

INTERNATIONAL  
CONFERENCE ON

NANOSTRUCTURED  
BIOCERAMIC  
MATERIALS



2020 December 1-3<sup>rd</sup> | VILNIUS UNIVERSITY | VILNIUS

Vilnius University Press

# 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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ISBN 978-609-07-0557-5 (digital PDF)





## Sol-Gel and Molten Salt Synthesis of Novel Y<sub>3-2x</sub>Ca<sub>2x</sub>Ta<sub>x</sub>Al<sub>5-x</sub>O<sub>12</sub> Garnet Structure Phosphors

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### ABSTRACT

There is a strong demand for the development of new inorganic luminescent materials which nowadays shows tremendous progress through physics, engineering, chemistry, biology and medicine. The growing need for LEDs and laser development by the human society demands environmentally friendly synthesis techniques, safe use and fabrication of low-cost novel multifunctional materials. One of the most suitable ways to solve this demand is to search for novel structure garnets and ceramics for versatile applications with controllable broad color tuning and improvement of quantum yield, thermal and radiation stability. The incorporation of garnet structure compounds into the glass ceramics is a good alternative for the conventional LEDs and laser diodes due to their potentially low manufacturing costs, high efficiency and ease of processing [1-3].

Yttrium aluminum garnet Y<sub>3</sub>Al<sub>5</sub>O<sub>12</sub> (YAG) doped with trivalent rare-earth ions shows optical, thermal and physical properties comparable to single-crystal rods, and currently is used in a wide variety of applications. The YAG ceramics is easier to fashion into shapes ideal for newly designed laser devices, and it can be less expensive to fabricate in large quantities. As is generally recognized that the lasing performance of single crystals is restricted. From the spectroscopic point of view, poly-crystalline transparent ceramics can substitute a single lasing crystal with extending capabilities. The increased compositional versatility of transparent ceramics enables tailoring improved laser materials. However, the optical properties of transparent ceramics strongly depend on their microstructure, which is a direct consequence of sintering [4-6].

In this research, two methods of synthesis are compared. Sol-Gel synthesis, is the most exploited method for the synthesis of metal oxides. This method is based on the hydrolysis, condensation, and polymerization reactions of metal precursors. Molten Salt synthesis, the synthesis of metal oxides, which involves the use of molten salt as the medium for preparing complex oxides from their constituent materials [7,8].

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