Title: **Photo- and radioluminescent properties Lu_2WO_6:Bi and Sr_2SiO_4:M (M= Ce, Eu) in the temperature range 10 – 300 K.**

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Abstract

The PhD thesis is devoted to the structural, morphological and spectroscopic characteristics of powders: Lu_2WO_6:Bi and Sr_2SiO_4:M (M= Ce, Eu). Radioluminescence measurements of Lu_2WO_6:Bi powders were carried out in the temperature range of 10 - 300 K, while for Sr_2SiO_4 powders:M (M= Ce, Eu) at room temperature. Photoluminescence measurements of powders- excitation and emission spectra were recorded at 10 and 300 K for Lu_2WO_6:Bi and 30 and 300 K for Sr_2SiO_4:M (M= Ce, Eu). For silicates also were recorded thermoluminescence spectra in the temperature range 40 - 500 °C.

The results of structural studies have shown that pure monoclinic phase Lu_2WO_6, can be obtained at 1200 and 1400 °C, and doping with Bi^{3+} ions does not change the structure of the compound. The analysis of radio- and photoluminescence studies showed that Bi^{3+} and WO_6 groups are able to capture the energy of excitating radiation by trapping charge carriers. The obtained results let us to propose a schematic energy diagram and a configuration diagram, which characterize spectroscopic process in the system.

In the case of Sr_2SiO_4:M (M = Ce, Eu) powders the research were focused on developing a synthesis method allowing to receive two polymorphic forms: orthorhombic (α'-Sr_2SiO_4) and monoclinic (β-Sr_2SiO_4). The results of structural research determined the parameters which allows to obtain pure phase compounds. It has been proved that: temperature, method of heating, type and amount of flux, as well as the type and amount of admixture ions affect the crystallization. Performed spectroscopic studies of two varieties of polymorphs Sr_2SiO_4:M (M = Ce, Eu) showed the emission from the activator ions occupying two inequivalent positions in the structure, and the occurring energy transfer between the ions takes place based on the Förster mechanism. Analysis of spectroscopic results showed that an efficient luminescence was obtained for powders crystallizing in a monoclinic system. Additionally, for silicates doped with Ce^{3+} or Eu^{2+} ions, were recorded thermoluminescence spectra. It was shown that both activators act as hole trapping centers, and in the same time they are emission centers in the thermoluminescence process. The electron is trapped on the defect which arises in the production process of materials - oxygen vacancy.