Methods

1.1 Synthesis and characterization of CuS nanoparticles

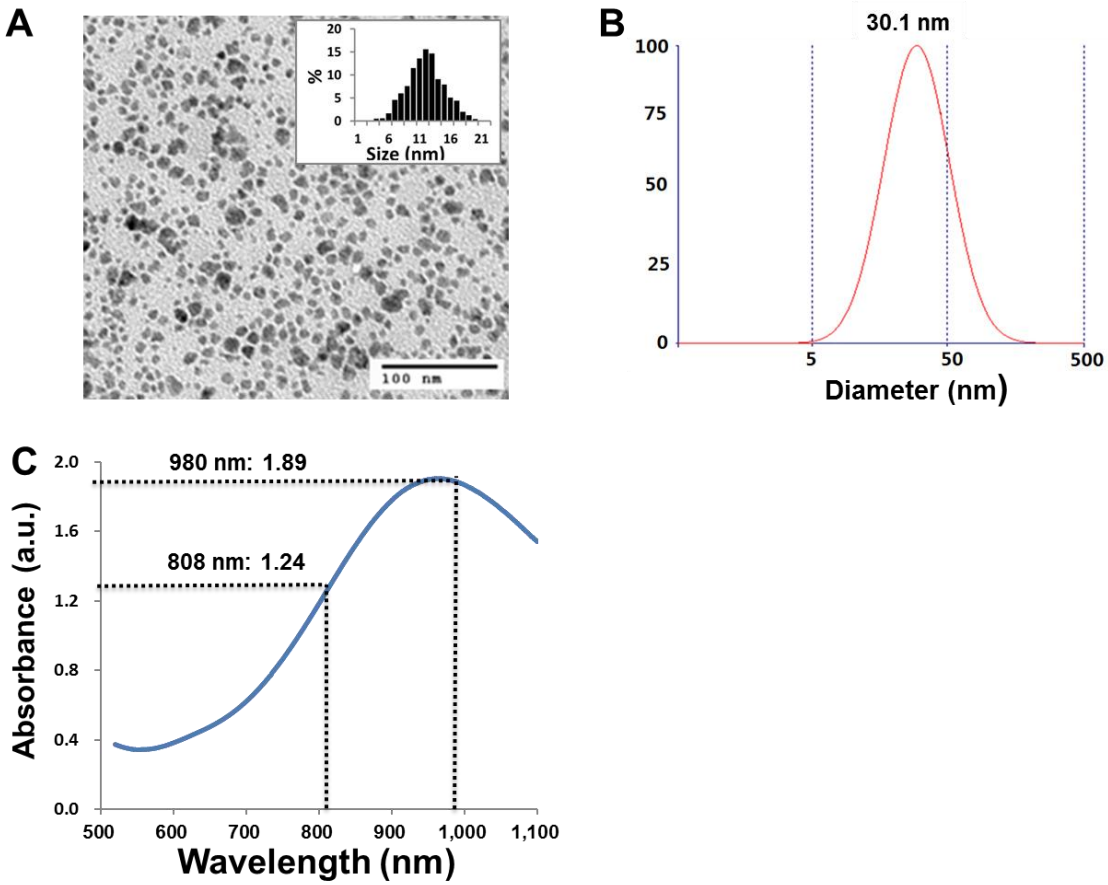
The ultraviolet−visible absorption spectra of different nanomaterials, CuS NPs, hollow gold nanospheres (HAuNS), and single-wall carbon nanotubes (SWCNTs, Nanospectra, TX) were measured on an UV−Vis spectrometer (DU-800, Beckman Coulter, USA). Particle size was characterized by a dynamic light-scattering (DLS) instrument (Brookhaven Instruments, USA) and by transmission electron microscopy. Compared to the particle sizes observed in the transmission electron microscopic image, the corresponding hydrodynamic diameters of the CuS NPs increased from 12.4 nm to 30.1 nm, owing to the hydrophilic PEG coating (**Supplemental Figure 1A and 1B**).

1.2 Photothermal effect in aqueous solution

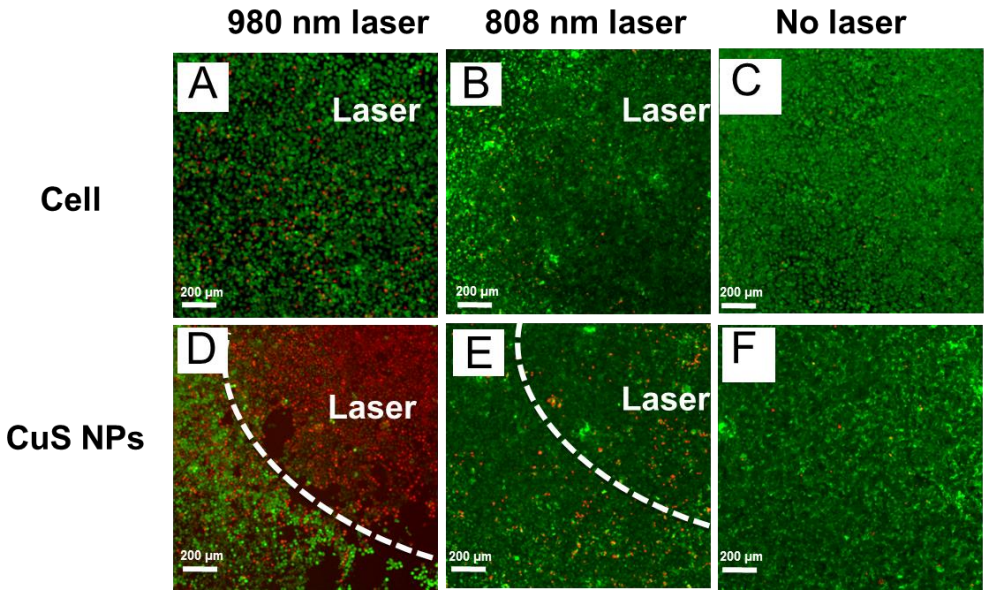
Two types of clinically used laser systems with different wavelengths were used in this study, a 980-nm NIR laser (PhoTex15; Visualase Inc., USA) and an 808-nm NIR laser (15PLUS Laser, Diomed, USA). For comparison of temperatures mediated by NPs using the 980-nm laser versus the 808-nm laser, NIR laser light (2 W/cm^2, spot size 10 mm in diameter) was passed through the NP's solution or pure water (control). A thermocouple was used to monitor the temperature changes.

1.3 Photothermal ablation of cancer cells with PEG-CuS NPs in vitro

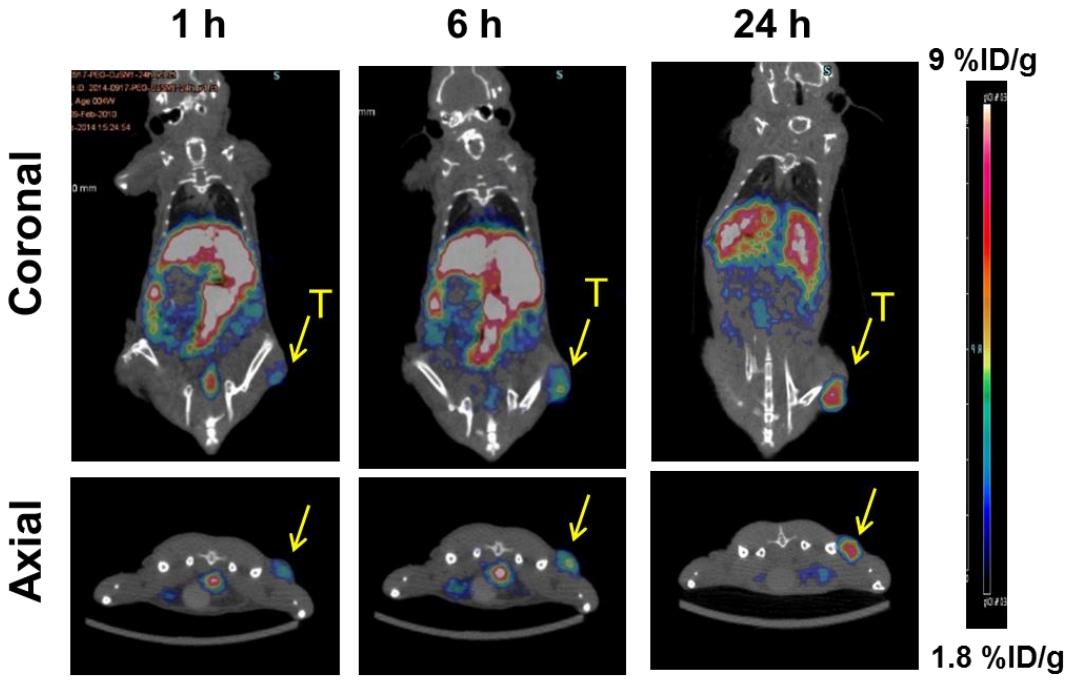
HeyA8 OvC cells were incubated with CuS NPs (50 μg/mL, 1 OD) in culture medium (RPMI-1640, Invitrogen, USA) for 2 h. After washing with RPMI-1640 medium, the cells were then exposed to the 980-nm or 808-nm NIR laser (2 W/cm^2) for 2 min. Following the manufacturer's protocol, the cells were co-stained with calcein AM and Ethd-1 24 h later to image dead (red) and viable (green) cells. Finally, the cells were assessed using a Zeiss Axio fluorescence microscope (Carl Zeiss GmbH, Germany).



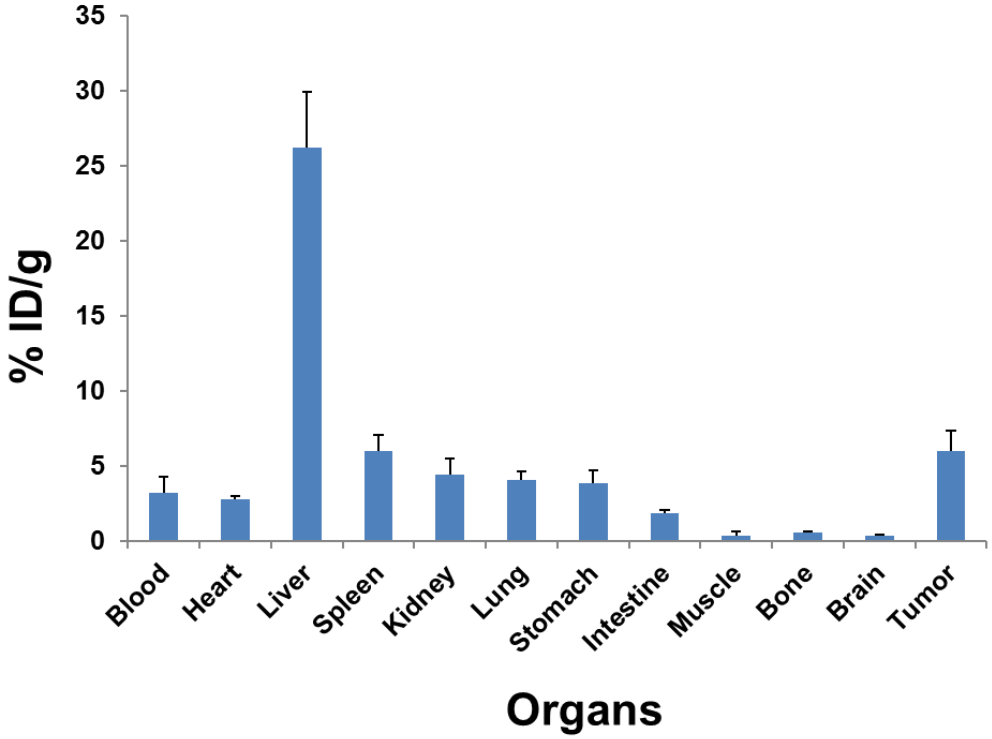
Supplemental Fig. 1. Characterization of copper sulfide nanoparticles (CuS NPs). (A) Typical transmission electron microscopy image of CuS NPs showing a core size of 12.4 ± 3.7 nm and (B) dynamic light-scattering analysis showing the hydrodynamic diameter of CuS NPs in aqueous solution. (C) The absorption absorbance of CuS NPs in aqueous solution.



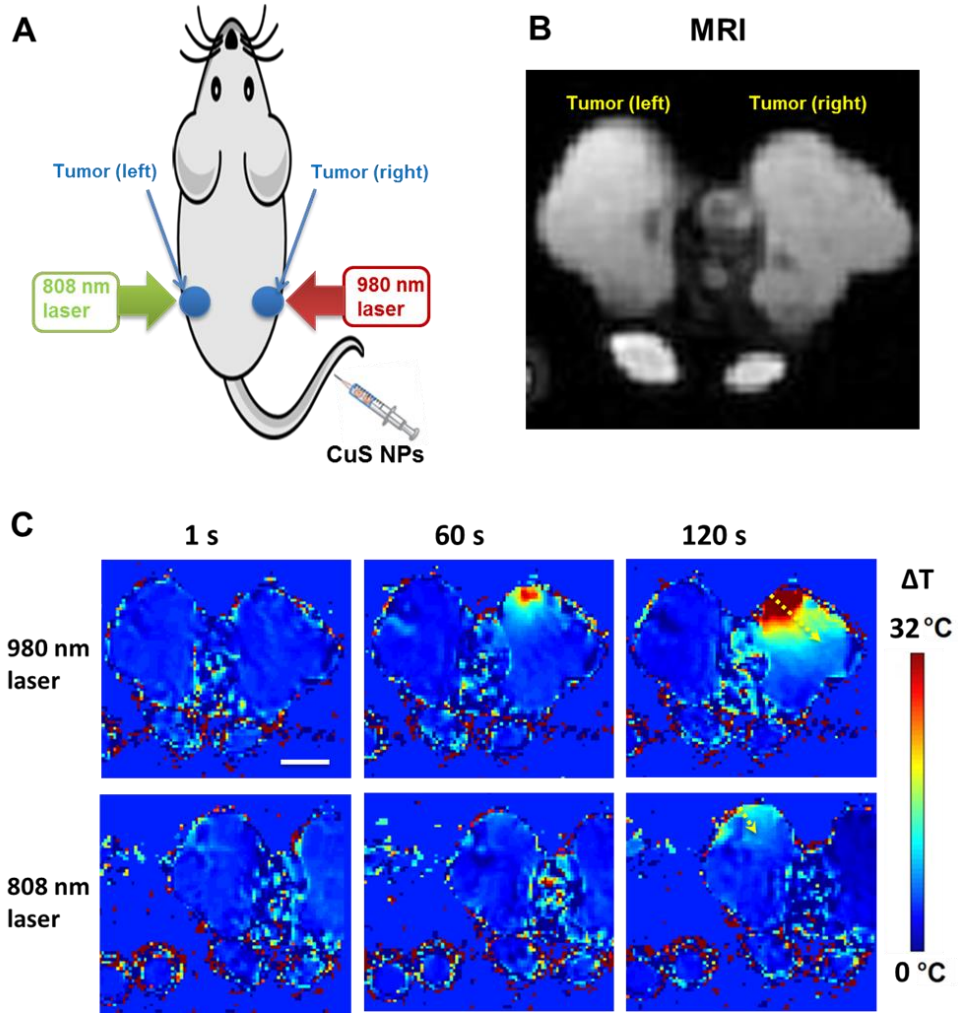
Supplemental Fig. 2. *In vitro* assessment of photothermal therapy mediated by CuS NPs with a 980-nm or 808-nm NIR laser. HeyA8 cells that were incubated with/without CuS NPs for 2 h were treated with/without NIR laser irradiation (980 nm or 808 nm, 2 W/cm^2 for 2 min). Fluorescence microscopy reveals that targeting CuS NPs with 980-nm laser irradiation resulted in significant loss of cell viability. Live cells fluoresce green (calcein AM) and dead cells fluoresce red (ethidium homodimer-1). (A-C): cells without CuS NPs; (D-F) cells with CuS NPs.



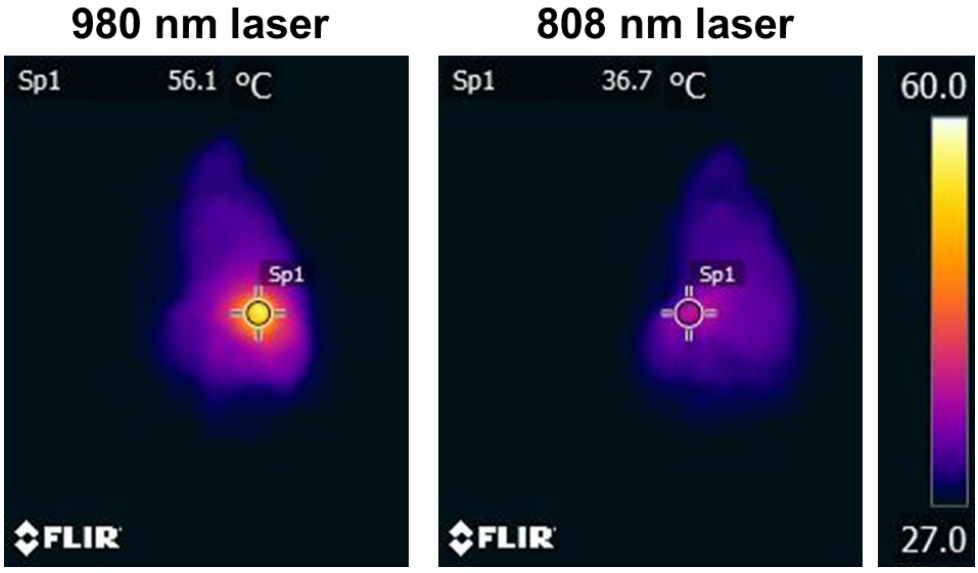
Supplemental Fig. 3. μPET/CT imaging of CuS NPs in mice bearing subcutaneous HeyA8 OvC tumors at 1, 6, and 24 h post-injection.



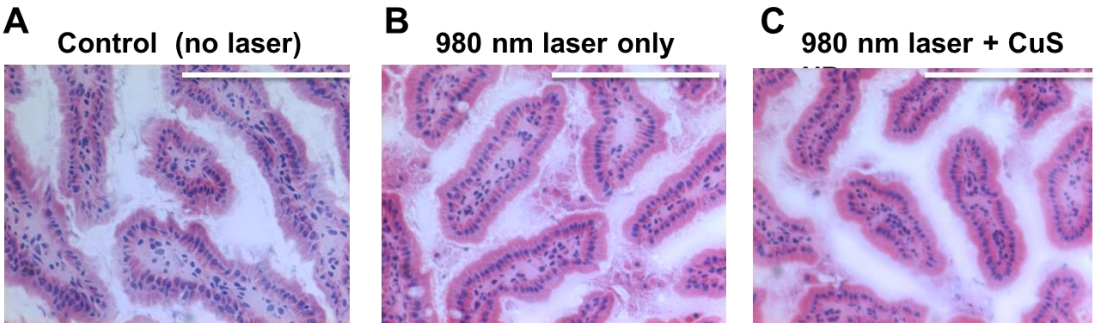
Supplemental Fig. 4. Biodistribution of CuS NPs 24 h after intravenous injection.



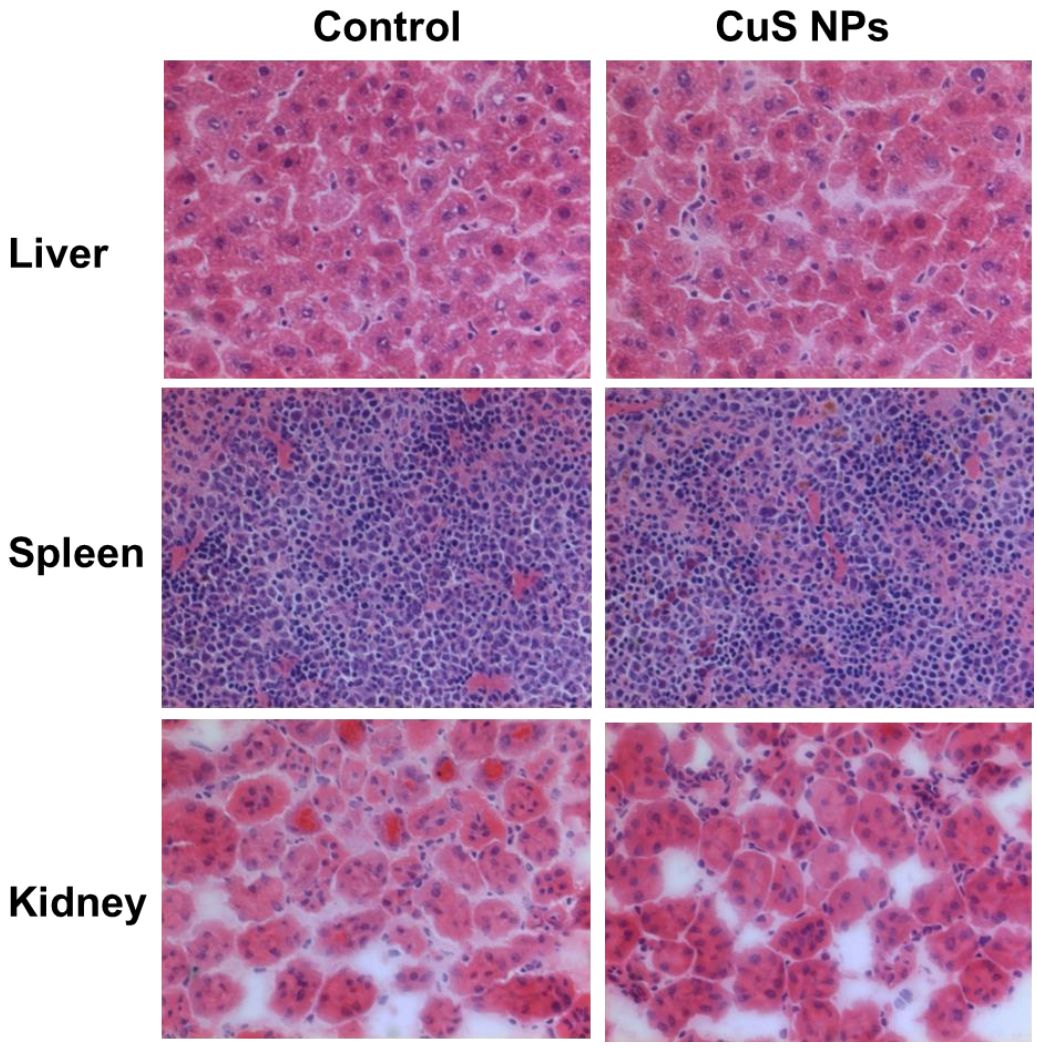
Supplemental Fig. 5. (A) Scheme of laser treatment with 980-nm and 808-nm laser. (B) *In vivo* magnetic resonance imaging (MRI) of mice. (C) Magnetic resonance temperature imaging (MRTI) of tumors injected intravenously with CuS NPs. Bar = 5 mm. Impact of CuS NPs on laser-induced increase in tumor temperature. At 24 h after CuS NP injection, tumors were irradiated with a 980-nm or 808-nm laser at 2 W/cm^2 for 2 min. Representative MRTI images of CuS NP-treated mice before laser treatment (t = 1 s), during laser treatment (t = 60 s), and just before the end of laser treatment (t = 120 s).



Supplemental Fig. 6. Infrared thermographic images of tumor surface temperature after laser irradiation in a subcutaneous HeyA8 ovarian tumor mouse model.



Supplemental Fig. 7. Representative Hematoxylin and Eosin-stained images of surrounding intestines (A-C) with/without 980-nm NIR laser irradiation (2 W/cm^2 for 2 min).



Supplemental Fig. 8. Hematoxylin and eosin-stained images of major organs of healthy mice (control) and mice 14 days after CuS NP injection.