Electronic Supplementary Material for

β-FeOOH/Fe-TiO_2 heterojunctions on Ti for bacterial inactivation under light irradiation and biosealing

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Preparation of Fe-TiO_2 and MFC coatings on Ti.

Ti plates (φ 14 mm) were MAOed at a voltage of 480 V and pulse frequency of 500 Hz for 2 min in an aqueous electrolyte containing various amounts of EDTA-FeNa and 0.02 M β-glycerophosphate disodium. The Fe-TiO_2 coatings were designated as Fe1, Fe2, Fe3 and Fe4 according to the EDTA-FeNa concentrations of 0.001M, 0.003 M, 0.006 M and 0.012 M, respectively. With the increased concentration of EDTA-FeNa in the electrolyte, the average content of Fe increased. They are 1.2 wt% on Fe1, 3.1 wt% on Fe2, 6.0 wt% on Fe3 and 11.8 wt% on Fe4, respectively.

In order to confirm the necessity of alkali-heat pretreatment in forming the HF*x* samples. A part of MC samples were directly HTed in 20 ml of aqueous solution with 0.1 M $FeCl_3 \cdot 6H_2O$ at 100°C for 2 h, and denoted as MFC.

Preparation of β-FeOOH nanoparticles.

Pure β-FeOOH nanoparticles were prepared by HT for 20 ml of aqueous solution with 0.1 M $FeCl_3 \cdot 6H_2O$ at 100°C for 2 h. The obtained precipitates were rinsed with deionized water and dried in a vacuum drying chamber overnight at room temperature.

Table S1 Primers used for qRT-PCR and the corresponding annealing temperatures

Gene	Forward primer sequence (5'–3')	Reverse primer sequence (5'–3')	Annealing temperature(°C)	Product size(bp)
IL-1β	GCAACTGTTCCTGAACTCAACT	ATCTTTTGGGGTCCGTCAACT	60	89
IL-6	ACAAAGCCAGAGTCCTTCAGAGAG	TTGGATGGTCTTGGTCCTTAGCCA	62	164
TNF-α	CCCTCACACTCAGATCATCTTCT	GCTACGACGTGGGCTACAG	62	61
CTGF	CCTACCGCGTCCCGATCAT	GAGAGCGAGGAGCACCAAG	60	71
Col-I	ACGCCATCAAGGTCTACTGC	CGTACTCGAACGGGAATCCA	59	162
α-SMA	CCTGAAGAGCATCCGACACT	AGAGTCCAGCACAATACCAGT	62	174
GAPDH	CCACCCTGTTGCTGTAGCC	CCCACTCCTCCACCTTTGA	60	105

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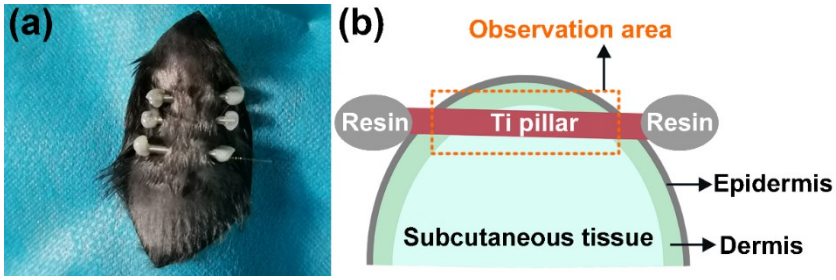

Figure S1 Schematic diagram showing the rectangle-marked region for histological analysis of the coated Ti pillar pertacuneously implanted in mice.

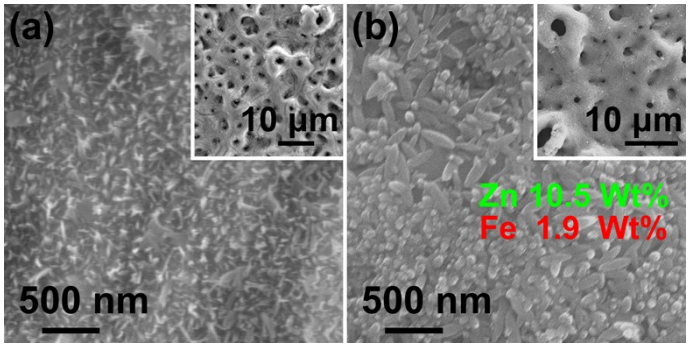

Figure S2(a) SEM morphology of MC after alkali-heat pretreatment and (b) SEM morphology of MFC coatings.

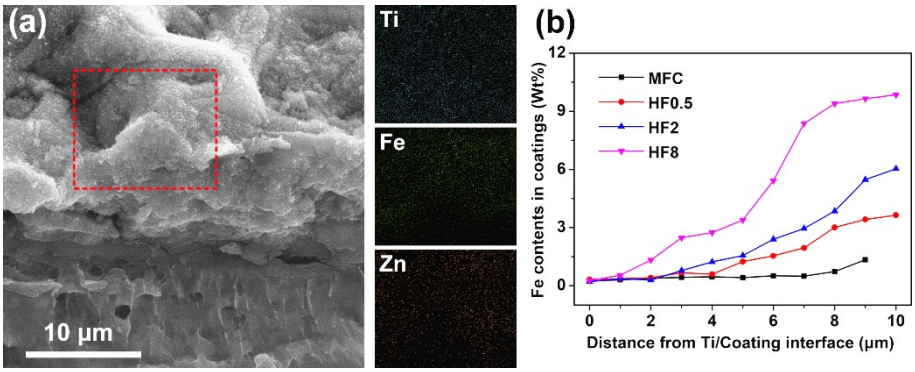

Figure S3(a) Cross-sectional SEM morphologies and the distributions of detected elements (Ti, Zn and Fe) of HF8 coating, (b) Fe profiles in the cross-sections of coatings for different treatments.

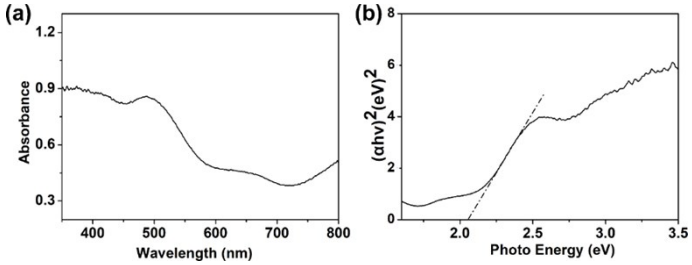

Figure S4(a) UV−vis diffuse reflectance spectra and (b) $(\alpha hv)^2$ as a function of hv calculated based on the band gap energy of β-FeOOH nanoparticles.

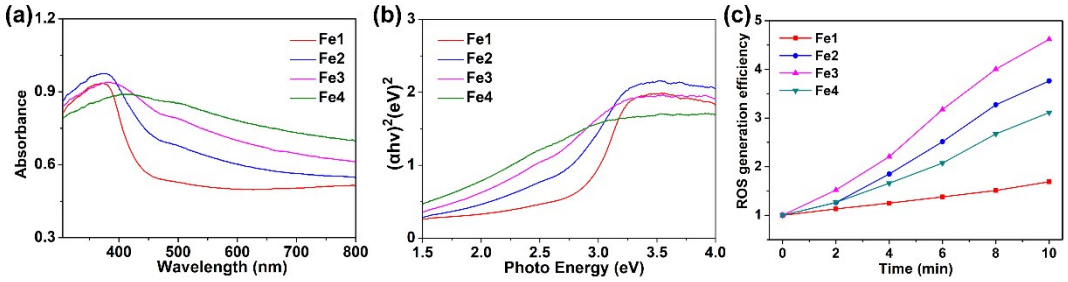

Figure S5(a) UV−vis diffuse reflectance spectra and (b) $(\alpha hv)^2$ as a function of hv calculated based on the bandgap energies of Fe-TiO_2 coatings, (c) ROS production curves of Fe-TiO_2 samples detected by DCFH-DA under 635 nm light irradiation for 10 min.

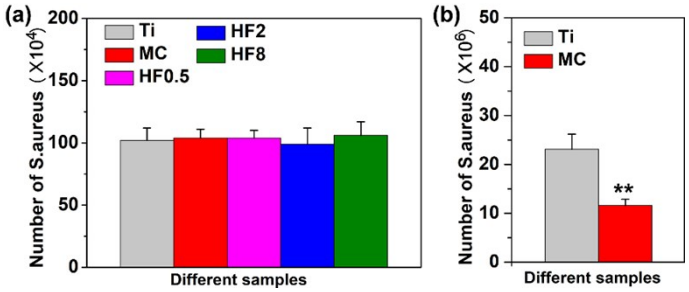

Figure S6 Numbers of S. aureus on different samples for 10 min (a) and 24 h (b) in dark.**$p < 0.01$ compared with the Ti control.

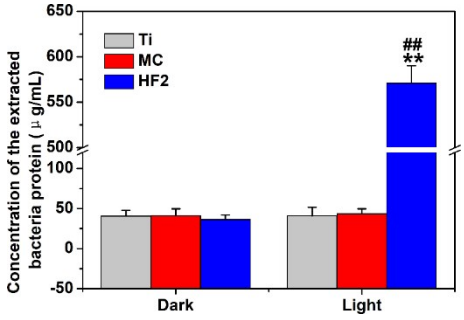

Figure S7 Concentration of the extracted bacteria protein on different surfaces with and without light irradiation for 10 min. (**) $p < 0.01$ compared with the Ti control, and (##) $p < 0.01$ compared with the MC.