

Supplementary information for

Biocompatible Folate-modified $\text{Gd}^{3+}/\text{Yb}^{3+}$ -doped ZnO
Nanoparticles for Dualmodal MRI/CT Imaging

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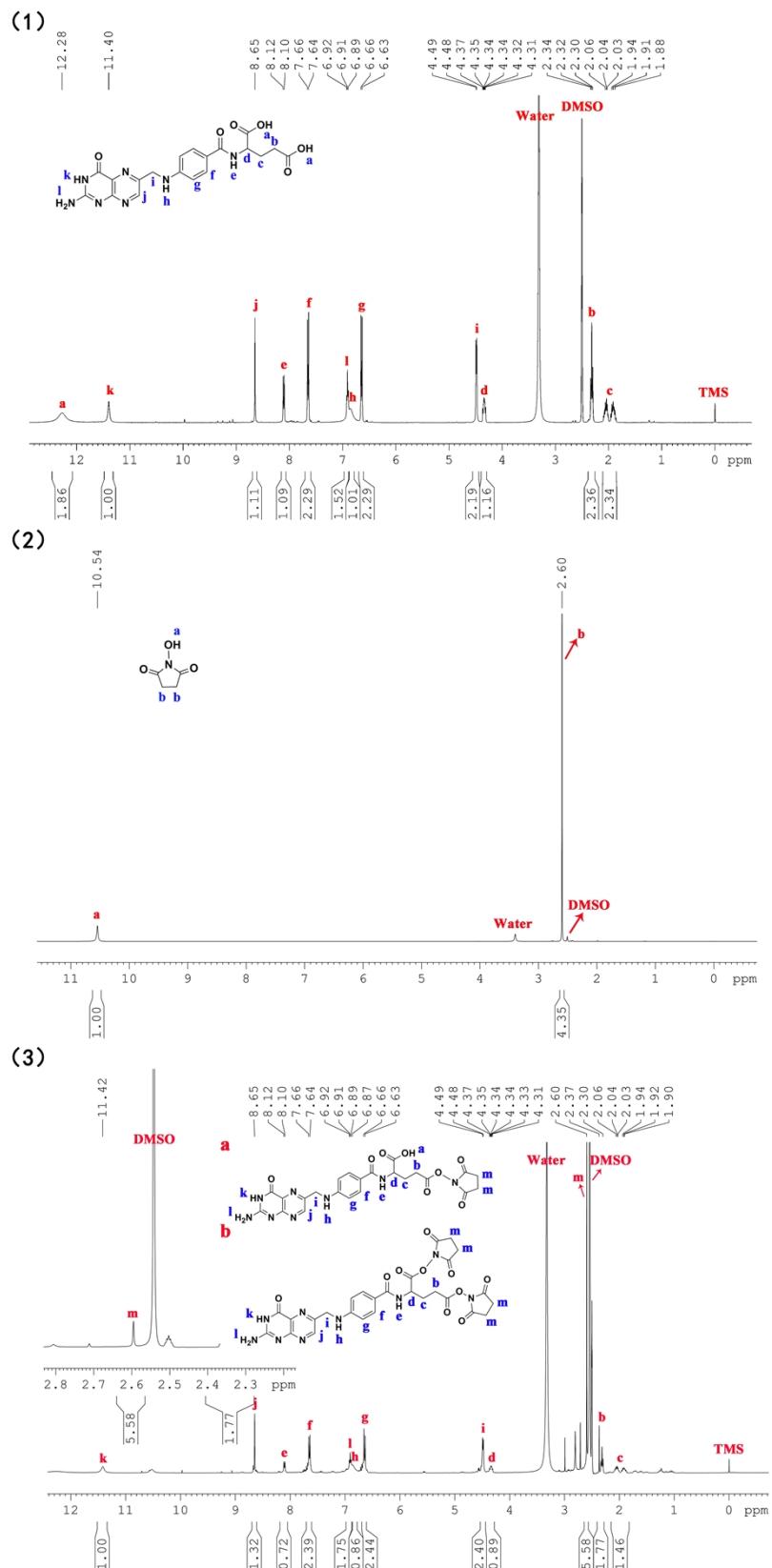


Figure S1 ^1H NMR spectra of folate (1), NHS (2) and folate-NHS (3) in DMSO, respectively. All proton signals have been assigned. Two possible structural formula of folate-NHS were presented. The peak at 2.60 ppm (m in Figure S1 (3)) can be assigned to the CH_2 of NHS, which demonstrates the conjugation of NHS to folate.

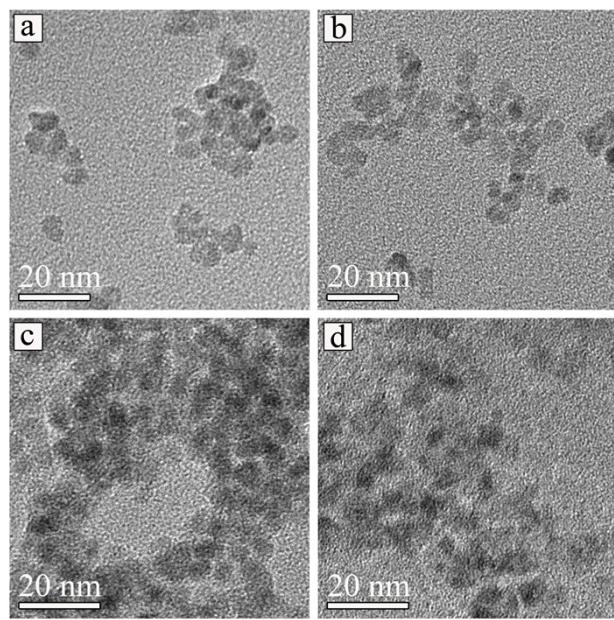


Figure S2 TEM images of ZnO:Gd,Yb-FA with the x value of 0.03 (a), 0.08 (b), 0.2 (c) and 0.3 (d), respectively.

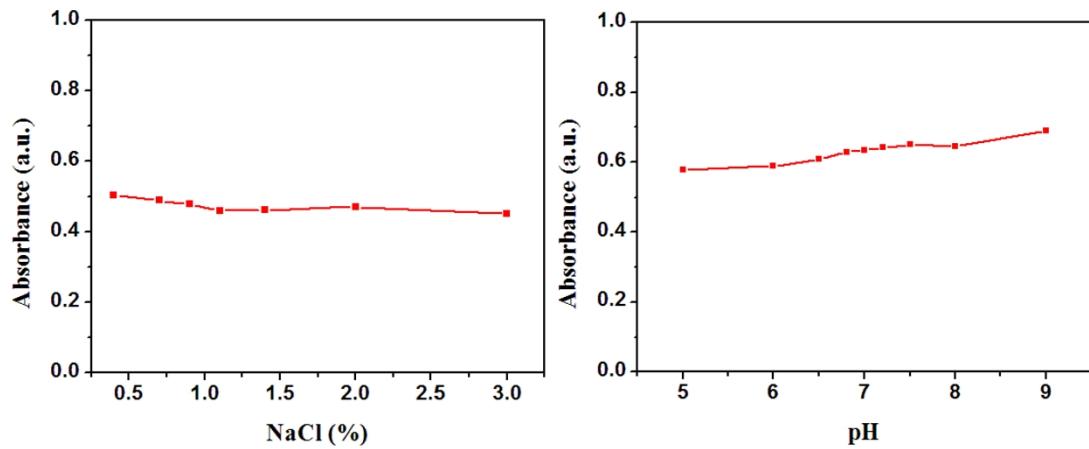


Figure S3 Absorbance of FA-modified ZnO:Gd,Yb NPs ($x = 0.1$) as a function of NaCl concentration and pH.

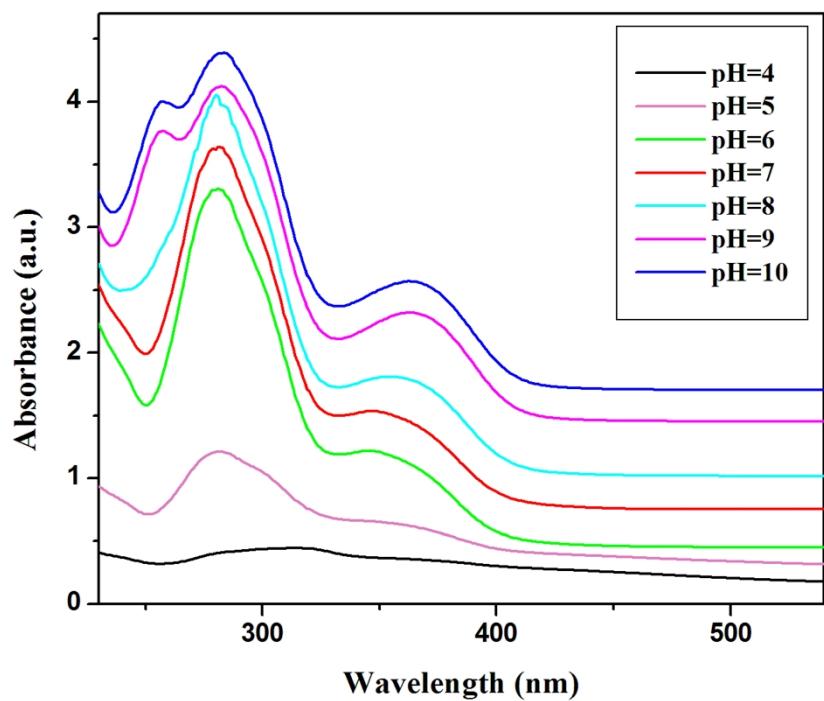


Figure S4 UV-vis spectra of folate at different pH values.

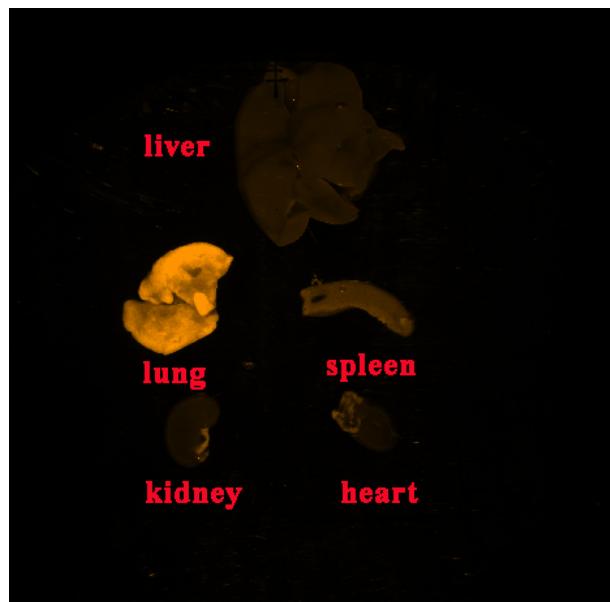


Figure S5 Biodistribution analysis of ZnO-FA NPs by fluorescence imaging of several organ (heart, liver, spleen, lung and kidney) harvested from the mice 1 h after injection of the as-prepared ZnO-FA NPs solution.

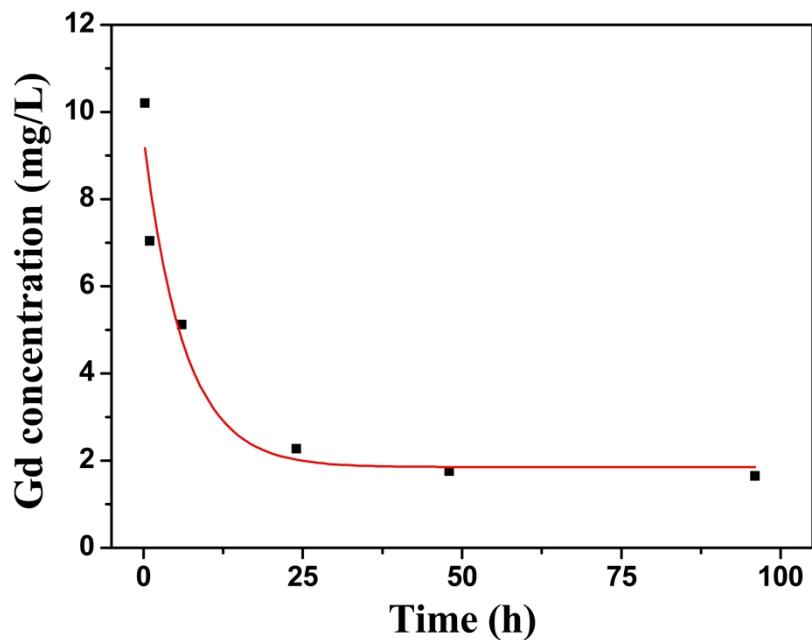


Figure S6 The blood retention of ZnO:Gd,Yb-FA NPs ($x = 0.1$) in Wistar mice ($n = 3$) at 0.25, 1, 6, 24, 48 and 96 h post-injection.

Table S1. Comparison between ZnO:Gd,Yb-FA NPs with different x values.

The mole ratio of Gd(Ac) ₃ and Zn(Ac) ₂ (x)	The mole ratio of Yb(Ac) ₃ and Zn(Ac) ₂ (x)	The mole ratio of Gd ³⁺ and Zn ²⁺ in NPs by ICP-OES	The mole ratio of Yb ³⁺ and Zn ²⁺ in NPs by ICP-OES	Diameter of average particles by XRD (nm)
0	0	0	0	6.078
0.03	0.03	0.0046	0.0070	5.078
0.08	0.08	0.0100	0.0151	5.034
0.1	0.1	0.0156	0.0262	5.011
0.2	0.2	0.0218	0.0423	4.499
0.3	0.3	0.0459	0.1281	4.434