Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting Information

Thermoregulatory elasticity braided fibers designed with core-sheath structure for wearable personal thermal management

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Supplementary Methods

1. Characterization

The apparent morphology of the aerogel was characterized by a scanning electron microscopy (SEM, SU1510, Hitachi, Co., Ltd, Japan). The lamellar structure of MXene was observed by transmission electron microscope equipment (TEM, Hitachi JEM-2100). RT-IR spectra was measured by Nicolet 6700 spectrometer (Nicolet Instrument Company, Madison, WI, USA). The functional group was determined using a thermo ESCALAB 250Xi instrument equipped with a monochromatic Al Kα (15 kV 5 mA) anode X-ray gun (XPS). The universal testing machine (UTM2203) equipped with a 100 N load cell was used to the compression test. The freezing-drying was carried out via the SCIENTZ-10 N freeze dryer (NingBo Scientz Biotechnology Co., Ltd, China). The color parameters of smart fabrics were obtained by computer color matching instrument (Datacolor DC850, America).

Supplementary Figures

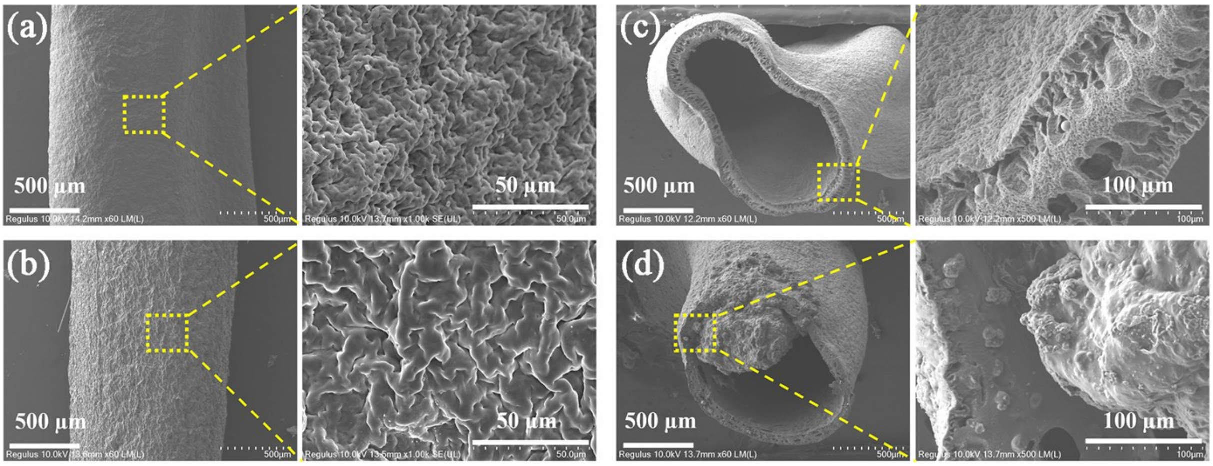

Fig. S1 Surface morphologies and partical enlarged detail of (a) PU, and (b) PU@GA. Cross-section morphologies of (c) PU, and (d) PU@GA.

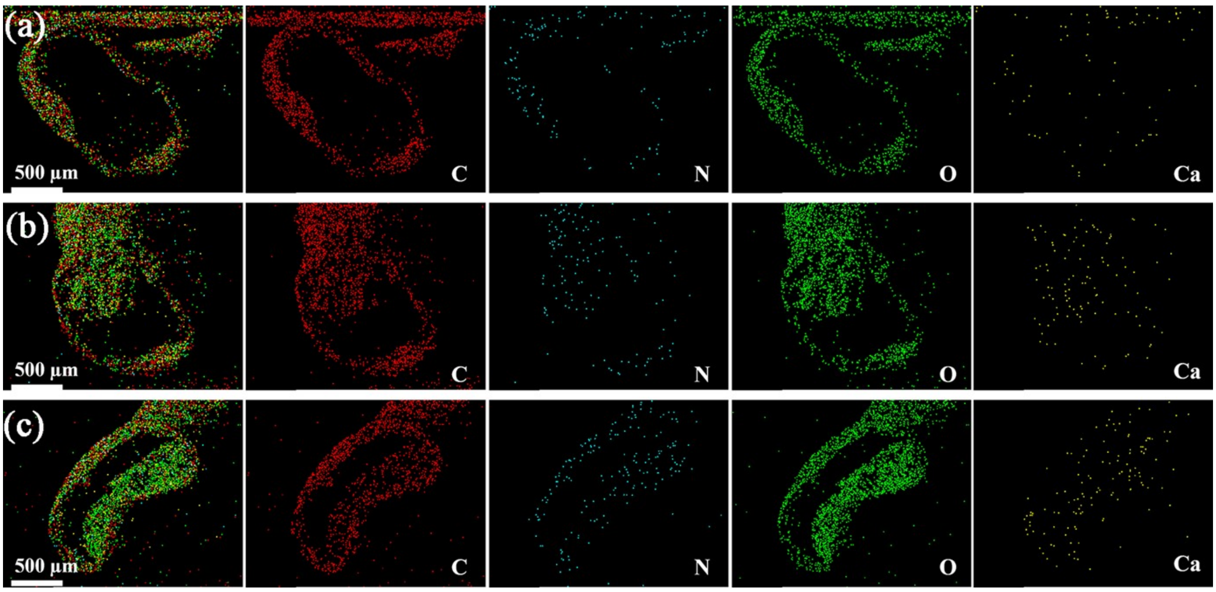

Fig. S2 EDS-mapping images of (a) PU, (b) PU@GA, and (c) PU@GA@Ms.

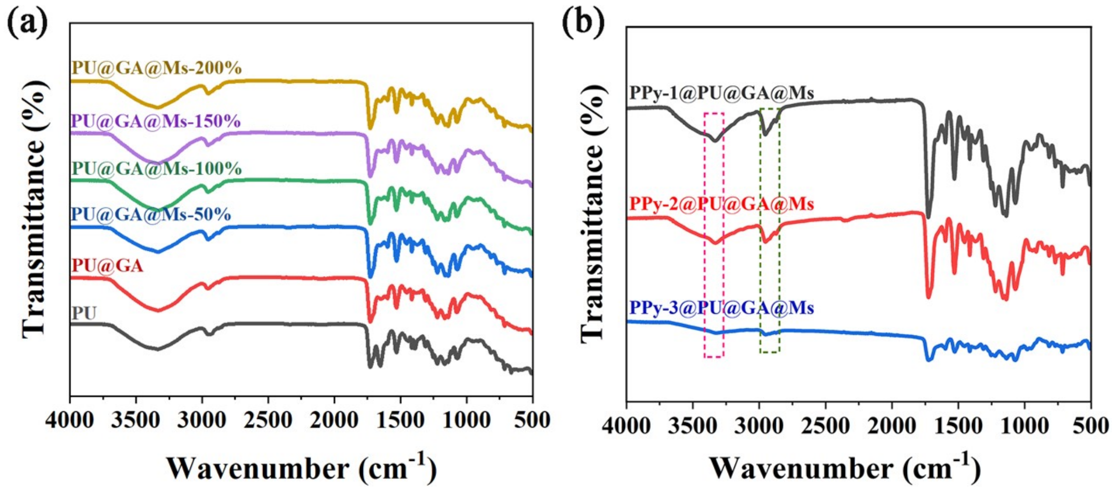

Fig. S3 FTIR spectra of PU, PU@GA, PU@GA@Ms, and PPy@PU@GA@Ms.

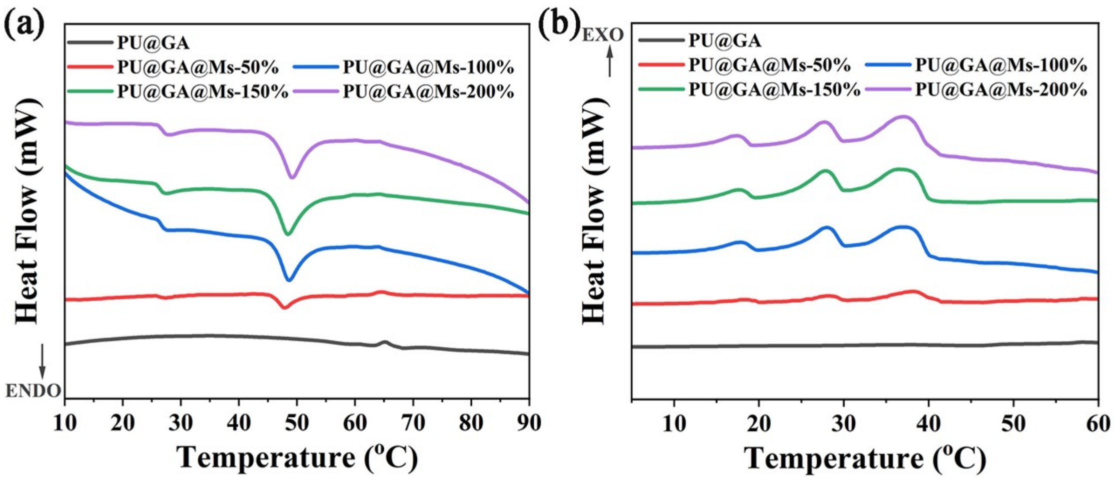

Fig. S4 DSC curves of PU@GA and PU@GA@Ms-50%~200%.

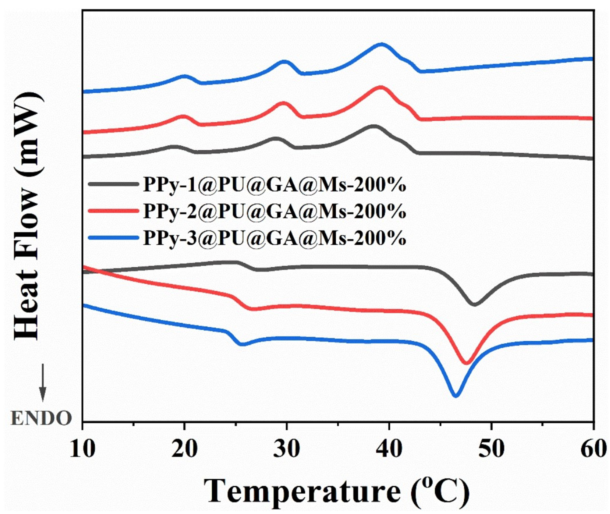

Fig. S5 DSC curves of PPy@PU@GA@Ms in heating and cooling processes.

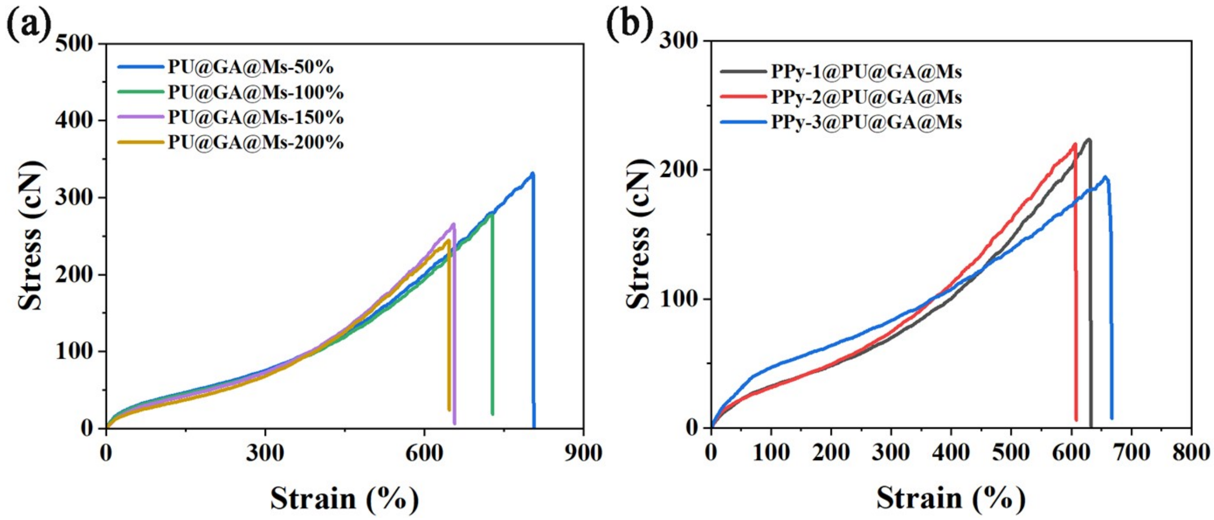

Fig. S6 Strain-stress curves of (a) PU@GA@Ms, and (b) PPy@PU@GA@Ms.

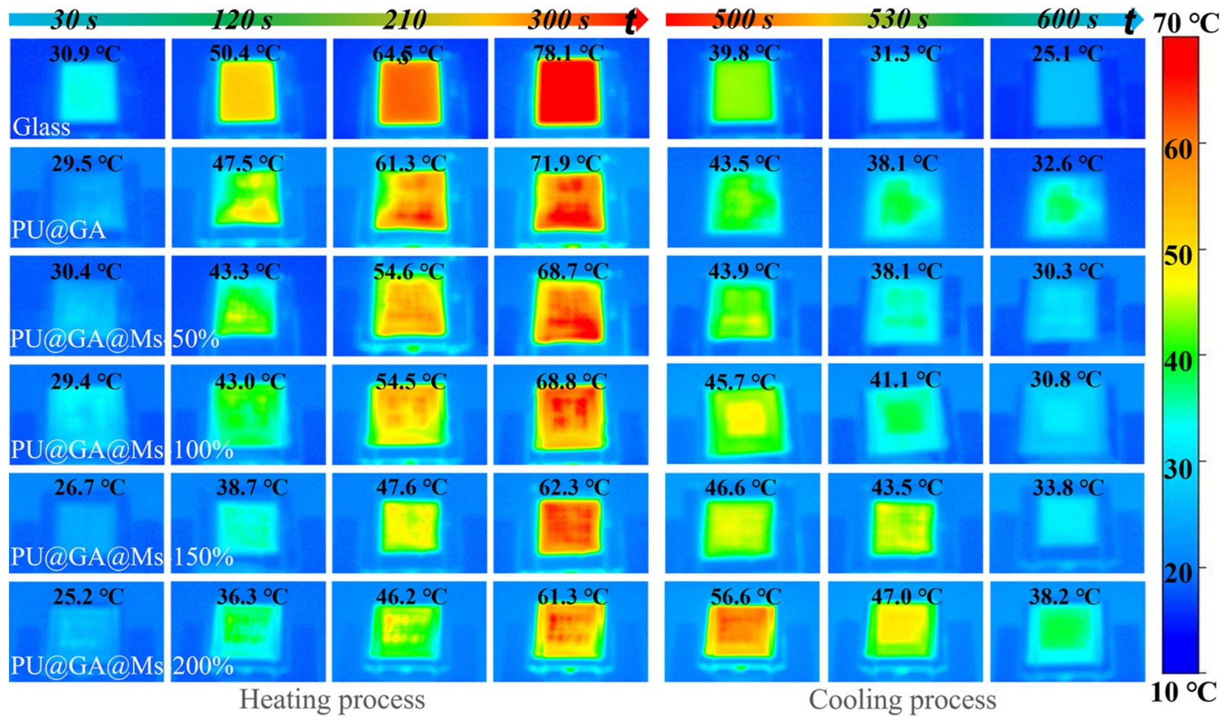

Fig. S7 IR thermal images of the pure glass sheet, PU@GA and PU@GA@Ms in the heating and cooling processes.

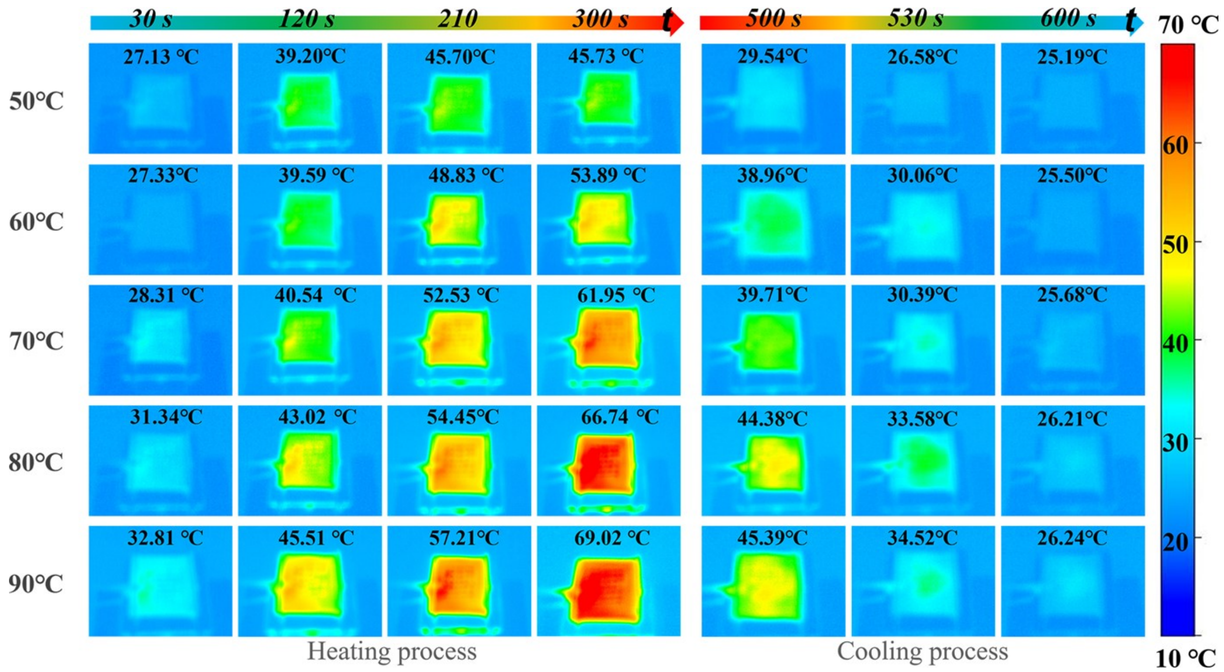

Fig. S8 IR thermal images of PU@GA@Ms-200% at different initial heating temperature and natural cooling processes.

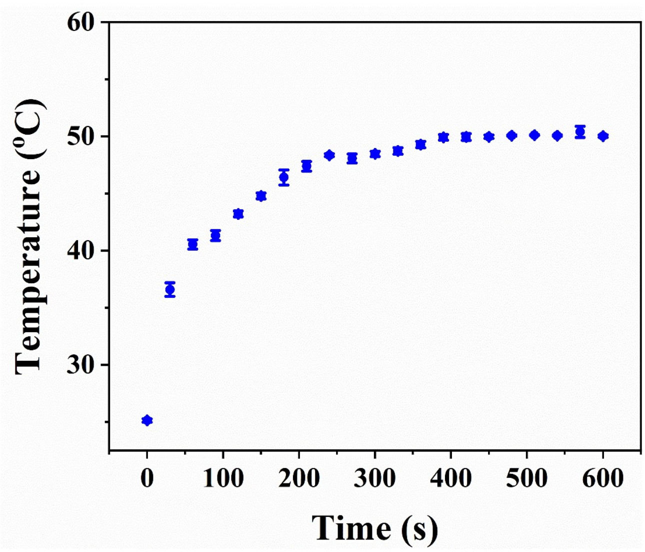

Fig. S9 Surface temperature variation of PPy-3@PU@GA@Ms under 1000 W·m^{-2} with different irradiation time.

Supplementary Tables

Table S1 The thermal data and enthalpy of MPCM and fibers

Samples	T_m (°C)	T_c (°C)	ΔH_m (J/g)	ΔH_c (J/g)
PU@GA	--	--	0	0
MPCM	47.45	39.60	88.01	95.14
PU@GA@Ms-50%	47.78	38.23	31.07	31.18
PU@GA@Ms-100%	48.61	37.60	32.42	32.77
PU@GA@Ms-150%	48.39	37.35	33.28	33.23
PU@GA@Ms-200%	49.05	37.33	35.10	34.78
PPy-1@PU@GA@Ms-200%	47.74	38.65	34.67	35.06
PPy-2@PU@GA@Ms-200%	47.57	39.18	35.58	35.17
PPy-3@PU@GA@Ms-200%	46.01	39.18	37.15	36.60

Table S2 Electrical conductivity of the PPy@PU@GA@Ms fiber

	PPy-1@PU@GA@Ms (KΩ/cm)	PPy-2@PU@GA@Ms (KΩ/cm)	PPy-3@PU@GA@Ms (KΩ/cm)
1	19.4	11.3	10.4
2	17.4	12.5	9.6
3	18.8	10.8	10.2
Average value	18.5	11.5	10.1

Table S3 The comparison of photothermal conversion performance of fibers

Materials	Saturation Temperature (°C) 1000 W·m^{-2}	Strain (%)	Morphology	Ref
PU/PPy/ZrC	55.8	150%	Coaxial wet spinning	S1
PW@PU@CNTs@PEDOT:PSS	70.5	264	Fibrous membrane	S2
PW@PDVB-12/PPy	47	--	--	S3
SF/CA	45	--	Silk Fiber	S4
AgNPs@PDA@PU@PW	63.2	--	Fibrous membrane	S5
PPy-PU/ZrC	78	291.57	Fibrous membrane	S6
PU/MXene@OD	65.3	--	Fiber	S7
PEG-PU-CNT	--	6	Composite membrane	S8
BPBBT CS-3	56.1	--	Fibrous membrane	S9
PPy@PU@GA@Ms	50.1	660	Fiber	This work

Reference

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