THE EFFECT OF SYNTHETIC CONDITIONS ON NIR FLUORESCENCE OF LANTHANUM FLUORIDE NANOPARTICLES

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It is well known that the luminescent properties of the rare earth nanomaterials may vary significantly depending not only on the compound phase, but also on their microstructure and morphology [1, 2]. Very important here is the nanomaterial crystallinity, surface state and, most importantly, the presence of the defects (from point defects to pores) and functional groups that can serve as luminescence quenchers. Previously [1, 3] our group reported the detailed studies on the luminescent properties of the rare earth phosphates nanoparticles with different synthetic pre-history. In particular, we showed that –OH groups of water molecules can quench fluorescence of rare-earth ions very effectively, thus decreasing the fluorescence quantum yield. These studies also suggest that the –OH quenchers are distributed in the volume of the material, rather than on its surface. Thus, in order to improve the fluorescent properties of the material, one need to choose the optimal synthetic path, which allows to obtain the nanomaterials with the desired real structure, morphology and the state of surface.

In this work we study how the chosen method of synthesis (co-precipitation, microwave-hydrothermal synthesis or thermal decomposition in high-boiling solvents) affects structural and optical properties of the NIR-fluorescent $LaF_3:Nd^{3+}$ nanoparticles, suitable for imaging and treatment of cancer tumors. This work was supported by the RSF (project # 16-12-10077).

References

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