DESCRIPTION FOR THE GENERAL PUBLIC

Luminescent materials, also referred to as phosphors, from the XVII century to the present day arouse interest in the scientific world. The reason is their wide range of applications in everyday life and specialized technologies XXI century. Examples include: modern, energy-efficient lighting, fluorescent paint, plasma displays, monitors, but also more technologically advanced diagnostic medical devices and lasers. It should be noted, however, that each field of science where the phosphors are used constantly looking for materials which will be characterized by better parameters than now available. Phosphors which are able to absorb electromagnetic radiation and emit light energy of visible (VIS), infrared (IR), ultraviolet (UV) or (rarely), vacuum ultraviolet (VUV).

A particularly interesting group of phosphors are thermoluminescent materials which are used as personal dosimeters, the phosphors with long-lasting afterglow and X-rays and optical storage. Thermoluminescence is (excess relative to the thermal emission) the light emission during heating of the material previously X-rays or ultraviolet sometimes visible (sun) irradiated.

The subject of the research project are "Thermoluminescent properties of $LuPO_4$:Eu ceramics". The orthophosphates with lanthanide-dopant elements in numerous publications have been described as potential laser materials, scintillators in medical imaging, plasma display phosphors, because of the beneficial chemical and physical properties. However, have not been described the thermoluminescent properties of $LuPO_4$:Eu ceramics which can emit a very intensive red light during thermal stimulation after X-rays irradiation of materials (Figure 1).

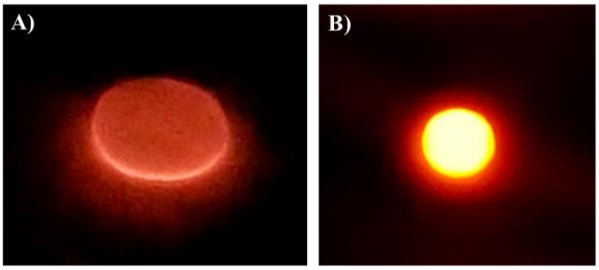

Fig. 1. The thermoluminescent effect of $LuPO_4$:Eu ceramics during X-rays irradiation (A), and thermal stimulation of the material (B). Photo B) was performed when the material has reached the temperature of ~ 170 ° C.

Understanding the mechanism of the so strong thermoluminescence phenomenon of $LuPO_4$:Eu ceramics can become the basis of the design new, more efficient, and above all more precise thermoluminescent detectors. However, the most important stage of the research is that the project will give a new portion of knowledge about thermoluminescent materials and physical processes mechanisms responsible for it. Such an understanding gives a chance for more conscious modeling of the thermoluminescent properties of this material type in the future.

Personal dosimetry is very important for people who in their everyday work are exposed to ionizing radiation (α, β, γ, X). This kind of devices are capable of absorbing radiation to which man is exposed and store this energy. Then it is possible to "read" the dose of ionizing radiation, by measuring the amount of light emitted by the phosphor when it is thermal and / or optical stimulated. This information is extremely important for the health and even the lives of people exposed to ionizing radiation during X-ray working medical diagnostic and the nuclear industry. Understanding the mechanisms responsible for thermoluminescent properties $LuPO_4$:Eu give important knowledge about thermoluminescent materials.