должна допускать наличие отличного от нуля вектора Дзялошинского и антисимметричного обменного взаимодействия Дзялошинского-Мория. Важнейшей задачей является определения знака и величины вектора Дзялошинского. В данной работе рассматривается новый теоретический подход для решения данной задачи. В качестве проверки теоретического подхода был выбран объемный кристалл MnSi, для которого уже имеются экспериментальные данные о взаимодействии Дзялошинского-Мория [1,2]. Нарушение инверсионной симметрии в кристалле MnSi и приводит к наличию антисимметричного обменного взаимодействия. На основе теоретической модели был разработан программный комплекс для проведения численных экспериментов.

2. K. V. Shanavas and S. Satpathy. Phys. Rev. B 93, 195101 (2016).
3. C. Dhital, L. DeBeer-Schmitt, Q. Zhang, W. Xie, D. P. Young, and J. F. DiTusa. Phys. Rev. B 96, 214425 (2017).

INFLUENCE OF ELECTRON EMISSION ON SPECTROSCOPIC PROPERTIES OF SOME PHOSPHATES WITH Pr^{3+} IMPURITY

Kiselev S. A.[1], Pustovarov V. A.[1], Lukashov A. S.[1]

[1)] Institute of Physics and Technology, Ural Federal University, Ekaterinburg, Russia

E-mail: sviat-kiselev@yandex.ru

This paper reports the spectroscopic properties of praseodymium-doped phosphates, $KLuP_2O_7$, $Sr_9Sc(PO_4)_7$, $K_3Lu(PO_4)_2$ doped with Pr^{3+} ions. Spectra of photoluminescence (PL) upon UV-VUV excitation, PL excitation, thermally stimulated luminescence was measured.

In recent years investigation of new scintillating materials based on rare earth-doped inorganic compounds gets huge attention due to potential variety of their applications in different spheres, such as detecting systems, medical tomography, nuclear physics, etc. Their properties are partly produced by presence of fast interconfigurational 5d – 4f optical transitions. In comparison with widely used impurity Ce^{3+} ions, praseodymium emission is located in higher energy region and has shorter lifetime (20-30 ns instead of 30-60) [1]. Emission transitions 5d – 4f of Pr^{3+} appear when strong enough crystal field moves the lowest $4f^15d^1$ excited state lower than $^1S_0$ state [2].

It is well known that most compounds change their emission characteristics in irradiation conditions. Thus, in this paper some results of comparative spectroscopy are presented. Observed polycrystalline samples were synthesized via solid state reaction in Laboratory of Luminescent Materials (University of Verona, Italy). Phase purity control was realized by powder X-ray diffraction technique (PXRD). Recordings of luminescence spectra were done with pure samples and after irradiating with electrons (E = 10 MeV) from linear electron accelerator.

Results of non-irradiated spectroscopy measurements of studied samples were previously published in [3-5]. For example, in Fig. 1 spectra of $KLuP_2O_7$ photoluminescence upon UV excitation before (black) and after irradiation (red) are presented. It can be easily observed that redistribution of interconfigurational transitions is observed. In addition, defect-related luminescence in 400-500 nm region extracts towards lower energies and single band divides into two peaks.

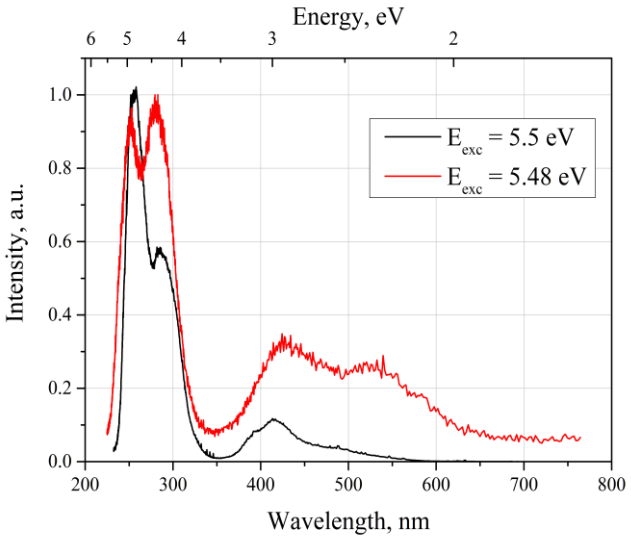

Рис. 1. Photoluminescence spectra of $KLuP_2O_7:Pr^{3+}$ (1%) upon UV excitation (E_{exc}), T = 295 K before (black) and after irradiation (red) with 10 MeV electrons from LINAC

The work was partially supported by the Ministry of Science and Higher Education of the Russian Federation (through the basic part of the government mandate, project No. FEUZ-2020-0060).

1. K.V. Ivanovskikh, Q. Shi, M. Bettinelli, V.A. Pustovarov, Opt. Mater. 79, 108-114 (2018).
2. A.M. Srivastava, J. Lumin. 169, 445–449 (2016).
3. V.A. Pustovarov, K.V. Ivanovskikh, S.A. Kiselev, E.S. Trofimova, S. Omelkov, M. Bettinelli, Opt. Mater. 108, 110234 (2020).
4. В.А. Пустоваров, К.В. Ивановских, Ю.Е. Хатченко, В.Ю. Иванов, M. Bettinelly, Q.Shi, Физика тв. тела 61, 866-871 (2019).
5. M. Trevisani, K. Ivanovskikh, F. Piccinelli, M. Bettinelli. J. of Chemical Sciences. 152, 2-6 (2014).