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Supplementary Information

A DNase-Mimetic Artificial Enzyme for Eradication of Drug-Resistant Bacterial Biofilm Infections

Haolu Hu[a,b], Xiaoxia Kang[b], Zhenhua Shan[a], Xiaoxiao Yang[b], Wei Bing*[a], Li Wu*[b], Haiyan Ge*[c], Haiwei Ji*[b]

[a.]School of Chemistry and Life Science, Advanced Institute of Materials Science, Changchun University of Technology, 2055 Yanan Street, Changchun 130012, People's Republic of China. E-mail: bingwei@ccut.edu.cn

[b.]School of Public Health, Nantong University, No. 9, Seyuan Road, Nantong 226019, People's Republic of China. E-mail: wuli8686@ntu.edu.cn

[c.]School of Chemistry and Pharmaceutical Engineering, Shandong First Medical University & Shandong Academy of Medical Science, Taian, Shandong, 271016, People's Republic of China. E-mail: hyge1979@163.com

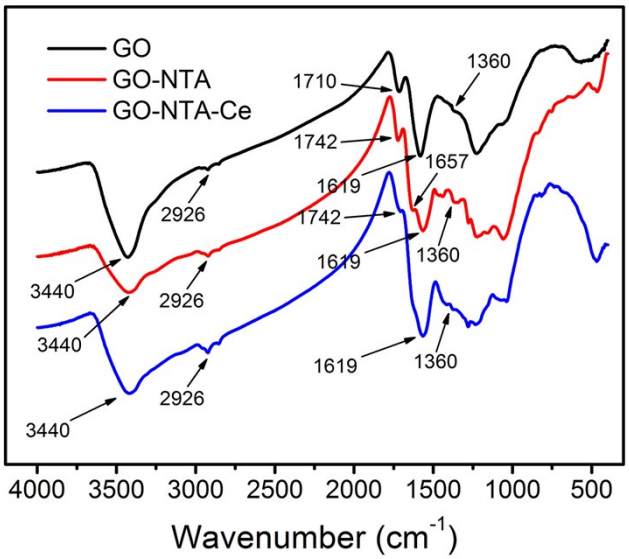

Figure S1. FT-IR spectra of the synthesized GO, GO-NTA, and GO-NTA-Ce.

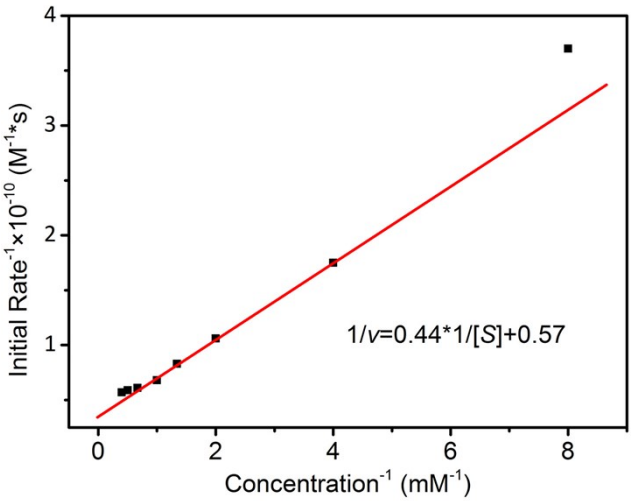

Figure S2. Michaelis constant is calculated from Lineweaver-Burk equation: $1/v = (K_m/V_{max})/[S] + 1/V_{max}$, where v is the initial velocity, V_{max} is the maximal reaction velocity, K_m is the Michaelis constant, and [S] is the the concentration of BNPP.

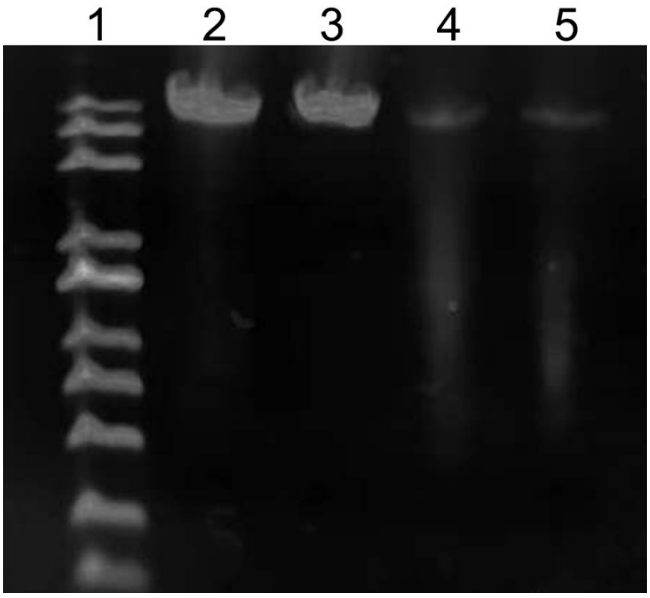

Figure S3. Cleavage of genomic DNA of *S. aureus* catalyzed by NTA-Ce. Agarose gel (1%) electrophoresis showed DNA cleavage in different treatment groups. Lane 1: DNA marker; lane 2: control with buffer only; lanes 3: GO; lanes 4: NTA-Ce; lanes 5: GO-NTA-Ce.

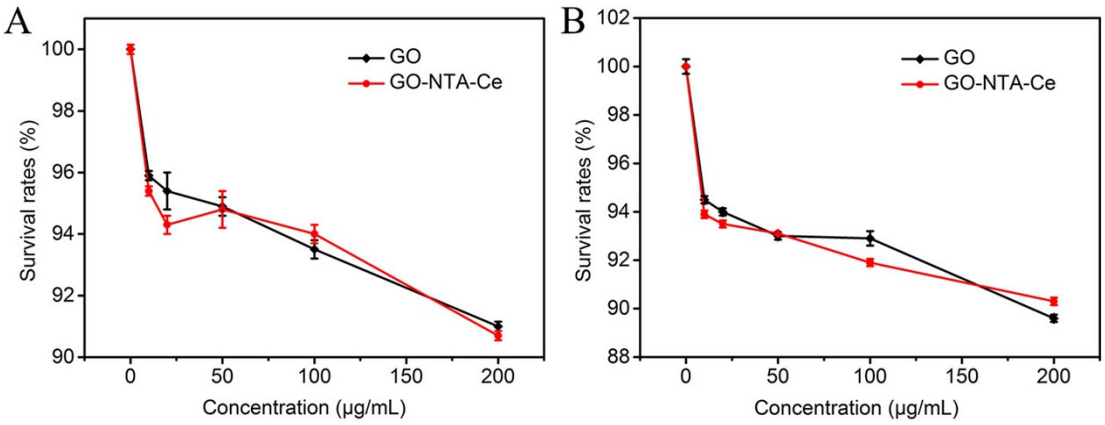

Figure S4. Survival rates of *S. aureus* (Figure A) and MRSA (Figure B) treated with GO or GO-NTA-Ce.

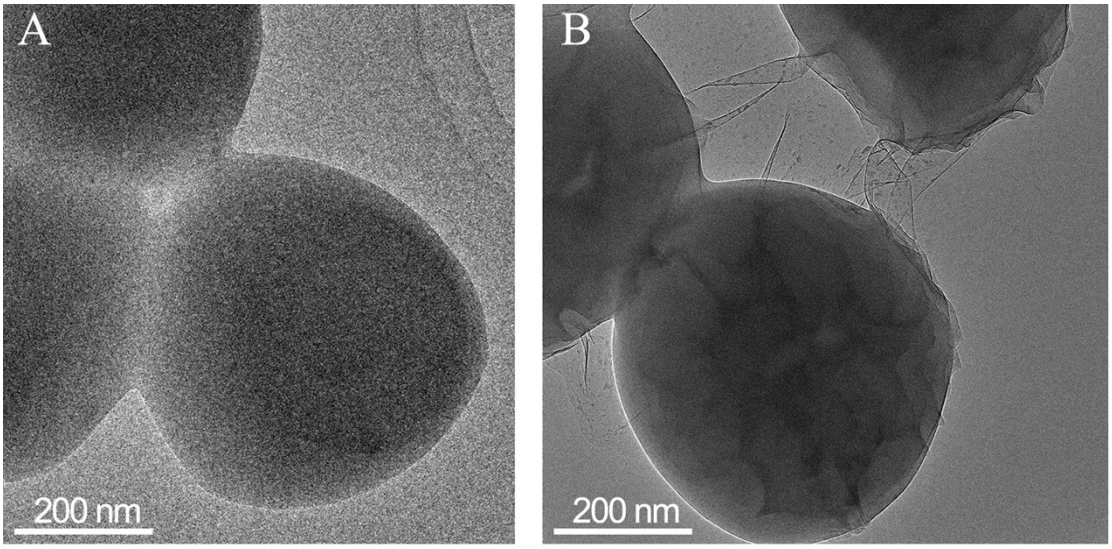

Figure S5. TEM of MRSA cells (A) and GO-NTA-Ce was wrapped on the surface of MRSA cells (B).

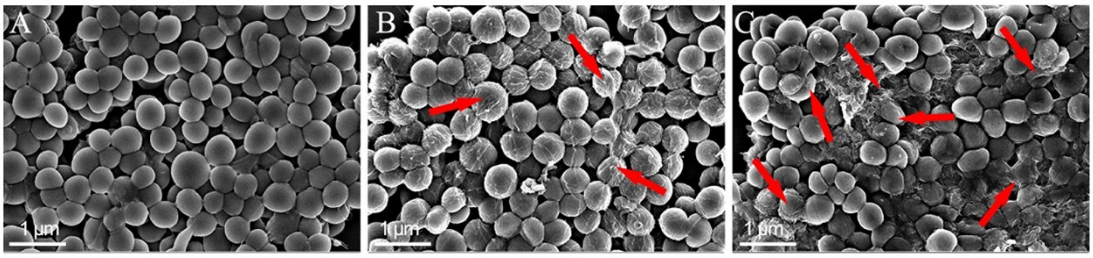

Figure S6. SEM of MRSA (A) and GO-NTA-Ce were co-incubated with MRSA cells without NIR irradiation (B) and under NIR irradiation condition (C). Red arrow represents a typical reaction site.

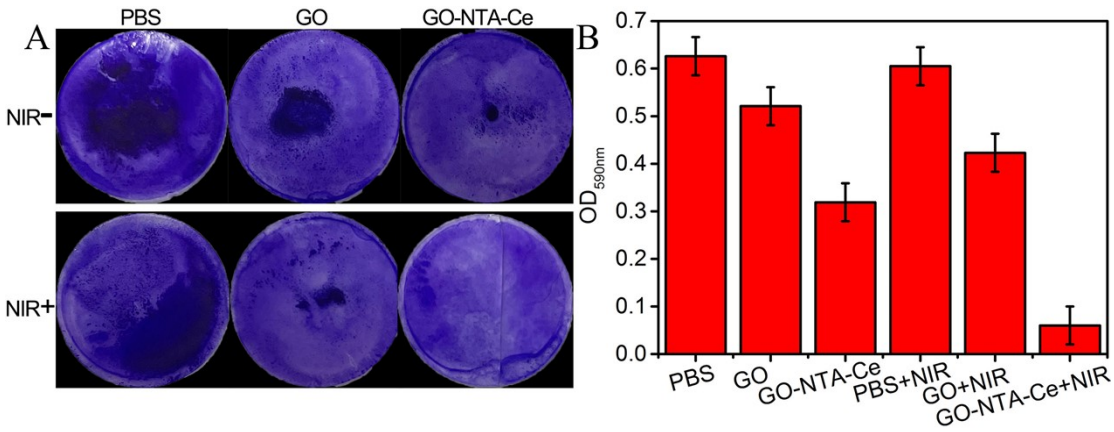

Figure S7. The efficiency of GO-NTA-Ce integrated platform to inhibit bacterial growth and further biofilm formation. (A) Qualitative analysis of the remaining biofilm biomass on suppressed surfaces by crystal violet staining and (B) the corresponding OD values.

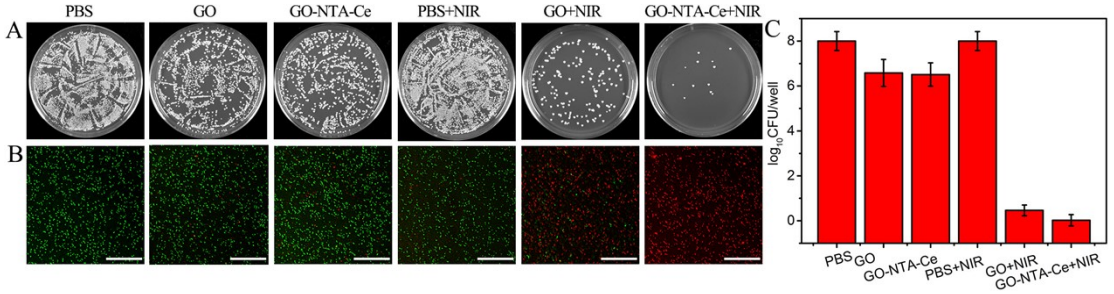

Figure S8. The efficiency of GO-NTA-Ce integrated platform to inhibit bacterial growth and further biofilm formation. (A) Standard plate coating method after incubation with MRSA in different treatment groups. (B) Fluorescence microscopy analysis of bacterial viability and (C) corresponding to the number of biofilm-coated bacteria surviving in the well (scale bar=10 µm).

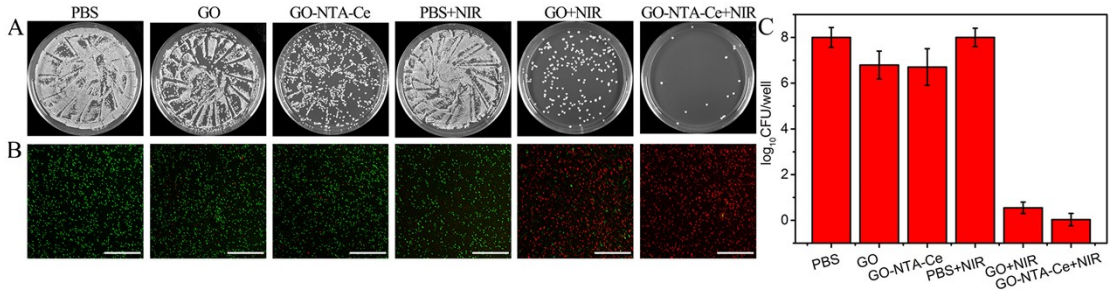

Figure S9. The efficiency of GO-NTA-Ce integrated platform to disperse and eradicate established biofilms. (A) Standard plate coating method after incubation with MRSA biofilms in different treatment groups. (B) Fluorescence microscopy analysis of biofilm activity and (C) corresponding to the number of biofilm-coated bacteria surviving in the well (scale bar= 10 µm).

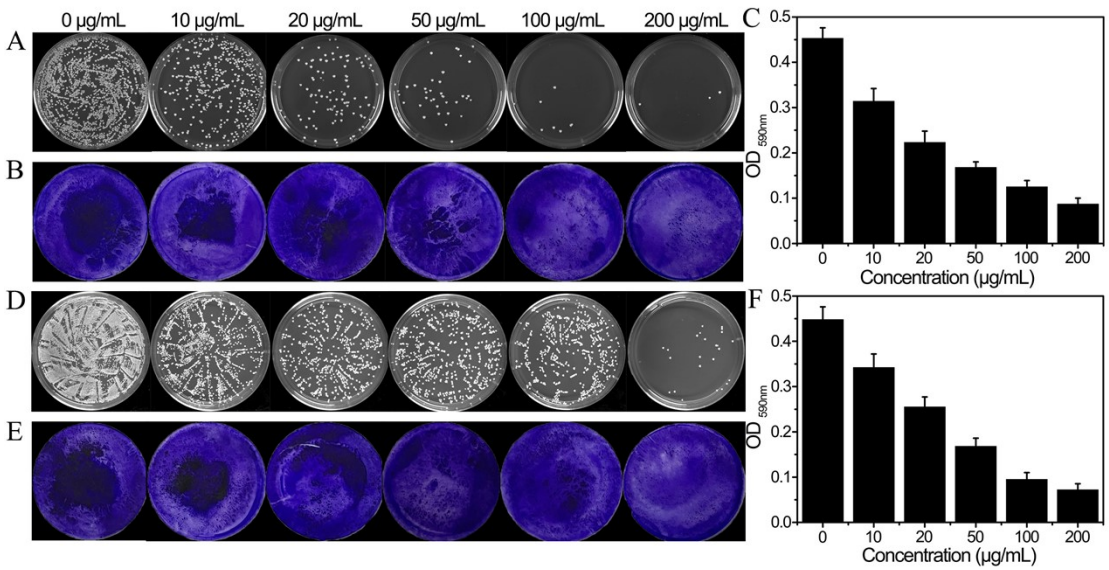

Figure S10. Concentration-dependent bactericidal activity and ability to disperse mature biofilms of GO-NTA-Ce. (A-C) MRSA was co-incubated with different concentrations of GO-NTA-Ce for 48 h in glass layer pore plate and before co-incubation, NIR irradiation was performed for 5 min. (A) The survival of bacteria was observed by standard plate coating method. (B) Crystal violet staining and (C) analysis of biofilm residues by UV-visible spectrophotometer. (D-F) 48-h-old MRSA biofilms was treated with different concentrations of GO-NTA-Ce for 12 h and NIR irradiation for 5 min. (D) The survival of bacteria was observed by standard plate coating method. The biomass of the remaining biofilms on these surfaces was quantitatively analyzed by (E) crystal violet staining and (F) UV-visible spectrophotometer.

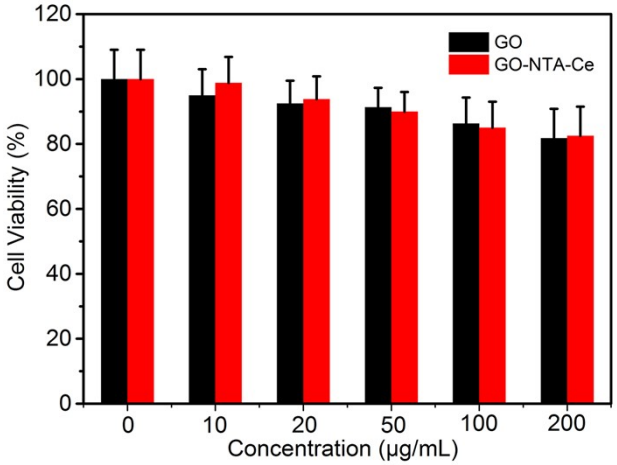

Figure S11. Cell viability of HUVECs incubated with different concentrations of GO/ GO-NTA-Ce for 24 h.

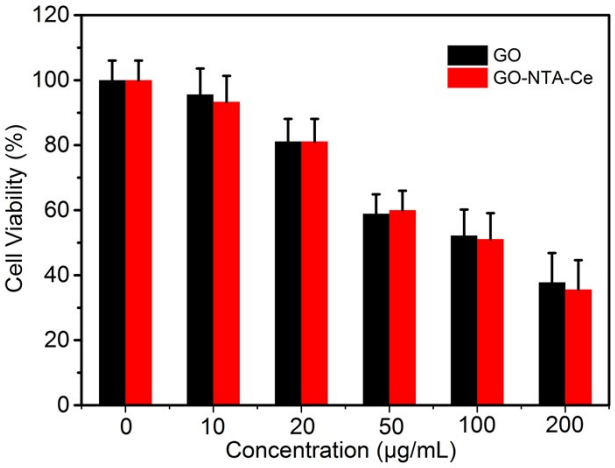

Figure S12. Cell viability of HUVECs incubated at different concentrations of GO/ GO-NTA-Ce for 24 h after 5 min NIR irradiation.

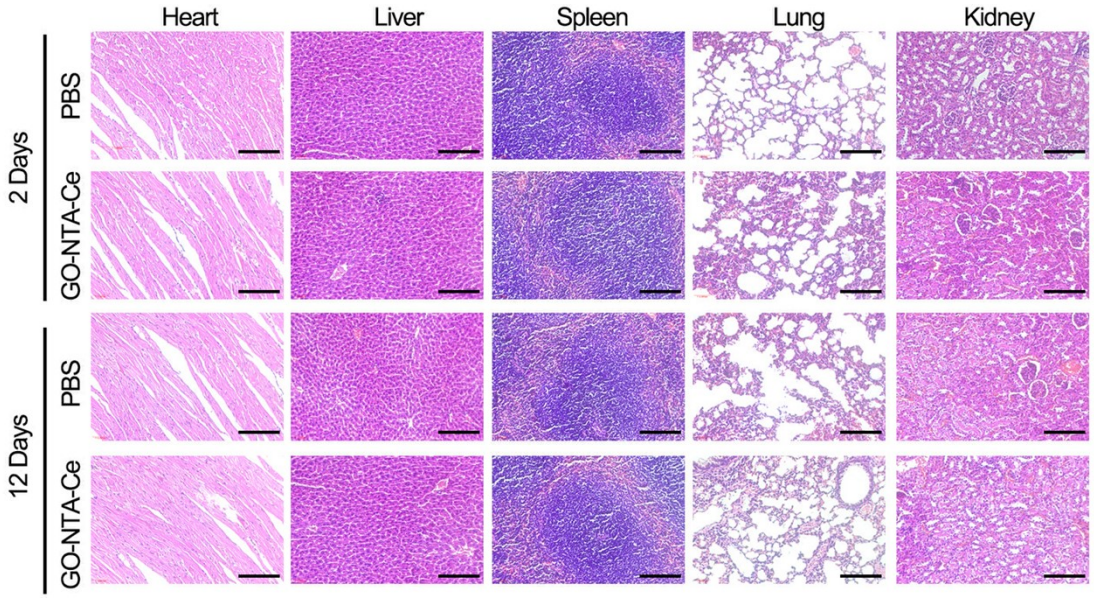

Figure S13. Representative H&E staining photographs of major organs (heart, liver, spleen, lung, and kidney) of mice after in situ injections of PBS/GO-NTA-Ce for 2 days and 12 days (scale bar=100 μm).