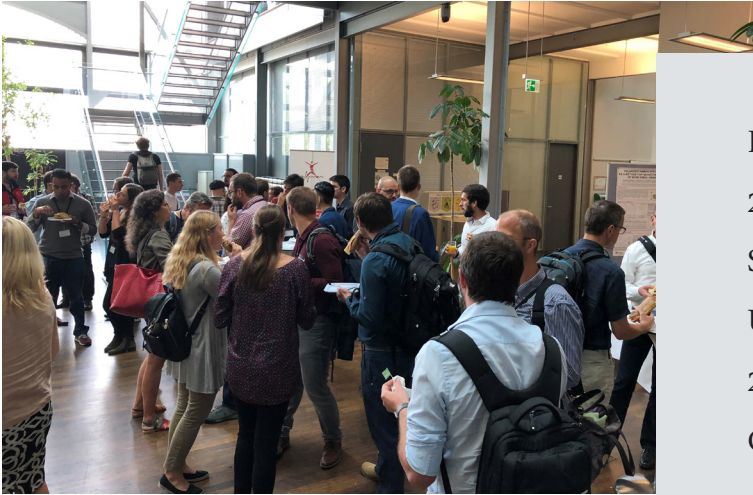




Newsletter

April 2022 \\\\ \ Swiss Society for Biomedical Engineering



President's Message	1
2021 Award Interviews	2
Swiss Medtech Message	5
Upcoming Events	6
2022 SSBE Awards	7
Contributions and Comments	7

President's Message

Dear SSBE members,

It is my pleasure to open this 2022 edition of the SSBE newsletter. I hope that your activities are all going well, and getting back to normal with that extra third dimension.

This newsletter looks back on the main events of our society in 2021, in particular the Annual Meeting in Bern, wonderfully organized by Philippe Büchler and his team, as well as interviews by Mathieu Lemay with the recipients of the SSBE Research and Student Awards. The Deep Dive Session on Technology during the Swiss MedTech Day was another notable highlight.

I also want to make use of this foreword to share some important updates with you. First, my term as president of the SSBE is ending soon. After long consideration, I decided to step down from the Board after serving on it since 2016. My focus and attention will be

directed at a new challenge; i.e., the interdisciplinary Master in Neuro-X at EPFL that will be launched in September, and for which I will act as its Section Director.

Second, the General Assembly 2022 will be scheduled during the Joint Annual Conference of the Austrian, German and Swiss Societies for Biomedical Engineering (BMT'2022) in Innsbruck, September 28-30. During that meeting, members will be provided with the usual overview of the society's status and activities, and in particular also with newly proposed Board members and an updated Board composition. The details will be announced later on when the agenda can be established.

Third, coming back to the BMT'2022, we are looking forward to a large and lively meeting where in-person networking will be (again) one of the core features. I want to draw your attention to the "Young Forum",

which is a special event on September 27 organized by and for biomedical engineering students. For all these reasons, I strongly encourage you to participate by submitting a paper or abstract contribution, for which the deadline has just been extended until April 14.

Yours sincerely and looking forward to meeting you soon,

Dimitri Van De Ville, President of the SSBE



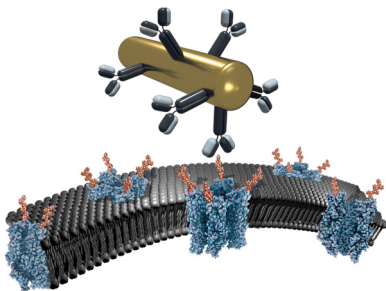
2021 Award Interviews

Research Award Winner: Dasha Nelidova



PLEASE INTRODUCE YOURSELF. WHAT IS YOUR BACKGROUND?

Dasha Nelidova completed her undergraduate degrees in medicine and human biology at the University of Auckland, New Zealand. She completed her Ph.D. in neurobiology at the Friedrich Miescher Institute for Biomedical Research in Basel, Switzerland.



YOU HAVE RECEIVED THE SSBE AWARD. PLEASE BRIEFLY DESCRIBE THE PROJECT.

Photoreceptor degeneration, including age-related macular degeneration, is a leading cause of blindness worldwide. Repair of retinal neurons by optogenetics—a technology that sensitizes neurons to light by transfer of genes for light-sensitive proteins of microbial origin—has entered

clinical trials. Optogenetic proteins are sensitive only to the brightest visible light, at intensities that overwhelm surviving functional photoreceptors. Yet, in a number of blinding diseases, light-sensitive and light-insensitive photoreceptor zones coexist within the same retina. In macular degeneration, for example, cone photoreceptors of the central retina lose their light sensitivity. Surrounding photoreceptors remain viable, and peripheral vision is largely unaffected. A key challenge for new translational technologies that aim to restore image-acquiring properties of the retina is the compatibility of such technologies with remaining vision. We reasoned that sensitizing the retina to wavelengths that functional photoreceptors are unable to detect (>900 nm) could supplement deteriorating natural vision, without interfering with the ability to see the visible spectrum. Inspired by infrared vision in snakes, we developed nanogenetic molecular tools that allowed blind mice and ex vivo human retinas to detect near-infrared (NIR) light.

WHAT DOES THE SSBE RESEARCH AWARD MEAN TO YOU?

We are very honoured to receive this award from our colleagues in the biomedical engineering community.

IS THIS PROJECT STILL ACTIVE? WHAT ARE THE GOALS?

Over the coming years, we will be working together with translational researchers and medical colleagues on a number of further studies in order to bring near-infrared visual restoration to patients blinded by macular degeneration. Different features of the sensor and near-infrared light projector system will need to be optimized over the coming years.

DID THE AWARD HAVE AN IMPACT ON YOUR CAREER?

I'm very honoured to receive this award. It is an important contribution to further accelerate the development of novel technologies for treating retinal degenerative disease.

WHAT KIND OF WORK ARE YOU CURRENTLY DOING? HOW IS IT RELATED TO YOUR PHD STUDIES?

We are continuing to work on new translational technologies for treating retinal diseases that lead to blindness.

WHAT IS SPECIAL ABOUT YOUR CURRENT WORK?

Remaining vision rules out several emerging vision restoration strategies, including optogenetic sensors, since these technologies require bright, visible light that saturates viable photoreceptors. At the present time, after patients are centrally blind, macular degeneration has no effective treatment.

WHERE DO YOU SEE YOURSELF IN FIVE YEARS?

I will be completing specialist training in ophthalmology.

IS THERE SOMETHING THAT YOU WOULD LIKE TO CONVEY TO THE SSBE MEMBERS?

Thank you very much for supporting our translational work.

Student Award Winner: Mathieu Simon



PLEASE INTRODUCE YOURSELF. WHAT IS YOUR BACKGROUND?

I started with an apprenticeship as a poly-mechanic because I wanted to learn how to build mechanical assemblies as watches. During the apprenticeship, I found interest in the study of forces acting on structures, so I continued with a Bachelor in mechanical engineering at the University of Applied Science in Fribourg. During these years, I discovered the taste of studying and learning, I performed my Bachelor project at University College London which gave me an insight into basic research. Then, I followed with a master in biomechanical engineering at the University of Bern with a major in biomechanics because I really liked the idea of applying mechanical concepts to the human body to understand its functioning and find solutions for diseases and disabilities. At the same time, I was working for a start-up in the biomedical field. Finally, I

performed my master thesis in the group of musculoskeletal biomechanics at ARTORG which confirmed my passion for basic research. And here I am.

YOU HAVE RECEIVED THE SSBE AWARD. PLEASE BRIEFLY DESCRIBE THE PROJECT.

The project treats the mechanical properties of the human distal tibia. Due to the pandemic situation in 2020, it has been separated into two parts. The first computational part made it possible to perform the work at home when the situation improved, the experimental part could begin, see Figure 1. For the computational part, high resolution scans of 120 healthy and 50 OI patients

were analyzed. Bone architecture and stiffness relations (called “fabric-elasticity relationships”) were compared between groups. For the experimental part, compressive properties (called “compressive failure behavior”) of 25 tibiae were analysed. Samples were scanned at high resolution, tested in compression until failure, and scanned again. The high-resolution scans were used for numerical simulation analysis and results were compared with the experiment. Finally, a qualitative assessment of fracture localization was performed using pre/post-test scans and compared to numerical simulation prediction.

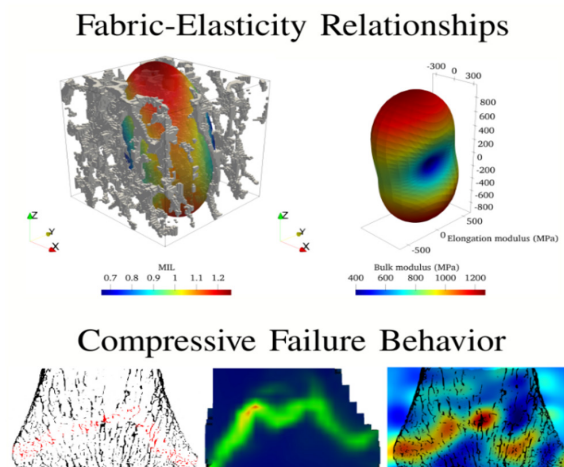


Figure 1: Main parts of the project. Top: Computational analysis of architecture and stiffness (fabric-elasticity) relationships. Left, typical region of interest with its fabric tensor (representing its main directions), right, corresponding stiffness tensor. Bottom: Experimental analysis of compressive properties. From left to right, fracture visual assessment, numerical simulation result, and pre/post-test scans registration result.

WHAT DOES THE SSBE AWARD MEAN TO YOU?

This award is aimed to recognize high standard research for a substantial contribution to the biomedical engineering community. For me, this award means multiple things. First, it helps different groups and different work areas to be more visible in this very interdisciplinary field. Second, it is very valuable for a student to be recognized by an expert committee in the field. I hope that in the future, this award will motivate students even more and increase the popularity of SSBE among biomedical engineering students.

IS THIS PROJECT STILL ACTIVE? WHAT ARE THE GOALS?

Yes sure. In a first time step, we continued the investigations on bone architecture and stiffness relationships. A more complete statistical analysis completed the work showing no difference in architecture and stiffness relationships between Osteogenesis Imperfecta (OI) and healthy trabecular bone. This means that the numerical analysis scheme based on high resolution scans used for healthy patients could be used for bone strength estimation of OI patients as well. This result led to a publication in Bone – the manuscript was recently accepted. The experimental project showed promising results at the end of the thesis and today investigations are still ongoing. The objective here is to assess the capacity of our numerical simulation scheme to predict fracture localization. This second part could lead to another publication in a journal.

DID THE AWARD HAVE AN IMPACT ON YOUR CAREER?

To be fair, not that much... for the moment. For sure, our group and I were proud to receive it but at this time I already had continued with a PhD within the musculoskeletal biomechanics group. On the other hand, I guess it confirms and reinforces the choice of my supervisor to hire me as a PhD student. Maybe, I hope, this award will help me in the future.

WHAT KIND OF WORK ARE YOU CURRENTLY DOING? HOW IS IT RELATED TO YOUR STUDIES?

I am continuing with a PhD in biomedical engineering. The project that I am working on stays in the biomedical engineering field and is very ambitious. The main idea is to quantify the effect of ageing on the properties of the proximal femur. This project, for which we are looking for one more PhD student, will help to increase or at least to quantify the accuracy of the hFE scheme we use for bone strength estimation. Combined with other projects of our group, the final goal is to perform an accurate risk fracture assessment of the proximal femur. My colleagues are realizing great work and it is pleasant to see how multiple projects can be combined to help clinicians and, ultimately, patients. I can't wait to see the results of these different studies!

WHAT IS SPECIAL ABOUT YOUR CURRENT WORK?

It depends on what do you call special. From my previous experiences, I guess

this is the first time that I work a such an interdisciplinary field. We work with people having a very broad spectrum of backgrounds, origins, and cultures. This helps to have a different point of view according to the subject and seeing things in their globality. Other specialities of my current activity would be to work with human samples. This requires specific care of the samples both according to ethics and safety. Another "special" thing, is the fact that we are working with many different institutes and enterprises. These entities allow us to perform work in a very broad range from basic research to clinical application or even prototype development and testing. This ends up with complete studies having a significant impact on the biomedical engineering community.

WHERE DO YOU SEE YOURSELF IN FIVE YEARS?

In five years, who knows? What is certain is that I want to continue in this challenging, exciting and interesting field of biomedical engineering. I know that one day, I want to teach, try to transmit my passion for this amazing art which is the application of engineering to understand the optimized structures provided from evolution. In the meaning time, I know that I am very attracted by the academic field but some of my good teachers also had experience from the industry and I think it could also be a very good experience. So, nothing sure at the moment. Today, I just want to do my best for the current project I am working on I and will see the opportunities next.

IS THERE SOMETHING THAT YOU WOULD LIKE TO CONVEY TO THE SSB MEMBERS?

Thank you, for providing the opportunity to students and researchers to present their work. The idea to have an organization at the national level contribute, from my point of

view, to help at building professional networks, to see what kind of projects are undergoing in Switzerland and find potential collaborations between education, research, manufacturing and even politics. I found it necessary as biomedical engineering is a very promising field at the national and international levels.

Swiss Medtech Message

Switzerland is now only a third country to the EU for medical devices by Daniel Delfosse, Head of Regulation & Innovation

26 May 2021 was a key date for the medtech industry: the new European Medical Device Regulation (MDR) replaced the old Medical Device Directive (MDD). The national Medical Device Ordinance (MedDO) with high import hurdles came into force. On the same day, the Federal Council broke off negotiations with the European Union on the Institutional Agreement (InstA), making it unlikely that the Mutual Recognition Agreement (MRA) for free bilateral trade in medical devices would be amended in the near future. With the MRA not being updated, the Swiss medtech sector was relegated to «third country» status. On the same day, the EU Commission announced that Swiss certificates would no longer be recognised in the EU, even though they had been issued in compliance with the MDD.

The Swiss Medtech Association and its members, with the support of alliance partners at home and abroad, have fought at all levels for easier export of goods to the EU and import of goods into Switzerland. The Swiss medtech

sector has made great efforts to prepare itself in good time for the third-country scenario. It can be noted that over 95 percent of all Swiss medtech manufacturers fulfilled the third-country requirements in time for the seamless export of goods. Just before the end of 2021, Swiss Medtech was able to find a pragmatic solution with the Federal Office of Public Health (FOPH) and Swissmedic to facilitate the import of medical devices and to prevent a supply shortage for our Swiss patients. One thing is clear: this solves some of the important problems, but by no means all of them.

The attractiveness of Switzerland as a medtech location has suffered greatly. What multi-national company would still choose Switzerland as its EU headquarters? And every Swiss start-up company must ask itself whether a location in the neighbouring EU area would not be better suited for market access to the EU internal market. But we must not give in.

With the aim of outlining the way

in which Switzerland can once again become one of the most attractive medtech locations in the world, the association carried out the strategy project «Medtech Location Switzerland 2030» in 2021. The result of this work will be presented at the General Assembly on 17 May 2022 (<https://www.swiss-medtech.ch/en/events/event/swiss-medtech-general-meeting-2022>) . You are all cordially invited to attend.

Upcoming Events

ANNUAL 2022 SSBE MEETING - JOINT ANNUAL CONFERENCE OF THE AUSTRIAN, GERMAN AND SWISS SOCIETIES FOR BIOMEDICAL ENGINEERING: SEPTEMBER 28TH - 30TH, CONGRESS INNSBRUCK, INNSBRUCK (AUSTRIA)



We are glad to announce that the Joint Annual Conference of the Austrian, German and Swiss Societies for Biomedical Engineering including the «14th Vienna International Workshop on Functional Electrical Stimulation» will be held at Congress Innsbruck in Innsbruck (Austria) from 28 Sep 2022 to 30 Sep 2022. Following the successful events in Graz (2013), Basel (2016) and Frankfurt/M (2019), the biomedical engineering community will come together again in the heart of the alps. Innsbruck with its unique combination of urban flair and impressive mountain scenery will provide an inspiring atmosphere to meet colleagues and friends, exchange scientific ideas, discuss current trends, initiate new research and make new contacts.

BMT 2022 will cover a broad range of topics in basic research, applied research, clinical research and medical applications. In addition to current trends in the field such as precision medicine, digital health, artificial intelligence, wearables, nanotechnology and additive manufacturing, the conference will also focus on established topics such as imaging techniques, image and signal analysis, modeling and simulation, biomaterials, implants and robotics.

<https://www.bmt2022.at/>

IMPORTANT DATES - April 14th 2022 - Submission deadline of abstracts and full papers

SWISS MEDTECH DAY: JUNE 14TH, KURSAAL BERN, BERN



The most important event of the Swiss medical technology industry - including around 700 participants - brings all the influential players to Bern. Expect a top programme combining the tried-and-tested with the new. A convention which provides you with important insights into the challenges and opportunities affecting our industry. Swiss Medtech and its principal partner Innosuisse look forward to welcoming you to the event.

<https://www.swiss-medtech.ch/en/swissmedtechday>

SSBE INDUSTRY VISIT 2022 - TO BE CONFIRMED, STAY TUNED!

Visit our website at www.ssbe.ch/Cms/News for events information!

The SSBE Awards honor outstanding work and stimulate active participation by our younger members.

2022 SSBE Awards

Call for award nominations (deadline: June 1, 2022)

One of the main goals of the Society is to build a network for education, research, manufacturing and politics within the field of biomedical engineering (BME). With the organization of regular scientific meetings, these fields are brought together. Scientific prizes awarded at the Annual Meeting of the Society are aimed at engaging younger members who will play an active role in the Society.

In 2022 the Society will continue its tradition of honoring outstanding scientific work by young Biomedical Engineers. The SSBE Research award (5000 CHF) will be conferred at the 2022 Annual meeting of the Society (during a dedicated session in the joint annual OGBMT | VDE DGBMT | SSBE conference). Nominations are now being accepted, with a deadline for nominations of 1st of June 2022. Following

a pre-selection by the awards committee, finalists will be invited to present their work at the General Assembly.

For detailed information on submissions and nominations, please refer to the Awards Regulations on the webpage or contact the Awards Committee.

CHAIRMAN AWARD COMMITTEE

Ass. Prof. Dr. Philippe Buchler
ARTORG Center for Biomedical Engineering
Research, Computational Bioengineering
Freiburgstrasse 3, CH-3010 Bern
philippe.buechler@artorg.unibe.ch

Contributions and Comments

Your contributions are welcome. If you have information or news items of interest to the SSBE members, please feel free to submit your content to our office. We encourage also an open dialogue and are always interested in SSBE members' opinions. Suggestions for future industrial visits or inquiries from industrial partners to host a visit are gladly received by our industrial liaison, Prof. Daniel Baumgartner (daniel.baumgartner@zhaw.ch) or Dr. Daniel Delfosse (daniel.delfosse@swiss-medtech.ch).

LAYOUT AND EDITOR

Dr. Mathieu Lemay
CSEM
Jacquet-Droz 1, CH-2002 Neuchâtel
mathieu.lemay@csem.ch

OFFICE SSBE/SGBT/SSGB

Prof. Dr. Dimitri Van De Ville
EPFL and University of Geneva
Campus Biotech
Chemin des Mines 9, CH-1202 Geneva
dimitri.vanderville@epfl.ch