Electronic Supplementary Material (ESI) for Polymer Chemistry.

Table S1 Thermal properties of PLBSI biobased polyester.

Samples	TGA			DSC					*Crystallinity*[f] (%)
				Second heating[e]			Cooling[e]		
	$T_{d,5\%}$[a] (°C)	$T_{d,max}$[b] (°C)	RW[c] (%)	T_g[d] (°C)	T_m (°C)	ΔH_m (J/g)	T_c (°C)	ΔH_c (J/g)	
PBSI	371	-/415	5.6	-54	61	82.9	43	79.7	43.4
PLBSI-10	347	309/413	5.8	-51	52	77.5	32	73.6	25.1
PLBSI-20	316	306/412	3.0	-50	33	47.2	15	46.8	14.2
PLBSI-30	304	304/411	3.9	-48	17	34.1	-4	32.4	3.9
PLBSI-40	290	302/409	4.1	-45	7	19.2	-	-	-
PLBSI-50	280	301/407	4.9	-42	-	-	-	-	-

[a] Temperature at which a 5% weight loss was observed in the TGA traces recorded at 10 °C/min.
[b] Temperature of maximum degradation rate (containing two degradation steps)
[c] Remaining weight after heating at 600°C.
[d] Glass-transition temperature (T_g) taken as the inflection point of the second heating DSC traces recorded at 10 °C min^{-1}.
[e] Melting (T_m) and crystallization (T_c) temperatures and their respective enthalpies (ΔH_m and ΔH_c) measured by DSC traces at heating/cooling rate of 10 °C min^{-1}.
[f] Calculated by WAXD method.

Crosslinking of PLBSI Biobased Copolyesters

In Figure S1and Table S2, the tensile strength of PLBSI-40 increases from 0.6 MPa to 0.8 MPa while the elongation at break decreases from 1179% to 328% with increasing DCP content. The swelling ratio and crosslink density of PLBSI-40 obtained from swelling measurements were calculated to confirm that the decrease in elongation at break with increasing DCP content is due to the high crosslink density caused by the restrained mobility of polymer chains. Thus, we chose 2.5 phr as the optimum amount of DCP in PLBSI copolyesters to obtain the best mechanical properties.

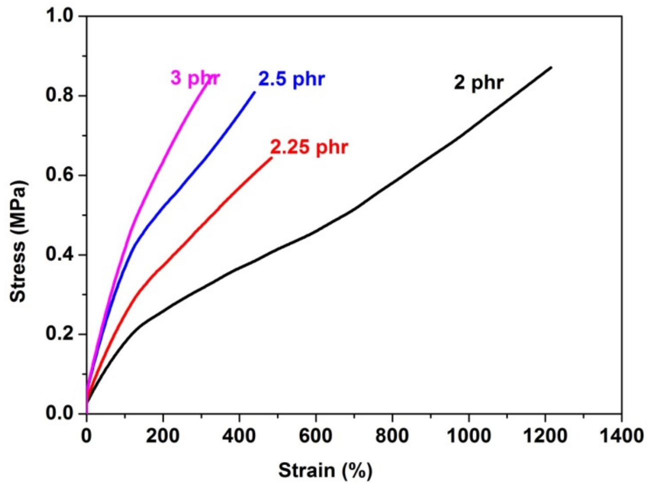

Figure S1. Stress-strain curves for different curing agent (DCP) contents in PLBSI biobased copolyester (PLBSI-40)

Table S2 Mechanical properties of PLBSI-40 with different curing agent (DCP) contents

DCP (phr)	Tensile strength (MPa)	Elongation at break (%)	Permanent set (%)
2.0	0.8±0.05	1179±13	0
2.25	0.6±0.04	483±17	0
2.5	0.8±0.03	438±14	0
3.0	0.8±0.03	328±15	0

Table S3 Crosslink density and swelling ratio of PLBSI-40 with different curing agent (DCP) contents

DCP content (phr)	Chloroform	
	Swelling ratio (%)	Crosslink Desity (10^{-5} mol/cm^3)
2	1991	4.70
2.25	1718	5.02
2.5	1569	5.79
3	1231	6.68

Table S4 Thermal properties of neat and crosslinked PLBSI biobased copolyesters

Samples	DSC					*Crystallinity*[c] (%)
	Second heating[b]			Cooling[b]		
	T_g^a (°C)	T_m (°C)	ΔH_m (J/g)	T_c (°C)	ΔH_c (J/g)	
PBSI	-54	61	82.9	43	79.7	43.4
PBSI/DCP	-49	51	61.1	28	60.4	36.5
PLBSI-20	-50	33	47.2	15	46.8	14.2
PLBSI-20/DCP	-43	28	38.5	4	37.1	9.5
PLBSI-40	-45	7	19.2	-	-	-
PLBSI-40/DCP	-40	-	-	-	-	-

[a] Glass-transition temperature (T_g) taken as the inflection point of a second heating DSC trace recorded at 10 °C min^{-1}.
[b] Melting (T_m) and crystallization (T_c) temperatures and their respective enthalpies (ΔH_m and ΔH_c) measured by DSC at heating/cooling rate of 10 °C min^{-1}.
[c]Calculated by WAXD method.

Table S5 Mechanical properties of crosslinked PLBSI copolyesters.

Samples	Tensile strength (MPa)	Yield strength (MPa)	Elongation at break (%)	Modulus at 100% elongation (MPa)	Permanent set (%)
PBSI	12.9±1.2	9.4±0.7	1016±13	7.1±0.4	300±13
PLBSI -10	10.7±0.7	5.6±0.5	1226±17	5.2±0.5	270±3
PLBSI-20	4.9±0.3	-	1530±9	0.8±0.2	10±2
PLBSI -30	0.9±0.2	-	513±15	0.4±0.1	0
PLBSI -40	0.8±0.1	-	438±14	0.4±0.03	0
PLBSI -50	0.4±0.1	-	459±9	0.1±0.01	0

Table S6 Relationship between RGR value and Cytotoxicity Grade

Grades	0	1	2	3	4	5
RGR/%	＞100	75-99	50-74	25-49	1-25	0

Table S7. Mechanical properties of PLBSI elastomer/PLA blends with different ratios of PLBSI elastomer to PLA

Samples	Tensile strength (MPa)	Elongation at break (%)	Modulus at 100% elongation (MPa)	Impact strength (kJ/m^2)
PLA	57.9±1.2	10±1	-	2.4±0.7
PLBSI/PLA -5	51.7±0.7	98±17	-	6.1±0.9
PLBSI/PLA-10	42.9±2.3	154±9	27.7±0.2	17.7±1.3
PLBSI /PLA-15	40.1±1.2	324±15	29.7±1.3	35.3±0.7
PLBSI /PLA-20	32.8±2.1	253±14	24.5±1.7	7.8±1.1