Detection of *Helicobacter pylori* in dental plaque using a DNA biosensor for noninvasive diagnosis

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1. Verification of the *H. pylori* culture

The *H. pylori* (HP) culture was verified through morphological observation, and various biochemistry tests (Figure S-1). As shown in Figure S-1A, transparent, round colonies were grown on the Brucella broth agar medium. The urease test with the HP test paper show a positive result (Figure S-1B). In addition, the catalase test in reaction with H_2O_2 produced obvious O_2 bubbles (Figure S-1C), and the oxidase test in reaction with N,N-dimethyl-p-phenylenediamine dihydrochloride (DMPDA) turned out a purple product (Figure S-1D). These tests identified positive *H. pylori* in the culture.

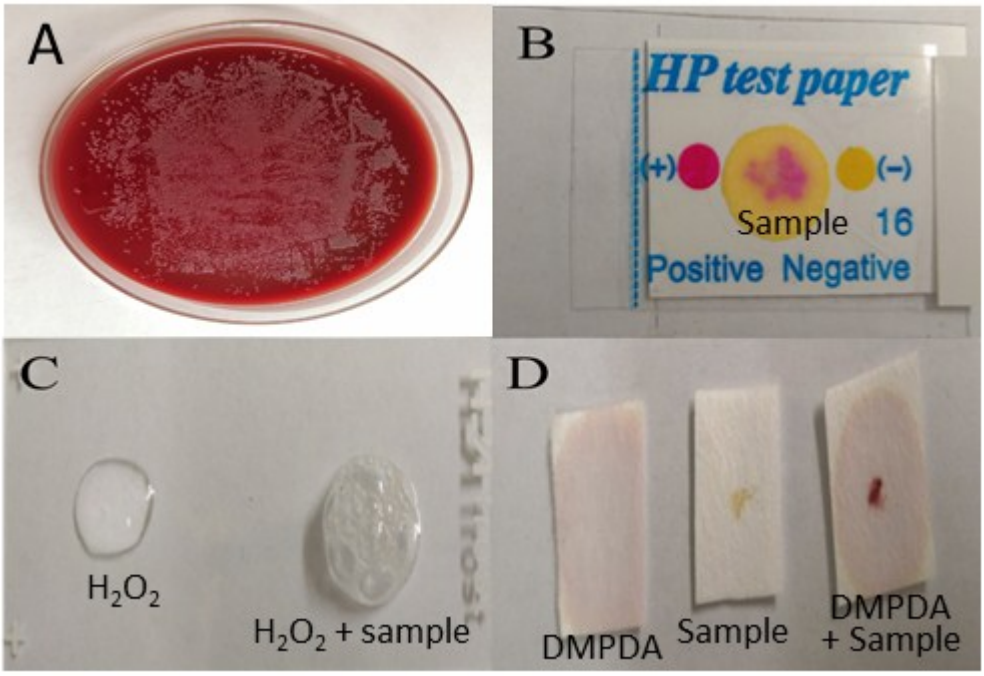
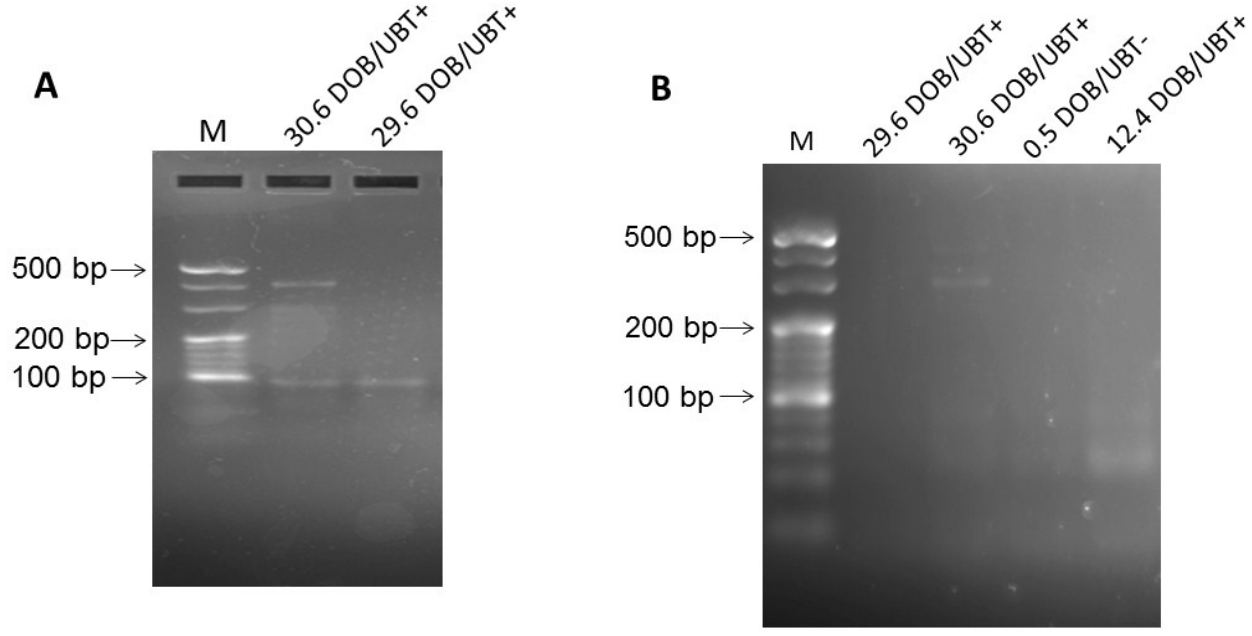


Figure S-1. Verification of the *H. pylori* culture. (**A**) Picture of the *H. pylori* colonies on Brucella broth agar medium supplemented with 10% goat blood. (**B**) The *H. pylori* urease test result of the *H. pylori* culture sample. (**C**) The catalase test result of the *H. pylori* culture sample in reaction with H_2O_2. (**D**) The oxidase test result of the *H. pylori* culture sample in reaction with 1% N,N-dimethyl-p-phenylenediamine dihydrochloride (DMPDA).

2. Gel electrophoresis measurement for colony PCR products of the dental plaque samples



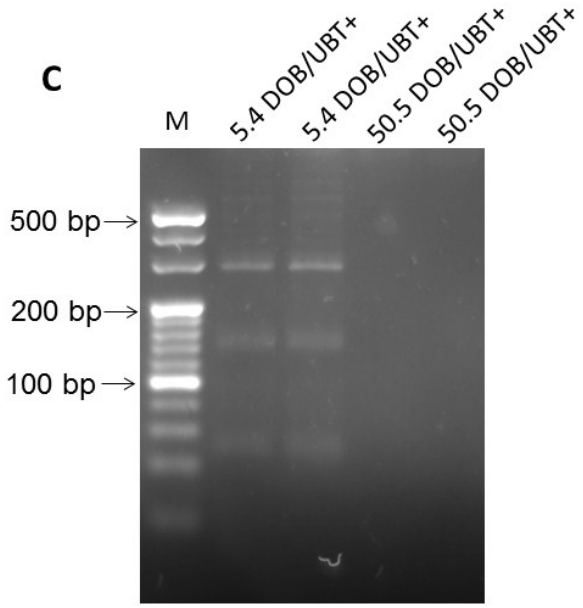


Figure S-2. The agarose (3.5%) gel electrophoresis results of the *H. pylori* colony PCR products of the dental plaque samples collected from the *H. pylori* positive patients/volunteers (UBT ≥ 4.0), and the *H. pylori* negative patients/volunteers (UBT < 4.0). M was from a DNA marker. Others Lanes 2 were the PCR products loadings. The gels were stained with GoldView I for observation. The designated PCR products of the *H. pylori* colony was 104 bp.

3. The biosensor performances in detecting dsDNA

Table S-1. Comparison of the proposed biosensor with other DNA biosensors

Modified material	Detection method	Target DNA	Linear range (nM)	Detection limit（nM）	References
L-cysteine	DPV	ssDNA	18.75–250	18.13	34
AuNPs/PEM	DPV	ssDNA	0.01–1.0×10^4	0.01	35
AuNPs/TB-GO	DPV	ssDNA	0.01–1.0	2.95×10^{-3}	36
GNRs	CV	ssDNA	0.001–1.0×10^3	2.0×10^{-3}	37
GA/Th-G/GA/Cys	DPV	ssDNA	0.001–100	1.26×10^{-4}	38
$AuNP_S$	DPV	dsDNA	0.000033–0.0065	3.2×10^{-5}	This work