

SUPPORTING INFORMATION

Tailored plasticization of bio- and fossil-based polymers using a versatile bioplasticizer derived from phenylacetic acid and glycerol

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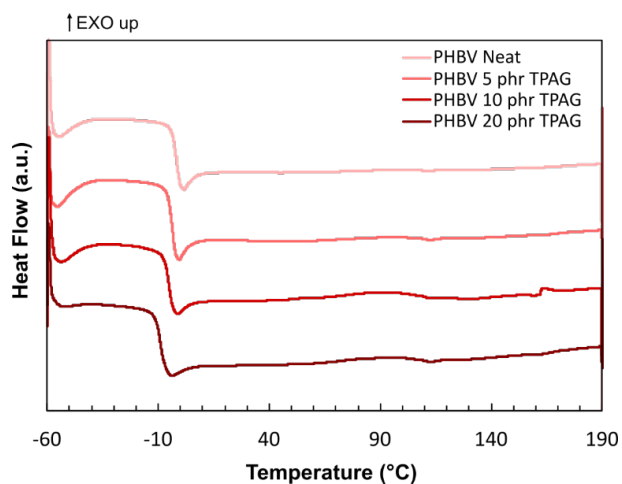


Figure S1. Full scale DSC thermograms recorded from the second heating scan of neat PHBV and related TPAG formulation.

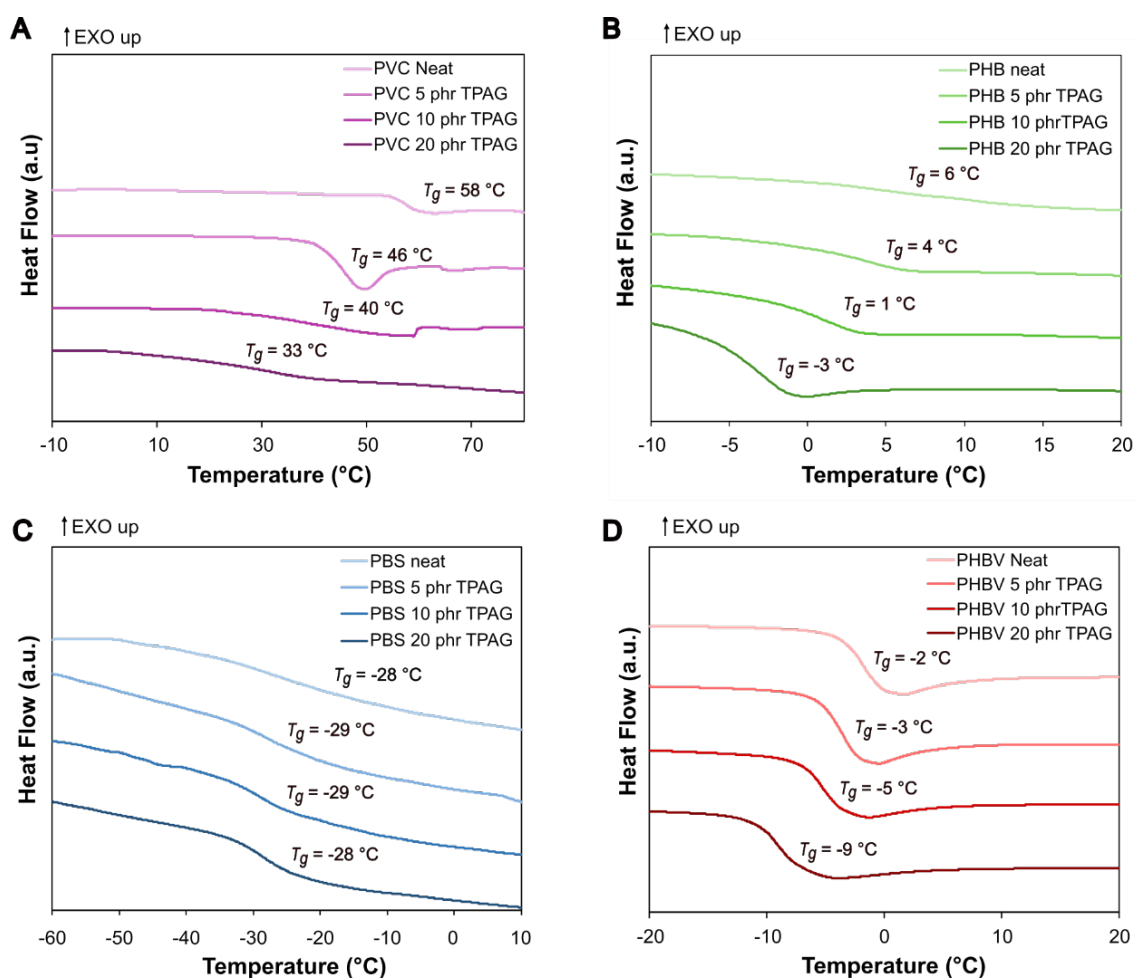


Figure S2. DSC thermograms recorded during the second heating scan at $10^\circ\text{C}\cdot\text{min}^{-1}$, showing glass transition temperatures (T_g) of neat and TPAG formulations of (A) PVC, (B) PHB, (C) PBS and (D) PHBV.

Table S1. Glass transition temperature ($T_{g,DSC}$), melting temperature (T_m) and melting enthalpy (ΔH_m) extrapolated from DSC thermograms, crystalline degree (X_c , calculated by Eq. 2), onset temperature (T_{onset}) and maximum degradation temperature (T_{max}) obtained from TGA of neat and plasticized polymers.

Polymer	TPAG content (phr)	$T_{g,DSC}$ (°C)	T_m (°C)	ΔH_m (J·g ⁻¹)	X_c (%)	T_{onset} (°C)	T_{max} (°C)
PVC	0	58	-	-	-	264 ⁽¹⁾	282 ⁽¹⁾
			-	-	-	426 ⁽²⁾	443 ⁽²⁾
	5	46	-	-	-	-	
	10	40	-	-	-	-	
	20	33	-	-	-	260 ⁽¹⁾	290 ⁽¹⁾
PHB	0	6	147	-	-	250	261
			172	84	57		
	5	4	147	-	-	-	-
			171	77	55		
	10	1	147	-	-	-	-
			169	75	57		
20	-3	147	-	-	250	260	
		167	68	58			
PBS	0	-28	115	62	30	356	382
	5	-29	114	67	33	-	-
	10	-29	113	66	35	-	-
	20	-28	112	62	37	351	381
PHBV	0	-2	-	-	-	257	268
	5	-3	-	-	-	-	-
	10	-5	-	-	-	-	-
	20	-9	-	-	-	261	271

⁽¹⁾ First thermal degradation step (dehydrochlorination)

⁽²⁾ Second thermal degradation step (cracking of the hydrocarbon chains)

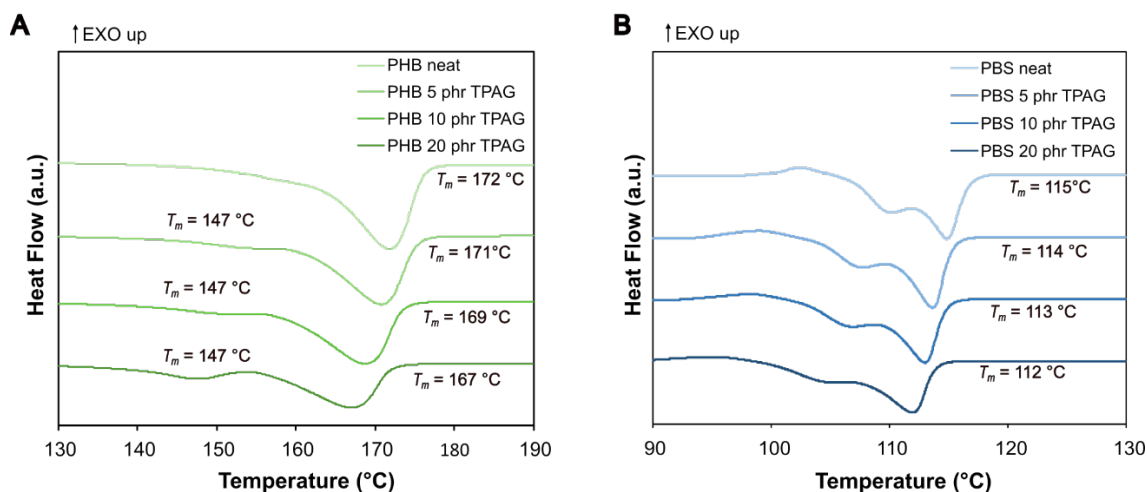


Figure S3. DSC thermograms recorded during the second heating scan at $10\text{ °C}\cdot\text{min}^{-1}$, endothermic melting peaks and the relative melting temperatures (T_m) of neat and TPAG formulations of (A) PHB and (B) PBS.

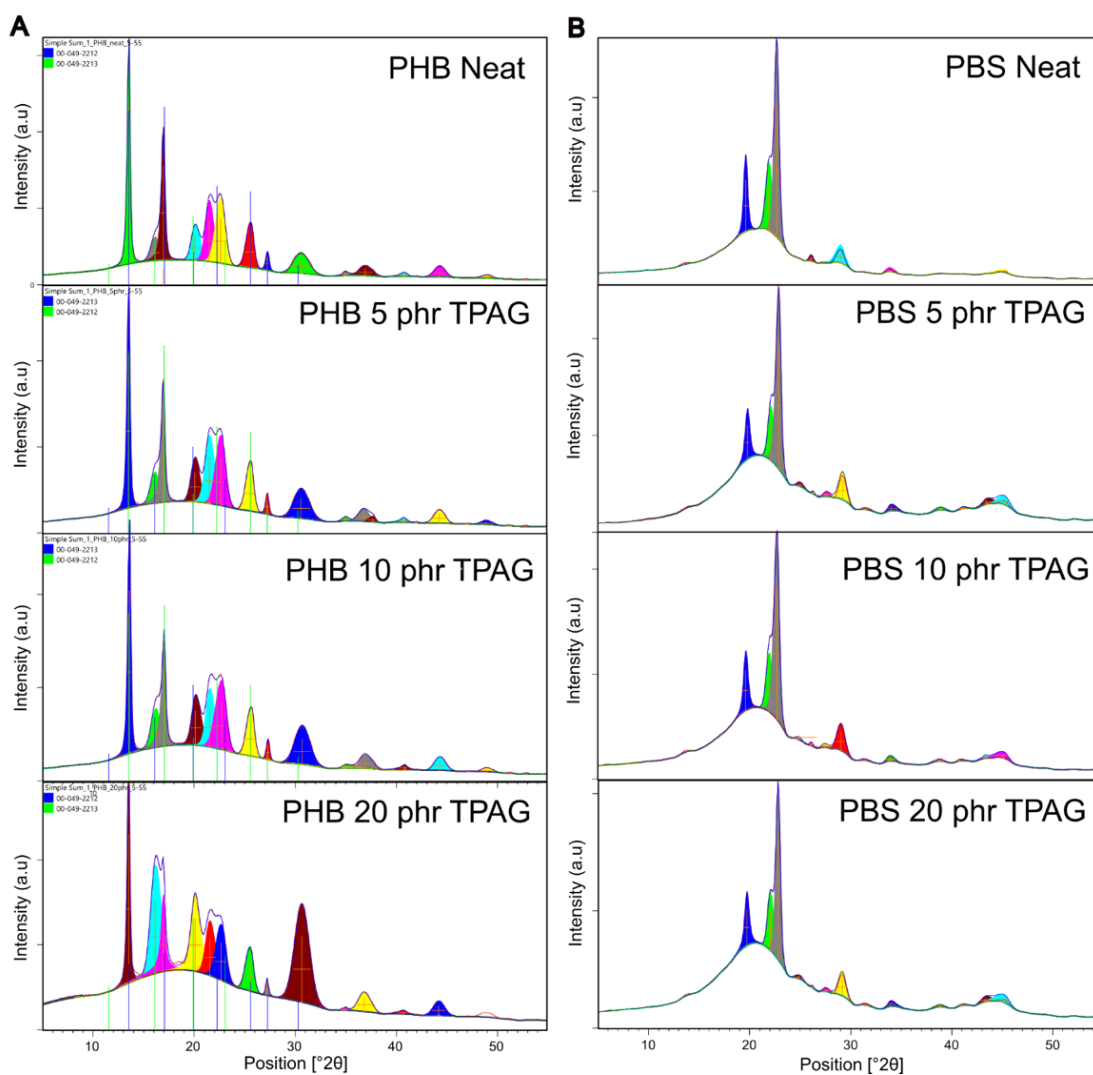


Figure S4. Results of the fitting and deconvolution process obtained from the XRD patterns collected in the $5\text{--}55^\circ$ (2θ) range for neat and TPAG formulations (5, 10 and 20 phr) of (A) PHB and (B) PBS.

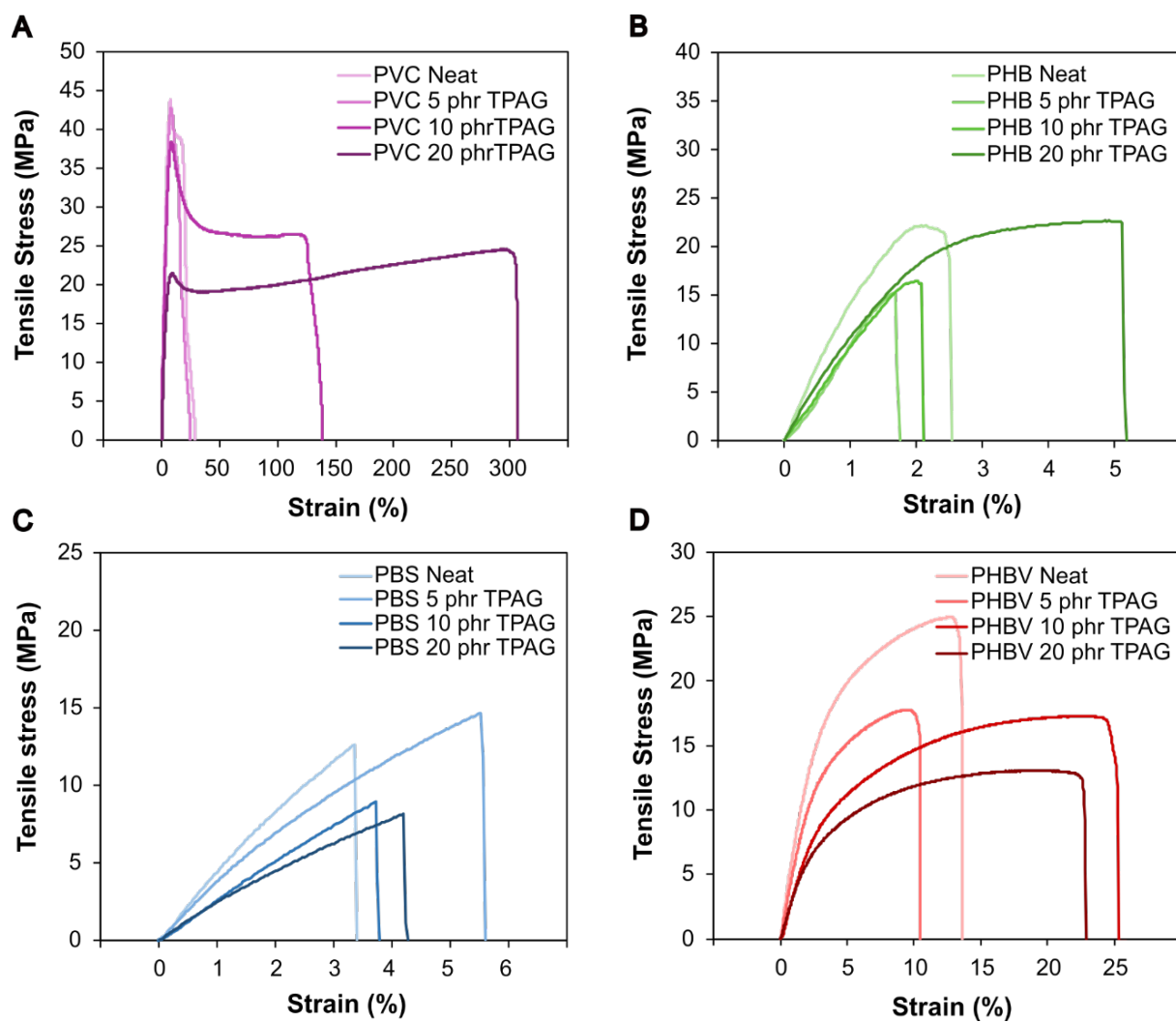


Figure S5. Stress-strain curves of neat and plasticized samples of (A) PVC, (B) PHB, (C) PBS, and (D) PHBV.

Table S2. Young's modulus (E) and elongation at break (ϵ_{break}) obtained from tensile tests of neat and plasticized polymers. E and ϵ_{break} are expressed as mean value \pm standard deviation.

Polymer	TPAG content (phr)	E (MPa)	ϵ_{break} (%)
PVC	0	1346 \pm 95	17 \pm 4
	5	1036 \pm 106	15 \pm 3
	10	1107 \pm 184	106 \pm 61
	20	698 \pm 289	349 \pm 68
PHB	0	1610 \pm 96	2.3 \pm 0.2
	5	1009 \pm 381	2.1 \pm 0.4
	10	1008 \pm 329	2.0 \pm 0.8
	20	1160 \pm 80	5.1 \pm 0.9
PBS	0	448 \pm 36	2.9 \pm 0.8
	5	409 \pm 31	5.4 \pm 0.2
	10	248 \pm 62	3.4 \pm 1.5
	20	285 \pm 27	4.1 \pm 0.4
PHBV	0	736 \pm 65	14 \pm 1
	5	491 \pm 112	10 \pm 2
	10	360 \pm 108	26 \pm 6
	20	311 \pm 33	22 \pm 1

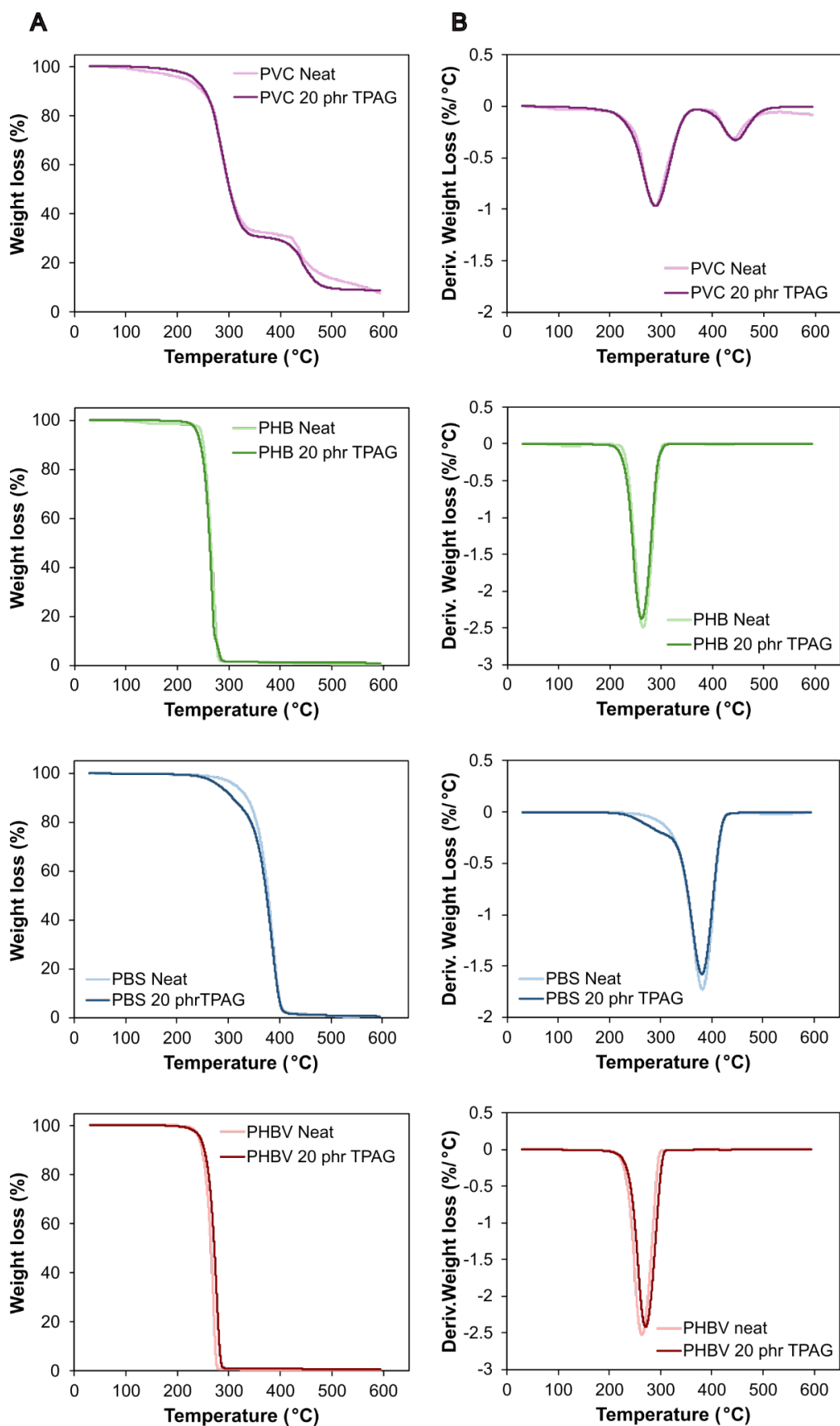


Figure S6. (A) TGA thermograms of PVC, PHB, PBS and PHBV recorded through a temperature ramp of $10\text{ }^{\circ}\text{C}\cdot\text{min}^{-1}$ from 30 to $600\text{ }^{\circ}\text{C}$ with a $60\text{ mL}\cdot\text{min}^{-1}$ nitrogen flow. **(B)** DTGA curves obtained from TGA thermograms of PVC, PHB, PBS and PHBV.