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Supplementary Information

Facile Ag^+ assisted bonding strategy built a defect-low hybrid layer with intrinsic antibacterial and enzymolysis-inhibitory property

Yajie Cheng†, Yadong Chen†, Shu Chang†, Chenying Zhou, Zhenzhen Zhang, Yan Tu*, Qiaojie Luo, Xiaodong Li*

Stomatology Hospital, School of Stomatology, Zhejiang University School of Medicine, Clinical Research Center for Oral Disease of Zhejiang Province, Key Laboratory of Oral Biomedical Research of Zhejiang Province, Cancer Center of Zhejiang University, Hangzhou 310000, China.

*Corresponding authors. Email: cisarli@zju.edu.cn, tuyan1984@zju.edu.cn

†These authors contributed equally to this work.

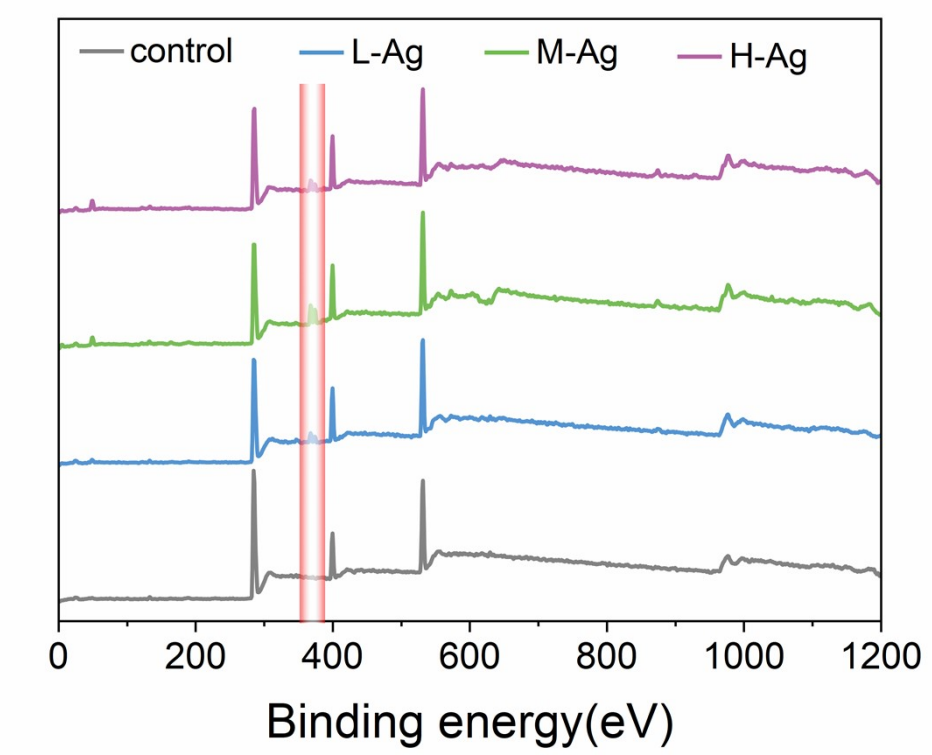

Figure S1 X-ray photoelectron spectroscopy analysis showed the apparent peaks of Ag except control.

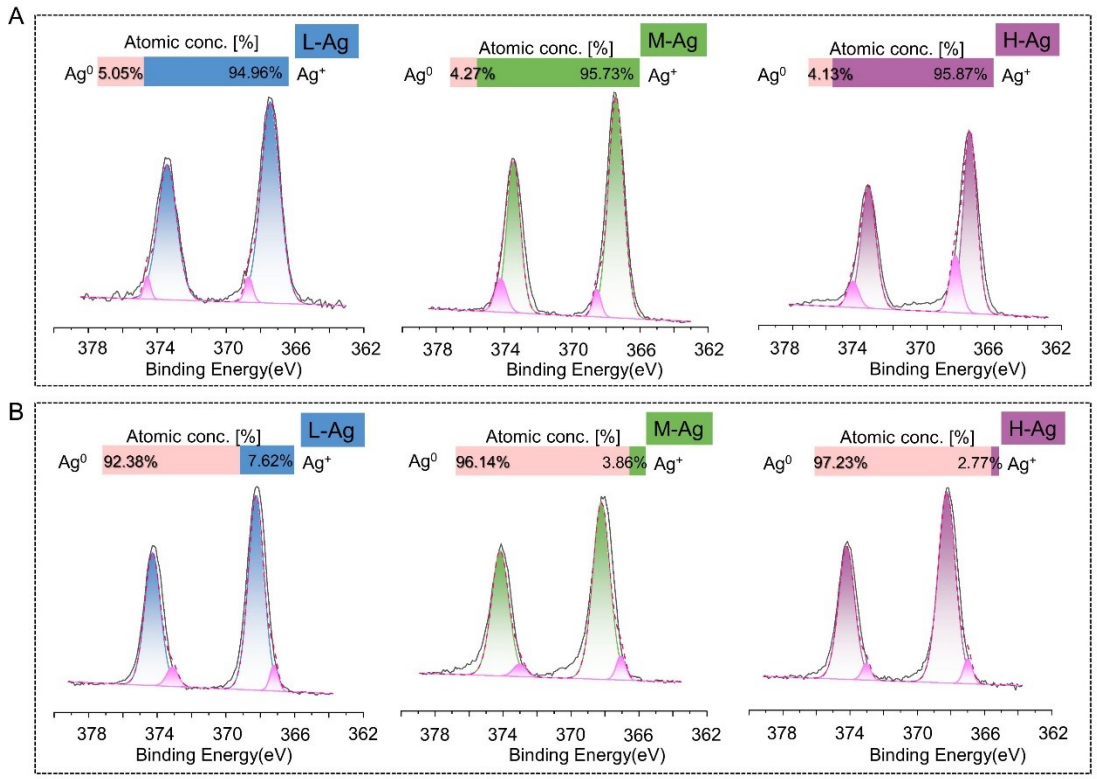

Figure S2 X-ray photoelectron spectroscopy analysis of the samples aged by thermal cycling for 10000. (A) Samples without light-irradiation. (B) Samples with light irradiated for 20 s before thermal cycling.

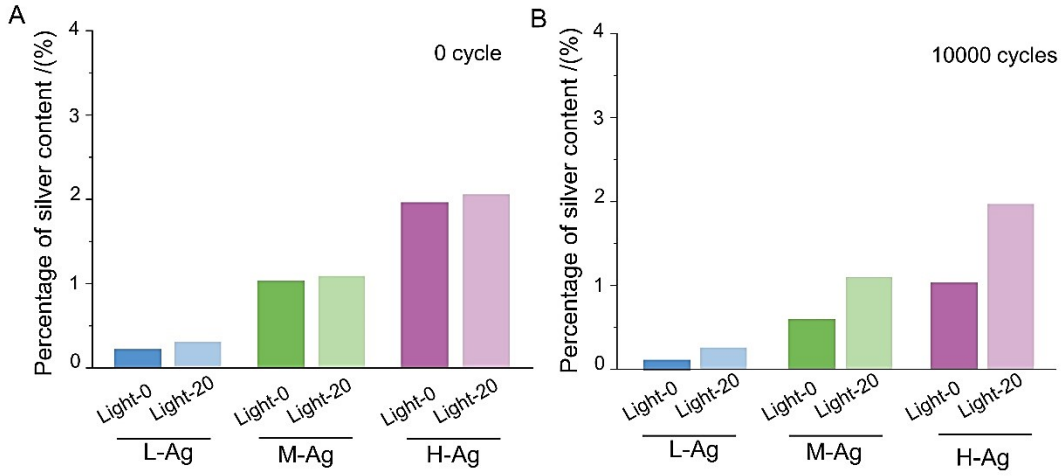

Figure S3 X-ray photoelectron spectroscopy analysis. (A) The content of Ag immediately after preparing. (B) The content of Ag after 10000cycles.

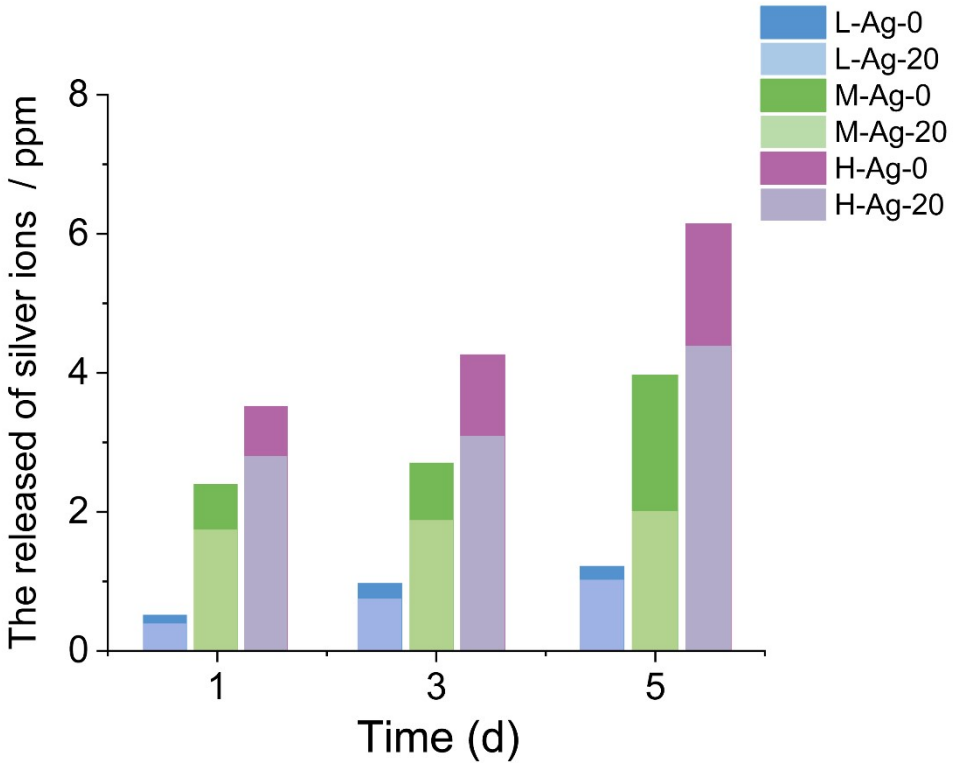

Figure S4 Silver ion release from different treatments of light-0 and light-20 detected by ICP-OES.

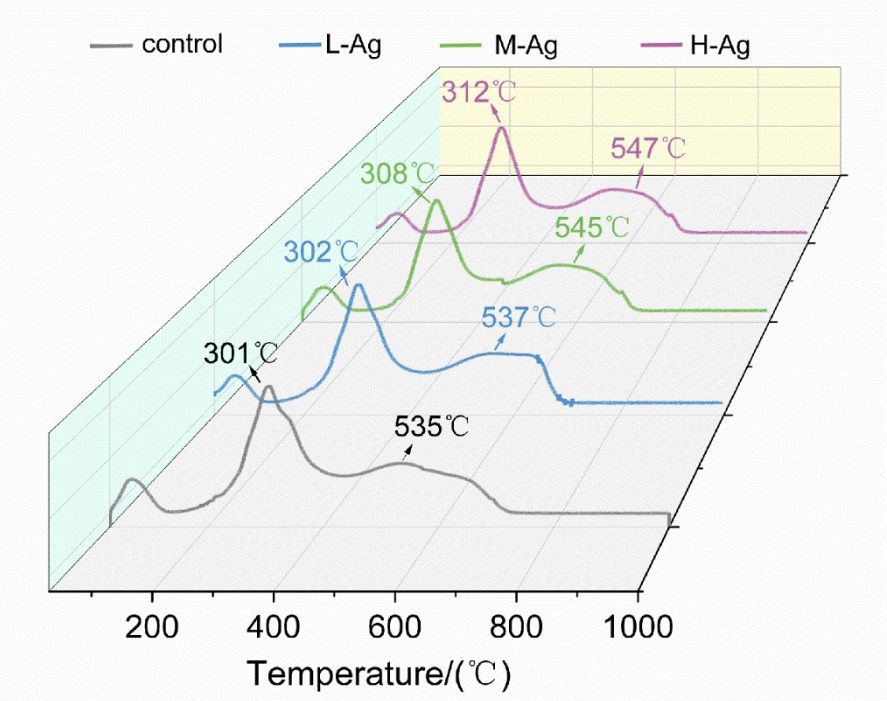

Figure S5 The differential thermal analysis (DTA) curves show that the collagen breakdown peaks increase after metal ion treatment.

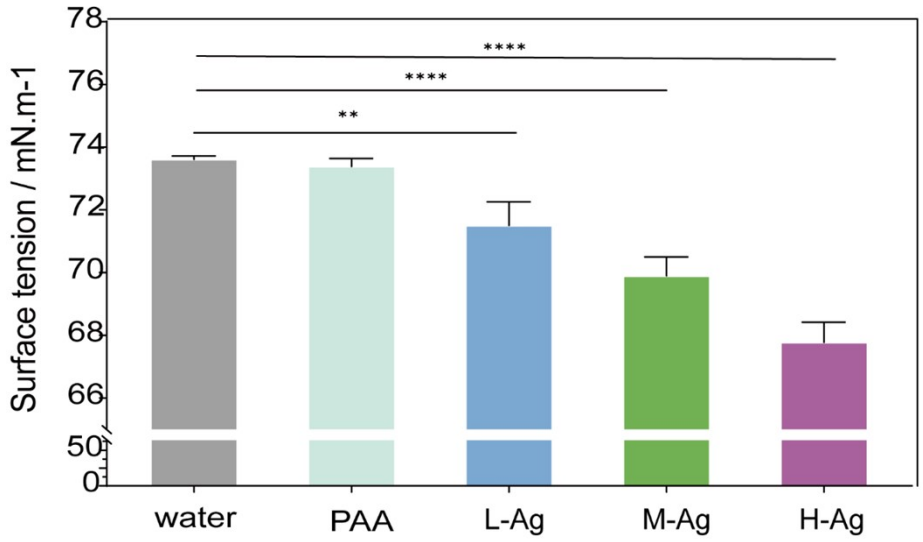

Figure S6 Surface tension measured by the pendent drop method, with the value recorded. ** $P < 0.01$. *** $P < 0.001$.

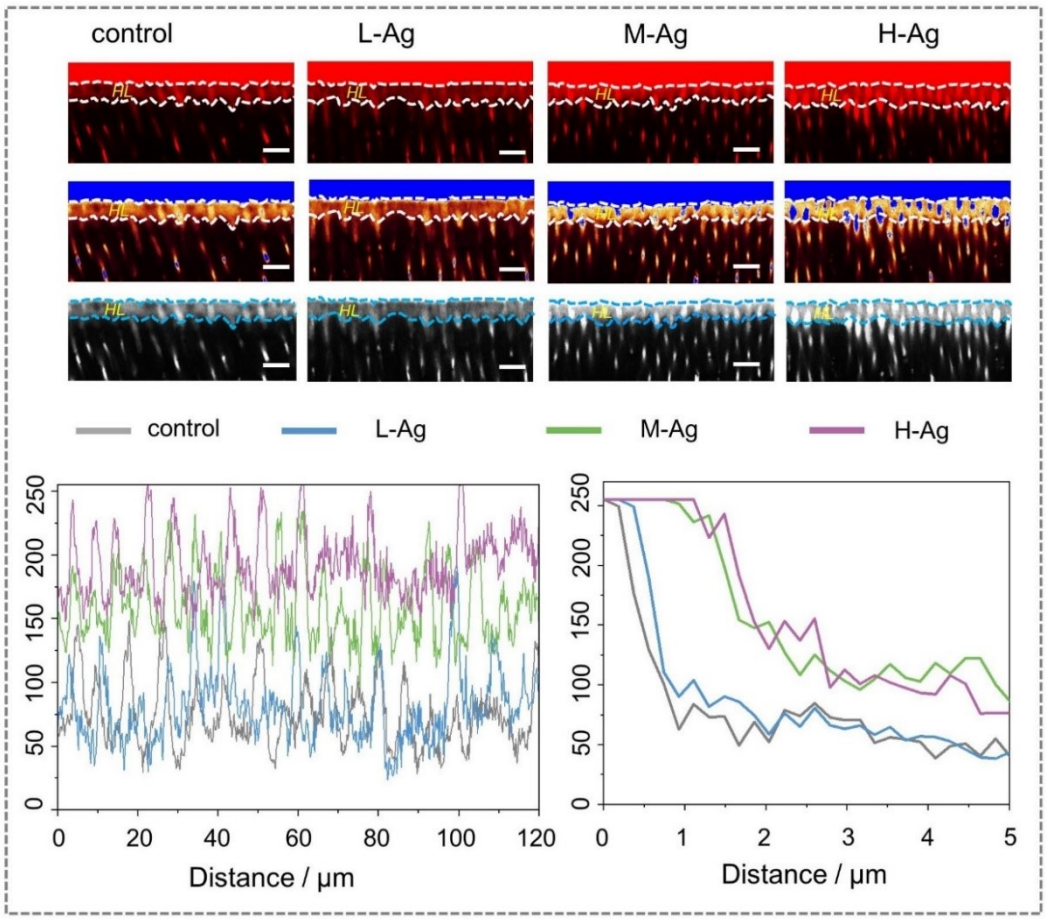

Figure S7 Dehydration of the demineralized dentin matrix (DDM) interface improves adhesive infiltration on Spectrum Bond system.

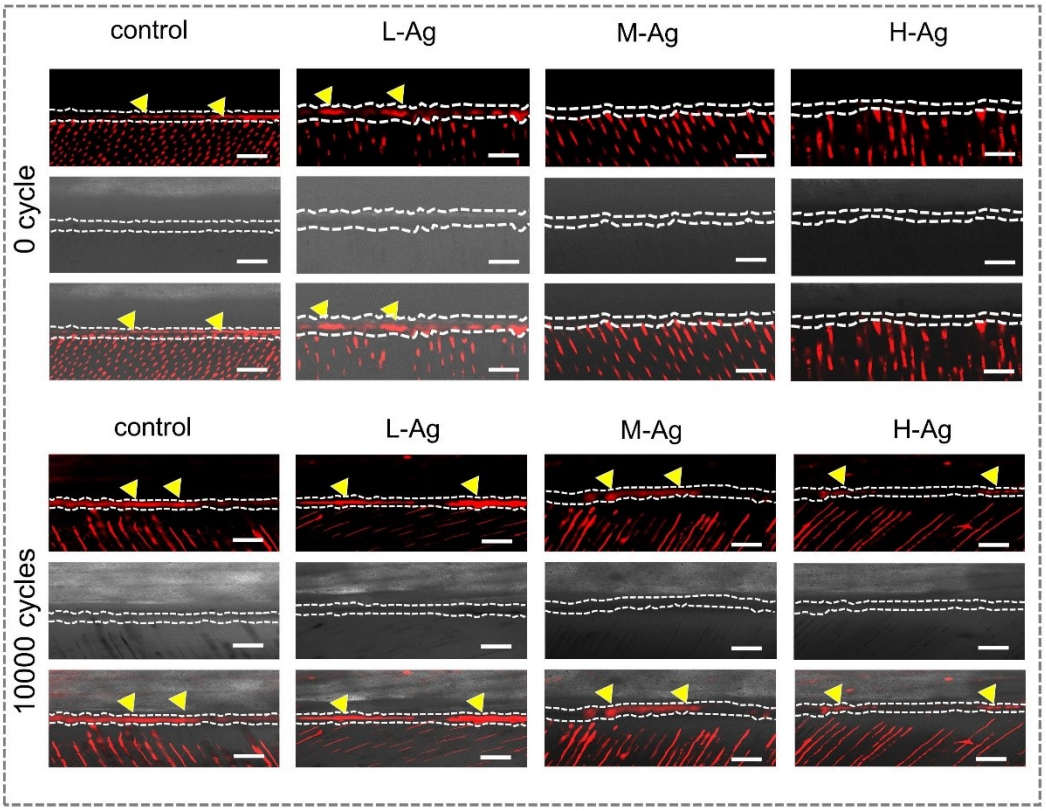

Figure S8 Nanoleakages show varying degrees of red fluorescence in the hybrid layer. The yellow marks band representing the amount of nanoleakage under the given experimental conditions on Spectrum Bond system. Scale bar = 5 μm.

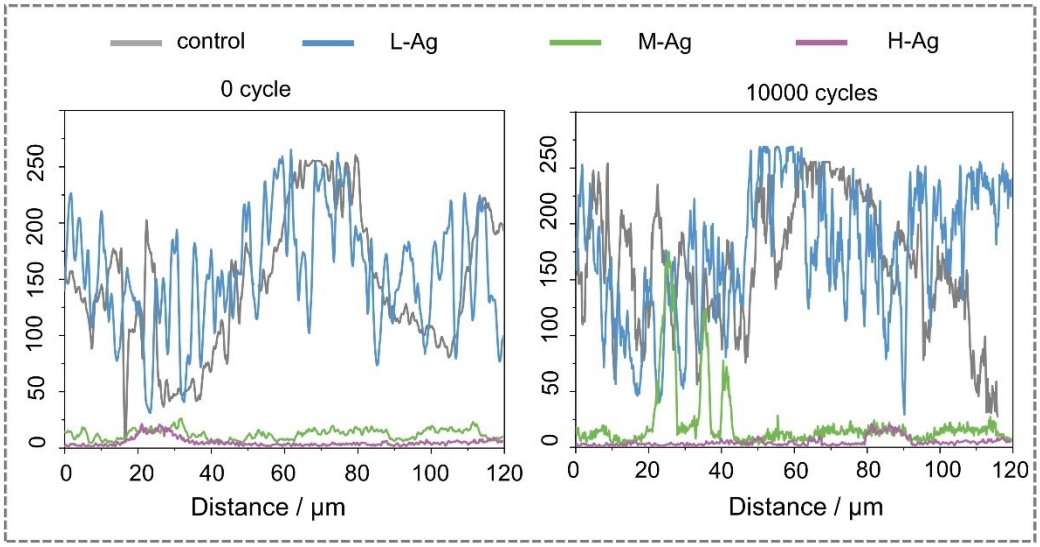

Figure S9 The transverse fluorescence intensity analysis of the hybrid layer by 0 cycle and 10000 cycles on Spectrum Bond system.

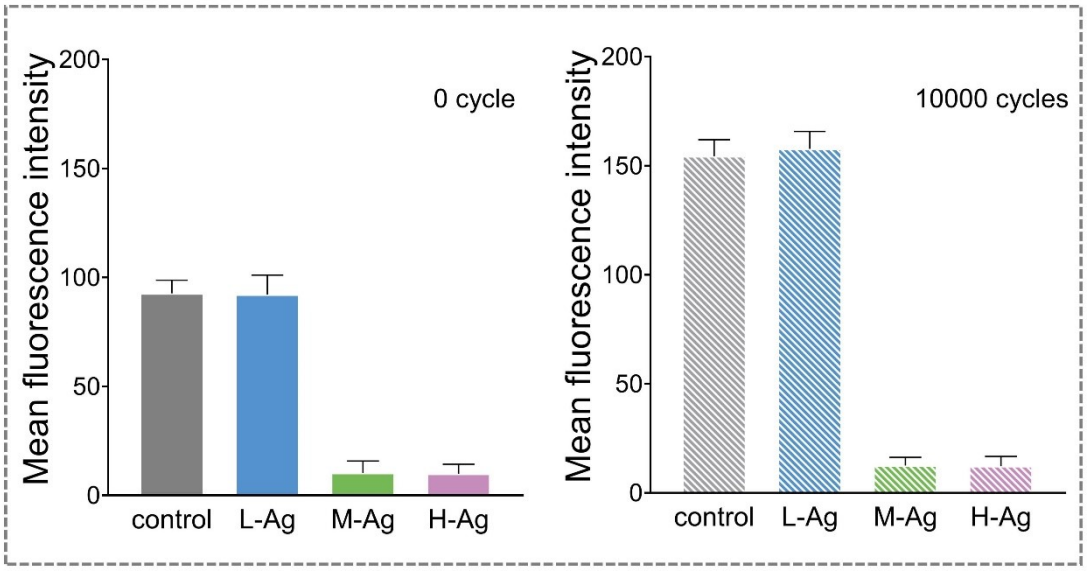

Figure S10 The quantitative fluorescence intensity was analyzed in the horizontal directions of the hybrid layer in Figure S6 under 0 cycle and 10000cycles on Spectrum Bond system.

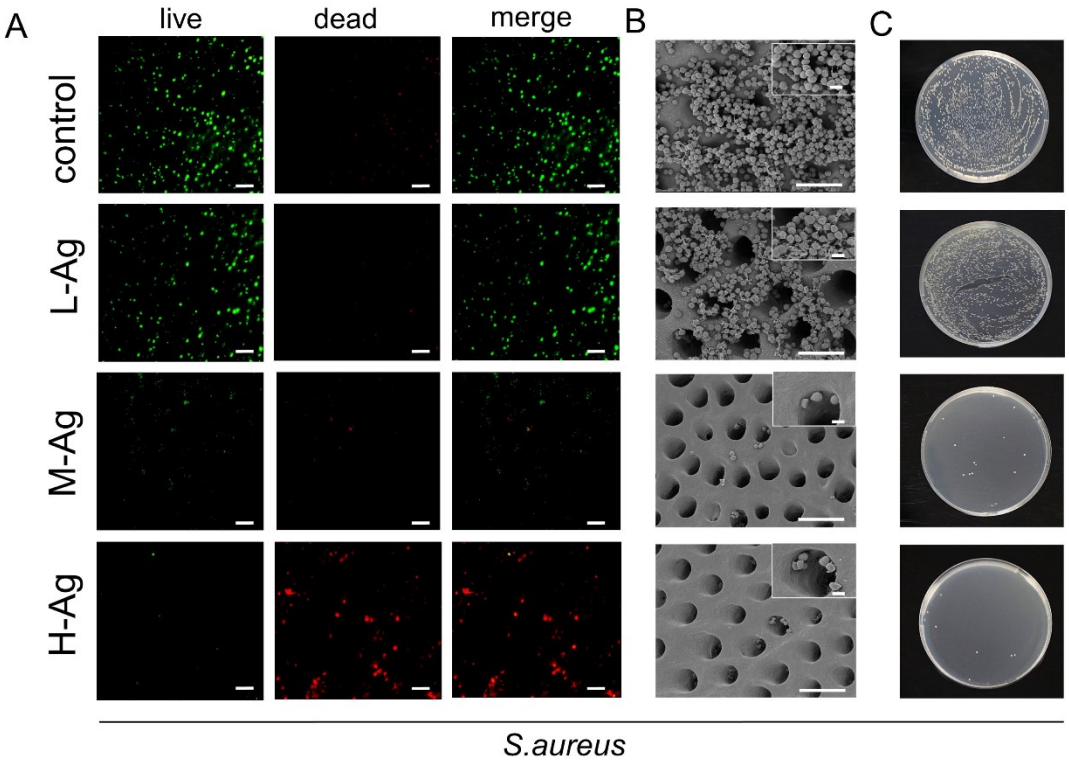

Figure S11 Ag treatment endows the DDM with strong antibacterial property to *S. aureus*. (A) Live/dead staining of *S. aureus* on DDM with light irradiation. (B) Representative FE-SEM images of bacteria cultured on DDM. Scale bar = 5 μm and 1 μm (inset). (C) Cultures of bacteria adhering to DDM surfaces.

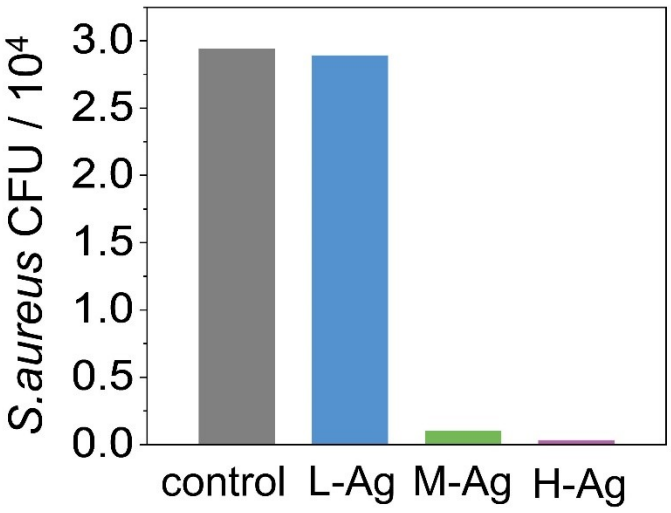

Figure S12 Colony counting calculated from Fig. S11C.

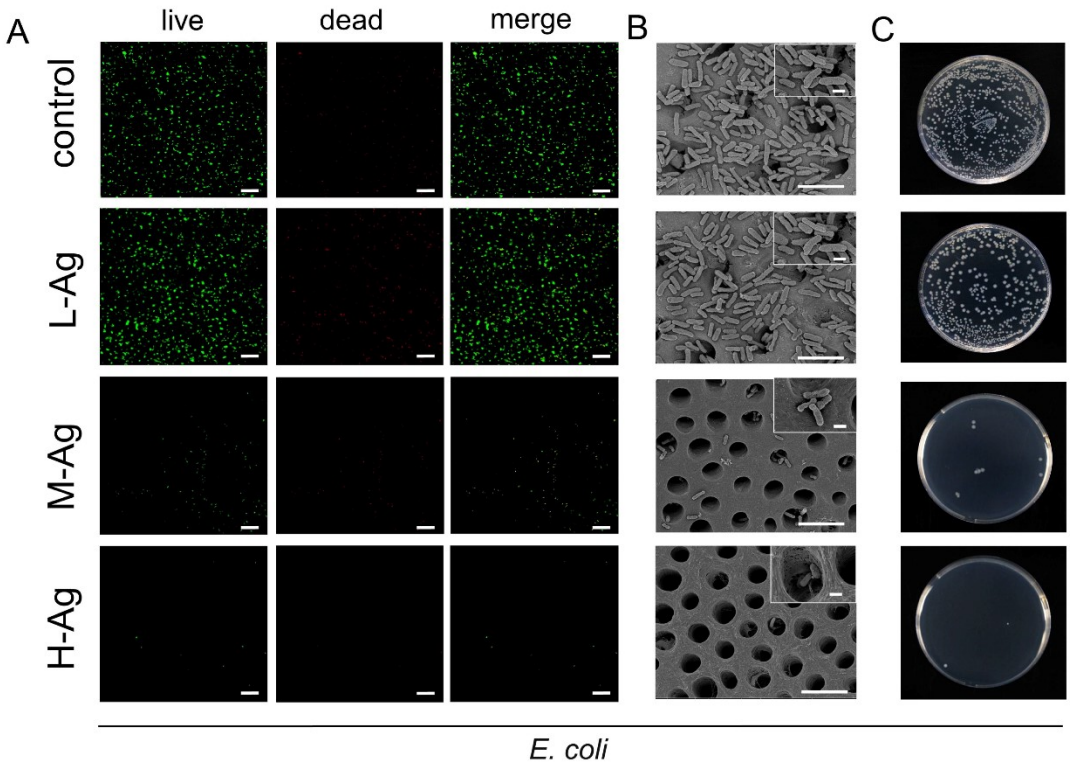

Figure S13 Ag treatment endows the DDM with strong antibacterial property to *E. coli*. (A) Live/dead staining of *E.coil* on DDM with light irradiation. (B) Representative FE-SEM images of bacteria cultured on DDM. Scale bar = 5 μm and 1 μm (inset). (C) Cultures of bacteria adhering to DDM surfaces.

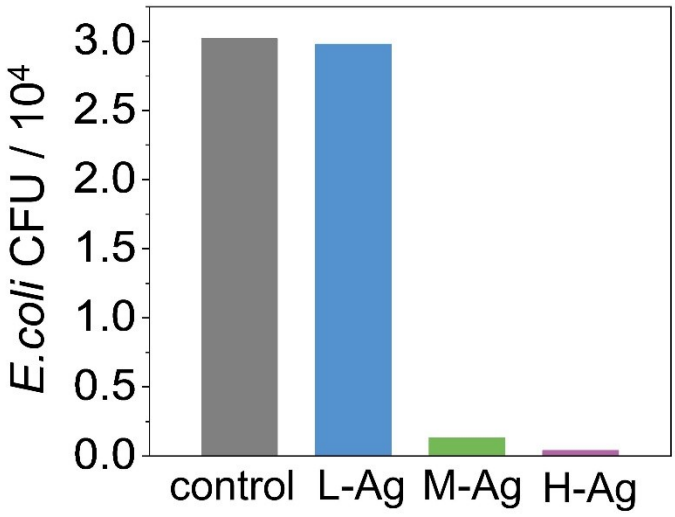

Figure S14 Colony counting calculated from Fig. S13C.

Table S1. The list of acronyms

Abbreviations	Full name
L-Ag	Low concentration Ag
M-Ag	Medium concentration Ag
H-Ag	High concentration Ag
DDM	demineralized dentin matrix
MMPs	matrix metalloproteinases
S. mutans	Streptococcus mutans
TDD	Total demineralized dentin
ICP-OES	Inductively Coupled Plasma-Optical Emission Spectrometer
TGA	thermal gravimetric analyzer
NCPs	non-collagenous proteins
S. aureus	Staphylococcus aureus
E. coli	Escherichia coli