Supporting Information

Ho^{3+} doped $NaGdF_4$ nanoparticles as MRI/optical probes for brain glioma imaging

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Supplemental Methods: Quantum yield

The quantum yield (ϕ) of the TETT-$NaGdF_4$:Ho^{3+} NPs was estimated by comparing the integrated PL intensities (excited at 458 nm) and the absorbance values (at 458 nm) of the TETT-$NaGdF_4$:Ho^{3+} NPs with that of the isothiocyanate (FITC) in PBS (ϕ = 79 %). Specifically, the absorbance values of TETT-$NaGdF_4$:Ho^{3+} NPs and isothiocyanate (FITC) were measured at 458 nm. PL emission spectra of TETT-$NaGdF_4$:Ho^{3+} NPs and isothiocyanate (FITC) were also recorded at an excitation wavelength of 458 nm to obtain the integrated fluorescence intensity, which is the area under the PL curve in the wavelength range from 480 to 700 nm. Then, the integrated fluorescence intensity against the absorbance was plotted and a linear regression was attained for each curve with intercept at zero. Absolute values were calculated according to the following equation:

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$$\Phi_X = \Phi_{ST}\left(\frac{Grad_X}{Grad_{ST}}\right)\left(\frac{\eta_X^2}{\eta_{ST}^2}\right)$$

where, the subscripts ST and X denote FITC standard and TETT-$NaGdF_4$:Ho^{3+} NPs, respectively, U is the fluorescence quantum yield, Grad is the gradient from the linear regression, and η is the refractive index of the solvent (both are 1.33). In order to minimize the re-absorption effects, the absorbance at 458 nm in a 10 mm cuvette was kept below 0.15.

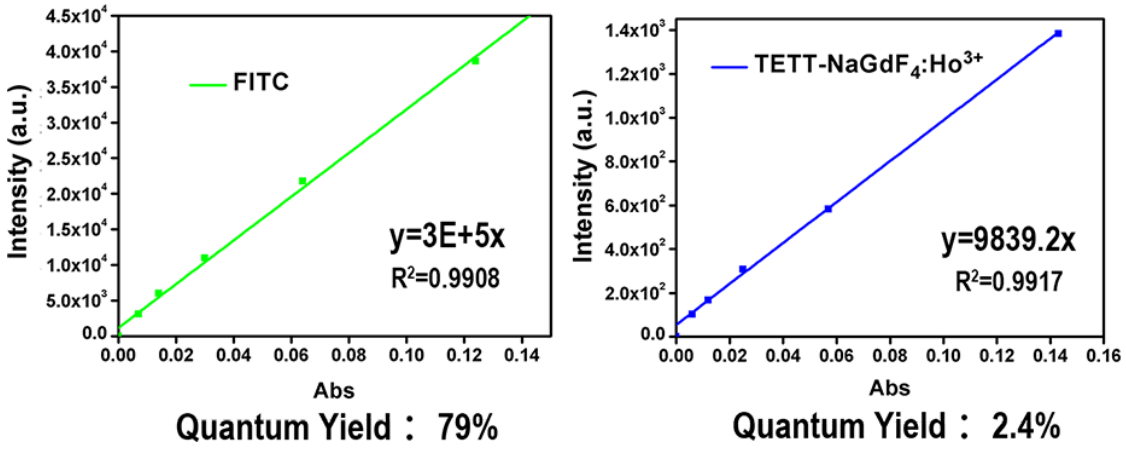

Fig. S1. Quantum yield measurement