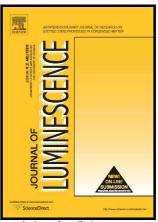
## Author's Accepted Manuscript

Comparative study of the luminescent properties of oxide compounds under synchrotron radiation excitation: Lu<sub>2</sub>O<sub>3</sub>:Eu nanopowders, ceramics and films

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## **ACCEPTED MANUSCRIPT**

Comparative study of the luminescent properties of oxide compounds under synchrotron radiation excitation: Lu<sub>2</sub>O<sub>3</sub>:Eu nanopowders, ceramics and films

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**Abstract.** The paper is dedicated to the comparative study of the luminescent properties of  $Lu_2O_3$ :Eu (5%) nanopowders, ceramics and film samples using excitation by the synchrotron radiation in the range of the fundamental absorption edge of  $Lu_2O_3$  host. The luminescence of  $F^+$  centers in the band peaked at 400 nm with a lifetime about of 1.4 ns was observed in  $Lu_2O_3$ :Eu nanopowder. We have also determined the energy of creation of excitons bound with the  $F^+$  centers in  $Lu_2O_3$  host which is equal to 5.36 eV. The notable differences in the luminescence properties of  $Lu_2O_3$ :Eu nanopowder, ceramic and film samples were found which are caused by involvement of the  $F^+$  centers at the grain boundaries of ceramics and surface of nanoparticles in the excitation processes of the  $Eu^{3+}$  luminescence in  $Lu_2O_3$  host. The positions of the high energy levels of the  $Eu^{3+}$  ions in  $Lu_2O_3$  matrix ware determined in details. We have found also the energy of creation of excitons bound with  $Eu^{3+}$  in the  $Lu_2O_3$  host which is equal to  $E_{ex}(Eu)$ =5.7 eV at 8 K. Meanwhile, the differences in the  $E_{ex}(Eu)$  values in  $Lu_2O_3$ :Eu nanopowders, ceramics and films were also observed to be caused by participation of the host defects and flux impurities in the excitation processes of the  $Eu^{3+}$  luminescence in these samples.

**Keywords:** Lu<sub>2</sub>O<sub>3</sub>, Eu<sup>3+</sup> dopant, nanopowders, ceramics and films, luminescence, excitons, F<sup>+</sup> centers

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