Supplemental Information

Synthesis and Luminescent Characteristics of Europium Dopants in SiO_2/Gd_2O_3 Core/Shell Scintillating Nanoparticles

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Room-temperature thin-film photoluminescence was measured with a spectrophotometer (FP-6500, Jasco, Inc.) equipped with a 150W Xenon lamp source and a photomultiplier tube (PMT) detector. Quantum yield measurements of solid thin film samples used an integrating sphere (60 mm diameter; $BaSO_4$ coating; *Spectralon* reflectance standards). The quantum yield (QY) of core/shell and multi-shell scintillation nanoparticles is defined to be the percent of emitted photons versus absorbed photons, i.e. S_2 divided by (S_0-S_1) as illustrated in Fig. S1 below. Here S_0 is the number of incident photons measured using a reflective standard, S_1 and S_2 are the number of incident photons not absorbed and luminous photons emitted by the thin film samples, respectively. All the nanoparticle samples were mixed into 500 μL of 4 % polymethyl methacrylate (PMMA) and stirred for more than 48 hours to obtain a homogeneously mixed solution. The uniformity of the thin film is evident from the emission photos under ultra-violet (UV) excitation shown in the insets of Fig. 6. Each sample was tested at least twice in two to three different areas to ensure reproducibility of the data.

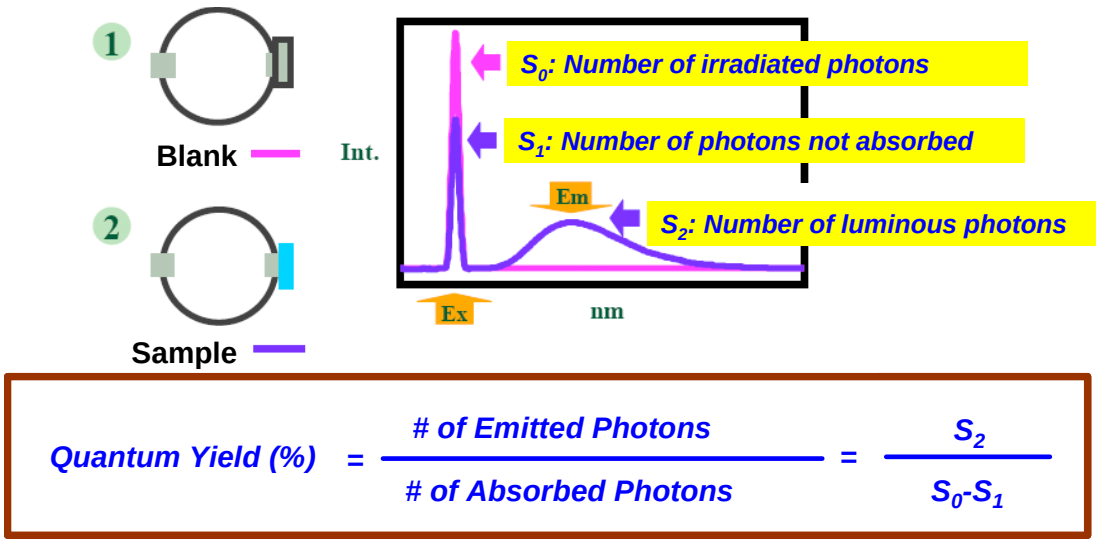

FIGURE S1. Schematic diagram of thin film quantum yield (QY) measurement [1, 2].

References

1. A. Monkman and L.-O. Pålsson, *Adv. Mater.*, 2002, **14**, 757.
2. L. Porrès, A. Holland, L.-O. Pålsson, A. Monkman, C. Kemp and A. Beeby, *J. Fluorescence*, 2006, **16**, 267.