Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Supporting Information

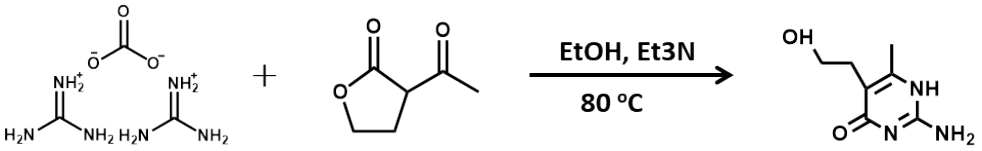
Thermally Healable Polyurethane with Tailored Mechanical Performance Using Dynamic Crosslinking Motifs

Haopu Xie[a,b], Dekun Sheng[a], Yan Zhou[a,b], Shaobin Xu [a,b], Haohao Wu[a,b], Xinxin Tian[a,b], Yinglu Sun[a,b], Xiangdong Liu*[a] and Yuming Yang*[a,b]

[a] CAS Key Laboratory of High-Performance Synthetic Rubber and its Composite Materials, Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, Changchun, 130022, P. R. China.

[b] University of Science and Technology of China, Hefei, 230026, P. R. China

*Corresponding authors. E-mail: liuxiangdong@ciac.ac.cn(X. Liu), ymyang@ciac.ac.cn(Y. Yang).



Scheme S1. Synthesis route of UPy

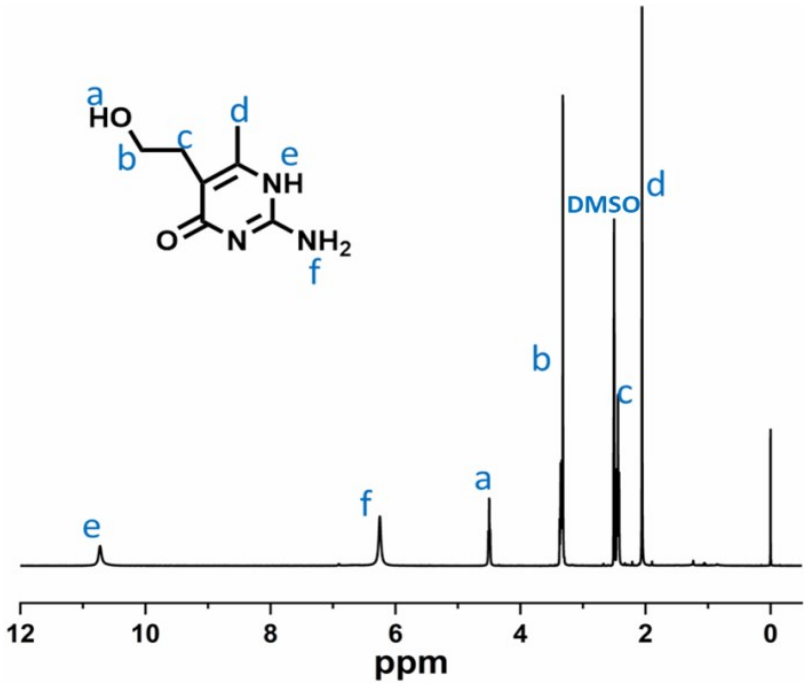


Figure S1, ^{1}H-NMR spectrum of UPy (DMSO-d6, 400MHz, 25°C): 10.72 (s,1H,NH), 6.25 (s,2H,NH_2), 4.50 (t,1H,OH), 3.36 (t.2H,CH_2), 2.44 (t,3H,CH_2), 2.05 (s,3H,CH_3).

Table S1.Molecular weight of SHP-X

Samples	Mn (10^4g/mol)	Mw (10^4g/mol)	PD
SHP-0	11.62	18.13	1.56
SHP-25	3.79	7.72	2.03
SHP-50	3.84	7.60	1.98
SHP-75	3.57	7.02	1.96
SHP-100	3.30	7.12	2.15

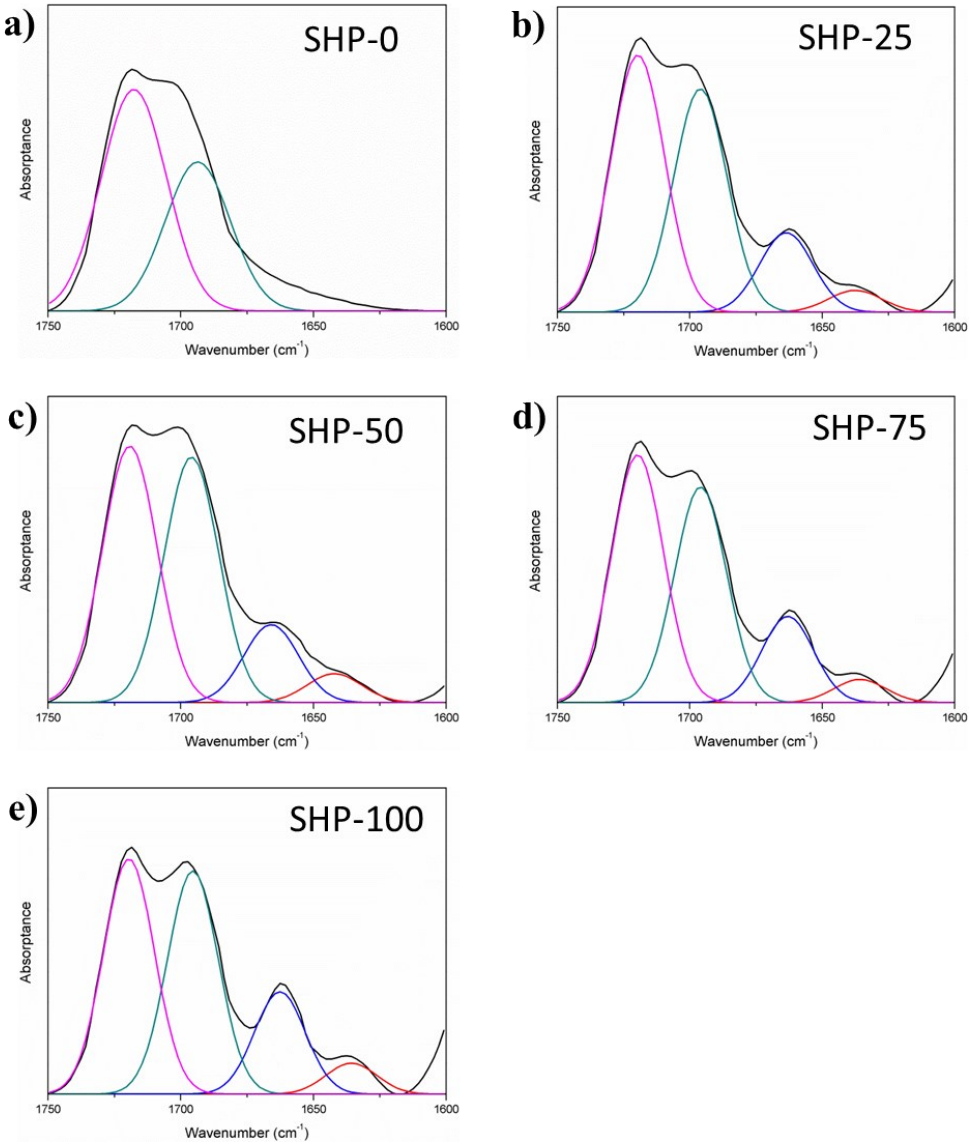


Figure S2. Peak fitting curves of C=O stretching vibration in the region of 1750-1600 cm^{-1}

Table S2. The ratio of C=O in different chemical environments

Sample	C=O(free)	C=O(urea,free) & C=O(H-bonded,urthane)	C=O(urea,disordered)	C=O(urea,ordered)
SHP-0	40.29%	59.71%	0.00%	0.00%
SHP-25	42.11%	40.34%	12.81%	4.74%
SHP-50	44.18%	38.38%	13.68%	3.76%
SHP-75	43.24%	37.66%	15.07%	4.03%
SHP-100	39.77%	37.72%	17.29%	5.22%

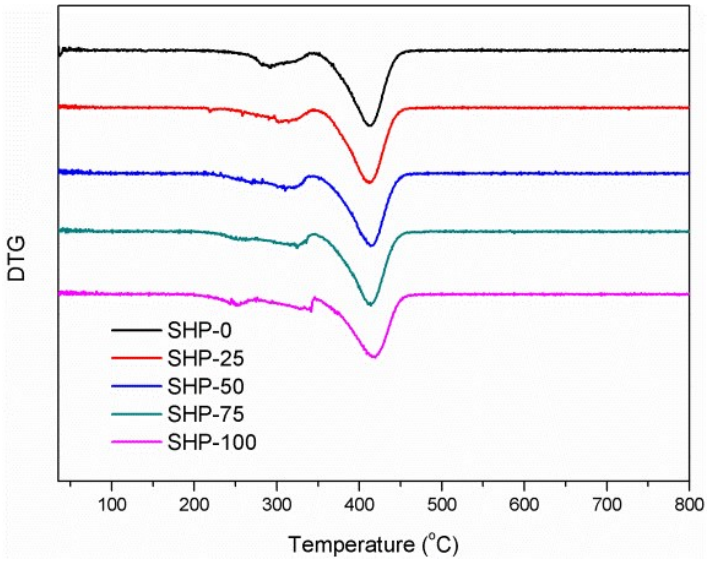


Figure S3. DTG curves of SHP samples.

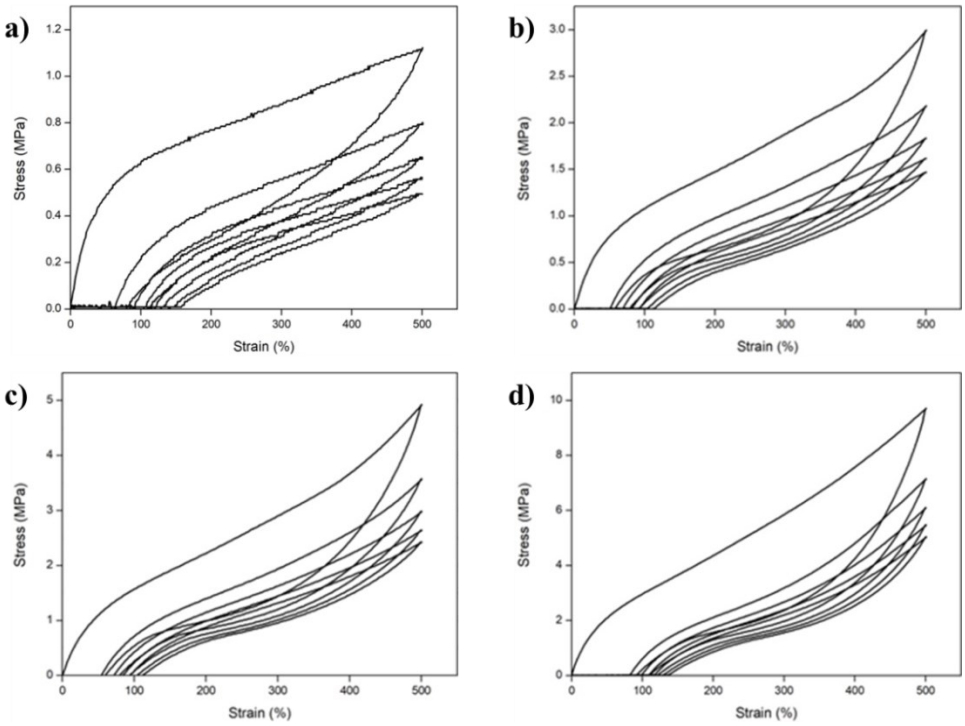


Figure S4. Cycle loading-unloading stress-strain curves of a) SHP-25, b) SHP-50, c) SHP-75, d) SHP-100.

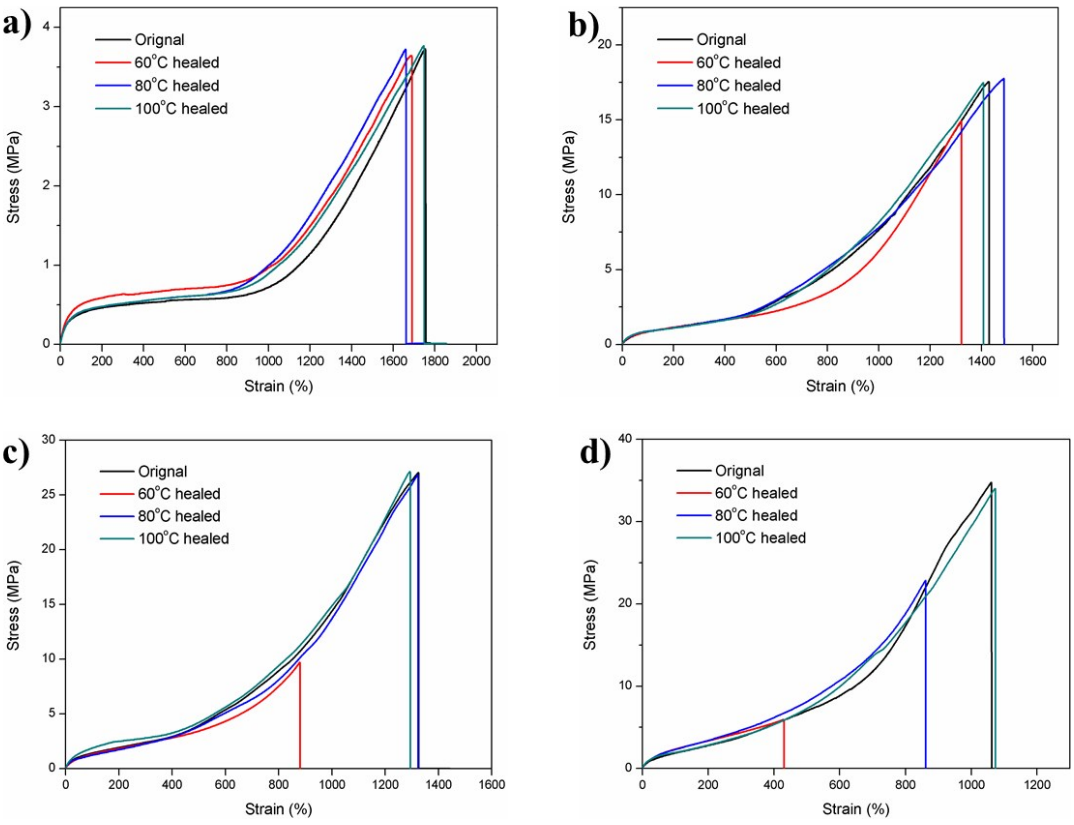


Figure S5. Stress-strain curves of a) SHP-25, b) SHP-50, c) SHP-75, d) SHP-100 samples after healing at different temperatures for 24h.

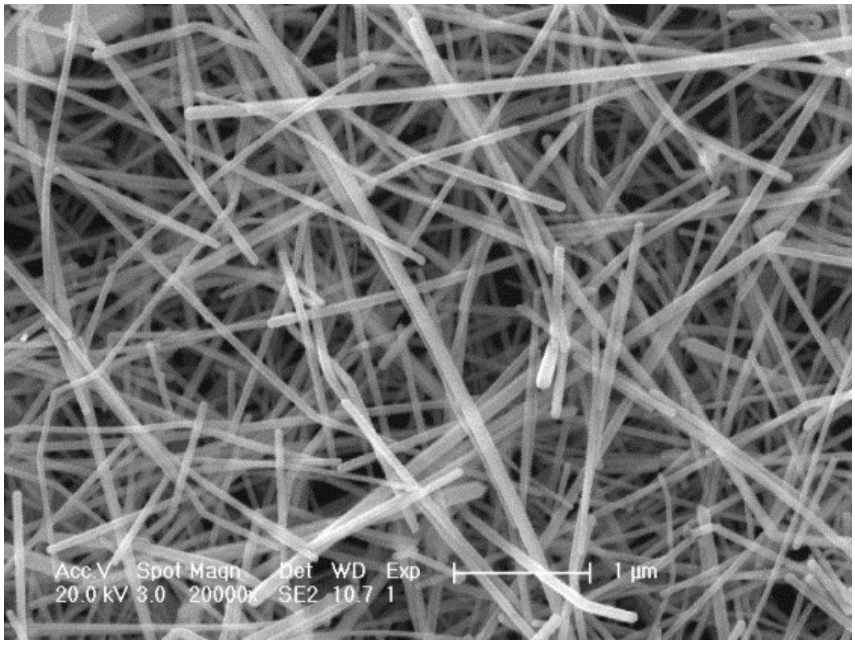


Figure S6. SEM image of the morphology of AgNWs

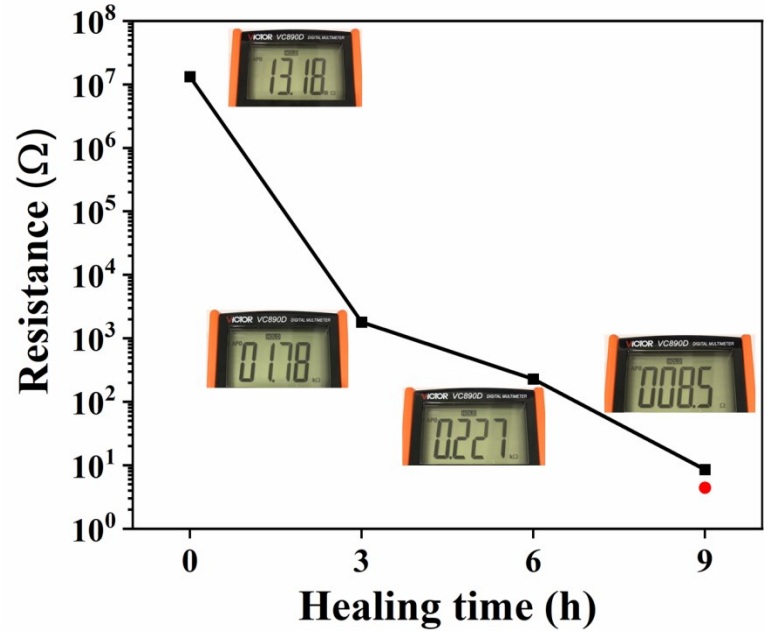


Figure S7. Resistance changes of SHP-75/AgNWs electrode during repairing process, the resistance value corresponding to ● is the orignal (4.4 Ω).