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WELCOME

The aim of the conference is to overview and share information about the latest achievements in bioceramic nanotechnologies with the scientific community. Over the duration of the conference, scientists from the fields of chemistry, physics, technology, medicine and implantology will be able to acquaint themselves with synthesis methods, unique properties, and applications of bioceramic nanomaterials.

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The book was compiled by:

Aivaras Kareiva (ORCID 0000-0002-9375-7226)
Greta Inkrataitė (ORCID 0000-0001-7173-7454)
Liudas Daumantas (ORCID 0000-0002-2649-4286)

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Determination of Different Garnet Films Characteristics Prepared Using Sol-Gel and Spin or Dip-Coatings Techniques

G. Inkrataitė*, R. Skaudžius
Institute of Chemistry, Faculty of Chemistry and Geosciences, Vilnius University, Naugardukas st. 24, LT-03225 Vilnius, Lithuania
e-mail: greta.inkrataite@chgf.vu.lt

ABSTRACT

In recent years materials with luminescent properties have become very popular. In addition, these materials are very popular for usage in lamps and other light emitting devices, but nowadays scintillators and their research is becoming a very interesting subject for scientists. Scintillators are the basis for devices, that are used for radioactive contamination detection and measurement, nuclear material monitoring, also they are included in the computer detector composition of the tomography devices. There are various compounds that can be used as scintillators, but one of the most popular are those which have a garnet structure [1]. Amongst others, these can be yttrium or lutetium aluminum garnet, doped with different lanthanides (YAG:Ln; LuAG:Ln). These inorganics compounds have the required optical properties and radiation resistance and can, therefore, be used for thermal neutron and high energy radiation (X-ray, γ-radiation) detection [2]. The development of new scintillators is important. However, not the materials which are used are important but also their form. The preparation of powder is the simplest, but they are not suitable for the construction of scintillator detectors. Best suited and used for the manufacture of various devices are single crystals. In addition to single crystals, coatings on various pallets or microfibers can be used [3]. Using the sol-gel method we can obtain homogeneous multicomponent coatings at low temperatures, leaving the possibility of synthesizing compounds with emission intensity.

Improvement of luminescence is essential for getting the fastest scintillators properties. One way to do this is to additionally dope compounds with other elements. Replacing one element with another in the crystal lattice can influence the properties of the materials. The most common goal is to improve key parameters: compound emission intensity and decay times. One of the greatest scintillators drawbacks that is being addressed is that decay time is too long. When it is extremely long, then these second signal captured by the materials overlaps with the first, making the results unreliable and provides less data than it could. Scintillators such as YAG:Ce and LuAG:Ce doped with boron or magnesium can solve this problem. If a quick quench of decay time was obtained given result would be more accurate, and this method of synthesizing scintillators could be practically applicable [4].

In this work cerium boron and/or magnesium doped YAG and LuAG are synthesized on sapphire and quartz substrates using the dip-coating and spin-coating methods. Boron and magnesium are expected to improve required luminescent properties, and with the sol-gel method, homogeneous compounds will be synthesized at low temperatures. Phosphor coatings were analyzed by x-ray diffraction (XRD), scanning electron microscopy (SEM). Of course, emission, excitation spectra and decay times have been investigated as well.

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