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FACULTY OF  
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ZVORNIK

# XXIII

## INTERNATIONAL CONGRESS

# VII

ENGINEERING, ENVIRONMENT AND MATERIALS  
IN PROCESS INDUSTRY  
EEM2021

BOOK OF ABSTRACTS



JAHORINA  
MARCH 17-19, 2021

REPUBLIC OF SRPSKA  
BOSNIA AND HERZEGOVINA

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***ENGINEERING, ENVIRONMENT AND MATERIALS IN  
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## CYTOTOXICITY OF MULTIFUNCTIONAL COMPOSITES OF AMORPHOUS CALCIUM PHOSPHATE CONTAINING CHITOSAN ON TITANIUM OBTAINED BY NOVEL *IN SITU* ANODIC PROCESS

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### **Abstract**

*Calcium phosphates (CP), amongst which amorphous calcium phosphate (ACP) and hydroxyapatite (HAp), along with Ti and TiO<sub>2</sub> layers, have found vast applications in preventive and regenerative medicine due to their excellent biocompatibility, nontoxic properties and ability to participate in the normal metabolism of organisms. In this paper cytotoxicity of amorphous calcium phosphate (ACP) and chitosan lactate (ChOL) multifunctional and hybrid composite coatings on MRC-5 human lung fibroblast cell line is presented. ACP/TiO<sub>2</sub> and ACP/TiO<sub>2</sub>/ChOL are deposited by coatings new in situ anodization/anaphoretic deposition process at constant voltage of 60 V for 180 s at 25 °C. Cytotoxicity tests showed that there was no significant decrease in the survival of healthy MRC-5 cells in the Ti and ACP/TiO<sub>2</sub> composite samples, while there was an increase in the number of viable cells in the ACP/TiO<sub>2</sub>/ChOL sample. There is improved cell proliferation, differentiation and cell viability in the later. Sample containing ACP/TiO<sub>2</sub>/ChOL coating showed negative cytotoxicity in both DET and MTT tests. Greater recovery of MRC-5 human lung fibroblasts cells was observed compared to the control sample after 48 h of recovery. From these results, it can be concluded that not only the ACP/TiO<sub>2</sub>/ChOL multifunctional composite coating is non-cytotoxic, but the presence of ChOL in the coating improves cell proliferation, differentiation and cell viability. Based on the obtained results, it can be concluded that both composite materials used in the studies are non-cytotoxic to the cell lines used, and that 5 wt.% of ChOL has a positive effect on the non-toxicity of the material. Based on presented results in this paper and previous published results of the physicochemical and bioactive properties of the ACP/TiO<sub>2</sub>/ChOL composite material, it can be concluded that further development as well as potential preclinical studies would be largely justified.*

**Key words:** *cytotoxicity, dye exclusion test, colorimetric test with tetrazolium salts, amorphous calcium phosphate, chitosan oligolactate.*