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Original

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Solid-Solid Latent Thermal Energy Storage in Nanotube-Reinforced Pentaerythritol and Pentaglycerine Composites

- Supplementary Information –

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Supplementary Note 1: Graphical results

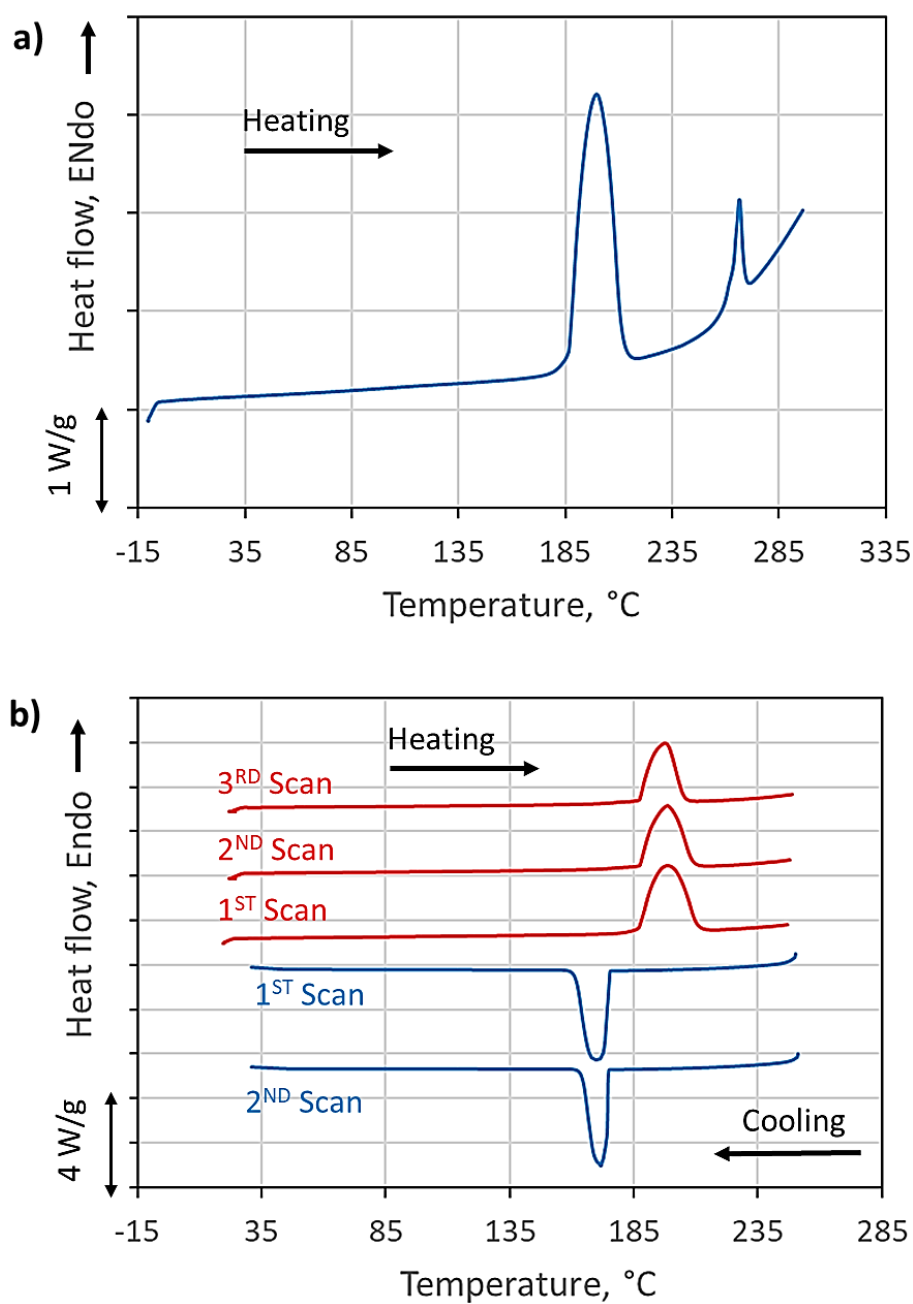


Figure S1. (a) Long DSC curve (Solid-Solid and Solid-Liquid phase transition) and (b) multiscans DSC curves (only solid-solid phase transition) of pure PE powder.

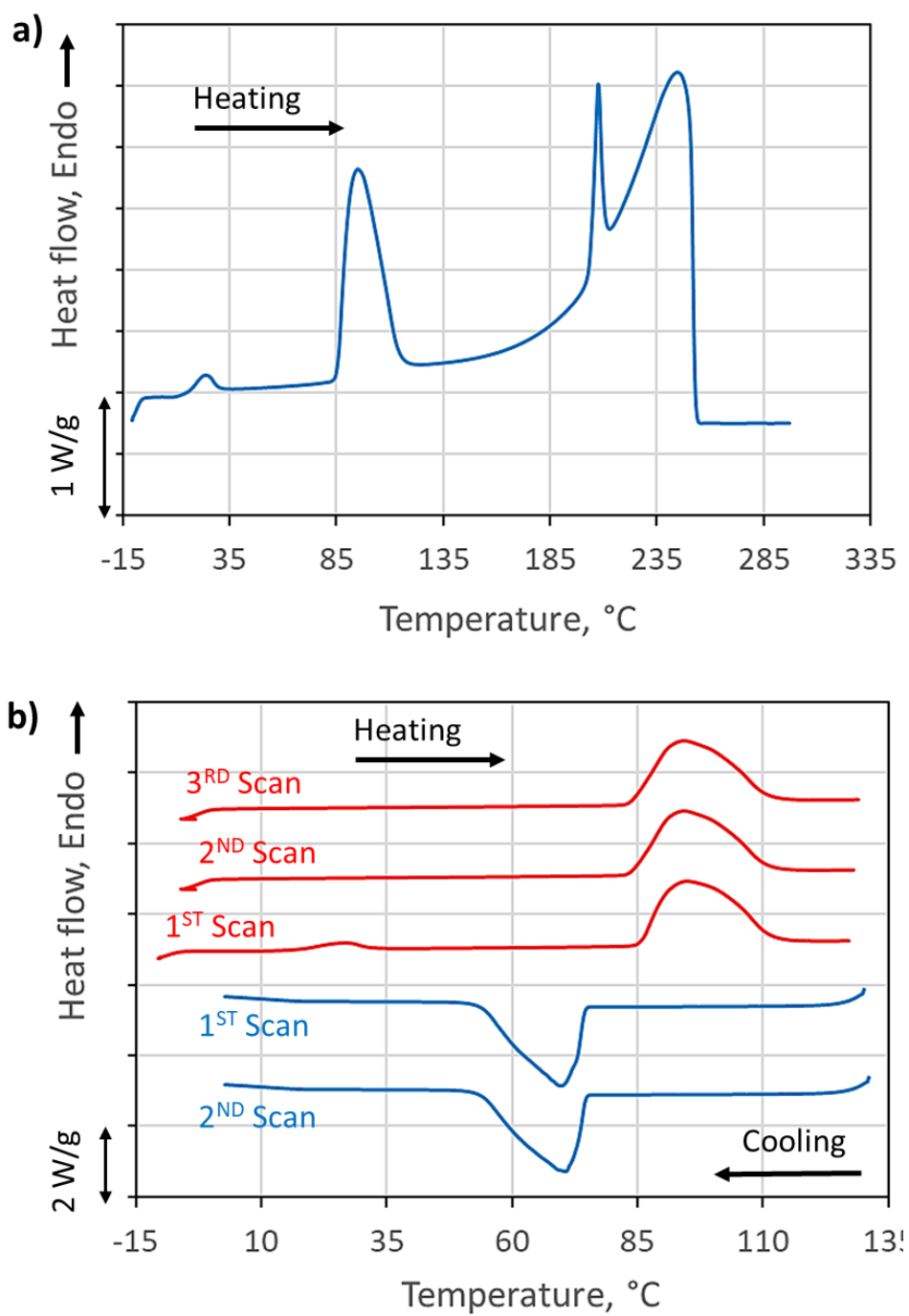
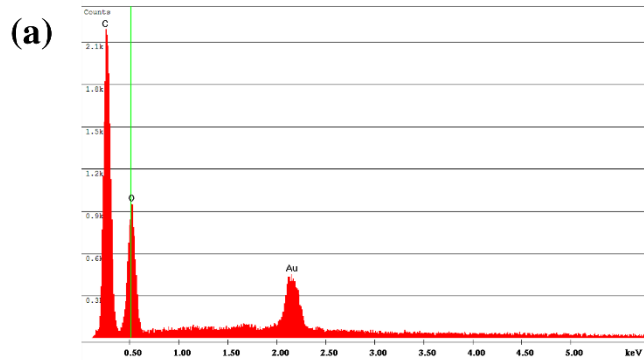
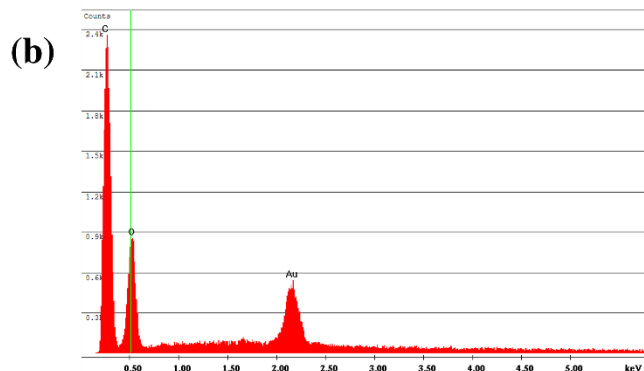


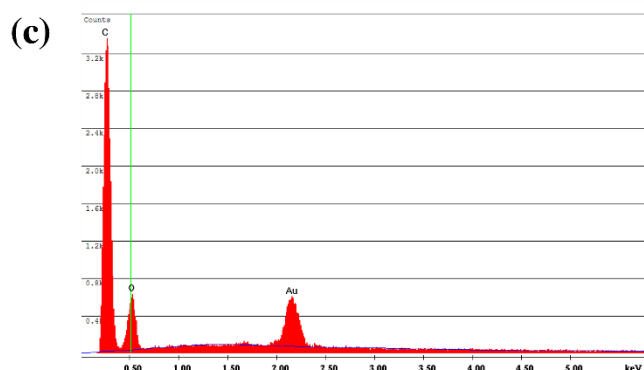
Figure S2. (a) Long DSC curve (Solid-Solid and Solid-Liquid phase transition) and (b) multiscans DSC curves (only solid-solid phase transition) of pure PG powder.



Element	Weight %	Atomic %
C	60.42	72.62
O	29.53	26.65
Au	10.05	0.74
Total	100	100



Element	Weight %	Atomic %
C	62.16	74.94
O	26.79	24.24
Au	11.05	0.81
Total	100	100



Element	Weight %	Atomic %
C K	71.34	83.70
O K	17.61	15.51
AuM	11.05	0.79
Total	100	100

Figure S3. EDS elemental mapping of (a) PG, (b) PG/MWCNTs-5% and (c) PG/MWCNTs-10%.

Supplementary Note 2: Tabulated results

	PG powder		PG tablet	
	$T_{\text{trans}}(^{\circ}\text{C})$	$\Delta H_{\text{trans}}(\text{J/g})$	$T_{\text{trans}}(^{\circ}\text{C})$	$\Delta H_{\text{trans}}(\text{J/g})$
Heating ₁	97.0±0.8	182±6	97.9	186.3
Heating ₂	96.0±0.6	182±5	98.0	180.3
Cooling ₁	70.1±0.7	168±4	64.1	175.6

Table S1. Thermal properties of pure PG powder and tablet.

	PE powder		PE tablet	
	$T_{\text{trans}}(^{\circ}\text{C})$	$\Delta H_{\text{trans}}(\text{J/g})$	$T_{\text{trans}}(^{\circ}\text{C})$	$\Delta H_{\text{trans}}(\text{J/g})$
Heating ₁	199.5±1.0	266±5	209.0	249.42
Heating ₂	200.0±0.5	222±5	207.2	212.18
Cooling ₁	169.3±1.1	242±3	161.6	228.8

Table S2. Thermal properties of pure PE powder and tablet.

System		Heating		Cooling	
		$T_{\text{trans}}(^{\circ}\text{C})$	$\Delta H_{\text{trans}}(\text{J/g})$	$T_{\text{trans}}(^{\circ}\text{C})$	$\Delta H_{\text{trans}}(\text{J/g})$
Closed	1	199.53	324.25	169.07	302.93
	2	198.30	308.29	167.97	289.05
	3	199.56	297.17	-	-
Open	1	199.5±1.0	266±5	169.3±1.1	242±3
	2	200.0±0.5	222±5	170.6±1.2	202±6
	3	197.9±0.7	187±4	-	-

Table S3. Comparison of thermal properties of pure PE powder in open and closed system.

Hydrostatic balance 	S. No	Density (g/cm ³)	
		PE	PG
	Sample-1	1.17	1.08
	Sample-2	1.18	1.07
	Sample-3	1.17	1.07
	Sample-4	1.15	1.09
	Sample-5	1.14	1.07
	Average	1.16	1.08
	Stdev	0.01	0.008

Table S4. Density measurement of PE and PG tablet using Archimedes principle.

Materials		HEATING		COOLING	
		T _{trans} (°C)	ΔH _{trans} (J/g)	T _{trans} (°C)	ΔH _{trans} (J/g)
PG	1	97.98	186.3	64.12	-175.6
	2	98.0	180.3	-	-
PG/MWCNTs-1%	1	99.6	179.5	67.0	-168.0
	2	98.9	174.2	-	-
PG/MWCNTs-5%	1	100.78	167.7	66.5	-157.5
	2	99.9	164.9	-	-
PG/MWCNTs-10%	1	100.0	160.4	68.4	-150.7
	2	99.0	144.3	-	-

Table S5. Latent heat and phase transition temperature of PG/MWCNTs composite PCM tablets.

MWCNTs (wt. %)	λ (W/mK) Experimental	λ (W/mK) Two step H-J model	λ (W/mK) Modified ME-I model	φ (-) Porosity
0	0.3642±0.002	0.3642	0.3642	0.044262
1	0.2694±0.009	0.2736	0.2705	0.215237
5	0.2394±0.006	0.2506	0.2675	0.246588
10	0.2734±0.003	0.2281	0.2692	0.273352

Table S6. Measured and predicted thermal conductivities, along with porosity values of the PG/MWCNTs composite tablets as a function of the MWCNTs content.