Self-assembled Gold-Spiked Nanosphere Based Paper Assay for Sensitive Glucose Detection

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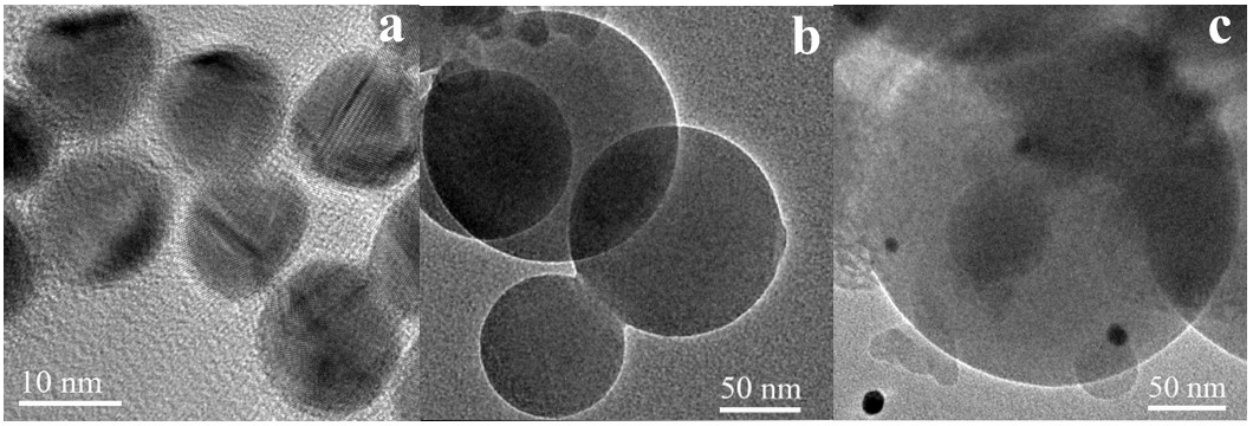

Fig. S1 TEM images of AuNPs (a), SiO_2 (b) and AuNPs-SiO_2 hybrid systems (c).

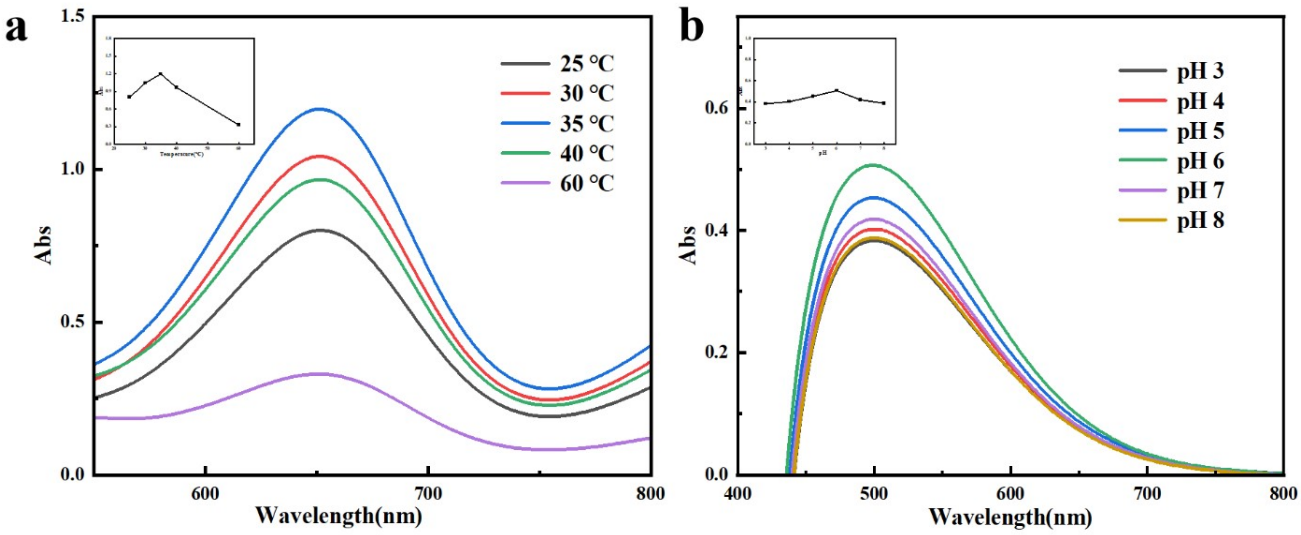

Fig. S2 Effect of different temperatures (a) and pH (b) on glucose oxidase-like activity of the GSN nanozyme.

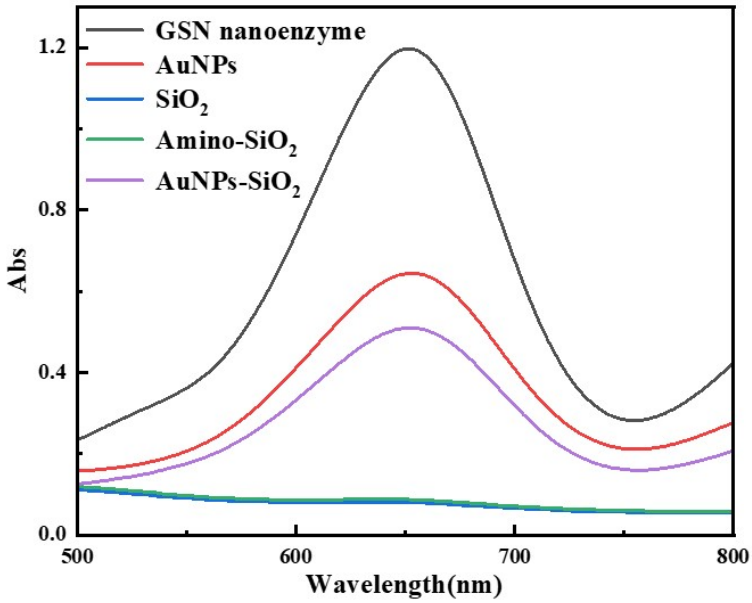

Fig. S3 The UV-vis absorption curves of the GSN nanoenzyme, AuNPs, SiO_2, Amino-SiO_2 and AuNPs-SiO_2 after reacting with 2 mM glucose for 20 min under the reaction conditions of 35 °C and pH 6.

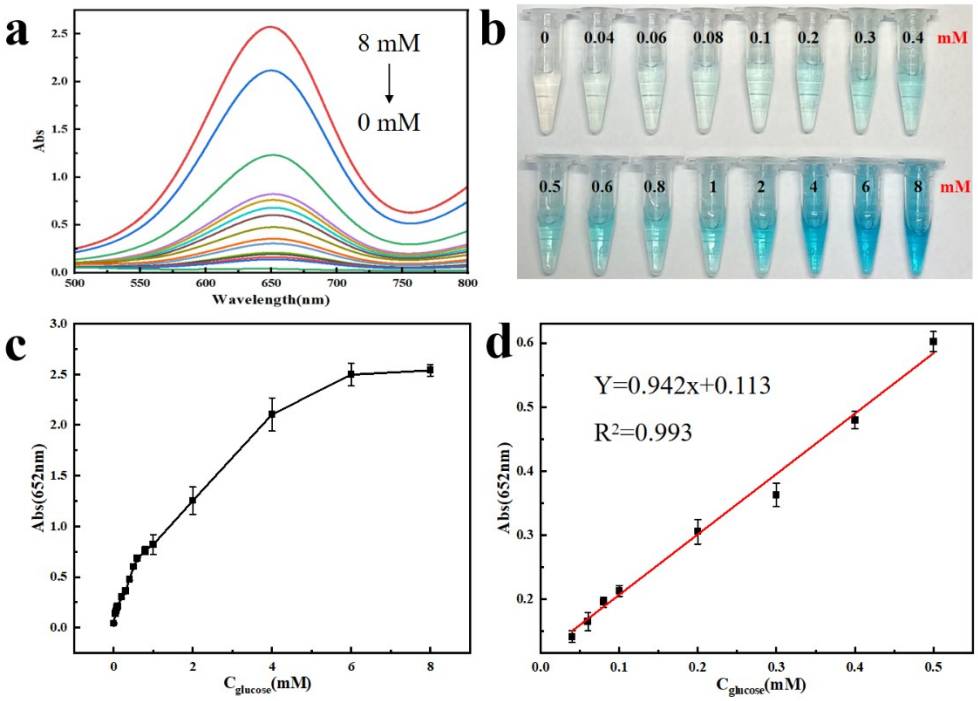

Fig. S4 (a) UV-Vis absorption curves of oxidized TMB with different concentrations of glucose and (b) digital photographs of colorimetric solutions. (c) Relationship between Abs value at 652 nm and glucose concentration and (d) linear relationship in the range 0.04~0.5 mM.

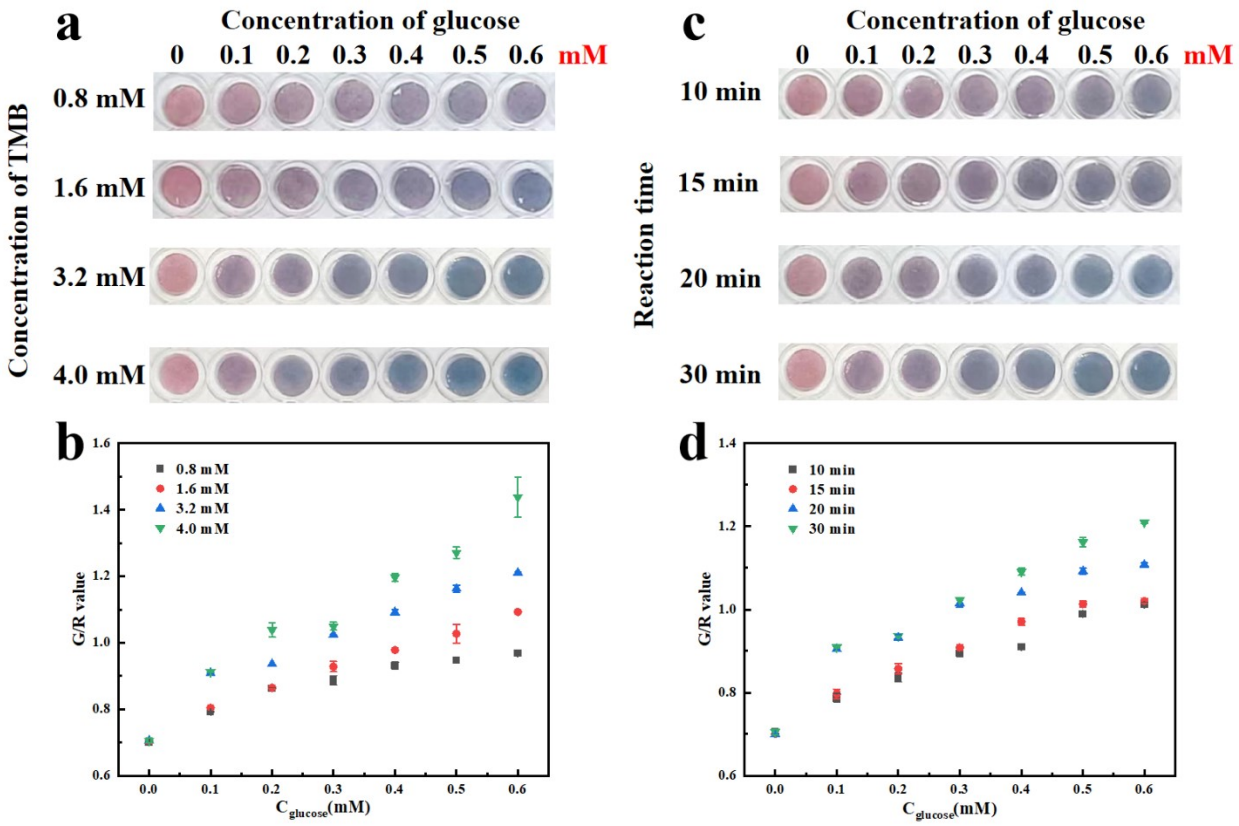

Fig. S5 Effect of TMB concentration ((a) and (b)) and reaction time ((c) and (d)) on the detection of glucose on PAD.

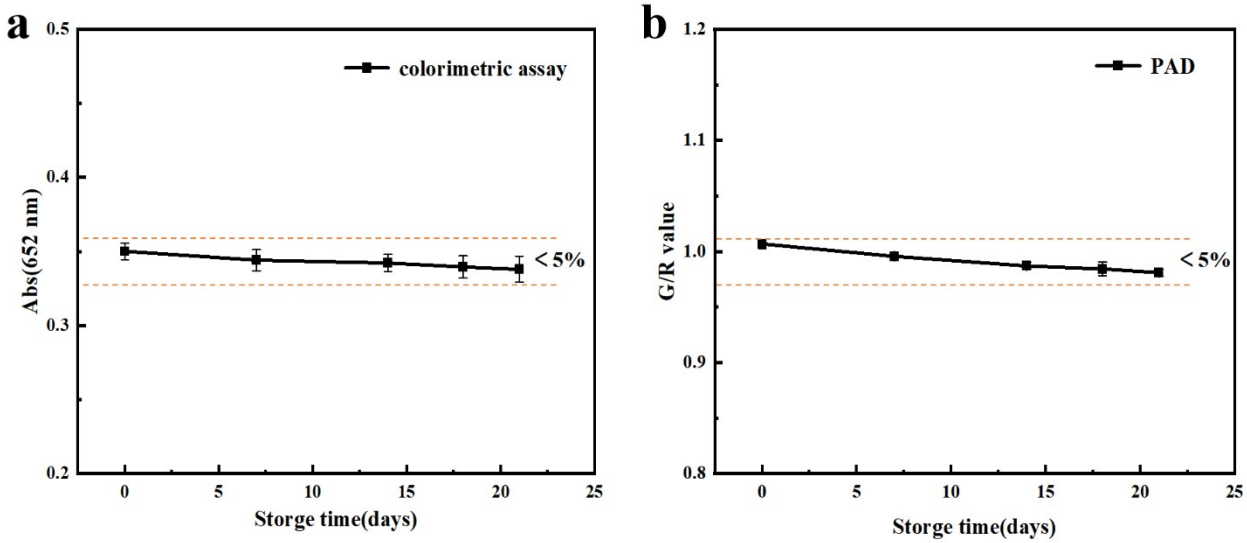

Fig. S6 Long-term stability of the GSN nanoenzyme for glucose detection.

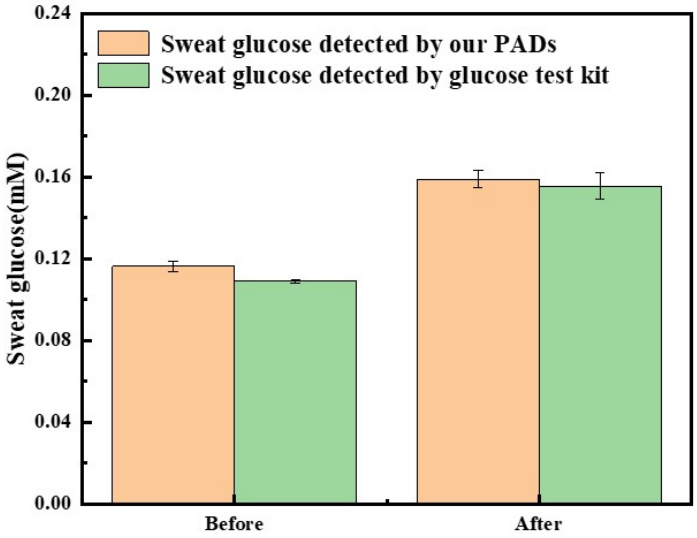

Fig. S7 Test results of the glucose content in sweat before and after meals (n=3).

Table S1. V_{max} and K_m values of AuNPs and the GSN nanozyme.

	V_{max} (μM/min)	K_m	R^2
AuNPs	1.20	6.02	0.998
GSN nanozyme	2.51	3.28	0.993

Table S2. Comparison of different methods for detecting glucose in sweat.

Materials	Type	Linear range (mM)	LOD (mM)	Ref.
GOD/HRP/KI	Wearable sensor	0.1 - 3	0.1	1
GOD/HRP/4-AAP/DHBS	Wearable sensor	0.05 - 0.3	0.05	2
GOD/ PtTFPP/ G1	Fluorescent microfluidic-chip	0.2 - 1.5	0.005 (H_2O_2-based) 0.04 (O_2-based)	3
GOD/PDMS	Wearable sensor	0.5 - 15	0.2	4
nanotubes/alginate hydrogel	PAD	0.1 - 0.8	0.044	5
GSN	Colorimetric PAD	0.04 - 0.5 0.1 - 0.5	0.016 0.038	This work

Table S3. Comparison of analytical features of PAD-based glucose sensors.

Materials	Linear range (mM)	LOD (mM)	Ref.
GOx/HRP/TMB	1.0–11.0	0.45	6
AuNPs/AgNPs	0.5 - 10	0.34	7
Fe_3O_4@PtNPs	0.5 - 5	0.39	8
PAni-NPs/RBCMs	0 - 56	0.54	9
AuNPs	1.25 - 20	0.65	10
GSN	0.1 - 0.5	0.038	This work

Table S4. Recovery analysis of glucose in artificial sweat by colorimetric assay and PAD assay.

Sample	Added (mM)	Colorimetric assay			PAD assay		
		Detected (mM)	Recovery (n = 3, %)	RSD (n=3, %)	Detected (mM)	Recovery (n = 3, %)	RSD (n=3, %)
1	0.100	0.102	102	3.02	0.0990	99.0	3.07
2	0.300	0.294	98.0	1.40	0.306	102	2.61
3	0.500	0.504	101	1.20	0.521	104	2.06

Reference:

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