Pechini synthesis of lanthanide (Eu$^{3+}$/Tb$^{3+}$ or Dy$^{3+}$) ions activated BaGd$_2$O$_4$ nanostructured phosphors: an approach for tunable emissions

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Characterizations:

XRD pattern of the needles type NBs were recorded on Mac Science (M18XHF-SRA) X-ray powder diffractometer with CuK$\alpha$= 1.5406 Å with a step of 0.02°. The morphology, SAED pattern, and HRTEM analysis were performed using the field emission transmission electron microscope (FE-TEM JEOL JEM-2100F), fitted with the energy dispersive X-ray spectromenter (Oxford INCA). KBr pellet based infrared spectrum was recorded in the range of 450-1000 cm$^{-1}$ with a Perkin Elmer spectrum-100 Fourier transform infrared (FTIR) spectrometer. The room-temperature PL and PLE spectra were recorded on a Photon Technology International (PTI, USA) fluorimeter with a Xe-arc lamp of 60 W power. The digital photographs were taken at the time of PL measurement using Samsung Galaxy-S5 smart phone. The quantum yield measurements were carried out using a fluorescence spectrophotometer equipped with the integrating sphere (Hamamatsu Photonics C9920-02). The CL properties were measured by a Gatan (UK) MonoCL3 system attached with the SEM (Hitachi S-4300 SE).
Fig S1. (a) PLE and (b) PL spectra of Eu$^{3+}$ ions co-activated BG:Dy$^{3+}$
**Fig S2.** CL spectra of Eu$^{3+}$ ions co-activated BG:Dy$^{3+}$ phosphors at the accelerating voltage of 5kV, and filament current of 55 μA