Supporting information

A biodegradable and near-infrared light-activatable photothermal nanoconvertor for bacterial inactivation

Luyao Wang,‡[a] Weisheng Zhu,‡[b] Yuan Zhou,[cd] Qisi Li,[b] Lizhi Jiao,[b] Hao Qiu,[b] Wei Bing*[ae] and Zhijun Zhang*[b]

[a]School of Chemistry and Life Science, Changchun University of Technology, 2055 Yanan Street, Changchun 130012, China

[b]Department of Chemistry, Key Laboratory of Surface & Interface Science of Polymer Materials of Zhejiang Province, Zhejiang Sci-Tech University, Hangzhou 310018, China

[c]Department of Pharmacy, Taihe Hospital, Hubei University of Medicine, Shiyan, Hubei, 44200, China

[d]College of Pharmacy, Hubei University of Traditional Chinese Medicine, Wuhan, 430065, China

[e]Advanced Institute of Materials Science, Changchun University of Technology, 2055 Yanan Street, Changchun 130012, China

* Corresponding author.

E-mail: bingwei@ccut.edu.cn; zjzhang@zstu.edu.cn

‡ These authors contributed equally to this work.

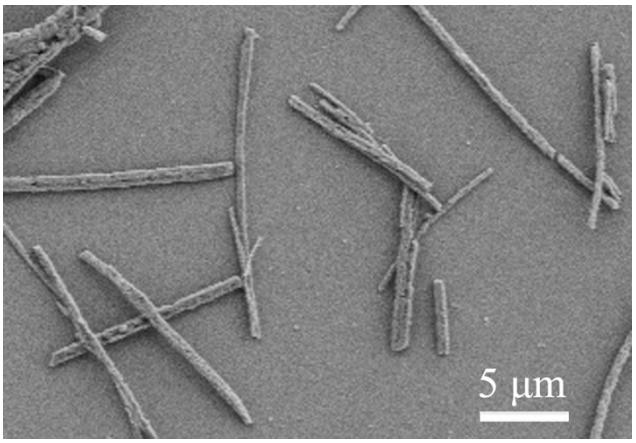

Fig. S1 SEM image of CTN.

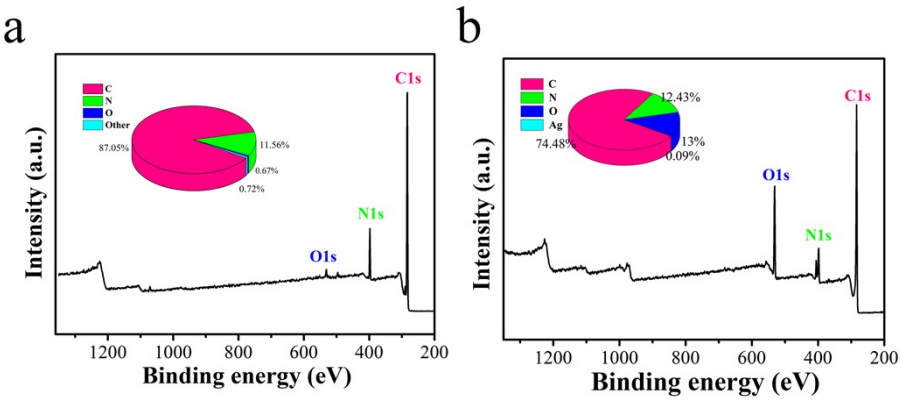

Fig. S2 XPS spectra of (a) TMB and (b) CTN.

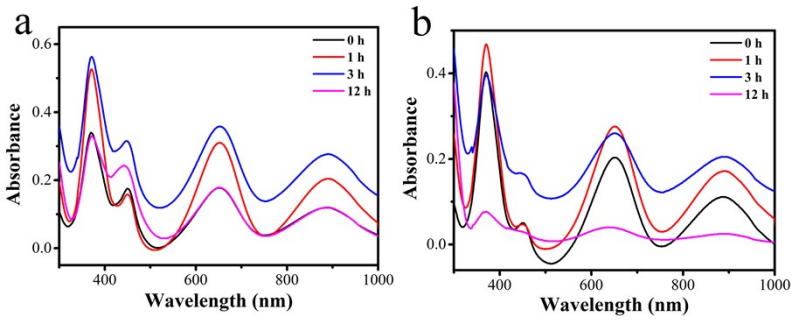

Fig. S3 (a) Absorption spectra of CTN (60 μg mL^{-1}) in MES buffer (pH 3). (b) Absorption spectra of CTN (60 μg mL^{-1}) in MES buffer (pH 4).

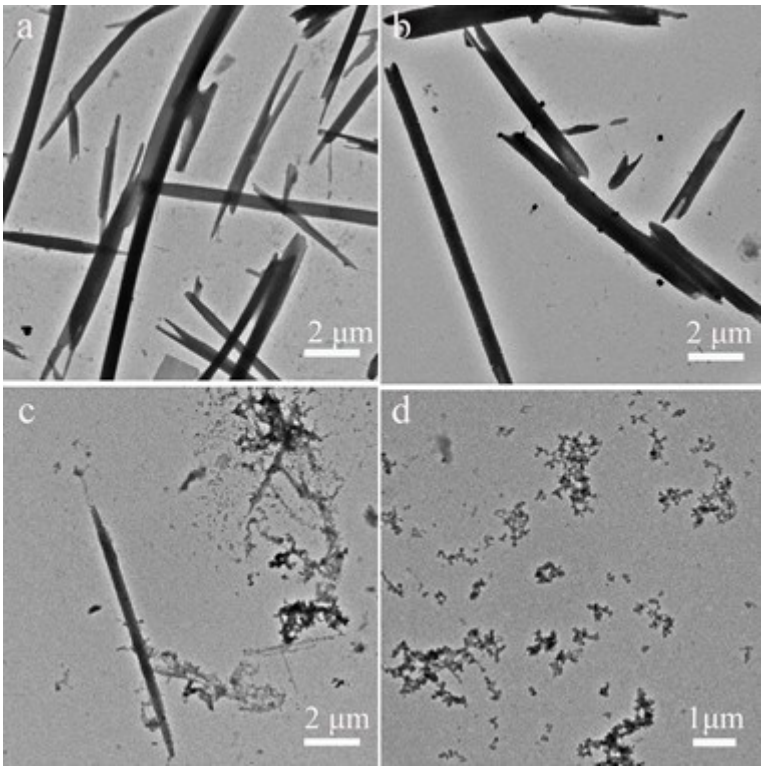

Fig. S4 TEM images of CTN in MES buffer (pH 7) at 0 h (a), 1 h (c), 3h (c) and 12h (d).

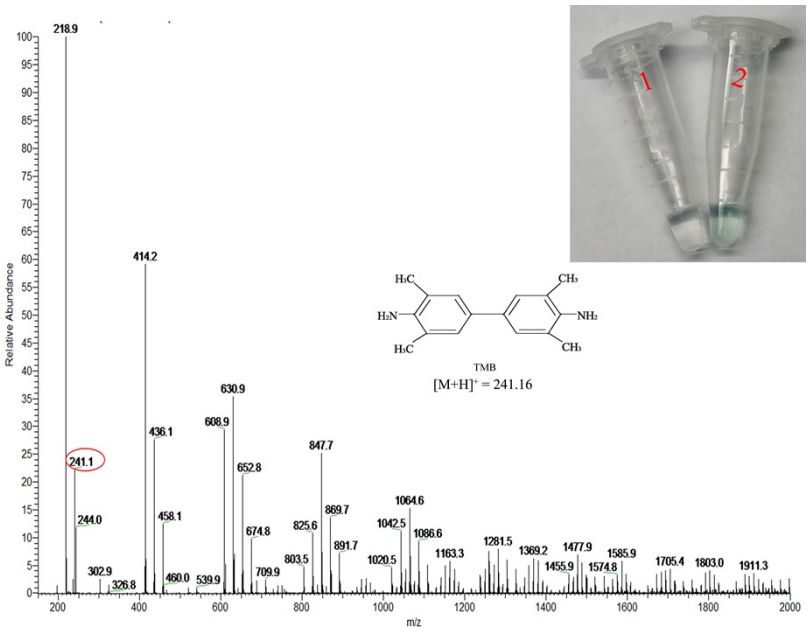

Fig. S5 Mass spectrometry (ES+) analysis after degradation of CTN. Insert showed the degradation solution (1) and the solution added with Fe^{2+} and H_2O_2 (2).

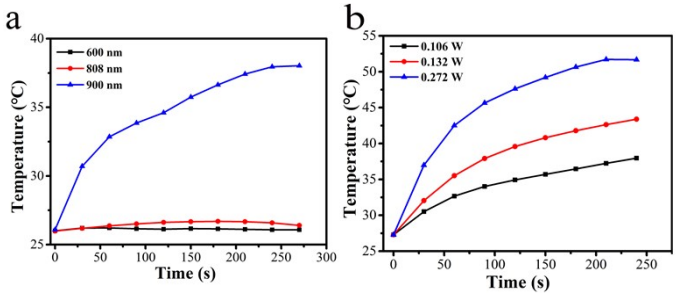

Fig. S6 (a) Temperature change of CTN (100 μg ml^{-1}) with different light wavelengths (600, 808 and 900 nm). (b) Temperature change of CTN (100 μg ml^{-1}) with NIR irradiation (0.106, 0.132 and 0.272 Wcm^{-2}).

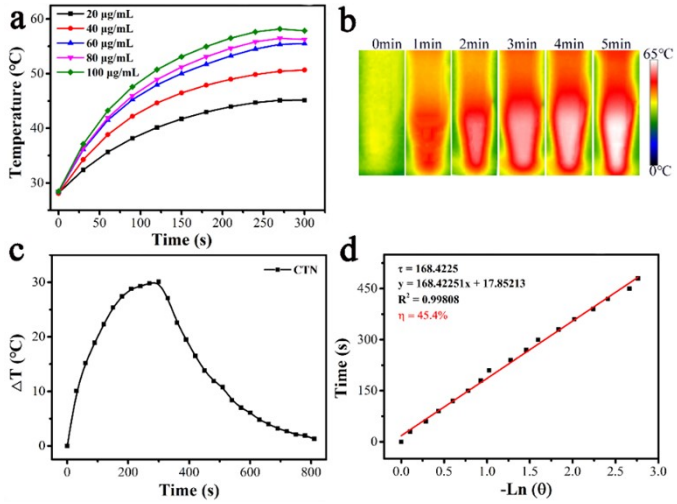

Fig. S7 (a) The photothermal effect of different concentrations of CTN in MES buffer (pH 5) under 900 nm laser irradiation (0.272 W cm^{-2}). (b) Thermal images of CTN in MES buffer (pH 5) under 900 nm laser irradiation (0.272 W cm^{-2}, 5 min). (c) "On−off" temperature change of CTN solution in MES buffer (pH 5) under 900 nm laser irradiation (0.272 W cm^{-2}). (d) Liner cooling time data versus –Ln (ϑ) vs negative natural logarithm of driving force temperature with τ_s = 168.4225 s.

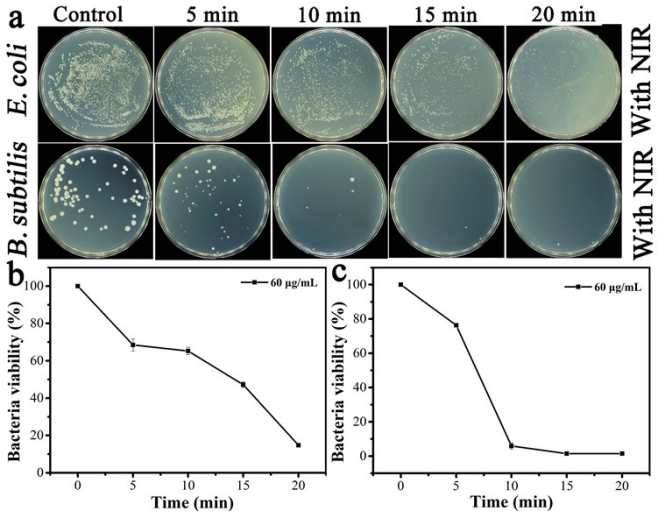

Fig. S8 (a) Photographic images of the colonies of *E. coli* and *B. subtilis* treated by CTN (60 μg mL^{-1}) in MES buffer (pH 7) at different times. The corresponding bacterial viabilities of (b) *E. coli* and (c) *B. subtilis* treated with CTN (60 μg mL^{-1}) in MES buffer (pH 7) under 900 nm laser irradiation (0.272 W cm^{-2}) for different times.

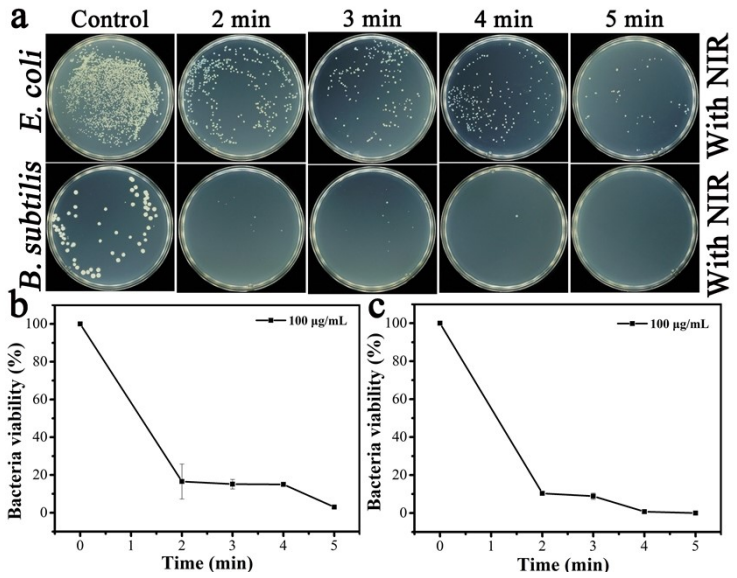

Fig. S9 (a) Photographic images of the colonies of *E. coli* and *B. subtilis* treated by CTN (100 μg mL^{-1}) in MES buffer (pH 7) at different times. The corresponding bacterial viabilities of (b) *E. coli* and (c) *B. subtilis* treated with CTN (100 μg mL^{-1}) in MES buffer (pH 7) under 900 nm laser irradiation (0.272 W cm^{-2}, 5 min) for different times.

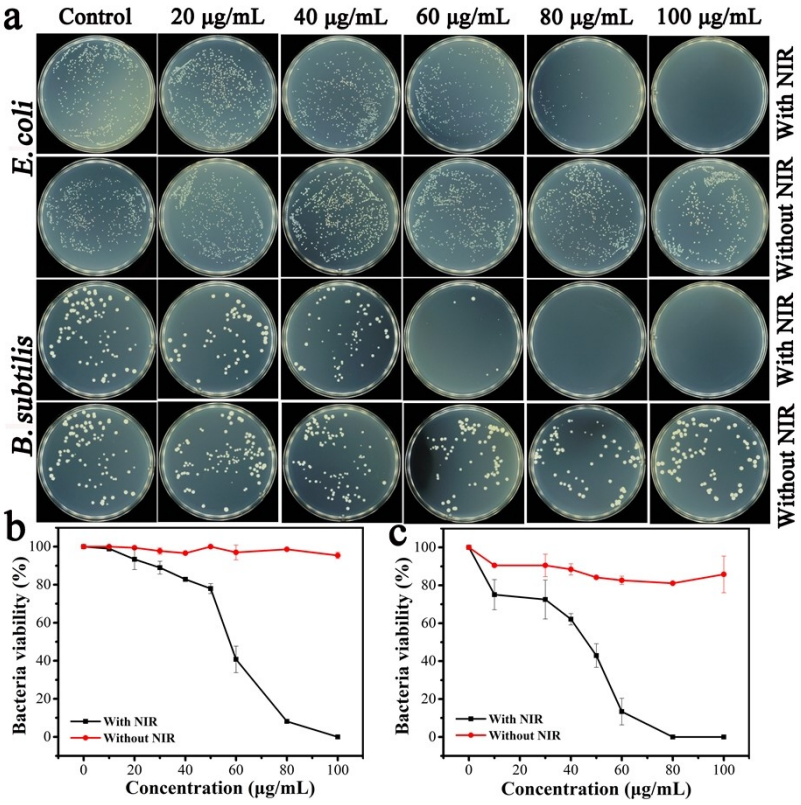

Fig. S10 (a) Photographic images of the colonies of *E. coli* and *B. subtilis* treated with different concentrations of CTN in MES buffer (pH 5). The corresponding bacterial viabilities of (b) *E. coli* and (c) *B. subtilis* treated with different concentrations of CTN in MES buffer (pH 5) with or without 900 nm laser irradiation (0.272 W cm^{-2}, 5 min).

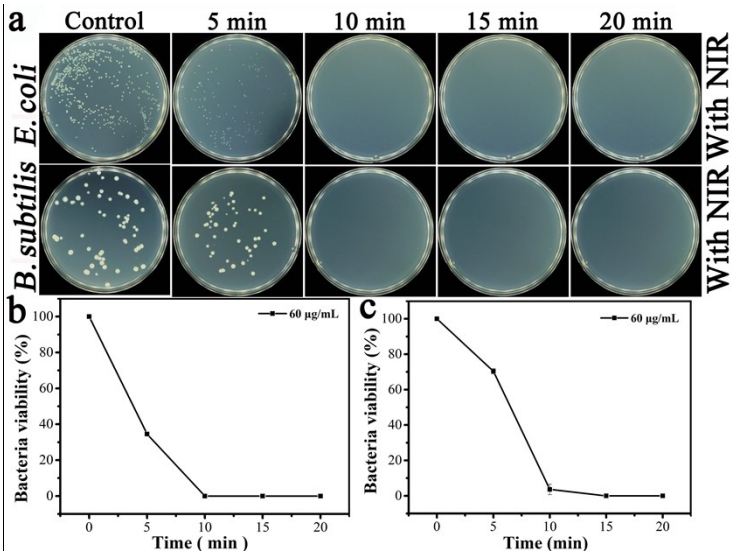

Fig. S11 (a) Photographic images of the colonies of *E. coli* and *B. subtilis* treated by CTN (60 μg mL^{-1}) in MES buffer (pH 5) at different times. The corresponding bacterial viabilities of (b) *E. coli* and (c) *B. subtilis* treated with CTN (60 μg mL^{-1}) in MES buffer (pH 5) under 900 nm laser irradiation (0.272 W cm^{-2}) for different times.

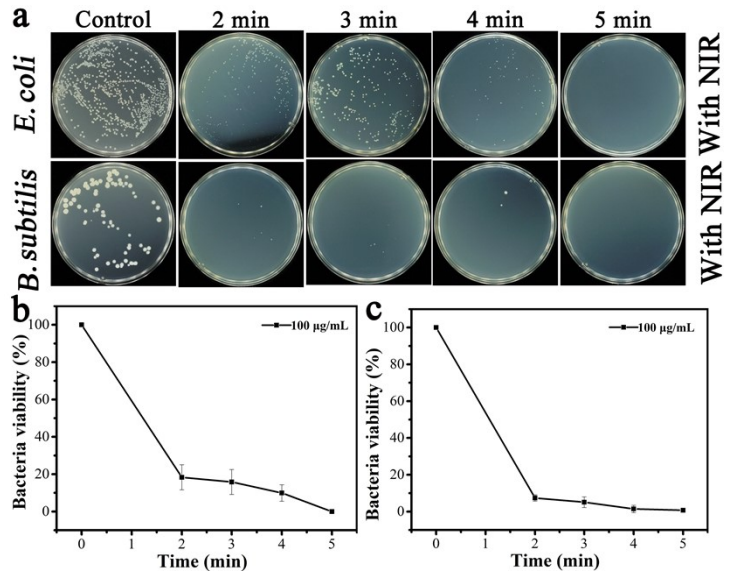

Fig. S12 (a) Photographic images of the colonies of *E. coli* and *B. subtilis* treated by CTN (100 μg mL^{-1}) in MES buffer (pH 5) at different times. The corresponding bacterial viabilities of (b) *E. coli and* (c) *B. subtilis* treated with CTN (100 μg mL^{-1}) in MES buffer (pH 5) under 900 nm laser irradiation (0.272 W cm^{-2}, 5 min) for different times.

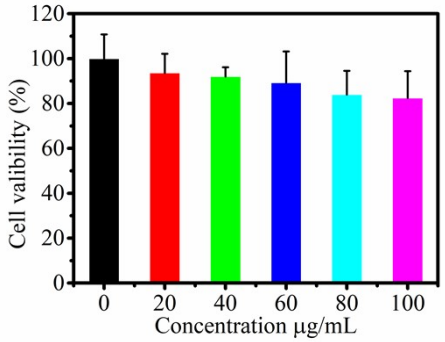

Fig. S13 MTT assay of HeLa cells incubated with different concentrations of CTN.