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## Supporting Information

# Synthesis and optical properties of $Y_3(Al/Ga)_5O_{12}$: $Ce^{3+}$, $Cr^{3+}$, $Nd^{3+}$ persistent luminescence nanophosphor: a promising near-infrared-II nanoprobe for biological applications

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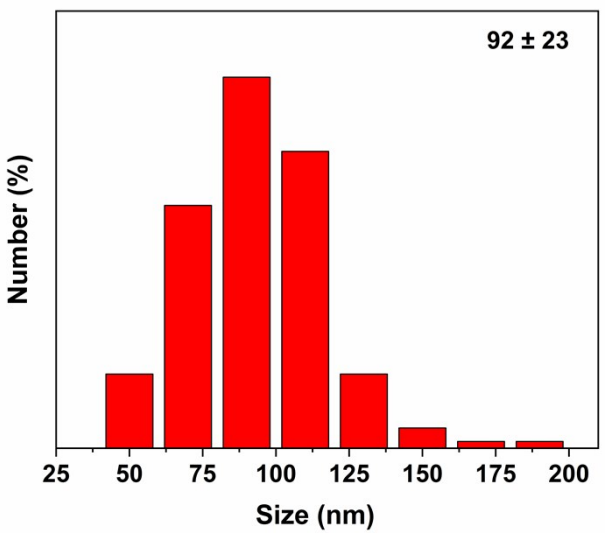


**Fig. S1** Size distribution of the synthesized YAGG: $Ce^{3+}$, $Cr^{3+}$, $Nd^{3+}$ (Ga content of $x$ = 3.75) nanocrystals, which was obtained by calculating 100 particles in the TEM images.

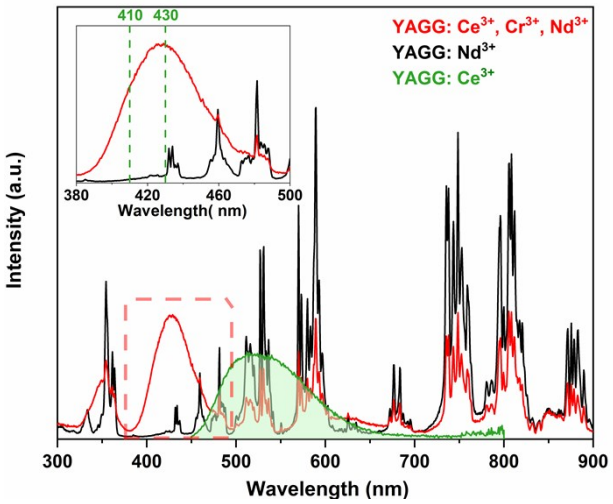


**Fig. S2** Photoluminescence (PL) spectrum of the YAGG: $Ce^{3+}$ ($x$ = 3.75) nanocrystals under excitation at 430 nm. PL excitation spectra of YAGG: $Ce^{3+}$, $Cr^{3+}$, $Nd^{3+}$ ($x$ = 3.75) and YAGG: $Nd^{3+}$ ($x$ = 3.75) nanocrystals by monitoring the emission of $Nd^{3+}$ ions at 1063 nm. The inset shows the enlarged PL excitation spectra in the range of 380 - 500 nm.

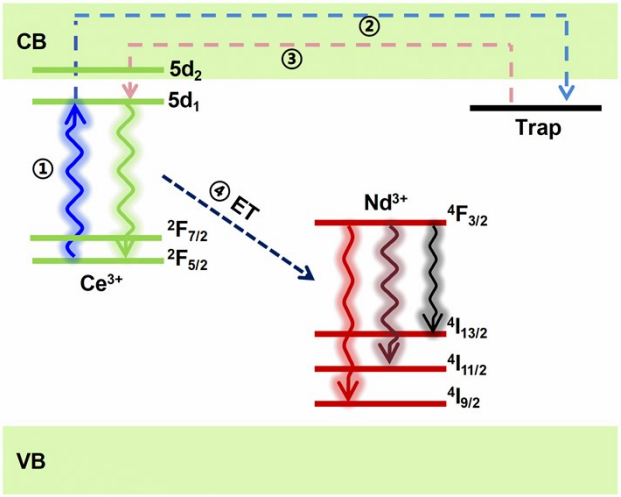


**Fig. S3** Schematic illustration of the proposed persistent luminescence mechanism in YAGG: $Ce^{3+}$, $Cr^{3+}$, $Nd^{3+}$ nanocrystals. VB and CB denote the valence and conduction bands of YAGG: $Ce^{3+}$, $Cr^{3+}$, $Nd^{3+}$, respectively.

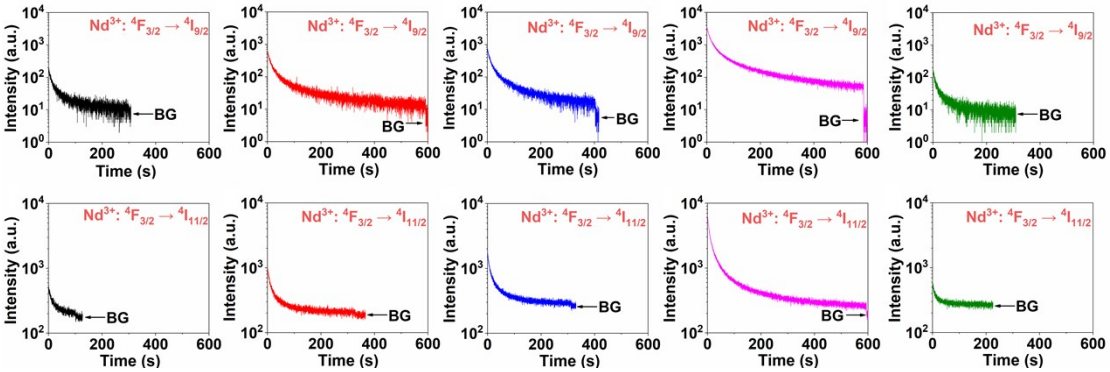


**Fig. S4** Persistent luminescence decay curves recorded by monitoring the emissions at 890 nm (the up panels) and 1063 nm (the bottom panels) of $Nd^{3+}$ ions in YAGG: $Ce^{3+}$, $Cr^{3+}$, $Nd^{3+}$ samples (from left to right: $x$ = 3.00, 3.25, 3.50, 3.75 and 4.00). The samples were illuminated by a 410-nm diode (3 W) for 10 min before measurements.

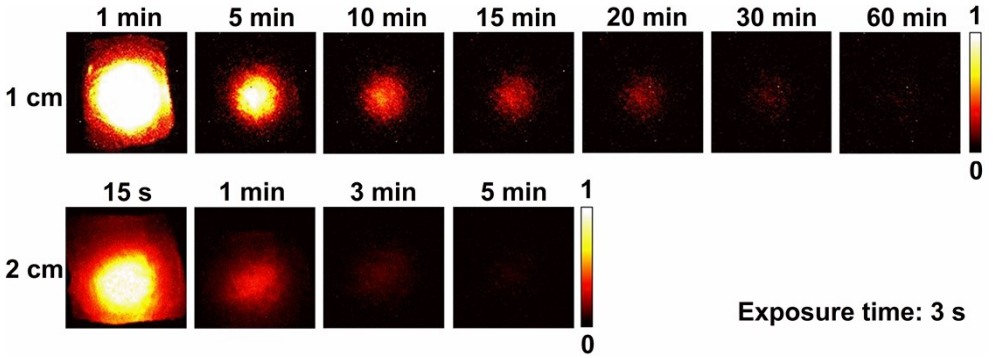


**Fig. S5** NIR persistent luminescence images of the YAGG: $Ce^{3+}$, $Cr^{3+}$, $Nd^{3+}$ ($x$ = 3.75) PLNPs covered with 1 and 2 cm chicken breast taken at different delayed time after being illuminated for 5 min with a 410-nm diode.

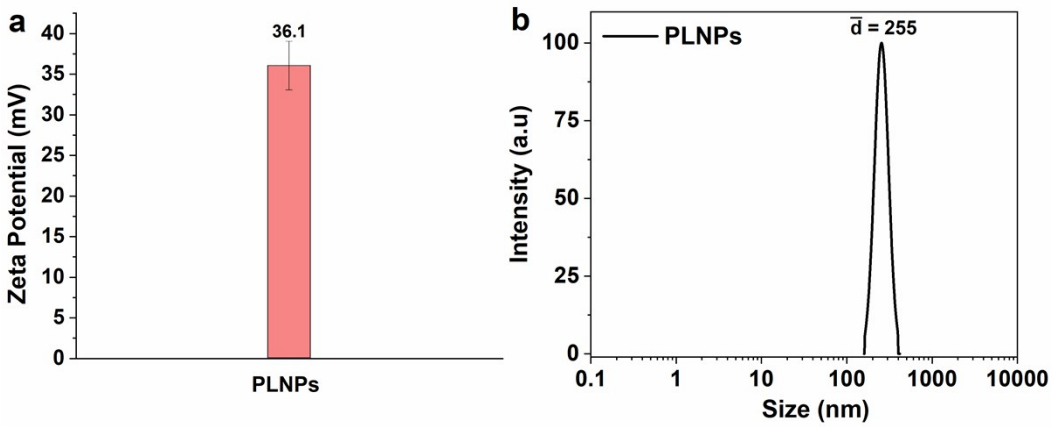


**Fig. S6** (a) The zeta potential and (b) hydrodynamic diameter of YAGG: $Ce^{3+}$, $Cr^{3+}$, $Nd^{3+}$ nanocrystals in ultrapure water (pH = 5.6) measured by dynamic light scattering (DLS) technique.