Newsletter #6

Baltic Biomaterials Centre of Excellence

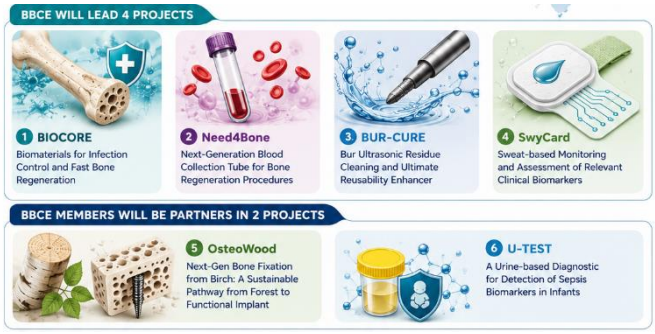
A Year of Science, Success & Impact

Celebrating BBCE achievements – from six SFGs and BioPhoT success to the next generation of scientists through BIO-GO-Higher.

Baltic Biomaterials Centre of Excellence (BBCE) project´s main objective is to establish a joint Centre for development of advanced biomaterials based on the long-term strategic cooperation between AO Research Institute Davos, Switzerland (ARI) and Friedrich-Alexander University of Erlangen-Nuremberg, Germany (FAU) on the one hand and Riga Technical University, Faculty of Natural Sciences and Technology Institute of Biomaterials and Bioengineering (RTU IBB), Latvian, Institute of Organic Synthesis (LIOS) and Riga Stradins University (RSU) and Riga Stradins University Institute of Stomatology (RSU IS) on the other hand.

BioPhot: A BBCE Success Story

The funded projects cover a wide range of cutting-edge topics!



BBCE achieves outstanding success in the **BioPhot First and Second Calls 2025/2026**. These projects will address urgent healthcare challenges — from regenerative biomaterials and infection control to sustainable implants, novel cleaning technologies, and next-generation diagnostics.



6 YEARS OF BIO-GO-Higher

Since 2020, **BIO-GO-Higher** has inspired Latvian school students to explore physics, chemistry, biology and medicine through experiments, teamwork and creativity. What started as an idea has grown into a nationwide tradition!



THE WINNING TEAMS OVER SIX SEASONS

2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
"Mitochondria are the powerhouse of the cell"	"Skābais atoms"	"Pērkons"	"Ozoliņi"	"Cikloheksāns"	"Eksotermiskie"
RTU Engineering High School	Sigulda State Gymnasium	Cēsu State Gymnasium	Sigulda State Gymnasium	Sigulda State Gymnasium	Riga State Classical Gymnasium

MORE THAN A COMPETITION

BIO-GO-Higher gave students the opportunity to step beyond the classroom and experience science first-hand – from challenging experiments in Latvia to visits at leading biomaterials research centres in Switzerland and Germany.





This project has received funding from European Union's Horizon 2020 research and innovation programme under agreement No 857287

SUCCESS OF 2025

SFG1 - Calcium phosphates and composites



In 2025, BBCE's SFG1 achieved an important milestone by **establishing research cooperation** with the Latvian company *SIA "UNISO"*. The collaboration contributes to the IPCEI-linked Tech4Cure project *"Synthesis of Nanoceramics and Nanoceramic Composites for Medical Applications"*, launched by UNISO in July 2025.



The **project aims to develop an energy-efficient cold-sintering technology** for producing nanoceramics and nanoceramic–polymer composites for medical applications. This technology will be combined with a cloud-based, artificial-intelligence-supported solution for predictive and personalised drug delivery. The envisioned approach could enable patient-specific drug-releasing ceramic systems to be prepared according to individual therapeutic requirements.

As the scientific institution engaged by UNISO, BBCE **completed comprehensive mapping of nanoceramics for medical applications** during the first project period in 2025. BBCE researchers provide advanced expertise in calcium phosphate nanoceramics, organic–inorganic composites, low-temperature and high-pressure consolidation, and drug-delivery materials.

This industry collaboration represents a major milestone for BBCE. It demonstrates the **growth of its research capacity and innovation potential**, as well as its **increasing ability to translate scientific expertise** into ambitious industry-led development projects. The cooperation creates a strong foundation for developing energy-efficient manufacturing technologies, personalised medical solutions and future commercially relevant innovations with European-level impact.

SFG 2 - Drug/ion/cell delivery



2025 was a highly productive year for BBCE SFG2. The group continued to **deliver high-impact research, publishing 12 scientific articles with an average journal impact factor of 5.6**. A notable milestone was the publication of the first article jointly co-authored by researchers from RTU and **both advanced partners** - the AO Research Institute Davos and Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU). The study combined bioactive glass and calcium phosphate biomaterials with advanced *in vitro* investigations of cell–material interactions.





Two innovation projects involving SFG2 members were also awarded funding: *Biomaterials for Infection Control and Fast Bone Regeneration* (BIOCORE) and *Injectable Hydrogel for Antimicrobial and Regenerative Therapy of Fracture-Related Bone Infections* (BoneART). Together, these projects attracted EUR 390,000 to SFG2 and will support the translation of laboratory developments towards practical and market-oriented applications.



Finally, three SFG2 postdoctoral researchers were awarded individual postdoctoral research grants, marking an important step in their career development as independent researchers and project leaders. **The funded projects included** *Synergetic Integration of Biochemical and Biophysical Cues in the Design of Next-Generation Bone Regenerative Biomaterials* (SynerMat), *Antibacterial Biomaterials through the Synergy of Metallic-Ion-Substituted Calcium Phosphates and Bacteriophages*, and *Electrospun Scaffolds for Targeting Bone Tumours: Fighting Drug Resistance and Supporting Bone Regeneration* (R2Bone).

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SUCCESS OF 2025

SFG3 – Materials *in vitro*



The past year was a year of **academic success** for SFG3, marking **an important milestone in the professional and academic development** of its members. It was a year in which the group could celebrate the results of sustained scientific work, collaboration, and capacity building within BBCE.



Several SFG3 members reached major stages in their academic careers. Annija Vaska and Elīna Ķelle **successfully defended their master's theses**, with Elīna also receiving an **RTU grant supporting her master's thesis research**. At the doctoral level, Jingzhi Fan **successfully defended his PhD thesis**.

The year also brought significant academic recognition for senior members of SFG3. **Dr.sc.ing. Arita Dubnika was elected Associate Professor**, while **Dr. Kristaps Klavins was elected Professor** at Riga Technical University. Together, these achievements **demonstrate academic progression across all career stages** within the group from master students and doctoral researchers to established academic leaders.



BBCE has **played an important role in creating an environment** where its members can develop scientifically, gain experience, establish collaborations, and progressively take on greater academic responsibilities. The achievements of SFG3 members therefore **represent not only individual milestones, but also the broader impact of BBCE in strengthening scientific capacity and supporting** the development of the next generation of researchers and academic leaders in Latvia.

SFG4 - Kinetics and stability of drug delivery systems



Science: Our research continued to expand across drug-delivery systems, hydrogels, biomaterials, medicinal plants and sterilisation technologies. We published **11 scientific papers, including eight in Q1 journals**, and presented our research through **23 oral and poster presentations at 10 conferences**. A major milestone was securing the **SinGel project**, opening a new research direction in smart injectable hydrogels for targeted osteomyelitis treatment. **New industry collaborations** were also established with OLPHA, Equine74, Asahi Kasei and Novartis.

Training and Education: At the same time, our researchers expanded their expertise through **international training and research visits** – from rheology training in Malmö and the BBCE Summer School at FAU to hands-on experience in 3D printing, cell and bacterial methods, SEM/STEM microscopy and CT imaging. These activities strengthened practical skills and collaboration across Europe. We also **supervised 10 Master's theses**, several leading to conference presentations and scientific publications, while students gained international experience through the **Erasmus BIP-INTEGRA programme** in Sardinia.



Outreach and Public Engagement: Beyond academia, we brought science closer to society through school visits, laboratory activities and RSU Open Day, while also sharing expertise on scientific publishing at the RSU Doctoral School. Our researchers reached wider audiences through Latvian Radio, discussing medicinal plants and the periodic table, and engaged with healthcare professionals to identify clinical challenges where pharmaceutical research could offer practical solutions. Together, these activities helped strengthen the connection between research, education, healthcare and society.

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SUCCESS OF 2025

SFG5 - Preclinical biomaterial evaluation



During the 2025/2026 academic season, SFG5 grew into a team of **10 members**, expanding its research from biomaterials and nanomedicine to preclinical imaging and translational biomedical technologies. The group secured **four research grants**, strengthening ongoing projects, opening new research directions and supporting contributing scientists across NIRI.



SFG5 researchers strengthened their expertise through long-term research visits to BBCE partner ARI and presented their work at major international events, including the **Gordon Research Conference on Cancer Nanotechnology, the 15th International Colloids Conference and the 2026 World Congress on Pharmacology**. A special highlight was SFG5 leader Antons Sizovs presenting the group's artificial blood project at the **2026 Hello Tomorrow** Summit in Amsterdam.

The group published **eight research papers**, with several additional manuscripts submitted for publication. Beyond the laboratory, SFG5 participated in **Science Night 2025**, visited a major international dental exhibition in Dubai and shared its research with the wider public through the Latvian science radio programme "Zināmais nezināmajā".

SFG5 also contributed to strengthening NIRI's preclinical research capabilities through the acquisition of the **IVIS Spectrum 2** *in vivo* 3D fluorescence and luminescence imaging system and the **Quantum GX3 microCT** animal imaging system. The group continues to invest in young researchers, with **Julija Bulatova joining the PhD programme** in Pharmacology at Rīga Stradiņš University to investigate nanoparticle pharmacokinetics.

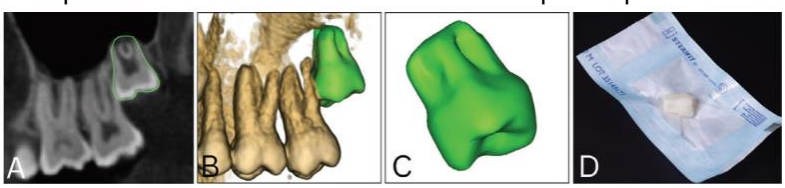
SFG6 - Clinical evaluation of the materials and personalized implant development



In 2025, with the support and professional network of Professor Sergio Uribe, **Dr. Miks Lejnieks spent two months in Chile** as a visiting researcher at the University of Valparaíso, Universidad de los Andes, and Pontificia Universidad Católica de Chile in Santiago. At the University of Valparaíso, Dr. Miks Lejnieks had the opportunity to **collaborate with internationally recognized experts in dental traumatology and tooth autotransplantation**, Professor Juan Onetto and Professor Marie Therese Flores.



As a result of an **intensive year-long collaboration, developed a novel treatment approach** for children and adolescents with severe disturbances in tooth development and eruption: sequential double autotransplantation, in which an immature tooth is used as a first-stage biological graft to preserve the alveolar bone and facilitate subsequent rehabilitation. This treatment concept was published in 2026.



CASE REPORT OPEN ACCESS

Sequential Double Autotransplantation Using Immature Teeth as First-Stage Autotransplants to Preserve Alveolar Architecture: A Case Series

Miks Lejnieks[1,2,3,4] | Juan E. Onetto[3,5] | Marie-Therese Flores[3,5] | Andris Abeltins[2,3] | Girts Salms[1,3] | Sergio E. Uribe[2,3,4]

What are we looking for:

- Cooperation with other institutions
- Cooperation with industry
- New project applications
- Staff mobility and training

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