Supporting Information for

Synthesis and Degradation study of Graft Copolymers of Poly (limonene carbonate)

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Table S1. Graft Copolymerization of ε-caprolactone onto PLimC backbone

Sample name	Feed ratio (PLimC: PCL) Molar ratio	Copolymer composition (PLimC: PCL) Molar ratio	Yield (%)	M_p (g mol^{-1})	$Đ^a$	Grafting density (%)	$T_{5\%}{}^b$ (°C)
PLimC-g-PCL (1:0.5)	1:0.5	1:0.3	81	102353	1.29	100	226
PLimC-g-PCL (1:2)	1:2	1:1	72	141383	1.29	100	248
PLimC-g-PCL (1:10)	1:10	1:4.4	80	238225	1.28	100	277

[a] Determined by THF-GPC; [b] Determined at a heating rate of 10 K min^{-1} under N_2 atmosphere from TGA.

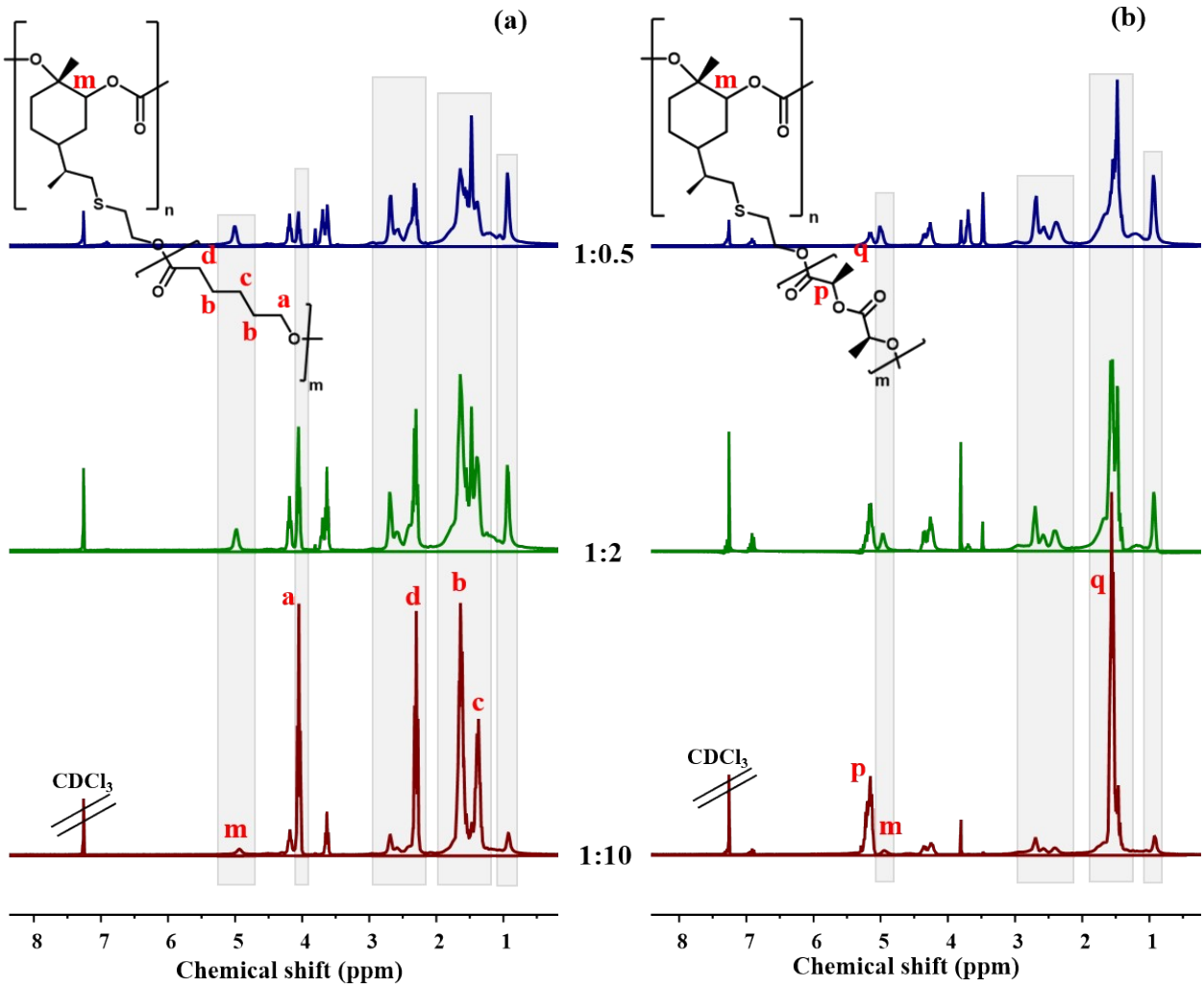

Figure S1. ^{1}H NMR of graft copolymers **(a)** PLimC-g-PCL and **(b)** PLimC-g-PDLLA with different feed ratios measured in $CDCl_3$.

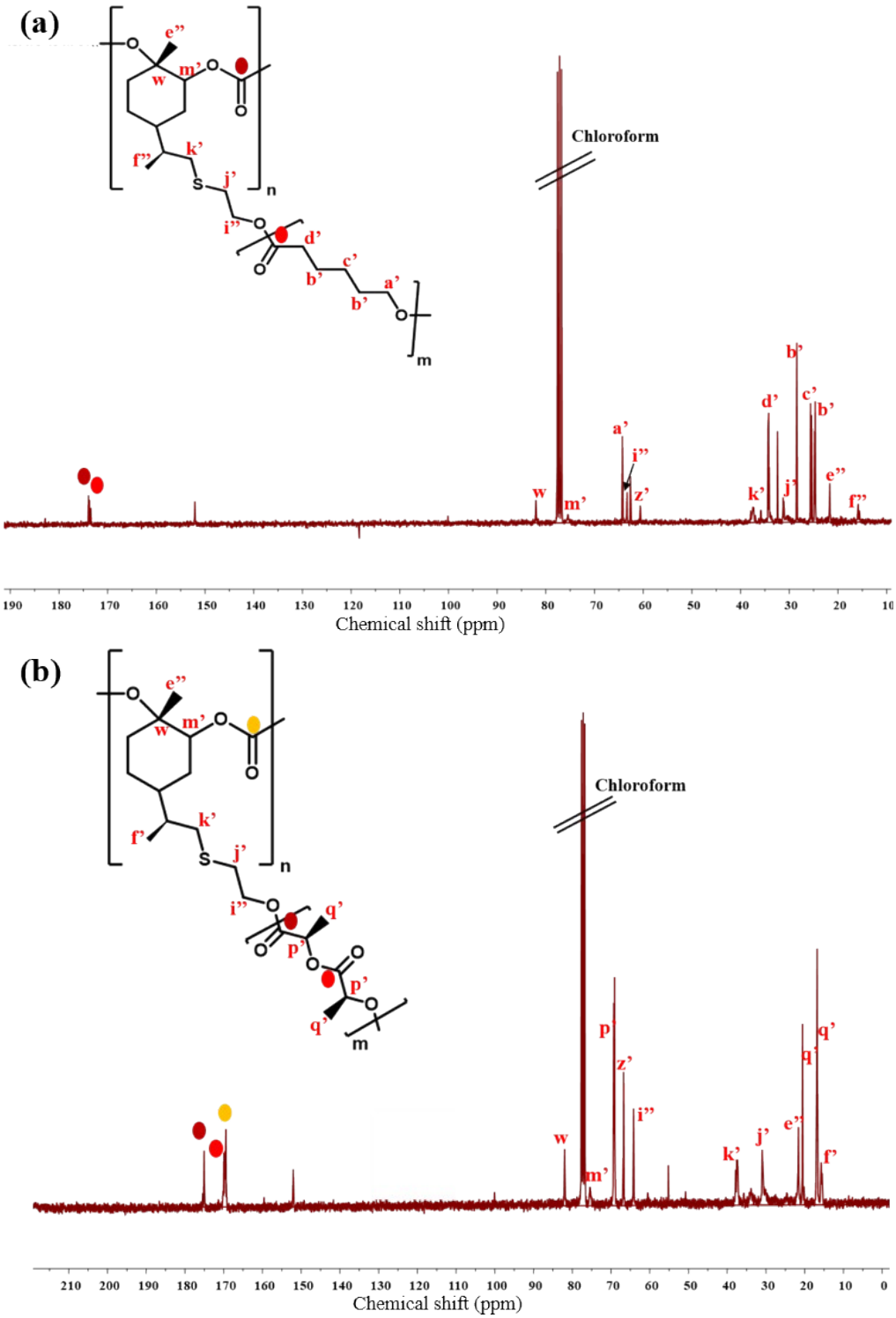

Figure S2. $^{13}C\{^{1}H\}$ NMR of graft copolymers **(a)** PLimC-g-PCL and **(b)** PLimC-g-PDLLA with different feed ratios measured in $CDCl_3$.

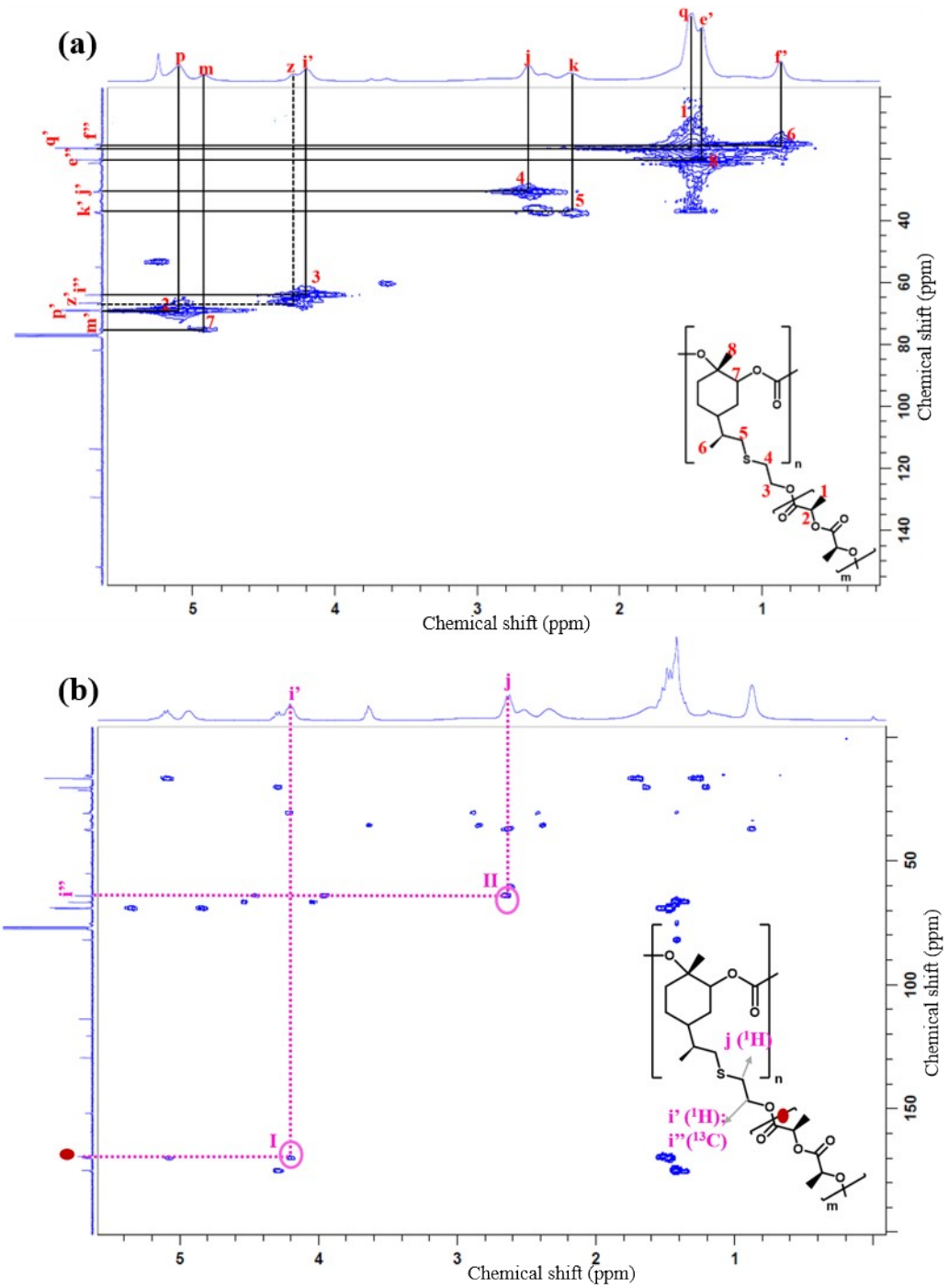

Figure S3. (a) HMQC NMR spectra and **(b)** HMBC NMR spectra of PLimC-g-PDLLA with feed ratio 1:2 measured in $CDCl_3$

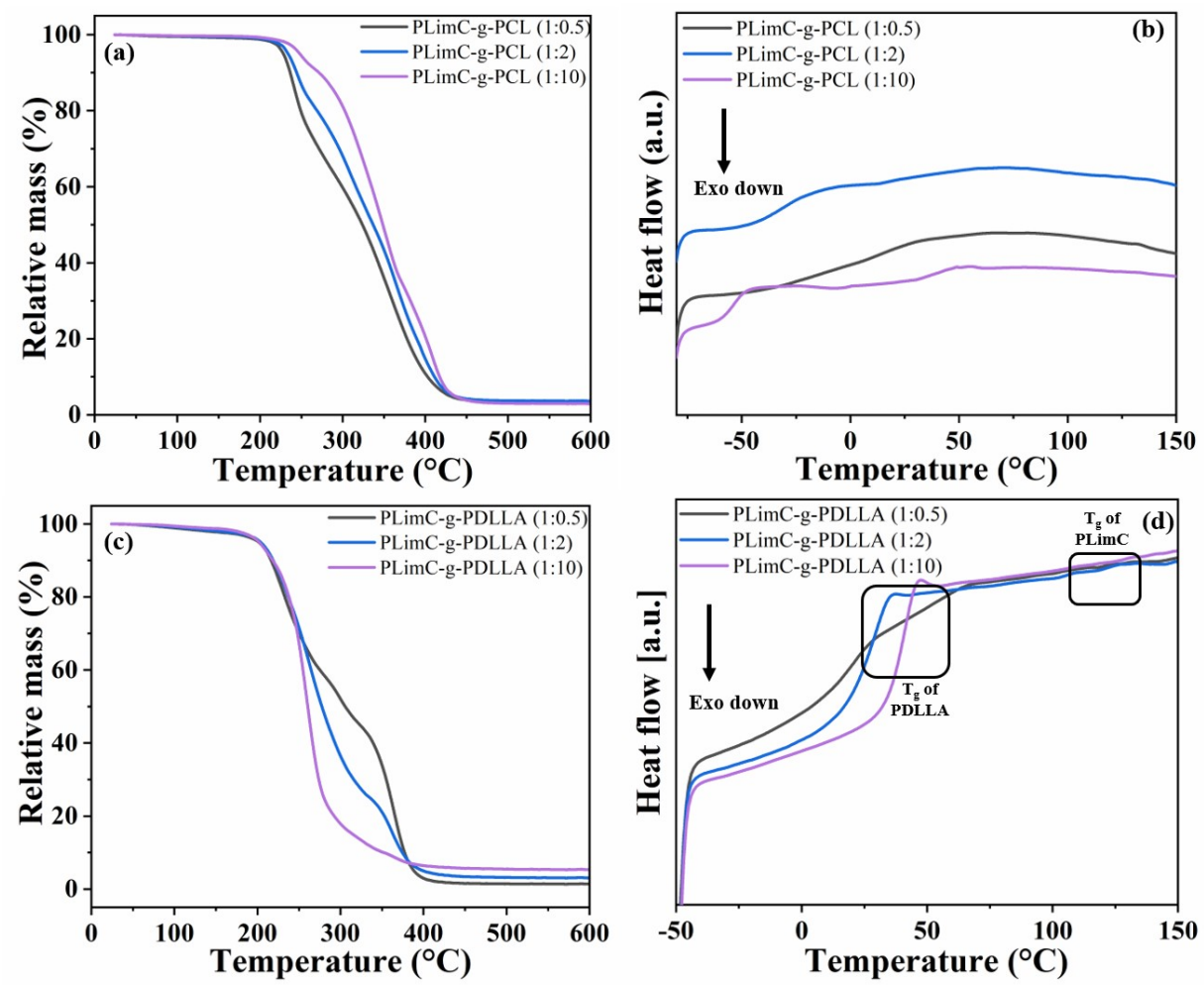

Figure S4. TGA thermograms of **(a)** PLimC-g-PCL and **(c)** PLimC-g-PDLLA with different feed ratios measured under nitrogen with 10 K min^{-1}. DSC thermograms (2^{nd} heating curve) of **(b)** PLimC-g-PCL and **(d)** PLimC-g-PDLLA with different feed ratios measured under nitrogen with 10 K min^{-1}.

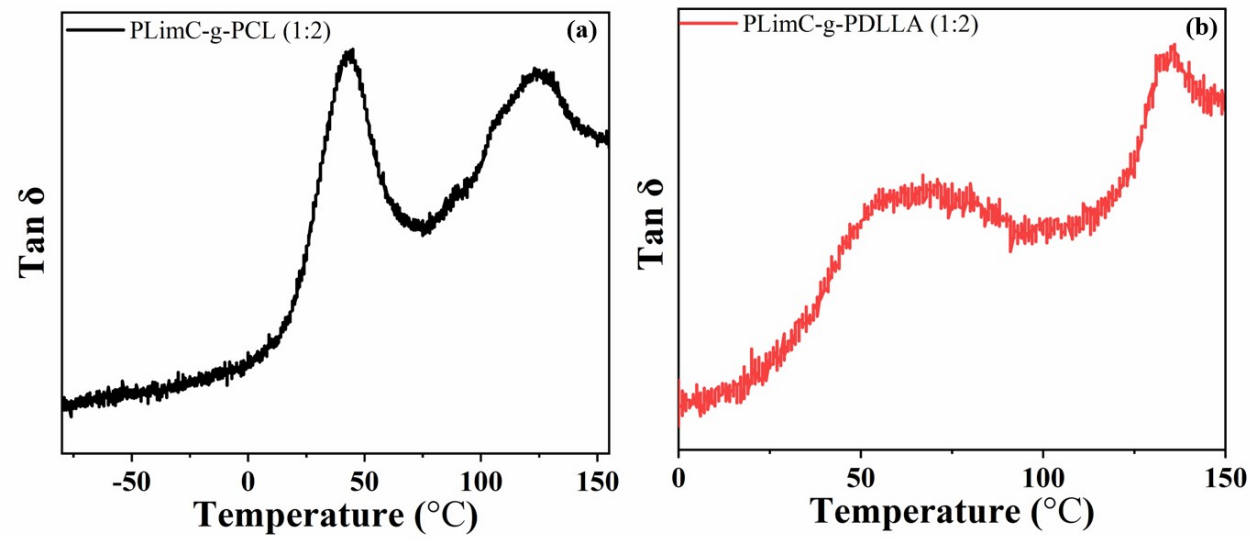

Figure S5. DMA curves measured for graft copolymers **(a)** PLimC-g-PCL **(b)** PLimC-g-PDLLA in the temperature range of -100 ℃ to 160 ℃.

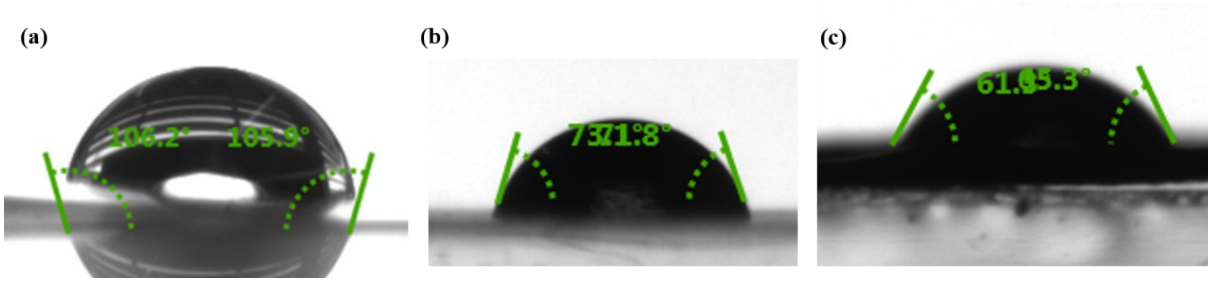

Figure S6. Contact angle measurement of **(a)** pure PLimC, **(b)** pure PDLLA and **(C)** pure PCL

Table S2. Mechanical properties of PLimC-g-PDLLA and PLimC-g-PCL

Sample name	Ultimate tensile[a] strength (MPa)	Elongation at break[a](%)
Pure PLimC	38 ± 4	5 ± 2
Pure PCL	26 ± 1	403 ± 3
Pure PDLLA	68 ± 1	4 ± 1
PLimC-g-PDLLA (1:0.5)	12 ± 0.5	3 ± 2
PLimC-g-PDLLA (1:2)	17 ± 0.1	3 ± 1
PLimC-g-PDLLA (1:10)	9 ± 0.5	5 ± 2
PLimC-g-PCL (1:0.5)	15 ± 0.5	87 ± 11
PLimC-g-PCL (1:2)	16 ± 0.5	102 ± 9
PLimC-g-PCL (1:10)	15 ± 1	114 ± 12

[a]Measurement done at 10 mm. min^{-1} test speed.

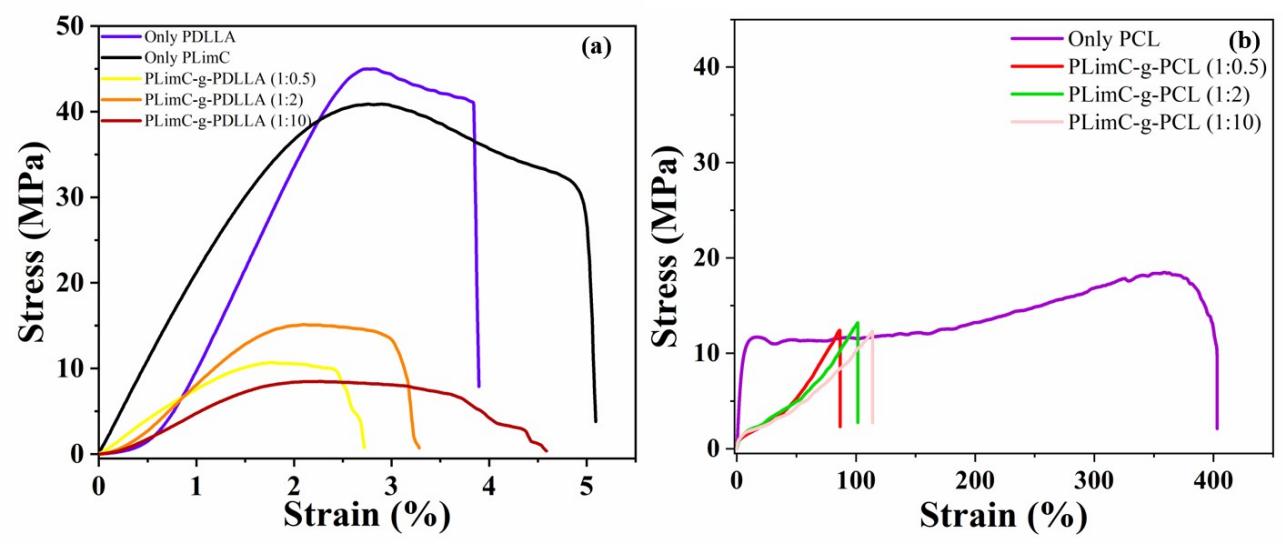

Figure S7. Stress-strain curves of PLimC-g-PDLLA and PLimC-g-PCL graft copolymers

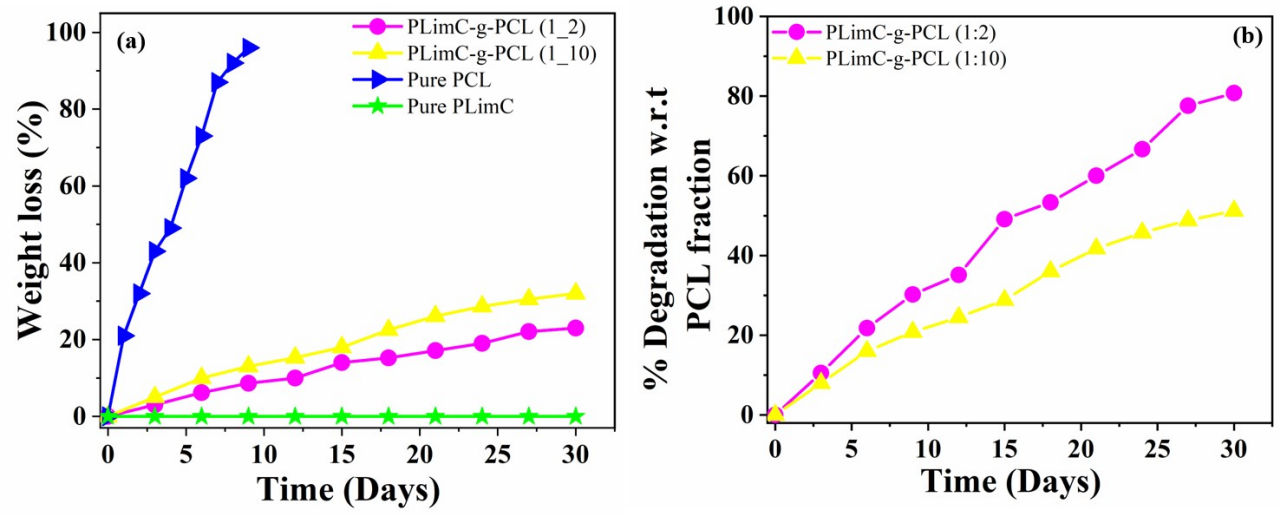

Figure S8. Enzymatic degradation of graft copolymers **(a)** PLimC-g-PCL films with Lipase (0.2 mg mL^{-1}) in phosphate-buffered solution (0.025M, pH = 7.4) and **(b)** percentage degradation with respect to PCL fraction in 30 days.

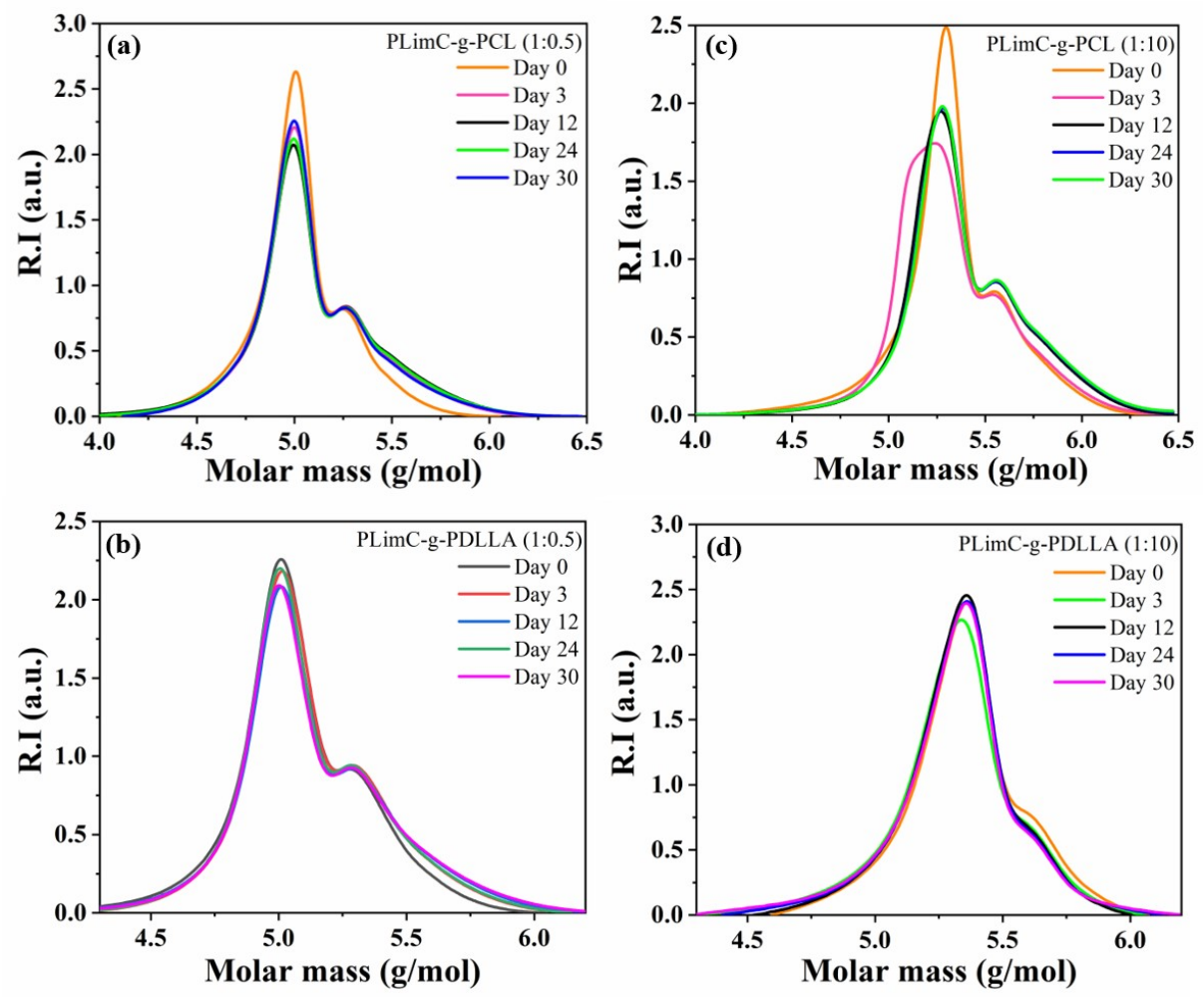

Figure S9. THF-GPC curves of graft copolymers **(a)** PLimC-g-PCL with 1:0.5 feed ratio **(b)** PLimC-g-PDLLA with 1:0.5 feed ratio **(c)** PLimC-g-PCL with 1:10 feed ratio and **(d)** PLimC-g-PDLLA with 1:10 feed ratio before and after enzymatic degradation.

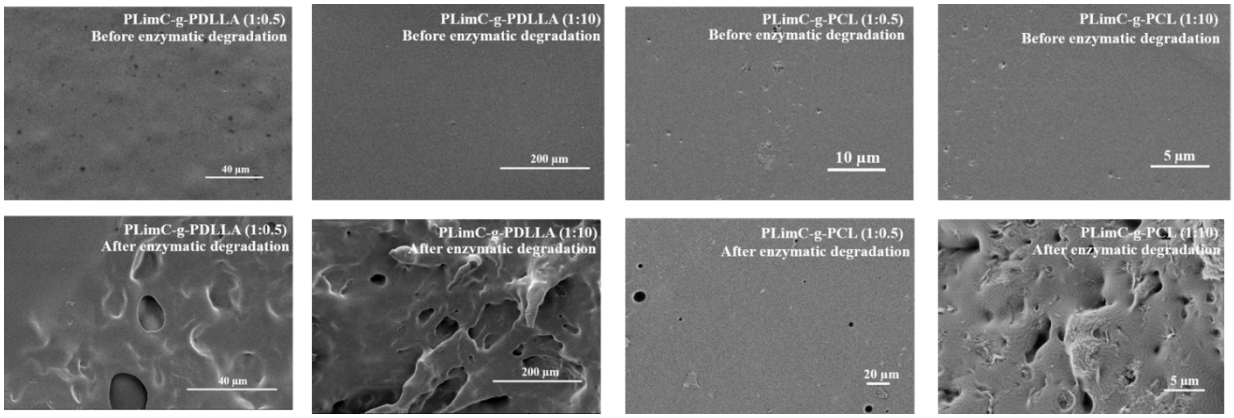

Figure S10. SEM images of PLimC-g-PDLLA and PLimC-g-PCL films before enzymatic degradation (1st row) and PLimC-g-PDLLA and PLimC-g-PCL films after enzymatic degradation (2nd row)

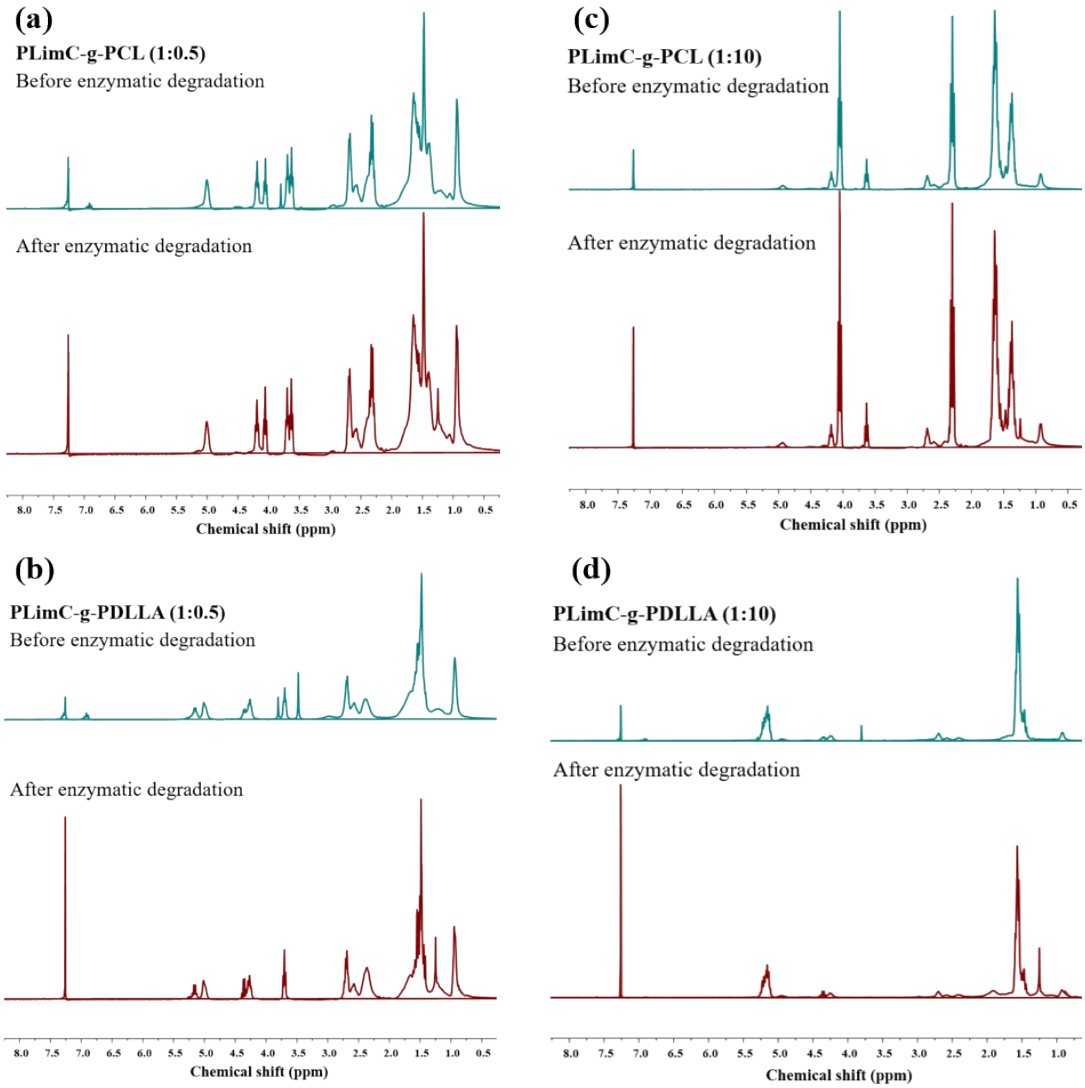

Figure S11. ^{1}H NMR of the graft copolymers before and after enzymatic degradation **(a)** PLimC-g-PCL with 1:0.5 feed ratio **(b)** PLimC-g-PDLLA with 1:0.5 feed ratio **(c)** PLimC-g-PCL with 1:10 feed ratio and **(d)** PLimC-g-PDLLA with 1:10 feed ratio.