

On-Demand Free Radical Release by Laser Irradiation for Photothermal–Thermodynamic Biofilm Inactivation and Tooth Whitening

Qi Zhang ¹, Yuan Liu ¹, Meng Ding ², Lihui Yuwen ^{1,*} and Lianhui Wang ^{1,*}

¹ State Key Laboratory of Organic Electronics and Information Displays & Jiangsu Key Laboratory for Biosensors, Institute of Advanced Materials (IAM), Nanjing University of Posts and Telecommunications, Nanjing 210023, China; zhangqi_nj@163.com (Q.Z.); lyy657200@163.com (Y.L.)

² Nanjing Stomatological Hospital, Medicine School of Nanjing University, Nanjing 210008, China; xzdingmeng@163.com

* Correspondence: iamlhyuwen@njupt.edu.cn (L.Y.); iamlhwang@njupt.edu.cn (L.W.)

Supporting Figures

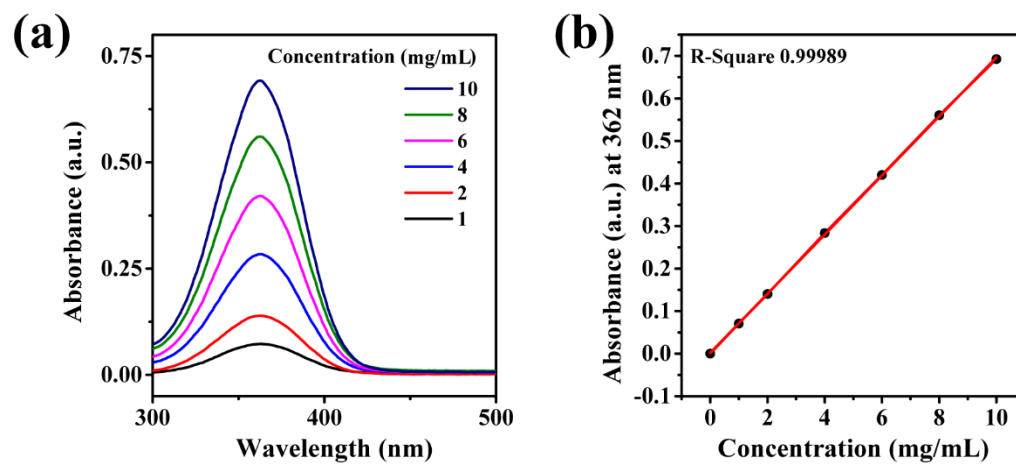


Figure S1. The working curve of AIPH aqueous solutions. (a) UV-Vis-NIR spectra of AIPH solutions at different concentrations. (b) The corresponding working curves.

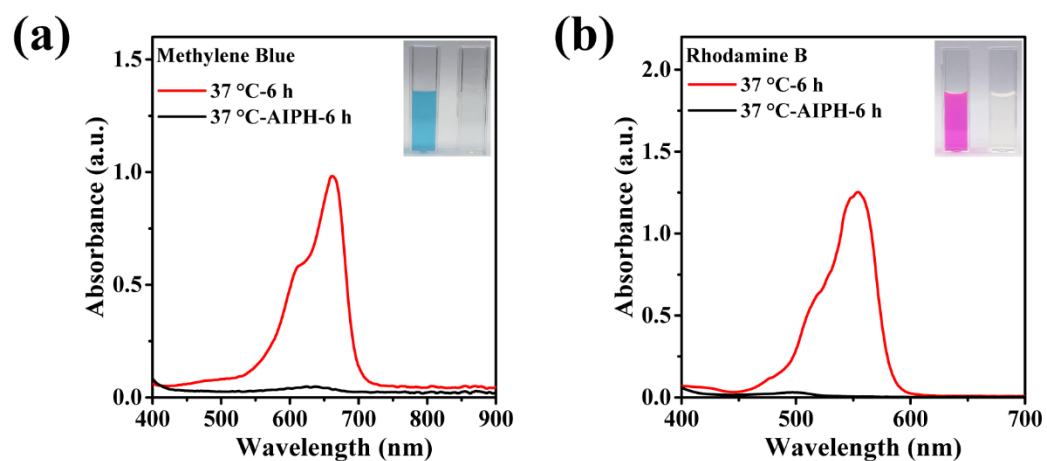


Figure S2. Degradation effect of alkyl radicals released from AIPH decomposition on dyes. UV-Vis-NIR spectra and photographs (inset) of methylene blue (a) and rhodamine B (b) under various incubation conditions.

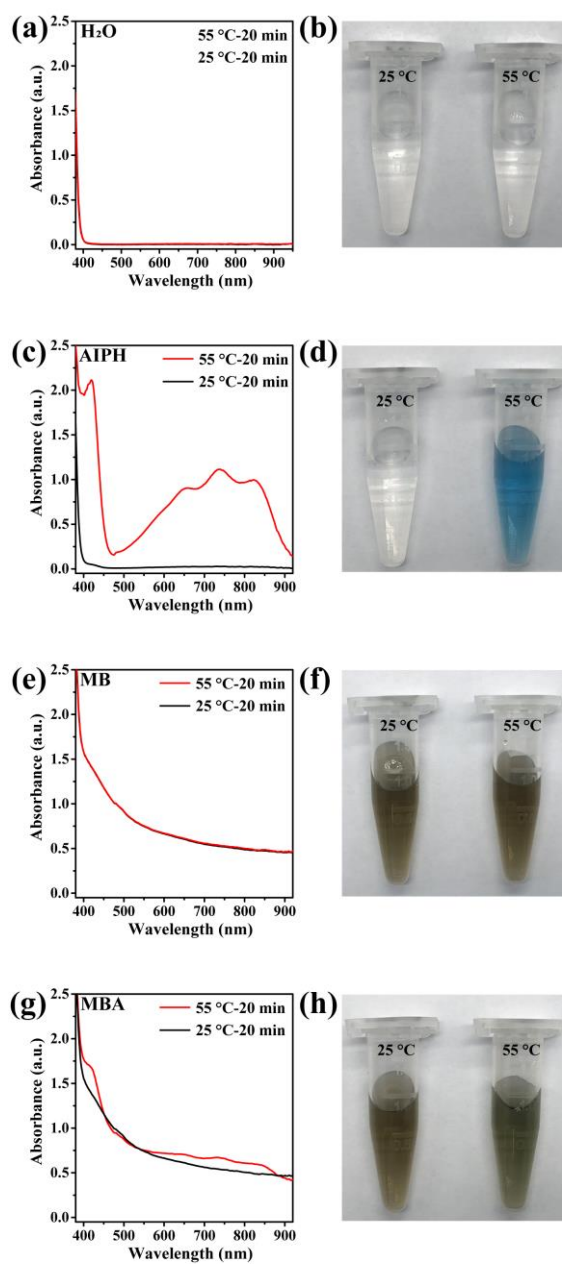


Figure S3. Detection of the formation of alkyl radicals by using ABTS. Ultraviolet-visible near-infrared (UV-Vis-NIR) spectra (a, c, e, g) and the corresponding photographs (b, d, f, h) of ABTS aqueous solutions after incubation under different conditions.

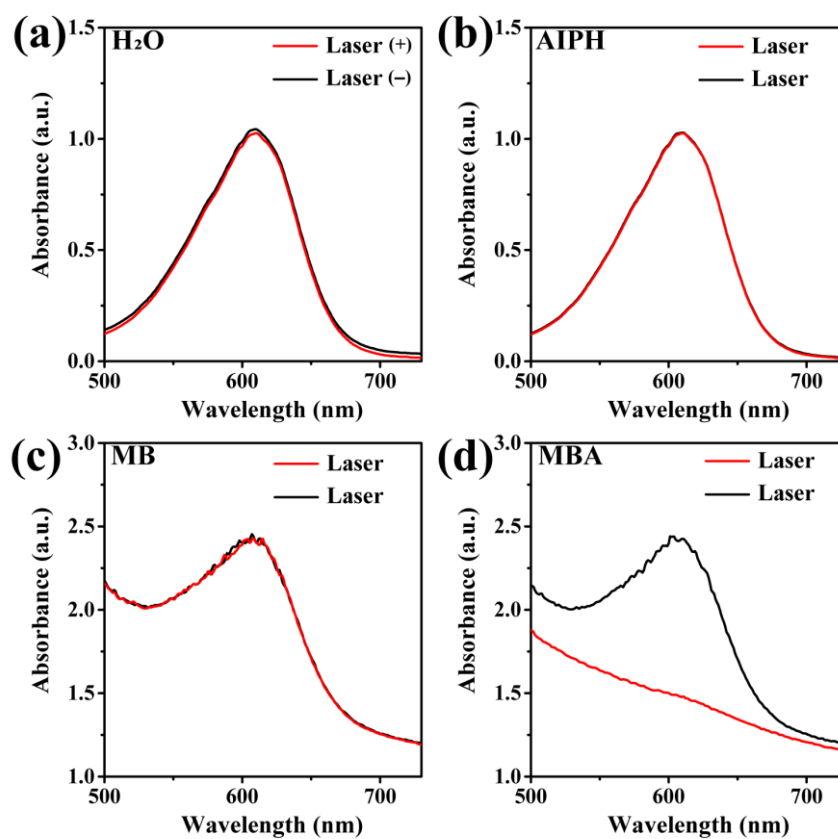


Figure S4. Laser-activated radical release for indigo carmine degradation. NIR light-triggered degradation of indigo carmine (50 $\mu\text{g/mL}$) by MB NSs with AIPH (MB NSs 40 $\mu\text{g/mL}$, AIPH 60 $\mu\text{g/mL}$). Laser irradiation conditions were kept constant (808 nm, 1.0 W/cm^2 , 5 min) across all experimental groups.

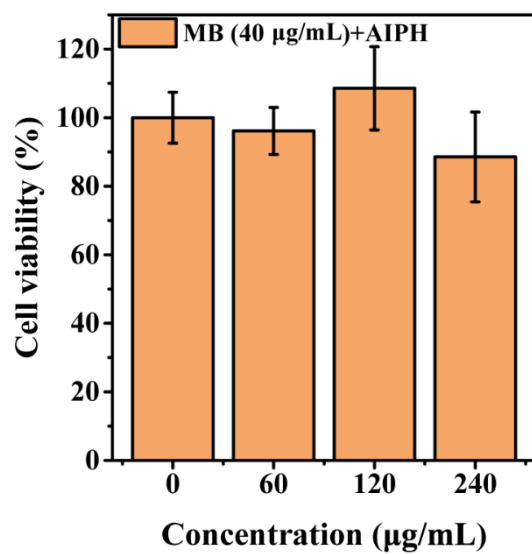


Figure S5. Cytotoxicity Assay. Cell viability of L-O2 cells after 24 hours incubation with AIPH and MB NSs aqueous solution (AIPH: 0, 60, 120, 240 µg/mL; MB NSs: 40 µg/mL).

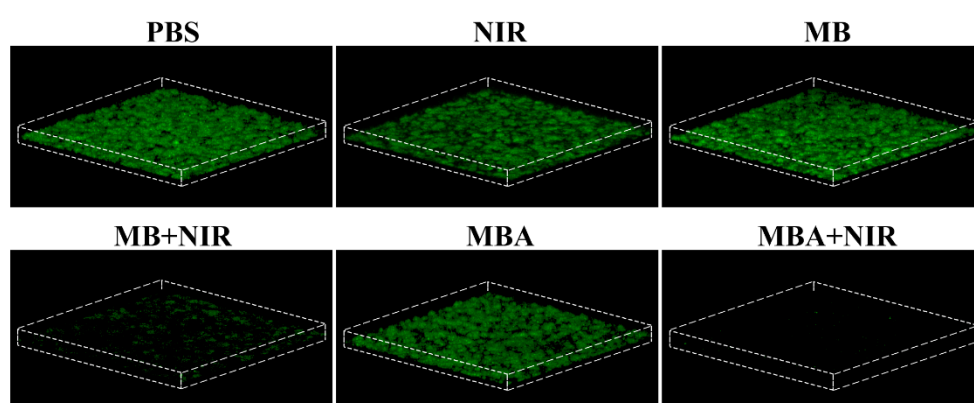


Figure S6. Three-dimensional (3D) CLSM images of *S. mutans* biofilms stained by Calcein-AM after various treatments (image size: 630 μm \times 630 μm).

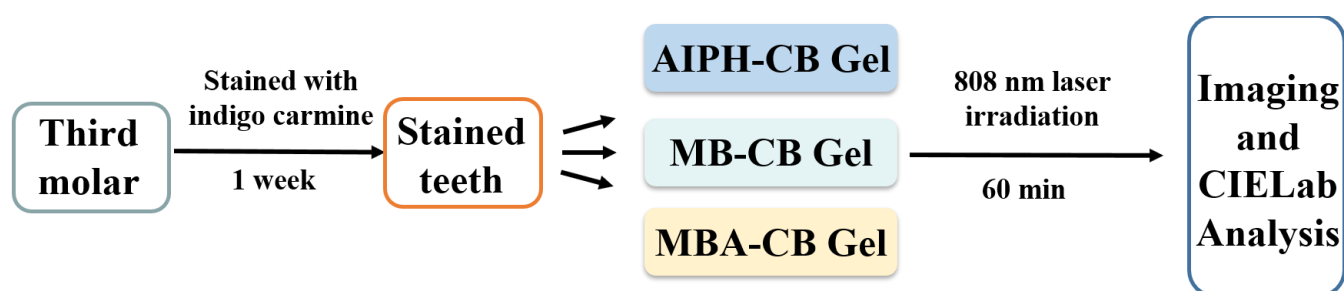


Figure S7. Flowchart of tooth whitening by different Gels.

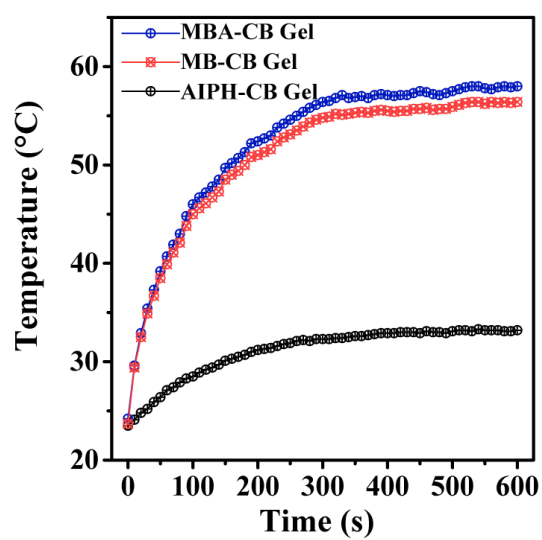


Figure S8. Laser-activated teeth cleaning. The temperature evolution curves of teeth treated with different gels (AIPH-CB Gel, MB-CB Gel, MBA-CB Gel). Laser irradiation conditions were kept constant (808 nm, 1.0 W/cm², 10 min) across all experimental groups.