Supporting Information for

A Thermoregulatory Flexible Phase Change Nonwoven for All-Season High-Efficiency Wearable Thermal Management

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Supplementary Figures and Tables

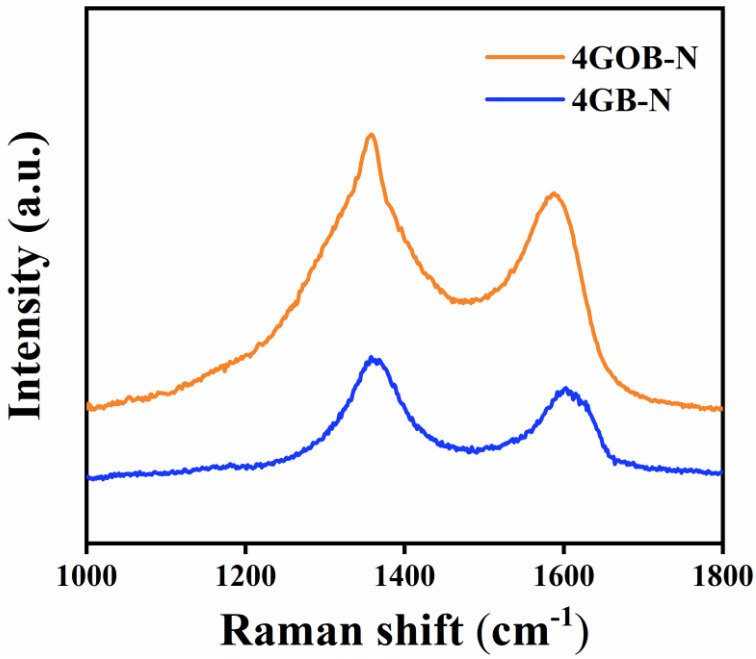

Fig. S1 Raman spectra of GB nonwoven before and after reduction

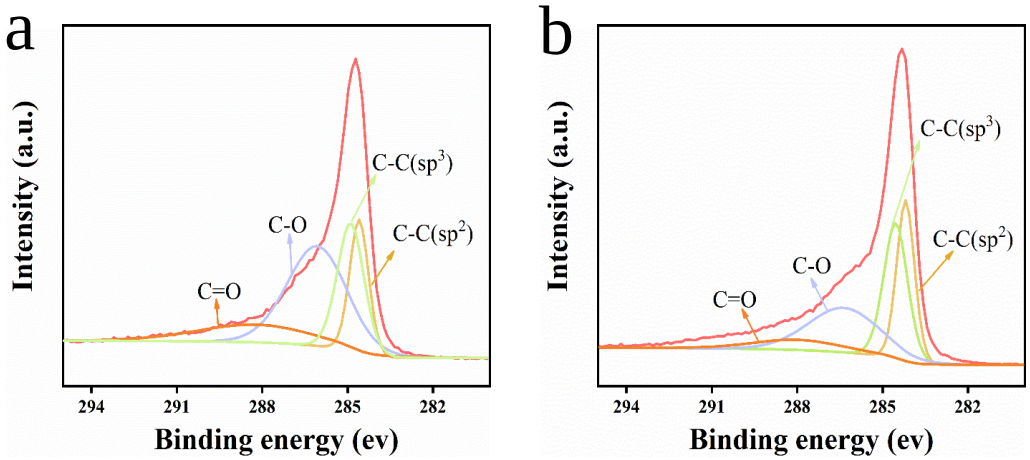

Fig. S2 C 1s XPS spectra of (**a**) GOB-N and (**b**) GB-N

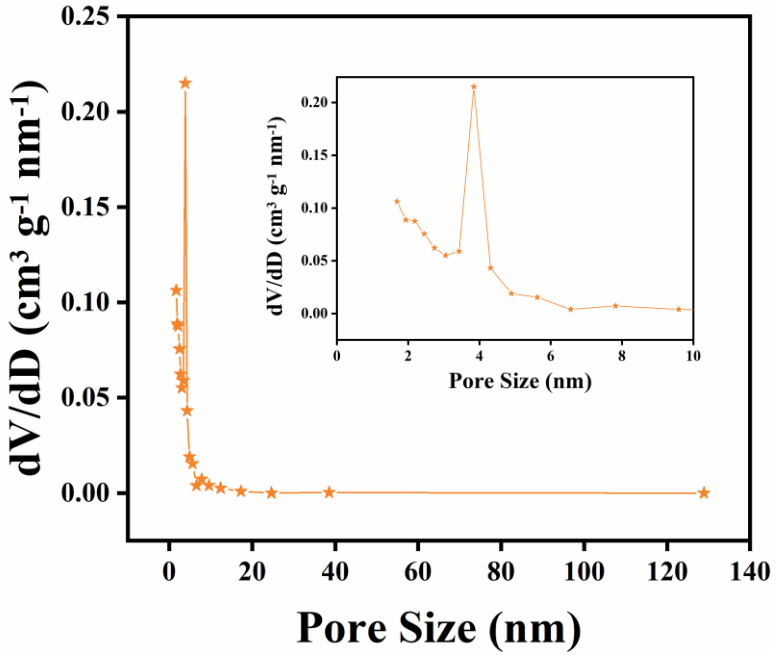

Fig. S3 Pore size distribution of 4GB-N. Inset is the partial enlarged curve from the pore size of less than 10 nm

Table S1 The mass difference before and after the leakage test of pure eicosane, E-4GB-PCN and E-2GB-PCN

Sample	m_{before}/g	m_{after}/g
blank filter paper	0.8015	0.8024
eicosane	0.7967	1.9445
E-4GB-PCN	0.8012	0.7990
E-2GB-PCN	0.7936	0.7973

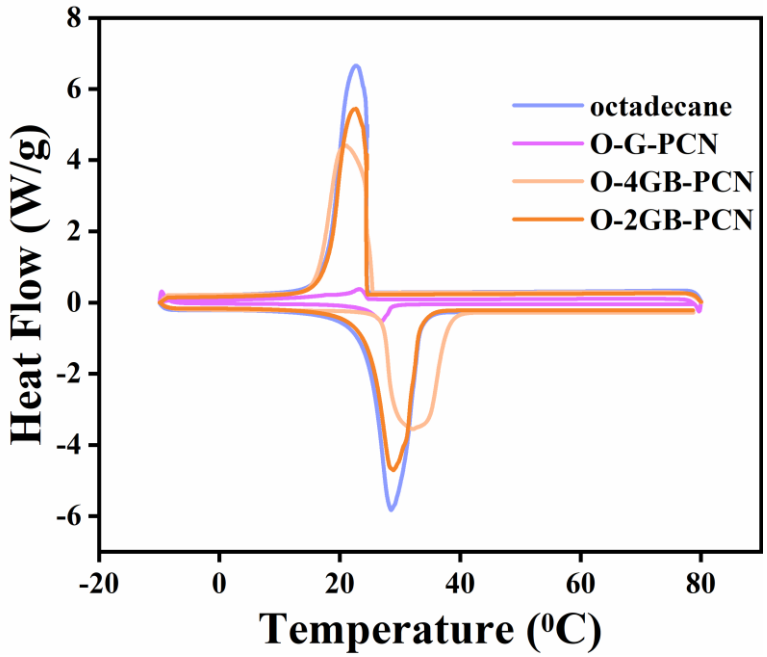

Fig. S4 DSC curves of octadecane based GB-PCN

Table S2 Thermal properties of octadecane, O-G-PCN, O-4GB-PCN and O-2GB-PCN

	T_m (℃)	$\triangle H_m$ (J/g)	T_c(℃)	$\triangle H_c$ (J/g)
octadecane	28.5	228.1	22.7	227.7
O-2GB-PCN	28.9	189.7	22.7	188.7
O-4GB-PCN	32.2	166.3	21.0	163.2
O-G-PCN	26.9	16.8	23.2	13.6

Table S3 Thermal properties of eicosane, E-G-PCN, E-4GB-PCN and E-2GB-PCN

	T_c (℃)	$\triangle H_c$ (J/g)	T_m (℃)	$\triangle H_m$ (J/g)
eicosane	30.8	245.5	38.7	248.3
E-2GB-PCN	28.6	202.4	38.8	206.0
E-4GB-PCN	27.3	175.4	37.7	179.6
E-G-PCN	31.3	30.9	36.6	32.2

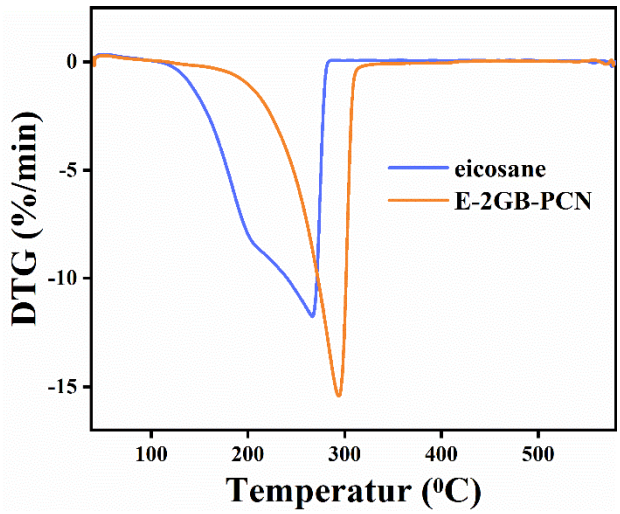

Fig. S5 DTG curves of eicosane and E-2GB-PCN

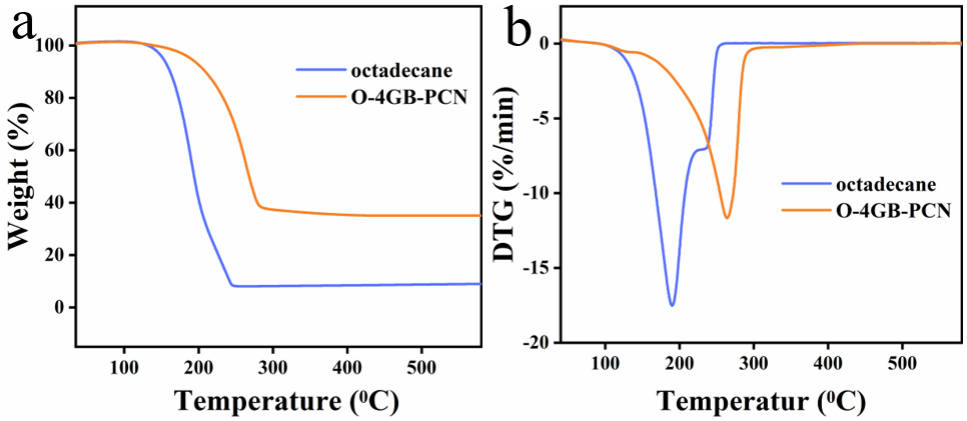

Fig. S6 (**a**) TG and (**b**) DTG curves of octadecane and O-4GB-PCN

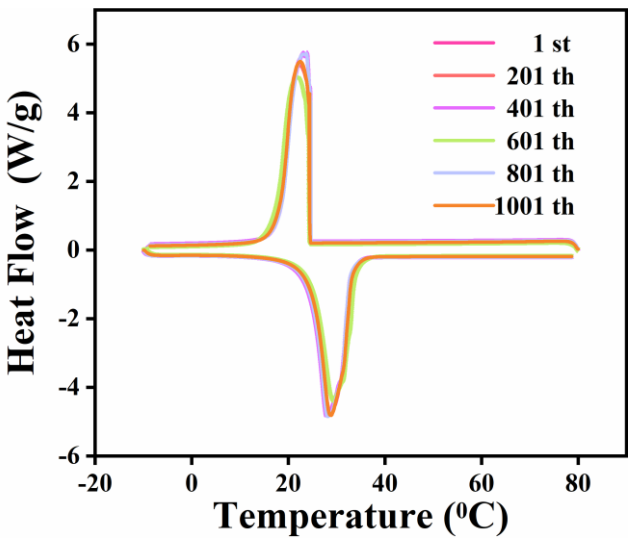

Fig. S7 Cycling stability of O-2GB-PCN

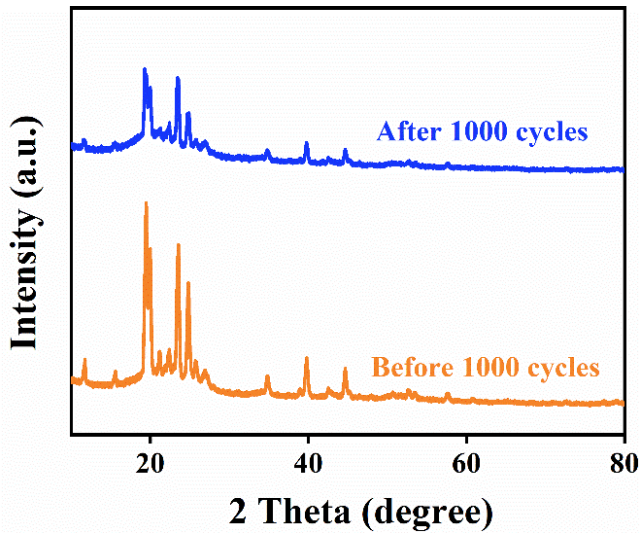

Fig. S8 XRD patterns of O-2GB-PCN before and after 1000 cycles

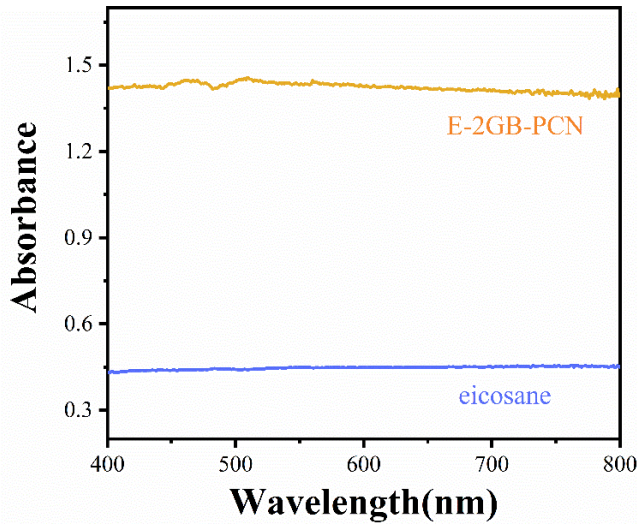

Fig. S9 UV-vis absorption spectra of eicosane and E-2GB-PCN

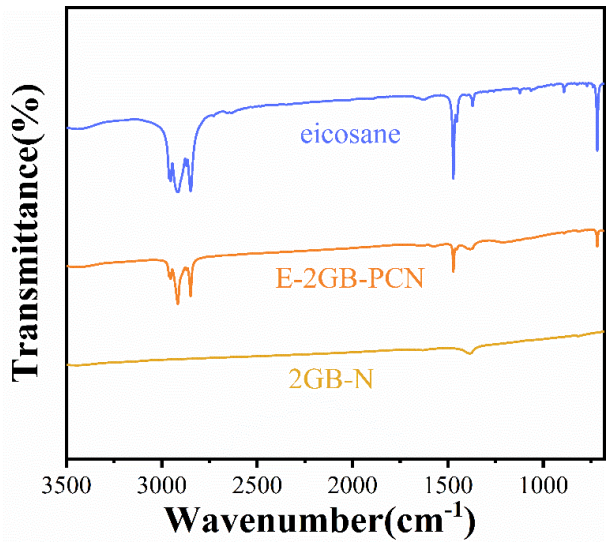

Fig. S10 FT-IR spectrum of eicosane, 2GB-N and E-2GB-PCN

Table S4 Water vapor transmission of PE, cotton and cotton-E-2GB-PCN

	$m_{(PE)}$/g	$m_{(cotton\text{-}PCN)}$/g	$m_{(cotton)}$/g
0 h	36.4125	38.4947	38.4852
8.17 h	36.4094	38.3184	38.2803
20.67 h	36.4058	38.0294	37.9663
32.08 h	36.4016	37.7634	37.6800
44.25 h	36.3977	37.5090	37.3745
56.83 h	36.3935	37.2288	37.0588

Table S5 Comparative performance of the phase change fabric in previous literatures

Sample	**Diameter (μm)**	**Melting temperature (℃)**	**Enthalpy (J/g)**	**Loading capacity**	**Water vapor permeability**	**Refs.**
PCF/MCNC	0.23	62.4 61.5	69.2 83.1	38.4% 46.0%	-	[S1]
PCM-30 (9 w/w% PVA)	0.75	38.46 37.95	84.7 48.7	38.3% 22.0%	-	[S2]
PW@H-KAF	91.8	44.4	135	72.0%	✓	[S3]
OD@F-SiO_2-PA	2.66	49.6	56.9	47.8%	-	[S4]
Polyethylene glycol/polyvinylpyrrolidone/ CNTs	4.5	51.9	77.5	35.7%	-	[S5]
Polyethylene terephthalate particles (PET)/ lauric acid (LA) /palmitic acid (PA)/	2.0	36.3	61.2	36.1%	-	[S6]
CPCF	0.15-0.4	26.1 25.7 24.6	43.4 56.2 72.3	28.1% 36.4% 46.8%	-	[S7]
Polyethylene glycol (PEG)/ polyvinylpyrrolidone (PVP)/Nano-Al_2O_3	2.66	49.6	56.9	47.8%	-	[S8]
Commercial hollow Polypropylene/PW	350	37.39	199.9	88.6%	✓	[S9]
PW@PU	2	20-35	83.96 120.46	41.3% 59.2%	-	[S10]
E-2GB-PCN	about 250	38.8	206.0	83.0%	✓	This work

Supplementary References

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