Supplementary Material for

2D Superparamagnetic Tantalum Carbide Composite MXenes for Efficient Breast-Cancer Theranostics

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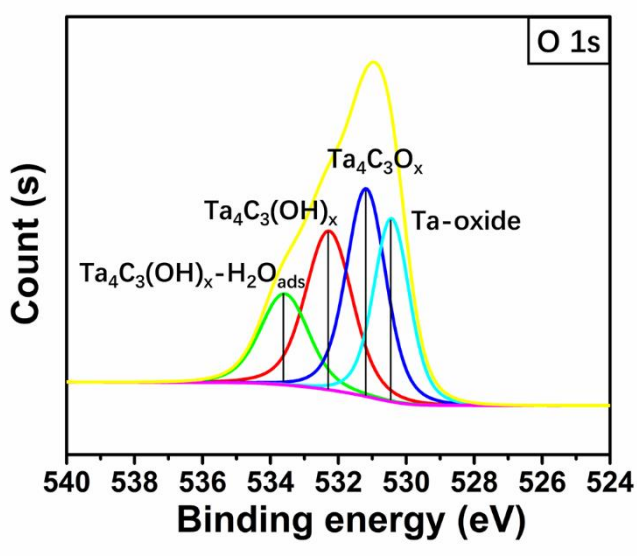

Figure S1. XPS spectra of Ta_4C_3 nanosheets in O 1s region. The vertical lines represent the assigned species.

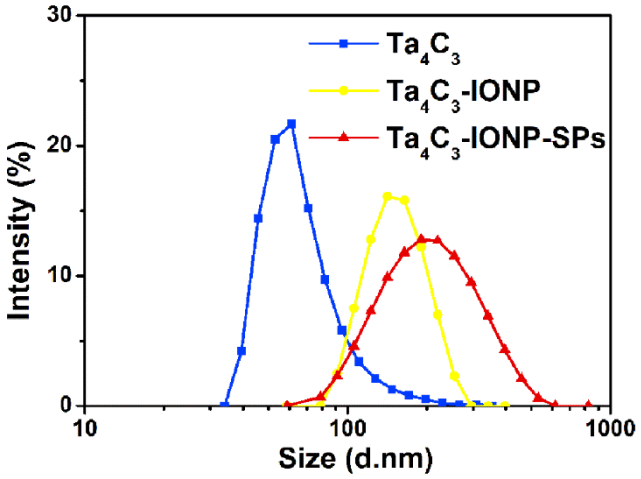

Figure S2. Dynamic light scattering (DLS) curves of Ta_4C_3 nanosheets, Ta_4C_3-IONP and Ta_4C_3-IONP-SPs composite nanosheets in aqueous solution.

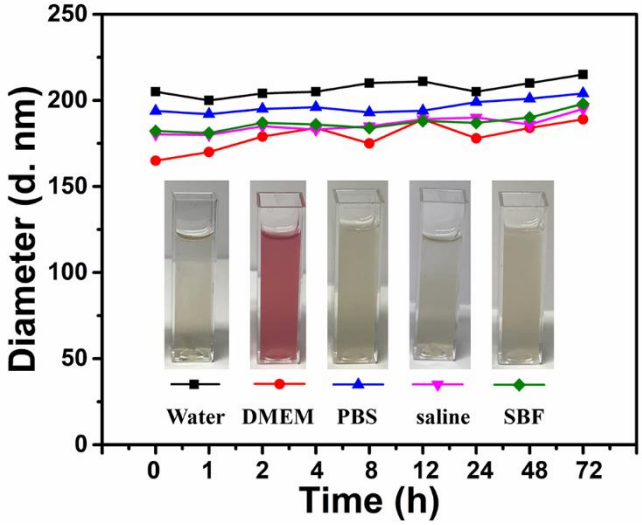

Figure S3. Diameter changes of Ta_4C_3-IONP-SPs dispersed in different solutions (Water, DMEM, PBS, saline and SBF) at time point of 0, 1, 2, 4, 8, 12, 24, 48, and 72 h. Insets are the corresponding digital photographs.

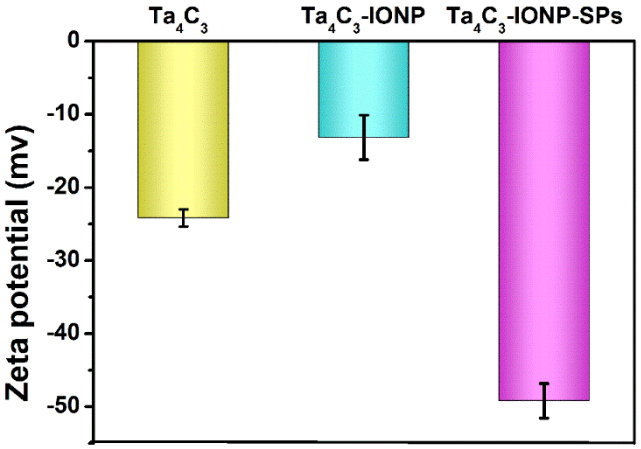

Figure S4. Zeta potential of Ta_4C_3 nanosheets, Ta_4C_3-IONP and Ta_4C_3-IONP-SPs composite nanosheets in aqueous solution.

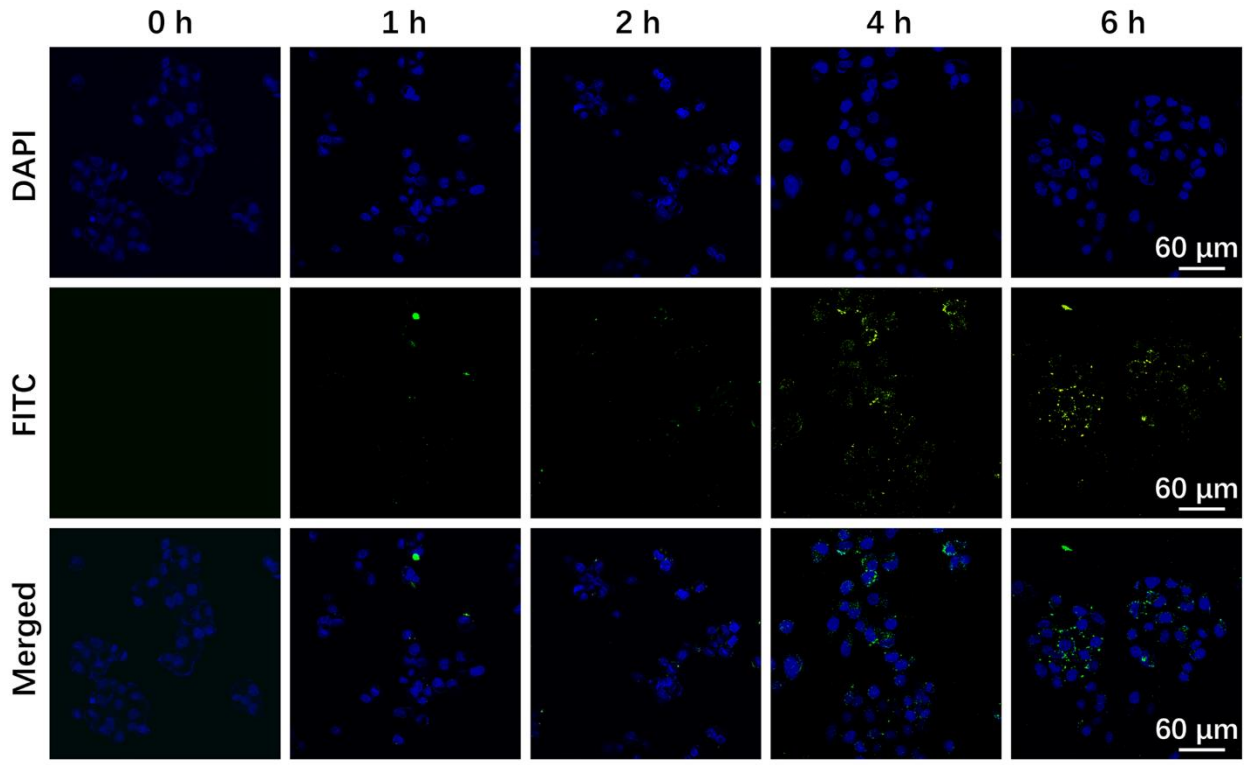

Figure S5. CLSM images of 4T1 cells incubated with FITC-labeled Ta_4C_3-IONP-SPs for varied durations of 0, 1, 2, 4 and 6 h (all the scale bars are 60 μm).

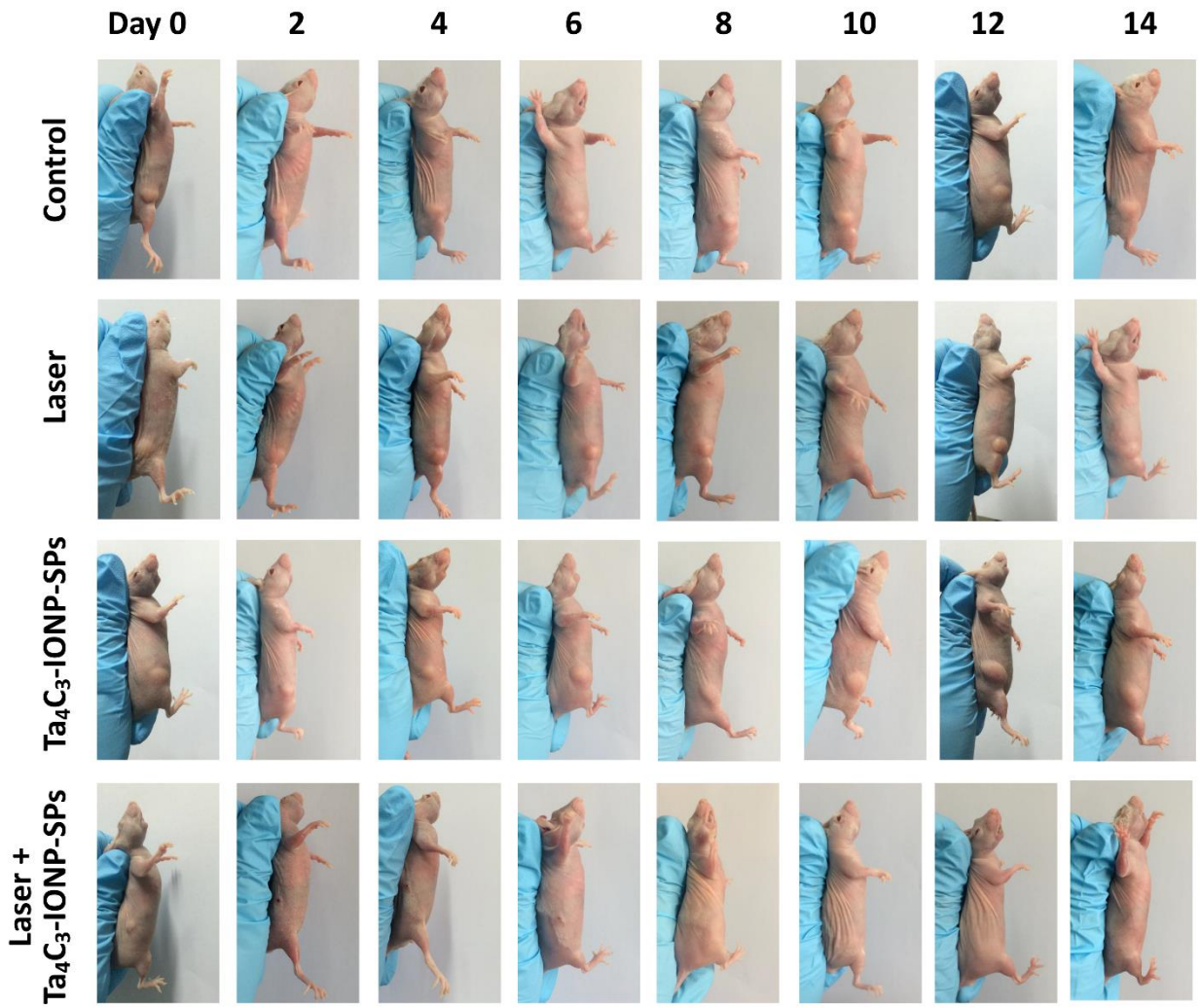

Figure S6. Digital photography of 4T1 tumor-bearing BALB/c nude mice in different treatment groups within 14 days.

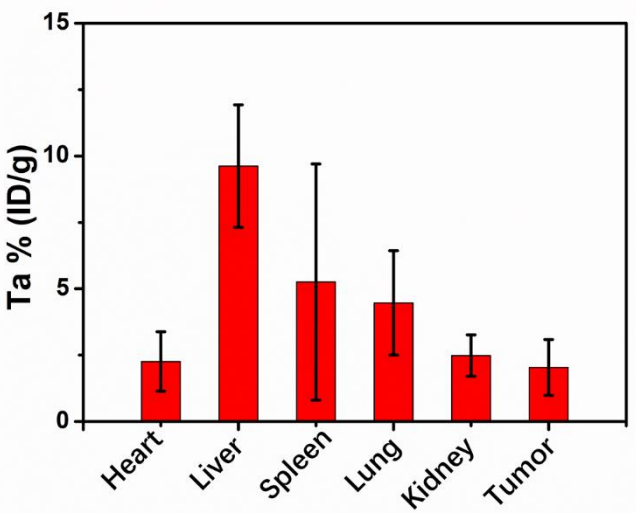

Figure S7. Biodistribution of Ta_4C_3-IONP-SPs in 4T1 tumor-bearing mice after the intravenous injection for 24 h.

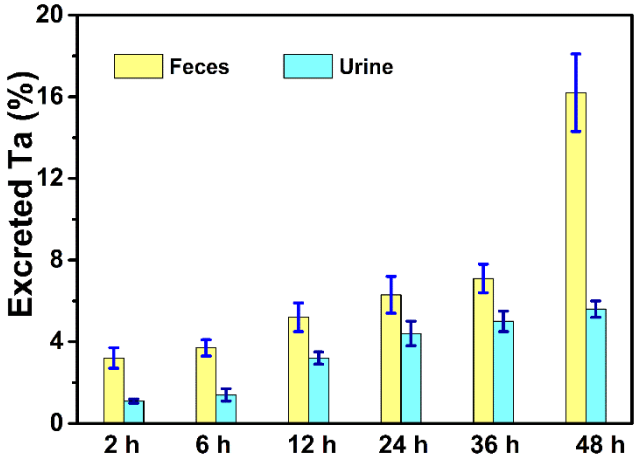

Figure S8. Accumulated (feces and urine) Ta excretion out of the health Kunming mice after the intravenous administration of Ta_4C_3-IONP-SPs for different durations.

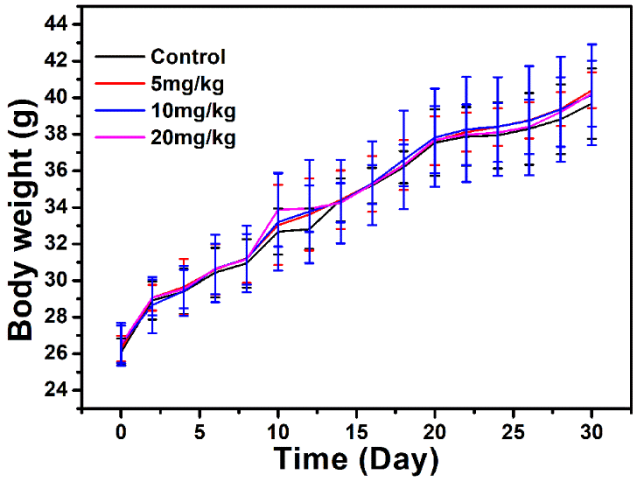

Figure S9. Time-dependent body-weight changing profiles of Kunming mice within 30 days after intravenous administration of Ta_4C_3-IONP-SPs at elevated doses (0, 5, 10 and 20 mg kg^{-1}).

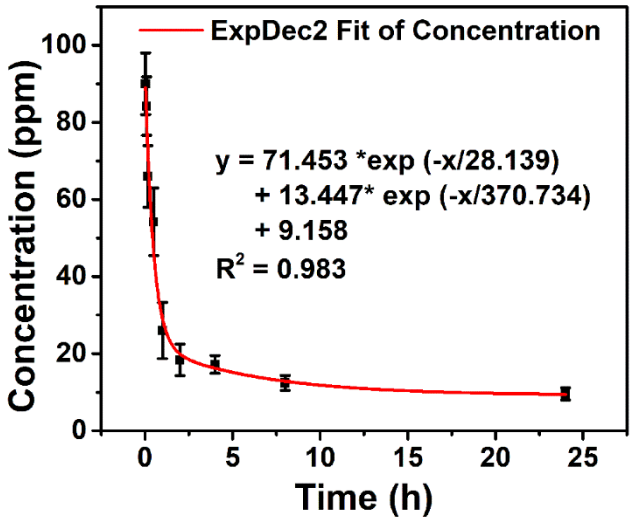

Figure S10. Blood circulation curve of Ta_4C_3-IONP-SPs by measuring the Ta concentration in blood of health Kunming mice at different time points post *i.v.* injection (n = 6). The half-time ($T_{1/2}$) is calculated to be approximately 0.5 h.