

EXECUTIVE SUMMARY

of the PN-III-P4-PCE-2021-0702 project, Contract project 102/2022-2024
Implementation period: 02/06/2022 - 31/10/2024

CONTEXT - The motivation of the research

Given that implant biomaterials undergo corrosive degradation over time due to the corrosive environment of biological fluids, international research focuses on different methods of modifying the surface of biomaterials to improve their properties in relation to corrosive degradation in the implant environment. The director of this project has studied and has scientific results regarding this susceptibility to corrosion of titanium alloys in biological solutions and in special inflammatory conditions. Some of the obtained experimental results are published in ISI scientific journals:

<https://www.brainmap.ro/profile/Lidia-BENEĂ>, <https://bionanosurf.ugal.ro/Dissemination>

Thus, the drastic decrease in the corrosion resistance of titanium alloys was found when the implant is at the interface of a biological fluid and a compound specific to inflammatory processes in the human body. The possibilities of modifying the surfaces of titanium and titanium alloys by electrochemical methods were explored, leading to an increase in the resistance of the respective implants to degradation occurring in contact with corrosive biological fluids (blood, inflammatory compounds).

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 resulting from the application of a top-down electrochemical nanotechnology and a bottom-up electrochemical nanotechnology (-up) that can lead to obtaining a new composite film made of porous oxide with inside the pores other bioactive or biocompatible molecules or even some necessary drugs.

Achievements of stages 1, 2 and 3, respectively the implementation period: 02/06/2022 - 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.

● **Knowledge management. Dissemination. Results management. Part I, II and III.**

During the implementation period, **02/06/2022 - 31/10/2024**, it was possible to participate and present **15 scientific papers at International Scientific Conferences**.

During the entire project implementation period, **10 articles were published in ISI journals (Clarivate Analytics) and 2 scientific papers in BDI scientific journals. In total, 12 scientific papers are published in ISI and BDI journals.**

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

<https://bionanosurf.ugal.ro/Conferinte>.

<https://bionanosurf.ugal.ro/dissemination.html>

Invention proposal: Patent application filed in 2024/00306.

The top of the best scientists in the world. 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>

Director proiect,
Prof. univ. dr. Lidia Benea

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