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Spectroscopic studies of nanofluorides doped with Ln3+ synthesized via thermal decomposition of organic precursors

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<p>There has been a growing demand for quantum cutting and upconverting efficient nano luminescent materials during the last decades. Wide band gap luminescent materials, specially the fluoride, are one of the major role players. Due to a number of advantages such as the excellent transparency in theinfrared (IR) to far ultraviolet (UV) range and low-energy phonons as well as low toxicity they have recently gathered considerable attention for their potential applications in bioimaging, disease detection and diagnostics. The same group of materials having downconversion characteristics can be applied for the improvement of solar cell efficiency in the quantum cutting processes. Here, we report on the synthesis and luminescence properties of colloidal double fluorides which belong to the general composition MF-LnF3 co-doped with optically active rare earth ions. During the thermal decomposition of the alkaline metals trifluoroacetate and lanthanide trifluoroacetate precursors NaYF4, KYF4, and KY3F10 samples have been obtained. The noncoordinating, high-boiling solvent octadecene was selected as the growth medium for the nanoparticles. Oleiamine and oleic acid were employed as the surfactant, which attached to the particle surface during the crystal growth and kept the nanoparticles well-separated from each other. Nanocrystals of RE3+ doped in the range of 40 nm were obtained. High Resolution Transmission Electron Microscopy (HRTEM) was used to evaluate the morphology and particle size distribution (PSD) of the prepared nanoparticles. The structural (XRD) and spectroscopic properties of optically active lanthanides doped fluorides have been determined based on the excitation spectra, emission spectra and luminescence decay curves recorded in the UV-Vis spectral regions.

Level (Hons, MSc,
   PhD, other)?

Phd

Consider for a student
   award (Yes / No)?

No

Would you like to
 submit a short paper
 for the Conference
 Proceedings (Yes / No)?

Yes

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