

Supporting Information *for*

Melanin Nanoparticles as an Actinide in vivo Sequestration Agent with Radiation Protection Effect

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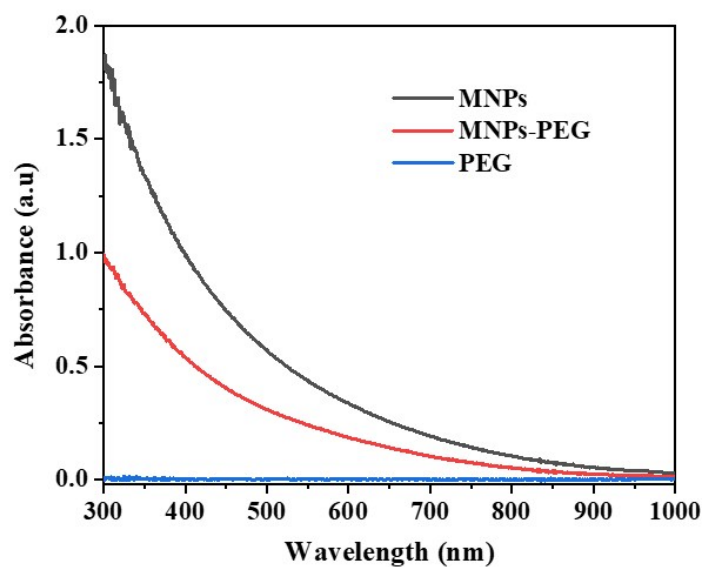
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S1. UV-vis spectrum

(a)



(b)

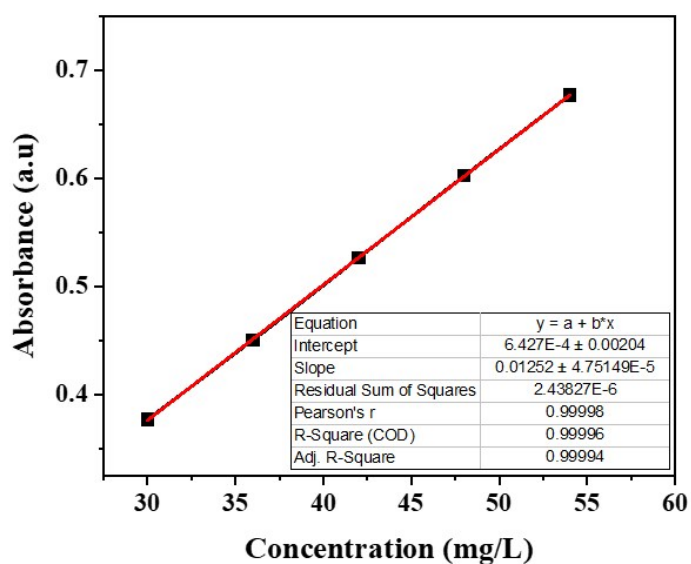


Figure S1. (a) UV-vis-NIR absorption spectra of MNPs (60 ppm), MNPs-PEG (60 ppm) and PEG (1000 ppm). (b) Absorbance of different concentrations of MNPs at 450 nm.

S2. Zeta potential

Table S1. Zeta potential of MNPs and MNPs-PEG.

	Zeta potential (mV)
MNPs	-24.0 ± 1.1
MNPs-PEG	-18.4 ± 1.5

S3. Adsorption selectivity

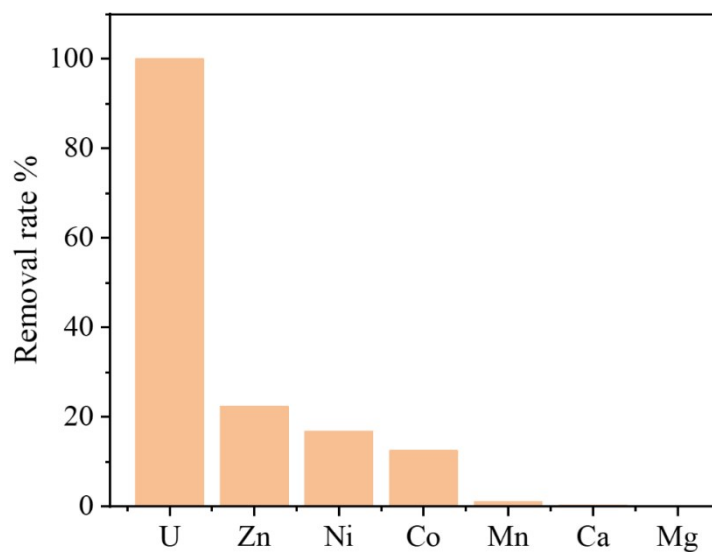


Figure S2. Adsorption behavior of MNPs-PEG towards uranium and divalent essential metal ions (pH = 7.4, 50 mmol/L Tris-HCl buffer, m/V = 0.3 g/L, T = 310 K, the initial concentration of uranium is 2.4 ppm, and the initial concentration of interfering ions are about 40 ppm).

S4. Cytotoxicity assays.

Table S2. Dosage-dependent growth rate of NRK-52E cells treated with $\text{UO}_2(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$, values were presented as means \pm SD (n=4). (Data from reference 1)

Concentration of uranium ($\mu\text{g}/\text{mL}$)	Survival Rate (%)
1.48	96.7 \pm 4.3
2.95	90.9 \pm 0.1
5.90	71.2 \pm 1.3
11.80	68.5 \pm 1.9
21.23	63.3 \pm 1.8

Table S3. Dosage-dependent growth rate of AML-12 cells treated with $\text{Th}(\text{NO}_3)_4 \cdot 6\text{H}_2\text{O}$, values were presented as means \pm SD (n = 6).

Concentration of thorium ($\mu\text{g}/\text{mL}$)	Survival Rate (%)
3.7	100.4 \pm 3.2
7.4	94.4 \pm 2.0
14.8	95.7 \pm 4.8
29.7	89.4 \pm 5.1
59.3	88.5 \pm 4.3
118.7	74.7 \pm 2.2

S5. ROS level assays.

Table S4. ROS level of normal NRK-52E cells and NRK-52E cells treated with U(VI), U(VI) + DTPA, and U(VI) + MNPs-PEG, values were presented as means \pm SD (n=3).

Group	ROS
Normal	131.0 \pm 8.0
U(VI)	272.7 \pm 51.2
U(VI) + DTPA	232.0 \pm 23.5
U(VI) + MNPs-PEG	133.3 \pm 13.2

Table S5. ROS level of normal AML-12 cells and AML-12 cells treated with Th(IV), Th(IV) + DTPA, and Th(IV) + MNPs-PEG, values were presented as means \pm SD (n=3).

Group	ROS
Normal	2.3 \pm 1.7
Th(IV)	8.3 \pm 0.9
Th(IV) + DTPA	5.7 \pm 0.8
Th(IV) + MNPs-PEG	2.3 \pm 0.5

Reference

- (1) C. Shi, X. Wang, J. Wan, D. Zhang, X. Yi, Z. Bai, K. Yang, J. Diwu, Z. Chai, and S. Wang *Bioconjugate Chem.*, 2018, 29, 3896-3905.