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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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Sol-Gel Synthesis and Characterization of $SrTiO_3$-$BiMnO_3$ Solid Solutions

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ABSTRACT

Perovskites are the large family of compounds that have crystal structure related to the mineral $CaTiO_3$. ABX_3 is the general formula for perovskites, where A and B are two cations and X is anion (halide, nitride, sulfide or oxygen) that bonds to both [1]. Due to multiple combinations of A and B elements and different crystal structures, this type of materials display large variation of physical properties, including piezoelectricity [2], multiferroicity [3], colossal magnetoresistance [4] etc. As a result of high variety of physical properties, inorganic perovskite-type materials have wide ranges of applications such as information storage devices, fuel cells, gas sensors. Moreover, these materials can be used in medicine as well. For example, $La_{0.75}Sr_{0.25}MnO_3$ (LSMO) based magnetic fluids (MF) were applied for treatment of rat tumors. It was observed that single intratumoral administration of LSMO-based MF results in complete tumor regression for 15-35 % of rats [5].

$SrTiO_3$ is another perovskite-type material, which can be used in medicine. Well-ordered $SrTiO_3$ nanotube arrays, which are capable of Sr release at slow rate and for a long time, was succesfully fabricated on titanium. This material showed good biocompatability, also it can induce precipitation of hydroxyapatite from stimulated body fluids and can be considered an ideal candidate for osteoporotic bone implants [6]. Furthermore, Ni^{2+} and Er^{3+} co-doped $SrTiO_3$ demonstrated applicative potential for luminescent nanothermometer for biomedical purposes [7].

In present study, solid solutions of $SrTiO_3$-$BiMnO_3$ have been synthesized using an aqueous sol-gel method. The maximal substitution level was determined. The thermal behaviour of precursor gels was investigated by thermogravimetric and differential scanning calorimetry (TG-DSC) measurements. X-ray diffraction (XRD) analysis was performed for the characterization of phase purity and crystallinity. Scanning electron microscopy (SEM) was employed for the estimation of morphological features. Moreover, $SrTiO_3$-$BiMnO_3$ specimens were also characterized by FT-IR and magnetization measurements were carried out for all samples.

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