Association of Metallurgical Engineers of Serbia
Faculty of Technology and Metallurgy, University of Belgrade
Institute for Technology of Nuclear and Other Mineral Raw Materials
Institute of Chemistry, Technology and Metallurgy
Vinca Institute of Nuclear Sciences
Serbian Foundrymen's Society

MME SEE 2019

Metallurgical & Materials Engineering Congress of South-East Europe

BOOK OF ABSTRACTS

June, 5th - 7th 2019, Belgrade, Serbia
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Editors:

Dragomir Glišić
Branislav Marković
Vaso Manojlović

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Faculty of Technology and Metallurgy, University of Belgrade

Branislav Marković
Institute for Technology of Nuclear and Other Mineral Raw Materials

Vaso Manojlović
Faculty of Technology and Metallurgy, University of Belgrade

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PREFACE

The Fourth Metallurgical & Materials Engineering Congress of South-East Europe (MME SEE 2019) is a biannual meeting of scientists, professionals, and specialists working in the fields of metallurgical and materials engineering. The aim of the Congress is to present current research results related to processing/structure/property relationships, advances in processing, characterization, and applications of modern materials.

Congress encompasses a wide range of related topics and presents the current views from both academia and industry: Future of metals/materials industry in South-East European countries; Raw materials; New industrial achievements, developments and trends in metals/materials; Ferrous and nonferrous metals production; Metal forming, casting, refractories and powder metallurgy; New and advanced ceramics, polymers and composites; Characterization and structure of materials; Recycling and waste minimization; Corrosion, coating, and protection of materials; Process control and modeling; Nanotechnology; Sustainable development; Welding; Environmental protection; Education; Accreditation & certification.

The Editors hope that Congress will stimulate new ideas and improve the knowledge in the field of metallurgical and materials engineering.

The Congress is organized jointly by the Association of Metallurgical Engineers of Serbia, Faculty of Technology and Metallurgy, University of Belgrade, Institute for Technology of Nuclear and Other Mineral Raw Materials, Institute of Chemistry, Technology and Metallurgy, Vinca Institute of Nuclear Sciences and Serbian Foundrymen's Society.

The Editors would like to thank the Scientific and the Organizing Committee, the Congress Secretariat - CONGREXPO d.o.o. and all those who helped in making the Congress a success.

Special thanks are due to the Ministry of Education, Science and Technological Development of the Republic of Serbia and sponsors for the financial support of the Congress.

Editors

CHARACTERIZATION OF LANTHANUM-DOPED PHOSPHATE GLASS

Vladimir Topalović[1], Srđan Matijašević[1], Jelena Nikolić[1], Marija Đošić[1], Veljko Savić[1], Sonja Smiljanić[2], Snežana Grujić[2]

e-mail: v.topalovic@itnms.ac.rs

[1]Institute for the Technology of Nuclear and Other Mineral Raw Materials, 86 Franchet d' Esperey St, 11000 Belgrade, Serbia,
[2]Faculty of Technology and Metallurgy, University of Belgrade, Karnegijeva 4, 11000 Belgrade, Serbia

Due to their potential biomedical application, different types of phosphate-based glasses were studied and evaluated for drug delivery applications and bone tissue engineering.
The addition of lanthanum to modified apatite was found to improve its biocompatibility and lower the cytotoxicity against osteoblast.

In this paper, glass-ceramic with the composition $42P_2O_5 \cdot 40CaO \cdot 5La_2O_3 \cdot 10Na_2O \cdot 3TiO_2$ (mol %) was obtained by the standard melt-quenching method. The raw materials used for glass synthesis were reagent grade $(NH_4)_2HPO_4$, Na_2CO_3, $CaCO_3$, La_2CO_3, and TiO_2. Powder X-ray diffraction analysis confirmed the quenched melt to be vitreous.

To examine the glass crystallization non-isothermal crystallization was studied using DTA. Samples were crystallized at the appropriate temperature according to the DTA analysis. The XRD technique was used to identify the phase composition of the crystallized bulk glass samples.

XRD analysis of the powdered sample showed that during sintering the glass particles crystallized and the determined crystalline phases were: α-$Ca_2P_2O_7$, β-$Ca_2P_2O_7$, $Ca_{10}Na(PO_4)_7$, LaP_5O_{14}, β-$NaTiOPO_4$, $Ca_2P_2O_7 \cdot 4H_2O$, $Ca(PO_3)_2$, β-$Ca_3(PO_4)_2$, $Ca_3(PO_4)_2$, γ-$Ca(PO_3)_2$, $NaCa(PO_3)_3$. For α-$Ca_2P_2O_7$, β-$Ca_3(PO_4)_2$ and β-$Ca_2P_2O_7$, the bioactivity, i.e., the ability to promote the formation of apatite (HAP) layer after reaction with the surrounding body fluid, has been reported. The obtained phase composition of the glass-ceramic indicated its possible application as a bioactive material for bone tissue engineering.

Keywords: polyphosphate glass, bioactive glass-ceramic, α-$Ca_2P_2O_7$, β-$Ca_3(PO_4)_2$, β-$Ca_2P_2O_7$