

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
&
Institute of Technical Sciences of SASA**

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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.

Sponsors



ANALYSIS
LABORATORY EQUIPMENT

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**Hydrothermal synthesis of hydroxyapatite
on calcium-enriched natural and synthetic zeolite as a carrier**

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The aim of this study was to investigate the possibilities and to optimize the conditions for the synthesis of hydroxyapatite (HAP) on calcium-enriched natural and synthetic zeolites as carriers. Two synthetic zeolites were used in the paper: zeolite 4A (Na-form) and zeolite 5A (Ca-form) as well as natural zeolite - clinoptilolite from Slanci deposit in Serbia. Clinoptilolite and zeolite 4A were enriched with calcium ions by ion exchange treatment in order to enable the source of Ca²⁺ in the crystallization of hydroxyapatite. Phosphorus, necessary for the crystallization of hydroxyapatite, was introduced through a solution of ammonium-hydrogenphosphate. The influence of the concentration of hydrogen phosphate ions, temperature and crystallization time of hydroxyapatite on the morphology of the zeolite surface as well as the degree of its coverage with newly formed hydroxyapatite particles was monitored in the experiments. The obtained powders were characterized by X-ray powder diffraction (XRD), thermal TG-DTG analysis, infrared spectroscopy with Fourier transformation (FTIR) and scanning electron microscopy (SEM). Based on the structural analysis, it was shown that the synthesis of hydroxyapatite did not affect on the structure of the zeolite, except in the case when a very concentrated hydrogen-phosphate solution was used. Thermal analysis showed that all obtained zeolite and HAP samples were stable up to 800 °C. Optimization of the hydrothermal crystallization process showed that temperature and time do not have a crucial influence on the synthesis of the materials (similar results were obtained at 120 °C for 20 hours and at 160 °C for 4 hours). When the concentration of the solution of ammonium hydrogen phosphate was higher, larger crystals of hydroxyapatite were obtained, but the crystal lattice of the zeolite was collapsed. SEM micrography showed that unevenly distributed hydroxyapatite crystals were formed on natural zeolite due to the presence of various impurities, while the best results were achieved using zeolite 5A, where the surface of the zeolite is completely covered with crystals of hydroxyapatite.