Supporting Information

Superhydrophobic Surfaces as a Source of Airborne Singlet Oxygen Through Free Space for Photodynamic Therapy

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Kinetic derivation for the steady-state (ss) approximation of $[^1O_2]_{ss}$

$$-d[^1O_2]/dt = k_{obs}\,[^1O_2] = \{k_d + (k_r + k_q)\,[\mathbf{1}]\}\,[^1O_2] \quad \text{(a)}$$

$$[^1O_2] = [^1O_2]_0\, e^{-(k_{obs}\, t)} = [^1O_2]_0\, e^{-\{k_d + (k_r + k_q)\,[\mathbf{1}]\}\, t} \quad \text{(b)}$$

$$k_{obs} = k_d + (k_r + k_q)\,[\mathbf{1}] \quad \text{(c)}$$

where the steady-state (ss) approximation for $[^1O_2]_{ss}$ in eq 7 is taken to be

$$d[^1O_2]_{ss}/dt = -k_d[^1O_2]_{ss} - (k_r + k_q)[^1O_2]_{ss}\,[\mathbf{1}] = 0 \quad \text{(d)}$$

$$d[^1O_2]_{ss}/dt = [^1O_2]_{ss}\,(-k_d - (k_r + k_q)[\mathbf{1}]) = 0 \quad \text{(e)}$$

$$[^1O_2]_{ss} = (-k_d - (k_r + k_q)\,[\mathbf{1}])^{-1} \quad \text{(f)}$$

plugging eq f into eq 7, assuming $k_q = 0$ since 9,10-disubstituted anthracene traps are known to be mainly chemical quenchers not physical quenchers of $^1O_2$, gives eq 9, in the main manuscript.

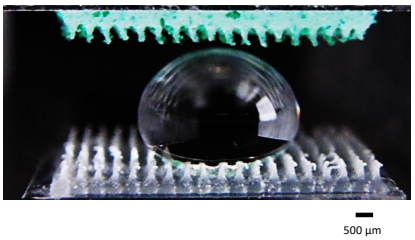

Figure S1. Photograph of a water droplet poised on a lower SH surface. The upper sensSH surface is embedded with sensitizer particles, where upon illumination airborne $^1O_2$ is delivered from this upper surface to the water droplet below. The lower SH surface bears no sensitizer particles.

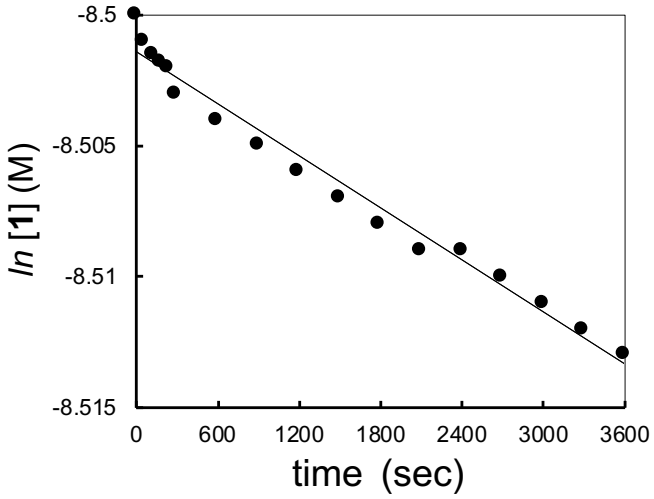

Figure S2. Plot of *ln* [**1**] vs time for the distance of 600 µm between the upper sensSH surface and the top of the 25-µL water droplet in Table 1. The slope is k_{obs} (0.33×10^{-5} s^{-1}, $R^2 = 0.9792$).

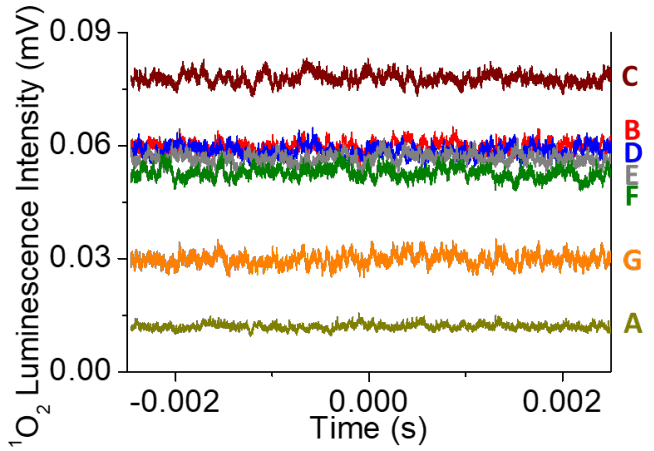

Figure S3. Singlet oxygen luminescence intensity at 1270 nm as a function of time for the (A) native SH surface (single layer); (B) sensSH surface (single layer); (C) sensSH surface with oxygen gas flowing at a rate of 130 mL/min (single layer); (D) SH sandwich system with no H_2O droplet as quencher; (E) SH sandwich system using a 25 µL H_2O droplet as quencher; (F) SH sandwich system with a 25 µL H_2O droplet containing anthracene **1** (0.2 mM); and (G) sensSH surface with nitrogen flowing at a rate of 130 mL/min (single layer). The distance between the sensSH surface and the water droplet was 150 µm.

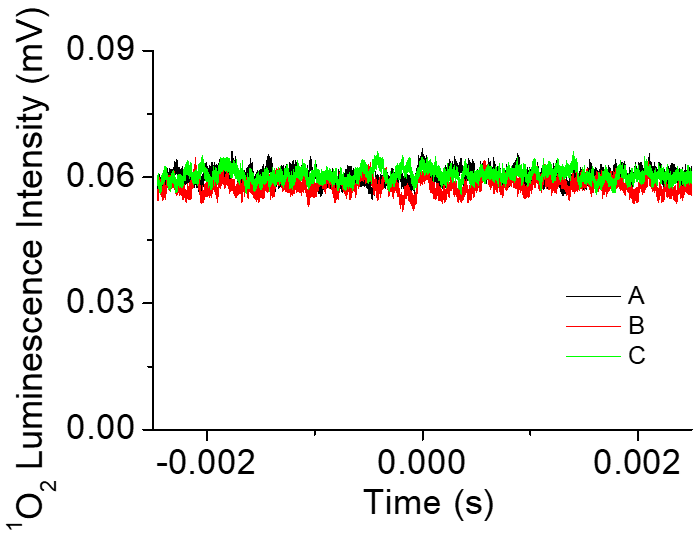

Figure S4. Singlet oxygen luminescence intensity at 1270 nm as a function of time for the SH sandwich system containing a 25 µL H_2O droplet with **1** in concentrations of (A) 0.2 mM, (B) 10 mM, and (C) 20 mM. The distance between the sensSH surface and the water droplet was 80 µm.