SYNTHESIS OF HIGHLY LUMINESCENT $LAF_3:LN^{3+}/LAF_3$ CORE/SHELL NANOCRYSTALS AND $LAF_3:LN^{3+}$ IN COMBINATION WITH CDTE QUANTUM DOTS

Řezáčová Lenka[a], Lubal Přemysl[a], Runowski Marcin[b], Lis Stefan[b], Vaněk Jakub[a]

[a]*Department of Chemistry and CEITEC, Masaryk University, Kamenice 5, 625 00 Brno, Czech Republic*

[b]*Department of Rare Earths, Faculty of Chemistry, Adam Mickiewicz University, Grunwaldzka 6, 60780 Poland*

Abstract

LaF3: Gd3+ 30% Ce3+ 10% Eu3+ 1% (core-shell) nanoparticles have been successfully synthesized via a co-precipitation approach. Transmission electron microscope (TEM), photoluminescence spectra (PL) and lifetime measurements were used to characterize the samples. Three organic modifiers (polyacrylic acid (PAA), ethylenediaminetetraacetic acid (EDTA), citric acid (CA)) were used to prepare surface-modified nanoparticles (e.g. PAA-modified nanoparticles ~5-6 nm). Due to the presence of Eu3+ in the structure, all samples showed a bright red luminescence (λex = 248nm).

Preparation LaF3: (Gd3+ 30%, Ce3+ 10%, Eu3+ 1%) of nanoparticles conjugated with CdTe quantum dots was performed by two methods. The first method includes mixing of two products while the second method was based on the co-precipitation approach. From the measurement of dynamic light scattering (DLS), it is evident that mixing of the individual components does not lead a new product. On contrary, the product obtained by synthesis led to particles having about 140 nm in diameter. The product exhibits red (λex = 248nm) and green (λex = 340 m) luminescence due to the presence of Eu3+ ion and CdTe quantum dots.

Keywords: LaF3:Ln3+ nanoparticles, CdTe quantum dots

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