Preparation of a wearable K-PAN@CuS composite fabric with excellent photothermal/electrothermal properties

Jintao Zhang[1,*], Qi Zhang[2,*], Wei Pan (✉)[3,1], Yu Qi[1], Yajie Qin[1], Zebo Wang[4], and Jiarui Zhao[3]

1 International Joint Laboratory of New Textile Materials and Textiles of Henan Province, Zhongyuan University of Technology, Zhengzhou 450007, China
2 Huanghe Science and Technology College, Zhengzhou 450006, China
3 School of Materials and Chemical Engineering, Zhongyuan University of Technology, Zhengzhou 451191, China
4 College of Textiles, Zhongyuan University of Technology, Zhengzhou 451191, China

E-mail: doctorpan0152@163.com
* J.Z. and Q.Z. contributed equally to this work.

Supplementary materials

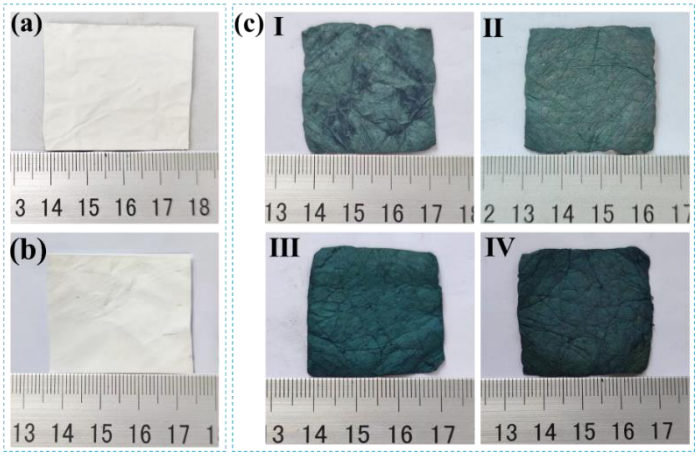

Fig. S1 Optical images of **(a)** the original PAN fabric, **(b)** the K-PAN fabric, and **(c)** the K-PAN@CuS fabric with CuS-loading amounts at different contents of KH-550 (I: 0.025 wt.%; II: 0.05 wt.%; III: 0.1 wt.%; IV: 0.25 wt.%).

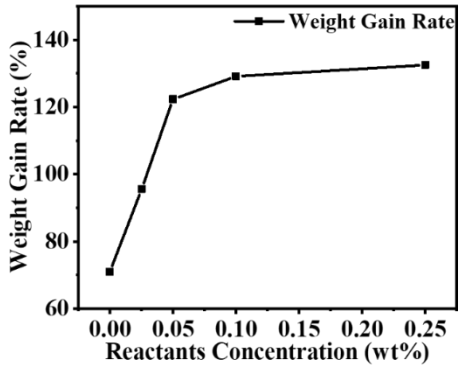

Fig. S2 The loading of CuS on the PAN fabric modified by different concentrations of KH-550.

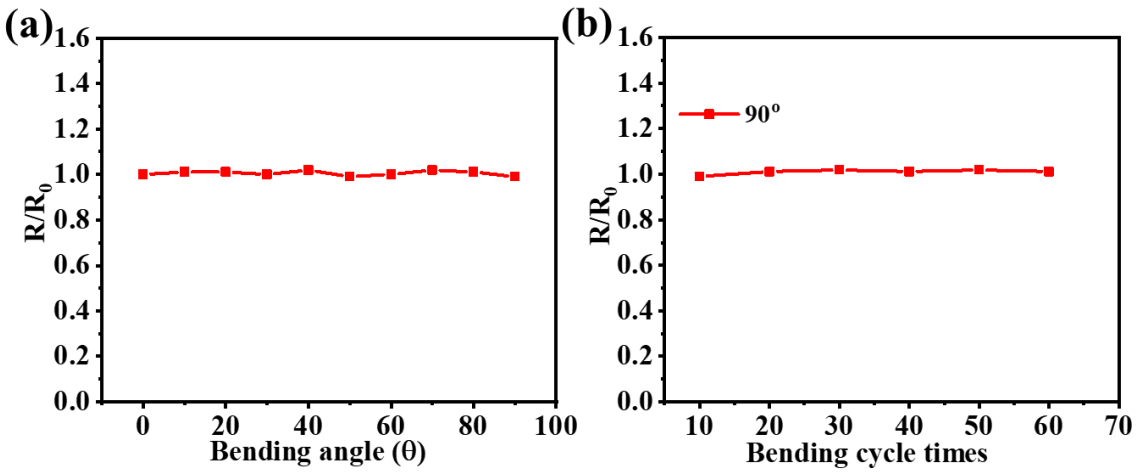

Fig. S3 Changes of R/R_0 with **(a)** bending angle and **(b)** bending cycle number for the K-PAN@CuS-100 fabric.

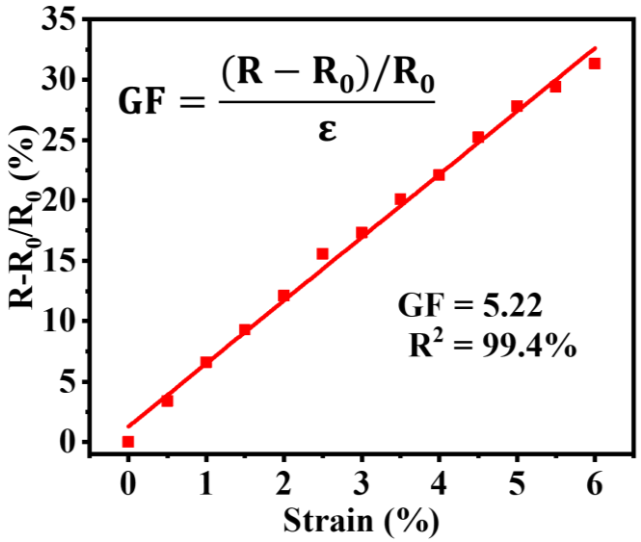

Fig. S4 Change of $(R-R_0)/R_0$ with strain for the K-PAN@CuS-100 fabric.

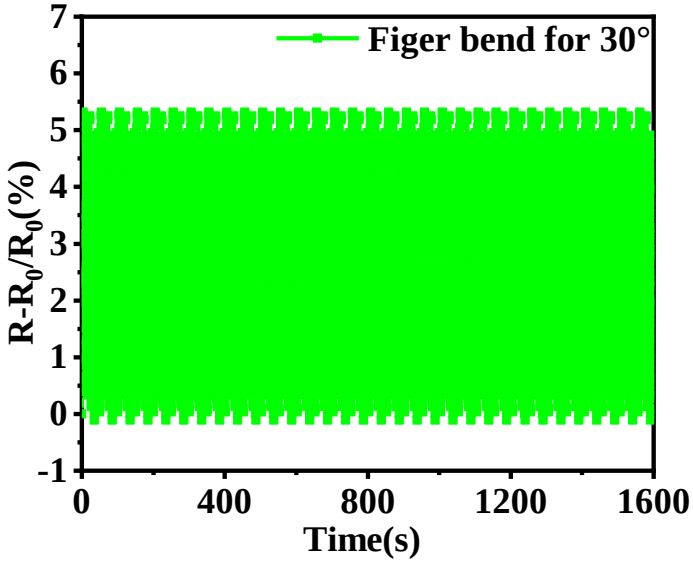

Fig. S5 Change of $(R-R_0)/R_0$ with time for the K-PAN@CuS-100 fabric on the finger bent for 30° in the duration of 1600 s with 200 cycles.

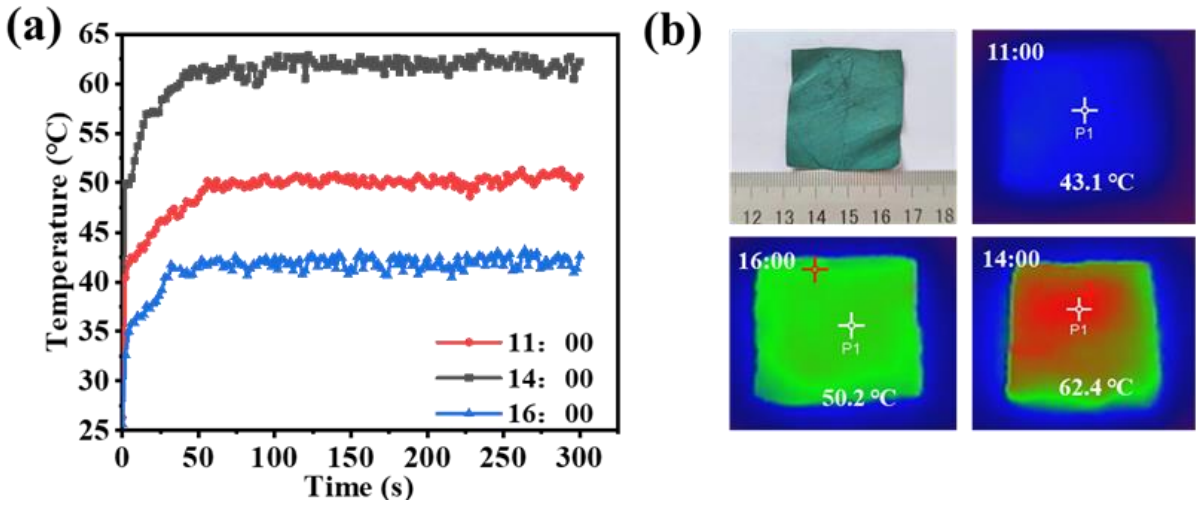

Fig. S6 Schematic diagram of the K-PAN@CuS-100 fabric irradiated with sunlight: **(a)** temperature evolution curves of the K-PAN@CuS-100 fabric irradiated by sunlight at different time points; **(b)** corresponding IR images of the K-PAN@CuS-100 fabric irradiated at different time points (on October 10, 2023 in Zhengzhou, China).

Table S1 Comparison of the photothermal conversion performance in recent studies

Material	Light intensity/(W·m^{-2})	Surface equilibrium temperature/°C	Time/s	Ref.
MXene-modified FRV/SA fabrics	1000	~ 68	–	[56]
Cot@PDA/MXene/PF composite fabric	1000	~ 43.6	~ 40	[57]
CuO@Cu fractal dendrite fiber	1000	~ 39.4	~ 70	[58]
BC/MXene spiral fiber	1000	~ 38	–	[59]
PAN/CNT fabric	1000	~ 67	~ 200	[60]
K-PAN@CuS-100 fabric	1000	~73	~15	this work