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YUCOMAT 2023

**Program
and
Book of Abstracts**

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YUCOMAT 2023

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Program and Book of Abstracts

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Towards new approaches for ultraviolet sterilization of MXenes

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Corrosion and scratch resistance of the nanotube layer formed on the titanium-based materials

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Composite scaffolds for regenerative dentistry applications

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Radmila M. Jančić-Heinemann¹, Dušica B. Stojanović¹, Petar S. Uskoković¹,
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Poster Presentations

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**Corrosion and scratch resistance of the nanotube layer formed
on the titanium-based materials**

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Titanium-based nanotubelayer was formed through the electrochemical anodization technique on coarse-grained and ultrafine-grained Ti-13Nb-13Zr (wt.%) alloy, in 1M H₃PO₄ + NaF electrolyte for 90 minutes. The nanotube layer morphology was analyzed using the scanning electron microscopy (SEM) and the X-ray diffraction (XRD). The electrochemical impedance spectroscopy (EIS) technique was used to determine the corrosion resistance of the alloy before and after electrochemical anodization. These materials were exposed to a solution simulating conditions in the human body (Ringer's solution) with pH of 5.5 at a temperature of 37 °C. In order to investigate the titanium-based nanotube layer adhesion on alloy surface a scratch test was done. The scratch test was performed on nanoindenter G200, Agilent Technologies, using an indenter Berkovich-type diamond tip with applying an increasing load up to 40 mN. It was established that electrochemical anodization led to the formation of the nanotube oxide layer on the surface of titanium-based materials. Influence of the ultrafine-grained material structure on the homogeneity of the nanotube layer obtained by electrochemical anodization has been noticed. Both coarse-grained and ultrafine-grained alloy showed excellent corrosion resistance in Ringer's solution. Moreover, electrochemical anodization led to a decrease or an increase of the corrosion resistance of these materials, depending on the nanotube layer morphology. The scratch test showed that plastic deformation was present in the nanotube layer. The scratch resistance for the nanotube layer failure was on the higher load, pointing to the good adhesion for the titanium-based nanotube layer formed using electrochemical anodization.