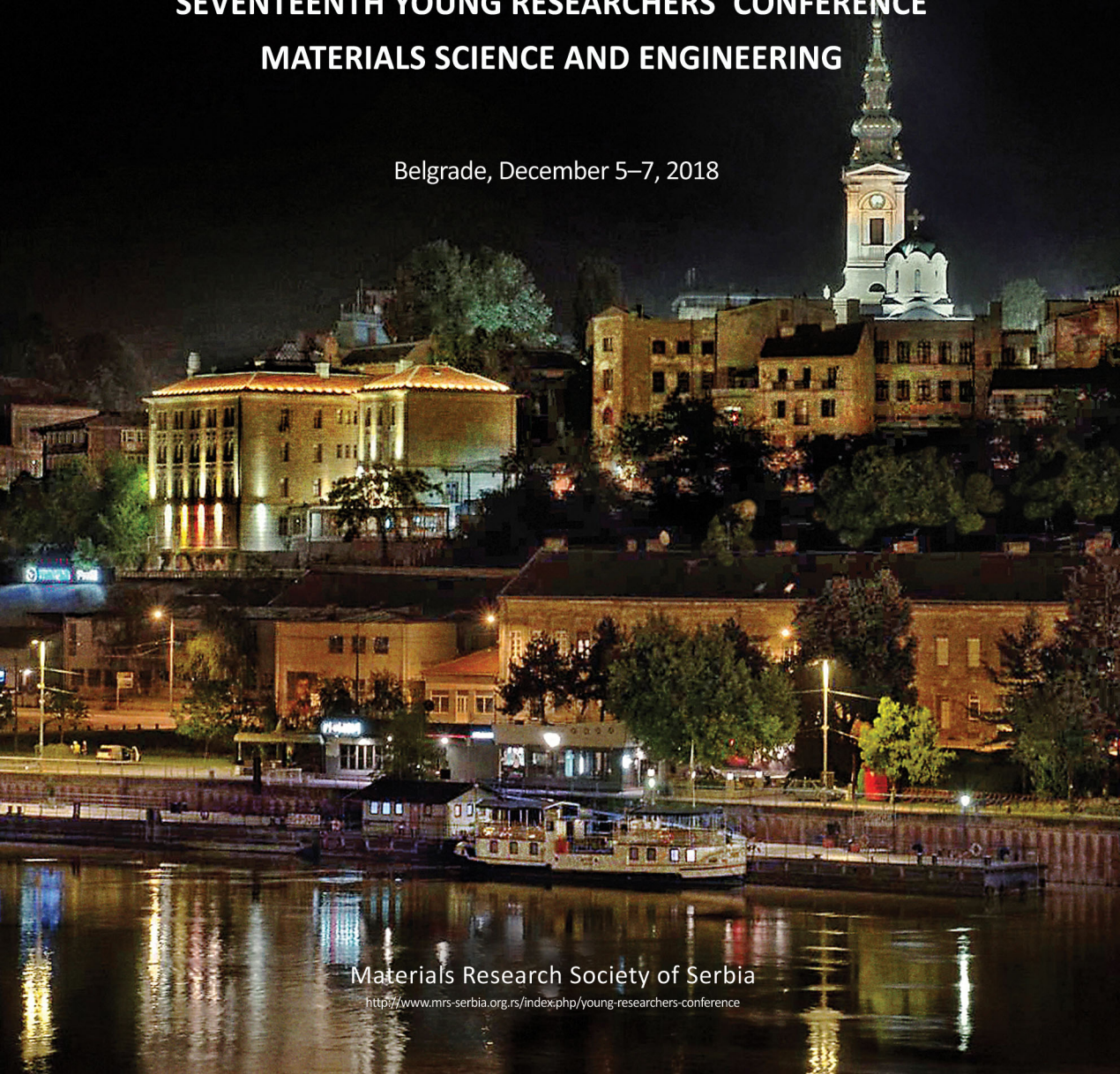
MATERIALS RESEARCH SOCIETY OF SERBIA
INSTITUTE OF TECHNICAL SCIENCES OF SASA

Programme and the Book of Abstracts

SEVENTEENTH YOUNG RESEARCHERS' CONFERENCE MATERIALS SCIENCE AND ENGINEERING

Belgrade, December 5–7, 2018



Materials Research Society of Serbia
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&
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Aim of the Conference

Main aim of the conference is to enable young researchers (post-graduate, master or doctoral student, or a PhD holder younger than 35) working in the field of materials science and engineering, to meet their colleagues and exchange experiences about their research.

Topics

Biomaterials
Environmental science
Materials for high-technology applications
Nanostructured materials
New synthesis and processing methods
Theoretical modelling of materials

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Results of the Conference

Beside printed «Program and the Book of Abstracts», which is disseminated to all conference participants, selected and awarded peer-reviewed papers will be published in journal "Tehnika – Novi Materijali". The best presented papers, suggested by Session Chairpersons and selected by Awards Committee, will be proclaimed at the Closing Ceremony. Part of the award is free-of-charge conference fee at YUCOMAT 2019.

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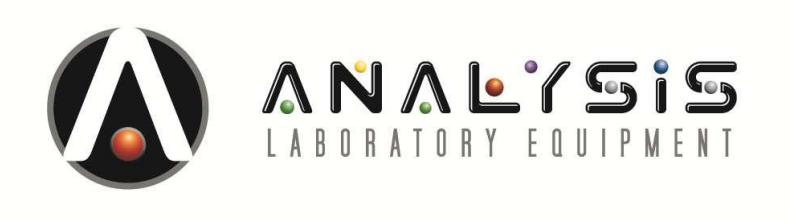

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1-5

Development and optimization of the production procedure of biphasic scaffolds for osteochondral tissue engineering

Mia Radonjić, Jovana Zvicer, Bojana Obradović
University of Belgrade, Faculty of Technology and Metallurgy, Chemical Engineering, Belgrade, Serbia

Scaffolds used for osteochondral tissue engineering should comprise two distinct regions: a bottom region with characteristics corresponding to bone tissue, such as a porous structure with mineral components (predominantly hydroxyapatite), and a top region with characteristics of articular cartilage, which is gelatinous with high water content. In this work, we have investigated possibilities to formulate and optimize a procedure for obtaining such biphasic scaffolds based on gellan gum (GG). A porous base layer of the scaffold was obtained by lyophilization of the 2 % GG hydrogel with dispersed bioactive glass nanoparticles, as hydroxyapatite precursors. Next, different procedures were investigated to produce the upper GG hydrogel such as partial immersion of the porous layer in the GG solution and pouring the GG solution over the porous layer at different moisture conditions and temperatures. A simple mathematical model was derived and subsequently experimentally validated to find optimal temperatures of the porous layer, GG solution and the surrounding environment to provide adequate gelation rate to form the GG hydrogel on top of the porous layer with a thin interfacial zone.

1-6

Functional characterization of biphasic implants based on gellan gum and bioactive glass for osteochondral tissue engineering

Ilijana Kovrlija, Jovana Zvicer, Bojana Obradović
University of Belgrade, Faculty of Technology and Metallurgy, Department of Chemical Engineering, Belgrade, RS

Osteochondral implants need to be compatible with bone tissue in their base, and with cartilage tissue in the surface layer with an integrated interfacial zone. In this work, we have used a previously optimized procedure to produce biphasic scaffolds based on gellan gum (GG) and bioactive glass (BAG). In specific, the upper scaffold layer consisted of the 2 mass. % GG hydrogel corresponding to cartilage while the bottom layer was lyophilized GG hydrogel with 2 mass. % of BAG corresponding to bone. The obtained scaffolds were characterized under physiologically relevant conditions in a biomimetic bioreactor during 14 days at the constant flowrate of the simulated body fluid of 1.1 mL/min. Dynamic compression (337.5 μm/s compression rate, 5 % deformation of the upper layer, 1 h/day) was applied from day 7 until day 14. Over the examined period, the scaffolds retained their mechanical integrity while SEM and EDX analyses have shown transformation of BAG into hydroxyapatite, good integration of the two layers and preserved porosity of the bottom layer, indicating potentials for osteochondral tissue engineering.