

## NATIONAL RESEARCH-DEVELOPMENT AND INNOVATION PLAN- PNCDI III

### Program 4 – Fundamental and Frontier Research Exploratory Research Projects (ECPs) Competition PN-III-ID-PCE-2021-3

For the support and promotion of fundamental scientific research,  
multi-, inter- and trans-disciplinary and/or explorers from Romania.

<https://uefiscdi.gov.ro/proiecte-de-cercetare-exploratorie>

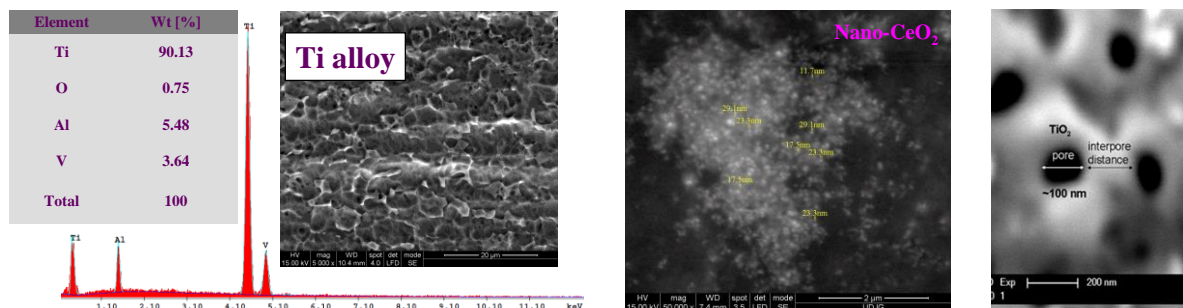
Code project: PN-III-P4-PCE-2021-0702.

Contract: 102/2022.

Top-down nanoporous oxide films and bioactive molecules obtained  
electrochemically to improve the properties of titan base implant  
biomaterials.

Acronym: **BioNanoSurf**

<https://bionanosurf.ugal.ro>



## Abstract.

The aim of the project is to explore the possibility of functionalizing the surfaces of biomaterials by electrochemical and chemical methods resulting in a set of several layers consisting of a nanoporous titanium oxide ( $\text{TiO}_2$ ) film controlled on titanium or titanium alloys by electrochemical top-down nanotechnology followed by electrodeposition of the assembly of bioactive molecules, which can preliminarily absorb some drugs and / or dispersed nanoparticles such as AgNPs or bioceramic nanoparticles of cerium oxide ( $\text{CeO}_2$ ) or zirconium oxide ( $\text{ZrO}_2$ ). As an innovative exploratory method, the formation of the nanoporous oxide layer will be followed simultaneously with the incorporation of bioactive molecules in a single step. The resulting multilayer surface as well as the intermediate modified surfaces will be tested comparatively in terms of hydrophobicity and chemical-electrochemical reactivity in biological fluids for specific biomedical applications. Hydrophobicity will be assessed by measuring the contact angle. The chemical, morphological and structural changes of the obtained surfaces will be evaluated by electron microscopy with X-ray dispersion analysis (EDX) for chemical composition, X-ray diffraction for the structure, microtopography to verify the roughness and microhardness. Finally, adhesion tests of living cells and proteins on these surfaces will give additional indications for biofunctionalization.

### Project Manager

**Prof. univ. dr. Lidia Benea**

e-mail: [Lidia.Benea@ugal.ro](mailto:Lidia.Benea@ugal.ro)

<https://www.brainmap.ro/profile/Lidia-BENEA>

[www.cc-ites.ugal.ro](http://www.cc-ites.ugal.ro)

