

Supplementary Information

# Cell-Penetrating Peptide Enhanced

# Intracellular Raman Imaging and

# Photodynamic Therapy

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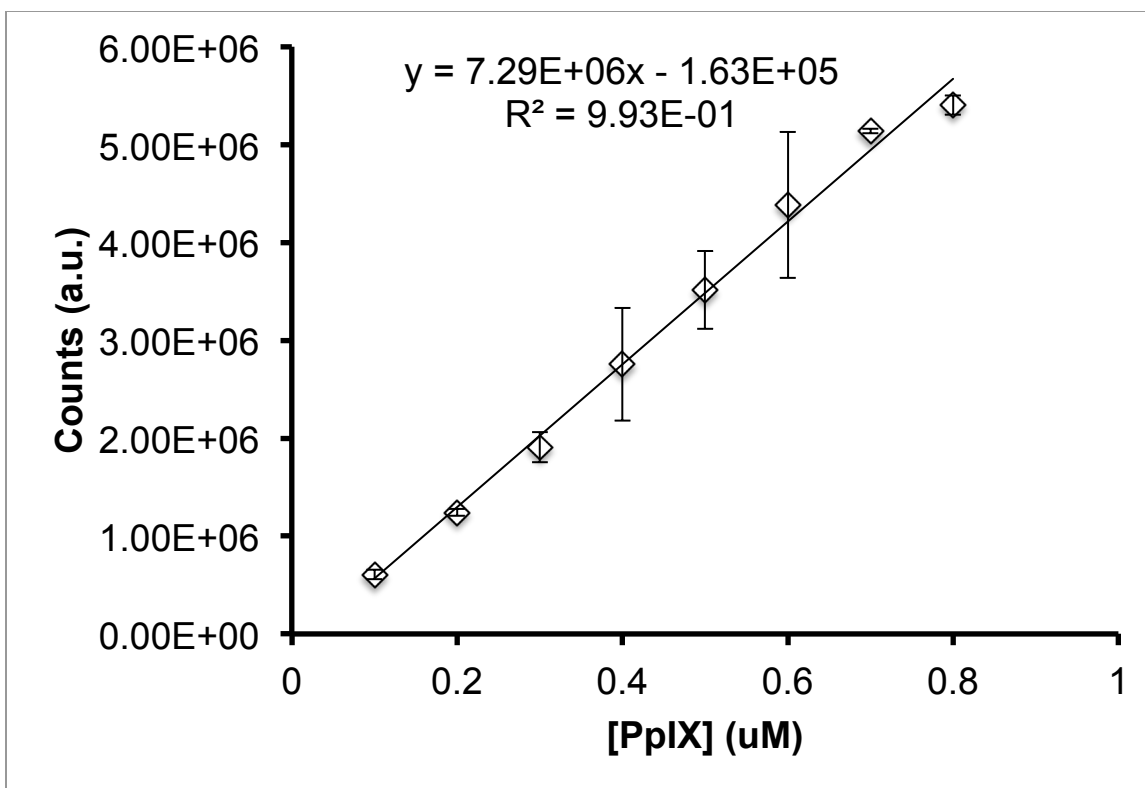
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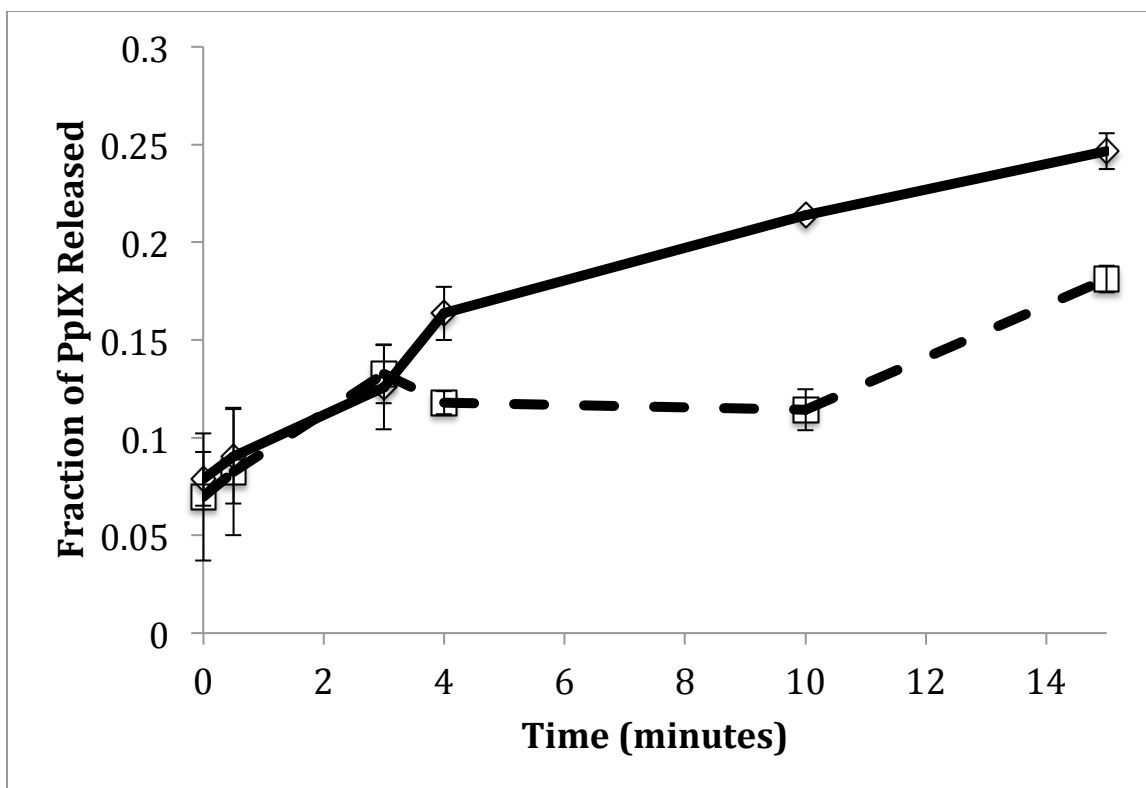
<sup>†</sup> Fitzpatrick Institute for Photonics

<sup>‡</sup> Department of Biomedical Engineering

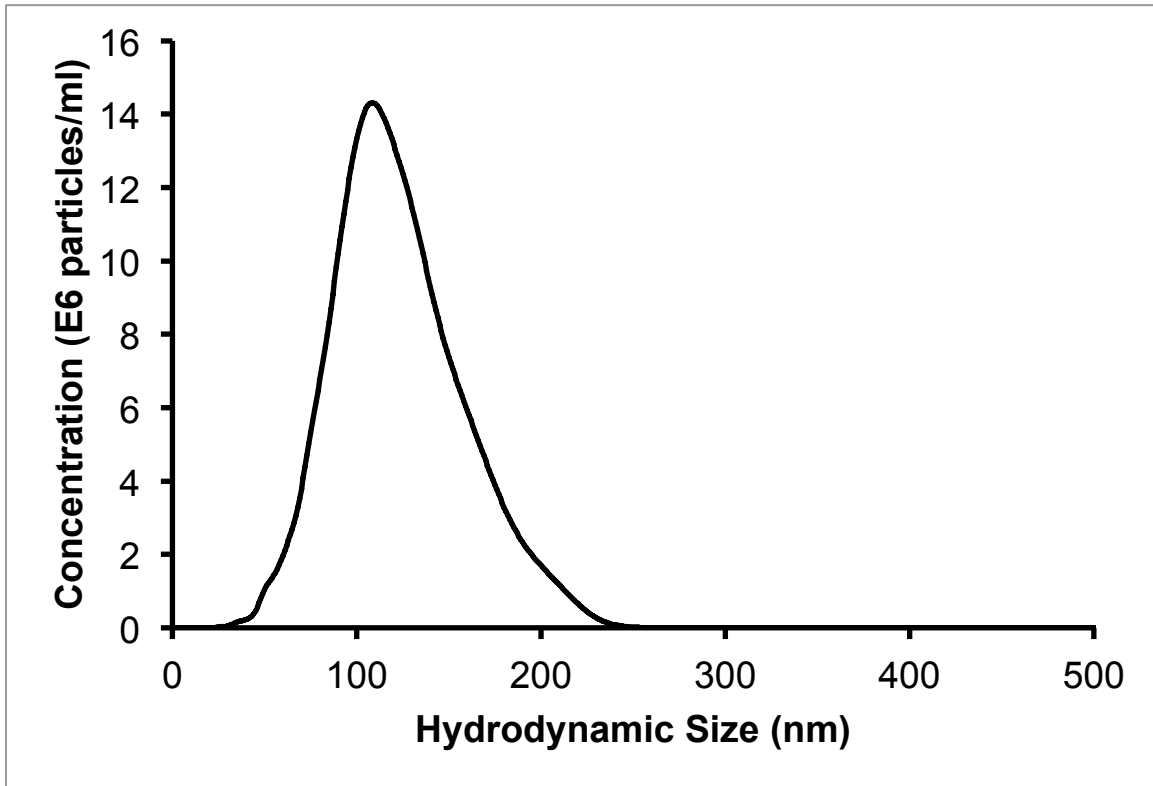
<sup>§</sup> Department of Chemistry



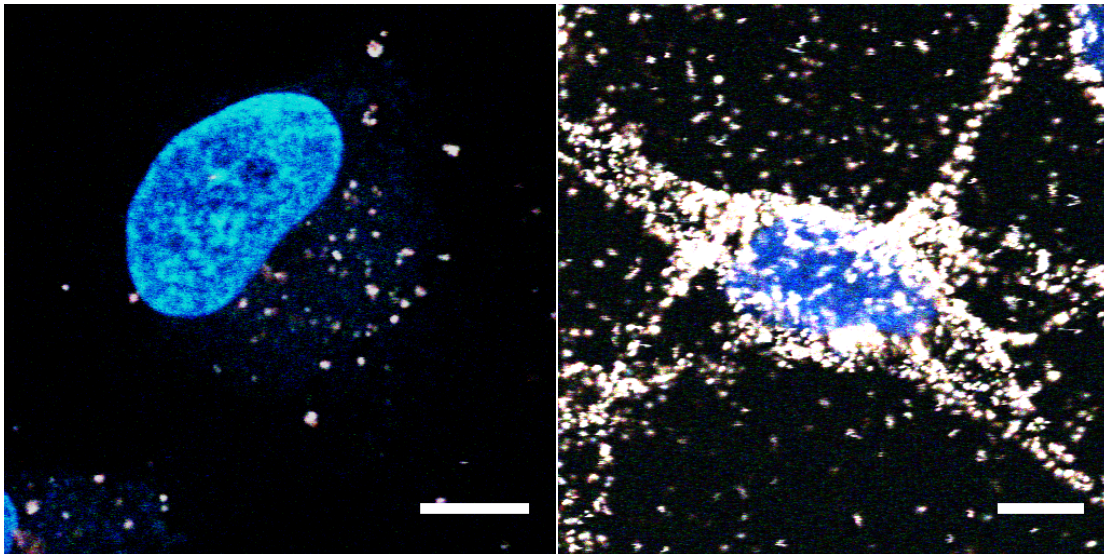
**Figure S1.** A calibration curve created from the integrated fluorescence intensity of PpIX upon excitation at 415 nm. Error bars are  $\pm$  one standard deviation of three measurements.



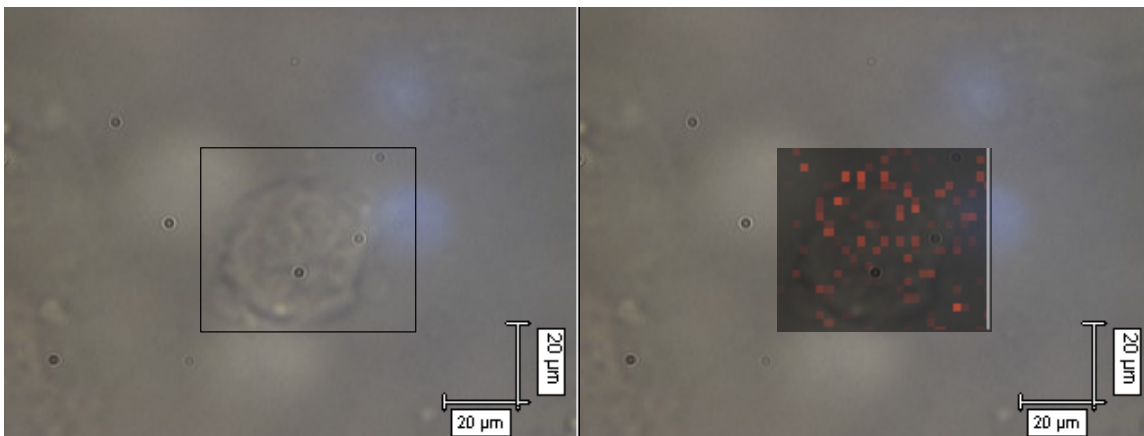
**Figure S2.** PpIX release profiles from AuNS-DTDC@SiO<sub>2</sub>-PpIX (solid) and AuNS-DTDC@SiO<sub>2</sub>-PpIX-TAT (dashed) after irradiation with an 8 mW 633 nm laser. Error bars are ± one standard deviation of three measurements.



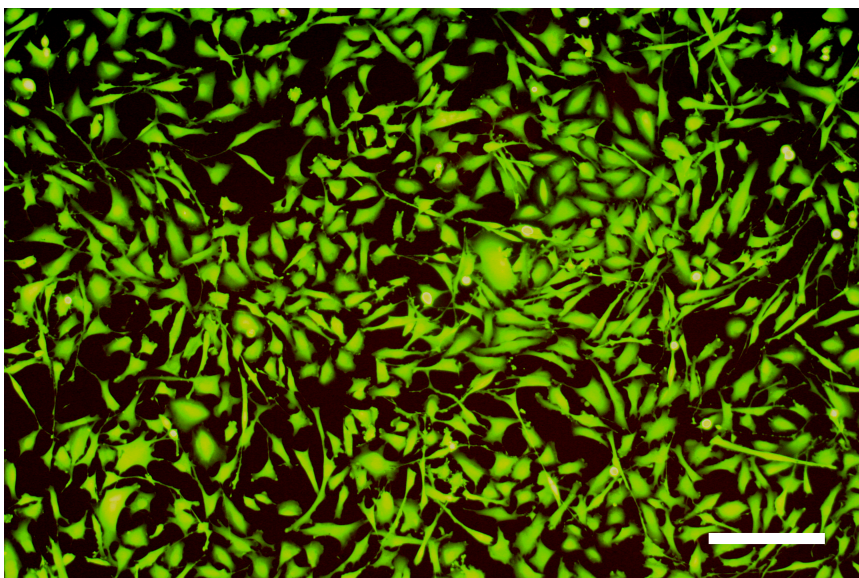
**Figure S3.** Hydrodynamic size distribution of the silica-coated particles as measured by NTA.



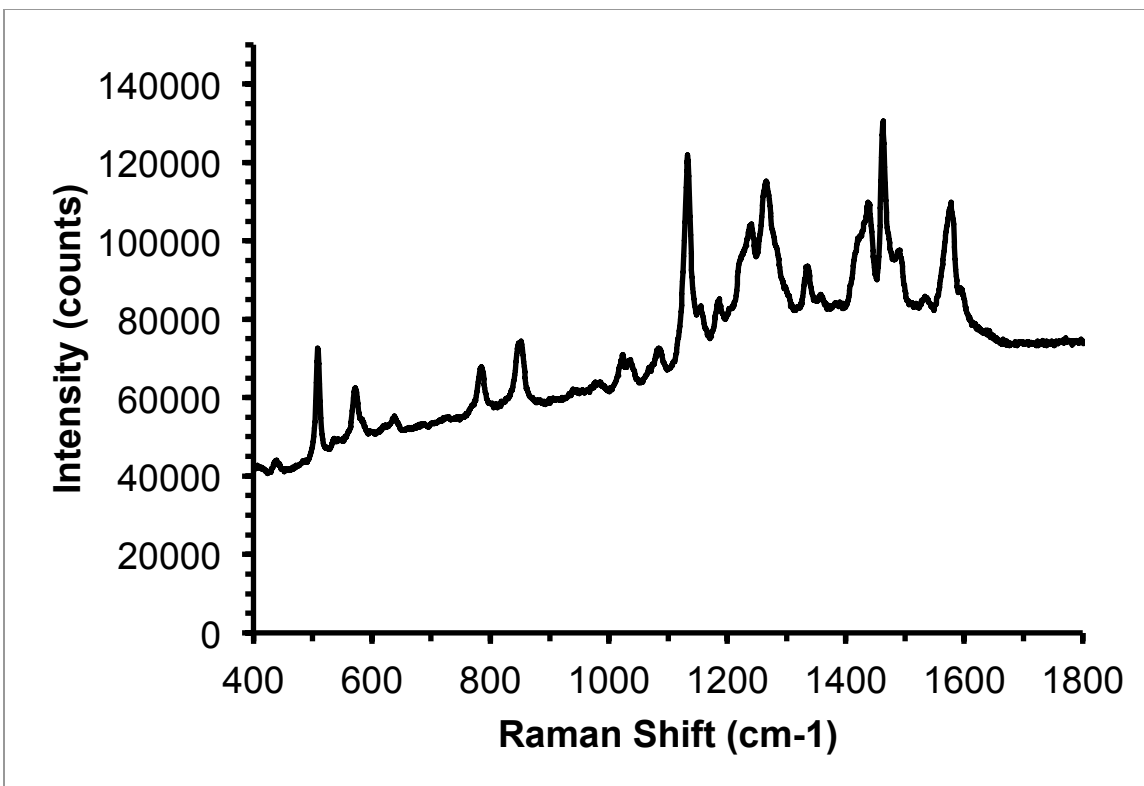
**Figure S4.** Two-photon luminescence images of cells incubated with AuNS-DTDC@SiO<sub>2</sub>-PpIX (left) and AuNS-DTDC@SiO<sub>2</sub>-PpIX-TAT (right). The blue color is from a nuclear stain and the white color is from the nanostars. Particle concentration was 0.1 nM with a 1 hour incubation time for both samples.



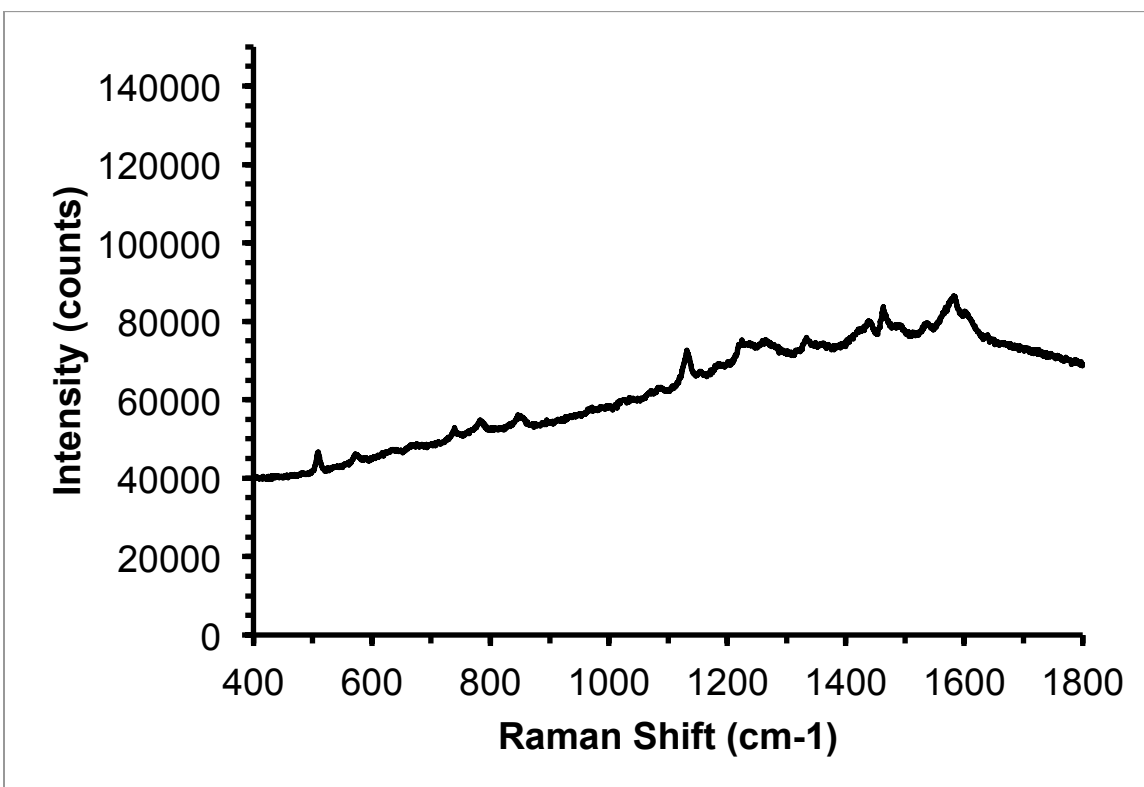
**Figure S5.** Raman image of a cell incubated with AuNS-DTDC@SiO<sub>2</sub>-PpIX without TAT. The color scale remains the same as that in Figure 4 of the main text.



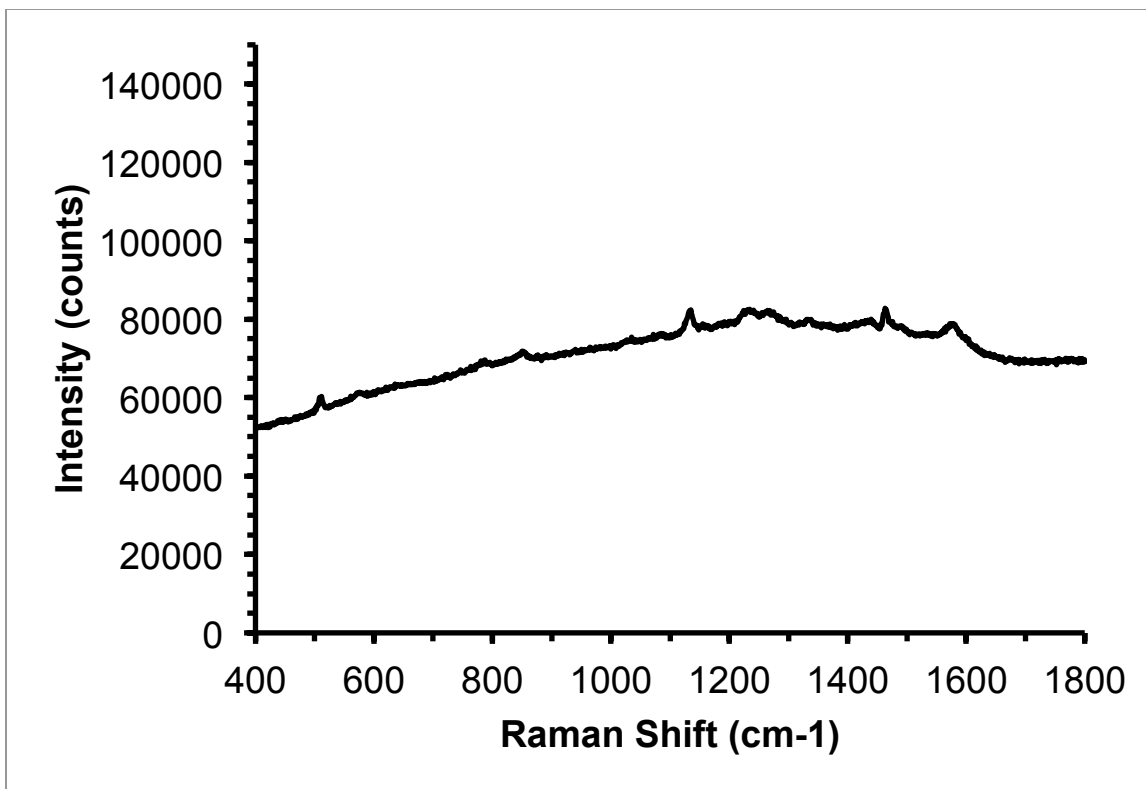
**Figure S6.** Viability staining of cells incubated with 0.1nM AuNS-DTDC@SiO<sub>2</sub>-PpIX for 1 hour after 30 seconds of light irradiation. Live/dead cells are stained green/red. Scale bar is 250 μm.



**Figure S7.** Unprocessed Raman spectrum of the AuNS-DTDC particle solution.



**Figure S8.** Unprocessed Raman spectrum of the AuNS-DTDC@SiO<sub>2</sub>-PpIX particle solution.



**Figure S9.** Unprocessed Raman spectrum collected from a cell that was incubated with the AuNS-DTDC@SiO<sub>2</sub>-PpIX-TAT particle solution.