FIRST INTERNATIONAL CONFERENCE ON ELECTRON MICROSCOPY OF NANOSTRUCTURES

ELMINA 2018

ПРВА МЕЂУНАРОДНА КОНФЕРЕНЦИЈА О ЕЛЕКТРОНСКОЈ МИКРОСКОПИЈИ НАНОСТРУКТУРА

August 27-29, 2018, Belgrade, Serbia
27–29. август 2018. Београд, Србија

FIRST INTERNATIONAL CONFERENCE

ELMINA 2018

PROGRAM

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BOOK OF ABSTRACTS

Rectorate of the University of Belgrade, Belgrade, Serbia
August 27-29, 2018
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Serbian Academy of Sciences and Arts and Faculty of Technology and Metallurgy, University of Belgrade

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ELMINA 2018
Program and Book of Abstracts

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GENERAL INFORMATION

DATE AND VENUE: The conference will be held August 27-29, 2018 at the Rectorate of the University of Belgrade, Studentski Trg 1, 11000 Belgrade, Serbia with the beginning at 8:30 AM on August 27th, 2018, in the Solemn Hall.

REGISTRATION: At the registration desk, located and the ground floor hall of the conference venue. Registration desk working hours are: Sunday, August 26th, from 16:00 to 18:00, Monday, August 27th, from 08:00 to 18:30, Tuesday, August 28th, from 08:00 to 13:00, Wednesday, August 29th, from 08:00 to 11:00. Registered participants will receive a nametag and a conference bag.

INSTRUCTIONS FOR AUTHORS: The conference will feature plenary sessions and poster sessions as well as vendor presentations during lunch breaks. Presentations during plenary sessions will last 30 minutes each, including discussion. Standard and hands-free microphones will be on site. No A-V equipment will be provided for any poster presentations. Poster presenters must remain at their poster on their assigned day during the required poster session. Each poster will be allocated a 130 cm high and 95 cm wide (130X95) display area.

CONFERENCE AWARDS: Poster presentations will be reviewed according to the following criteria: (a) relevance to a specific symposium, (b) scientific content, quality and innovative proposals, (c) clarity of the text, and (d) compliance with the format. During the conference, the best three (3) posters, selected by a poster award committee, will receive awards.

Synthesis of Phosphate Based Bioactive Glass-ceramics Scaffolds

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In recent years, because of dissolution behavior, bioactivity and biocompatibility, there is an expanding interest for development and application of phosphate-based glasses as biomaterials in medicine [1, 2]. These glasses are preferable than silica-based glasses because of their more controllable dissolution rate [3, 4]. A number of techniques have been developed to fabricate bioactive porous glass–ceramic scaffolds for application in bone tissue engineering [5-7]. In this paper, the 3D macroporous bioactive glass–ceramic scaffolds based on $42P_2O_5$•40CaO•5SrO•$10Na_2O$•-$3TiO_2$ (mol %) glass were prepared by polyurethane (PU) foam replication technique and analyzed.

The appropriate batch composition of raw materials was melted at 1250 °C for 0.5 h in a Pt crucible. Obtained glass samples were transparent, without visible residual gas bubbles. In order to obtain desired particle size (< 5μm), the glass sample was ground at 400 rpm during 1h in a SFM-1 Desk-Top Planetary Ball Miller, MTI Corporation.

The polymeric template used for scaffolds preparation was a commercial PU sponge. The sponge cubes were soaked into the glass slurry, compressed, dried and thermally treated (650 °C, 1h) in order to remove the organic phase and to obtain macroporous glass-ceramic scaffolds. The sintering temperature for glass was chosen according to DTA and HSM experiment performed previously [8].

Scaffolds structure and morphology were analyzed by stereo microscope (EU Instruments) and a scanning electron microscope (MIRA X 3 TESCAN). The phase composition of the sintered scaffold was determined by XRD analysis using a Philips PW-1710 automated diffractometer.

Figure 1, shows the structure of PU sponge, used as scaffolds template that exhibits 3-D network of pores, which vary in size from 100 to 600 μm. In Figure 2, the SEM micrograph of PU skeleton coated with glass particles is shown. As may be seen in Figure 3, the morphology of the scaffold sintered at T = 650 °C for 1h remains highly porous without significant decrease of the pore size. The images revealed that the pore struts are well sintered.

XRD analysis of the powdered scaffold showed that during sintering the glass particles crystallized and the crystalline phases determined are: $Ca(PO_3)_2$, β-$Ca_3(PO_4)_2$, α-$Ca_2P_2O_7$ and β-$Ca_2P_2O_7$ (Figure 4). For 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 [9]. The obtained phase composition and the microstructure of as-prepared scaffold indicated its possible application as a bioactive material for bone tissue engineering [10].

References:

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[10] The authors are grateful to the Ministry of Education and Science, Republic of Serbia for financial support (Projects TR 34001 and OI 172004).

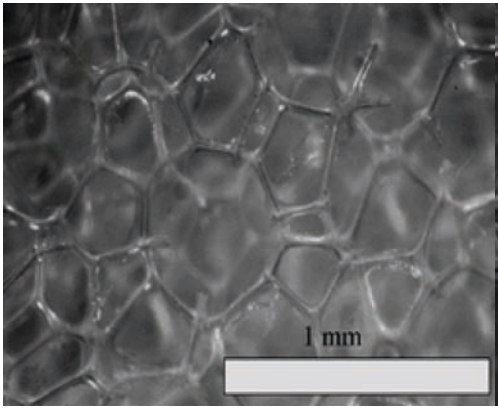

Figure 1. Bare PU sponge.

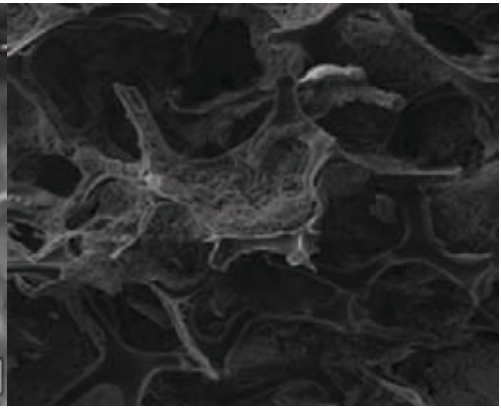

Figure 2. SEM micrograph of PU sponge covered with glass particles.

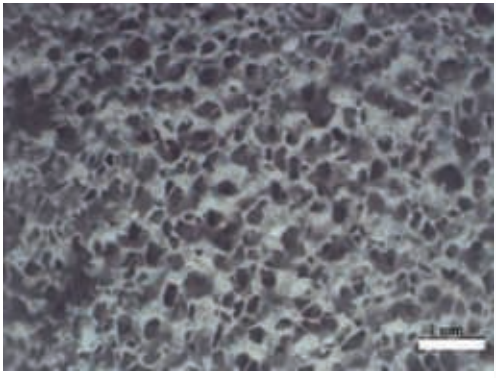

Figure 3. Sintered glass-ceramics scaffold structure.

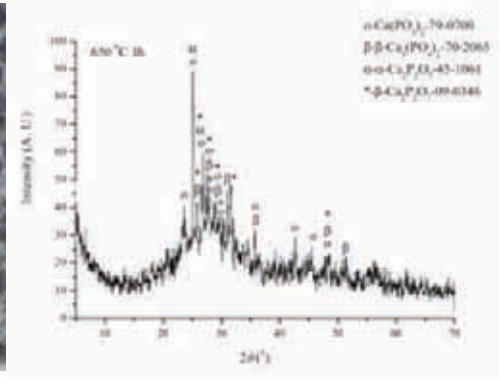

Figure 4. XRD pattern of the sintered scaffold.