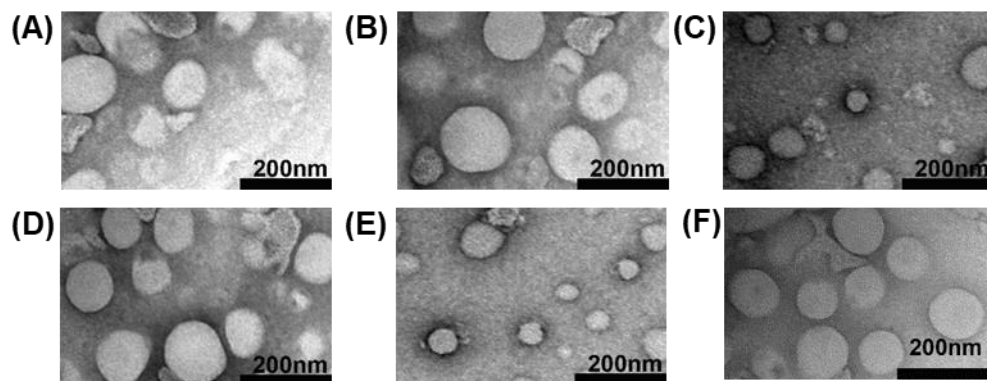


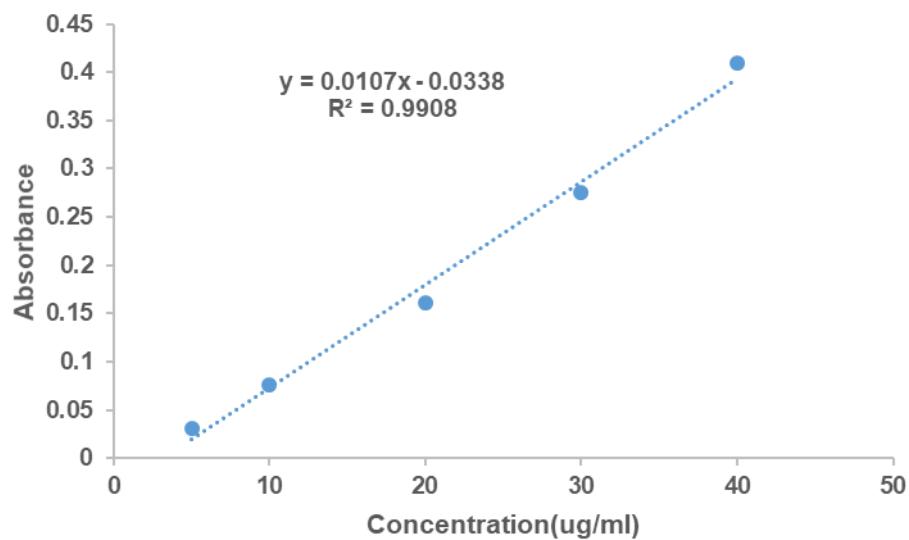
Supplementary Material

Table 1. Optimization of ICG-Liposome with different formulations. N=3 in each group. Data are presented as means \pm SD.

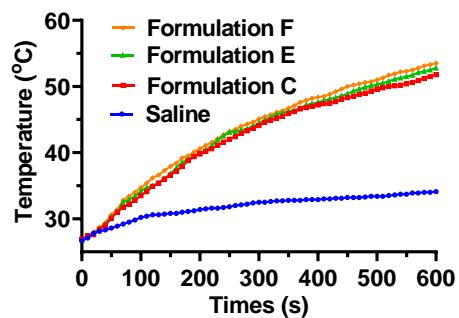
Formulations	Weight ratio of (DPPC / CHOL / DSPE-PEG)	ICG/lipid weight ratio	Liposome diameter (nm \pm SD)	PdI	ICG loading efficiency (%)
A	5:3:1	1:5	154.4 \pm 2.6	0.349 \pm 0.047	7.6 \pm 0.4
B	5:3:1	1:10	165.9 \pm 2.8	0.275 \pm 0.004	6.7 \pm 0.2
C	6:2:1	1:5	82.8 \pm 1.9	0.228 \pm 0.009	8.6 \pm 0.4
D	6:2:1	1:10	136.6 \pm 0.8	0.332 \pm 0.005	8.0 \pm 0.4
E	6:3:1	1:5	90.7 \pm 3.2	0.194 \pm 0.018	8.2 \pm 0.3
F	6:3:1	1:10	121.4 \pm 1.2	0.254 \pm 0.008	9.1 \pm 0.2



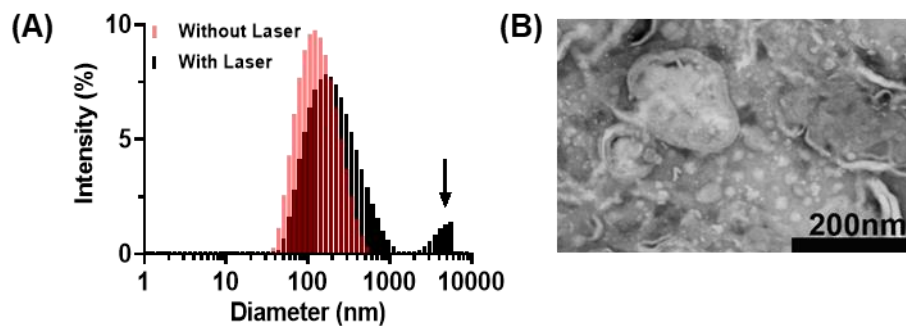
Supplementary Figure 1. TEM image of Liposome-ICG Formulation A (A), B (B), C (C), D (D), E (E), and F (F).



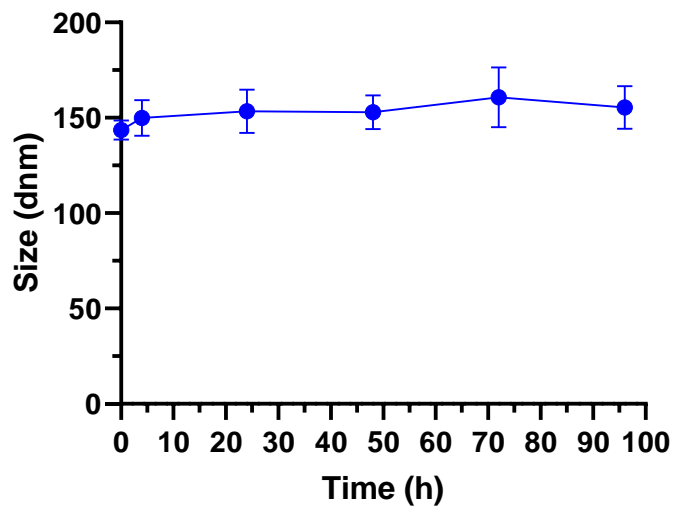
Supplementary Figure 2. The absorbance at 810 nm was measured on a UV-Vis/NIR spectrophotometer and standard curve of ICG concentration was obtained.



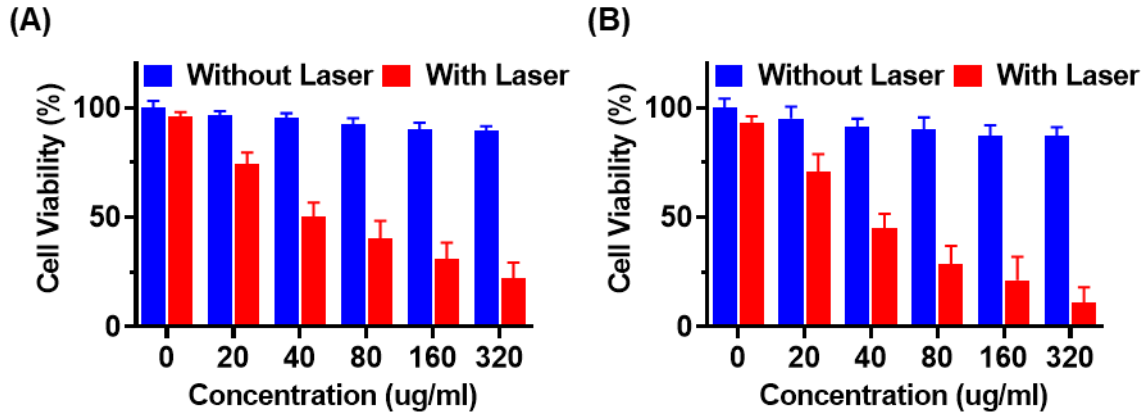
Supplementary Figure 3. Temperature curves of Saline, Formulation C, E and F (ICG-Liposome at same ICG concentrations of 80 $\mu\text{g}/\text{mL}$) under the 808 nm light irradiation ($2 \text{ W}/\text{cm}^2$, 10 min).



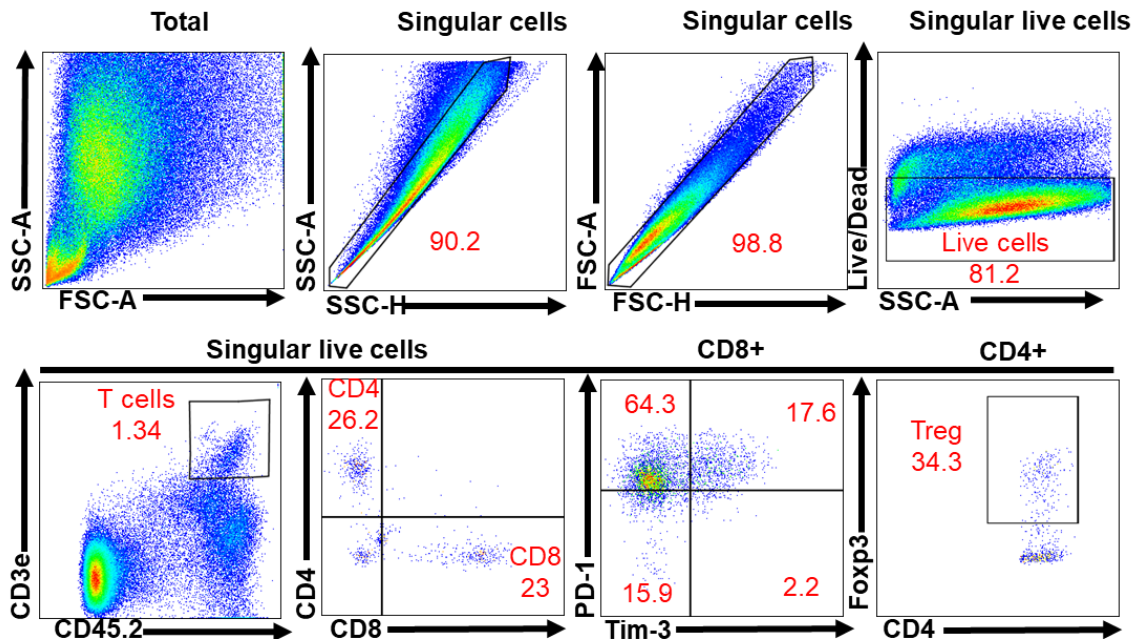
Supplementary Figure 4. (A) Hydrodynamic diameter of Formulation F without or with laser irradiation (808 nm $2\text{W}/\text{cm}^2$, 10 min). (B) TEM image of Formulation F with laser irradiation (808 nm $2\text{W}/\text{cm}^2$, 10 min).



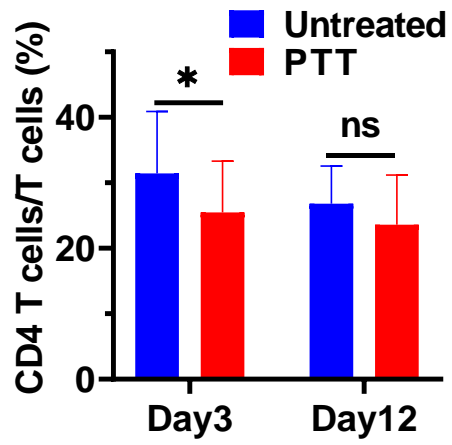
Supplementary Figure 5. Stability of the Liposome-ICG incubated in PBS with 10% FBS; data are represented as mean \pm SD (n= 3).



Supplementary Figure 6. The cell-killing effect of CT-26 cells (A) and HEK-293 cells (B) incubated with Liposome-ICG of different concentration with or without NIR laser irradiation (808 nm, 2 W/cm², 10 min, n=4).



Supplementary Figure 7. Gating strategy for flow cytometry analysis of living singular cells (Live/dead⁻), T cells (CD45.2⁺CD3e⁺), CD4 T cells (CD4⁺), CD8 T cells (CD8⁺), PD-1 and Time-3 expression in CD8 T cells, and Tregs (CD4⁺Foxp3⁺) in MC-38 tumor from C57BL/6 mice.



Supplementary Figure 8. Flow cytometry results showing the percentage of CD4⁺ T cells on days 3 and 12 after PTT in distal MC-38 tumors. N=5 in each group. Data are presented as means \pm SEM. Statistical significance was calculated by Student's t-test: *** P < 0.001, **P < 0.01, *P < 0.05.