

EXECUTIVE SUMMARY**of the PN-III-P4-PCE-2021-0702 project; Contract: PCE 102/2023****Implementation period: 01/01/2024 - 31/10/2024****CONTEXT - Research motivation**

Considering that implant biomaterials undergo corrosive degradation over time due to the corrosive environment of biological fluids, research focuses on different methods of modifying the surface of biomaterials to improve their properties in relation to corrosive degradation in biological environments. Scientific results are thus studied and obtained regarding this susceptibility to corrosion of titanium alloys in biological solutions and in special inflammatory conditions as well as in the formation of titanium oxide films on their surface. Part of the experimental results obtained in 2024 are published in ISI scientific journals (1 paper):

<https://www.brainmap.ro/profile/Lidia-BENEĂ>; <https://bionanosurf.ugal.ro/Publicatii>

Objectives

The main scientific objective of the project is the exploration and development of a new possibility of functionalizing the surfaces of biomaterials through an electrochemical - chemical method that can lead to obtaining a new composite film made of porous oxide having inside the pores other bioactive or biocompatible molecules or even some drugs necessary.

Achievements stage III - a, respectively the implementation period: 01/01/2024 - 31/10/2024

● **Coordination of research and development activities** by drafting experimental protocols, planning experimental activities and the activities of team members for data acquisition, interpretation, mobility and dissemination of obtained experimental data.

● **The management of knowledge. Dissemination. Management of the results. Part III - a.**

During the implementation period, 01/01/2024 - 10/31/2024, it was possible to participate and present 4 scientific papers at 2 international conferences: <https://bionanosurf.ugal.ro/Conferinte>.

1 ISI publication (article), 1 BDI publication and 1 invention proposal were also created.
<https://bionanosurf.ugal.ro/Publicatii>.

● **Optimization of anodic oxidation parameters and solutions.**

-Modified solution for anodic oxidation doped with nano-CeO₂, mixed nanoparticles or biopolymer nanoparticles (Chitosan). Part III.

-During this project implementation period, several solutions for oxidation of biomaterials based on pure titanium and titanium alloy were tested: Solutions based on sulfuric acid doped with cerium oxide (CeO₂) or chitosan (CS) and solutions oxidation based on phosphoric acid. The results are detailed in the doctoral thesis coordinated by Prof. Lidia Benea, which will be defended publicly on December 3, 2024 (Ph.D. project member Veaceslav Neaga).

● **Ex-situ characterization of nanoporous thin film obtained** on titanium and/or titanium alloy. Checking whether the compounds added to the oxidation solution were trapped in the porous oxide film, by SEM-EDX, X-ray diffraction (XRD). Part III - a.

● **Caracterizare Ex-situ characterization of the corrosion resistance of the nanoporous thin film obtained** on titanium and/or titanium alloy by electrochemical methods in solutions simulating the fluids in the human body (Detailed results are presented in the thesis elaborated by Ph.D. Veaceslav Neaga).

And in 2024, as in 2021, 2022 and 2023, the project director, **prof. dr. chem. Lidia BENEĂ** is named in the top of the best scientists in the world, taking into account the related publications from the years 2021 - 2023.

<https://elsevier.digitalcommonsdata.com/datasets/btchxktzyw/6>.

<https://www.ugal.ro/anunturi/stiri-si-evenimente/12685-patru-profesori-de-la-udjg-printre-cei-mai-importanti-oameni-de-stiinta-din-lume>

Project Manager,
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