Electronic Supplementary Information

Polypyrrole-encapsulated Iron Tungstate Nanocomposites: A Versatile Platform for Multimodal Tumor Imaging and Photothermal Therapy

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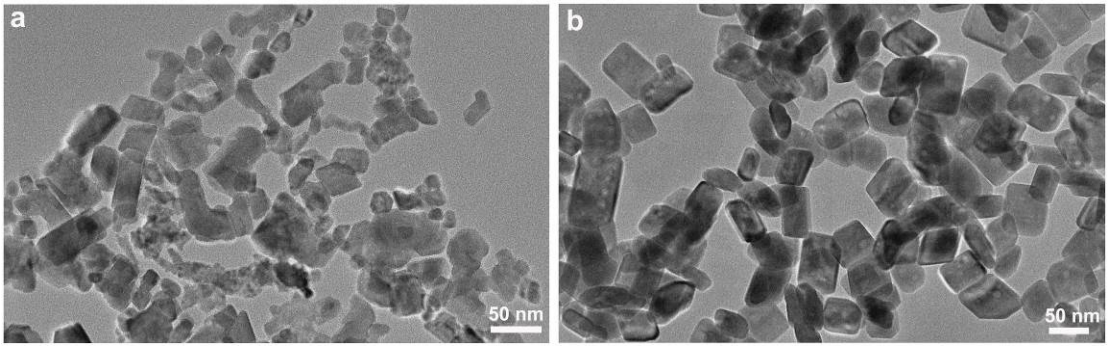

Figure S1. TEM images of as-synthesized $FeWO_4$ nanoparticles with the absence (a) or presence (b) of PEG-400.

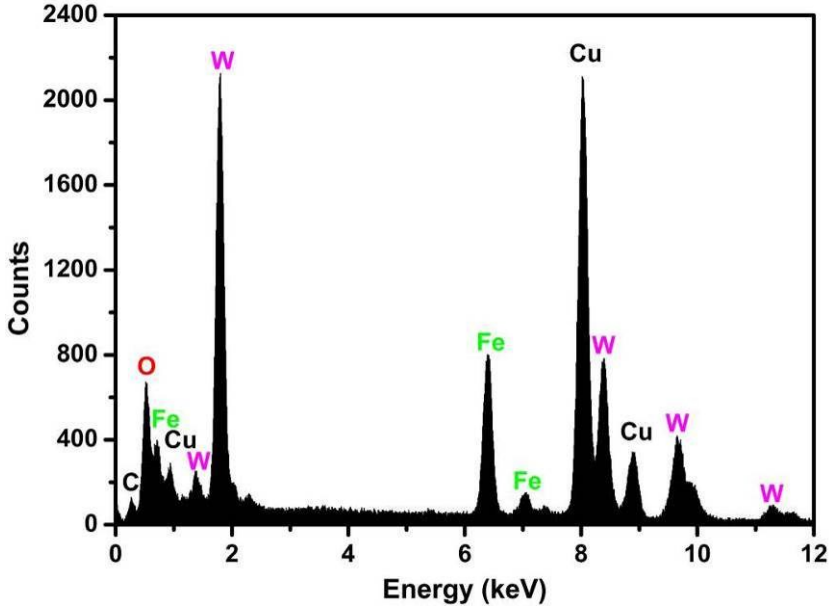

Figure S2. EDS spectrum of the as-prepared $FeWO_4$ sample.

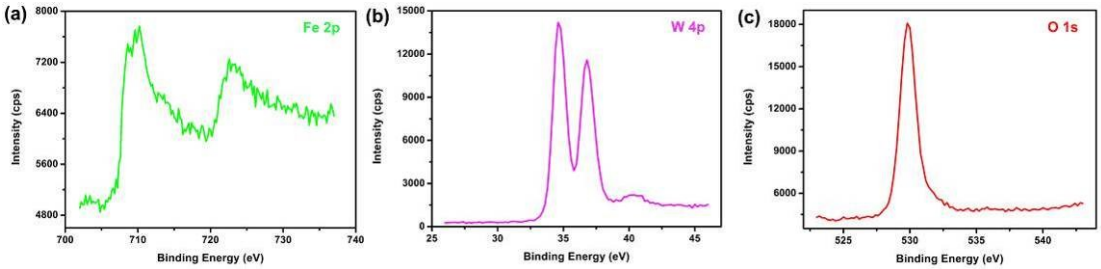

Figure S3. XPS spectra of Fe 2p (a), W 4p (b) and O 1s levels (c) of $FeWO_4$ nanoparticles.

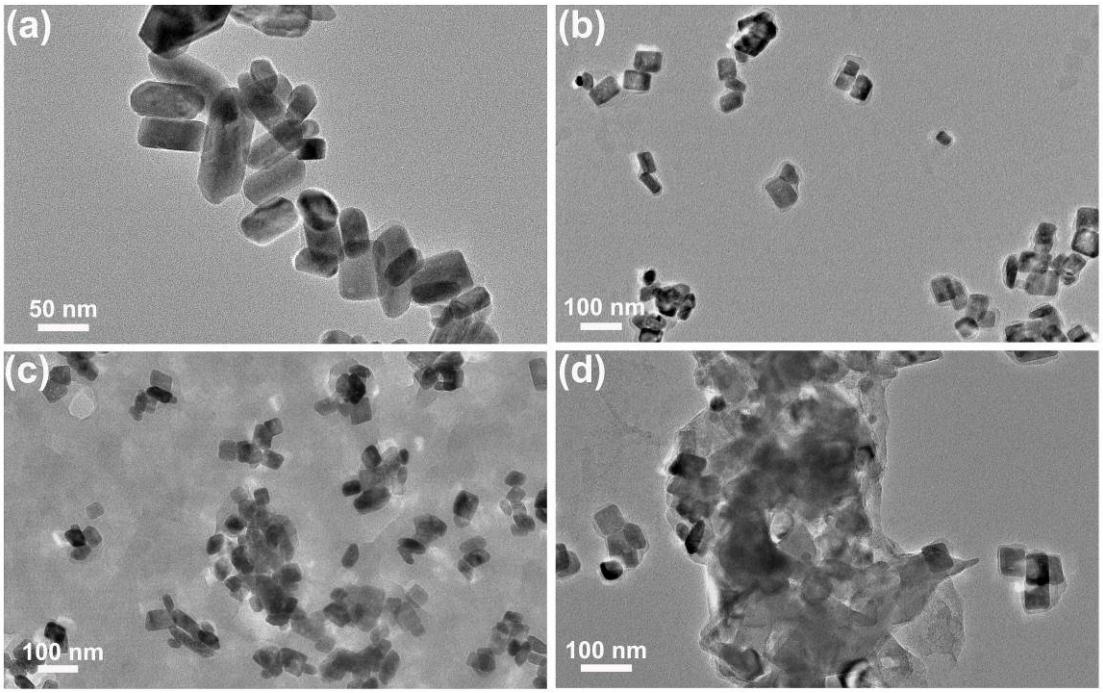

Figure S4. TEM images of as-synthesized $FeWO_4$@PPy nanocomposites under different conditions. Mass ratio of $FeWO_4$: pyrrole = 10 : 1 (a), 2 : 1 (b) and 1 : 5 (c) in a PVA concentration of 4 mg/mL, and 2 : 1 (d) in the PVA concentration of 20 mg/mL.

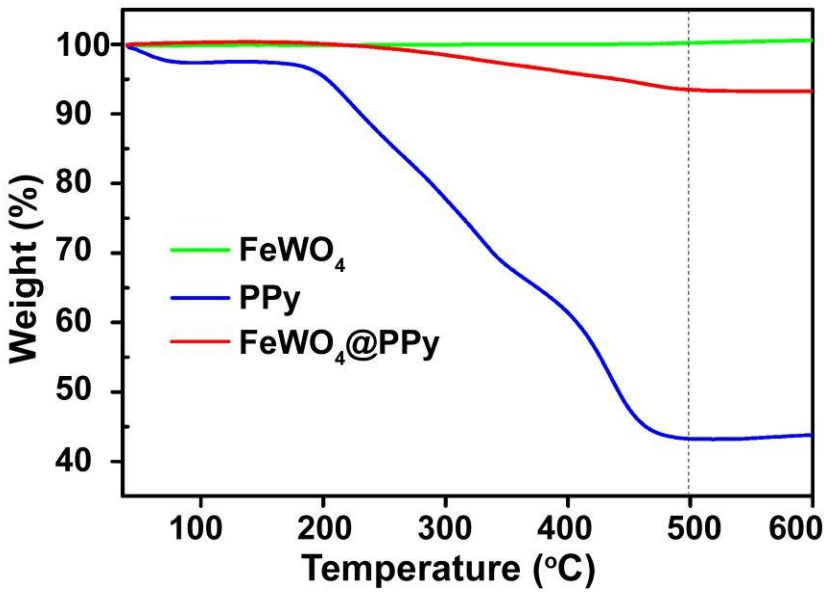

Figure S5. Thermal gravimetric analysis curves of $FeWO_4$, PPy and $FeWO_4$@PPy samples.

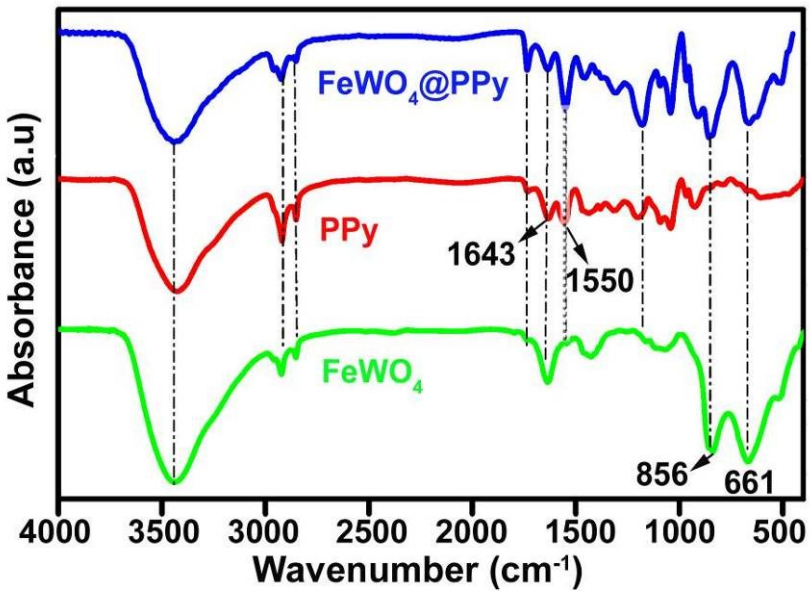

Figure S6. FTIR spectra of $FeWO_4$, PPy and $FeWO_4$@PPy samples.

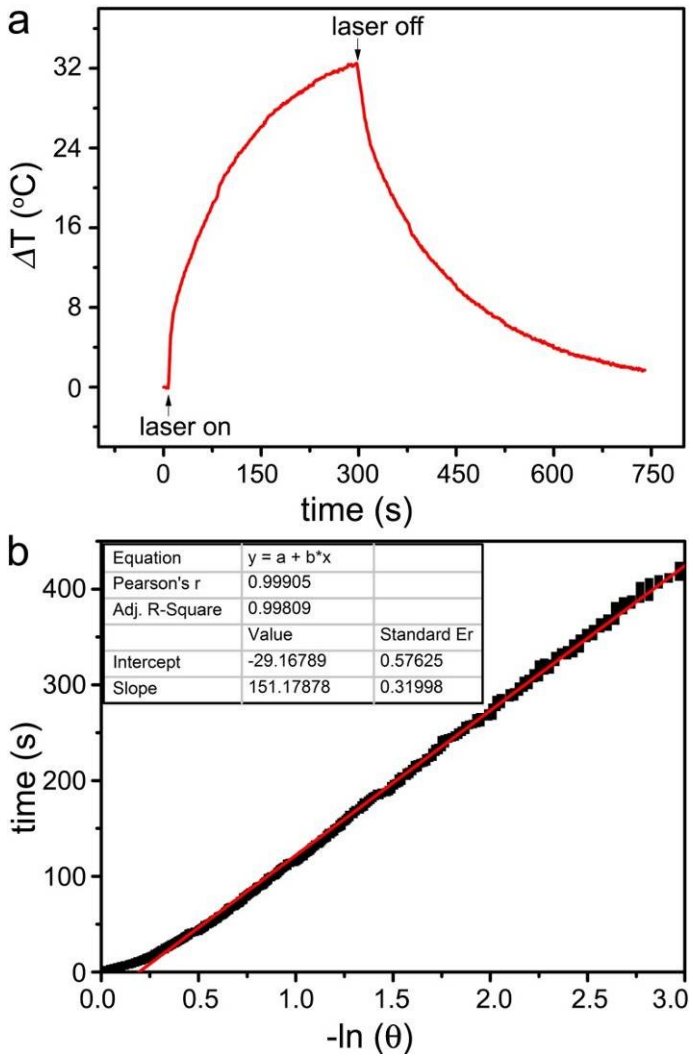

Figure S7. (a) Temperature curve of the $FeWO_4$@PPy nanocomposites with laser on for 5 min and then laser off for cooling. (b) Linear fitting of the time data during the cooling period of (a) versus their corresponding negative natural logarithm of the driving force temperature (θ). To measure the the photothermal conversion efficiency (η_T), 0.25 mL of the $FeWO_4$@PPy nanocomposites was irradiated by an 808-nm laser for 5 min and then the laser was turned off to let the solution cooling. On-line temperatures were monitored and illustrated in Figure S7a. During the irradiation, the temperature of the $FeWO_4$@PPy solution raised quickly from ambient temperature with an increment of 32.5 ^oC. Linear fitting of the cooling time versus negative natural logarithm of the temperature driving force ($-\ln\theta$) gave the time constant (τ_s) of the system as 151.2 s. Heat input of the solvent (Q_{dis}) without the $FeWO_4$@PPy nanocomposites was also measured independently to be 12.1 mW. Therefore, the value of η_T could be calculated to be 56.1%.

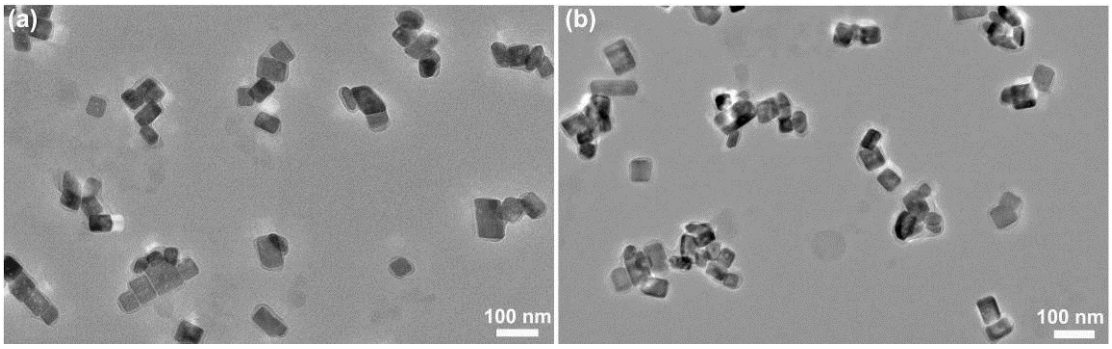

Figure S8. Typical TEM images of the $FeWO_4$@PPy nanocomposites before (a) and after (b) maintaining in solution for one year.

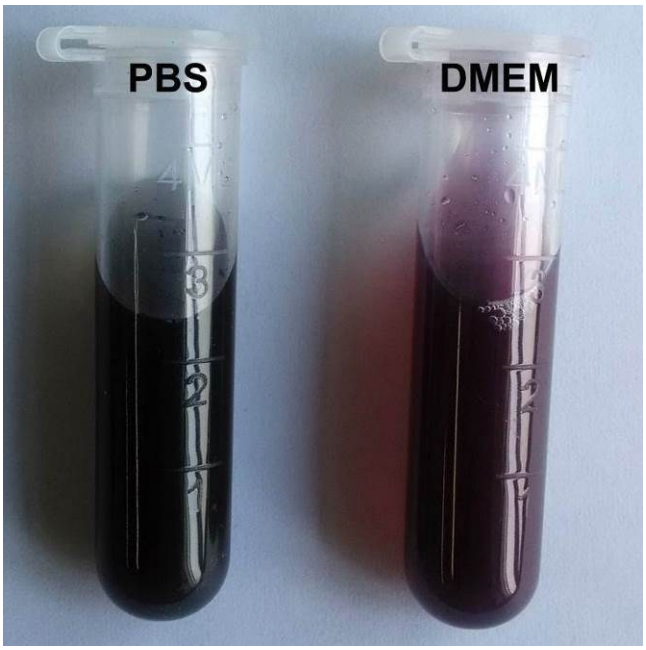

Figure S9. Photo of the $FeWO_4$@PPy nanocomposites dispersed in PBS or DMEM media (400 ppm) after maintaining for two months.

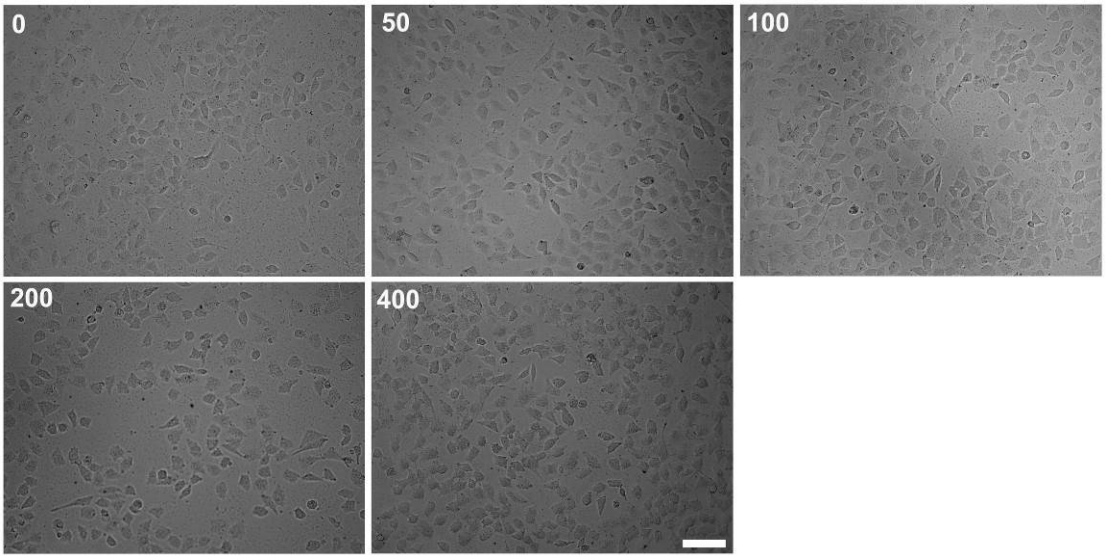

Figure S10. Cellular morphologies of HeLa cells after being incubated with different concentrations of the $FeWO_4$@PPy nanocomposites for 24 h (scale bars = 50 μm).

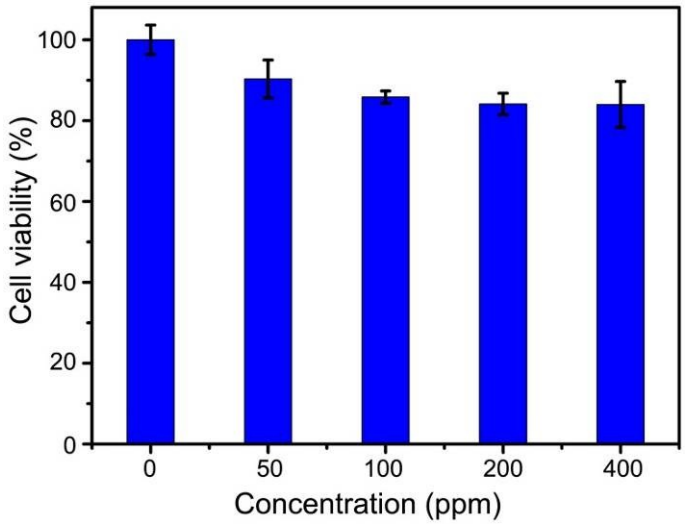

Figure S11. Cell viabilities of the BMSCs with treatments of different concentrations of the $FeWO_4$@PPy nanocomposites determined by a standard MTT assay.

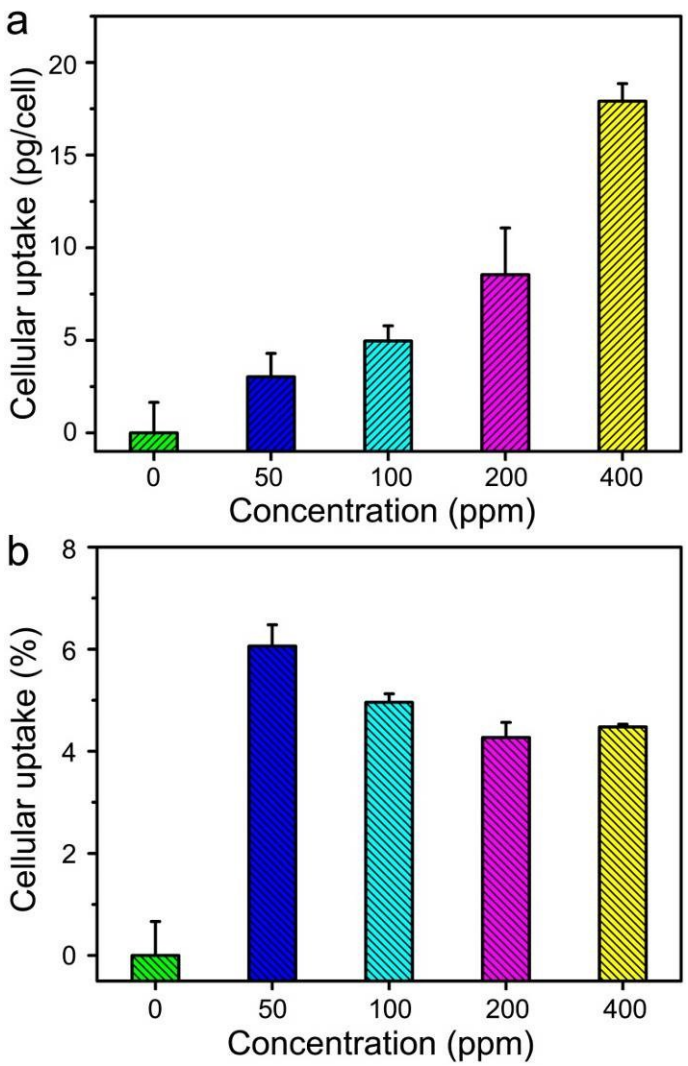

Figure S12. (a) Cellular uptake of the $FeWO_4$@PPy nanocomposites in HeLa cells and (b) their responding uptake percentage.

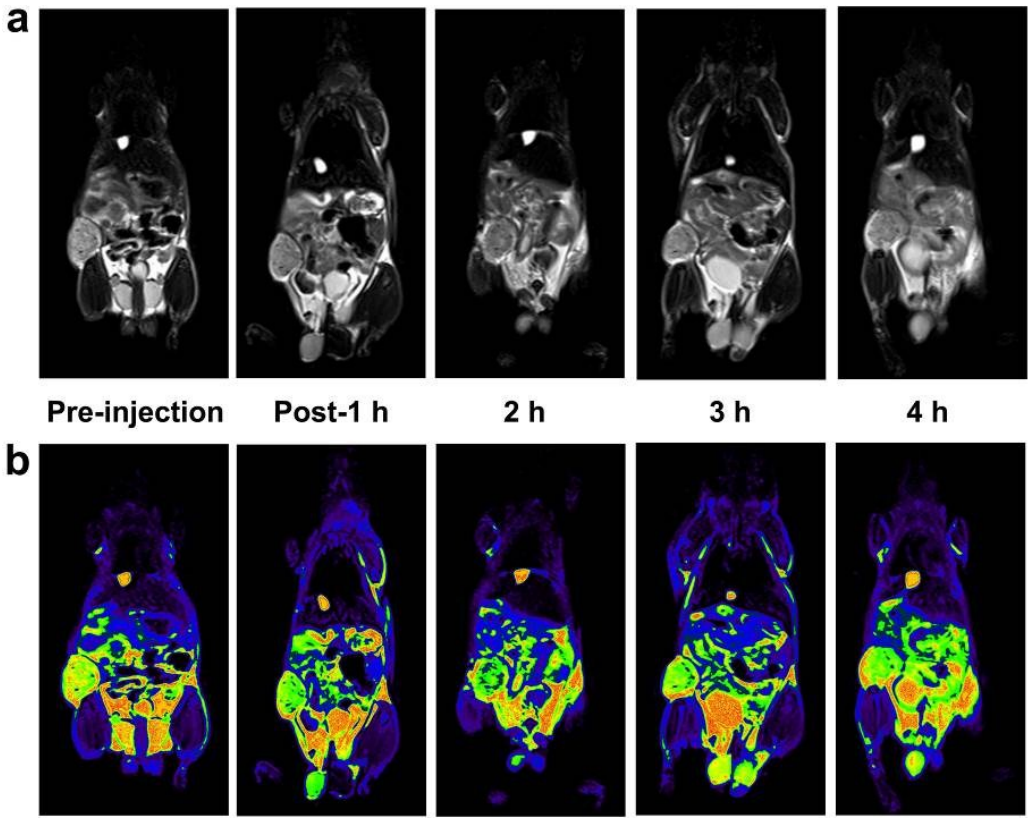

Figure S13. (a) Typical MR images of the tumor-bearing mice before and after intravenously injection with 100 μL of $FeWO_4$@PPy solution (dose: 20 mg/Kg) at different time intervals (0, 1, 2, 3 and 4 h) and (b) their responded weight-colored images.

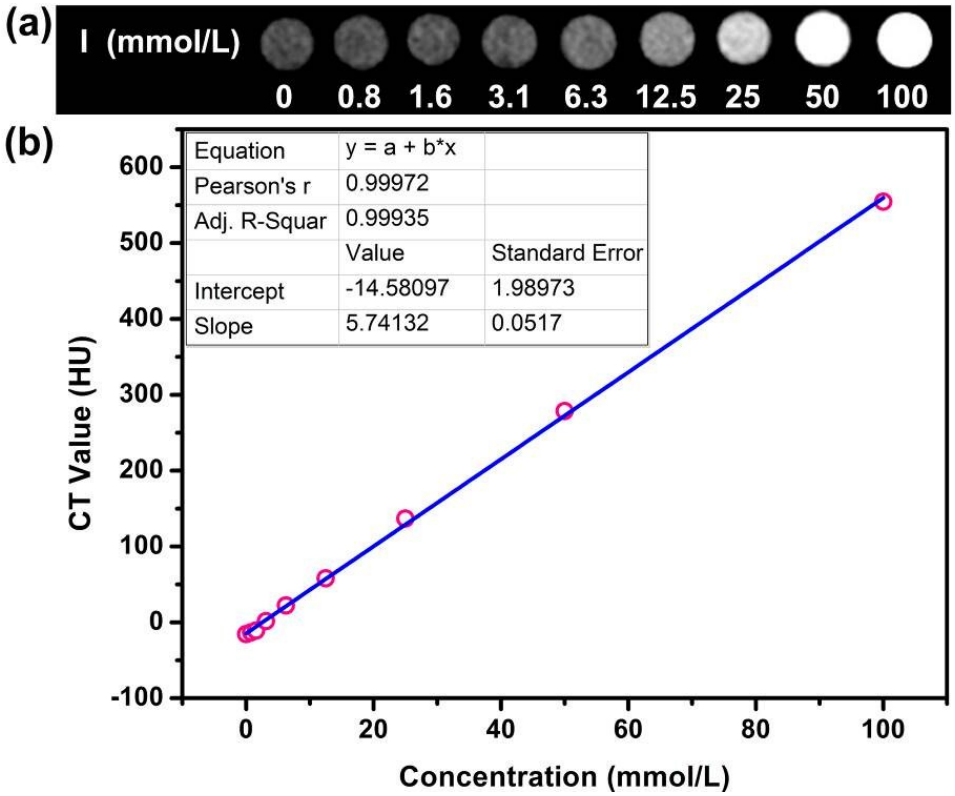

Figure S14. X-ray CT imaging test of Iohexol in solution. (a) CT image of Iohexol in solutions with different I concentrations. (b) Linear fitting of the relative CT values versus I concentrations.

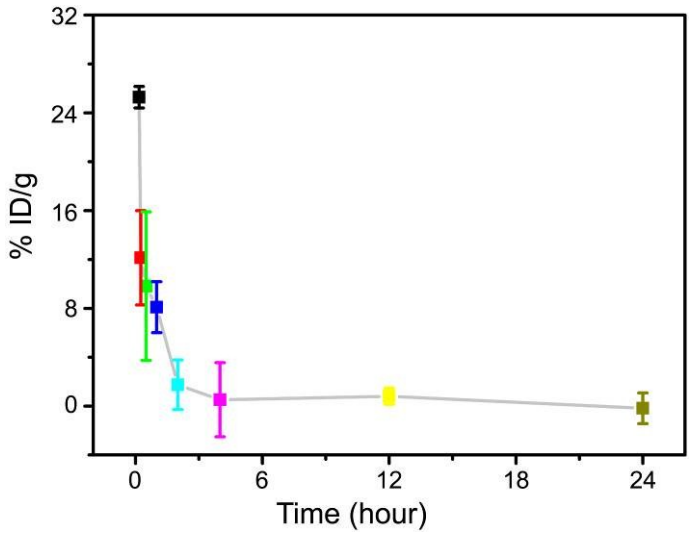

Figure 15. Blood circulation of the $FeWO_4$@PPy nanocomposites by intravenous administration.

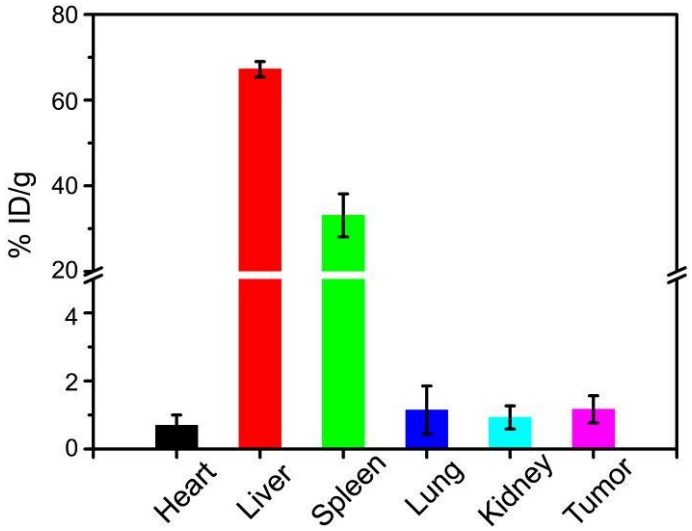

Figure 16. Biodistribution of the $FeWO_4$@PPy nanocomposites in the major organs and tumor of the mice after intravenous injection for 24 h.