Electronic Supplementary Material (ESI) for Nanoscale.

Supplementary Data

Sn_xWO_3 as a Theranostic Platform for Realizing Multi-imaging-guided Photothermal/Photodynamic Combination Therapy

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Calculation of thermal conversion efficiency

The photothermal conversion efficiency (η) is calculated with following equation:

$$\eta = \frac{hA\left(T_{max} - T_{surr}\right) - Q_{dis}}{I\left(1 - 10^{-A_{1064}}\right)}$$

Equation S1

h is heat transfer coefficient; **A** is the surface area of the container;

$\mathbf{T}_{max}$ and $\mathbf{T}_{surr}$ are the equilibrium temperature and ambient temperature, respectively;

$\mathbf{Q}_{dis}$ is heat dissipated from light absorbed by the quartz cell.

I is incident laser power (2 W/cm^2); **A1064** is the optical absorbance of nanoparticles at 1064 nm (0.49).

hA is unknown and could be obtained by following equation.

$$hA = \frac{\sum mC}{\tau s}$$

Equation S2

Where m, C, τ_s are the mass, heat capacity of water and time constant, respectively.

For determining the τ_s, θ is introduced as in Equation 3.

$$\theta = \frac{T - T_{surr}}{T_{max} - T_{surr}}$$

Equation S3

At the cooling stage of the aqueous dispersion (see **Figure 2d**), the cooling time t and θ abide by the following Equation 4:

$$t = -\tau s \ln(\theta)$$

Equation 4

Time constant for heat transfer from the system could be determined by plotting linear time from the cooling stage against negative natural logarithm of θ. (**Figure. 2e**) By this way, τ_s is determined as 224.8 s. (m=0.5 g, C 4.2 J g^{-1} ^{o}C^{-1}, hA = 9.34 mW/ ^{o}C)

Thus, the photothermal conversion efficiency (η) is calculated to be 18.6%.

Calculation of synergy index

HepG2 cells seeded 96-well plates were incubated with 250 or 500 μg mL^{-1} of Sn_xWO_3@BSA for 24 h, respectively. Then, 880 nm NIR irradiation (2.0 W cm^{-2}) was applied for 10 min. For the PTT process, sodium azide (50 μL, 10 × 10^{-6} M) was introduced into each well before NIR irradiation. As to the PDT group, the phototherapy was carried out under ice bath, while kept other operations unchanged. MTT assay was performed for quantifying cell viabilities after above treatments. The data of *in vitro* PDT, PTT and synergetic PDT/PTT effect were inputted into the CompuSyn software and the synergy index was 0.243.

Table S1 The therapeutic efficiency of PDT, PTT and PDT/PTT with regard to the concentration of Sn_xWO_3@BSA

Concentration	PDT (Inhibition rate)	PTT (Inhibition rate)	PTT/PDT (Inhibition rate)
250 mg/mL	0.121	0.388	0.46
500 mg/mL	0.171	0.45	0.52

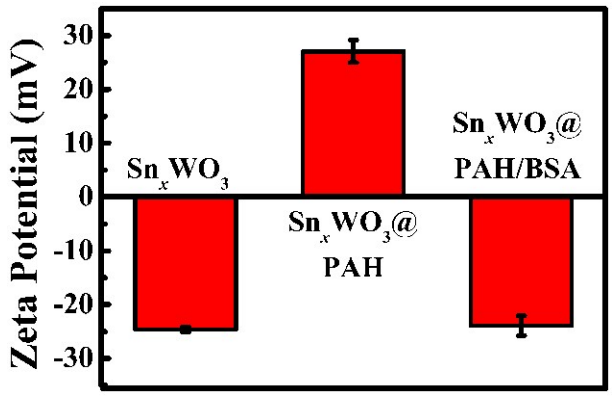

Fig. S1. Zeta potential of Sn_xWO_3, Sn_xWO_3@PAH and Sn_xWO_3@PAH/BSA.

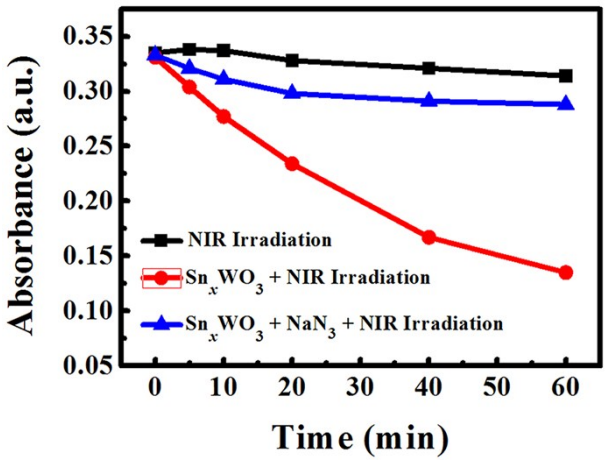

Fig. S2. Absorbance of DPBF solutions after different treatment.

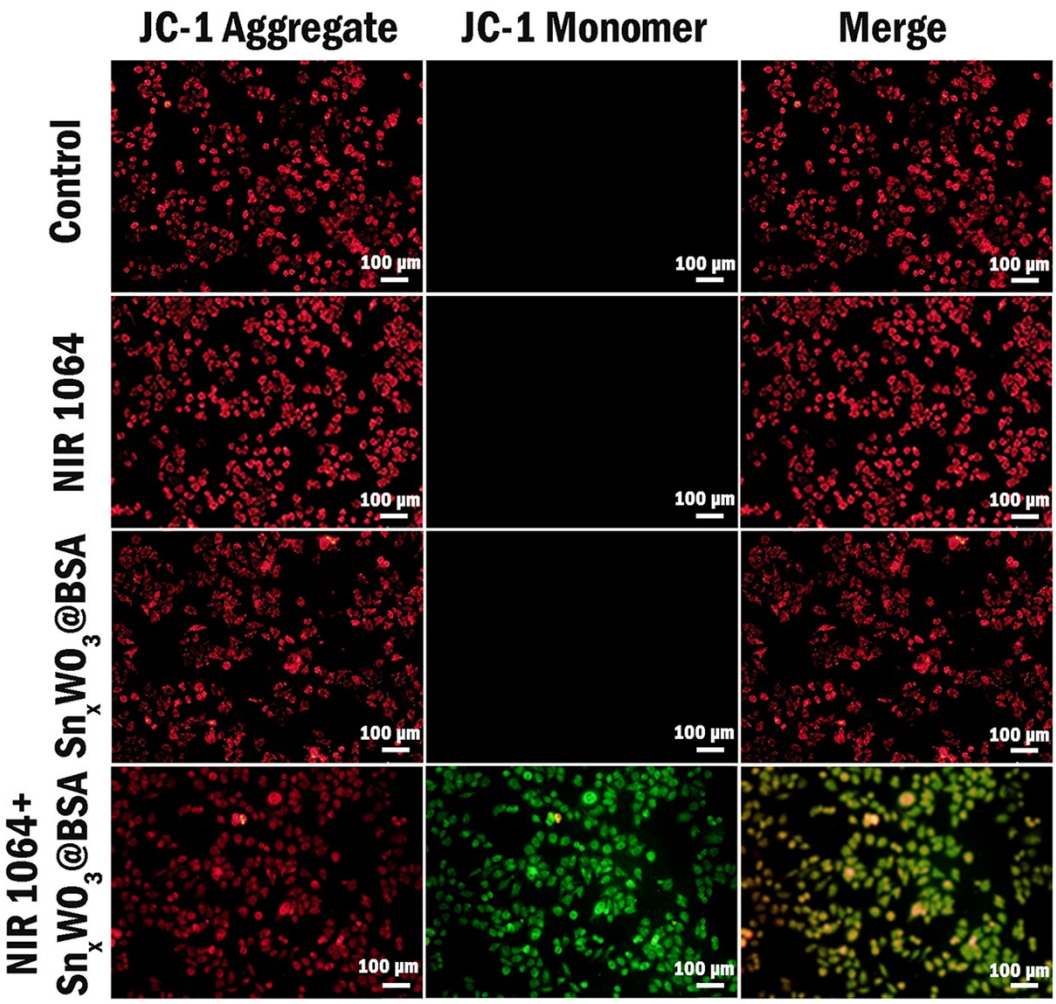

Fig. S3. Detection of mitochondrial potential changes by JC-1 staining.

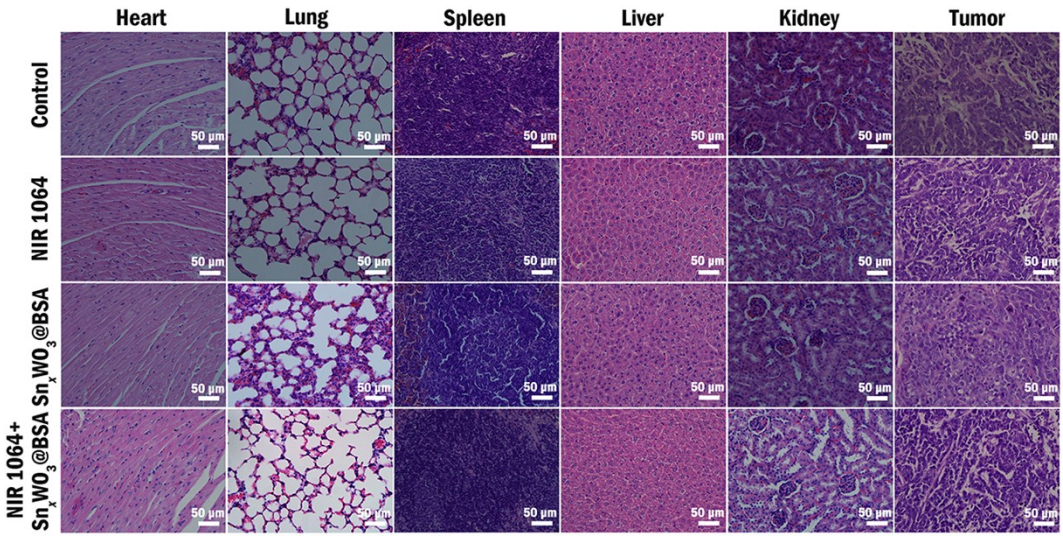

Fig. S4. Histology staining of major organs harvested from different groups of mice at 14th days.

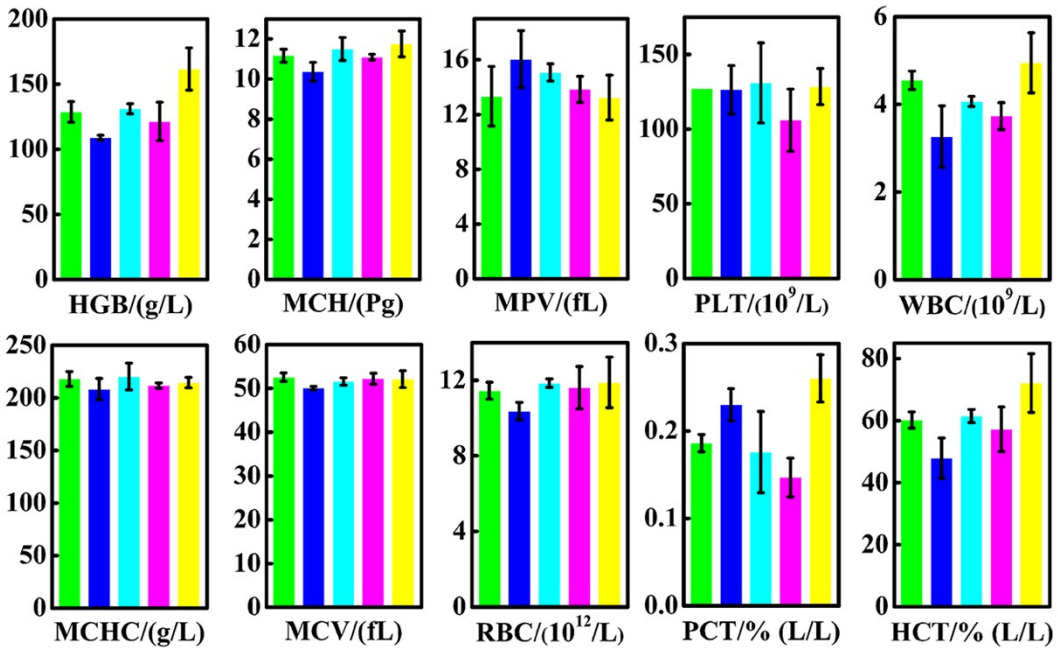

Fig. S5. Haematological data were collected from the control nude mice or mice injected with Sn_xWO_3@BSA (1 mg mL^{-1}) at 1, 3, 7 and 14 days after injection.