Supporting Information

Smart salt-responsive thread for highly sensitive microfluidic glucose detection in sweat

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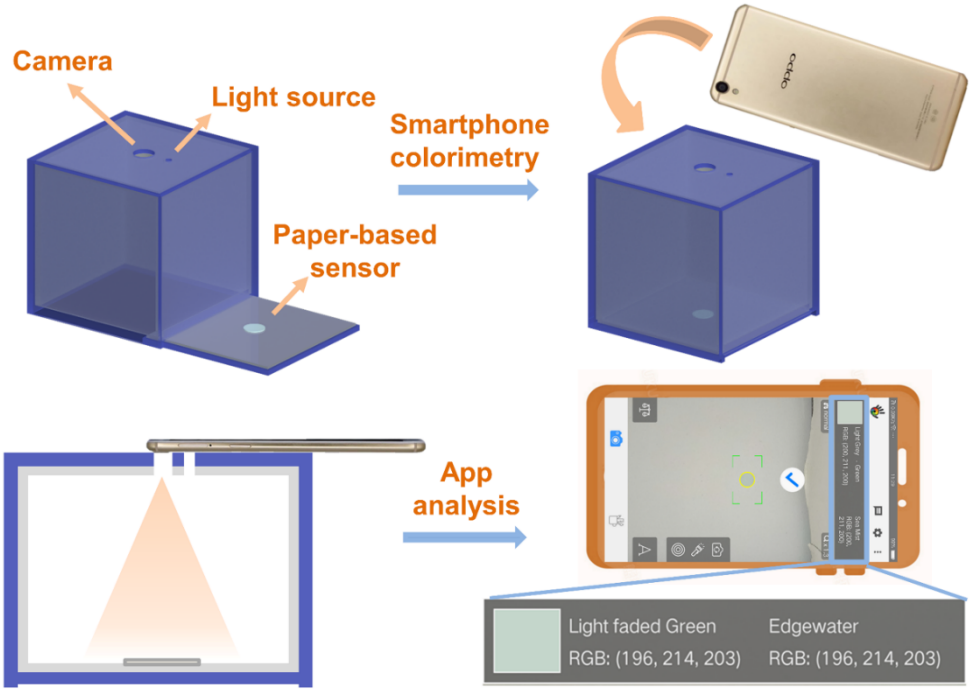

Figure S1. Smartphone-based data collecting system.

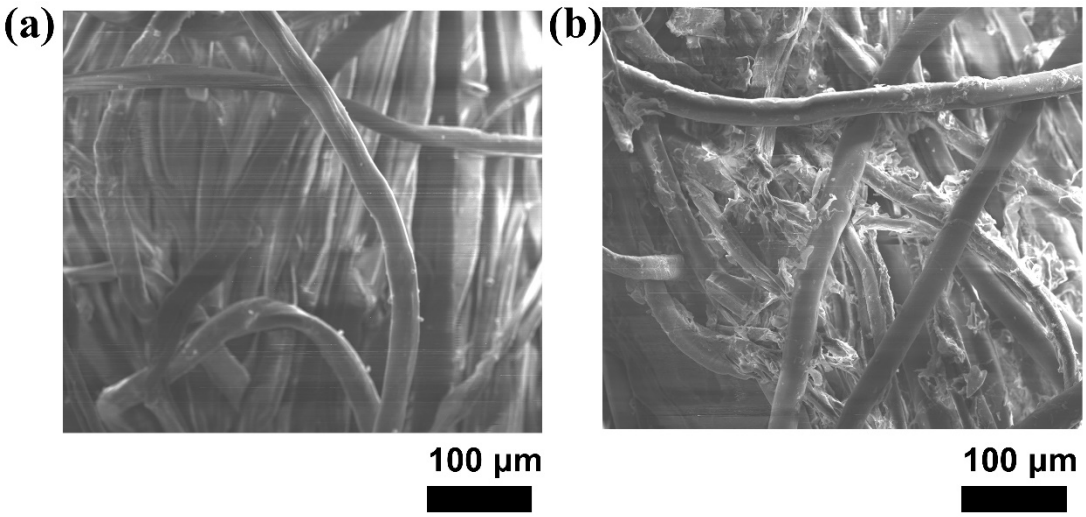

Figure S2. SEM images of the pristine (a) and PSBMA-modified (b) cotton threads.

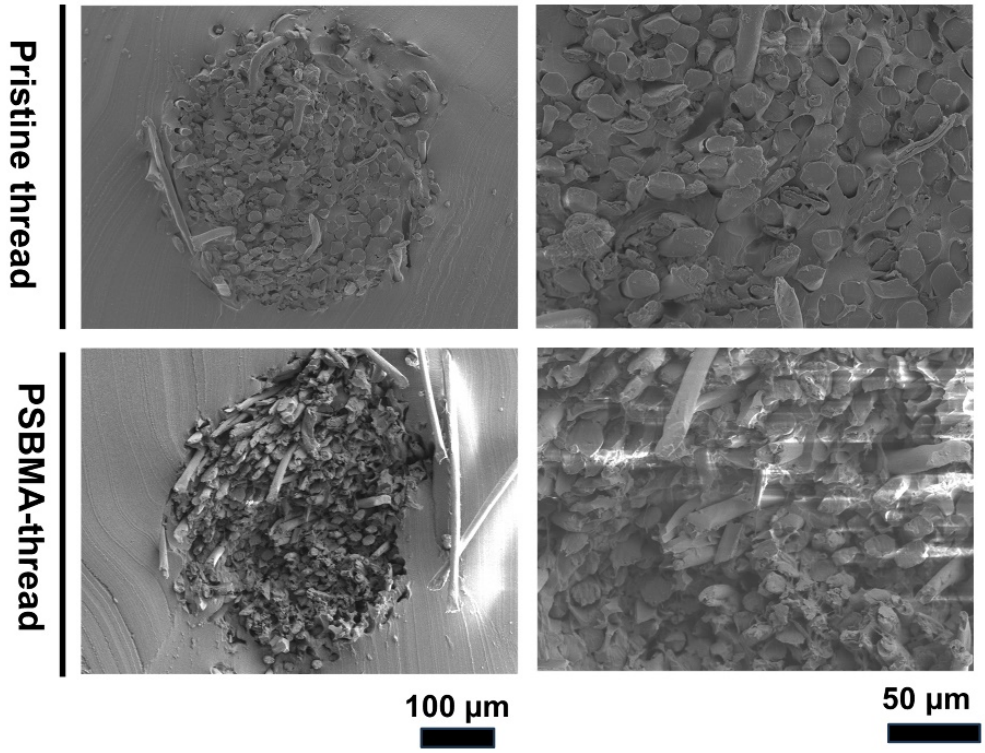

Figure S3. Cross-sectional SEM images of the pristine thread and PSBMA-thread.

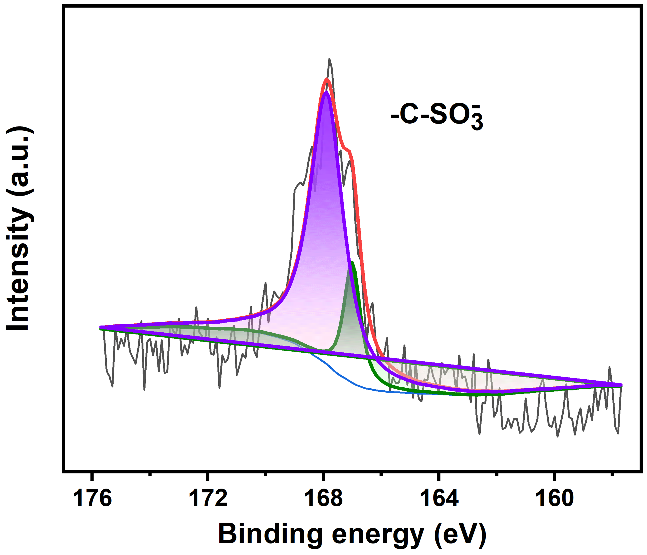

Figure S4. XPS S2p spectra of PSBMA-thread.

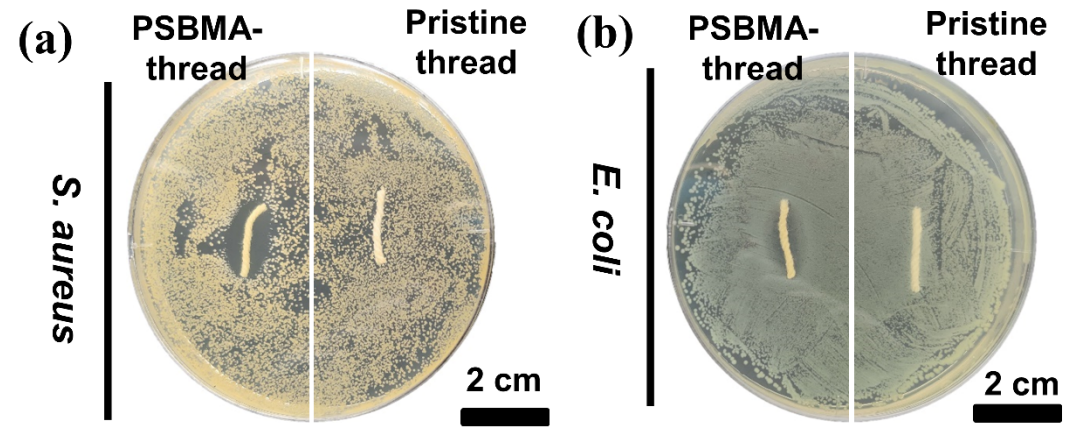

Figure S5. Antibacterial effects of pristine cotton thread and PSBMA-modified thread.

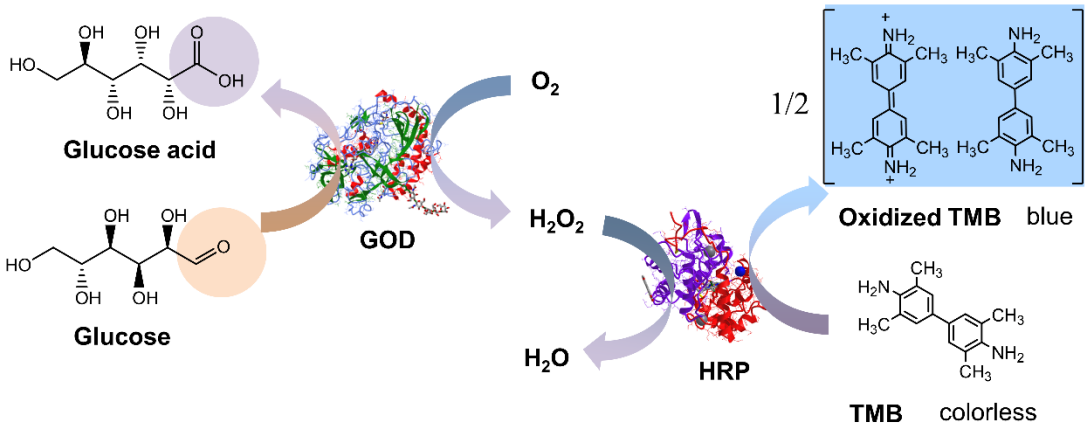

Figure S6. Working principle of the GOD/HRP/TMB-based colorimetric sensors.

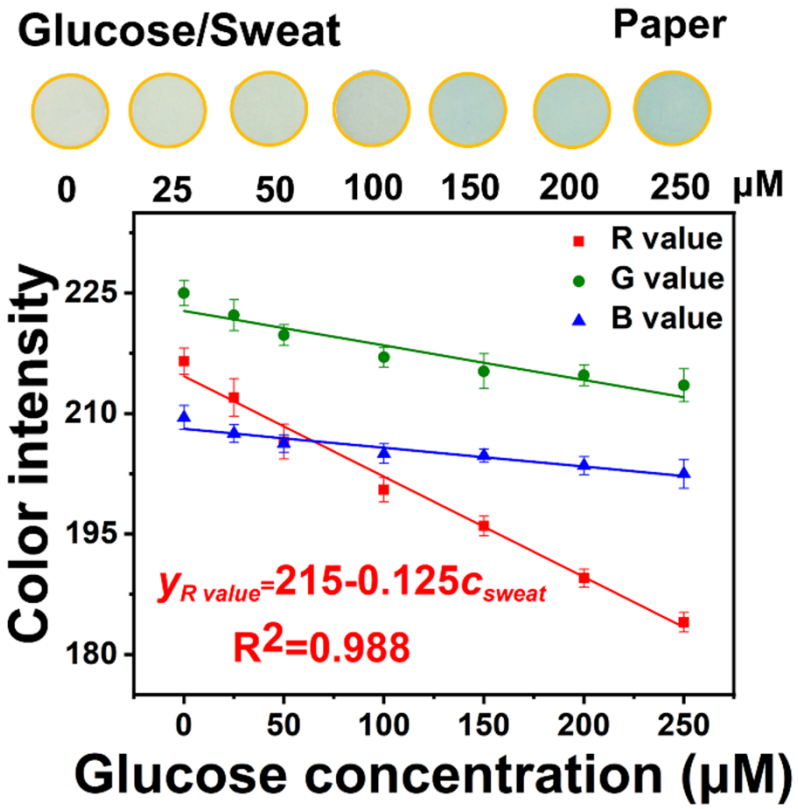

Figure S7. Performance of the paper-based colorimetric glucose sensor.

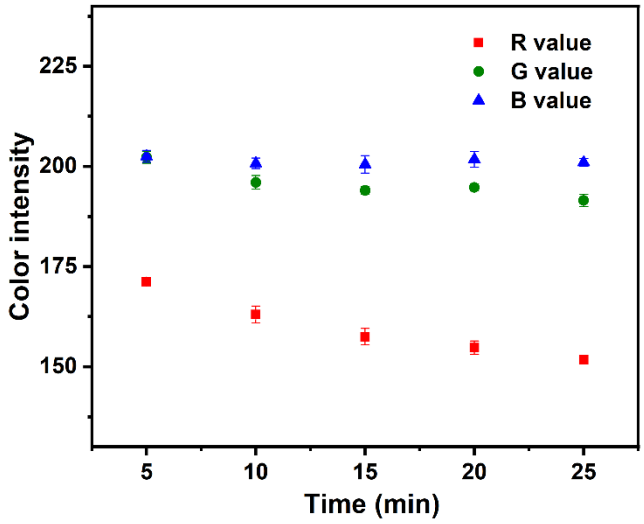

Figure S8. Effects of the reaction duration on the color intensity of the paper-based sensors.

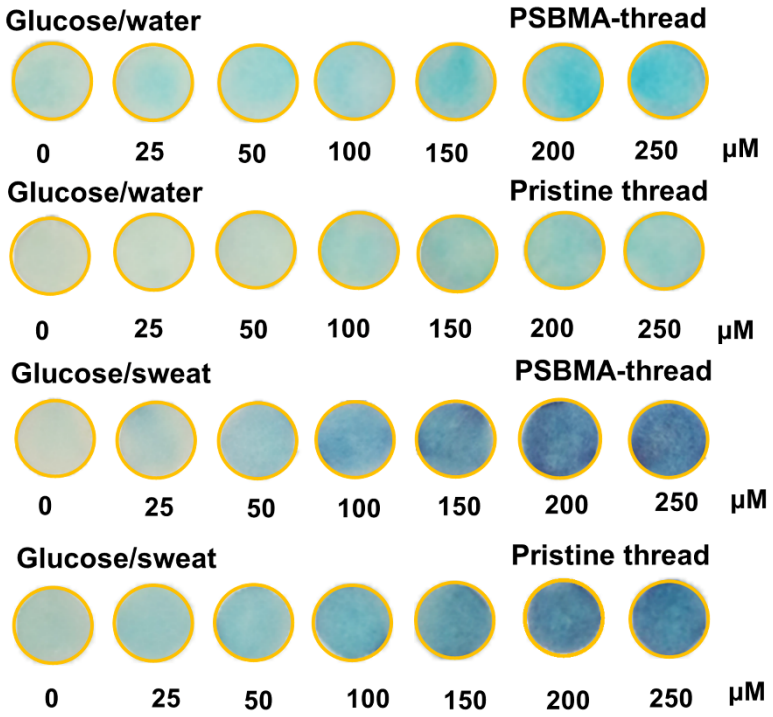

Figure S9. Photos of the corresponding paper sensing units after glucose sensing.

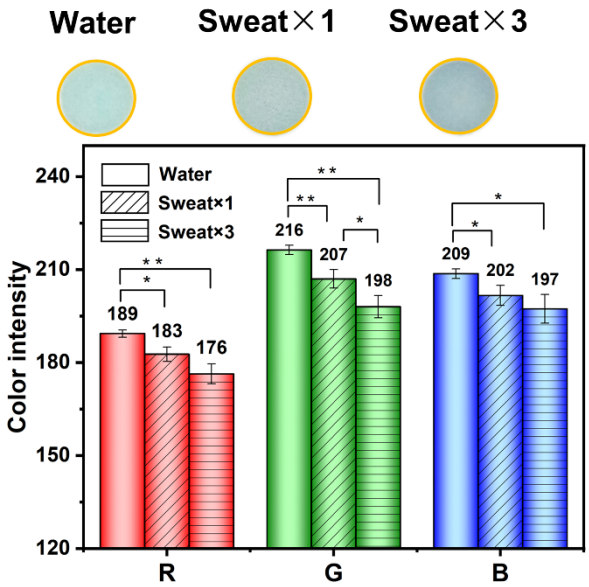

Figure S10. Effects of the ionic strength on the color intensity of the paper-based sensors.

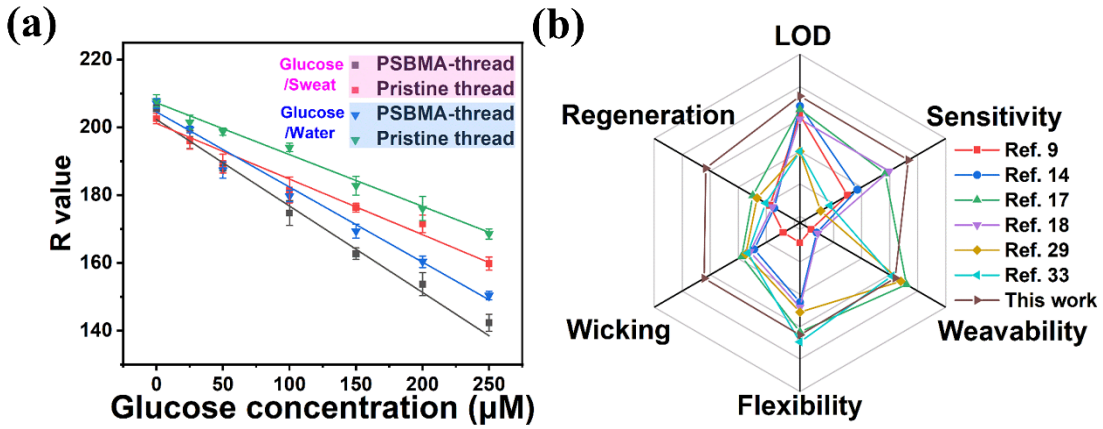

Figure S11. Performance of the microfluidic thread/paper-based glucose sensing systems in different solutions (a). A comparison of the performance of glucose sensors for body fluid (b).

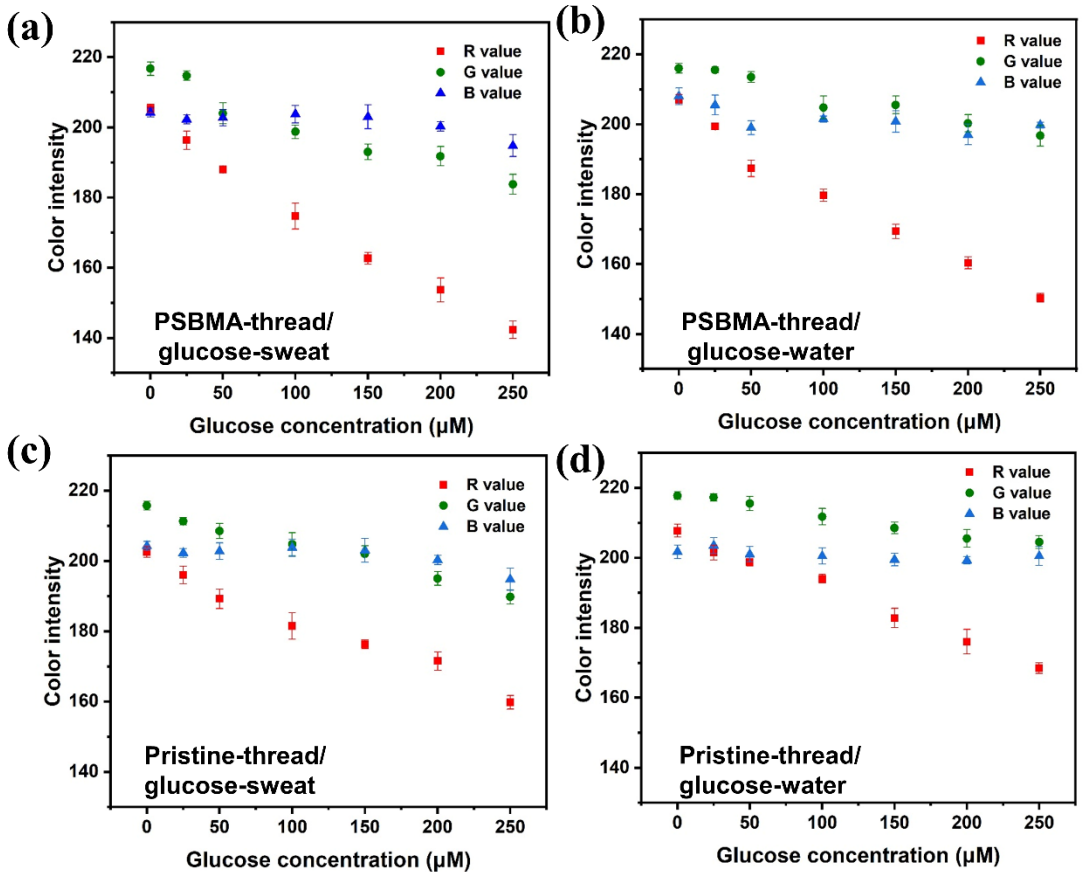

Figure S12. Color intensity against glucose concentration in terms of the R-, G-, and B-value.

Table S1. Parameters for the calibration curves.

	PSBMA-thread/glucose-water	Pristine-thread/glucose-water	PSBMA-thread/glucose-sweat	Pristine-thread/glucose-sweat
Intercept	205	207	202	201
Adj. R-Square	0.981	0.984	0.989	0.986
LOD/μM	19.1	35.1	14.7	27.4
Sensitivity/μM^{-1}	-0.222	-0.153	-0.255	-0.164

Table S2. Recovery ratio of the thread-based microfluidic sensors.

Thread	Spiked concentration/μM (glucose)	μTPAD assay (μM)(mean ± SD, n=3）	Recovery/%（mean ± SD, n=3）	Coefficient of variation/% (CV)
PSBMA-thread	50	48.7±0.4	97.4±0.7	0.8
	150	150.3±1.5	100.2±1.0	1.0
	250	247.8±1.8	99.1±0.7	0.7
Pristine thread	50	49.5±0.6	99.0±1.1	1.1
	150	148.4±1.2	98.9±0.8	0.8
	250	246.3±1.5	98.5±0.6	0.6

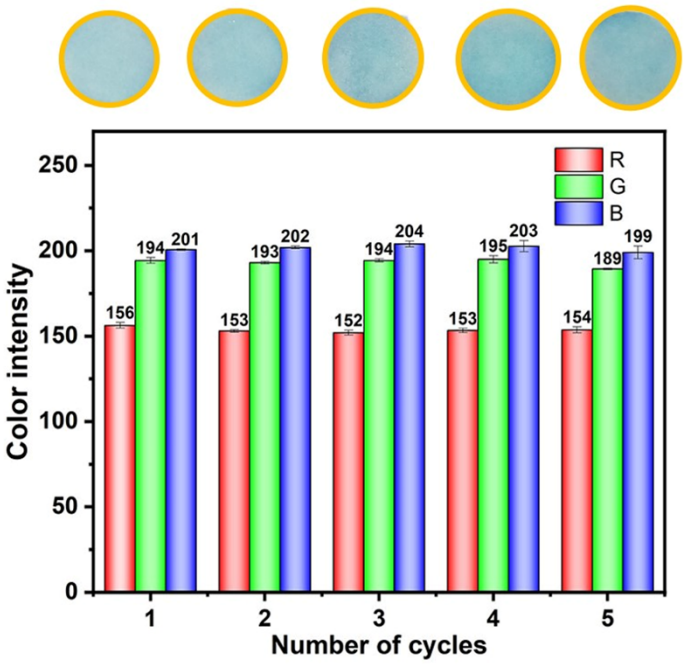

Figure S13. Regeneration of the PBMSA-modified threads in the microfluidic system.

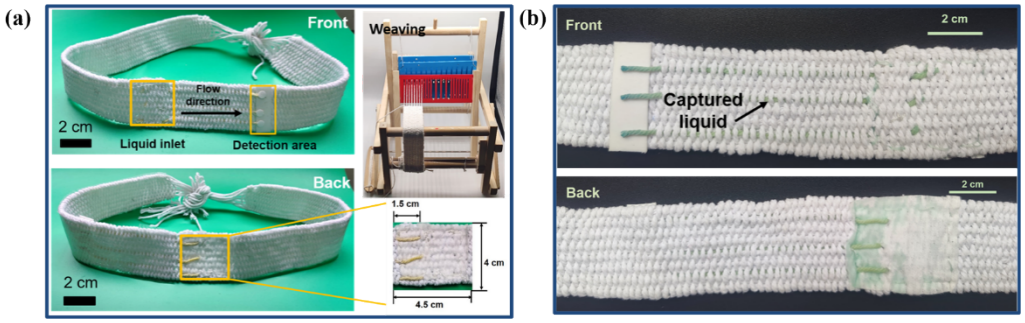

Figure S14. (a) Preparation of the glucose sensing headband; (b) Photos of the headband worn on the forehead during exercise.

Table S3. Summary of glucose colorimetric sensors in body-fluid analysis

Materials and Substrate	Enzyme and chromogenic reagent	LOD	Detection range	Sensitivity	Test sample	Reference
PDMS	GOD/HRP/o-dianisidine	30 μM	0.1–0.5 mM	111.23 mM^{-1}	Sweat	1
PDMS	GOD/AuNCs/ODA	21 μM	0.05−1.6 mM	0.469 $dec(mM)^{-1}$	Sweat	2
BC/CMC hydrogel	GOD/HRP/KI	25 μM	0.025–0.5 mM	Not given	Sweat	3
PVA/sucrose hydrogel	GOD/HRP/4-aminoantipyrine	Not given	0–2 mM	Not given	Sweat	4
TiO_2 nanotubes/alginate hydrogel	GOD/HRP/TMB	44 μM	0.1-0.8 mM	83.678 mM^{-1}	Sweat	5
Cotton cloth	GOD/HRP/TMB	1700 μM	3.0-15.0 mM	53.963 $dec(mM)^{-1}$	Serum	6
Filter paper	GOD/HRP/TBHBA/4-AAP	300 μM	1.0-11.0 mM	0.5238 mM^{-1}	Serum	7
Filter paper	GOD/HRP/TMB	14 μM	0.02-4.0 mM	108.06 $dec(mM)^{-1}$	Serum /Tear	8
Filter paper	GOD/HRP/4-AAP/ DHBS	50 μM	0.05–0.3 mM	200.9 mM^{-1}	Sweat	9
Cotton thread	GOD/HRP/KI	100 μM	0.1–5.0 mM	8.28 mM^{-1}	Tear	10
Cotton thread	GOD/HRP/KI	100 μM	0.1–3 mM	34.455 mM^{-1}	Sweat	11
Cotton thread/paper	GOD/HRP/TMB	35 μM	0.05–0.25 mM	190 mM^{-1}	Sweat	12
PSBMA thread/paper	GOD/HRP/TMB	14.7 μM	0.025–0.25 mM	255 mM^{-1}	Sweat	This work

Reference

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