Supporting Information

From structural phase transition to highly sensitive lifetime based luminescent thermometer: multifaceted modification of thermometric performance in Y_{0.9-x}Nd_xYb_{0.1}PO_4 nanocrystals

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KEYWORDS luminescent thermometry, lifetime, Yb^{3+}, phonon-assisted, orthophosphates

Luminescence decay profiles were fitted using the double-exponential function:

\[ I(t) = A_1 \cdot e^{-t/\tau_1} + A_2 \cdot e^{-t/\tau_2} + y_0 \] (1)

The average lifetime was calculated as follows:

\[ \tau_{\text{avr}} = \frac{A_1 \tau_1^2 + A_2 \tau_2^2}{A_1 \tau_1 + A_2 \tau_2} \] (2)
Figure S1. The XRD patterns of $Y_{0.9-x}Nd_xYb_{0.1}PO_4$ where $x$: 0.15, 0.2, 0.25, 0.30, 0.40, 0.50.
Figure S2. The thermal evolution of emission of $Y_{0.9-x}Nd_xYb_{0.1}PO_4$ upon 808 nm excitation line measured in the temperature range of 123-563K.

Figure S3. The thermal evolution of decay profiles of $Y_{0.9-x}Nd_xYb_{0.1}PO_4$ upon $\lambda_{\text{ex}} = 808$ nm ($\lambda_{\text{em}} = 999$ nm) measured in the temperature range of 123-563K.
Figure S4. The thermal evolution of luminescence decay profile of Yb$^{3+}$ ions in Y$_{0.9}$Yb$_{0.1}$PO$_4$ nanocrystals.
Figure S5. The luminescence quantum efficiency (QY) measured for $Y_{0.9-x}Nd_xYb_{0.1}PO_4$ upon $\lambda_{ex} = 808$ nm as a function of Nd$^{3+}$ concentration.
Figure S6. The temperature resolution of luminescent thermometers based on $Y_{0.9-x}Nd_xYb_{0.1}PO_4$ nanocrystals.