Phosphor-converted white light-emitting diodes are emerging as an indispensable solid state light source for the next generation lighting industry, until now, major challenges in these materials have been to achieve high luminous efficacy, high chromatic stability and brilliant color rendering properties.

In the present work, Y$_3$Al$_{3.5}$Ga$_{1.5}$O$_{12}$ nanoparticles doped with 1.0, 3.0 and 6.0 mol% of cerium (Ce$^{3+}$) ions were synthesized by a combustion method. From the XRD results, the crystallite sizes were found to be in the range of 14–20 nm. Excitation spectra showed that the samples can be efficiently excited by near UV and blue LEDs. The emission spectra were found by the excitation at 215, 349 and 440 nm producing blue, nearly green-white and green emission respectively. Upon excitation at 440 nm, the emission spectra of all these samples showed one band centered at 518 nm which corresponds to the transition $5d_{1} \rightarrow 2F_{5/2}$ and $5d_{1} \rightarrow 2F_{7/2}$. The chromaticity coordinates of all the prepared nano-phosphors were obtained and found to be dependent on Ce$^{3+}$ ion concentration and excitation wavelength. The decay curves for $5d_{1} \rightarrow 2F_{5/2}$, $7/2$ level of Ce$^{3+}$ ion exhibited a bi-exponential curve and the lifetime values were found to decrease with increasing the Ce$^{3+}$ ion concentration. Quantum efficiency of luminescence Y$_3$Al$_{3.5}$Ga$_{1.5}$O$_{12}$:Ce$^{3+}$ samples have been found to be around 88% and is much higher than bulk and nanoparticles of YAG:Ce$^{3+}$.

**Keywords:** Y3Al3.5Ga1.5O12, YAGG:Ce, Combustion method

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