*Supporting information*

# Impairment of Biofilm Formation by $TiO_2$ Photocatalysis through Quorum Quenching

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This supporting information contains 9-page document, including 8 figures and this cover page.

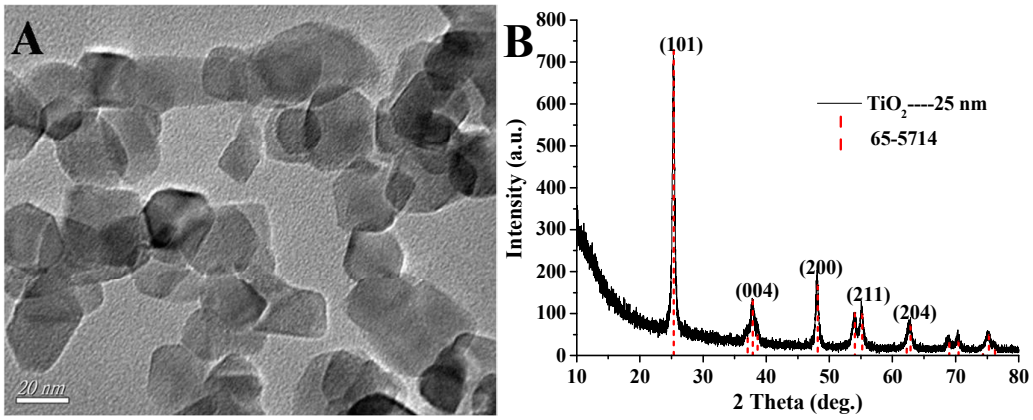


**Fig. S1** TEM image (A) and XRD spectra (B) of $TiO_2$.

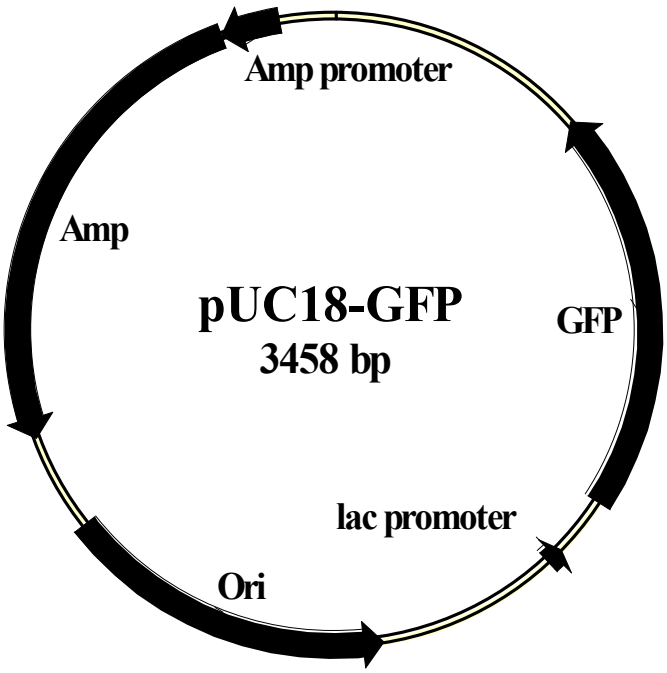


**Fig. S2** pUC18-GFP plasmid

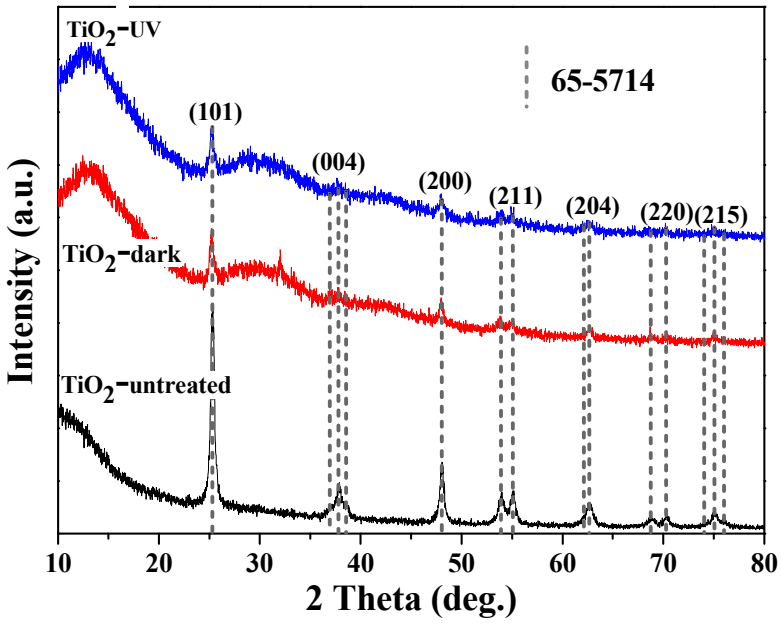


**Fig. S3** XRD analysis of $TiO_2$ before and after treatment. $TiO_2$-untreated refers the $TiO_2$ without any treatment; $TiO_2$-dark refers the $TiO_2$ treated without photoexcitation; $TiO_2$-UV refers the $TiO_2$ treated with UV. The diffraction peaks of the untreated $TiO_2$ could be perfectly indexed to the cubic phase of anatase (JCPDS card No. 65-5714). The XRD spectra of $TiO_2$ treated with or without UV photoexcitation were similar and both of them could be indexed to the cubic phase of anatase (JCPDS card No. 65-5714). The treatment resulted in the unclear spectra compared with the untreated $TiO_2$. Since crystallinities of $TiO_2$-UV and $TiO_2$-dark were similar, the most likely reason for the unclear spectra was the adsorption of organic components onto the $TiO_2$ surface.

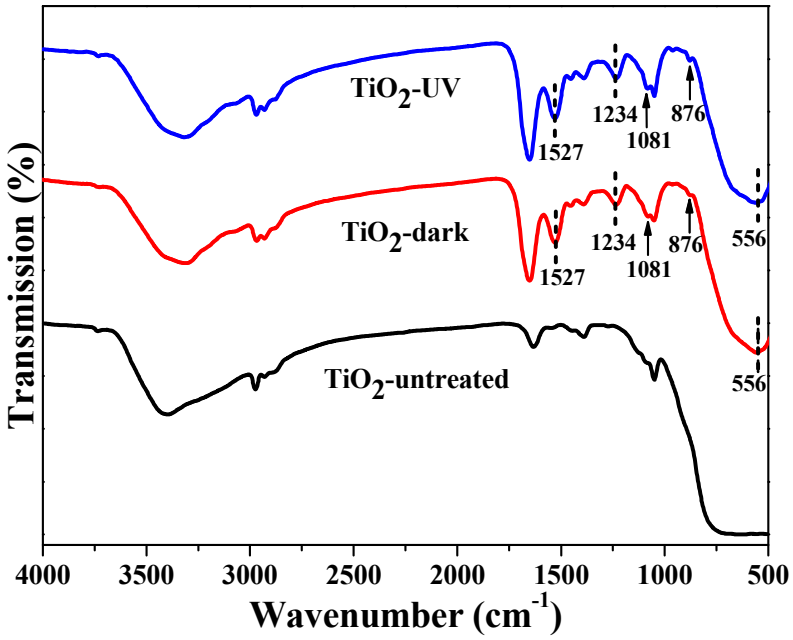


**Fig. S4** FTIR spectra of the $TiO_2$ samples before and after treatment. $TiO_2$-untreated refers the $TiO_2$ without any treatment; $TiO_2$-dark refers the $TiO_2$ treated without photoexcitation; $TiO_2$-UV refers the $TiO_2$ under UV irradiation. The infrared spectra were analyzed using a Fourier transform infrared spectrometer (Nexus 470, Nicolet Co., USA). Five new characteristic peaks were detected from the treated $TiO_2$ samples in dark or under UV irradiation, compared with the untreated $TiO_2$. The absorptions at 1527, 1234, 1081, 876, 556 $cm^{-1}$ are associated with C-H, C-O, C-O, C-N and C-X, respectively. These results clearly show that organic compounds were adsorbed onto the $TiO_2$ surface, resulting in the unobvious XRD spectra. These results are consistent with the well recognized observation that $TiO_2$ nanoparticles display a high stability under usual photocatalytic conditions.

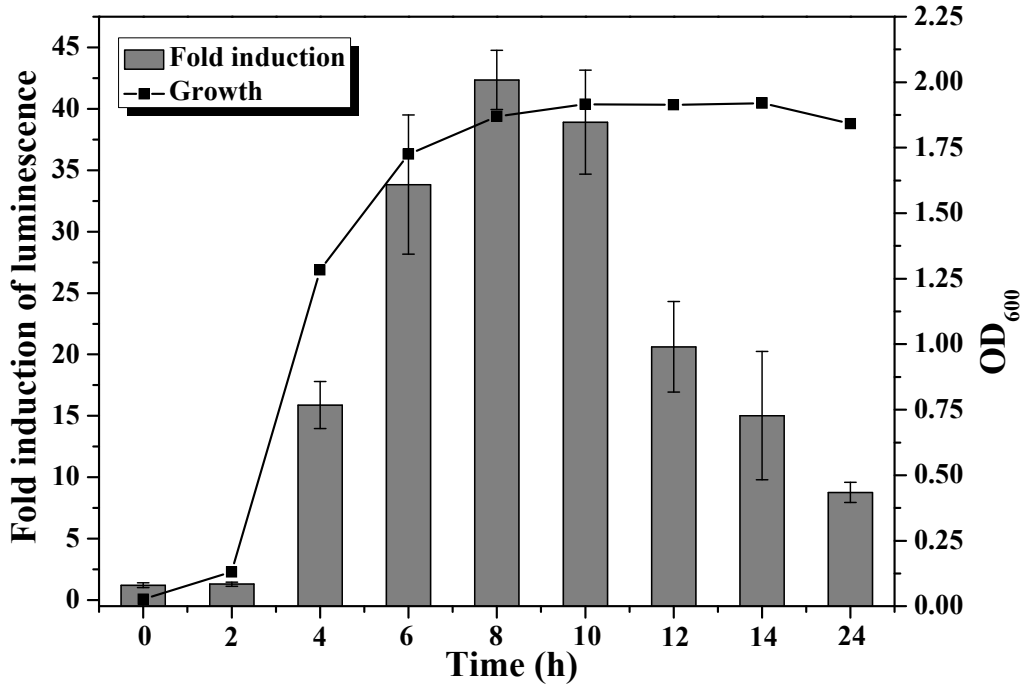


**Fig. S5** Cell growth of *E. coli* K12 and AI-2 activity during the microbial growth. All values represent mean±SD

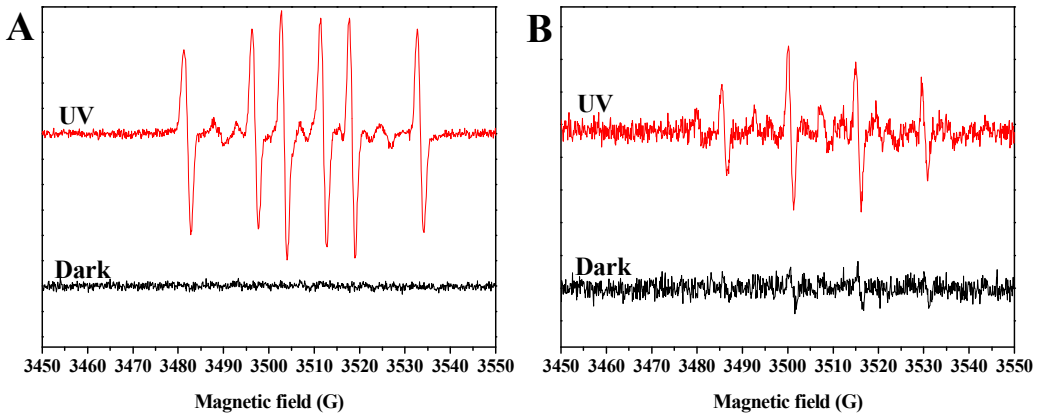


**Fig. S6** DMPO spin-trapping ESR spectra recorded for DMPO-$O_2^{\bullet-}$ in methanol dispersion (A) and DMPO-•OH in aqueous dispersion (B).

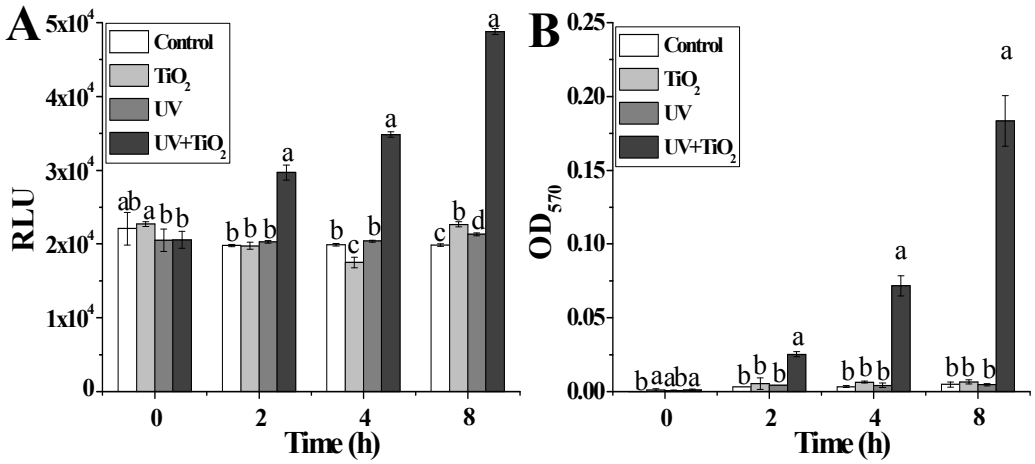


**Fig. S7** Impact of $TiO_2$ photoexcitation on the generation of •OH (A) and $O_2^{\bullet-}$ (B). All values represent mean±SD. Values with the same letter are not significantly different at $P<0.05$, according to the Duncan's multiple range test.

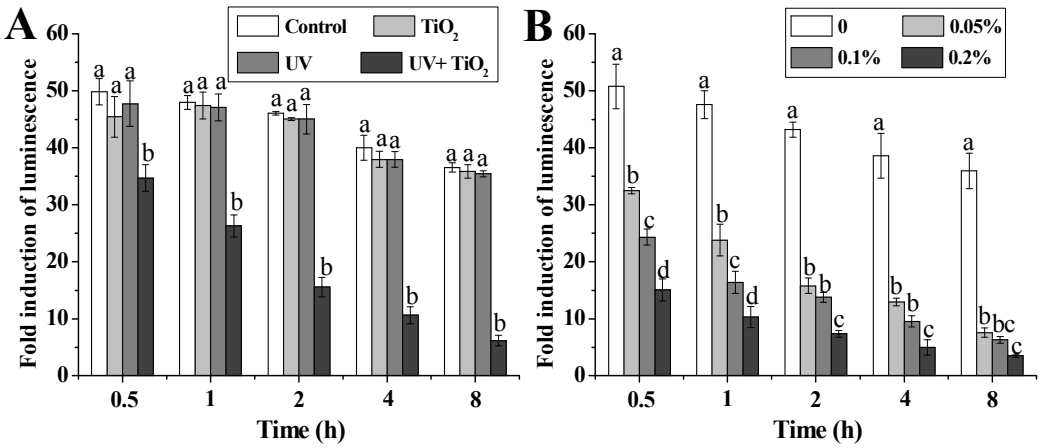


**Fig. S8** Impacts of $TiO_2$ photoexcitation (A) and $H_2O_2$ at different concentrations (0, 0.05, 0.1 and 0.2%) (B) on the AI-2 activities in vitro. All values represent mean ± SD. Values with the same letter are not significantly different at $P<0.05$, according to the Duncan's multiple range test.