

Electronic Supplementary Information (ESI) for

In Vitro Photodynamic Therapy Based on Magnetic-luminescent Gd₂O₃:Yb,Er Nanoparticles with Bright Three-Photon Up- conversion Fluorescence Under Near-Infrared Light

Hao Li,^a Shaoxin Song,^a Wei Wang^{*a} and Kezheng Chen^{*a}

^a *Lab of Functional and Biomedical Nanomaterials, College of Materials Science and Engineering, Qingdao University of Science and Technology, Qingdao 266042, China*

** To whom correspondence should be addressed.*

E-mail: kchen@qust.edu.cn; wangwei@qust.edu.cn; Fax: 86 532 84022509;

This file include: Figure S1-S8

Figure S1. XRD patterns of $\text{Gd}_2\text{O}_3:\text{Yb,Er}$ nanoparticles with varied temperatures.

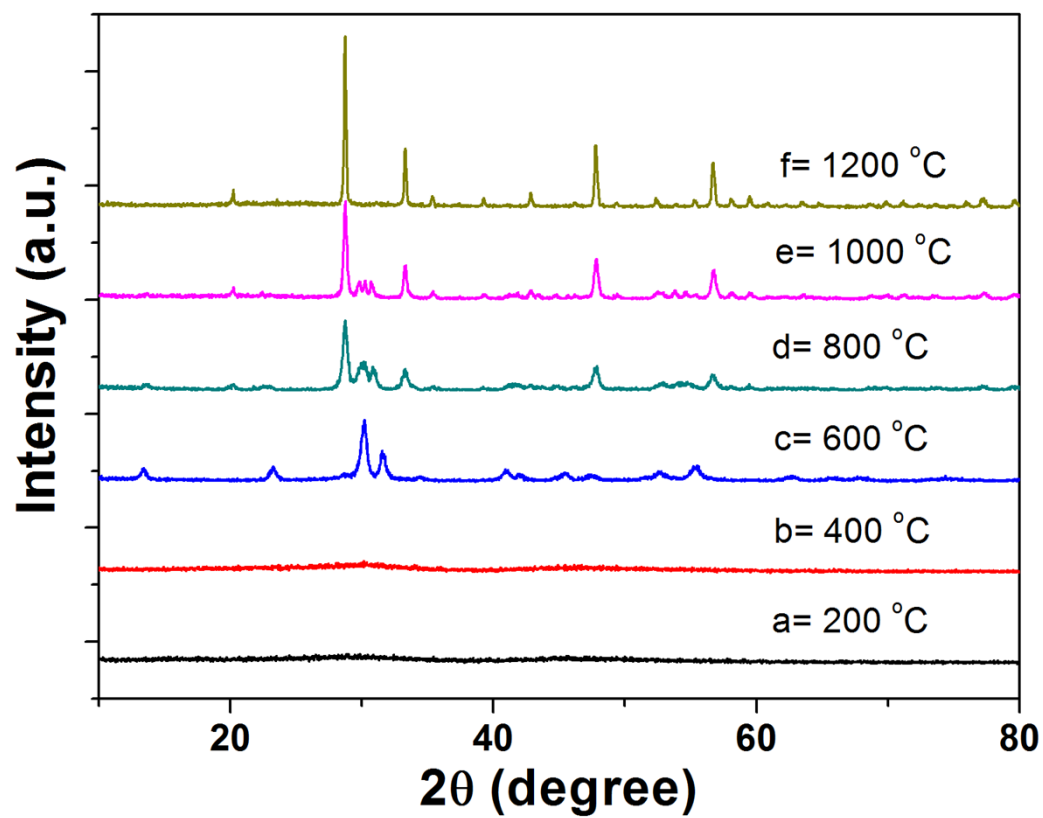


Figure S2. (a) Column of size distribution, (b) the corresponding SEM image and (c) DLS measurement of the particle size distribution of $Gd_2O_3:Yb,Er$ nanoparticles with calcination temperature of 900 °C.

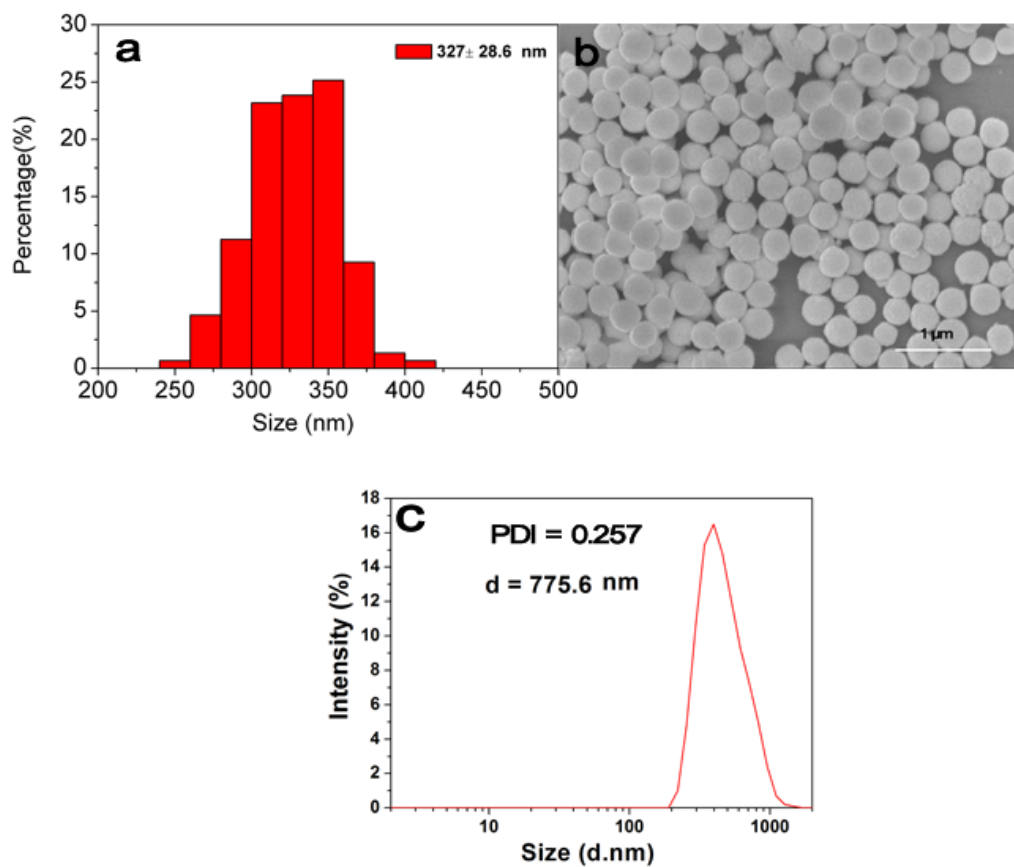


Figure S3. Digital photos of (a) PEGylated-Gd₂O₃:Yb,Er nanoparticles (10 mg/mL) and (b) Gd₂O₃:Yb,Er nanoparticles (10 mg/mL) without PEGylation dispersed in ultrapure water for 4 h.

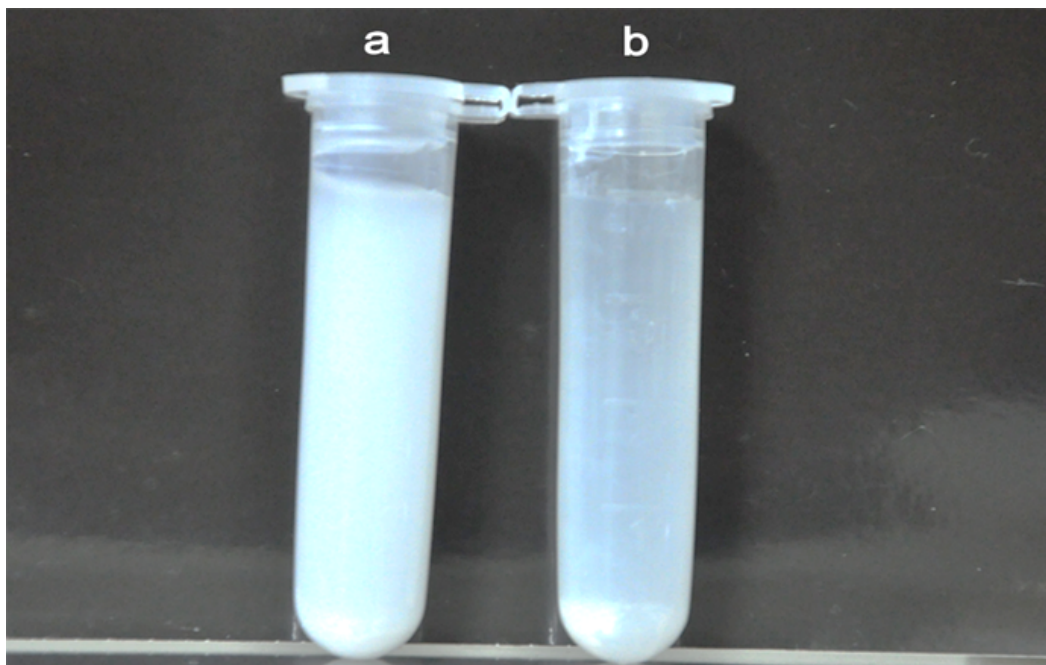


Figure S4. FTIR spectra of the (a) PEGylated $Gd_2O_3:Yb,Er$ samples with varied sintering temperature, (b) $Gd_2O_3:Yb,Er$ and PEGylated $Gd_2O_3:Yb,Er$ samples with sintering at 900 °C.

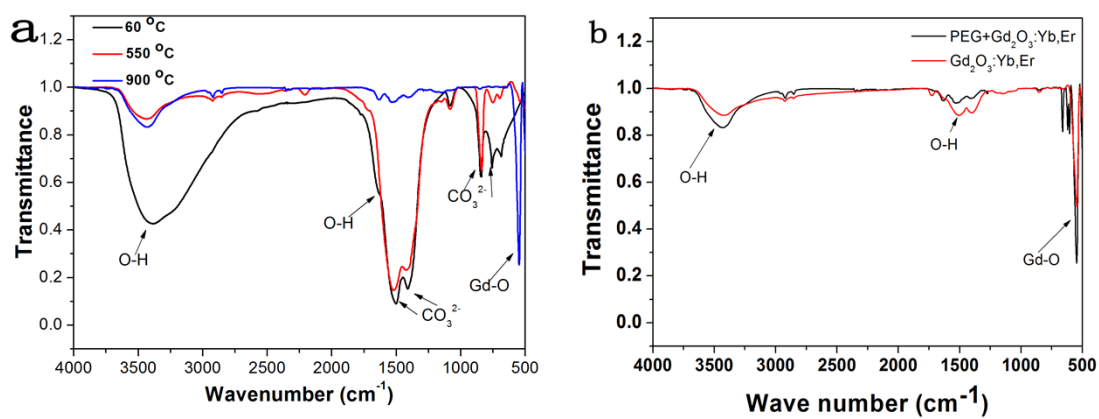


Figure S5. SEM images of $\text{Gd}_2\text{O}_3:\text{Yb},\text{Er}$ nanoparticles with calcination temperature of (a) 1000 °C and (b) 1200 °C.

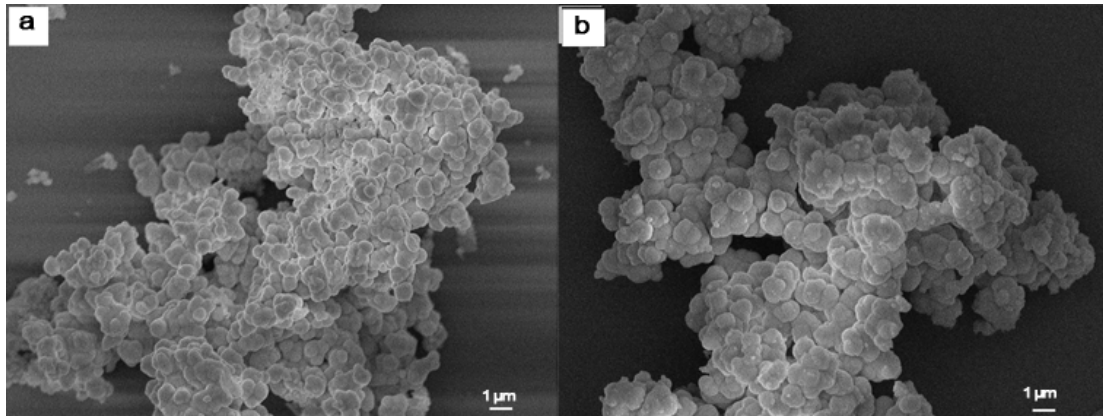


Figure S6 Double-logarithmic plots of the excitation power dependent up-conversion emission intensity of the $\text{Gd}_2\text{O}_3:\text{Yb,Er}$ ($\text{Gd}:\text{Yb}:\text{Er} = 0.890:0.092:0.018$) samples excited by a 980 nm laser.

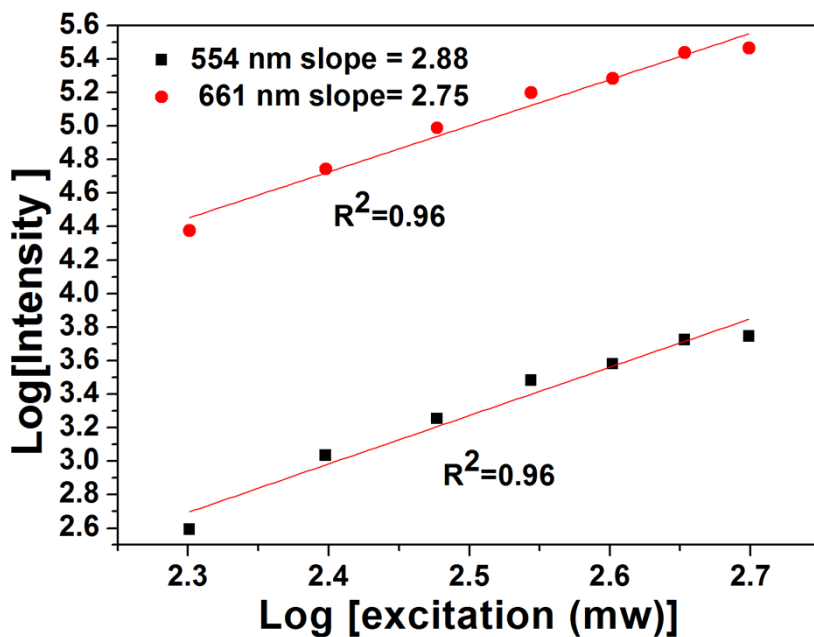


Figure S7 Linear calibration plots between (a) the absorbance at 665 nm and concentration of MB, (b) the absorbance at 265 nm and concentration of 5ALA.

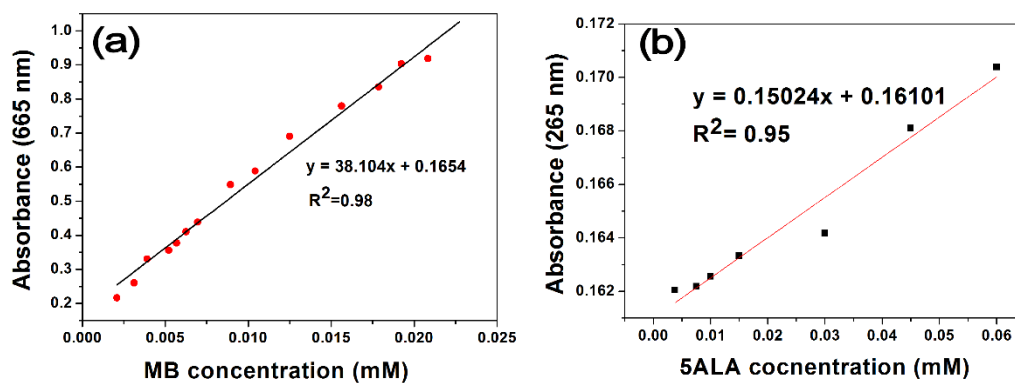


Figure S8. Cell viabilities of HeLa cells incubated with $Gd_2O_3:Yb,Er$ nanoparticles at different concentrations for 24 h, with and without NIR light irradiation.

