

**Self-assembled Three-dimensional Hierarchical Nanoflower: An Efficient Enzyme-mimetic for
Cancer Cell Detection and Improves ROS Generation for Therapy**

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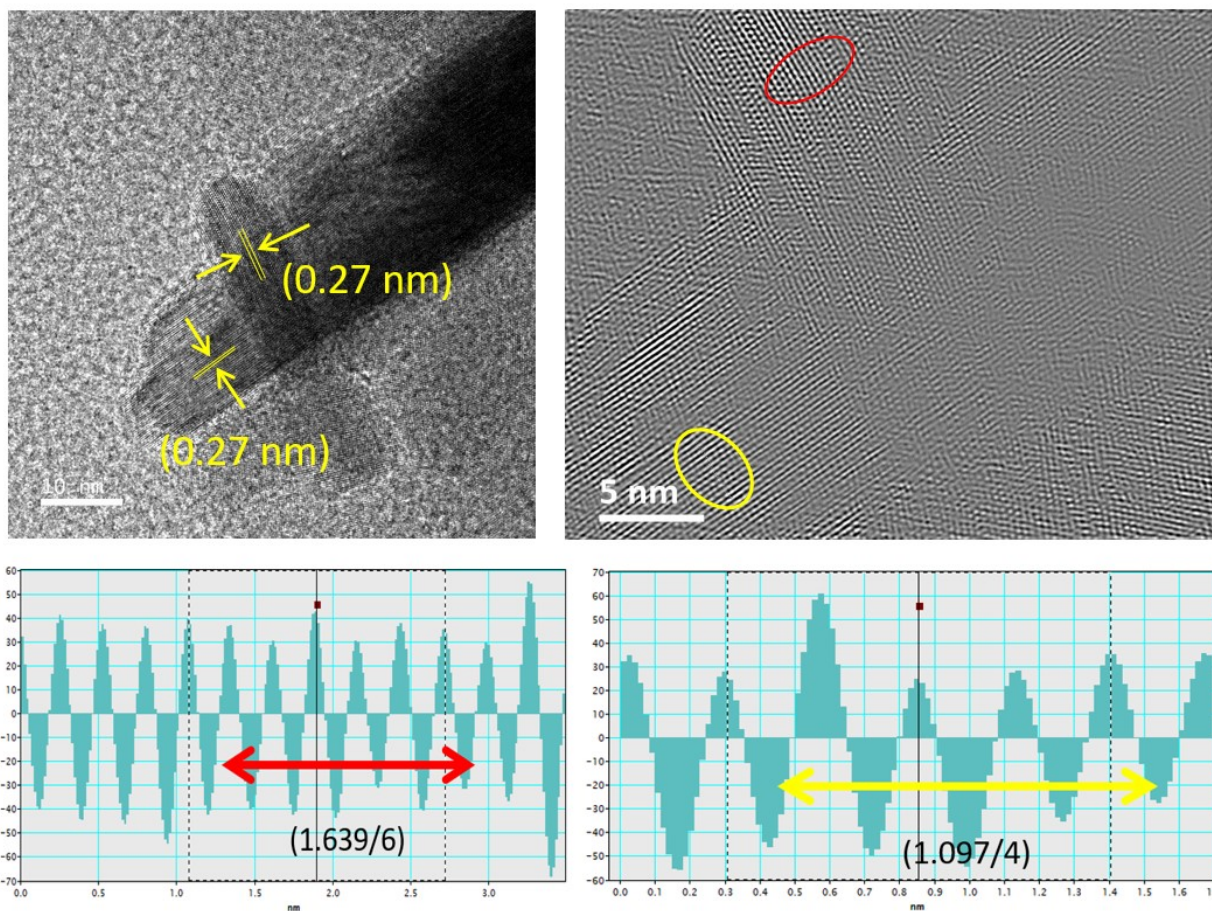


Figure S1. HR-TEM investigation of the CMC NFs. HR-TEM image of petal-like designs on the nanoflower surface and the line profile for the selected line in its inverse Fast Fourier Transform (FFT).

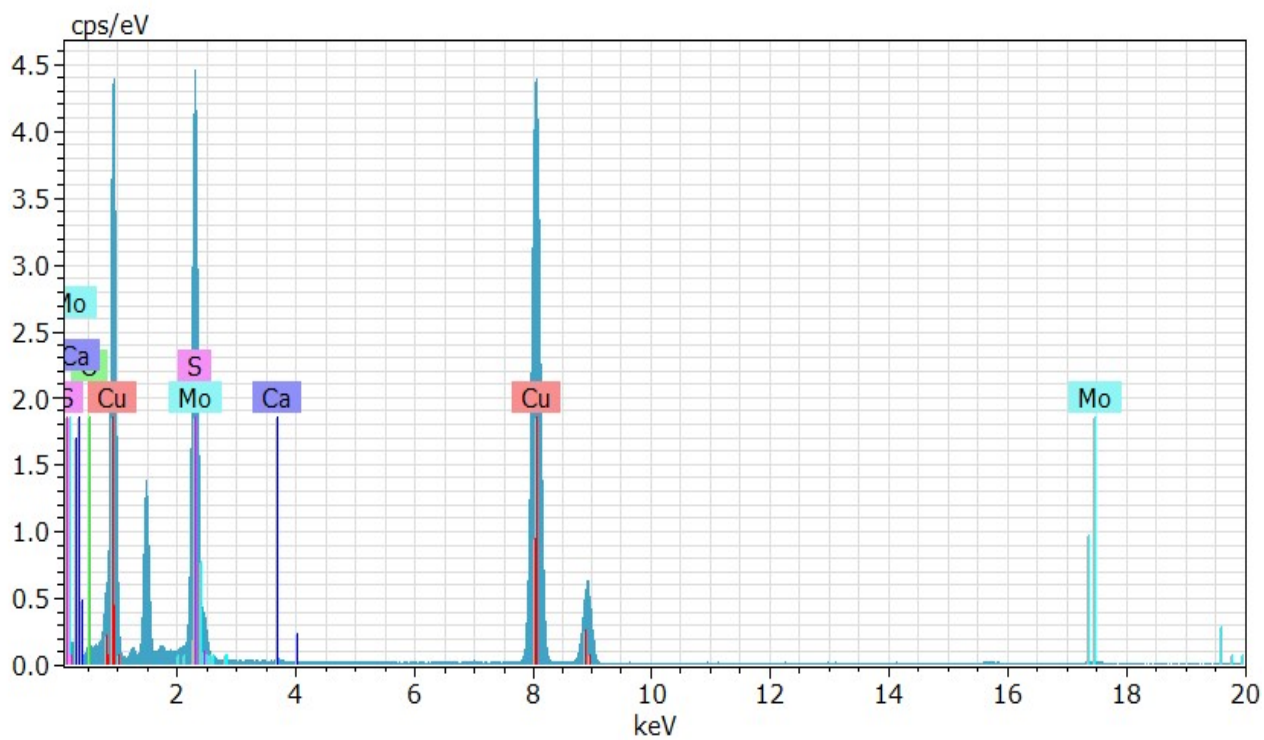


Figure S2. EDX spectrum of 3D-CMC NFs showing the presence of Cu, Mo, S, Ca, and O elements.

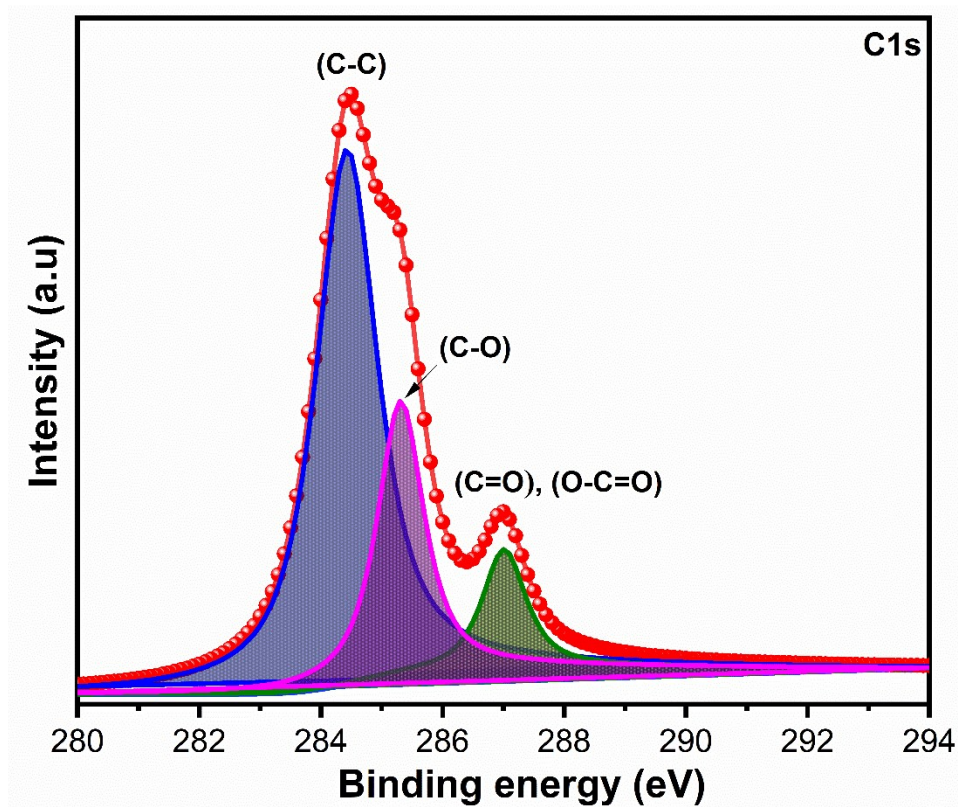


Figure S3. C 1s spectrum of 3D-CMC NFs.

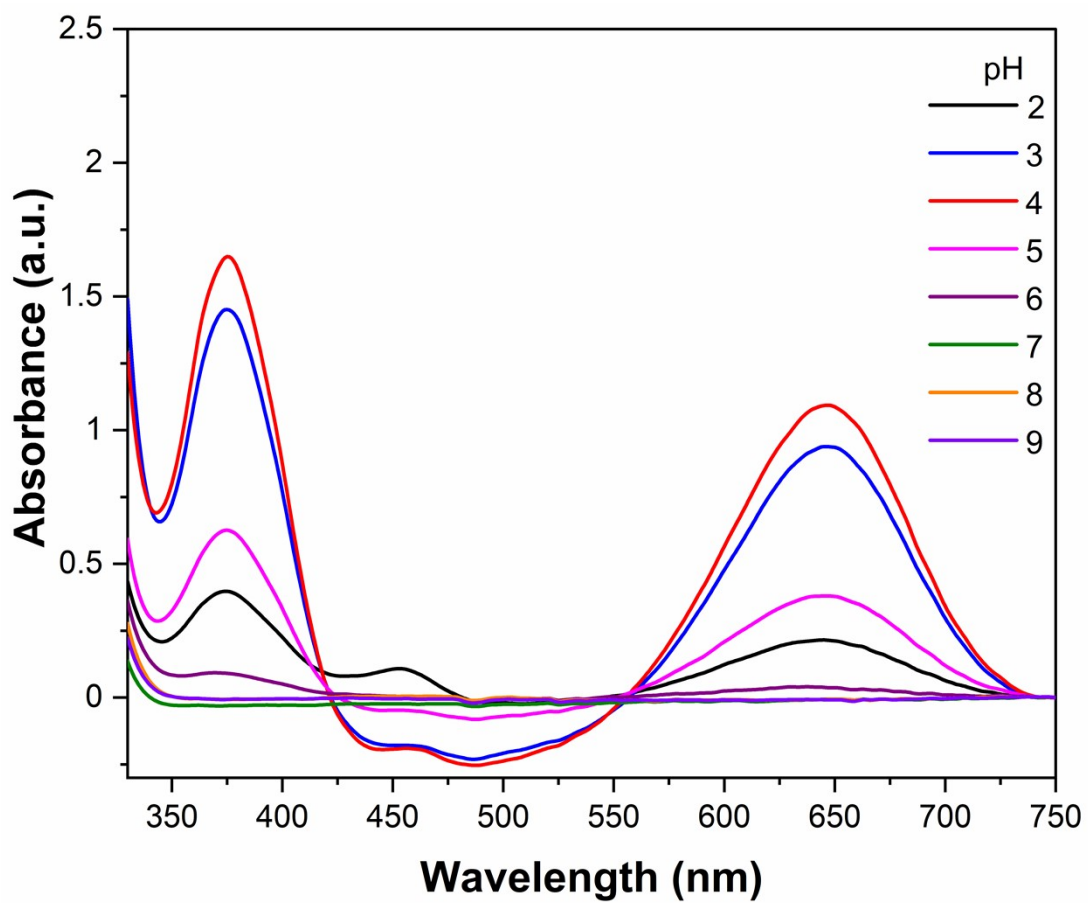


Figure S4. Peroxidase-like activity evaluation at the different pH values (2, 3, 4, 5, 6, 7, 8, and 9) to optimize the reaction condition. The increased TMB oxidation activity was attained at weakly acidic conditions and decreased at neutral or alkaline pH conditions.

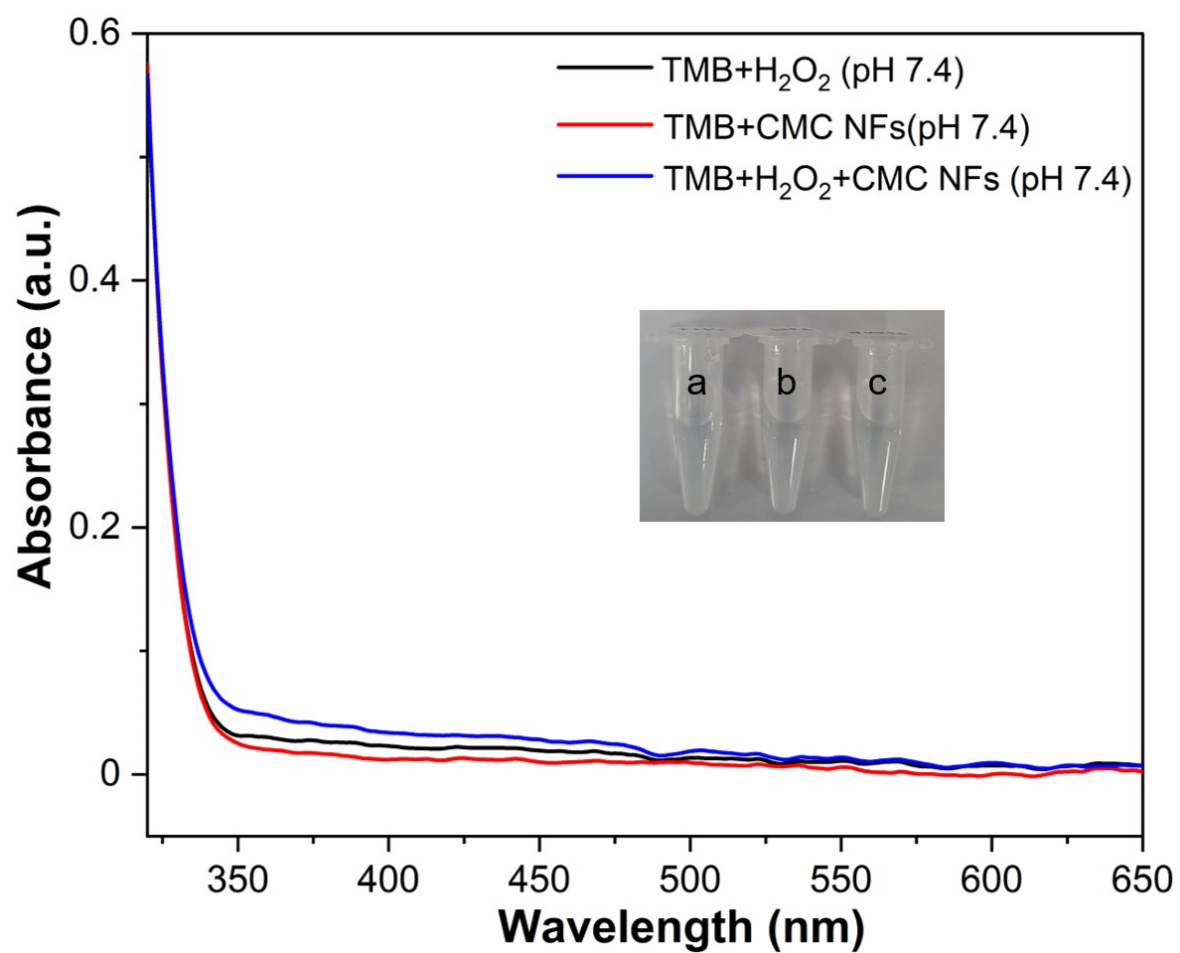


Figure S5. The enzyme-mimetic activities of TMB+H₂O₂, TMB+CMC NFs, and TMB+H₂O₂+ CMC NFs in physiological conditions (pH 7.4).

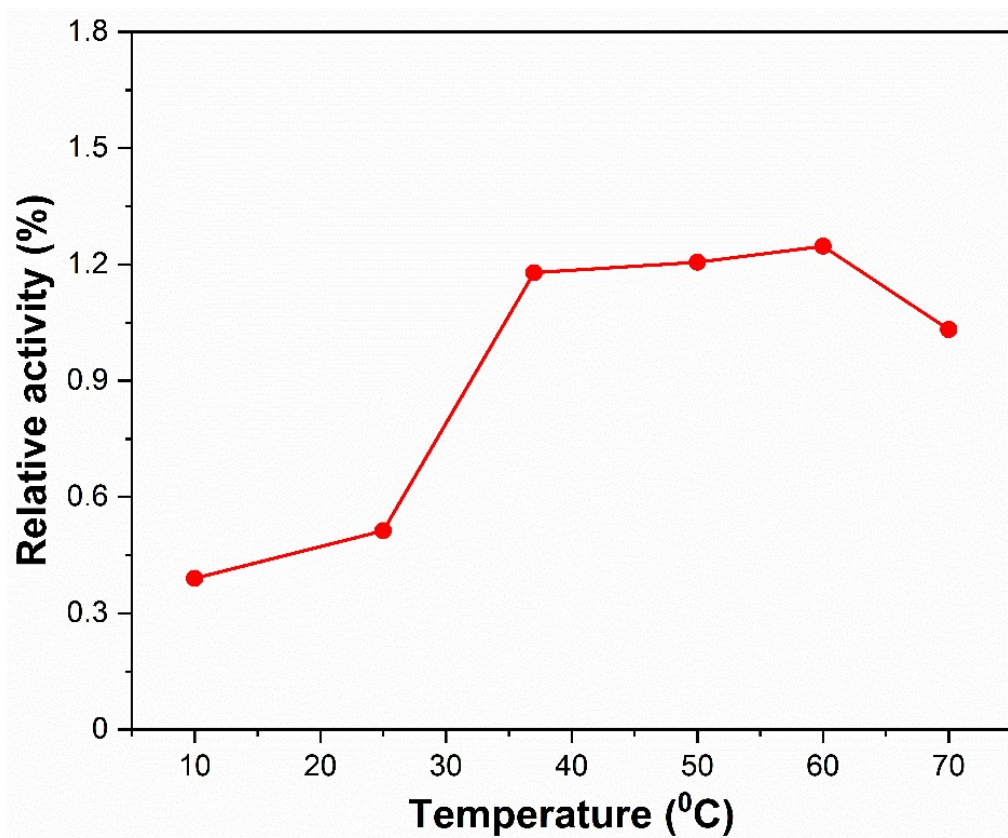


Figure S6. Different incubation temperatures (10, 25, 37, 50, 60, and 70 °C) to assess the peroxidase-like activity of CMC NFs at 652 nm.

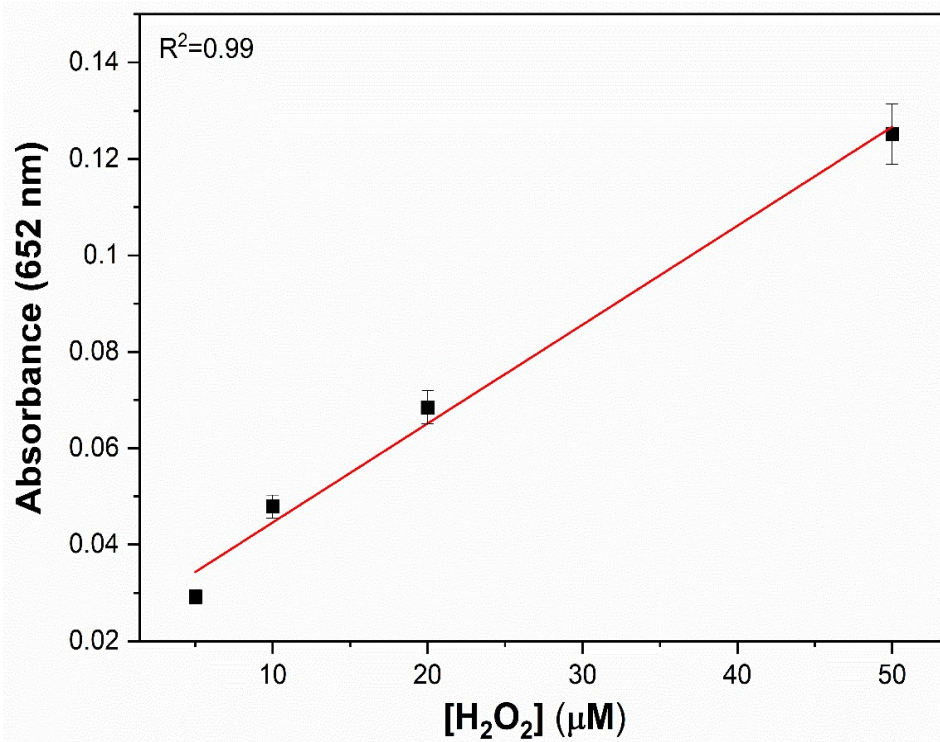


Figure S7. Corresponding linear calibration plots for the various H_2O_2 concentrations and the reaction conditions are noted as follows: 40 μL of CMC NFs (1 mg/mL) and 0.5 mM TMB were added in buffer (pH 4.0) at 37 $^{\circ}C$ for 10 min.

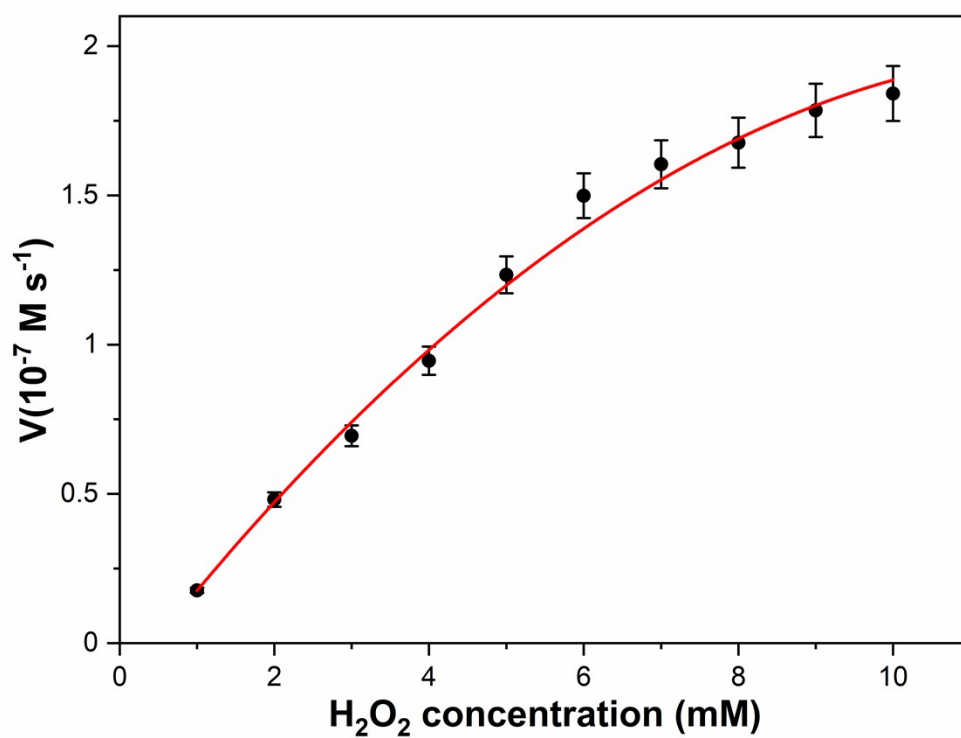


Figure S8. The concentration of H₂O₂ was 6 mM, and the TMB concentration was varied from 0.05 to 5.0 mM.

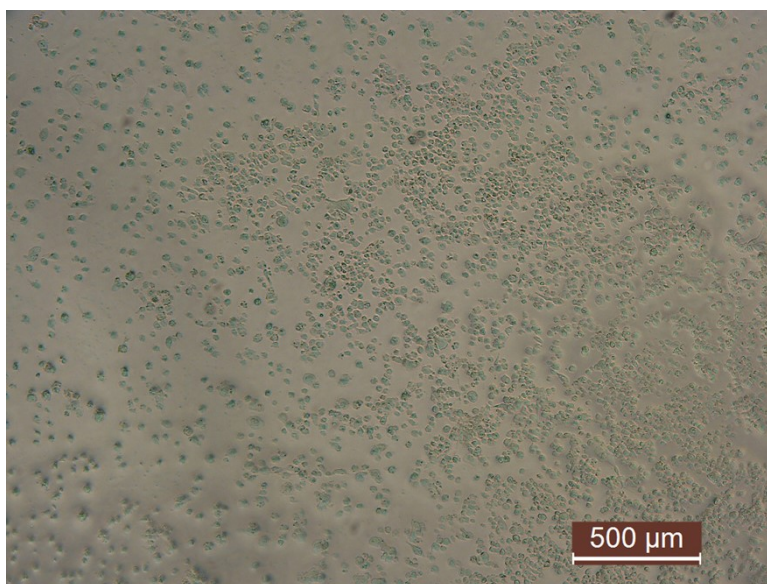
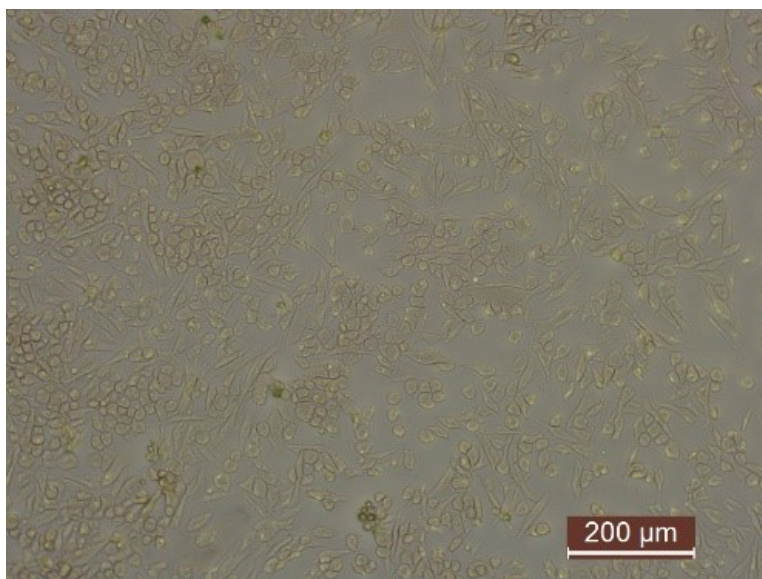


Figure S9. Typical photographs for imaging of MDA-MB-231 cells without and with CMC NFs (From top to down image). Both experiments were conducted in the existence of H_2O_2 and TMB.

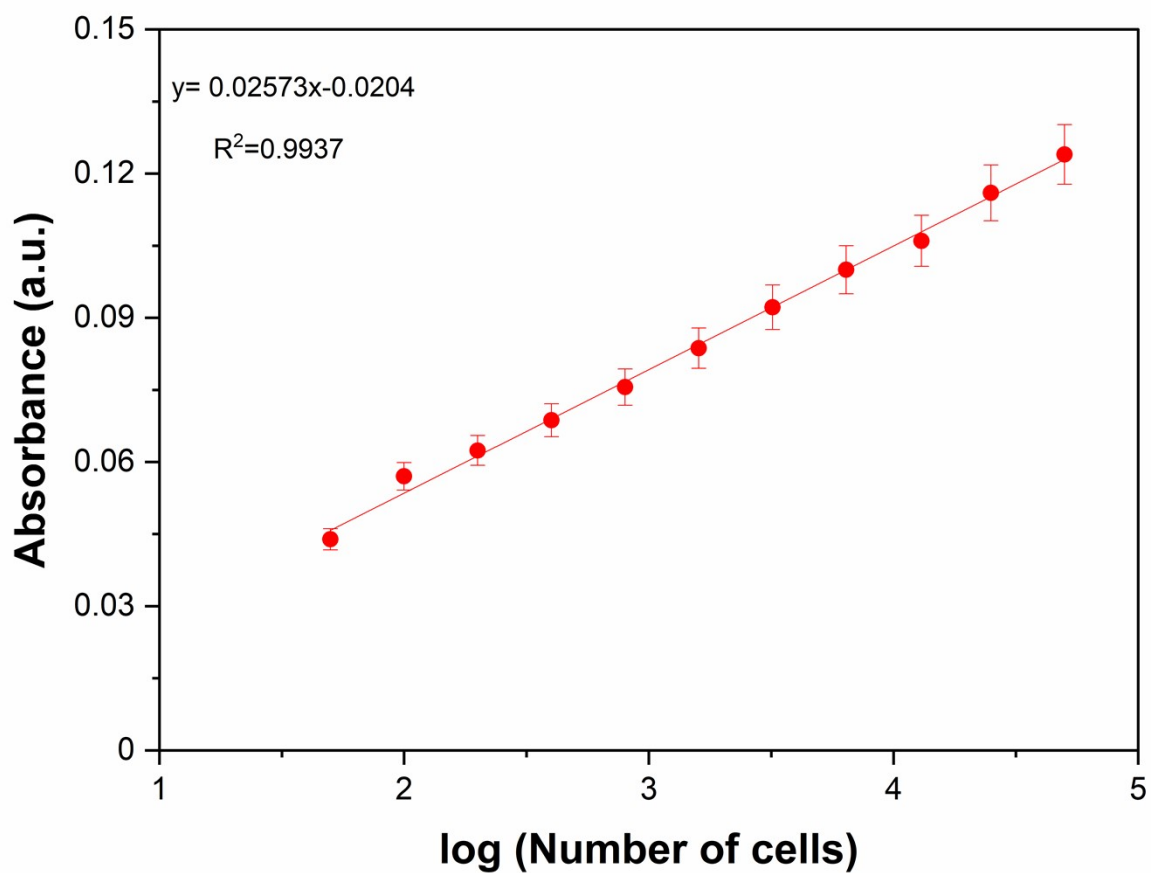


Figure S10. A linear regression coefficient of the absorption intensity changes at 450 nm was 0.9937 for the target MDA-MB-231 cells ranging from 5×10^1 - 5.5×10^4 cells/mL.

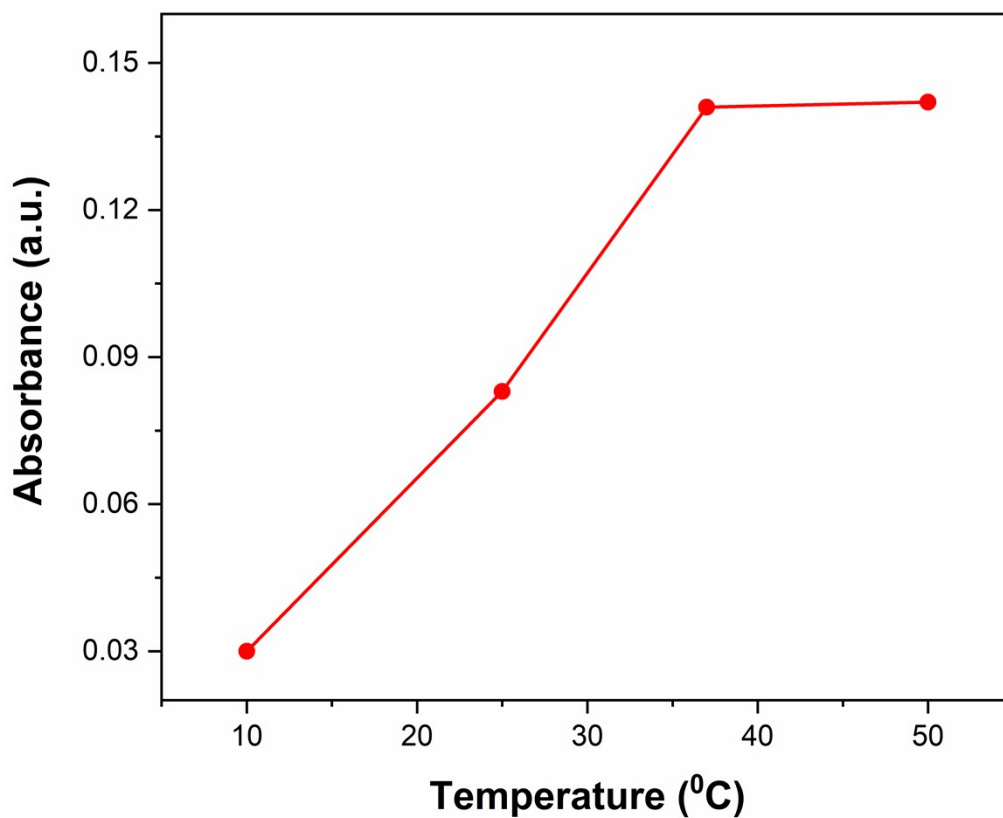


Figure S11. The enzyme-mimetic activities of CMC NFs in MDA-MB-231 cells (5.5×10^4 cells) of different temperatures such as 10, 25, 37, and 50 °C.

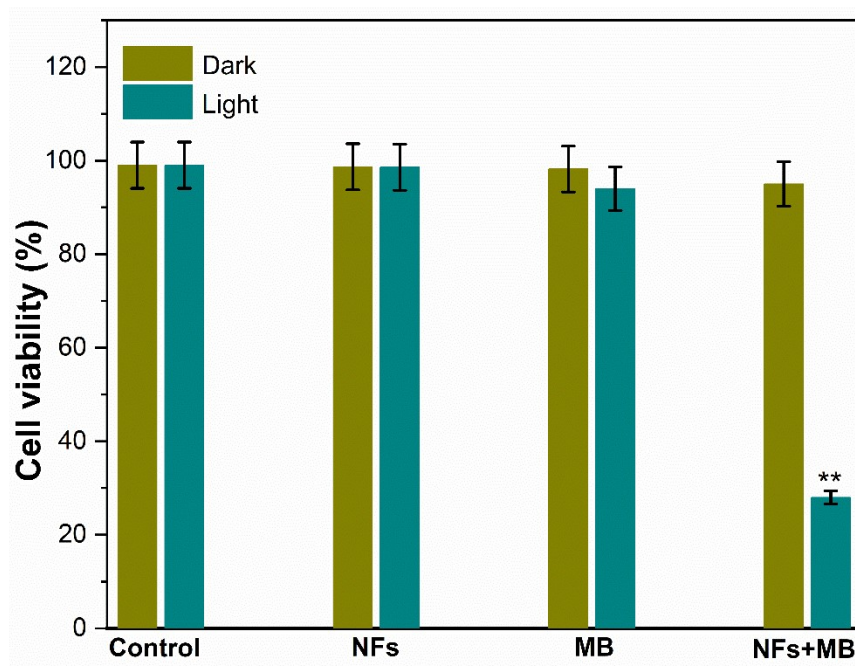


Figure S12. The cell viability of MDA-MB-231 cells after treated with control, CMC NFs, MB, and CMC NFs + MB with or without light.

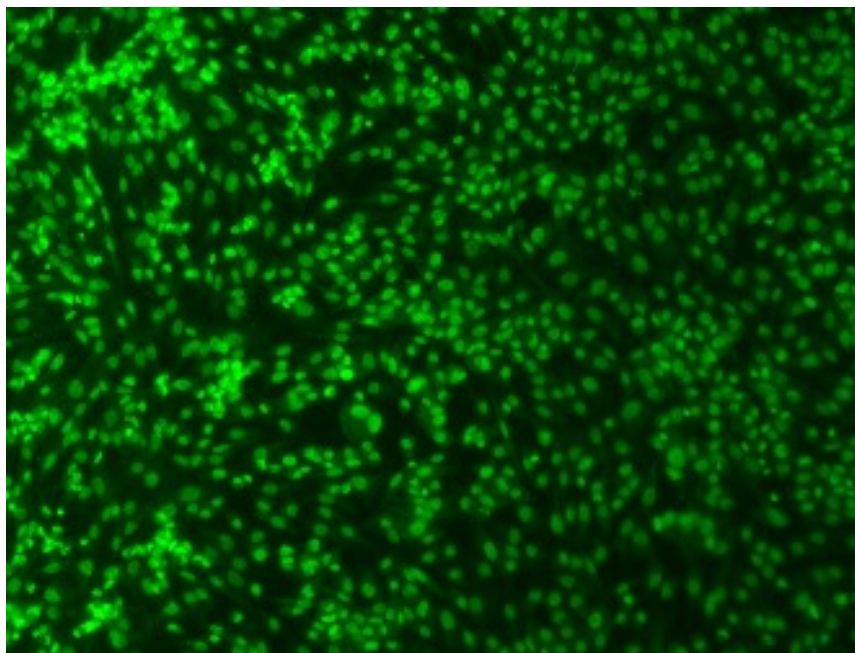


Figure S13. Fluorescence images of MDA-MB-231 cells stained with propidium iodide (PI)/acridine orange (AO) after treatment with MB without light (1W LED) for 15 min.