

**Synthesis and molecule dynamics study of high damping
polyurethane elastomer based on the synergistic effect of dangling
chains and dynamic bonds**

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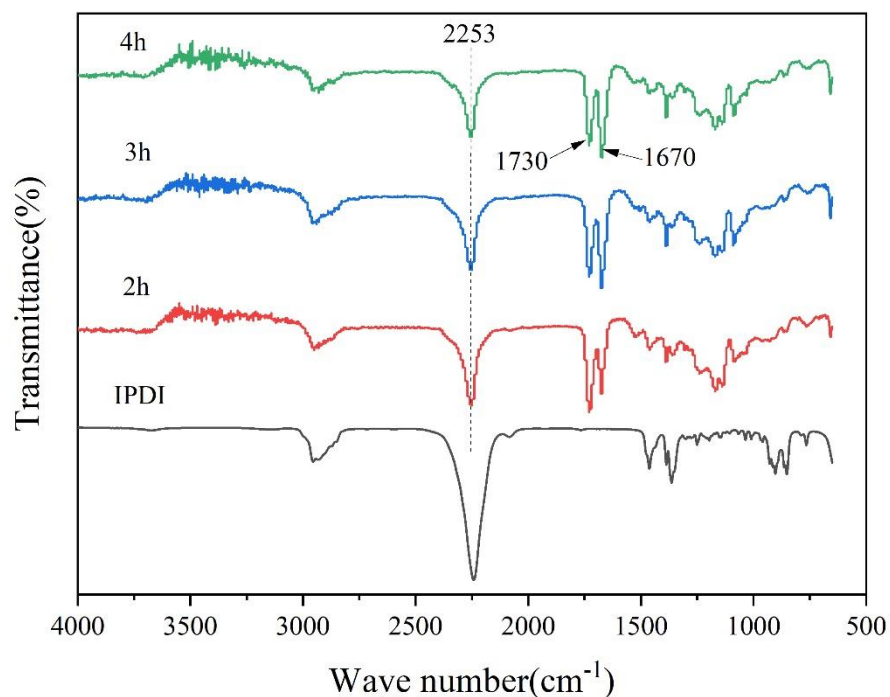


Figure S1 FT-IR spectrogram of pre-polymerization

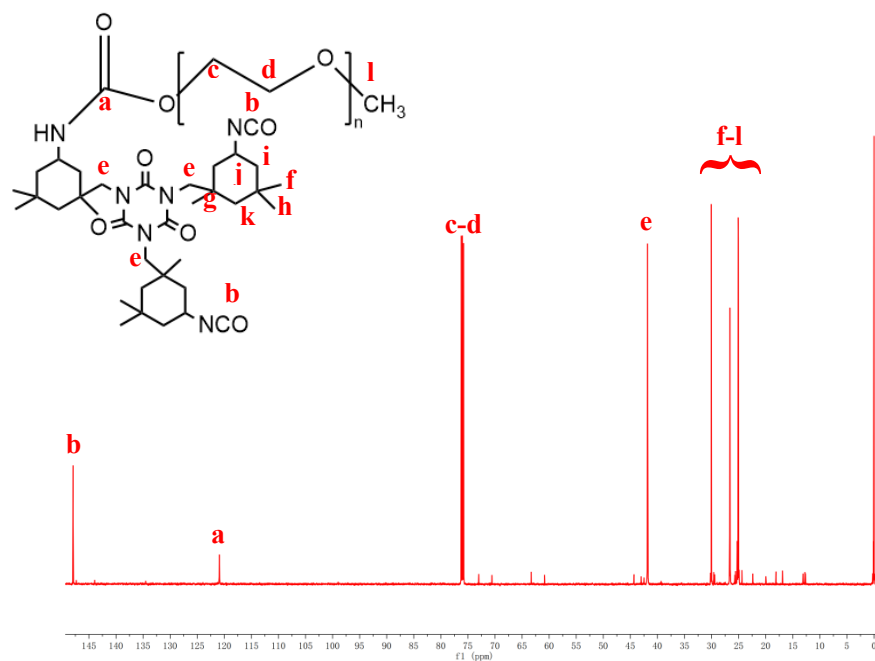


Figure S2 ^{13}C NMR of MPEG350

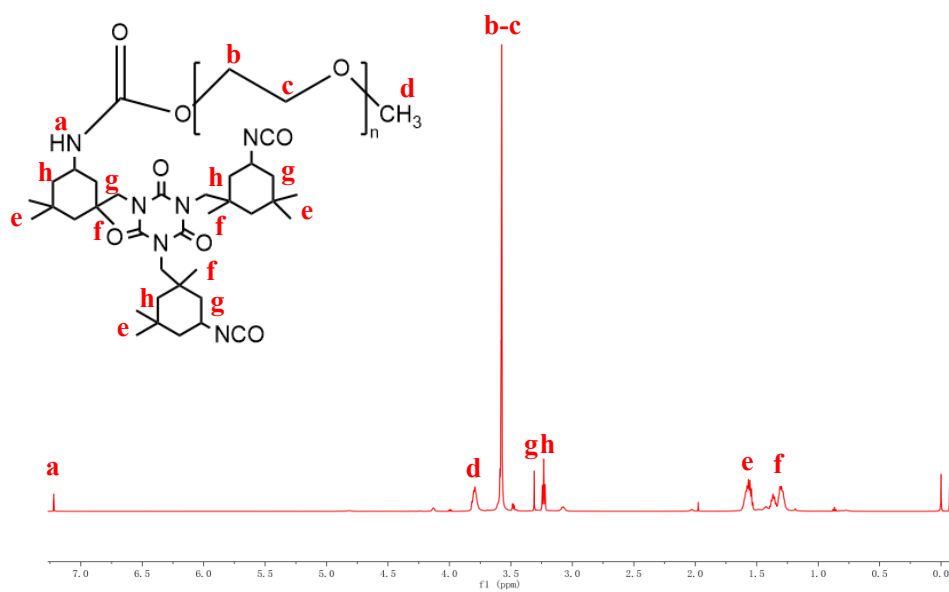


Figure S3 ^1H NMR of MPEG350

Table S1 the original data of DMA extrapolation curve and Calculation of activation energy of different MPEG content in PU from Muller and Huff equations

MPEG 0%				
Frequency(Hz)	/	1	10	16.66
Temperature(K)	/	242.72	250.00	251.89
logf	/	0	1	1.221
1000/T(1/K)	/	4.12	4.00	3.97
$\frac{dLogf}{d(1/T)}$	-7.04			
E _a (kJ/mol)	134.83			

MPEG 5%				
Frequency(Hz)	/	1	10	16.66
Temperature(K)	/	243.01	250.63	253.16
logf	/	0	1	1.221
1000/T(1/K)	/	4.115	3.99	3.95
$\frac{dLogf}{d(1/T)}$	-6.88			
E _a (kJ/mol)	131.75			

MPEG 10%				
Frequency(Hz)	/	1	10	16.66
Temperature(K)	/	238.66	247.52	249.37

logf	/	0	1	1.221
1000/T(1/K)	/	4.19	4.04	4.01
$\frac{dLogf}{d(1/T)}$	-6.67			
E _a (kJ/mol)	127.85			

MPEG 15%				
Frequency(Hz)	/	1	10	16.66
Temperature(K)	/	243.31	251.89	253.81
logf	/	0	1	1.221
1000/T(1/K)	/	4.11	3.97	3.94
$\frac{dLogf}{d(1/T)}$	-6.65			
E _a (kJ/mol)	127.35			

MPEG 20%				
Frequency(Hz)	/	1	10	16.66
Temperature(K)	/	235.85	243.90	245.70
logf	/	0	1	1.221
1000/T(1/K)	/	4.24	4.10	4.07
$\frac{dLogf}{d(1/T)}$	-6.02			
E _a (kJ/mol)	115.36			

MPEG 350				
Frequency(Hz)	0.1	1	10	16.66
Temperature(K)	233.64	240.38	247.52	250.63
lnf	-2.303	0	2.303	2.813
1000/T(1/K)	4.28	4.16	4.04	3.99
$\frac{d \ln f}{d(1/T)}$	-15.09			
E _a (kJ/mol)	125.49			

MPEG 550				
Frequency(Hz)	0.1	1	10	16.66
Temperature(K)	235.29	243.31	253.16	255.75
lnf	-2.303	0	2.303	2.813
1000/T(1/K)	4.25	4.11	3.95	3.91
$\frac{d \ln f}{d(1/T)}$	-14.80			
E _a (kJ/mol)	123.11			

MPEG 750				
Frequency(Hz)	0.1	1	10	16.66
Temperature(K)	229.36	238.09	249.37	252.52
lnf	-2.303	0	2.303	2.813

1000/T(1/K)	4.36	4.20	4.01	3.96
$\frac{d \ln f}{d(1/T)}$	-12.56			
E _a (kJ/mol)	104.43			

MPEG 1000				
Frequency(Hz)	0.1	1	10	16.66
Temperature(K)	221.24	232.02	241.54	246.30
lnf	-2.303	0	2.303	2.813
1000/T(1/K)	4.52	4.31	4.14	4.06
$\frac{d \ln f}{d(1/T)}$	-11.48			
E _a (kJ/mol)	95.42			