

Supplementary Information

Mesoporous silica-coated luminescent Eu³⁺ doped GdVO₄ nanoparticles for multimodal imaging and drug delivery

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Table S1. ICP result of GdVO₄:Eu³⁺ NPs synthesized using various ratios of Gd/Eu

| Insert ratio of Gd/Eu | mol fraction of GdVO ₄ :Eu ³⁺ NPs (mol%) | |
|-----------------------|--|-------|
| | Eu | Gd |
| 1/99 | 1.58 | 98.82 |
| 5/95 | 5.73 | 94.27 |
| 9/91 | 10.04 | 89.96 |
| 11/89 | 12.07 | 87.93 |
| 15/85 | 16.35 | 83.66 |

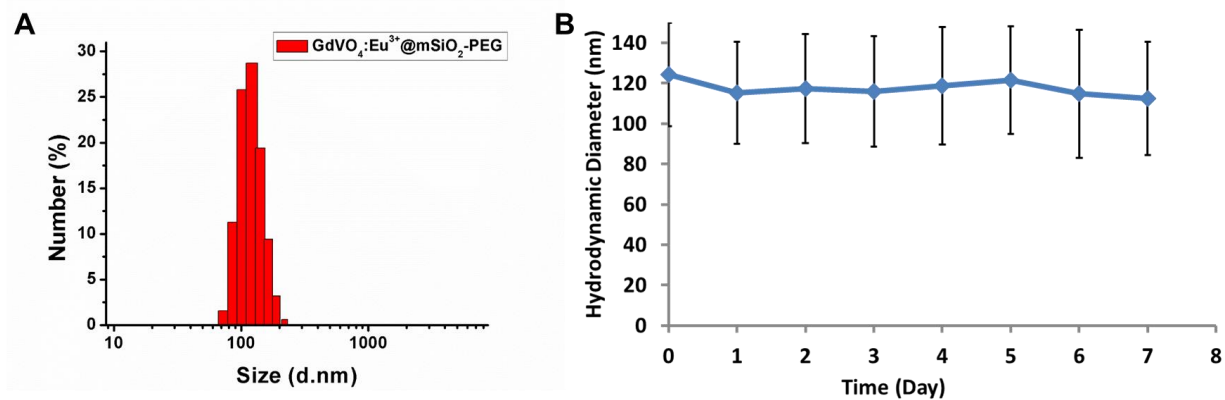


Fig. S1 Hydrodynamic diameters of GdVO₄:Eu³⁺@mSiO₂-PEG NPs in PBS as measured by dynamic light scattering (DLS). (a) The average hydrodynamic diameters was 124 nm on day 0 and (b) maintained at 110-125 nm for over 7 days.

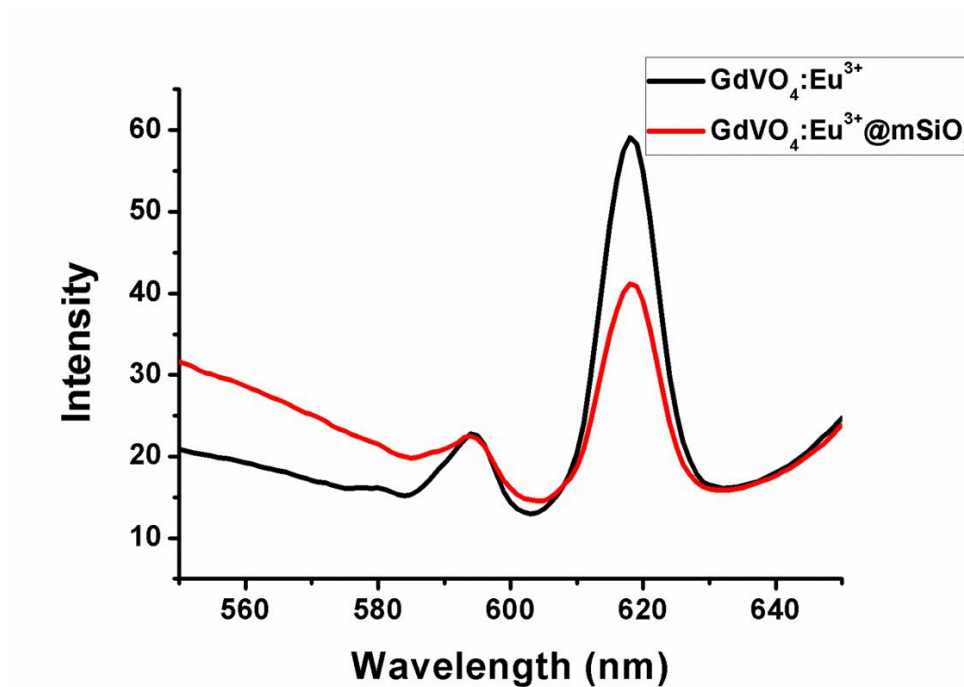


Fig. S2 Room temperature PL spectra of GdVO₄:Eu³⁺ NPs and GdVO₄:Eu³⁺@mSiO₂ NPs (at the same concentration of Eu³⁺; 0.01 mg Eu/mL) under UV irradiation, showing 70% of PL efficiency of GdVO₄:Eu³⁺ NPs was maintained after mesoporous silica coatings.

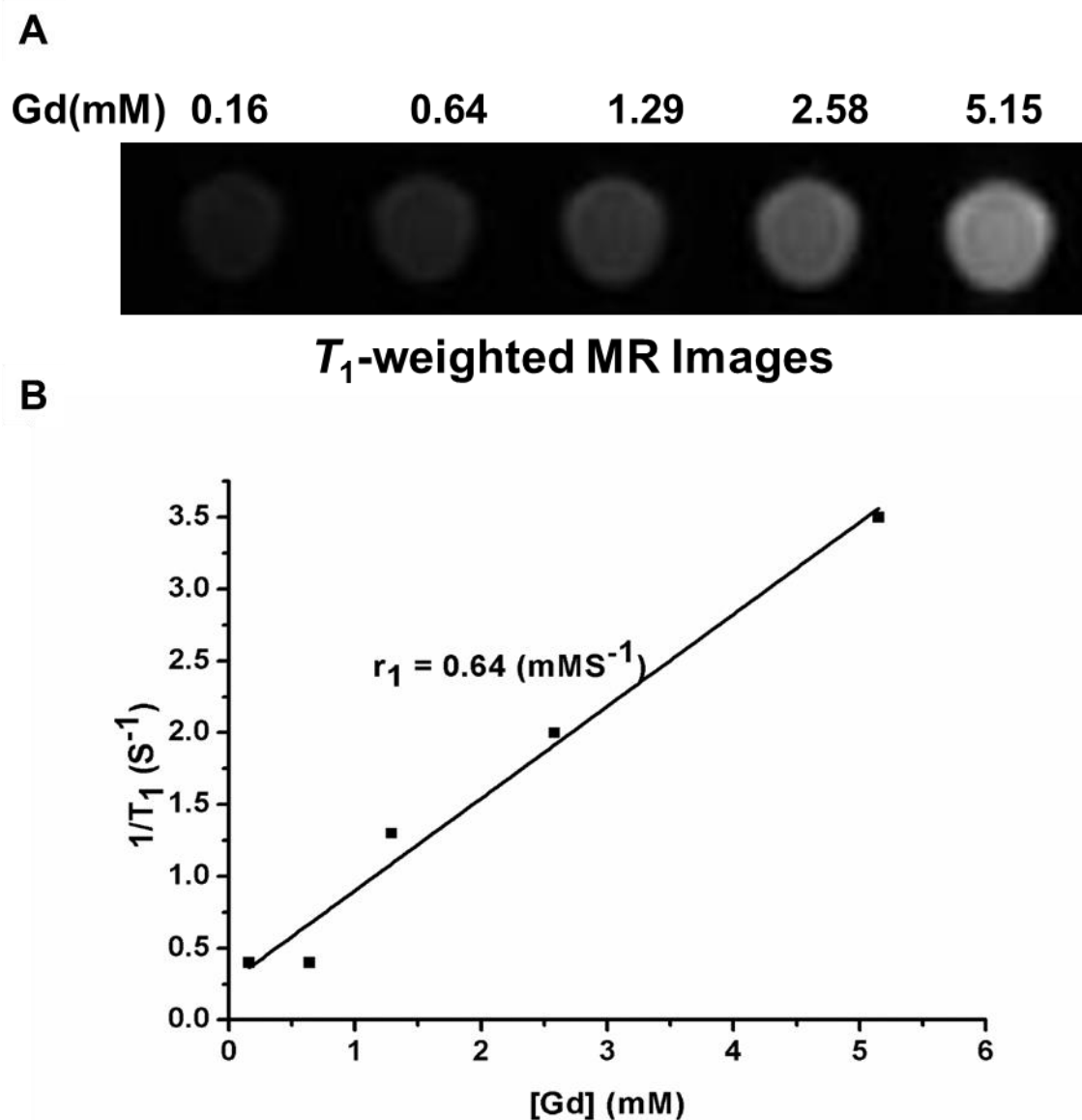


Fig. S3 MR property of the $GdVO_4:Eu^{3+}@dSiO_2$ NPs. (A) T_1 -weighted MR images of the $GdVO_4:Eu^{3+}@dSiO_2$ -PEG NP dispersion in water. The contents of Gd in the dispersions are indicated above the images. (B) Linear plot of Gd concentration versus $1/T_1$ with a relaxivity value (r_1) of $0.64 \text{ mM}^{-1} \text{ s}^{-1}$.

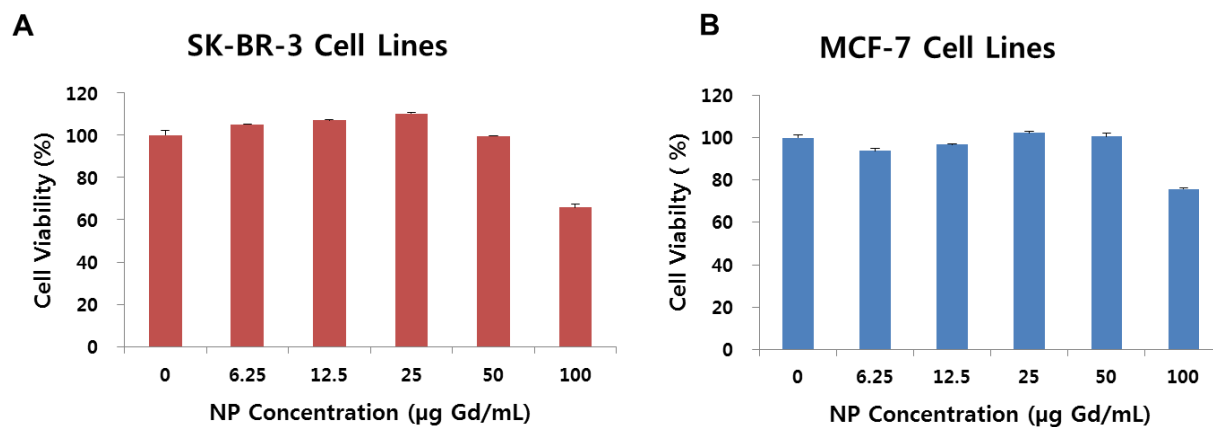


Fig. S4 Assessment of the viability of SK-BR-3 cells (A) and MCF-7 cells (B) by MTT assay after a 24h incubation with GdVO₄:Eu³⁺@mSiO₂-PEG NPs of various concentrations (0, 6.25, 12.5, 25, 50, and 100 µg Gd/mL).

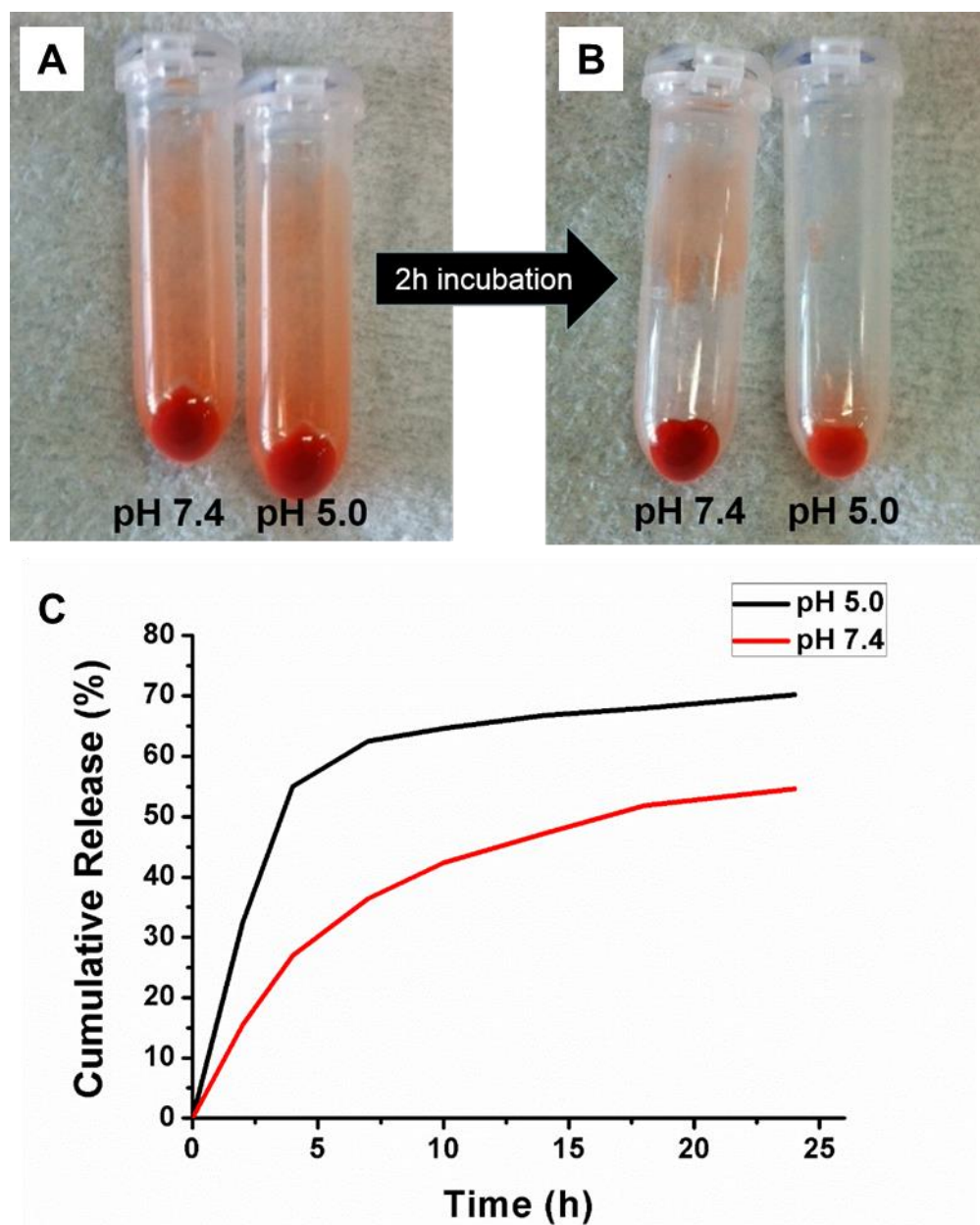


Fig. S5 DOX release profile. Photographs of DOX loaded NPs (A) after DOX loading step, and (B) after 2h incubation. (C) Cumulative release of DOX for 24h at different pHs (black: pH 5.0, red: pH 7.4).

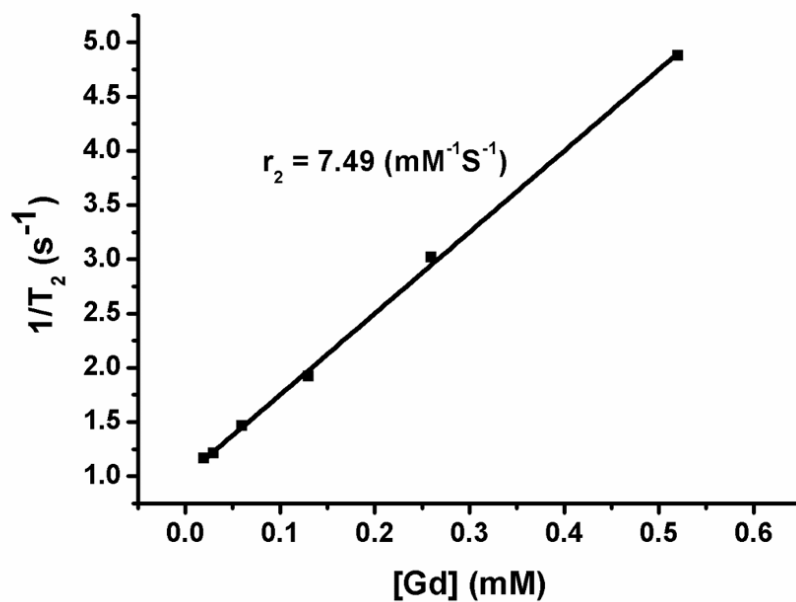


Fig. S6 MR property of the $GdVO_4:Eu^{3+}@mSiO_2$ NPs. Linear plots of Gd concentration versus $1/T_2$ with a relaxivity value (r_2) of $7.49 \text{ mM}^{-1}\text{S}^{-1}$.

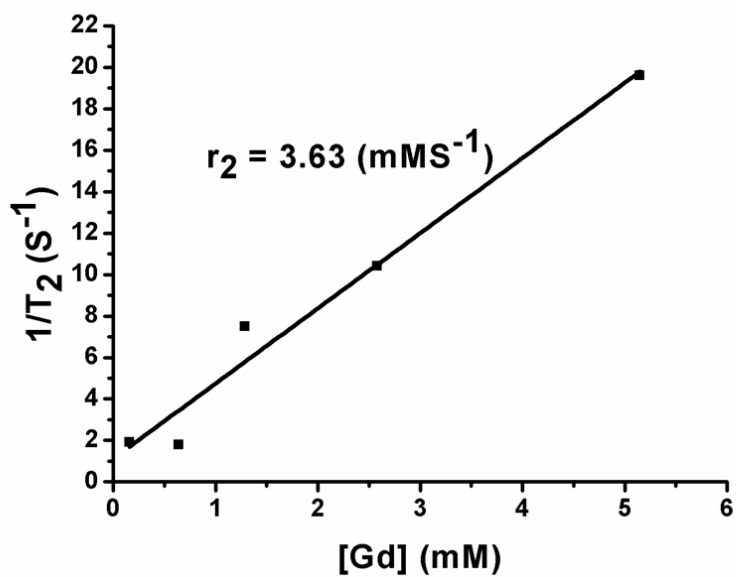


Fig. S7 MR property of the $GdVO_4:Eu^{3+}@dSiO_2$ NPs. Linear plots of Gd concentration versus $1/T_2$ with a relaxivity value (r_2) of $3.63 \text{ mM}^{-1}\text{S}^{-1}$.

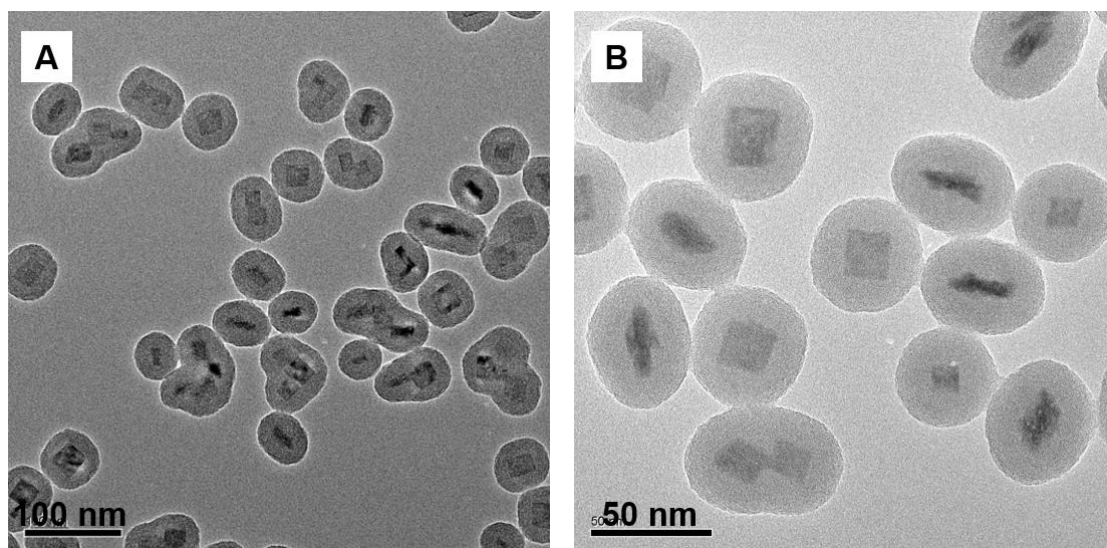


Fig. S8 TEM and HRTEM images of dense silica coated $\text{GdVO}_4:\text{Eu}^{3+}$ NPs ($\text{GdVO}_4:\text{Eu}^{3+}@\text{dSiO}_2$ NPs).