Supporting Information

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Photoinduced Rapid Transformation from Au Nanoagglomerates to Drug-Conjugated Au Nanovesicles

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Reassembly of Au AGs to TAuD NVs through a gaseous, single-pass process under 185-nm UV irradiation. Au AGs were first prepared via spark ablation between two identical Au rods, and the AGs were then introduced into the TD solution before the orifice of a collison atomizer. The AGs and TD were sprayed out to form hybrid droplets, which were subsequently exposed to 185-nm UV (6.2 eV) for photoionization of Au AGs (5.1 eV) and subsequent electrostatic conjugation with TD in a denuder packed with pelletized activated carbons and silica gels, resulting in the formation of TAuD NVs. The NVs were electrostatically charged (+ field) and subsequently collected (– field) in an aerosol state and dispersed in PBS for in vitro and in vivo bioassays.
(a) DLS particle size distribution, zeta potential, and (b) UV-vis spectra (including TD) of TAUd NVs dispersed in PBS (0.2 mg mL⁻¹). The absorbances of TAUd, TAU, and Au AG samples at 808 nm were 0.254, 0.266, and 0.11, respectively, and the analogous data at 632 nm were 0.307, 0.295, and 0.166, respectively. Inset in (b) shows TAUd, Au AGs, and TAU dispersions in PBS. (c) Changes in average diameter, polydispersity index (PDI), and zeta potential for dispersion storage (15 days) of TAUd NVs. For 15-day measurements after they were dispersed in PBS, there were no significant changes in the size distribution and zeta potential.
TEM images of reassembled Au AGs incorporating different T solutions: 5.35 (0.5 v·T/v·ethanol%), 10.70 (1.0 v/v%), 26.75 (2.5 v/v%), and 53.50 (5.0 v/v%) mg·T mL⁻¹·ethanol. Increasing T concentrations resulted in vesicles assuming a more tightened configuration.
(a) XPS Au spectra in TAuD and Au AG, (b) FTIR spectra of TAuD, AuD, and TAu, and (c) Raman spectra of TAuD, TD, and Au AG (insets show optical microscope specimens on glass discs for measurements).
(a) Concentration-dependent (at 2.5 W cm\(^{-2}\)) and (b) 808-nm NIR irradiation intensity-dependent (at 150 µg mL\(^{-1}\)) temperature elevation profiles of TAU and RPMI (control) for 6 min. Temperature contours for each condition are included. Temperatures near the laser beam spot significantly increased in response to irradiation.
(a) Concentration-dependent (at 2.5 W cm$^{-2}$) and (b) 632-nm NIR irradiation intensity-dependent (at 150 µg mL$^{-1}$) temperature elevation profiles of TAU and RPMI (control) for 6 min. Temperature contours for each condition are included. Temperatures near the laser beam spot increased significantly in response to irradiation.
FACS results to determine cellular apoptosis of MCF-7 (top) and MDA-MB-231 (bottom) cells following treatment with (i) control, (ii) free D, (iii) TAu + NIR, and (iv) TAuD + NIR.
Inverted fluorescence microscope images from live/dead assays. The displayed images show live cells (green, stained with calcein-AM) and dead cells (red, stained with EthD-1) after NIR irradiation (4 W cm$^{-2}$) for 5 min. Dashed lines demarcate the areas of irradiation.
Optical microscope images from cell cycle analyses. Cell-clock labeling in MDA-MB-231 cells was performed after 24-h incubation with (a) control, (b) free D, and (c) TAuD.
In vivo photothermal imaging during NIR irradiation of tumors in mice pretreated with saline and TAuD.