## Specialization: 010604 Optical information technologies

Program: **09 Laser physics and quantum optics**

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**Biocompatible fluorescent inorganic nanoparticles**

**for medical diagnostic label's preparation**

# ***I.E. Kolesnikov***

The aim of the present work is to study the luminescent properties of nanocrystalline powders Y2O3, YVO4 and Y3Al5O12 (YAG) doped with europium rare-earth ions.

In the literature review a number of articles devoted to the study of the luminescence’s dependence on many various factors such as the composition of the host, the method of synthesis, the size and shape of particle grain, the synthesis temperature and the concentration of the ligand were examined.

In the experimental part the luminescence spectra of different nanocrystalline powders were measured. The temperature and concentration dependences of luminescence were studied for nanopowders YVO4:Eu3+ and Y3Al5O12:Eu3+. Also the asymmetry coefficients were calculated. Excitation spectrum was obtained for YVO4:Eu 16% 1000oC. Raman spectrum was measured for YVO4:Eu 16% with annealing temperature 950oC.

The most efficient phosphors are determined to be YVO4:Eu3+. For these samples kinetics of luminescence were measured and lifetime of europium’s level 5D0 were calculated. Also the kinetics was studied for solutions of nanopowders YVO4:Eu with different stabilizers.

Publications list:

1. Kolesnikov I., Dolinskaya J., Kurochkin A., Mikhailov M. Luminescence properties of nanocrystalline YVO4:Eu3+ and Y2O3:Eu3+// Book of abstracts of “Nonlinear Photonics 2011”. — 2011. — p. 44
2. Kolesnikov Ilya. Efficient phosphors based on nanocrystalline powders doped with europium // Book of abstracts of the International Student Conference “Science and Progress 2011”. — 2011. — p. 155
3. Kolesnikov Ilya. Luminescence spectra of YVO4 and Y2O3 nanopowders // Proceedings of the International Student Conference “Science and Progress 2011” — in print.
4. Mikhailov M.D., Semencha A.V., Kolesnikov I.E., Manshina A.A. Synthesis and study of the structure of nanoparticles Y2O3: Eu // Modern problems of science and education. — 2012. — № 2.
5. Mamonova D.V., Medvedeva T.A., Kolomichenko N.S., Kolesnikov I.E. Synthesis of yttrium aluminum garnet nanoparticles in salt melts // Proceedings of the conference “Future of optics - 2012”. — in print.