

Supporting information

Thermoset meets Thermoplastic: Upcycling PLA in Digital Light Processing 3D Printing of Dynamic Thiol–Ene Composites

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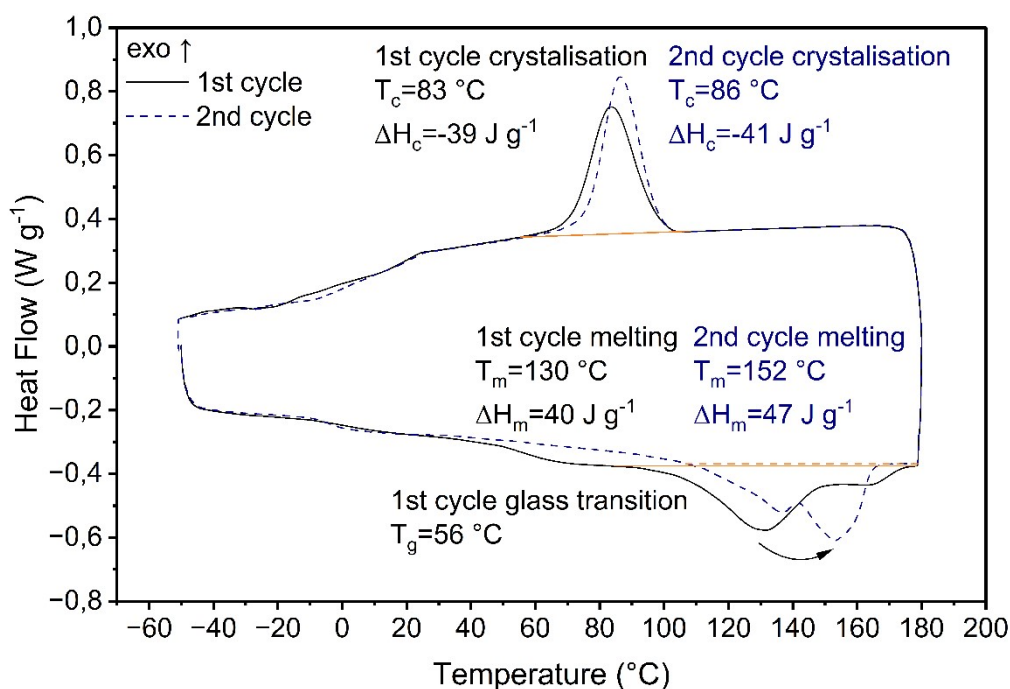


Figure S1 DSC curve of neat PLA filler obtained over two consecutive heating–cooling cycles (10 °C min⁻¹, N₂ atmosphere).

Table S1 Formulas and values used to calculate PLA density

Degree of crystallinity	$\chi_c = \frac{\Delta H_m - \Delta H_{cc}}{\Delta H_m^0}$			43%	Density	$\rho = \left(\frac{\chi_c}{\rho_c} + \frac{1 - \chi_c}{\rho_a} \right)^{-1}$			1,266 g cm ⁻³
Parameter	Short	Value	Source		Parameter	Short	Value	Source	
Melting enthalpy	ΔH_m	40 J g ⁻¹	DSC		Degree of crystallinity	χ_c	43%	Calculated	
Cold crystallisation enthalpy	ΔH_{cc}	0 J g ⁻¹	DSC		Density of crystalline phase	ρ_c	1,290 g cm ⁻³	[2]	
Reference melting enthalpy of 100% crystalline PLA	ΔH_m^0	93 J g ⁻¹	[1]		Density of amorphous phase	ρ_a	1,248 g cm ⁻³	[3]	

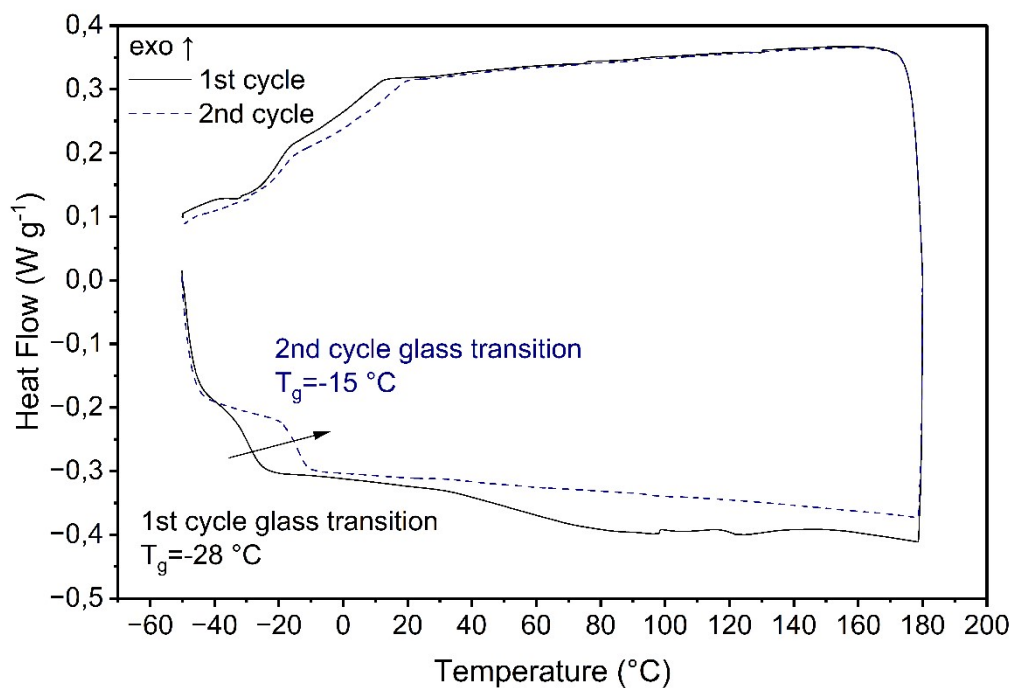


Figure S2 DSC curve of the pristine photopolymer obtained over two consecutive heating-cooling cycles ($10^{\circ}\text{C min}^{-1}$, N_2 atmosphere).

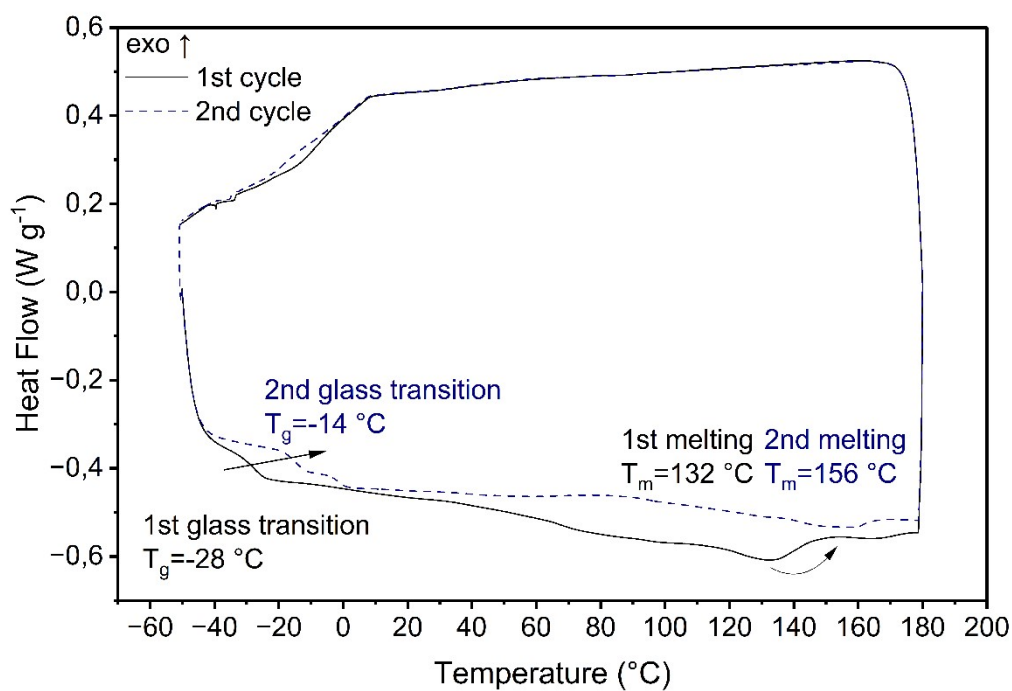


Figure S3 DSC curve of PLA30% composite obtained over two consecutive heating-cooling cycles ($10^{\circ}\text{C min}^{-1}$, N_2 atmosphere).

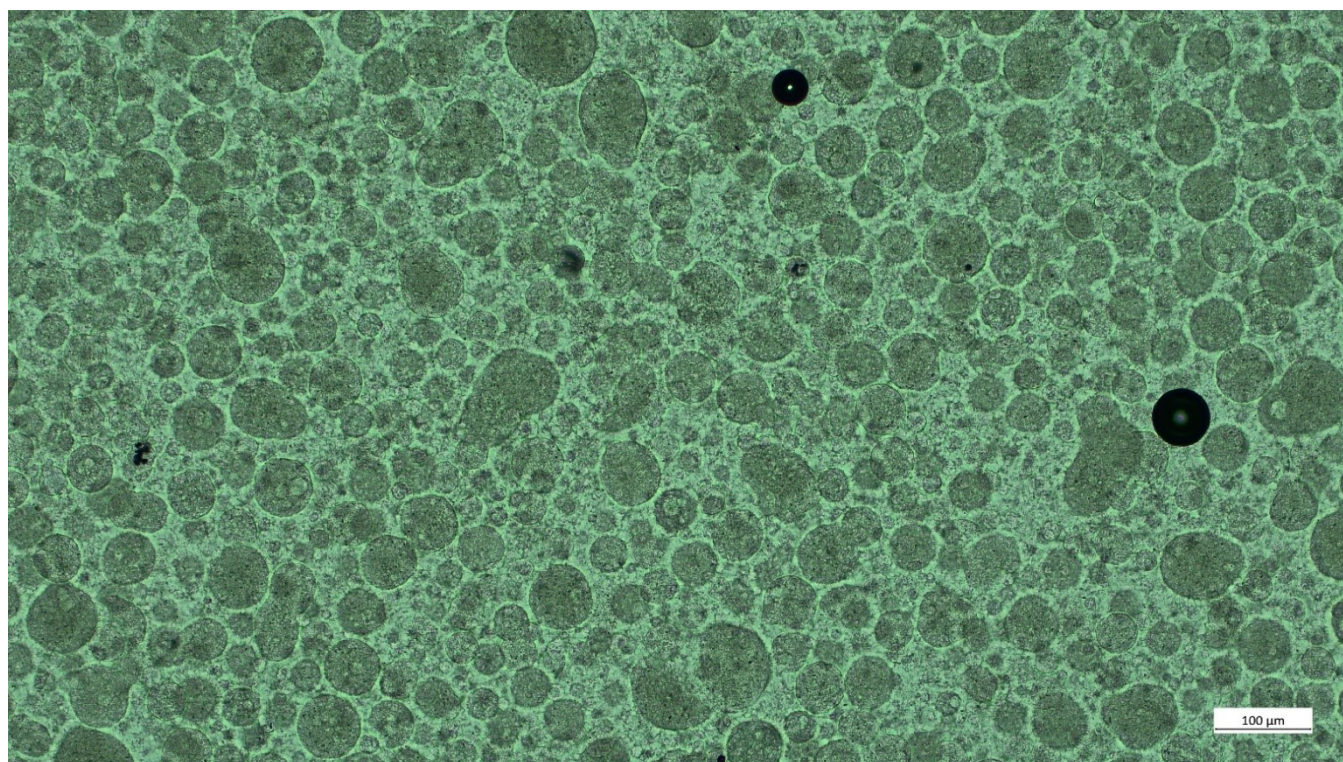


Figure S4 Microscopic image of PLA filler distributed in PLA30 resin.

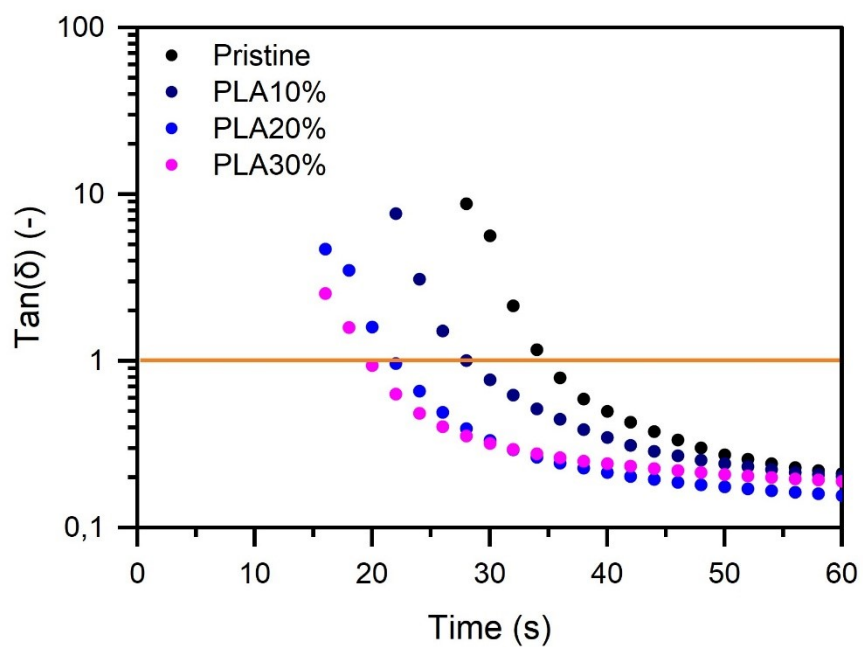


Figure S5 Change of loss factor $\tan(\delta)$ during light irradiation obtained from photo-rheology. The gel point was determined for the time at which the loss factor value was 1.

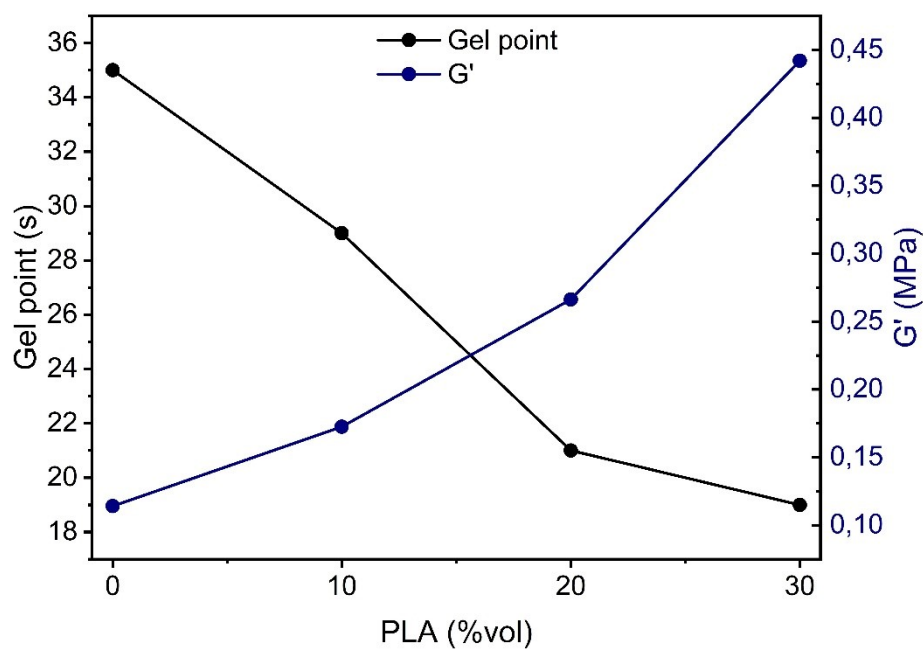


Figure S6 Gel point and maximum storage modulus G' obtained from photo-rheology as a function of filler volume.

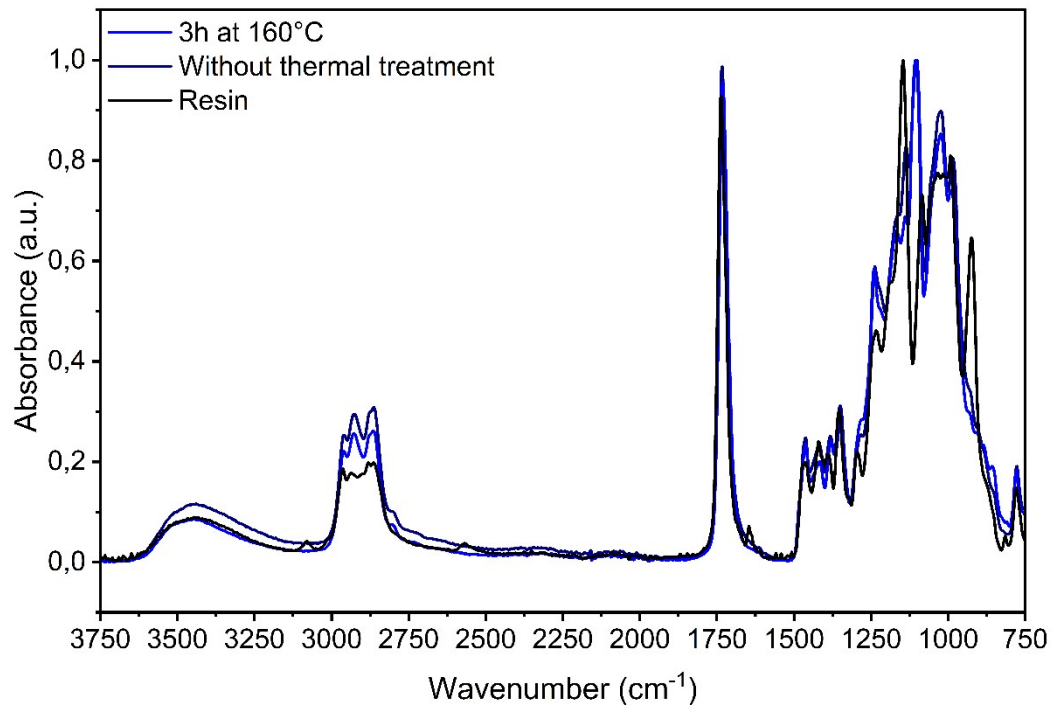


Figure S7 FTIR spectra showing changes in characteristic signals during photopolymerisation and post-baking (full range).

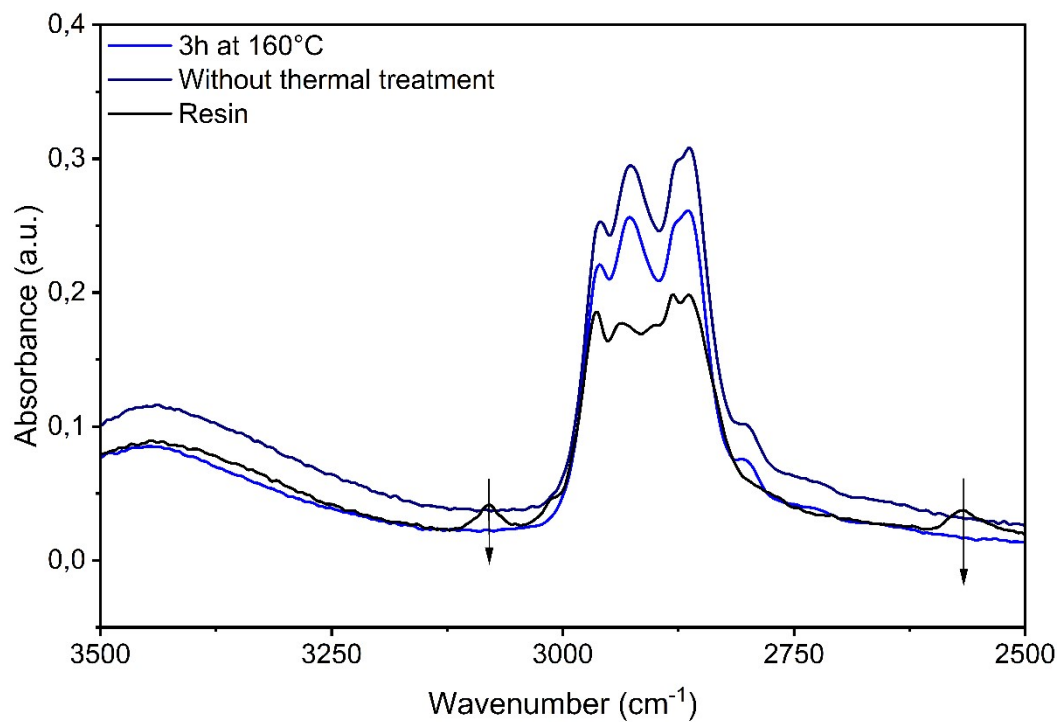


Figure S8 FTIR spectra showing changes in characteristic signals during photopolymerisation and post-baking (range 3500-2500 cm⁻¹).

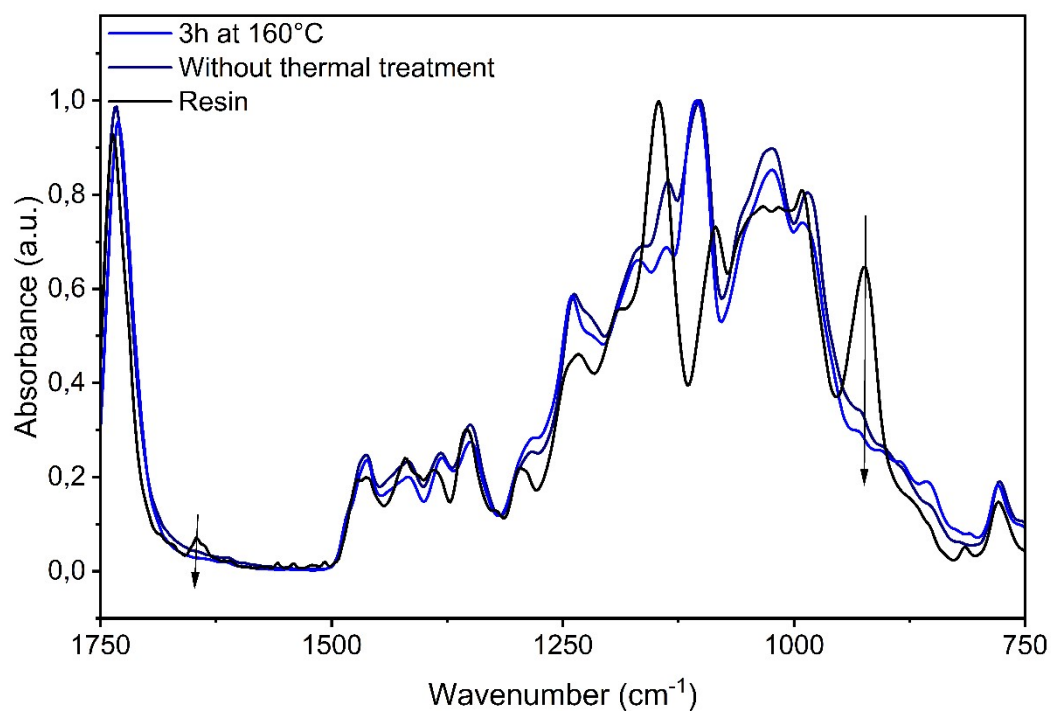


Figure S9 FTIR spectra showing changes in characteristic signals during photopolymerisation and post-baking (range 1750-750 cm⁻¹).

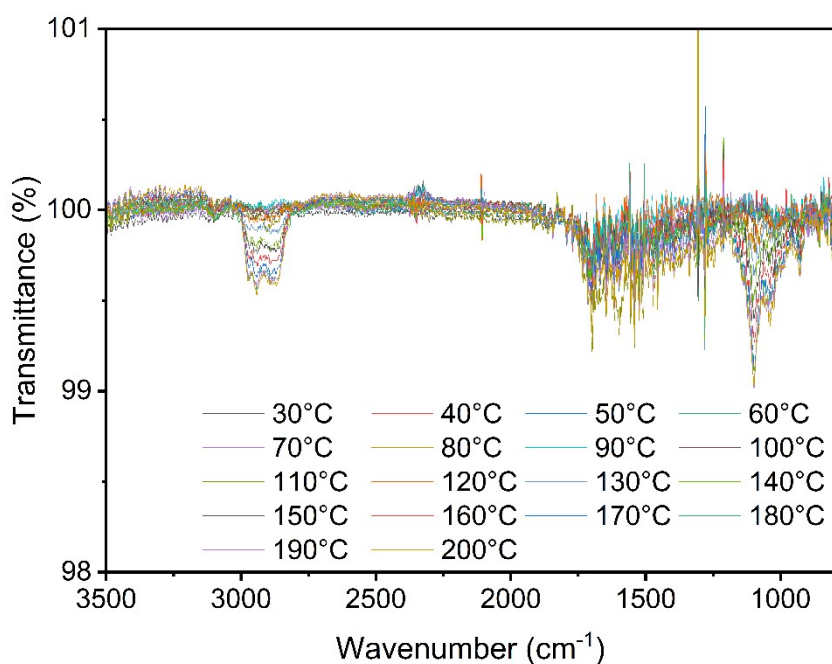


Figure S10 FTIR spectra of the evolved gases at various temperatures during uncatylsed pristine sample post-baking (range 3500-750 cm⁻¹).

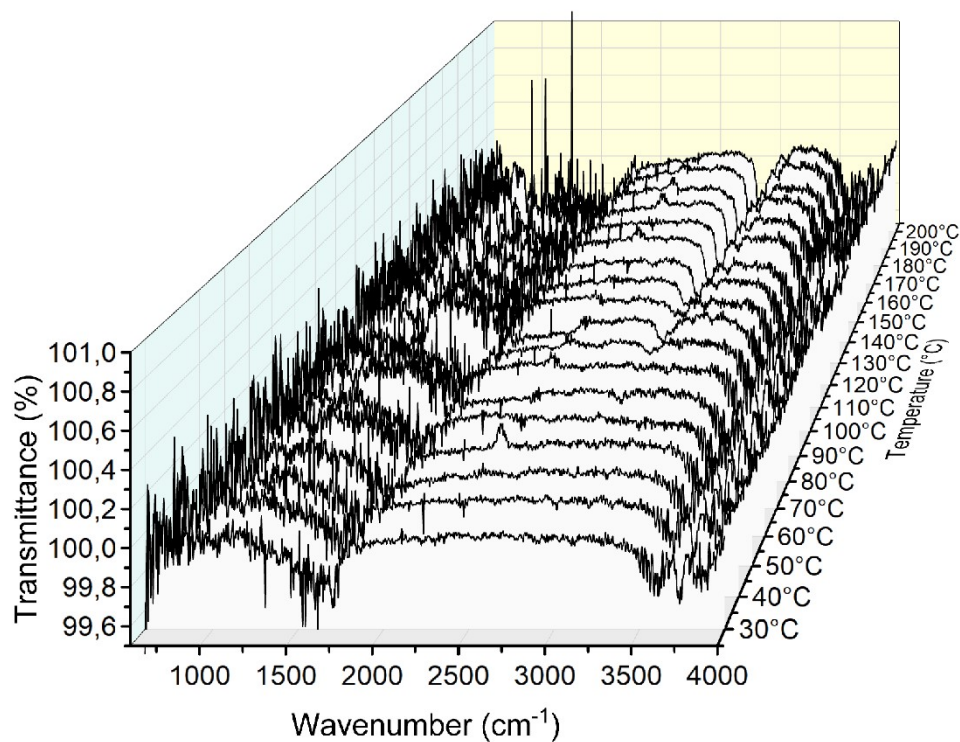


Figure S11 FTIR spectra of the evolved gases at various temperatures during uncatylsed pristine sample post-baking (range 4000-600 cm⁻¹).

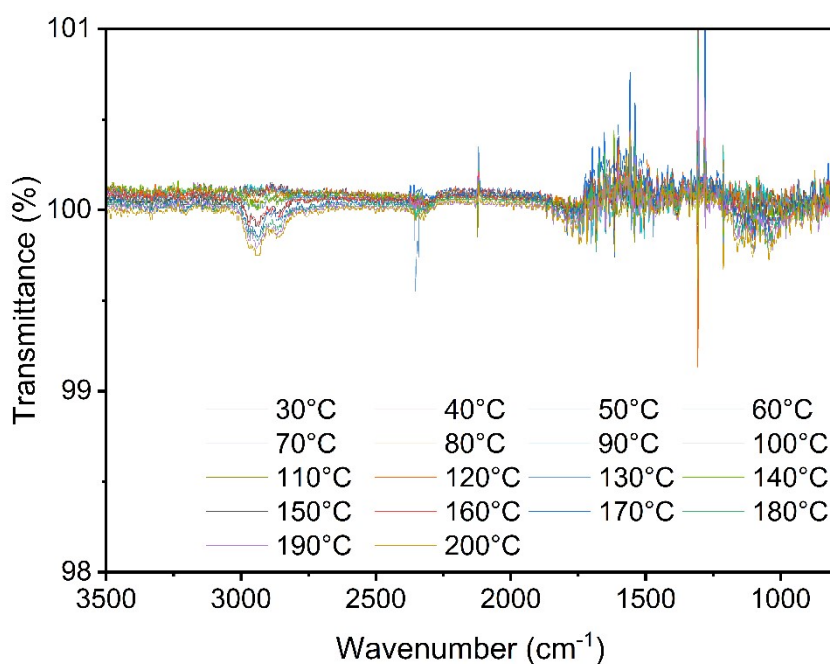


Figure S12 FTIR spectra of the evolved gases at various temperatures during catalysed pristine sample post-baking (range 3500-750 cm^{-1}).

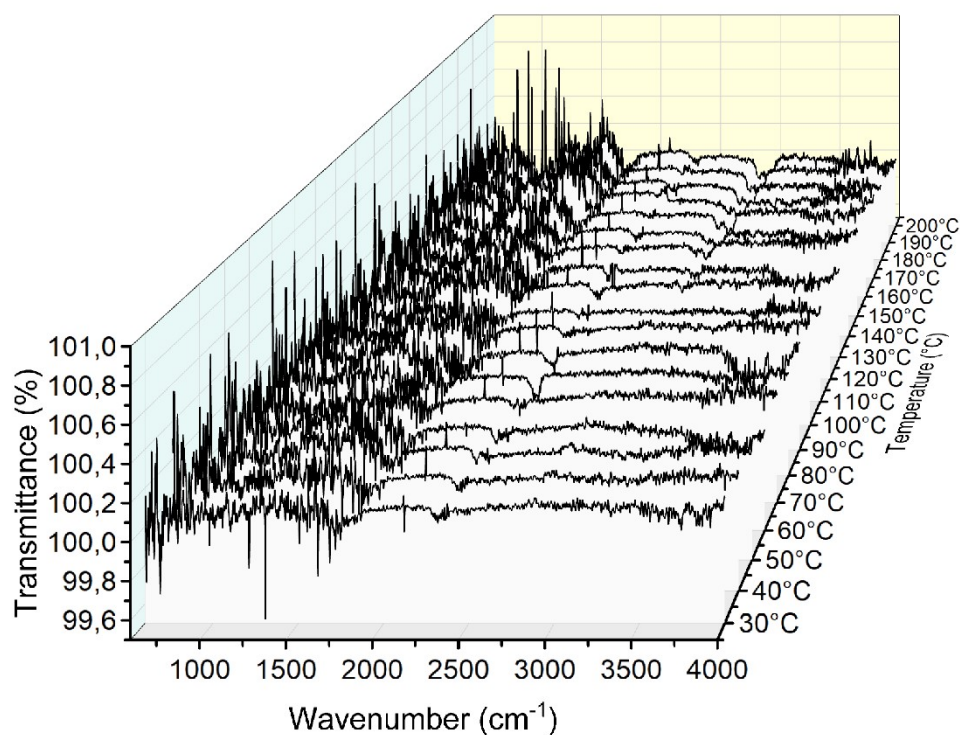


Figure S13 FTIR spectra of the evolved gases at various temperatures during catalysed pristine sample post-baking (range 4000-600 cm^{-1}).

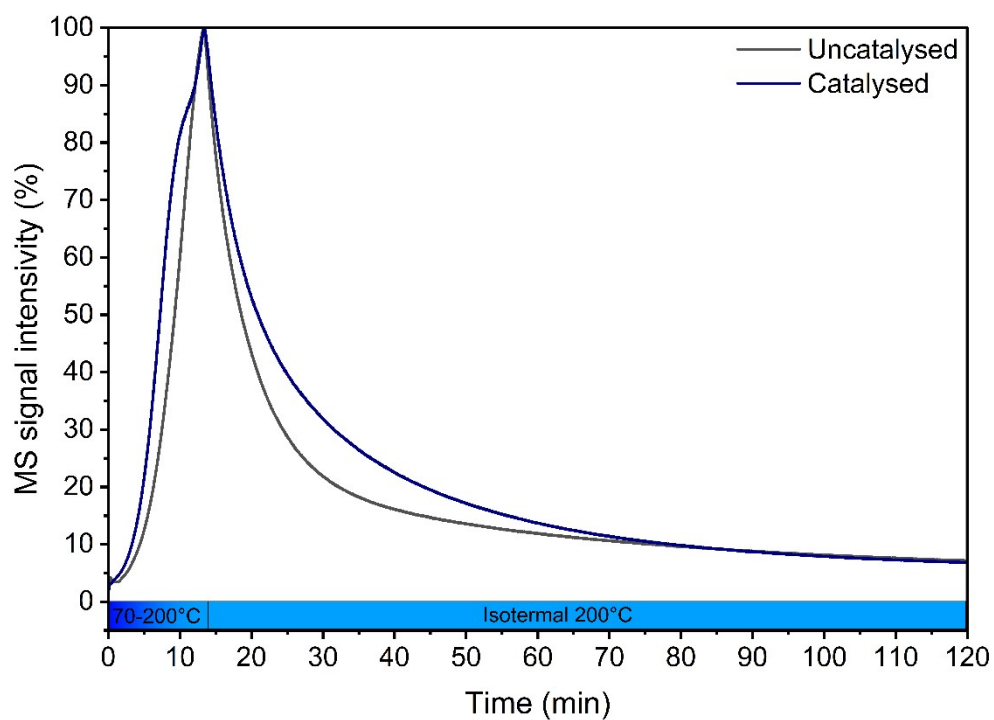


Figure S14 Mass spectrometry signal intensity as a function of time during sample thermal treatment.

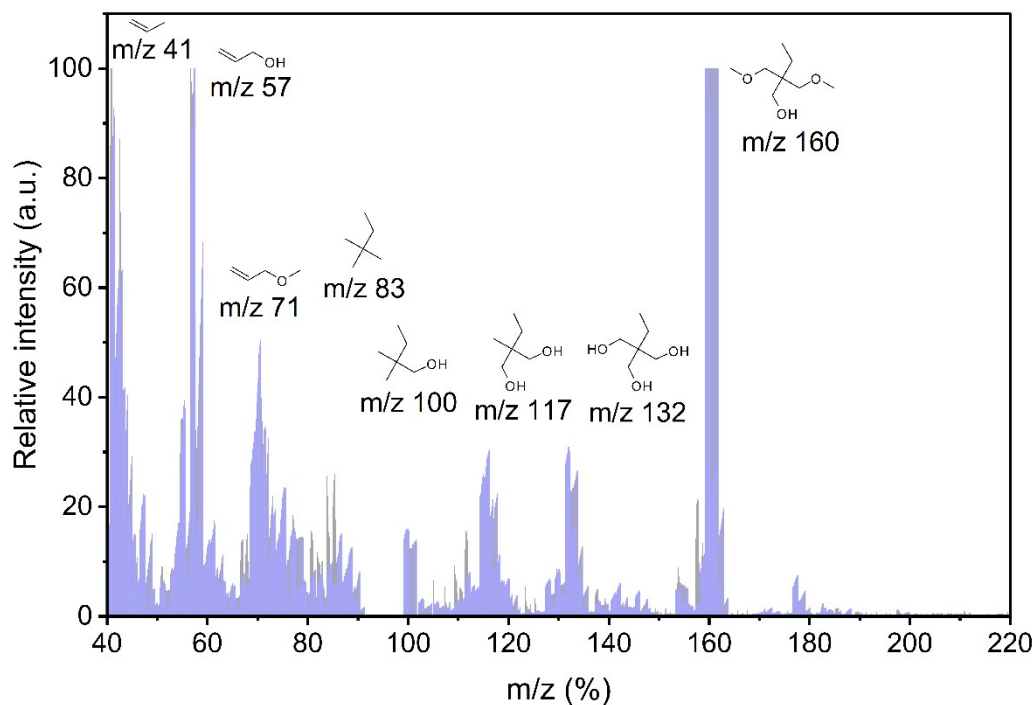


Figure S15 Proposed structures for MS peaks obtained during thermal treatment of the uncatalysed pristine sample.

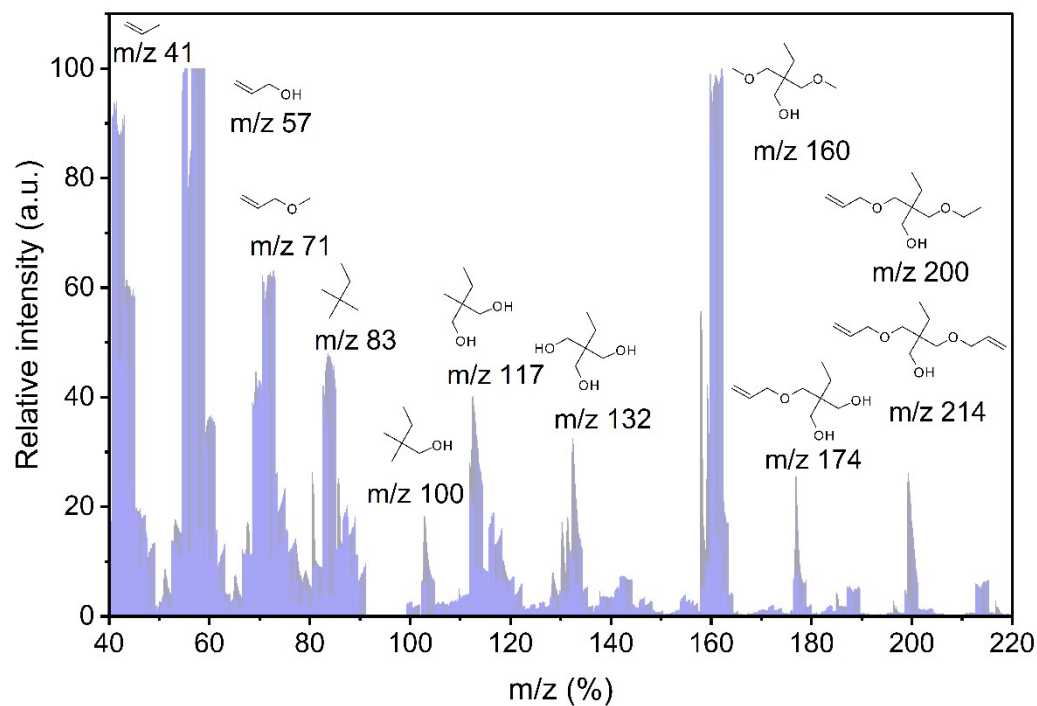


Figure S16 Proposed structures for MS peaks obtained during thermal treatment of the catalysed pristine sample.

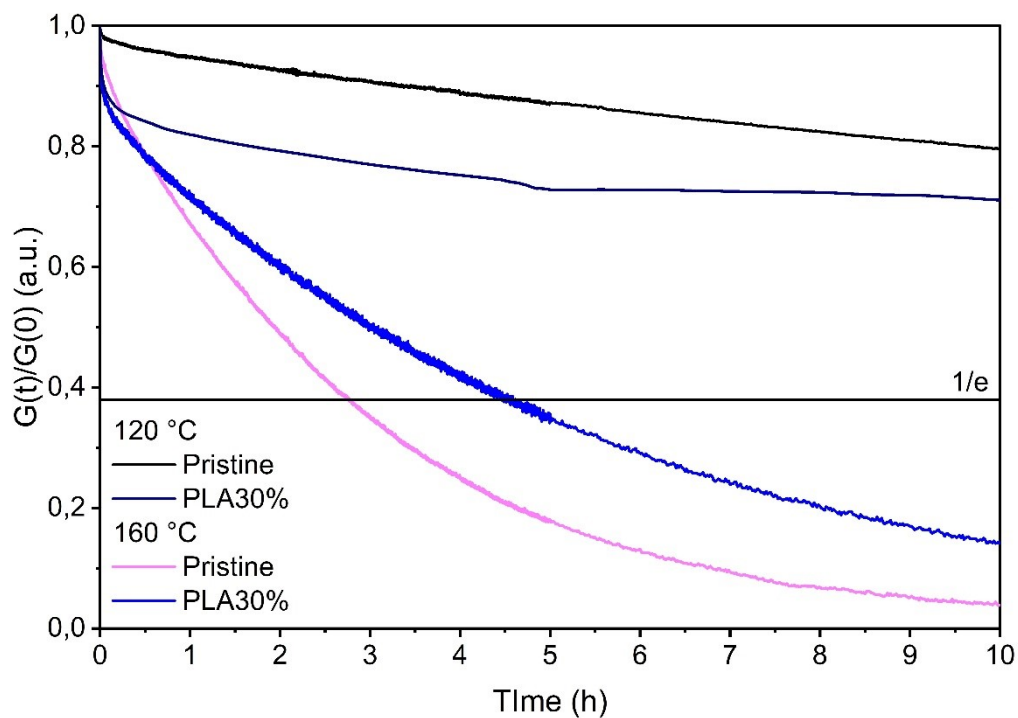


Figure S17 Stress relaxation curve for thermally treated uncatalysed samples at 120°C.

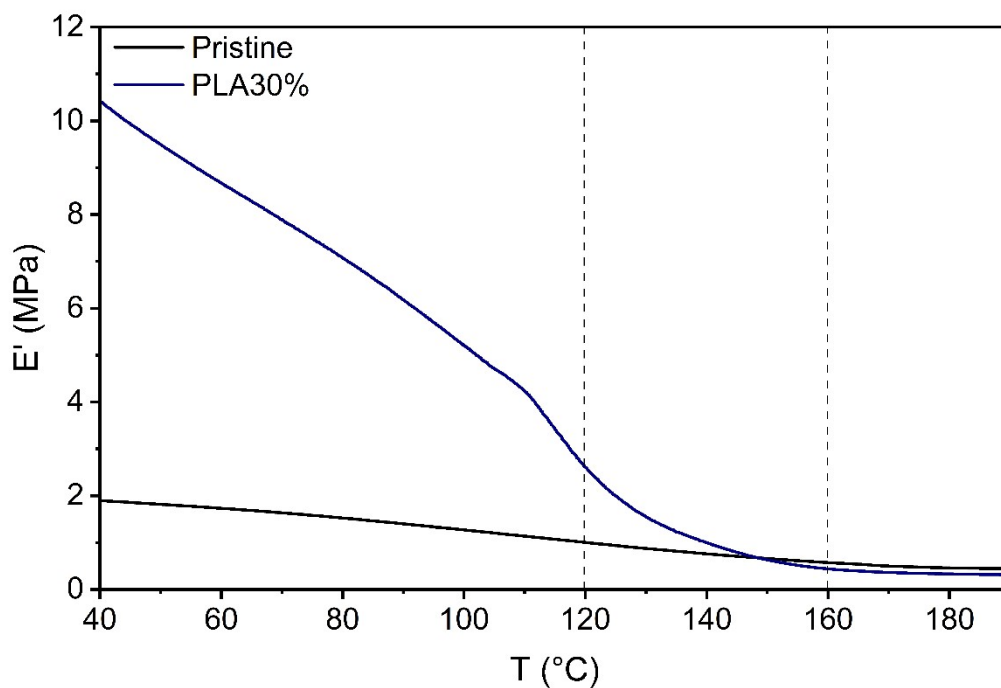


Figure S18 Storage modulus (E') of printed and post-baked samples. The dash lines indicate the temperature range in which stress relaxation tests were conducted.

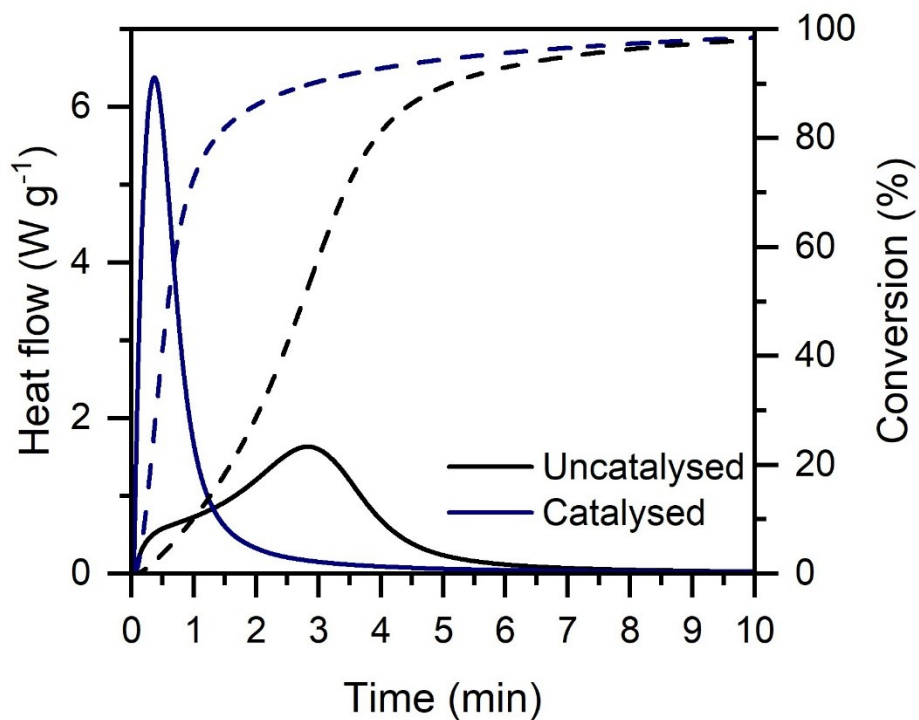


Figure S19 Thermal effect of curing and conversion of monomers based on ΔH normalized to the resin including filler obtained from photo-DSC experiments.