

Supplementary Materials

Transarterial Delivery of a Biodegradable Single-Agent Theranostic Nanoprobe for Liver Tumor Imaging and Combinatorial Phototherapy

Nanoparticle preparation and photo-theranostic functions

The SiNc-TN formulation was prepared employing a water addition/solvent evaporation method by encapsulating SiNc (0.3 mg/mL) into the polymer PEG-PCL (10 mg/mL). According to cryogenic transmission electron microscopy (cryo-TEM), SiNc-TN are spherical and highly uniform with a size of ~20 nm (Fig S1A). The formulated SiNc-TN demonstrated strong NIR fluorescence as confirmed by Fluobeam® 800 (Fig S1B), enabling *in vivo* imaging using the same device. Under 785 nm continuous NIR laser light (0.6 W/cm²), SiNc-TN in aqueous solution at a concentration of 0.3 mg/mL produced heat reaching 45 °C in 4 min and 47 °C in 6 min (Fig S1C). In addition, the same formulation was capable of production of various reactive oxygen species including singlet oxygen (¹O₂), demonstrating a ~20-fold increase when compared to the saline control (Fig S1D).

Solution Studies

Singlet Oxygen ¹O₂ Generation. As previously reported, ¹O₂ production was measured by SOSG assay in a 96 well plate (34, 35). Corresponding wells were treated for 5 min at 785 nm and 0.6

W/cm² while the dark controls were protected from light. Instantly, the samples were evaluated on Varian Cary Eclipse R3896 fluorescence spectrophotometer using excitation/emission of 504/525 nm.

Photothermal Effect. A 785 nm laser diode (CW, ThorLabs, Newton, NJ, 0.6 W/cm²) was used. For temperature increase evaluation, 300 μ L of SiNc-TN aqueous solutions (0.3 mg/mL) in the 500 μ L vials was exposed for 20 min to the NIR laser. The thermocouple was used to record temperature at selected time points. As a control, water was tested under the same irradiation conditions.

Figures and Figure legends:

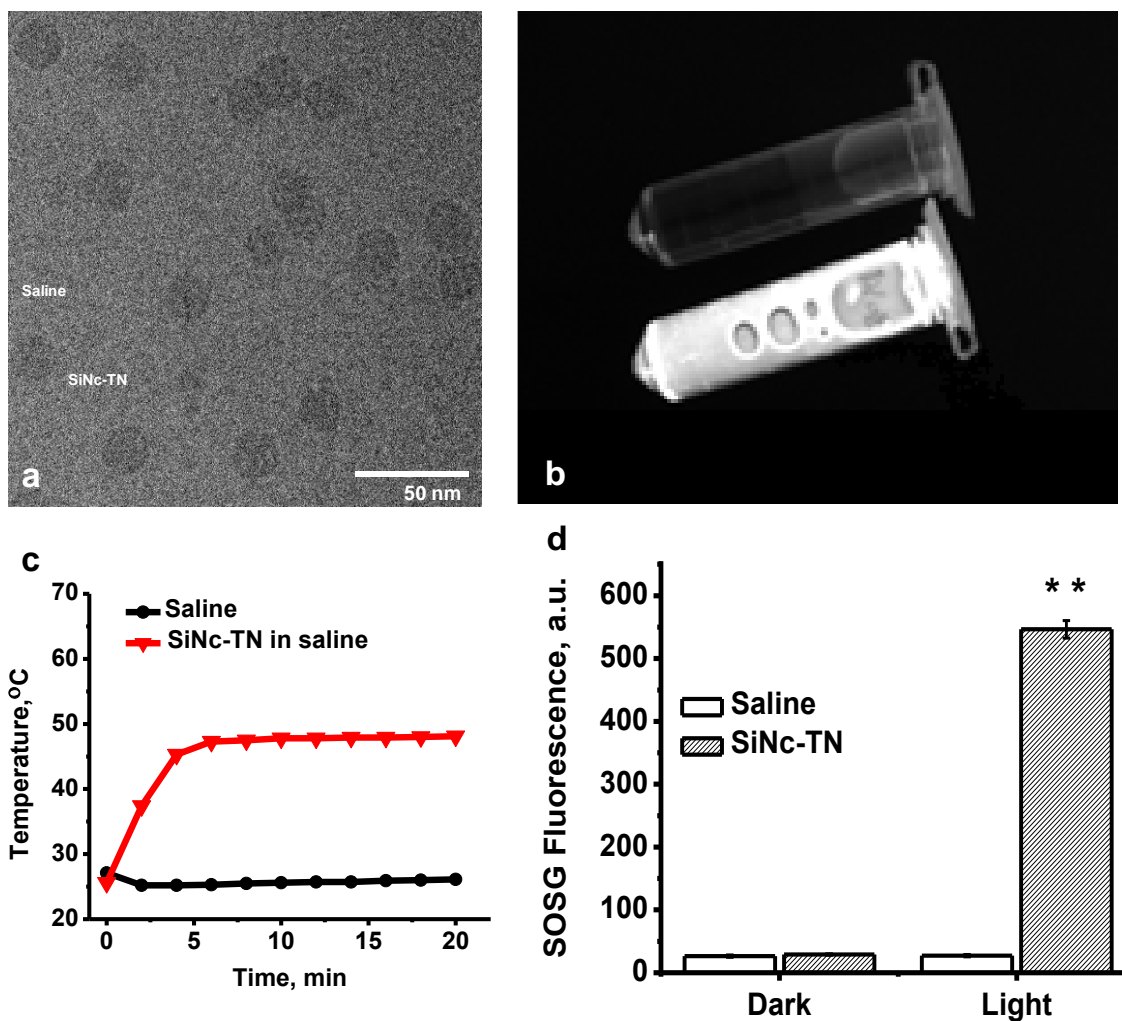


Figure S1. Theranostic properties in solution of SiNc-TN: A, cryo-TEM image of SiNc-TN; B, NIR fluorescence image of SiNc-TN solution (0.3 mg/ml of SiNc) recorded with Fluobeam® 800; C, temperature profiles of saline (black) and SiNc-TN (0.3 mg/mL) aqueous solution (red) exposed to NIR light (785 nm, 0.6 W/cm²); D, singlet oxygen generation by SiNc-TN (0.05 mg/mL) in the

absence (dark) and presence (light) of NIR light (785 nm, 0.6 W/cm², 5 min). **P < 0.005 when compared with saline as the control.

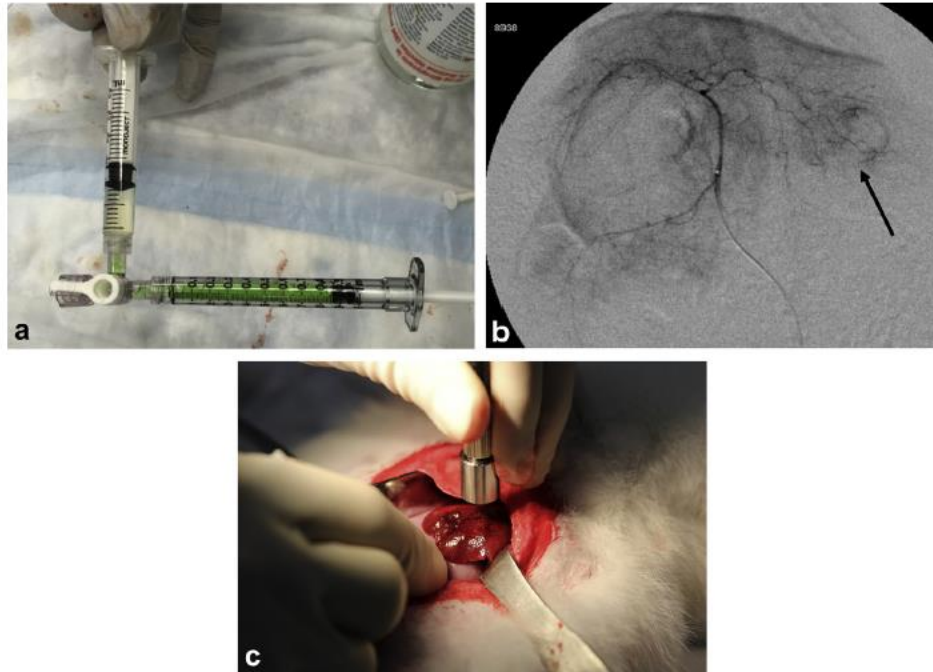


Figure S2. Transarterial nanoparticle delivery. A, Nanoparticle solution (0.3mg/mL) in syringe for transarterial delivery. B, Digital subtraction angiogram of hepatic arteries with a peripherally hypervascular tumor in the left lobe (arrow). C, Intraoperative photograph demonstrating the photoablation procedure under laser stimulation (left hand) with an implanted fiberoptic temperature probe (right hand).

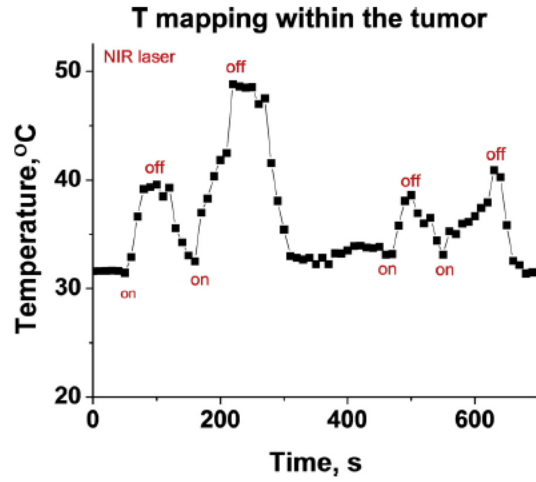


Figure S3. Temperature probing within the liver tumor implanted in the rabbit injected with SiNc-TN via transarterial delivery.