



Sytenko Institute of Spine and  
Joint Pathology NAMS of  
Ukraine

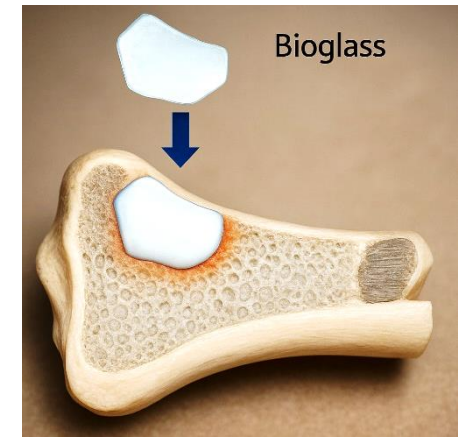
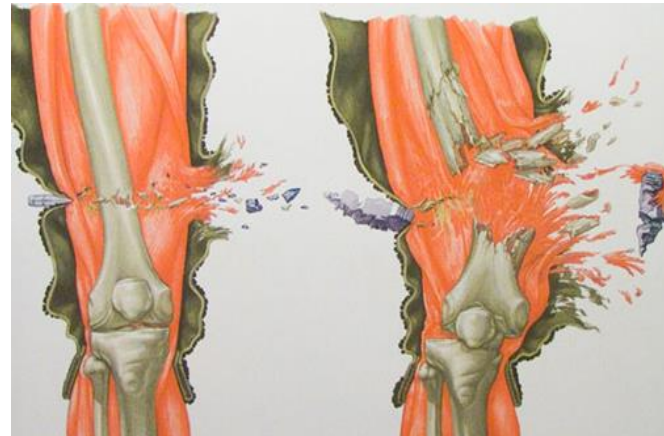
# Personalized bioactive glass materials for tissue regeneration: energy-efficient production technologies, biomedical evaluation, and preparation for industrial implementation (*PERSO- GLASS*)



Priazovsky State Technical  
University



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# Tasks

**Task 1.** Develop a system of modified bioactive glass materials with the possibility of personalizing their composition and properties.

**Task 2.** Introduce energy-efficient technologies for the synthesis and processing of bioglasses that are suitable for scaling up.

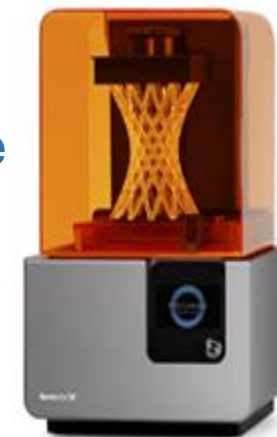
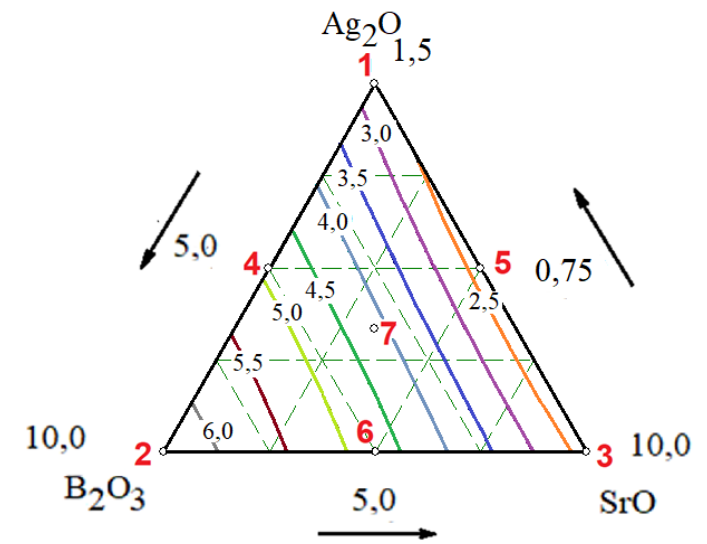
**Task 3.** Create different material form factors for clinically relevant applications

**Task 4.** Conduct a comprehensive biomedical evaluation of bioglasses at the in vitro and in vivo levels

**Task 5.** Create a roadmap and technical solutions for transition to industrial production (TRL 5–7)

**Task 6.** Ensure the integration of personalized approaches into the production cycle

**Task 7.** Develop a commercialization and regulatory support strategy



# The uniqueness of collaborations for the project implementation



**UKRAINIAN STATE  
UNIVERSITY OF  
SCIENCE AND  
TECHNOLOGIES**

*Strong foundation for developing the technological aspects of personalized bioglass fabrication and optimizing the reduction of synthesis temperatures (Development of modified glasses for a wide range of purposes, technical ceramics with specified properties (quartz, cordierite ceramics), development of bioactive coatings for metal implants)*



**Sytenko Institute  
of Spine and Joint  
Pathology NAMNS  
of Ukraine**

*Unique resources and experience in conducting clinical research on bone implants in vitro and in vivo (Advanced nanocoatings for artificial implants, growth-adaptive spinal constructs for scoliosis management, and innovative sapphire endoprosthesis solutions.)*



**Priazovsky State  
Technical  
University**

*Well-developed sector of information technologies, biomedical modeling, and experience in the practical implementation of developments in medicine (Segmentation of patient tomograms for preoperative planning and 3D printing of anatomical models, including the development of artificial implants with enhanced properties through surface and bulk modification techniques.)*



# Project effects

- Creation of a new generation of personalized bioactive glass materials with controllable properties

- Expand knowledge about the relationship between composition, microstructure, and biological action.

- Development of energy-efficient synthesis technologies

- May become a new standard in the production of bio-glass, replacing energy-intensive high-temperature processes

- Development of production technology in conjunction with medical and biological research

- It will enable the technological readiness level (TRL) of materials and prototypes to be raised to the level required for further industrialization and clinical trials.

- Formation of a technological base for scalable and resource-efficient production of bioglass

- Reduce the cost of final medical products

- Creating competitive solutions for the European regenerative medicine market

- Potentially allows us to occupy a niche in the high-value segment of implant materials.

- The emergence of a new direction in bioglasses with flexible adaptation to individual needs

- Enable commercialization and further investment (spin-offs, licensing, industrial partnerships)

## Project effects

Providing the medical community with new materials with personalized action

- will improve tissue healing, reduce complications, and shorten the rehabilitation period for patients.

Reducing the risks of infectious implants

- Reduces the number of repeat interventions thanks to the targeted functionalization of bioglasses (osteinduction, angiogenesis, antimicrobial properties).

Flexible control of bioglass properties

- reduction in the number of repeat interventions, thanks to the targeted functionality of bioglass (osteinduction, angiogenesis, antimicrobial action).

Creating effective, safe, and personalized medical solutions

- will improve patients' quality of life

acceleration of bone tissue regeneration

- reducing the burden on the healthcare system

reducing energy consumption and increasing environmental awareness

- will promote the transition to sustainable and environmentally safe production of medical materials

## European strategic effect

- Strengthening the EU's position in global competition in the field of regenerative technologies and biomaterials
- Supporting EU policy in the areas of Green Deal, Digital Transition and Health Innovation
- Formation of a sustainable interdisciplinary ecosystem: metallurgy-medicine-industry-digital technologies.

## Impact on scientific infrastructure and human capital

- Training highly qualified specialists in the field of biomaterials, biomedical engineering, and sustainable production technologies
- Creating international scientific and industrial collaborations that can grow into long-term cooperation platforms
- Strengthening the role of research teams in the European innovation space.