Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.


Supporting Information for:

# Influence of excitation and detection geometry on optical temperature readouts – reabsorption effects in luminescence thermometry

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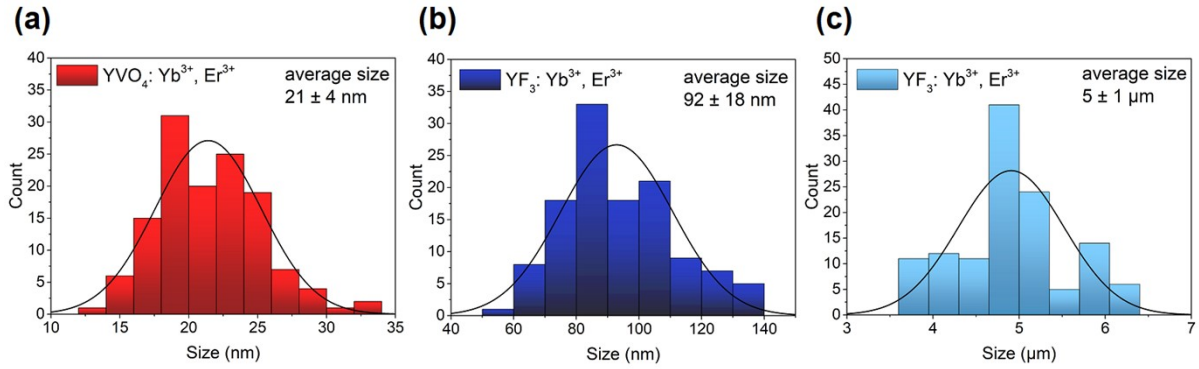


**Figure S1.** Particle size distributions of **(a)** nanocrystalline $YVO_4$: $Yb^{3+}$, $Er^{3+}$, **(b)** nanocrystalline $YF_3$: $Yb^{3+}$, $Er^{3+}$, and **(c)** microcrystalline $YF_3$: $Yb^{3+}$, $Er^{3+}$.

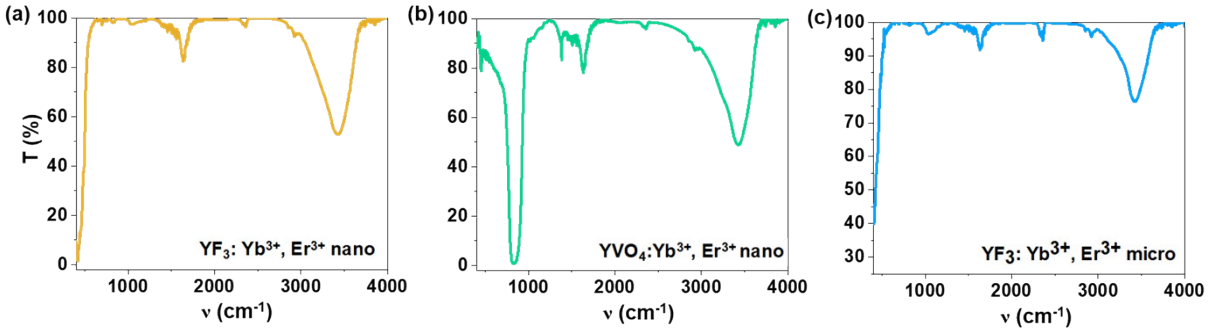


**Figure S2**. FT-IR spectra of **(a)** nanocrystalline $YF_3$: $Yb^{3+}$, $Er^{3+}$, **(b)** nanocrystalline $YVO_4$: $Yb^{3+}$, $Er^{3+}$, and **(c)** microcrystalline $YF_3$: $Yb^{3+}$, $Er^{3+}$.

In order to determine the number of photons participating in the transitions associated with the observed UC emission bands we have used the well- known relation $I_{UC} \propto (I_{pump})^n$ . In this relation $I_{UC}$ is the UC emission intensity, $I_{pump}$ is the pump laser power density and $n$ is the number of photons involved in the UC mechanism. Performing a simple linear fitting, n can be calculated from the slopes of the plotted UC emission intensity as a function of the pump power, both in the logarithmic representations.

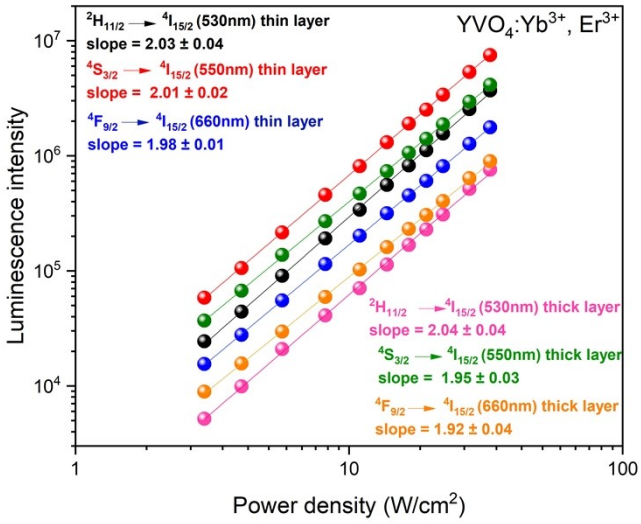


**Figure S3**. Double logarithmic plot of the incident laser power density vs. the luminescence intensity for $YVO_4$: 20% $Yb^{3+}$, 2% $Er^{3+}$.

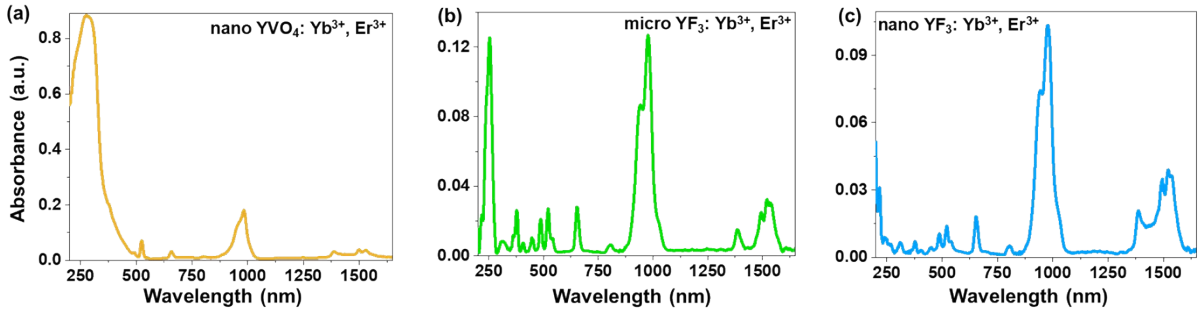


**Figure S4**. Absorption spectra of **(a)** nanocrystalline $YVO_4$: $Yb^{3+}$, $Er^{3+}$, **(b)** microcrystalline $YF_3$: $Yb^{3+}$, $Er^{3+}$, and **(c)** nanocrystalline $YF_3$: $Yb^{3+}$, $Er^{3+}$.

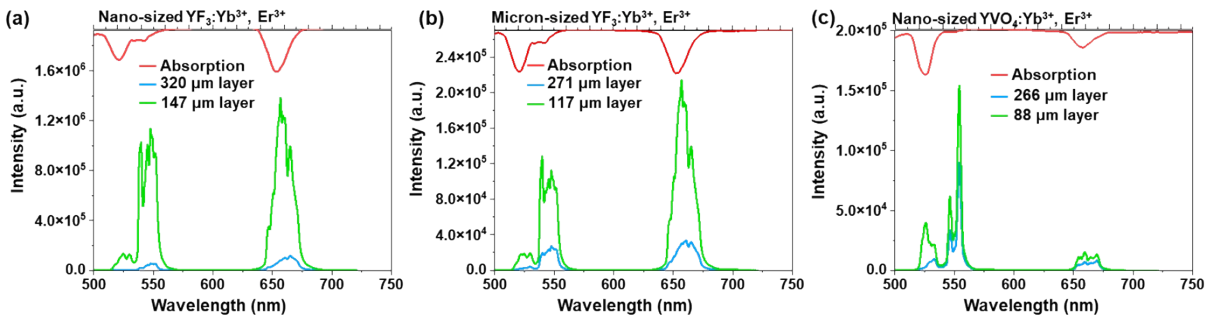


**Figure S5**. Non-normalized UC emission spectra of **(a)** the nano-sized $YVO_4$: $Yb^{3+}$, $Er^{3+}$, **(b)** micron-sized $YF_3$: $Yb^{3+}$, $Er^{3+}$, and **(c)** nano-sized $YF_3$: $Yb^{3+}$, $Er^{3+}$, recorded for different sample thicknesses; ($\lambda_{ex}$= 975 nm, bottom) combined with absorption spectra (top) of the obtained products.

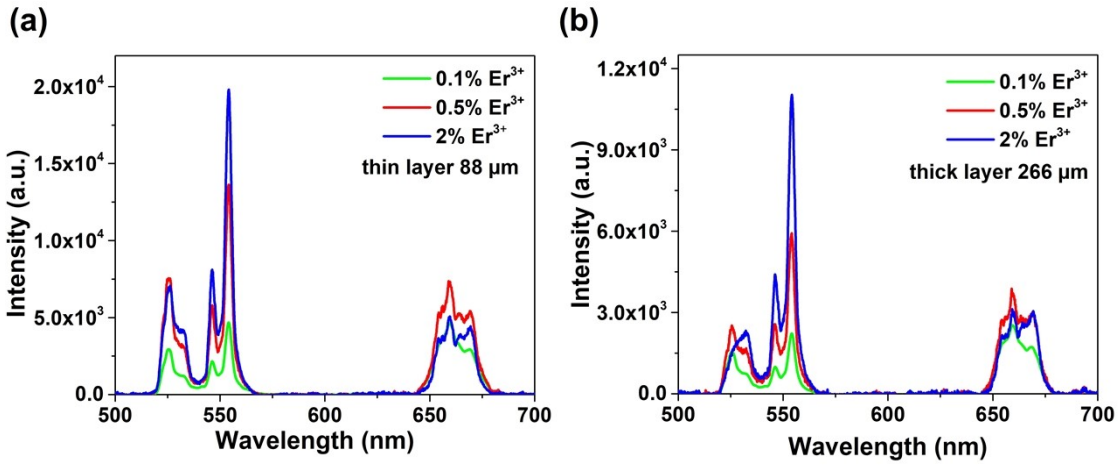


**Figure S6**. Non-normalized UC emission spectra of nanocrystalline $YVO_4$: $Yb^{3+}$, $Er^{3+}$, recorded for different concentrations of $Er^{3+}$ (0.1%, 0.5% and 2%) and for different sample thicknesses: **(a)** 88 μm and **(b)** 266 μm; $\lambda_{ex}$= 975 nm.

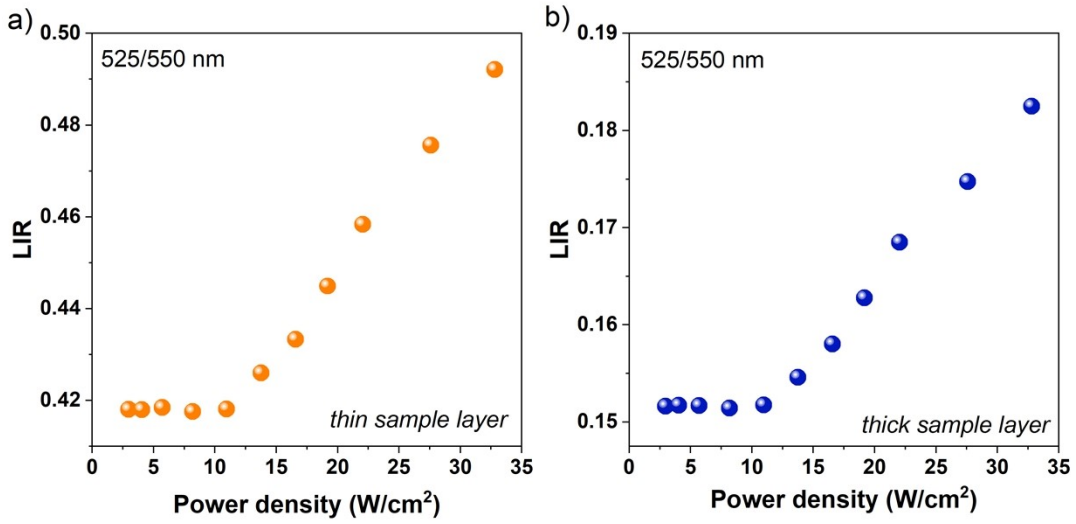


**Figure S7**. Determined LIR values for $Er^{3+}$ TCLs ($^2H_{11/2} \rightarrow {}^4I_{15/2}$ / $^4S_{3/2} \rightarrow {}^4I_{15/2}$) as a function of laser power density for (a) the thin layer sample 88 µm and (b) thick layer sample 266 µm.

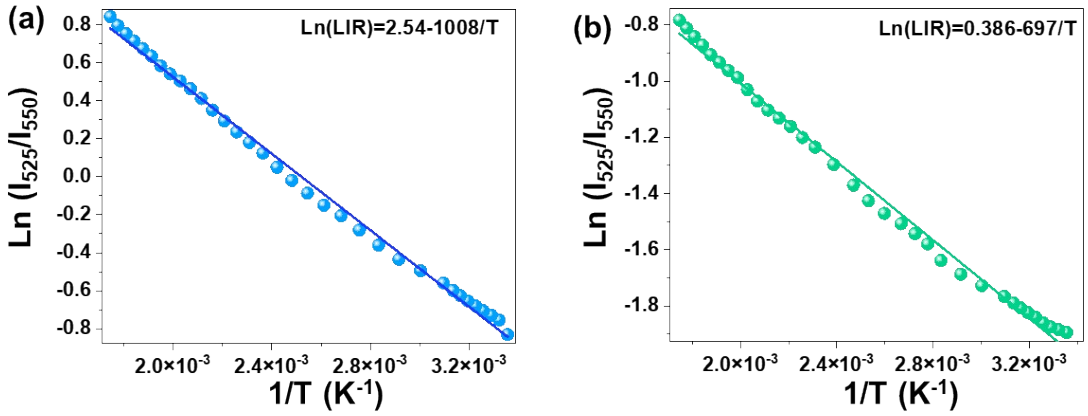


**Figure S8**. The determined LIR values (525/550 nm) as a function of inverse temperature for $YVO_4$: $Yb^{3+}$, $Er^{3+}$ for **(a)** thin layer and **(b)** thick layer of sample.