SUPPORTING INFORMATION

Dextran-Gold Nanoparticle-Based Tablets and Swabs for Colorimetric Detection of Urinary H_2O_2

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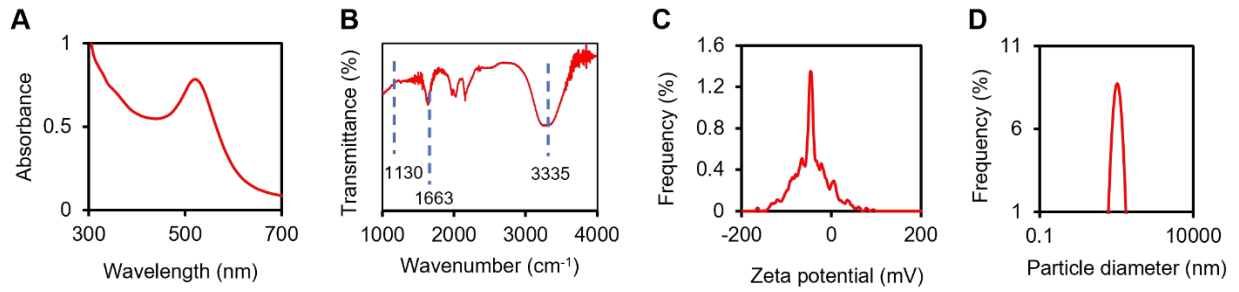

Fig. S1. Characterization of colloidal dAuNPs-Sol showing **A)** absorbance spectra; **B)** FTIR spectra; **C)** zeta potential graph; **D)** a plot of hydrodynamic size.

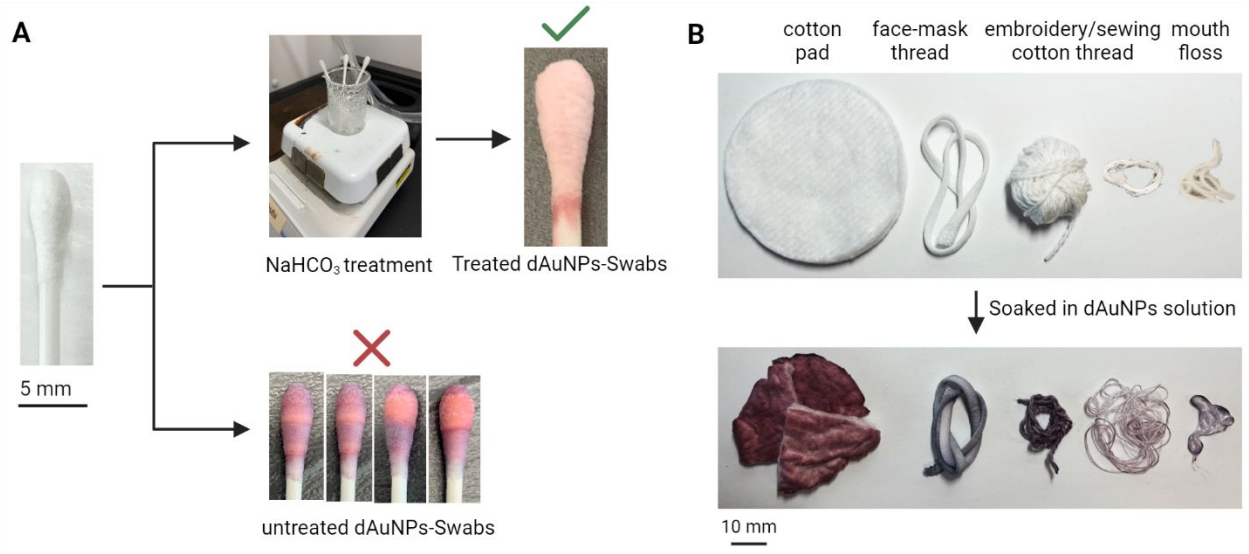

Fig. S2. Testing the suitability of different materials (i.e. cotton, polyester) and platforms (i.e. swab, ball, thread, floss) for colorimetric assay. **A)** The $NaHCO_3$ treatment removed wax layer from the cotton swab resulting in uniform spreading of dAuNPs suspension on the swab whereas untreated dAuNPs-Swabs led to the inconsistent spreading of colloidal dAuNPs giving multi-color zones; **B)** Incompatibility of different materials (i.e. cotton pad, face-mask thread, embroidery and

sewing cotton thread, and mouth floss) to adsorb and sustain dAuNPs well-dispersed on the surface. All of them turned purplish-blue after drying, hence unsuitable for the colorimetric assay.

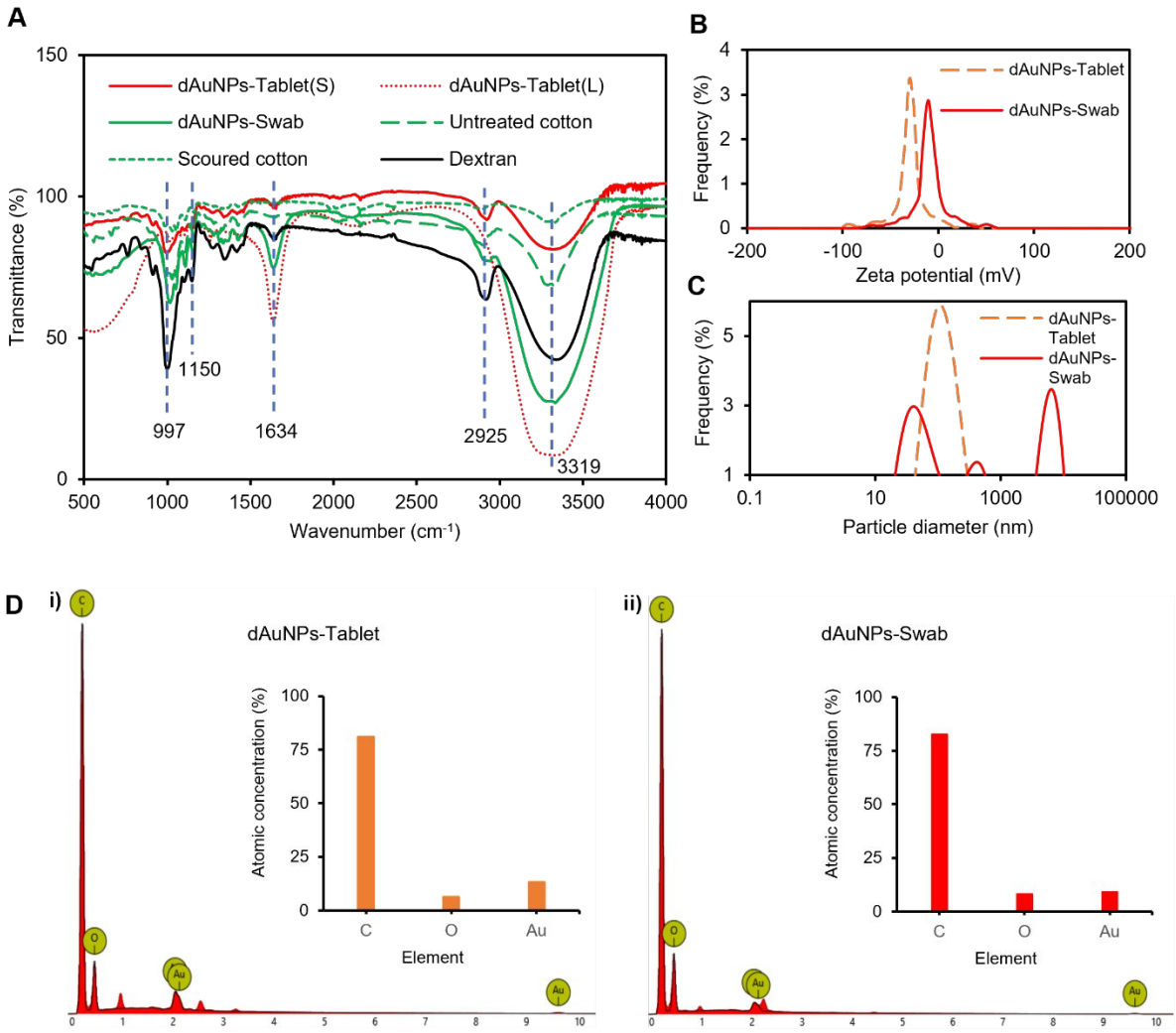

Fig. S3. Characterization of tablet and swab sensors. A**)** Infrared spectra of dAuNPs-Tablet as solid (S) and liquid (L) suspension along with dAuNPs-Swab which is compared with pure dextran and cotton; **B)** A graph showing zeta potential values of tablet and swab; **C)** A plot for the hydrodynamic size of tablet and swab; **D)** EDS spectra displaying the elemental composition (inset graph) of i) dAuNPs-Tablet and ii) dAuNPs-Swab.

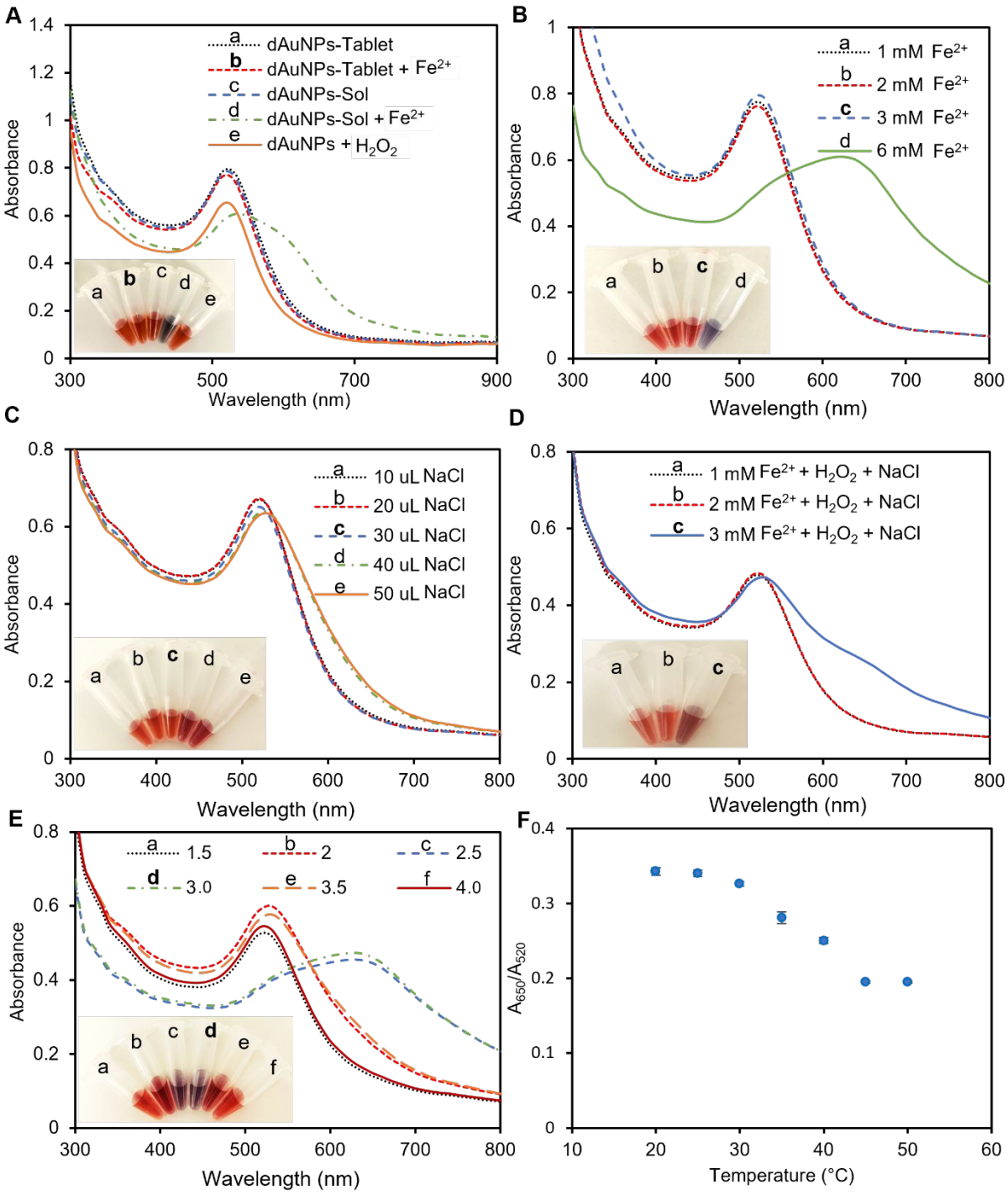

Fig. S4. Optimization of experimental conditions for H_2O_2 assay using a tablet sensor and Fenton's reagent. Insets show optical images of a color change in dAuNPs solution. **A)** The absorption spectra of dAuNPs-Tablet (2.01% dextran) and dAuNPs-Sol (0.01% dextran) showing λ_{max} at 520 nm but 10 µL of ferrous sulphate (1 mM) in dAuNPs-Sol solution caused the aggregation of particles which shifted the peak towards 650 nm whereas dAuNPs-Tablet solution remained intact; **B)** The effect of different concentration of ferrous sulphate (1, 2, 3, 6 mM) on dAuNPs-Tablet where no aggregation was observed till 3 mM of ferrous ions while a broad peak was recorded

with 6 mM ferrous ions indicating its unsuitability for the assay; **C)** Effect of different volumes (10, 20, 30, 40, and 50 µL) of 1 M NaCl solution on AuNPs-Tablet; **D)** The generation of hydroxyl radicle (·OH) using 10 µL of ferrous sulphate (1, 2, and 3 mM) and 50 µL of H_2O_2 (100 µM) that oxidized dextran around dAuNPs followed by salt-mediated aggregation for 3 mM ferrous ions; **E)** The H_2O_2 assay at different pHs using citrate-phosphate buffer where pH 2.5 and 3 produced a bathochromic shift; **F)** The H_2O_2 assay at variable temperature.

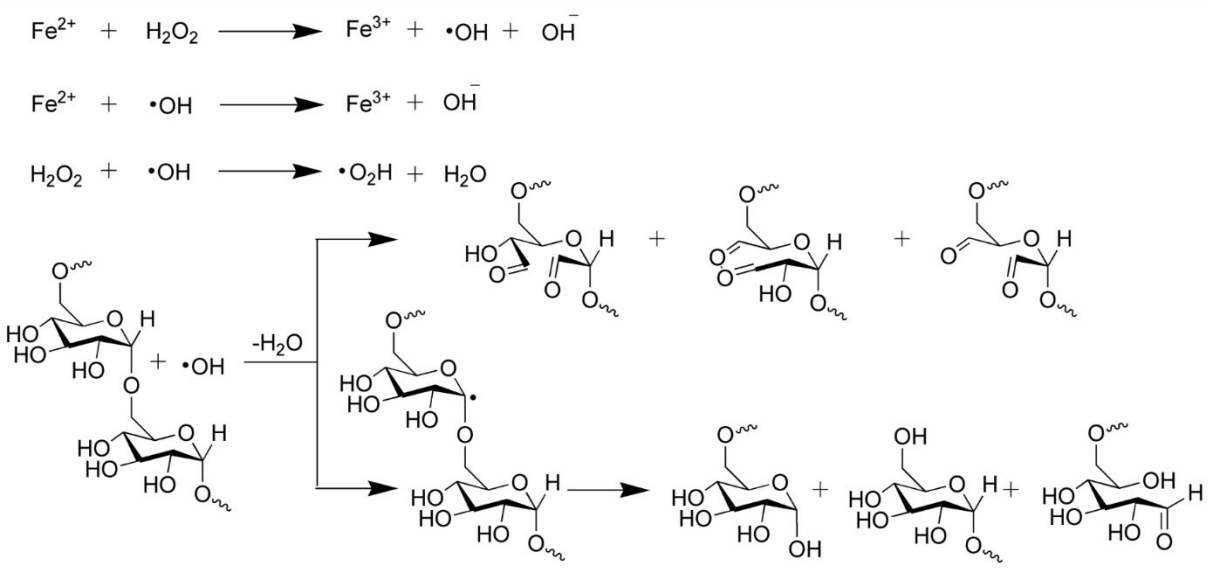

Fig. S5. The Fenton reaction generates hydroxyl radical which involves in further reactions and oxidizes the dextran polymer either by ring opening or depolymerization.

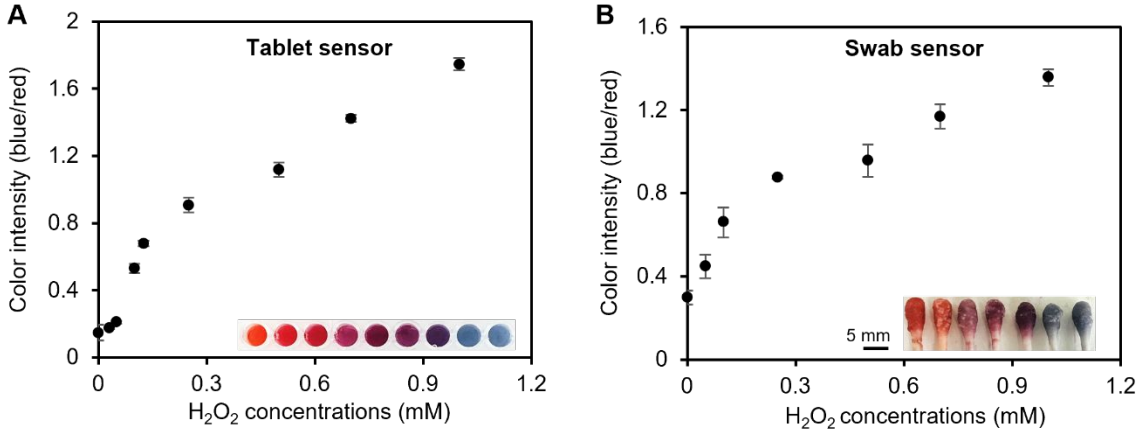

Fig. S6. Plasmonic tablet and swab sensors for the colorimetric detection of H_2O_2 in water. **A)** The calibration curve for H_2O_2 detection using dAuNPs-Tablet with LoD of 100 µM. An inset shows a gradual color change of a sensing probe; **B)** The calibration curve for H_2O_2 detection using blue/red color intensity of dAuNPs-Swab with LoD of 50 µM. An inset shows the color difference in cotton swabs due to varying H_2O_2 concentrations. The lower LoD in the swab sensor may be attributed to the strong signal on white cotton swab, which enabled a clear color variation between different concentrations.

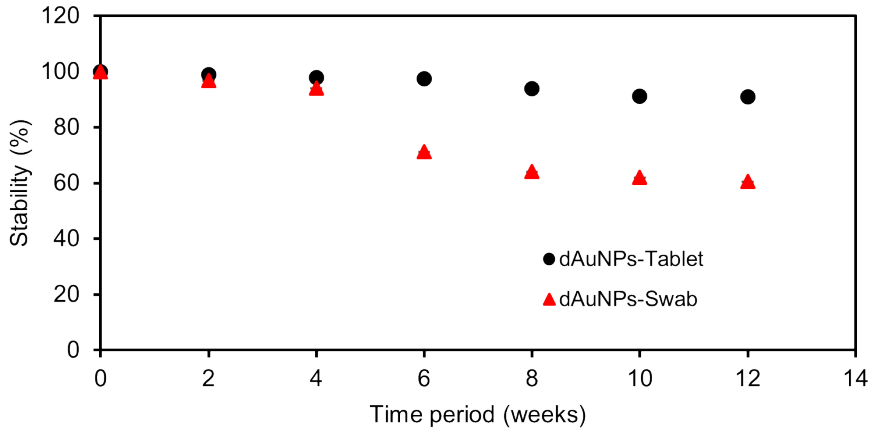

Fig. S7. The stability profile of a tablet and a swab sensor showed a 40% decrease in the stability of the swab over a period of 12 weeks.

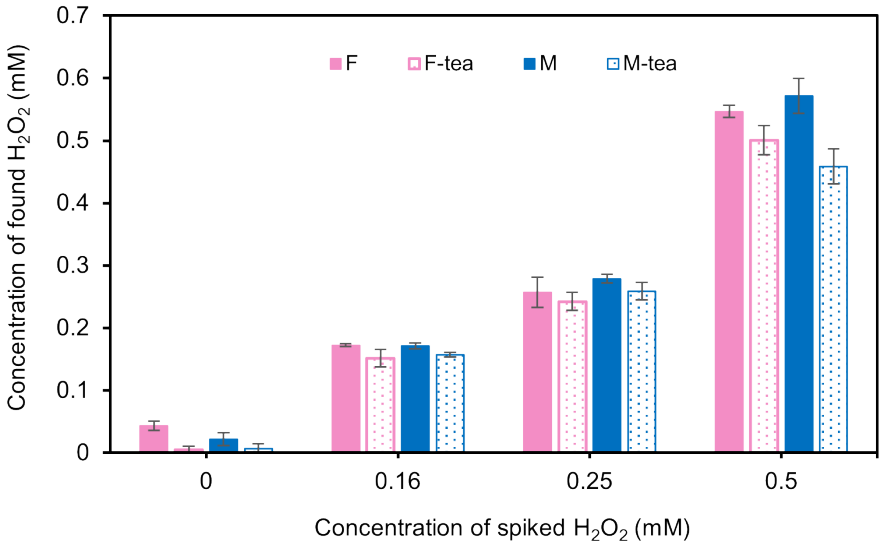

Fig. S8. Comparison of H_2O_2 levels in samples before (F and M) and after green tea consumption (F-tea and M-tea). The reduced H_2O_2 levels in F-tea and M-tea samples suggest a potential role of green tea in mitigating oxidative stress.

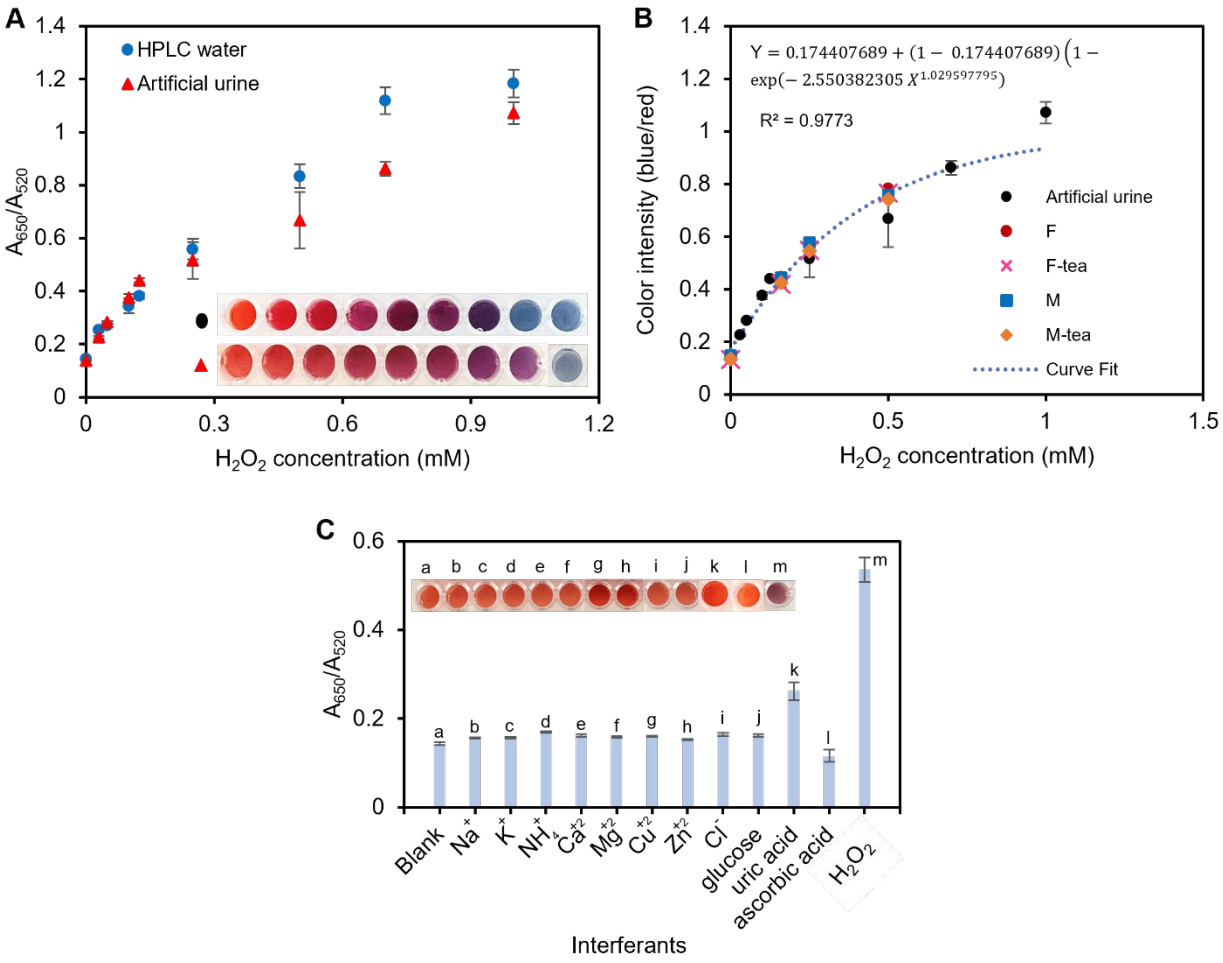

Fig. S9. Plasmonic tablet sensor for H_2O_2 detection using UV-vis spectrophotometer to record absorbance values. **A)** Calibration curve; **B)** Spiking analysis; **C)** Selectivity study.

Table S1. The spiking recovery analysis of proposed H_2O_2 assay before and after green tea consumption

Samples	Amount added (mM)	Tablet sensor			Swab sensor		
		Amount found (mM)	%R	%RSD	Amount found (mM)	%R	%RSD
F	0	0.03-0.04	-	4.53	0.01-0.04	-	1.27
	0.16	0.16-0.17	106-108	0.46	0.18-0.19	116-120	0.25
	0.25	0.22-0.27	91-110	4.37	0.28-0.29	115-118	0.29
	0.5	0.53-0.55	111-108	1.17	0.52-0.54	105-108	0.38
F-tea	0	0.00-0.01	-	1.79	0.00-0.03	-	1.51
	0.16	0.13-0.16	84-100	3.19	0.14-0.17	90-111	1.30
	0.25	0.22-0.25	91-103	2.74	0.25-0.27	101-109	0.77
	0.5	0.48-0.52	97-105	2.94	0.48-0.52	96-105	1.38
M	0	0.01-0.02	-	3.23	0.02-0.04	-	1.28
	0.16	0.16-0.17	104-109	0.96	0.14-0.18	92-112	1.22
	0.25	0.27-0.28	108-113	1.17	0.26-0.28	110-114	0.87
	5	0.53-0.59	107-118	3.22	0.50-0.59	101-119	3.07
M-tea	0	0.00-0.01	-	2.50	0.01-0.03	-	0.96
	0.16	0.15-0.16	95-100	0.84	0.13-0.14	84-92	0.47
	0.25	0.24-0.26	97-107	2.55	0.20-0.25	81-103	2.08
	0.5	0.42-0.47	85-95	3.74	0.40-0.50	80-100	3.13

Table S2. Comparison of recently reported methods for optical detection of hydrogen peroxide

Sensing probe	Method	Response time (min)	LoD	Real samples	Note	Ref.
CuO nanoflakes	peroxidase activity/colorimetry	15	0.96 µM	-	multistep preparation	[1]
Cysteine-AuNPs	catalytic activity/colorimetry	20	0.5 µM	human sweat	Multiple steps with longer incubation time	[2]
DNA-gold nanoparticles	Fenton reaction/colorimetry	10	1 µM	-	labor-intensive steps to prepare the probe	[3]
Gold nanoclusters (AuNCs)	peroxidase activity/colorimetry	20	7 µM	-	multistep preparation	[4]
Phosphor-based film of Li^+ co-doped $CaWO_4$:Tb^{3+}/PVA-AgNPs	fluorescent probe and colorimetric detection	≤ 5 s	12.8/20 µM	human blood serum	complicated synthesis procedures	[5]
MXene/Gold nanoparticles heterostructure	catalase mimic/colorimetry	40	7.51 nM	-	multistep preparation	[6]
Mustard seed-carbon quantum dots	catalytic activity/fluorescence	15	15 µM	different fresh fruits	requires a light source for data interpretation	[7]

Dextran-gold nanoparticles tablet/swab	Fenton reaction/colorimetry	10	50/100 μM	human urine	easy to synthesize and equipment-free data reading	This work

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