Electronic Supplementary Information

$Cu_{7.2}S_4$ Nanocrystals: A Novel Photothermal Agent with a 56.7% Photothermal Conversion Efficiency for Photothermal Therapy of Cancer Cells

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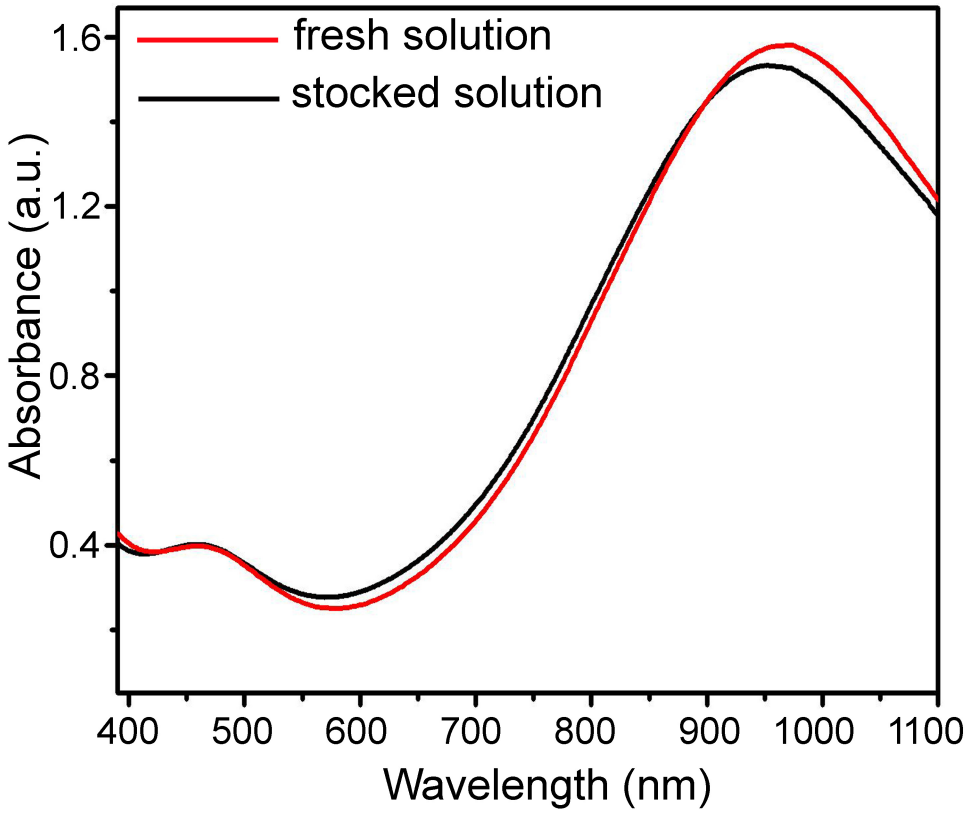

Fig. S1 UV-vis spectra of the freshly prepared $Cu_{7.2}S_4$ NCs and the $Cu_{7.2}S_4$ NCs stocked in chloroform under ambient conditions for 2 months.

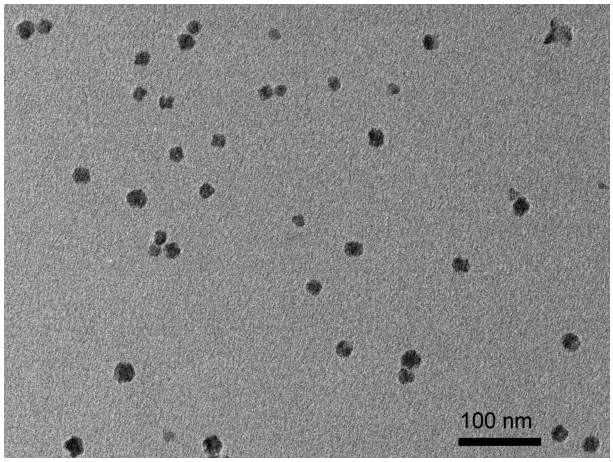

Fig. S2 TEM image of $Cu_{7.2}S_4$ NCs stocked in chloroform for two months.

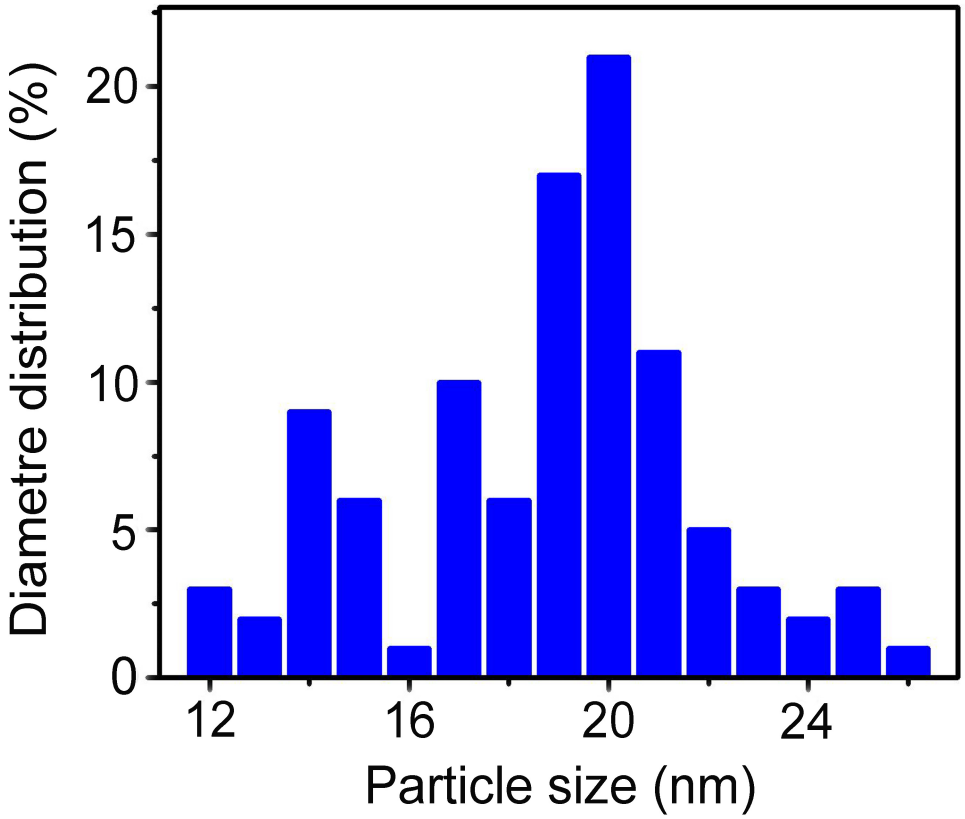

Fig. S3 Histogram showing the size distribution of the $Cu_{7.2}S_4$ NCs.

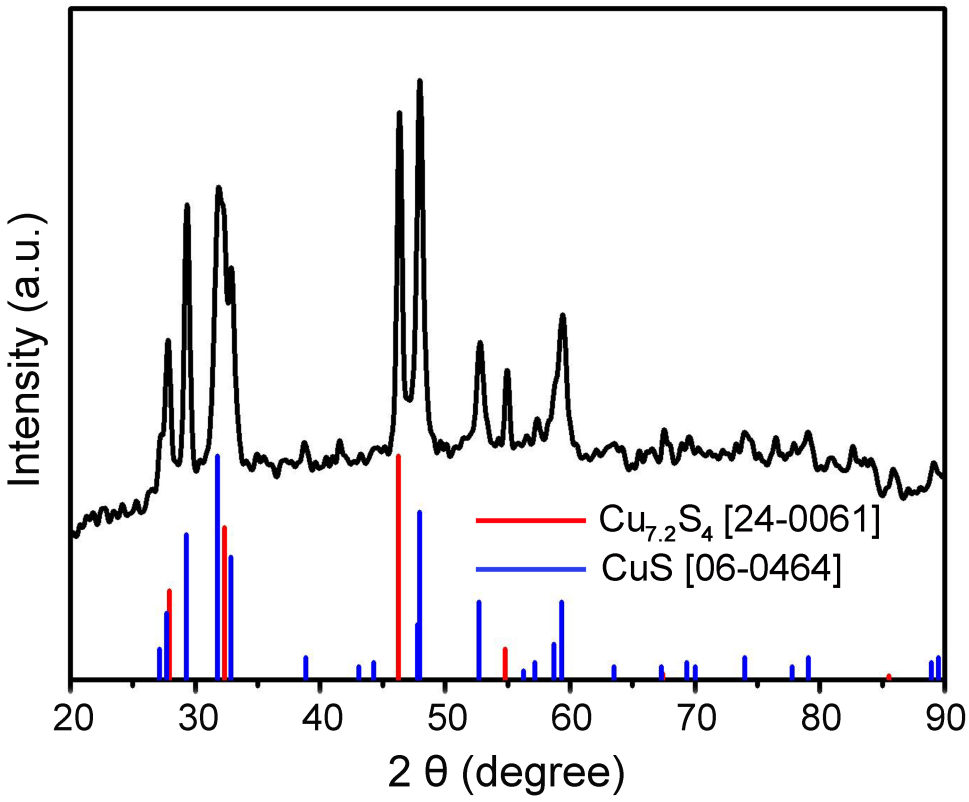

Fig. S4 XRD patterns of the product obtained under injection temperature below 240 ℃.

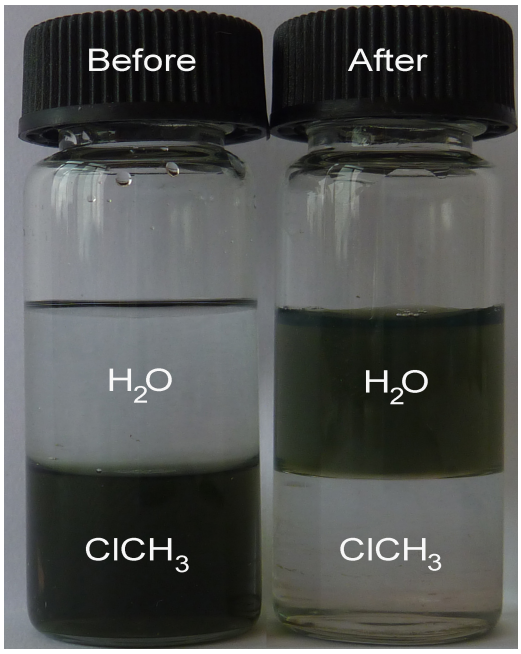

Fig. S5 A digital camera photo showing the $Cu_{7.2}S_4$ NCs dispersed into different

solvents (H_2O and $CHCl_3$) before and after the polymer coating.

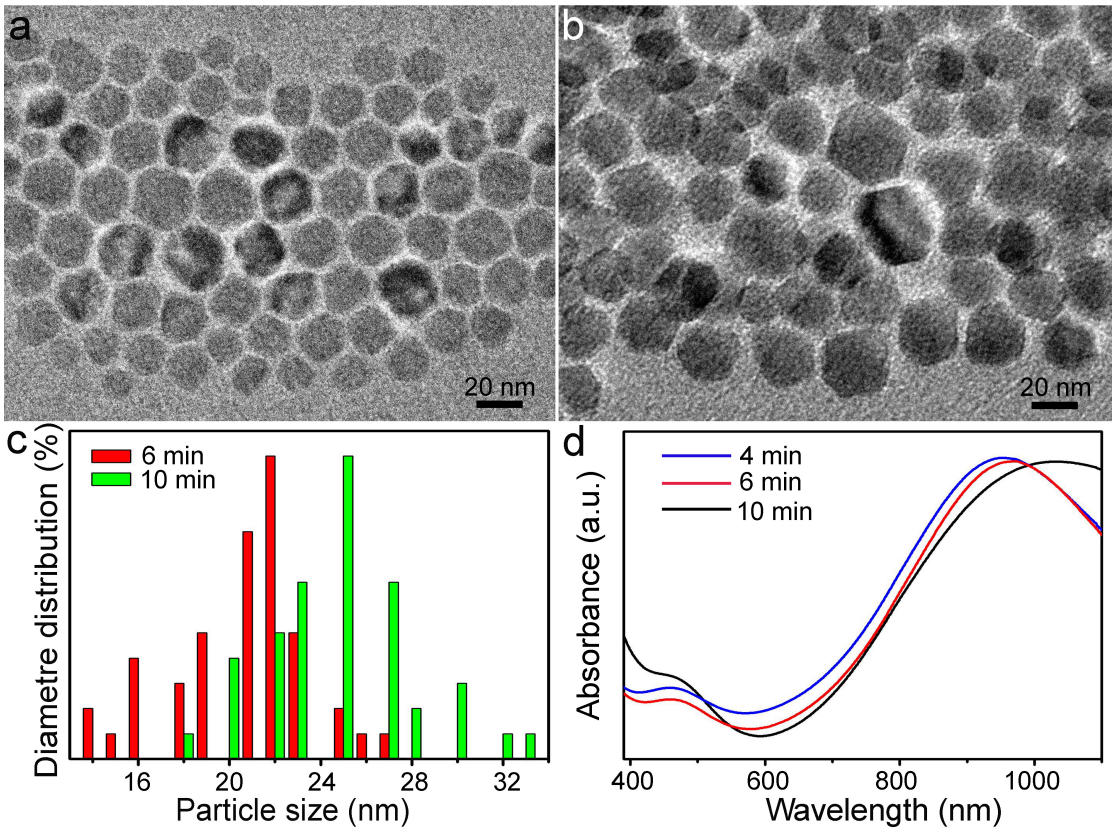

Fig. S6 TEM images of the $Cu_{7.2}S_4$ NCs collected via 6 min a) and 10 min b); c) Histogram showing the size distribution of the $Cu_{7.2}S_4$ NCs from S6a and S6b; d) UV-vis spectra of the $Cu_{7.2}S_4$ NCs collected via different time.

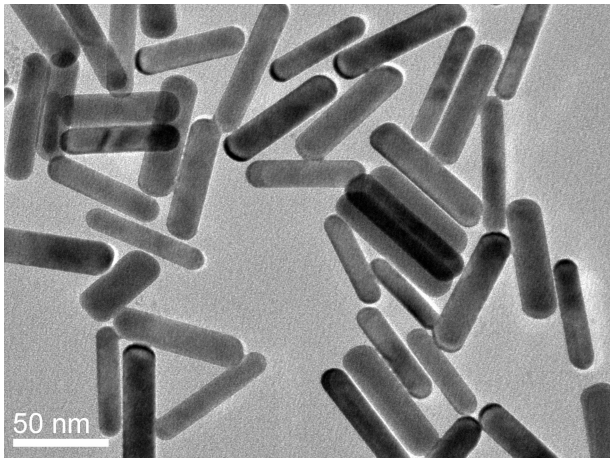

Fig. S7 TEM image of the CTAB capped Au nanorods

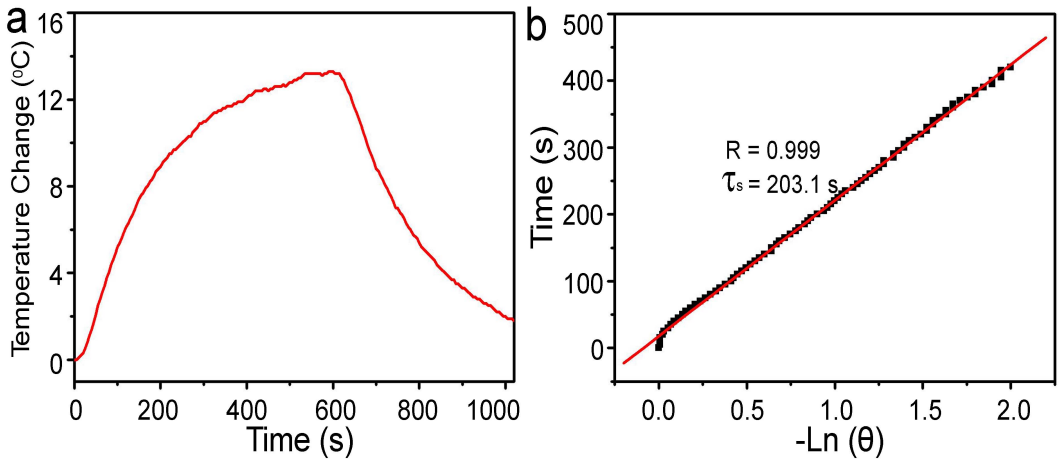

Fig. S8 a) Photothermal effect of 40 ppm Au nanorods upon being irradiated for 10 min (980 nm, 0.29 W) and shutting off the laser. b) Time constant for heat transfer from the system is determined to be τ_s = 203.1 s by applying the linear time data from the cooling period of Figure S6a versus negative natural logarithm of driving force temperature.

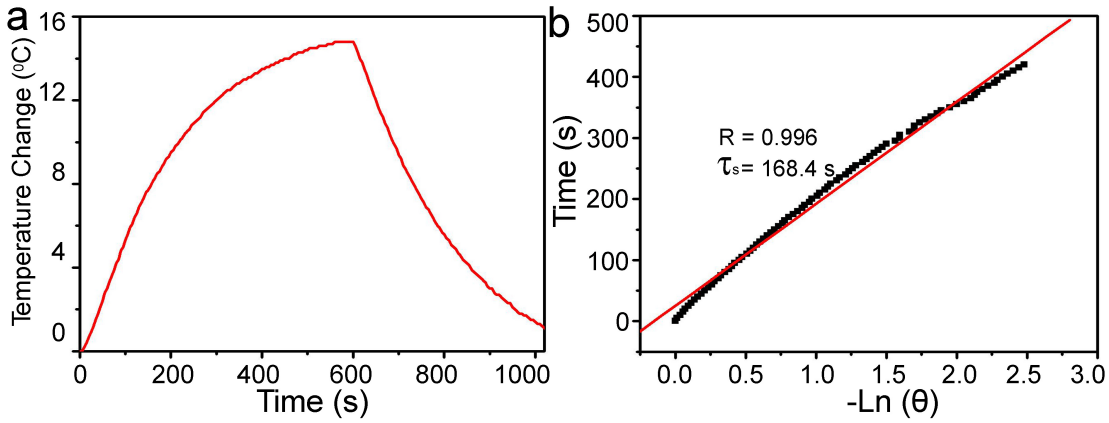

Fig. S9 a) Photothermal effect of 40 ppm Au nanorods upon being irradiated for 10 min (808 nm, 0.29 W) and then shutting off the laser. b) Time constant for heat transfer from the system is determined to be τ_s = 168.4 s by applying the linear time data from the cooling period of Fig. S9a versus negative natural logarithm of driving force temperature.

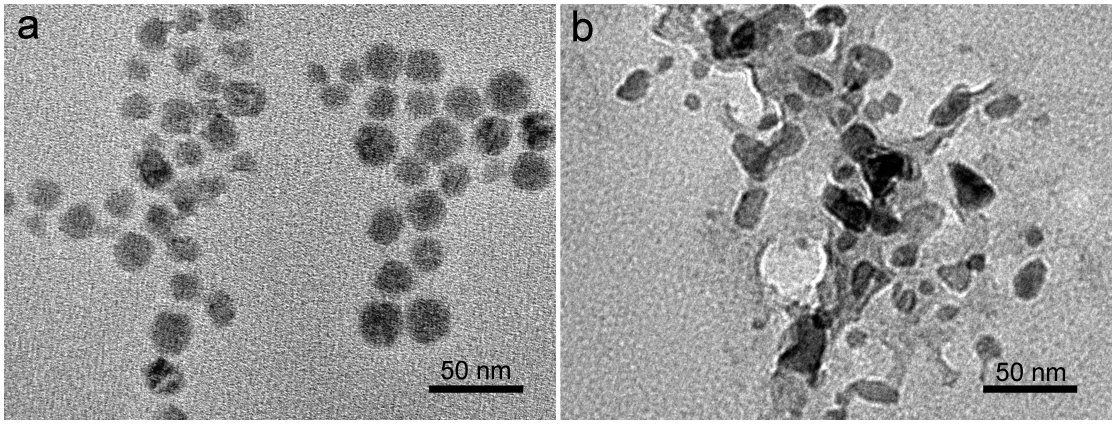

Fig. S10 TEM images of $Cu_{7.2}S_4$ NCs (a) and Au nanorods (b) after four LASER ON/OFF cycles of NIR light (980 nm, 2W) irradiation

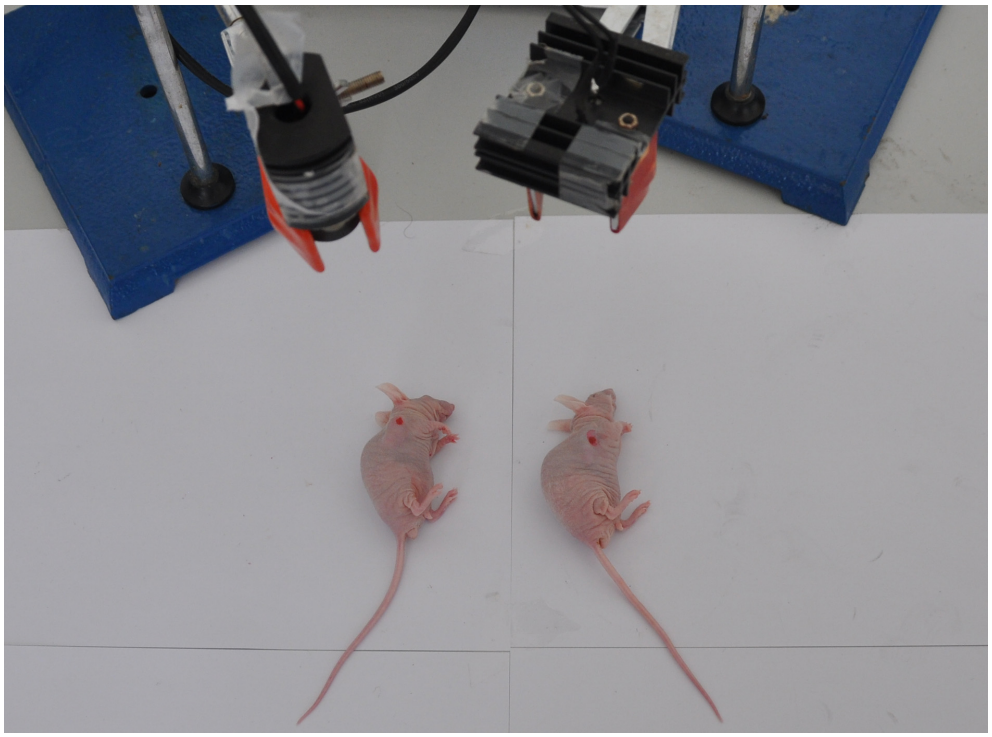

Fig. S11 Photograph showing the typical experimental setup for in vivo photothermal therapy of cancer cells.

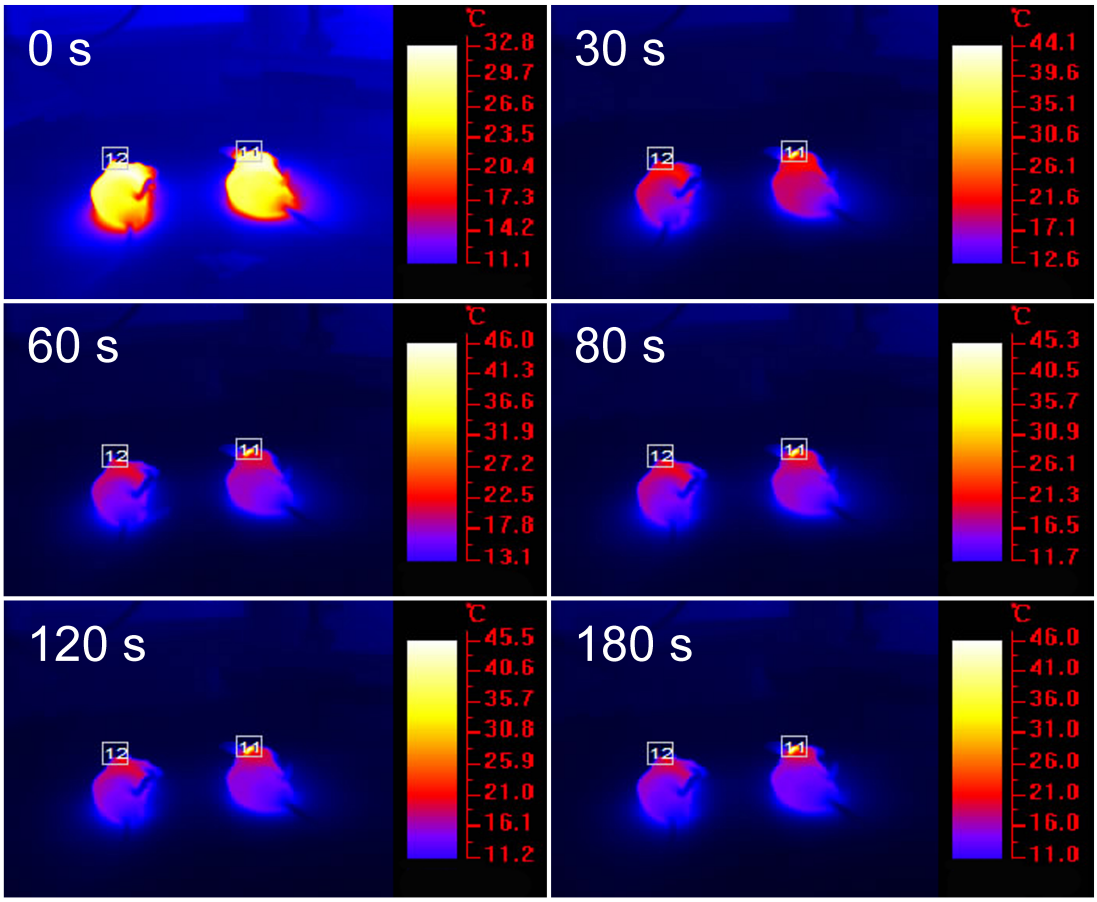

Fig. S12 The full-body thermographic images of mice containing tumors which were injected with saline solution (left mouse, indicated region 12) and PBS solution containing $Cu_{7.2}S_4$ NCs (right mouse, indicated region 11), under the irradiation of 980-nm laser with the safe density of 0.72 Wcm^{-2} for different time (0-180 s).

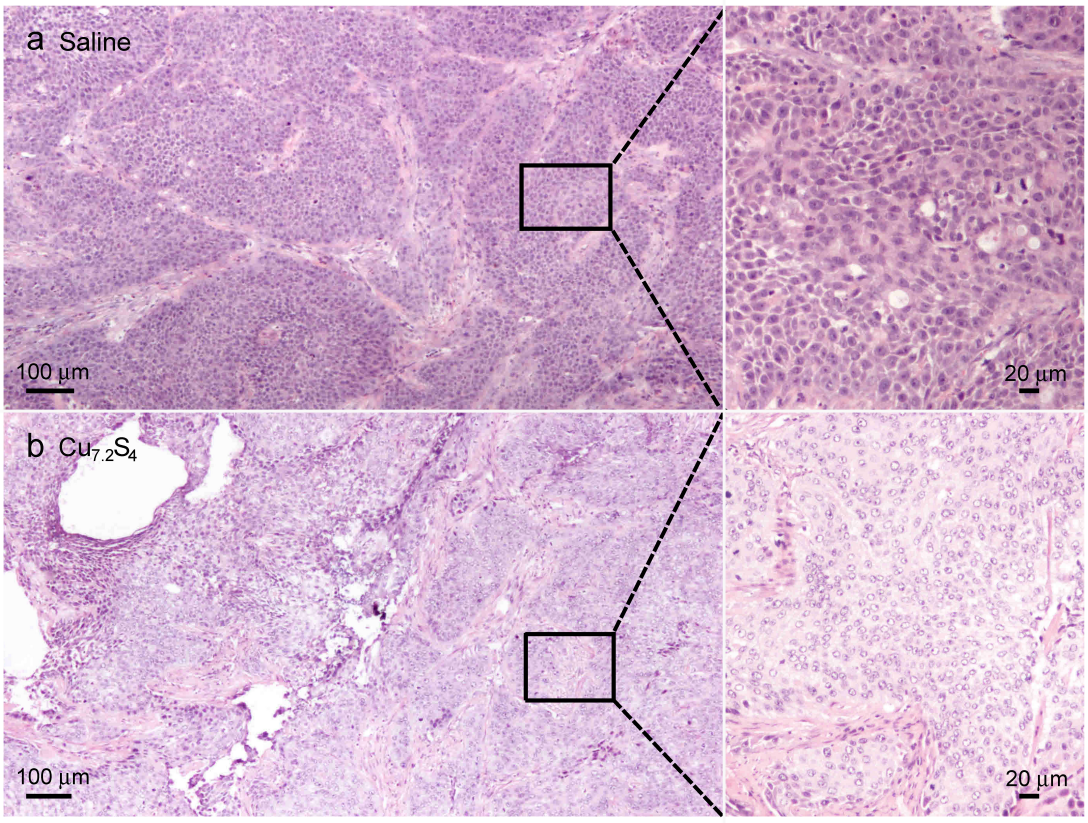

Fig. S13 Representative H & E stained histological images of *ex vivo* tumor sections injected with: a) saline and b) an aqueous dispersion of $Cu_{7.2}S_4$ NCs (40 ppm), respectively. The sections were irradiated with the 980-nm laser irradiation with the safe density of 0.72 Wcm^{-2} for 7 min.