MATERIALS RESEARCH SOCIETY OF SERBIA
INSTITUTE OF TECHNICAL SCIENCES OF SASA

Programme and the Book of Abstracts

NINETEENTH YOUNG RESEARCHERS' CONFERENCE MATERIALS SCIENCE AND ENGINEERING

Belgrade, December 1-3, 2021

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Materials Research Society of Serbia
&
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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
Materials for new generation solar cells
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 2022.

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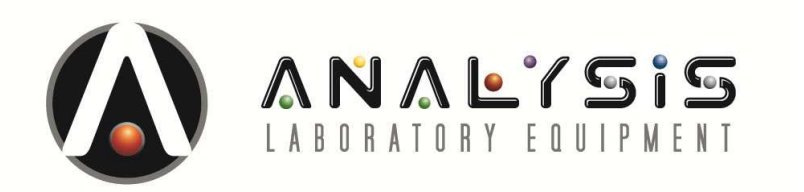

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Processing of gelatine coated composite scaffolds based on magnesium and strontium doped hydroxyapatite and yttria-stabilised zicronium oxide

Aleksa Galić[1], Tamara Matić[2], Nataša Obradović[2], Đorđe Veljović[1]
[1]University of Belgrade, Faculty of Technology and Metallurgy, Department of Inorganic Chemical Technologies, Karnegijeva 4, 11000 Belgrade, Serbia, [2]Innovation Center of Faculty of Technology and Metallurgy, Karnegijeva 4, 11000 Belgrade, Serbia

Autologous and allogenic grafts are often referred to as the gold standard for bone tissue transplants, but possess drawbacks such as risk of immunological reaction and infection, limited bone bank capacity and pain for the patient, which is why synthetic transplants are a highly researched topic.
The goal of the research was to process and test the mechanical properties and bioactivity of the magnesium and strontium doped hydroxyapatite gelatine coated scaffolds and the impact of adding yttria-stabilized zirconium oxide for potential use in bone tissue engineering.
The doped hydroxyapatite powder was synthesized using the hydrothermal method and calcinated. The foam replica method was chosen for production of the scaffolds. Both sample groups, with and without the added zirconium-dioxide, were sintered in the range of 1400-1470 °C, and further coated in gelatine solution. Compressive strength was tested using a universal testing machine and bioactivity was inspected after 7 days in simulated body fluid. Element analysis was done using energy dispersive spectroscopy, X-ray diffraction analysis was done to determine the phase composition of the synthesized powder and sintered scaffolds. The morphology of the powder and microstructure of the scaffolds were analyzed using scanning electron microscopy.
Element analysis showed a Ca/P molar ratio of 1.31 and dopant fractions of Mg and Sr ions of 0.4 and 0.7 at%, respectively. The diffractogram of the calcined powder showed a biphasic system, β-TCP being the majority. Scaffolds withstood satisfactory forces up to 3 N and after soaking mechanical properties were certainly improved. A macroporous structure was achieved with the pores in both sample groups being interconnected and having the mean size of 250 μm. The hydroxyapatite samples showed greater bioactivity than the composite samples.
Greater bioactivity and compressive strength of the doped hydroxyapatite scaffolds make them potential candidates for use in bone tissue engineering, while higher temperatures are needed for scaffolds with zirconia.