materials

Supplementary Material

# Development of Novel Magnetoliposomes Containing Nickel Ferrite Nanoparticles Covered with Gold for Applications in Thermotherapy

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**Evidence of stability of NPs dispersions**

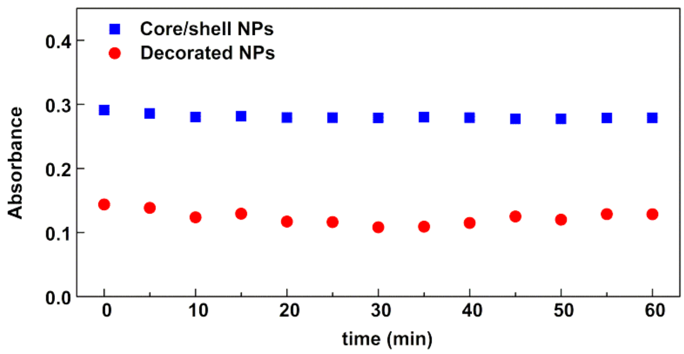


**Figure S1.** UV-Visible maximum absorbance of nanoparticles dispersions in PBS buffer (pH = 7.0) as function of time (5 minutes intervals).

**Fluorescence intensity dependence on temperature in irradiation assays**

Assuming an Arrhenius behaviour for the rate constant, $k_{nr}$, of non-radiative processes, it is possible to determine the temperature in each irradiation assay,

$$k_{nr} = k_0 e^{-\frac{E_a}{RT}} \tag{S1}$$

where $k_0$ is the preexponential factor; $E_a$ is the activation energy, $R$ the gas constant and $T$ the absolute temperature.

The fluorescence quantum yield, $\Phi_F$, is given by

$$\Phi_{\mathrm{F}} = \frac{k_{\mathrm{F}}}{k_{\mathrm{F}} + k_{nr}} \Rightarrow \frac{1}{\Phi_{\mathrm{F}}} - 1 = \frac{k_{nr}}{k_{\mathrm{F}}} \tag{S2}$$

where $k_{\mathrm{F}}$ is the fluorescence rate constant.

Taking as reference the fluorescence quantum yield at room temperature, $\Phi_{\mathrm{F}}^0$, it is obtained

$$\frac{\Phi_{\mathrm{F}}^0}{\Phi_{\mathrm{F}}} - \Phi_{\mathrm{F}}^0 = \Phi_{\mathrm{F}}^0 \frac{k_{nr}}{k_{\mathrm{F}}} \tag{S3}$$

or, similarly,

$$\frac{I_{\mathrm{F}}^0}{I_{\mathrm{F}}} - \Phi_{\mathrm{F}}^0 = \Phi_{\mathrm{F}}^0 \frac{k_{nr}}{k_{\mathrm{F}}} \tag{S4}$$

where $I_F$ represents the fluorescence intensity at a given wavelength.

Therefore, it can be obtained

$$\frac{I_{\mathrm{F}}^0}{I_{\mathrm{F}}} - \Phi_{\mathrm{F}}^0 = \Phi_{\mathrm{F}}^0 \frac{k_0}{k_{\mathrm{F}}} \, e^{-\frac{E_a}{RT}} \tag{S5}$$

Considering, as an approximation, that the fluorescence quantum yield of Rhodamine B near the nanoparticles is much lower than the quenching ratio, $\frac{I_{\mathrm{F}}^0}{I_{\mathrm{F}}}$, that is always above unity, it is obtained:

$$\frac{I_{\mathrm{F}}^0}{I_{\mathrm{F}}} \approx \Phi_{\mathrm{F}}^0 \frac{k_0}{k_{\mathrm{F}}} e^{-\frac{E_a}{RT}} \tag{S6}$$

Or

$$\frac{I_{\mathrm{F}}^0}{I_{\mathrm{F}}} \propto A\, e^{-\frac{E_a}{RT}} \tag{S7}$$