



Supporting Information

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Engineered Cell-Derived Microparticles Bi₂Se₃/DOX@MPs
for Imaging Guided Synergistic Photothermal/Low-Dose
Chemotherapy of Cancer

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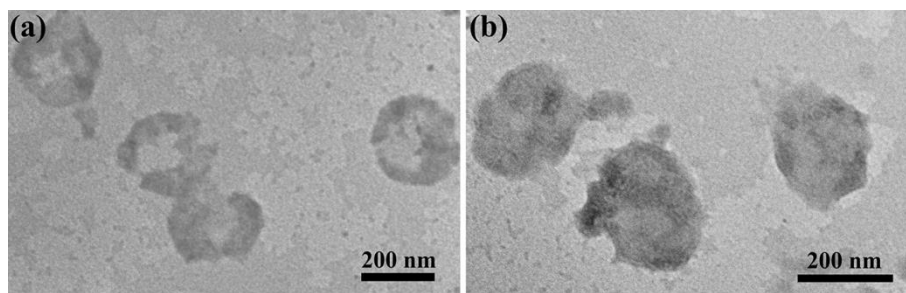


Figure S1. TEM images of multiple MPs (a) and Bi₂Se₃/DOX@MPs(b).

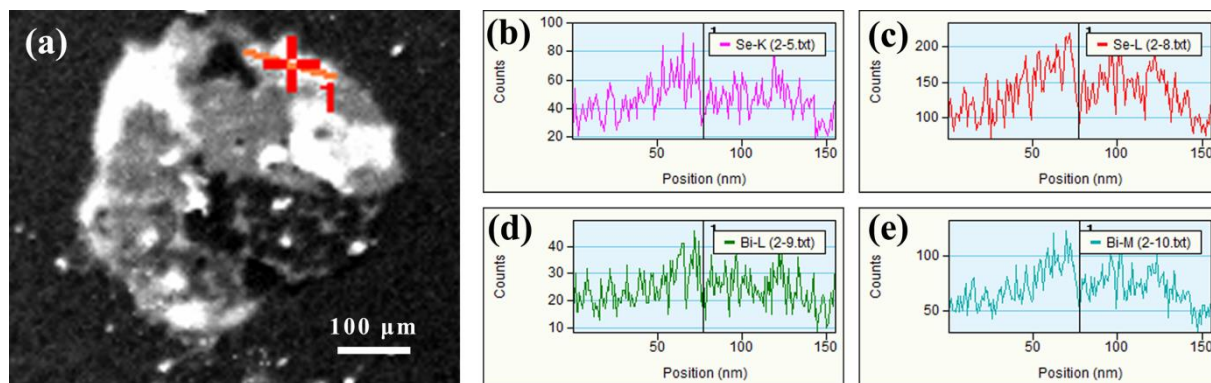


Figure S2. FTEM-EDS line-scan analysis of $\text{Bi}_2\text{Se}_3/\text{DOX}@\text{MPs}$.

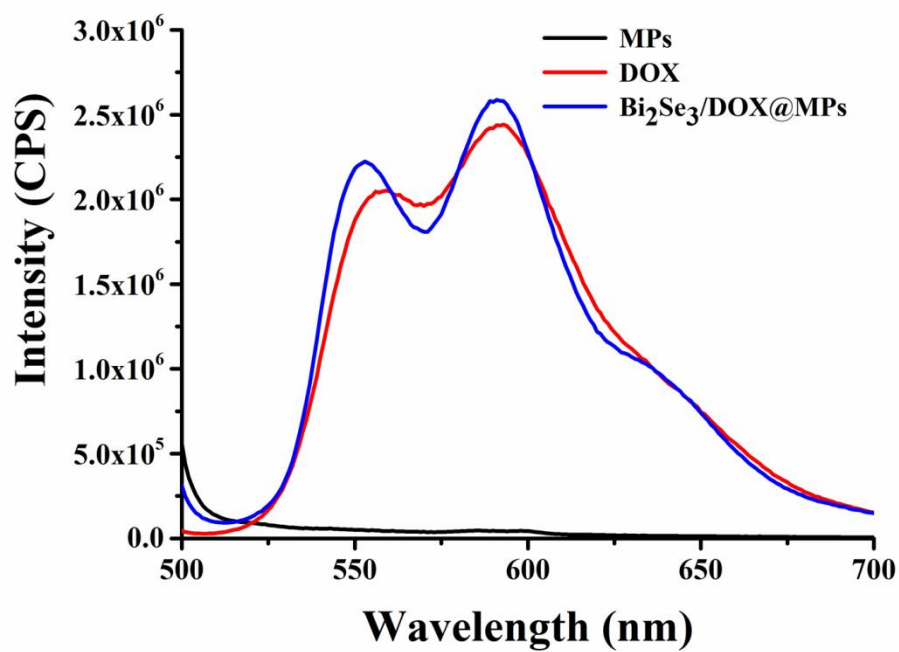


Figure S3. Fluorescence spectra of MPs, free DOX and Bi₂Se₃/DOX@MPs at the excitation of 488 nm.

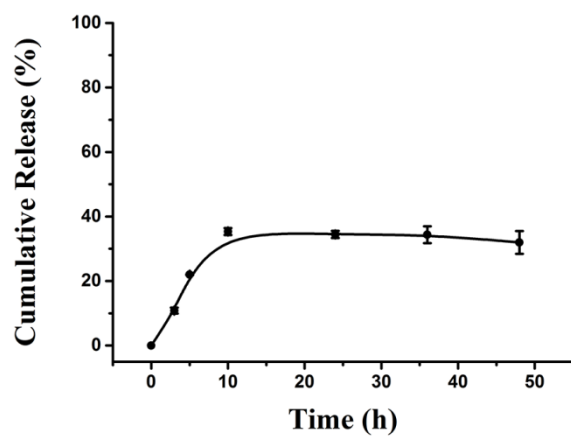


Figure S4. Cumulative amounts of DOX released from $\text{Bi}_2\text{Se}_3/\text{DOX}@\text{MPs}$ in pH 7.4 PBS buffer at 37 °C.

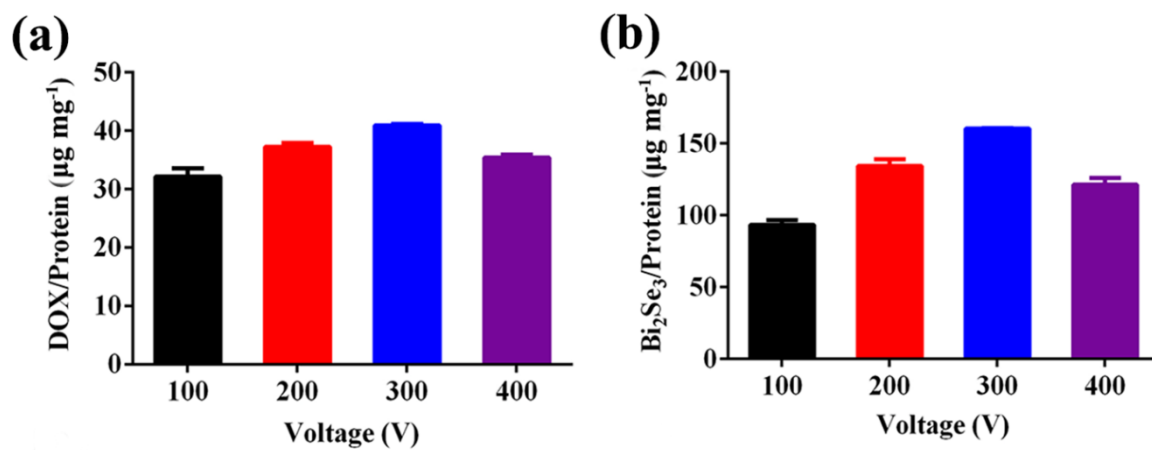


Figure S5. Voltage-dependent DOX (a) and Bi₂Se₃ (b) loading efficiency in Bi₂Se₃/DOX@MPs.

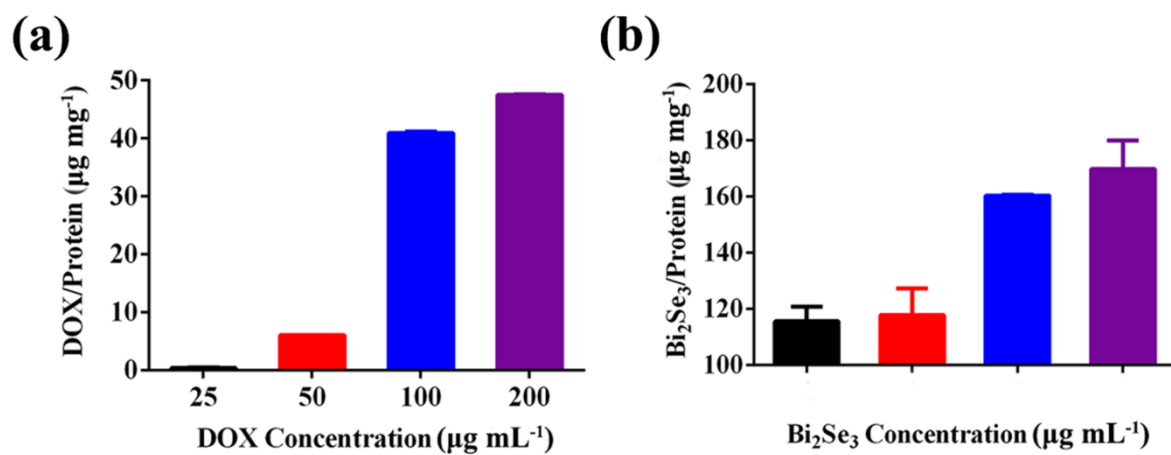


Figure S6. DOX and Bi₂Se₃ concentration-dependent loading efficiency in Bi₂Se₃/DOX@MPs.

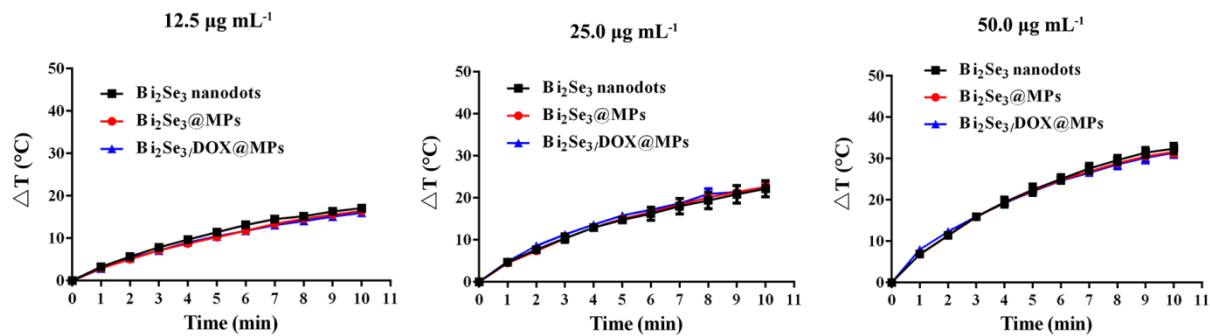


Figure S7. Comparison on temperature elevation of Bi_2Se_3 nanodots, Bi_2Se_3 @MPs and $\text{Bi}_2\text{Se}_3/\text{DOX}$ @MPs at different concentrations (12.5, 25, 50 $\mu\text{g mL}^{-1}$) under 808 nm NIR irradiation for 10 min.

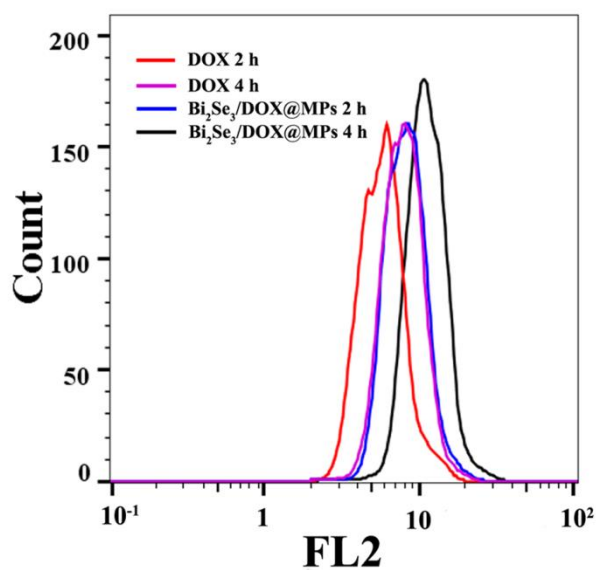


Figure S8. Flow cytometric profile of H22 cells respectively incubated with free DOX and Bi₂Se₃/DOX@MPs for 2 h and 4 h.

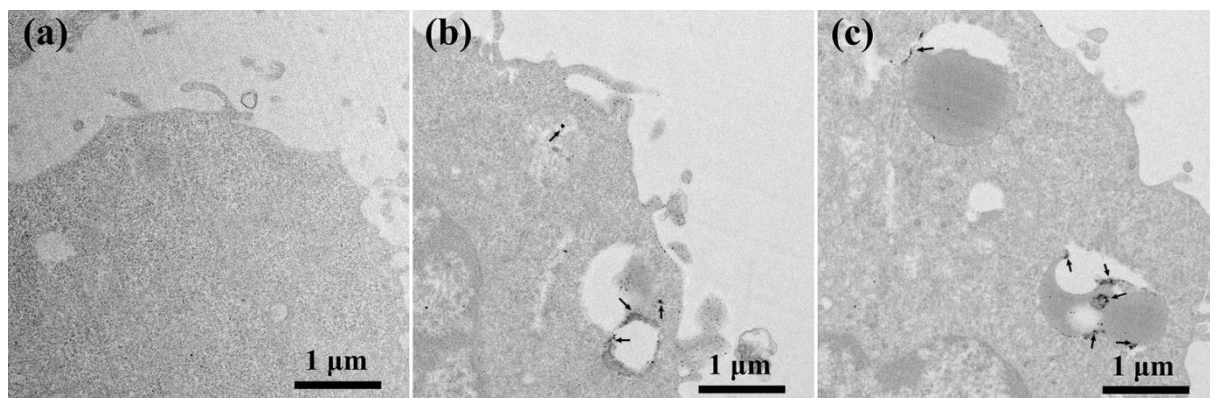


Figure S9. TEM images of control H22 cells (a) and H22 cells incubated with Bi₂Se₃/DOX@MPs for 2 h (b) or 4 h(c). The black arrows indicate Bi₂Se₃ nanodots.

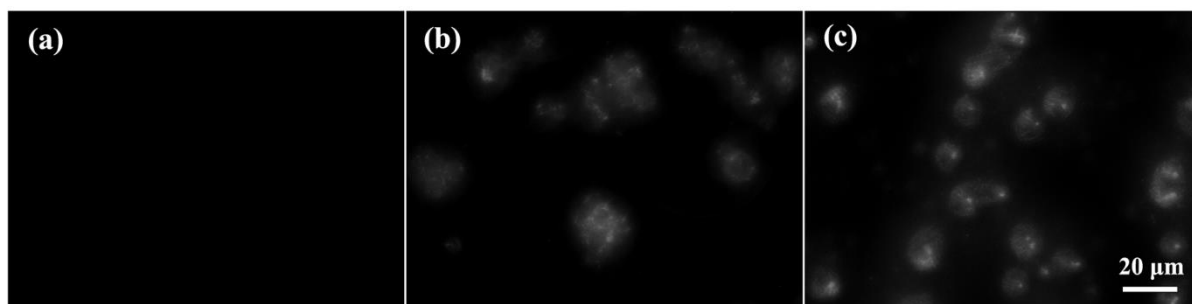


Figure S10. Dark-field optical microscopy images of control H22 cells (a) and H22 cells incubated with Bi₂Se₃/DOX@MPs for 2 h (b) or 4 h(c).

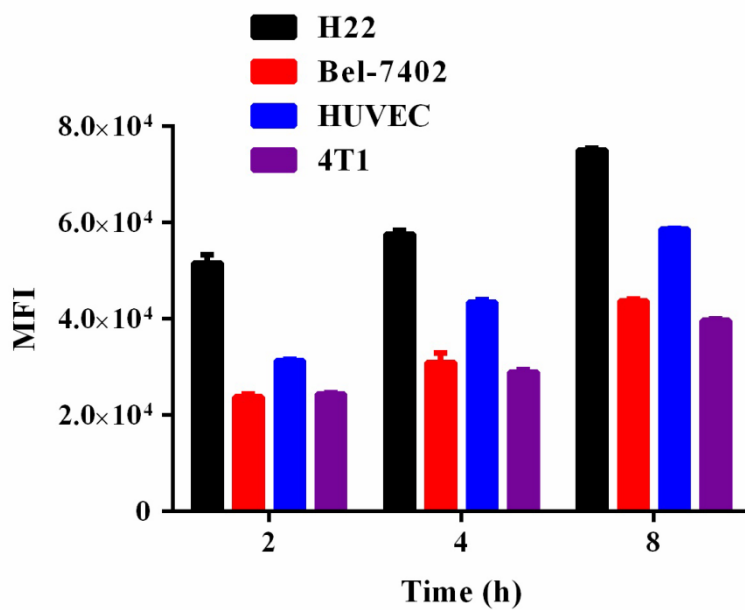


Figure S11. Cellular uptake of $\text{Bi}_2\text{Se}_3/\text{DOX}@\text{MPs}$ incubated with different cells (H22, Bel-7402, HUVEC and 4T1 cells) for 2, 4 and 8 hours.

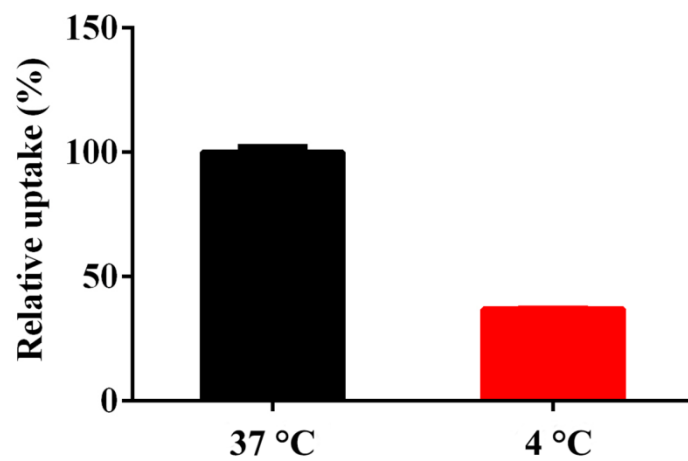


Figure S12. Relative cellular uptake of Bi₂Se₃/DOX@MPs incubated H22 cells at 37 °C and 4 °C.

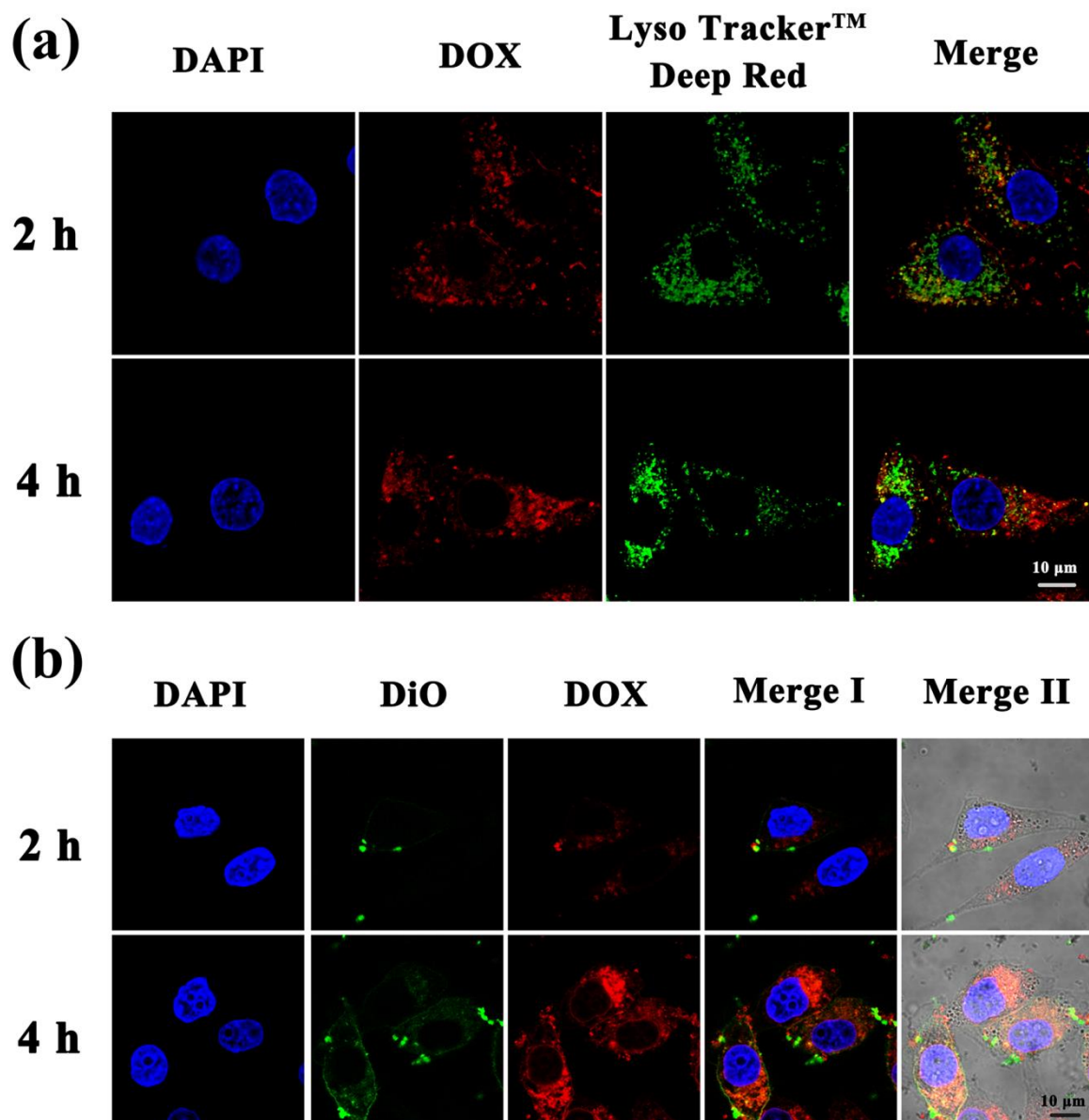


Figure S13. Cellular internalization pathway of $\text{Bi}_2\text{Se}_3/\text{DOX}@\text{MPs}$. CLSM images of Bel 7402 cells incubated with $\text{Bi}_2\text{Se}_3/\text{DOX}@\text{MPs}$ (a) and DiO-labeled $\text{Bi}_2\text{Se}_3/\text{DOX}@\text{MPs}$ (b) for 2 and 4 h. Cell nucleus were labeled with DAPI (blue) in both a and b. Lysosomes were labeled with LysoTracker Deep Red (green) in a. The concentration of DOX was fixed at $1 \mu\text{g mL}^{-1}$.

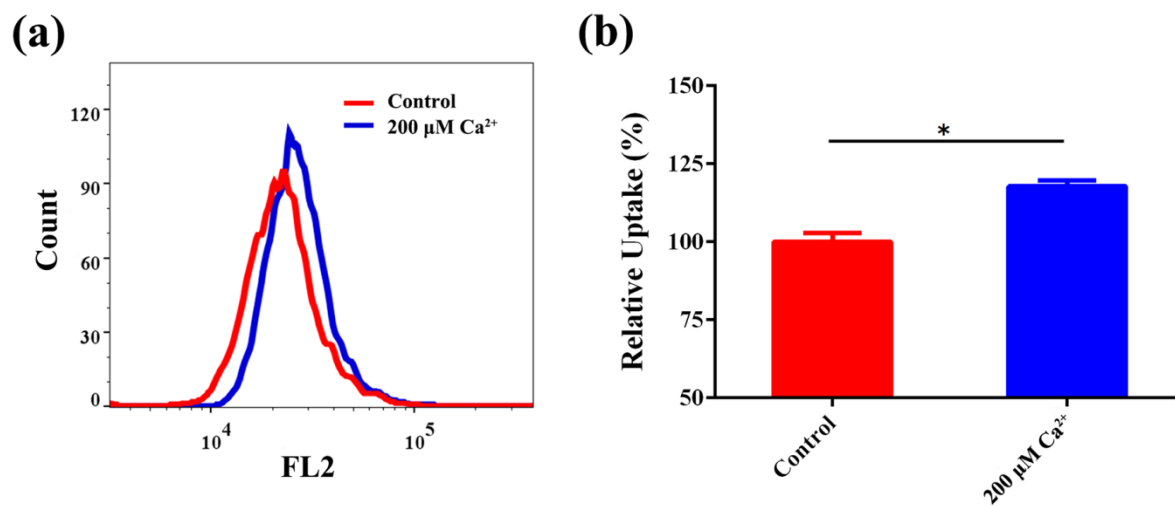


Figure S14. Flow cytometric profile (a) and relative cellular uptake (b) of $\text{Bi}_2\text{Se}_3/\text{DOX}@\text{MPs}$ with or without 200 μM Ca^{2+} .

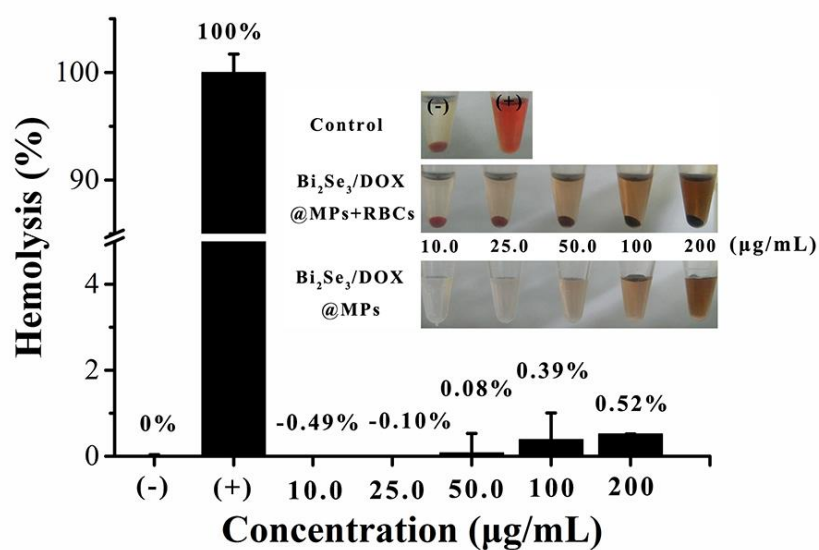


Figure S15. Hemolysis percentages of $\text{Bi}_2\text{Se}_3/\text{DOX}@MPs$ in physiological saline at concentrations of 10, 25, 50, 100 and 200 $\mu\text{g mL}^{-1}$, inset is the photograph of control (up), hemolysis assay to detect the presence of hemoglobin in the supernatant of $\text{Bi}_2\text{Se}_3/\text{DOX}@MPs$ (middle) and the $\text{Bi}_2\text{Se}_3/\text{DOX}@MPs$ physiological saline solutions (down).

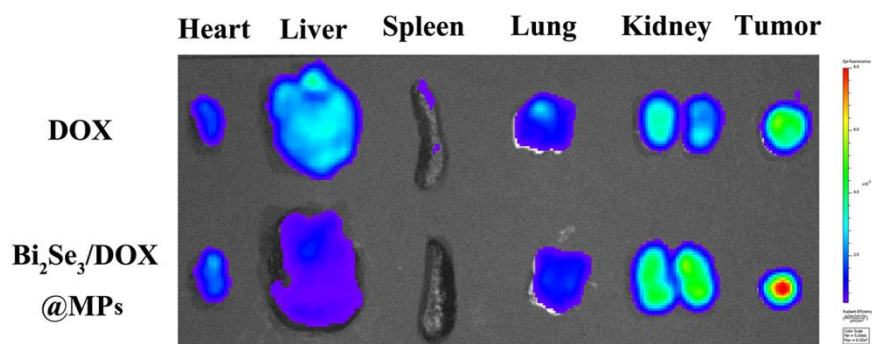


Figure S16. Ex vivo fluorescence images of heart, liver, spleen, lung, kidney, and tumor 12 h after treatment with free DOX and Bi₂Se₃/DOX@MPs.

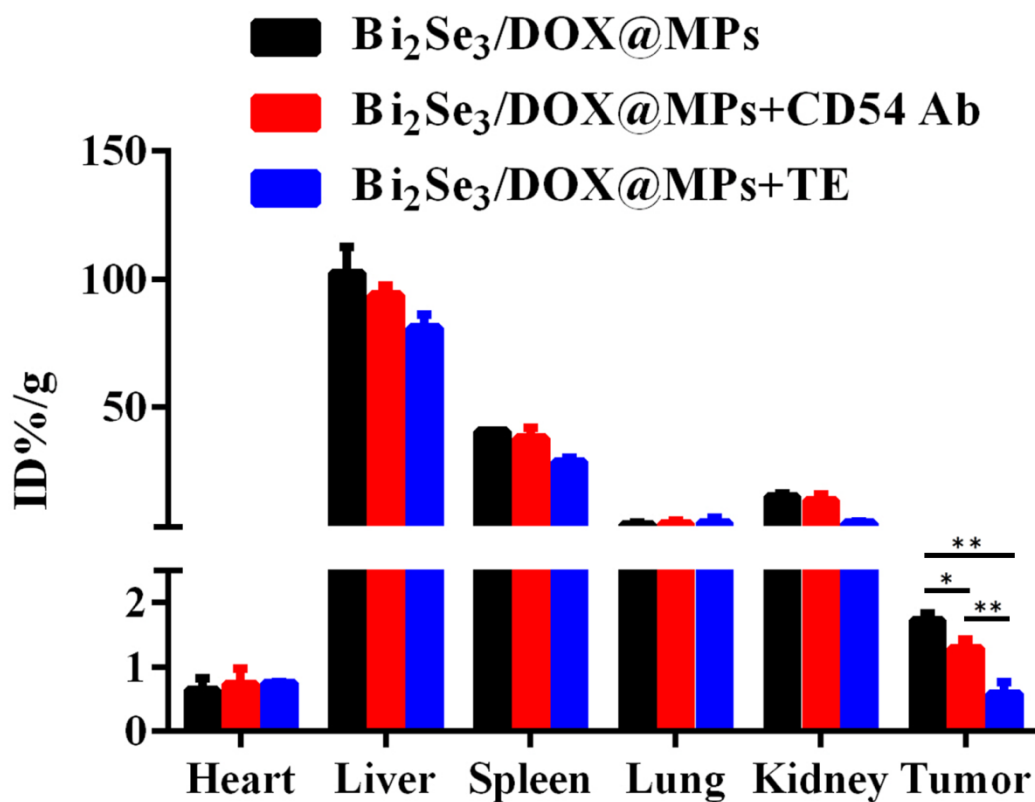


Figure S17. *In vivo* biodistribution of $\text{Bi}_2\text{Se}_3/\text{DOX}@MPs$ before or after treating with CD54 Ab or 0.25 % TE.

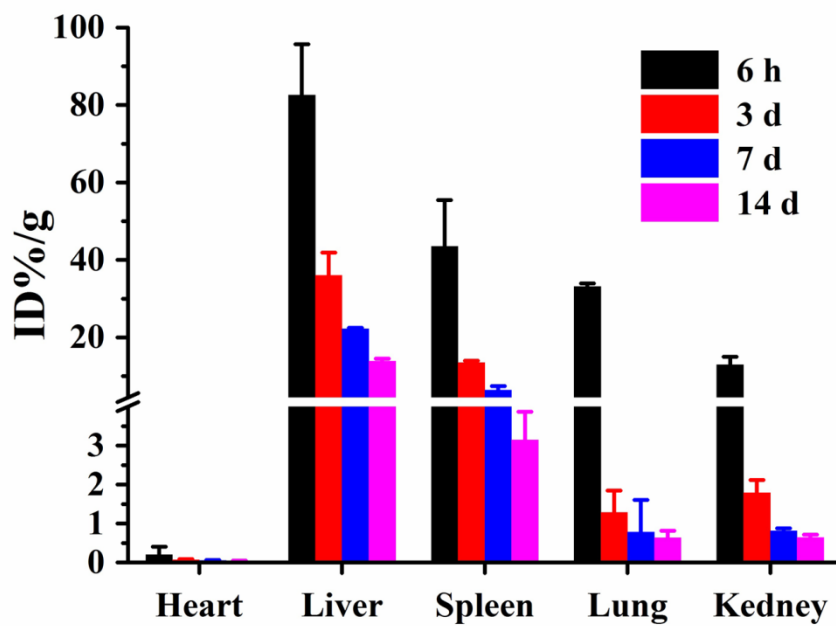


Figure S18. *In vivo* clearance of Bi element after injecting $\text{Bi}_2\text{Se}_3/\text{DOX}@\text{MPs}$ intravenously at 6h, 3 d, 7 d and 14 d.

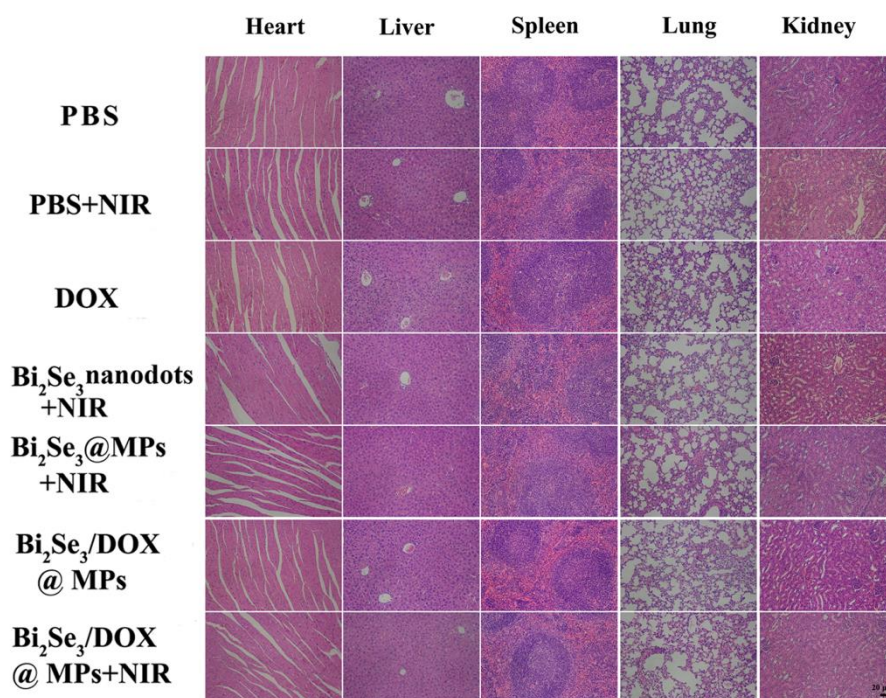


Figure S19. H&E staining images of heart, liver, spleen, lung, and kidney after the mice were sacrificed at 15th day post intravenous injection with PBS, free DOX, Bi₂Se₃ nanodots, Bi₂Se₃@MPs and Bi₂Se₃/DOX@MPs with or without NIR irradiation. DOX and Bi₂Se₃ dosage were fixed at 1.2 and 6.6 mg kg⁻¹. Magnification 200×.

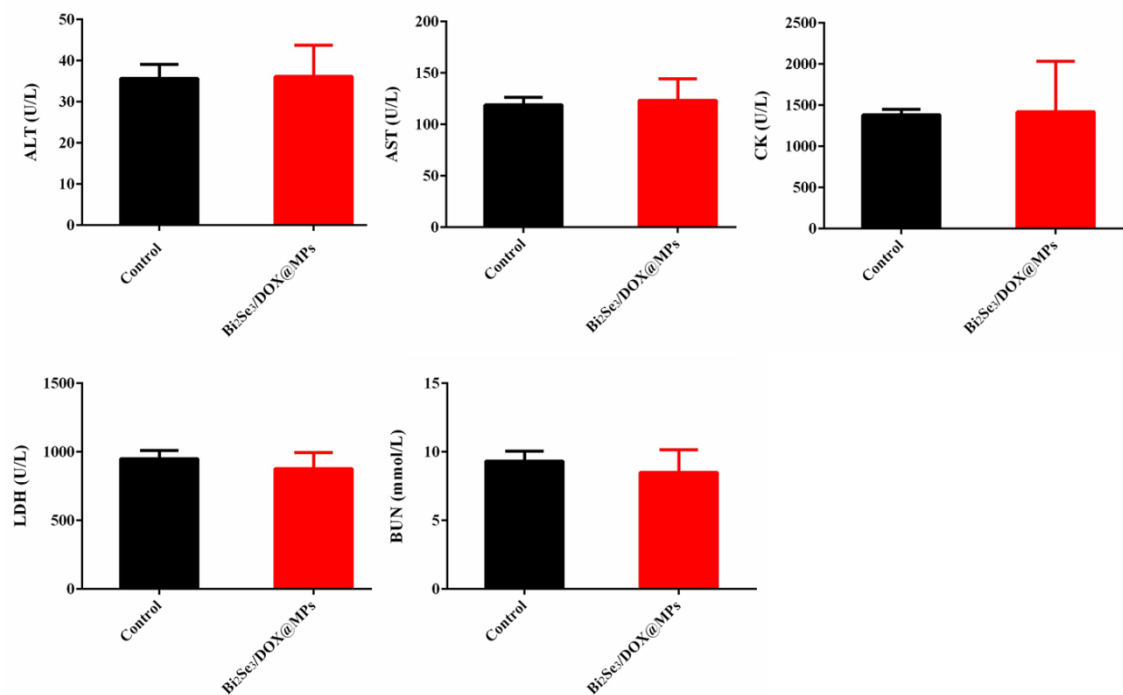


Figure S20. ALT, AST, CK, LDH and BUNs levels in the blood at day 7 after Bi₂Se₃/DOX@MPs treatment.