Electronic Supplementary Material

Self-assembly nanomicelle-microneedle patches with enhanced tumor penetration for superior chemo-photothermal therapy

Ying Sun[1,§], Minglong Chen[1,4,§], Dan Yang[2], Wanbing Qin[3], Guilan Quan[2] (✉), Chuanbin Wu[2], and Xin Pan[1] (✉)

[1] *School of Pharmaceutical Sciences, Sun Yat-sen University, Guangzhou 510006, China*
[2] *College of Pharmacy, Jinan University, Guangzhou 510632, China*
[3] *Jieyang Affiliated Hospital, Sun Yat-Sen University, Guangzhou 522091, China*
[4] *Physical Sciences at the Microscale, Department of Polymer Science and Engineering, University of Science and Technology of China, Hefei 230026, China*
[§] *Ying Sun and Minglong Chen contributed equally to this work.*

Supporting information to https://doi.org/10.1007/s12274-021-3817-x

Materials

PTX was purchased from Aladdin (Shanghai, China). IR780 was obtained from J&K Scientific (Beijing, China). Oligomeric sodium hyaluronic acid (HA, MW < 10 kDa) was purchased from Bloomage Freda Biopharm Co., Ltd (Shanxi, China). Polyvinyl pyrrolidone (PVP K90) was supplied by MBCHEM Co. (New Jersey, USA). Polydimethylsiloxane (PDMS, Sylgard 184 Silicone Elastomer Kit) was customized by DOW Corning Co. (Michigan, USA). RPMI Medium 1640 basic (RPMI-1640, GibcoTM), fetal bovine serum (FBS, GibcoTM), penicillin-streptomycin (GibcoTM), and trypsin (GibcoTM) were purchased from Thermo Fisher Scientific Co., Ltd. (Massachusetts, USA). Cell Counting Kit-8 (CCK-8) was obtained from Dojindo Molecular Technologies, Inc. (Kyushu, Japan). 2',7'-Dichlorofluorescein diacetate was purchased from Sigma-Aldrich (St.Louis, MO, USA). JC-1 dye was obtained from MedChemExpress (New Jersey, USA).

Murine melanoma B16 cells were kindly supplied by the Laboratory Animal Center of Sun Yat-sen University (American Type Culture Collection). C57 female mice were obtained from Guangdong Medical Experimental Animal Center, and all the mice were housed in the Experimental Animal Center of Sun Yat-sen University (Guangdong, China).

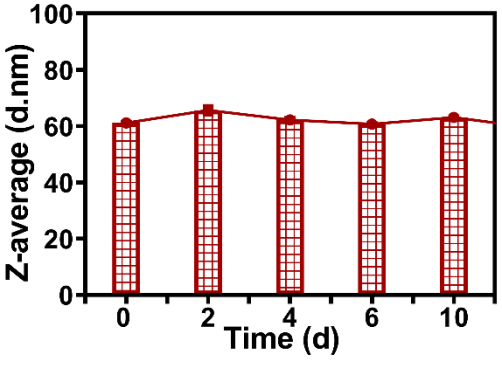

Figure S1 Stability of PTX/IR780-NMs at different time intervals.

Address correspondence to Guilan Quan, quanguilan@jnu.edu.cn; Xin Pan, panxin2@mail.sysu.edu.cn

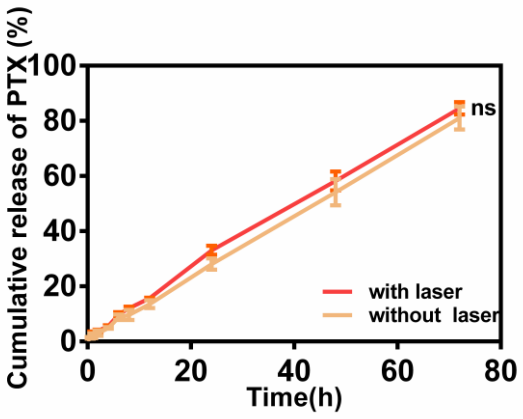

Figure S2 PTX release profile from PTX/IR780-NMs with or without NIR irradiation. Data are expressed as mean ± SD (n = 3).

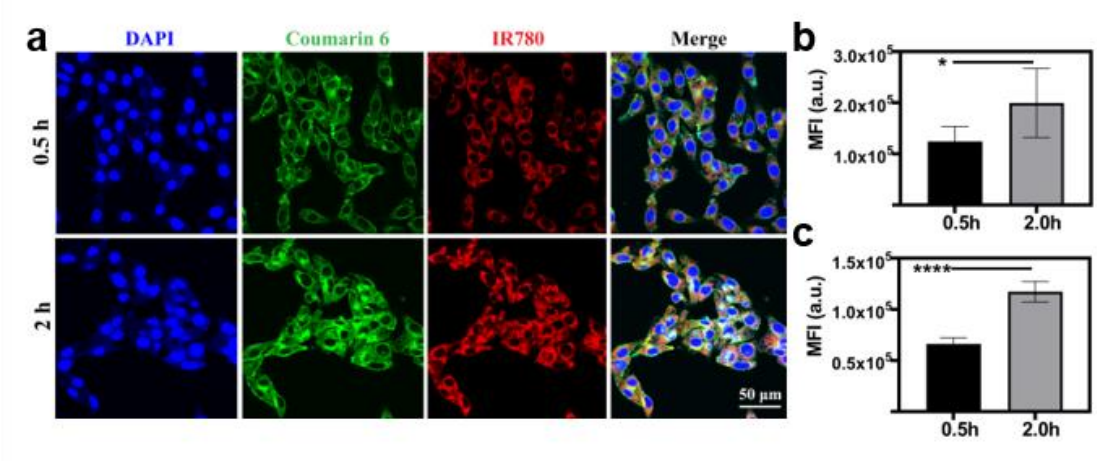

Figure S3 (a) CLSM images of B16 cells after co-incubation with C6/IR780-NMs for 0.5 h and 2 h. Semiquantitative examination of intracellular (b) C6 (green fluorescence) and (c) IR780 (red fluorescence). Scale bar = 50 μm. Data are expressed as mean ± SD (n = 3), *P < 0.05, **P < 0.01, ***P < 0.001, ****P < 0.0001.

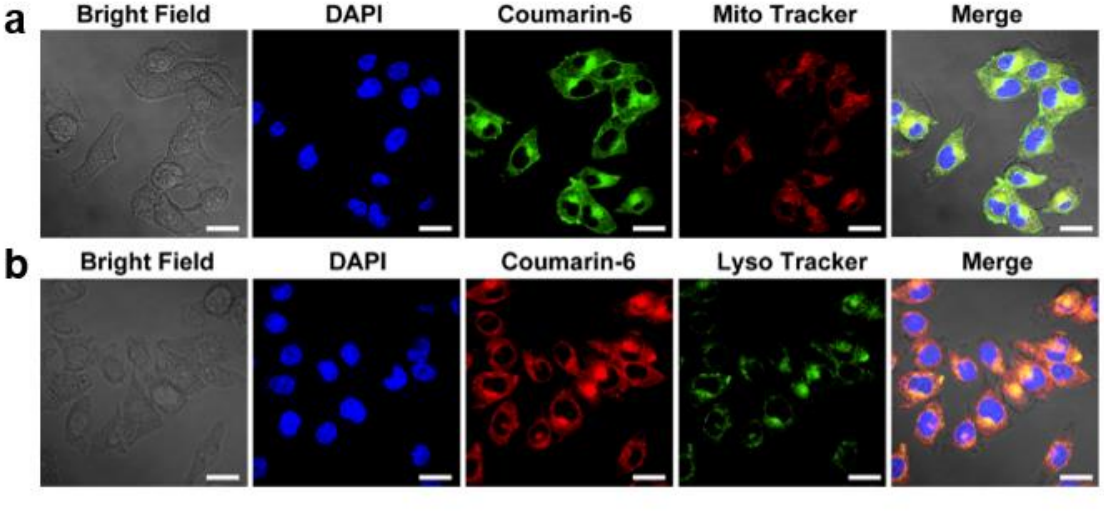

Figure S4 (a) Mitochondria colocalization images of C6-NMs by CLSM in B16 cells; cell nuclei were stained with DAPI (blue), and mitochondria and C6 were shown in red and green fluorescence, respectively. Scale bar = 20 μm. (b) Lysosome colocalization images of C6-NMs by CLSM in B16 cells; cell nuclei were stained with DAPI (blue), and lysosome and C6 were shown in green and red fluorescence, respectively. Scale bar = 20 μm.

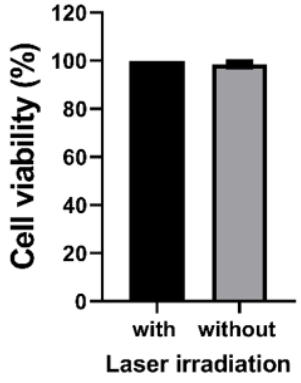

Figure S5 Cell viability of B16 cells with laser irradiation for 5 min and without any treatment (mean ± SD, n = 3).

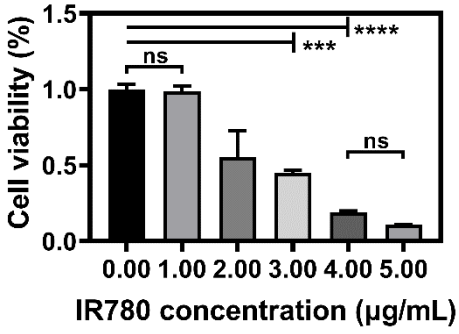

Figure S6 Cell viability of B16 cells after incubation with IR780-NMs at different IR780 concentrations plus laser irradiation. Data are expressed as mean ± SD (n = 3), *P < 0.05, **P < 0.01, ***P < 0.001, ****P < 0.0001.

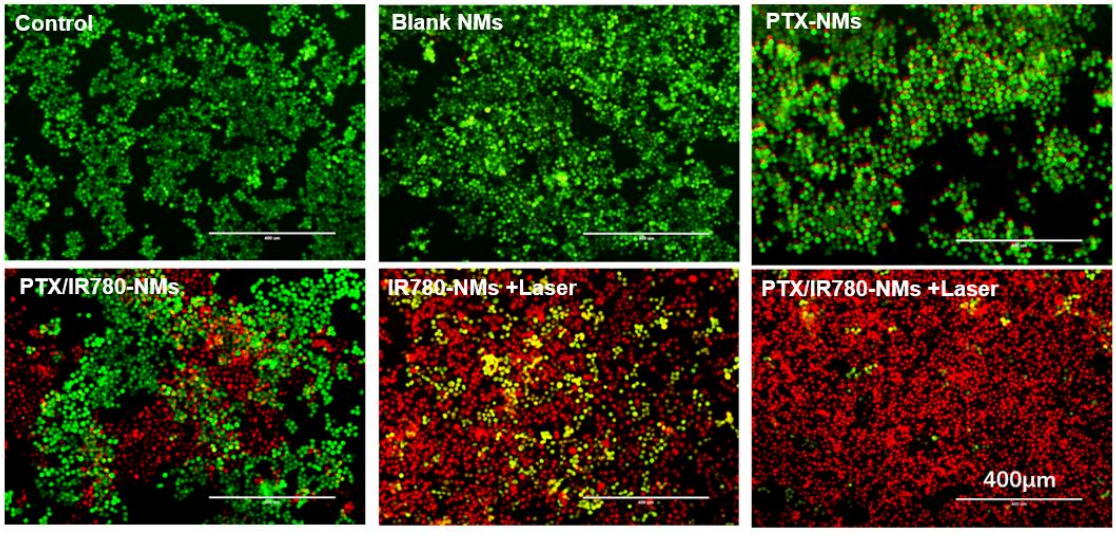

Figure S7 Fluorescent images of AM/PI stained B16 cells after various treatments for 24 h. The viable cells were stained with AM (green), and the dead cells were stained with PI (red). Scale bar = 400 μm.

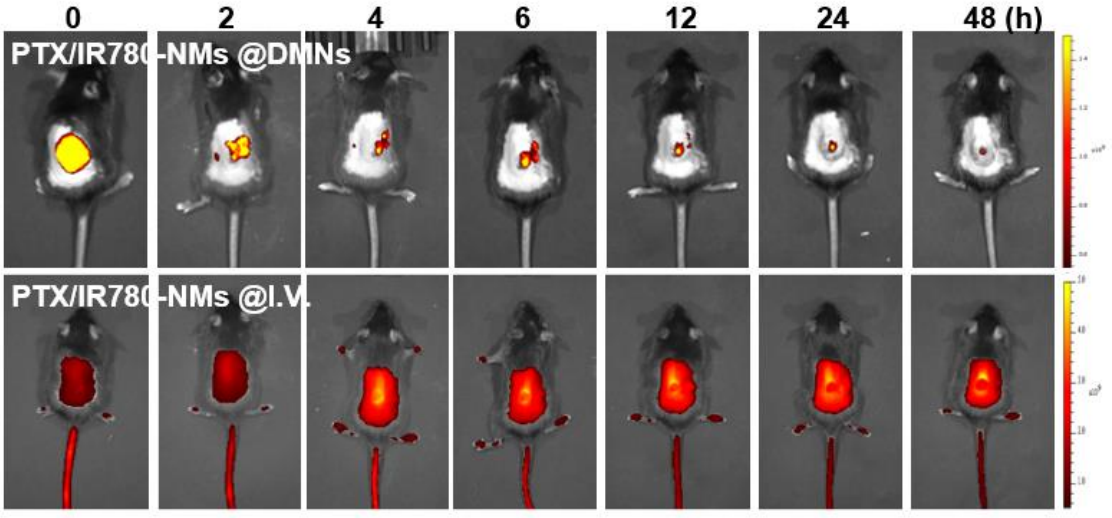

Figure S8 Fluorescent images of B16 tumor-bearing mice after administration of PTX/IR780-NMs by DMN and I.V. over 48 h.

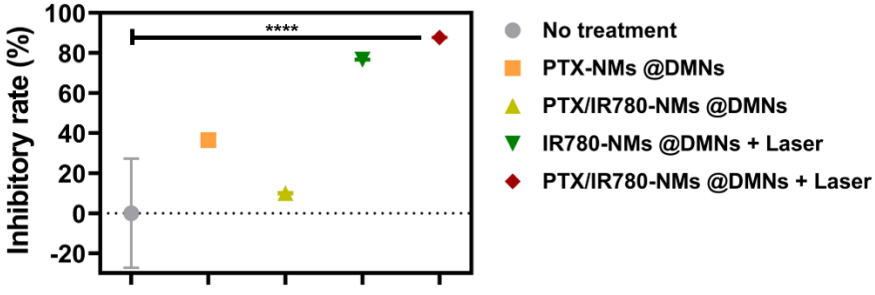

Figure S9 Tumor inhibitory rate of mice after various treatments. Data are expressed as mean ± SD (n = 3), *P < 0.05, **P < 0.01, ***P < 0.001, ****P < 0.0001.

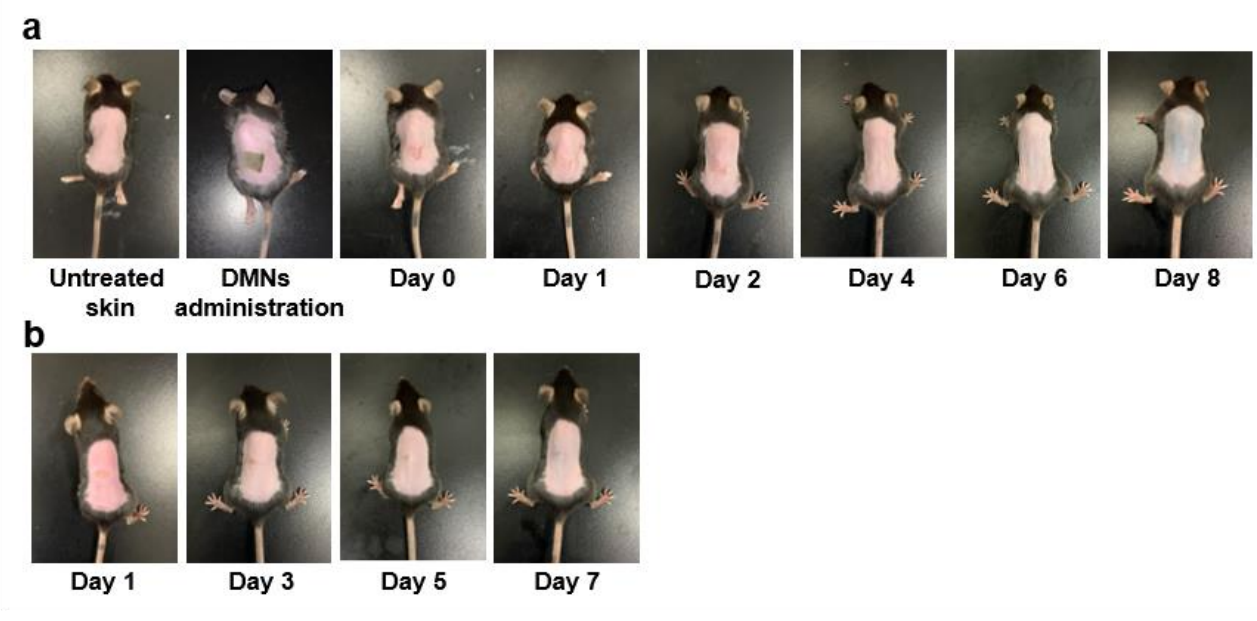

Figure S10 Photographs of mice skin recovery after PTX/IR780-NMs @DMNs administration (a) without and (b) with laser irradiation.