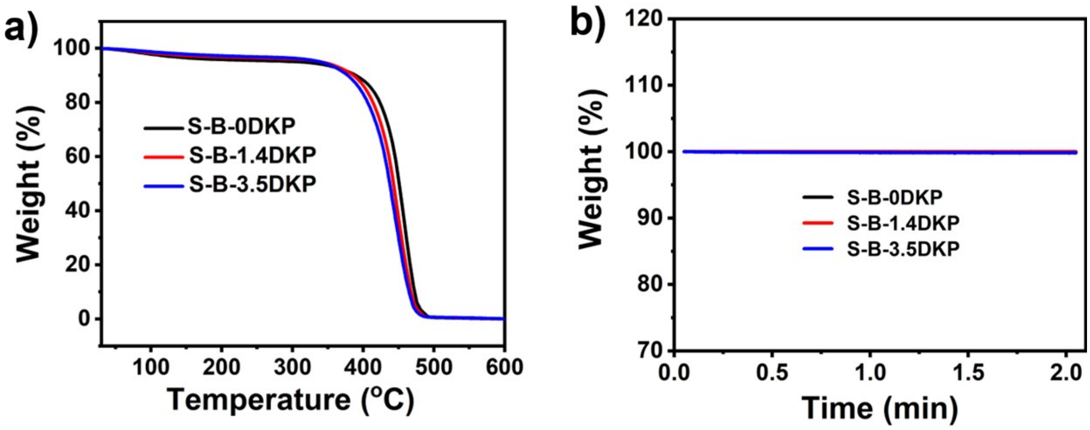


Figure S10. (a) TGA curves for S-B-0DKP, S-B-1.4DKP and S-B-3.5DKP; (b) Isothermal TGA curves of S-B-0DKP, S-B-1.4DKP and S-B-3.5DKP at 200 °C.

Table S1 Mechanical properties of S-B-*y*DKP.

Samples	Stress at 100% strain (MPa)	Ultimate stress (MPa)	Breaking strain (%)	Fracture energy (MJ/m^3)
S-B-0DKP	0.47±0.06	1.10±0.26	352±55	2.05
S-B-0.7DKP	1.17±0.11	4.37±0.31	390±19	7.48
S-B-1.4DKP	1.97±0.06	5.90±0.61	328±49	11.54
S-B-2.3DKP	4.30±0.17	8.60±0.44	278±26	14.6
S-B-3.5DKP	5.07±0.38	10.2±1.87	308±24	22.79