

Supplementary Information

A Mechanical Model for Stress relaxation of Polylactic Acid/Thermoplastic Polyurethane Blends

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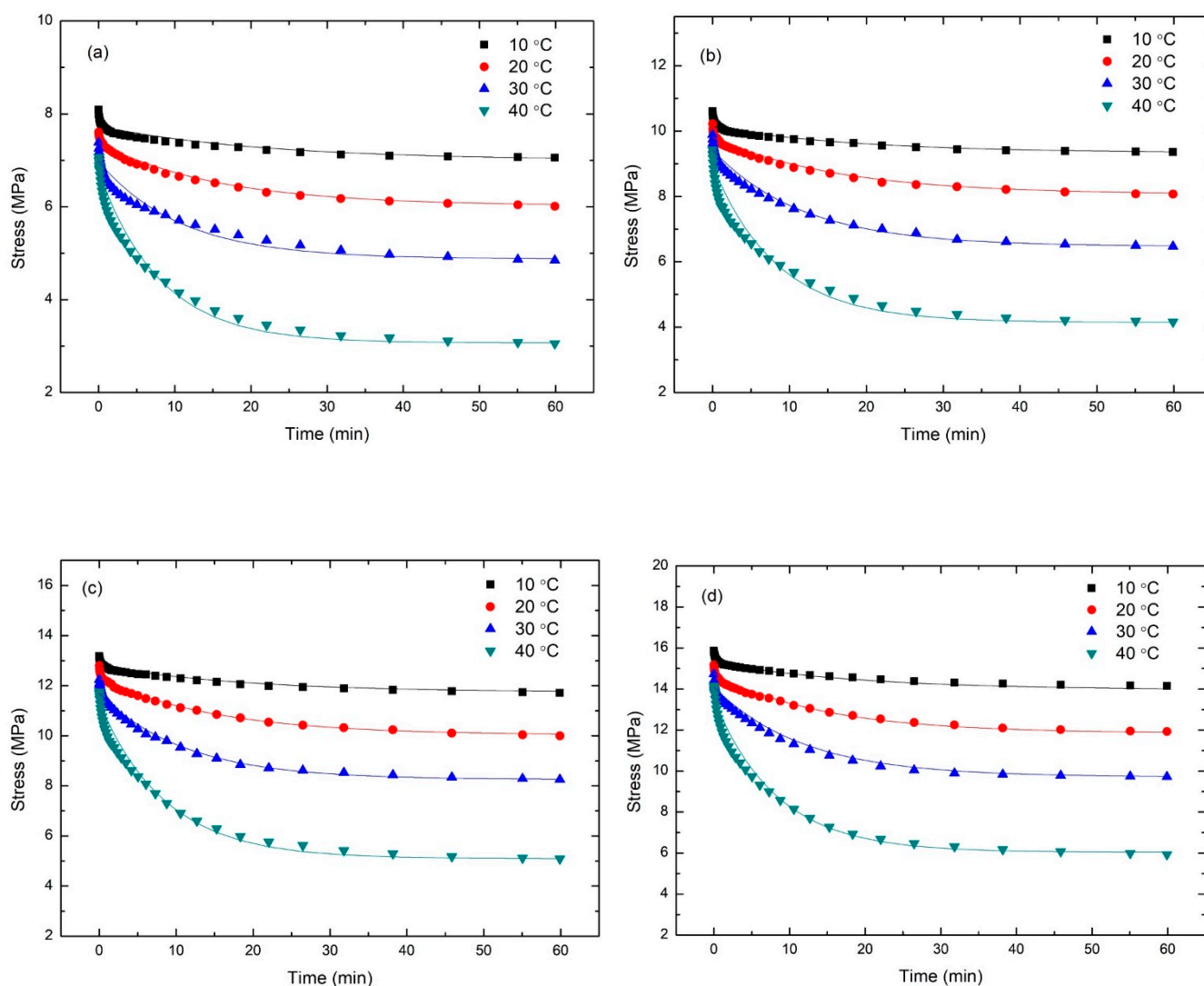


Figure S1. The stress relaxation of PLA (or the mass ratio of PLA to TPU: 100/0) at different temperatures under the applied strains of (a) 0.3 %, (b) 0.4 %, (c) 0.5 %, and (d) 0.6 %.

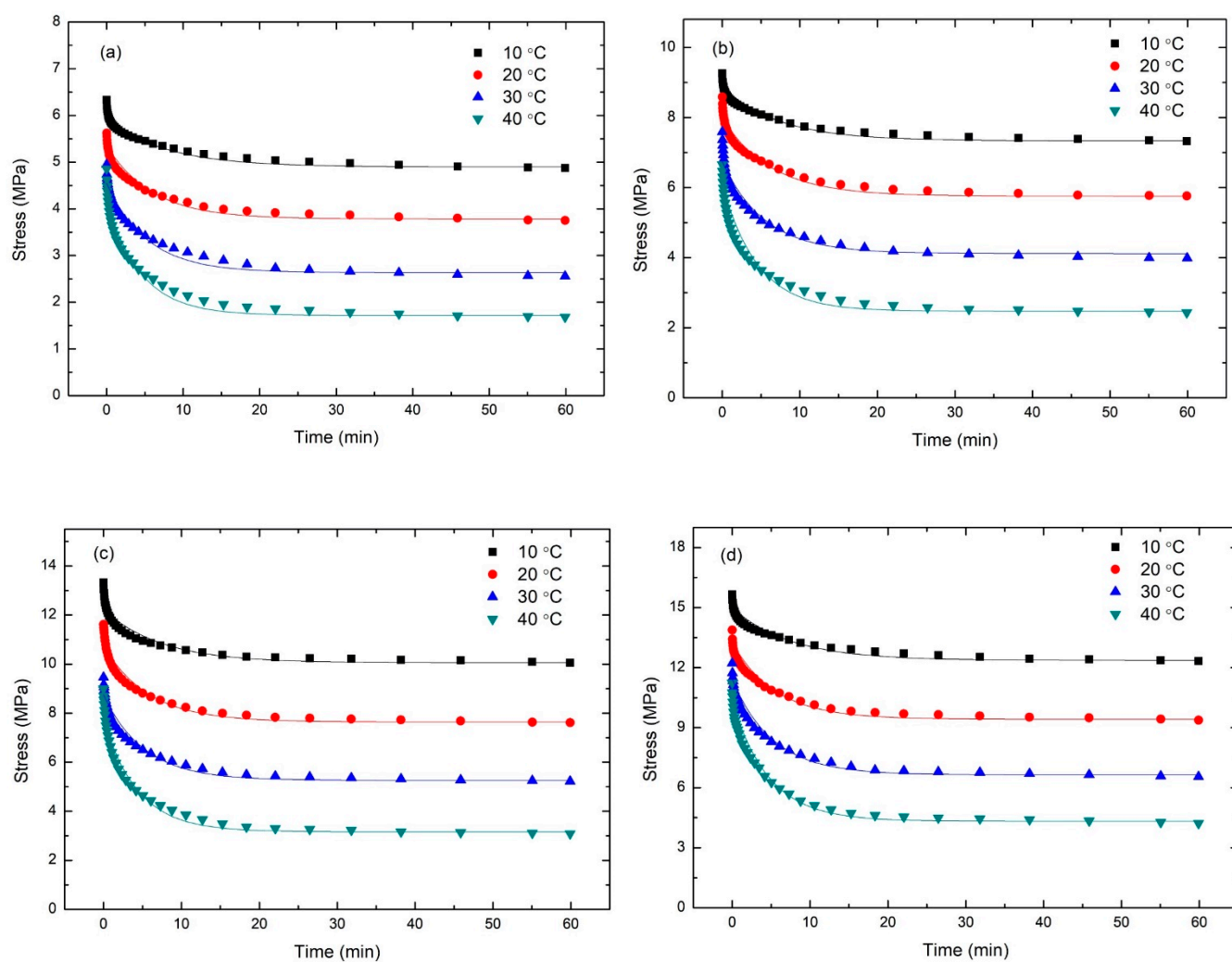


Figure S2. The stress relaxation of PLA/TPU blend with 50/50 for the mass ratio of PLA to TPU at different temperatures under the applied strains of (a) 0.6 %, (b) 0.9 %, (c) 1.2 %, and (d) 1.5 %.

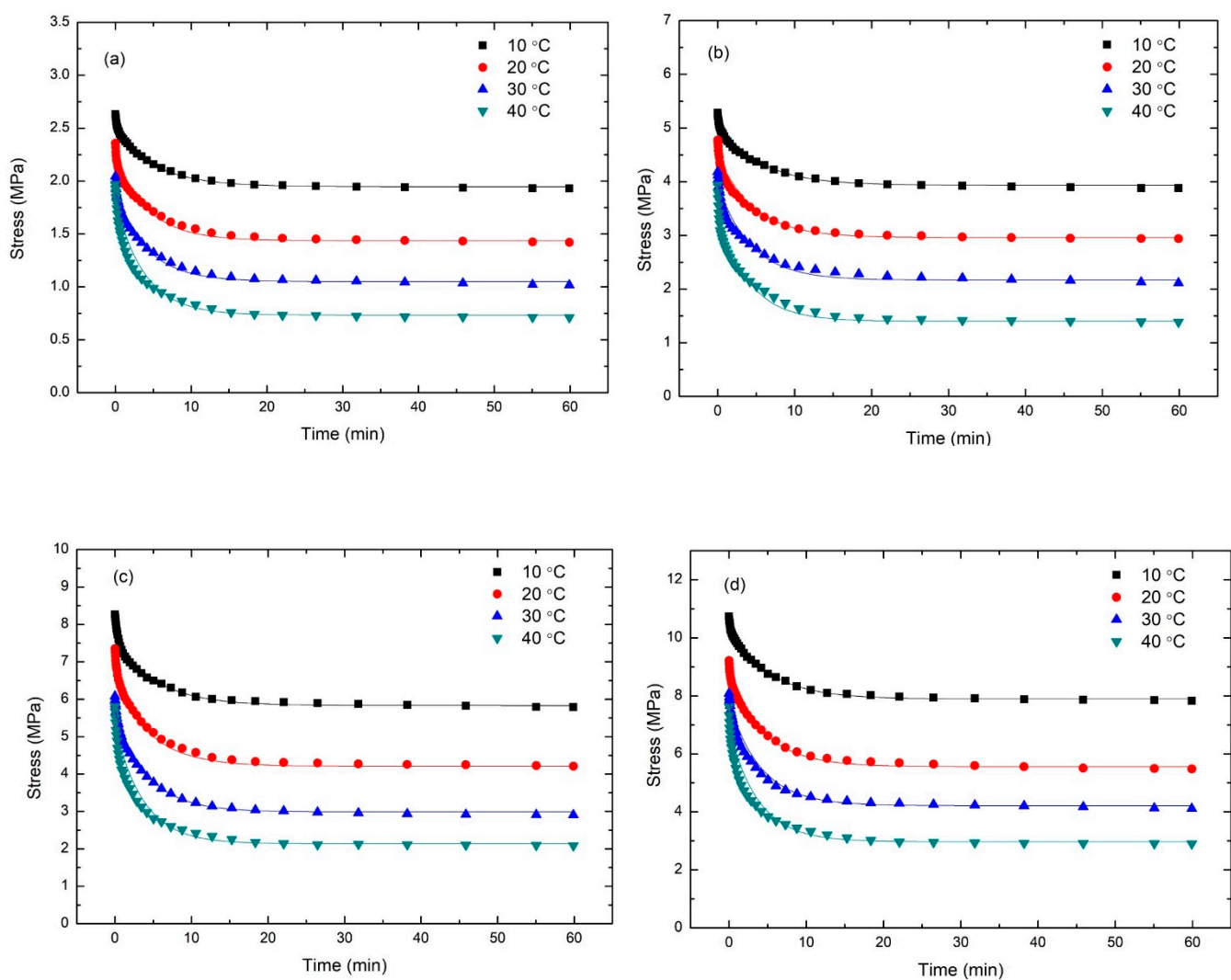


Figure S3. The stress relaxation of PLA/TPU blend with 30/70 for the mass ratio of PA to TPU at different temperatures under the applied strains of (a) 0.6 %, (b) 1.2 %, (c) 1.8 %, and (d) 2.4 %.

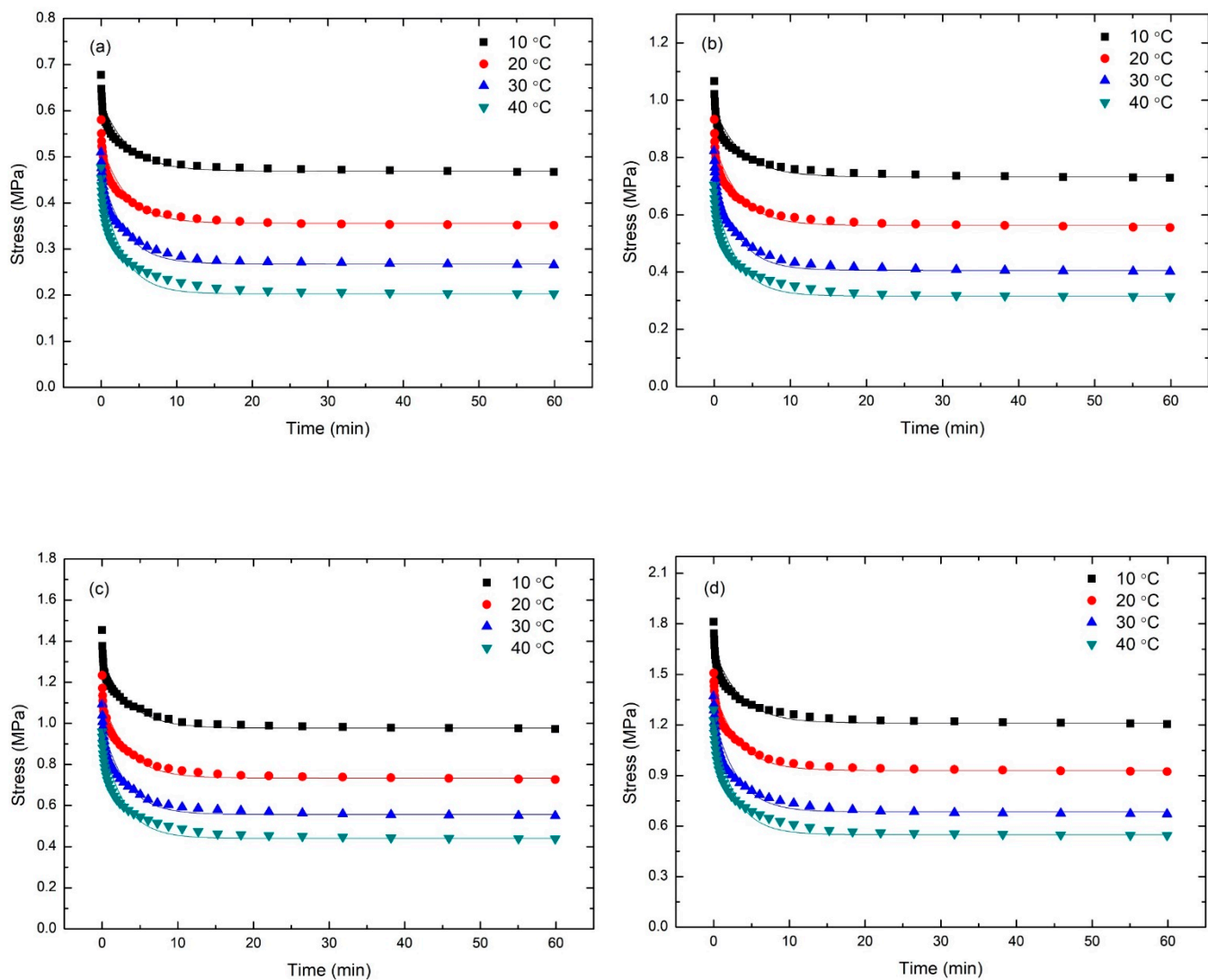


Figure S4. The stress relaxation of TPU (or the mass ratio of PLA to TPU: 0/100) at different temperatures under the applied strains of (a) 1.8 %, (b) 2.8 %, (c) 3.8 %, and (d) 4.8 %.

Table S1. The glass transition temperatures of $T_{g,1}$ and $T_{g,2}$ of PLA/TPU blends with different ratios of PLA to TPU.

PLA/TPU	100/0	70/30	50/50	30/70	0/100
$T_{g,1}(^{\circ}\text{C})$	-	-20.6	-20.8	-21.0	-23.2
$T_{g,2}(^{\circ}\text{C})$	68.3	67.5	67.1-	67.0	-

Table S2. SLSM mechanical constants E_1 , E_2 , and η_2 of PLA (100/0 for the mass ratio of PLA to TPU) at different temperatures.

Temperature	10 $^{\circ}\text{C}$	20 $^{\circ}\text{C}$	30 $^{\circ}\text{C}$	40 $^{\circ}\text{C}$
E_1 (GPa)	2.56 ± 0.11	2.46 ± 0.09	2.34 ± 0.09	2.25 ± 0.07
E_2 (GPa)	27.1 ± 1.1	10.8 ± 0.7	5.33 ± 0.19	1.80 ± 0.11
η_2 (GPa•min)	579 ± 25	202 ± 11	86.9 ± 2.4	34.2 ± 1.1

Table S3. SLSM mechanical constants E_1 , E_2 , and η_2 of PLA/TPU blend with 50/50 for the mass ratio of PLA to TPU at different temperatures.

	10 $^{\circ}\text{C}$	20 $^{\circ}\text{C}$	30 $^{\circ}\text{C}$	40 $^{\circ}\text{C}$
E_1 (GPa)	0.995 ± 0.031	0.890 ± 0.052	0.750 ± 0.022	0.676 ± 0.0025
E_2 (GPa)	4.67 ± 0.19	2.20 ± 0.09	1.09 ± 0.07	0.473 ± 0.027
η_2 (GPa•min)	42.2 ± 2.4	18.1 ± 0.5	9.74 ± 0.48	5.20 ± 0.33
R^2	0.958	0.961	0.965	0.960

Table S4. SLSM mechanical constants E_1 , E_2 , and η_2 of PLA/TPU blend with 30/70 for the mass ratio of PLA to TPU at different temperatures.

	10 °C	20 °C	30 °C	40 °C
E_1 (GPa)	0.425 ± 0.031	0.367 ± 0.011	0.321 ± 0.018	0.293 ± 0.014
E_2 (GPa)	1.41 ± 0.08	0.676 ± 0.027	0.382 ± 0.024	0.204 ± 0.012
η_2 (GPa•min)	9.54 ± 0.42	4.75 ± 0.18	2.94 ± 0.16	1.88 ± 0.01

Table S5. SLSM mechanical constants E_1 , E_2 , and η_2 of TPU (or 0/100 for the mass ratio of PLA to TPU) at different temperatures.

	10 °C	20 °C	30 °C	40 °C
E_1 (MPa)	34.6 ± 1.1	29.7 ± 1.2	26.3 ± 0.7	24.4 ± 0.9
E_2 (MPa)	101 ± 6	57.9 ± 2.1	32.7 ± 1.7	21.2 ± 1.1
η_2 (GPa•min)	0.481 ± 0.027	0.284 ± 0.011	0.180 ± 0.013	0.131 ± 0.007