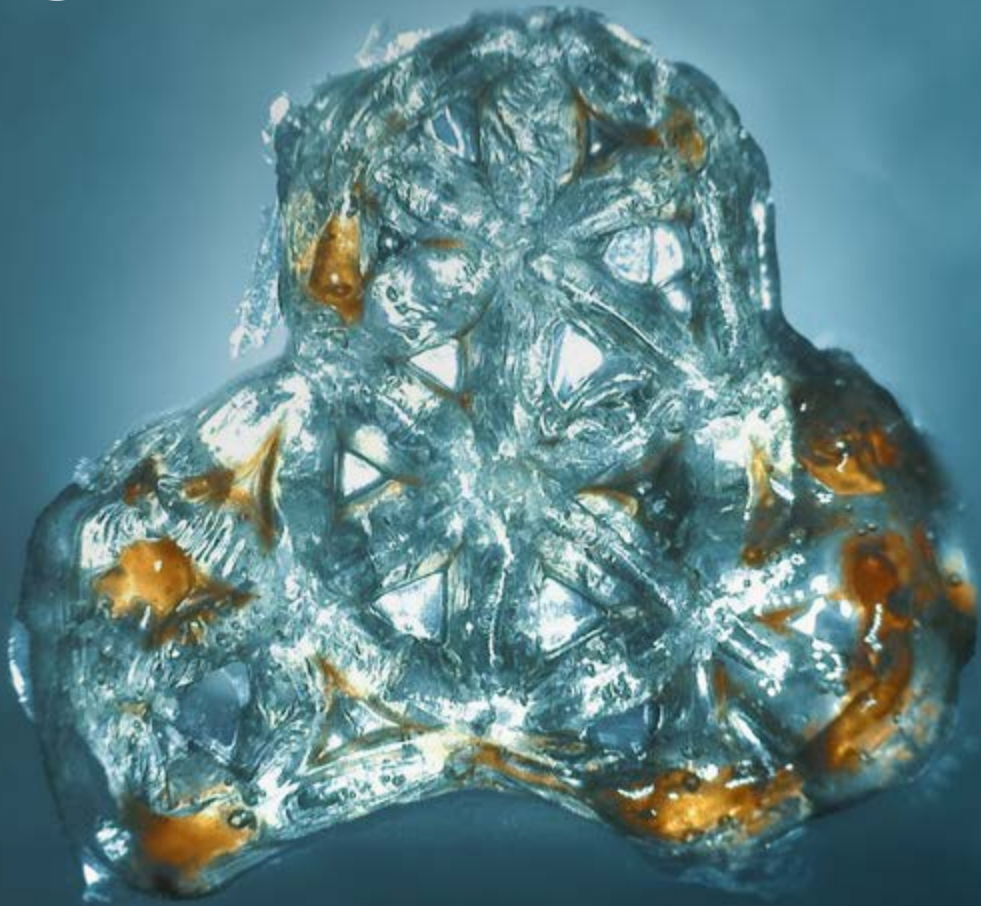


Annual Report 2022



Vision

AIMES' vision is a world in which the improvement of human well-being can be achieved alongside responsible utilization of Nature's resources.

Mission

AIMES' mission is to offer an academic research environment that promotes interdisciplinary research and education alongside innovation and entrepreneurship. By unifying basic and applied research in open dialogue with industry and the public sector, AIMES will bring science to society offering solutions to a number of global societal challenges.

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COVER IMAGE PROVIDED BY TEAM RUSSOM
3D bioprinting of a trilobular hepatic construct as an in vitro model for liver disease modeling and drug screening applications.

<https://www.mdpi.com/2306-5354/9/11/603>

Preface from the Chair of the Steering Group



Pam Fredman
Chair of the Steering Group
Professor emerita in Neurochemistry, University of Gothenburg
President of IAU – International Association of Universities



Christer Höög
Dean of Departmental group Solna at KI
Professor at KI



Mikael Lindström
Head of School of Engineering Sciences in Chemistry, Biotechnology and Health
Professor at KTH



Helene Svahn
Member of the supervisory board of Mercedes Benz Group AG and board member of Axel Johnson
International AB & Professor at KTH



Clara Hellner
Director of Research & Innovation, Region Stockholm

It is gratifying to conclude that we at AIMES have added a few more important pieces to the interdisciplinary puzzle of our environment that can facilitate solutions to major societal problems. The year has successfully brought forward both constructive and great collaborations with the surrounding society and general public but also innovation outcomes. Thanks to all collaborators, contributors and visitors during our public events!

During 2022 we could finally meet the general public. The pandemic years did for obvious reasons prevent us from showcasing the relevance of research and innovation for societal improvement. You can read more about our collaboration with Tekniska museum in Stockholm and one of the concepts we use when interacting with the general public. It has been shown to be very rewarding for both researchers and students showcasing their findings and methods as well as for kids and families to learn about what a researcher is doing.

The growing interest in the environment that AIMES creates demonstrates a well-functioning organization with good power of attracting collaborators both within and outside the academic sphere. The need of interdisciplinarity is more and more recognized and I am delighted to see that the strategic

path of AIMES is embraced by different stakeholders in the society. The achievements are based on the excellent work and engagement of all staff members, and a qualified and forward looking management.

Next step along the way is to start the discussion on “What is interdisciplinarity?”.

For us at AIMES it is a natural collaboration between disciplines. Technology and medicine have a strong connection, but to include industrial partners is for us a key factor to meet the national and global challenges of today. Diagnostics tools, alternative to animal experiments, new materials and new approaches to antibiotics need the industry to have an impact. If we also can add the clinical units and societal sciences to the mix, then you have interdisciplinarity in our opinion. By working together across areas, join in financial investments, trust the knowledge of others and dare to ask the basic questions to form a common language, then we can really improve and make our way towards the UN sustainable goals and societal improvement.

I am looking forward to continuing the work to elevate AIMES as an environment to transform scientific quality and interdisciplinary collaborations into social benefits!

Director's View

Finally, the pandemic lost its strong hold on us! This year, everyone at AIMES returned to the lab, the offices, and the lecture halls, we could finally meet again in real life! Back in 2020, AIMES had only been up and running for a month before the news reached us about a deadly virus in Italy and Austria. This forced us to change our work habits completely before we barely had started. Though our rapid adaptation to Zoom was essential to successfully take us through the pandemic, going back to meet each other in IRL this year has been fantastic. Only meetings in person can provide the extra dimension required for interdisciplinary, whether we consider research, teaching, or outreach. While Zoom helped us to expand the global reach of our webinar series Crossing Borders, creative discussions and the birth of brilliant ideas can rarely be scheduled to happen between 10.00 – 11.00 am on a Wednesday.

Despite restrictions associated with the pandemic, AIMES Team Leaders have had yet a successful year of research publications and grants. In addition to Project grants and 3R grants, three of the highly competitive VR-Starting Grant from the Swedish Research Council were given to AIMES Team Leaders! Yet a prestigious grant, from NovoNordisk, was received by another of our Team Leaders. We are very proud of our members, and we take this as a confirmation that we are doing the right thing, as we strive to establish AIMES as an environment where young intrinsically interdisciplinary scientists thrive!

As the world is on its way to open up, AIMES is now planning for a trip to Japan, to participate in the 5th Strategic Partnership-meeting between Stockholm Trio and the University of Tokyo to be held in Tokyo in February 2023. Six of AIMES Team Leaders will give presentations in the track Biomaterial, which we also co-organise. Also, the track Nanocellulose engage AIMES researchers, both Team Leader and PhD students. This meeting will also be the premier of a merger of the two tracks in one session. First, there is an interesting overlap between disciplines, also, both tracks are highly interested in innovation and bringing our research to societal use. Also, AIMES leadership and interested members are invited to Toyo University, a short train ride from Tokyo. Here, we will visit the interdisciplinary centre Bio-Nano Electronics Research Center, and exchange ideas specifically related to centres working across multiple disciplines. Collectively, this promises for a great time in Japan!

Biomaterials for biomedicine and clinical applications is a broad topic bringing AIMES scientists together. In the fall of 2022, this was also the title of a PhD course organised by AIMES scientists, targeting a mix of medical, biomedical, and engineering students. You can read more about our experiences from this exciting event in this report.

Outreach and interaction with the society are cornerstones of our activities. At the November school break, we showcased several themes of AIMES research as we engaged in the exhibition Hyper Human at Tekniska Museet in Stockholm. While this provided an excellent opportunity for AIMES graduate students and post-docs to communicate their research to the society, it was also very well received by children and adults alike. We look forward to continued interactions with Tekniska Museet, who has invited us to also participate in the upcoming Easter break.

Innovation is another aspect of outreach strongly supported by AIMES. Our Team Leader Thomas Crouzier has developed a prophylactic gel which reinforces the cervical mucus barrier, thus acting as non-hormonal contraceptives. The company formed by Crouzier, Circle Biomedical, has entered a \$360 million partnership with the women's health company, Organon, to develop and commercialize the technology.

Having given a few teasers, I hope it inspires to further reading of our achievements in the Annual Report 2022. Also, I look very much forward to the coming year as we are finally back to IRL.



Agneta Richter-Dahlfors
Director of AIMES
Professor in Cellular Microbiology at KI
Professor in Chemistry and Biotechnology at KTH

Science to society

After the pandemic years we are thrilled to finally meet the general public as a part of science communication. Not only is the public outreach fun and educational for our students and researchers, it is also prescribed by law and a fundamental task of each university in Sweden to share the knowledge that science has built, how it can be used and implemented in different settings.

At AIMES we do embrace the knowledge of others, the knowledge that can develop and bring new light to your own scientific questions. You can always learn something when interacting with people in other settings and with a different set of skills than your own, especially when meeting the general public and hear the questions and see the interest in science development.

We are very happy that we during this year has established a collaboration with Tekniska museum in Stockholm. We have found common paths and ways to exchange knowledge and at

the same time make the general public at large more aware of the research ongoing within the academia, why it is important and how it can be used for societal improvement.

To meet the general public has upgraded the communication skills of our students and researchers. It takes skills to explain the work that has been developed for years in a single minute, you really have to focus on the scope, language and message that you want to convey. Our internal evaluations has shown that it is much appreciated to practice this way of communication and documenting the ongoing work in the lab.

We have new projects ongoing that will further elevate our science communications skills and further meet one of the goals set for our center, goals set by the leadership of both Karolinska Institutet and KTH Royal School of Technology, a mission to provide a consistent way of communicating science. We embrace the task and appreciates the focus on communication that the leaders of our universities show in this field.



IMPORTANCE OF OUTREACH & SCIENCE COMMUNICATION

Health care and life science are going through unprecedented changes due to technology development and new challenges. These challenges are so called "wicked problems through their complexed and intersectional nature." In order to meet the coming challenges and evolve with the changing system, we need researchers that can move between silos with ease and work across sections. We need researchers who know how to do impactful engagement. AIMES nurture a collaborative and engagement focused environment, thereby creating new archetypes for what research can be. Their approach that implement engagement on all levels sets a great learning example for all academic institutions in Stockholm.

Anna Birgersdotter

PhD, Project coordinator EIT Health, Head of Bioentrepreneurial Culture & Facilitator Unit for Bioentrepreneurship (UBE), LIME, Karolinska institutet

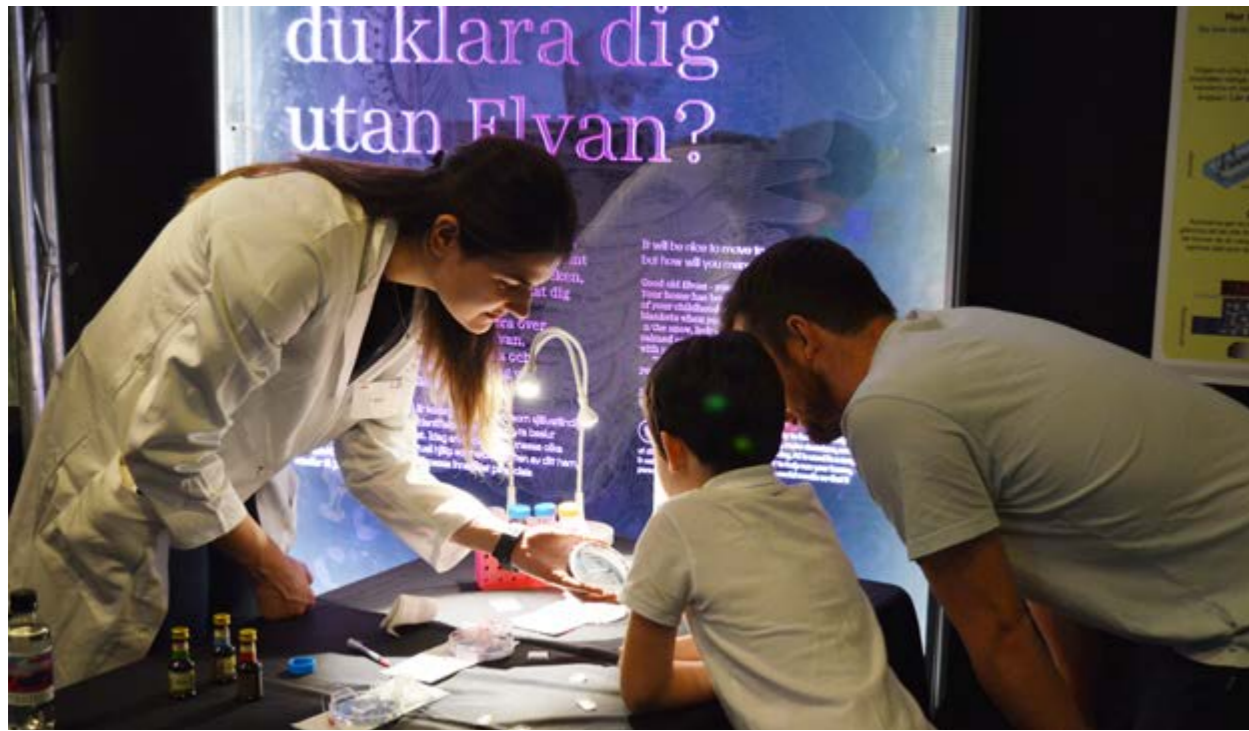
We have just started a new innovative journey in research, when we explore how museums can facilitate meetings between the seemingly unexpected and nurture dialogue. Together with AIMES, we have initiated a way to implement researchers into exhibits, something and we will continue to explore in our new hub in Hagastaden, devoted to Life science that opens in 2024."



Magdalena Tafvelin Heldner

Curator at Tekniska Museet/National Museum of Science and Technology

AIMES goes Tekniska



During Höstlov, the autumn school break in November 2022, the AIMES Center got the exceptional opportunity to participate in the HyperHuman exhibition at Tekniska Museet in Stockholm. It was a wonderful opportunity and experience for us, the researchers at AIMES, to share our passion for science and inspire the next generation of scientists.

Effective science communication is essential for promoting scientific education and improving public understanding of science. Over the last couple of years, it became quite striking that we need to reach out to build trust between scientists and the public. Usually, we present our research in the context of conferences, seminars, or symposia as well as in research articles published in science journals. However, what is easy to understand for our peers and fellow scientists, is not necessarily approachable and understandable for children (and their parents). Consequently, setting up our exhibits and displays was challenging and intense; we had to translate our complex scientific concepts into comprehensible and relatable terms that non-experts can follow.

With interactive demonstrations, hands-on activities, and informational displays we tried to make our exhibits as exciting as possible. We were happy that CELLINK and Getinge

supported us by providing a 3D printer and a mechanical ventilation apparatus, respectively. Overall, we had one information booth and six science showcases: starting at the information booth, where visitors could learn about our multidisciplinary AIMES Center and kids were challenged to fulfill our AIMES quest – a treasure hunt in which they accomplished certain tasks at each booth and temporarily became scientists themselves.

First station in the AIMES quest was a demonstration of a real ventilator used in intensive care to artificially respiration patients, hosted by a representative of Getinge. Next, the kids had the opportunity to operate a 3D printer by themselves (with the help of Siva and a CELLINK's field application specialists) and watch small sample objects being printed, which they even could take home afterwards! The following station showcased the field of bioelectronics: lead by Sanhita and Erica, kids learnt about plastics and gels that can conduct electricity and tried out using a multimeter to measure current flow through plastics and soft jelly like materials. They learnt how these materials can help people with brain and nerve problems and they had a lot of questions about how that might actually be done! For their next adventure, the kids had to be sharp-eyed since this

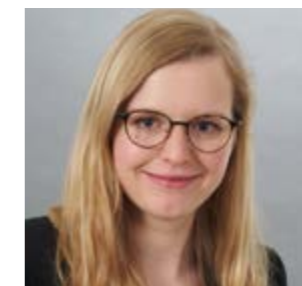


station, organized by Julia R., was all about microfluidics: in this hands-on-experiment, the kids used blunt syringes and tubing to push a blood-like liquid (red food color) through a microfluidic device. The kids learnt that with different channel dimensions the liquid travels at different speeds through the channels. Beside getting insights into the certain research fields of our AIMES Center, one booth focused on the concept of fluorescence and how it is used in daily lab work for different applications, brought up by Julia L. and Mariam. In a darkened area the kids experienced how fluorescently labelled objects can be differentiated using UV-torches and glow-in the dark painted balls. Last stop of the quest was a tough fight against infection – organized by Ferdinand. Here, the kids learnt how our body fights off microbial infections, and that sometimes the bodies own defense system requires help by medication such as antibiotics. To illustrate this concept, in a special version of traditional can knockdown, the kids attacked a microbial infection by throwing white blood cell, and later antibiotic plushies at microbial plushies.

During the event, it was fulfilling to see kids' faces light up with excitement and curiosity as they learnt about the various scientific concepts on display. It was humbling to see how our research could inspire young minds to think

critically and creatively. The kids asked thoughtful questions and showed enthusiasm for learning about science.

Altogether, our outreach event at Tekniska Museet was a huge success, with hundreds of children attending and engaging with our exhibits. Not only the participating junior scientists were inspired and worked up curiosity for the wonders of life sciences but also we, the more seasoned researchers, got inspired by the kids' thoughtful questions. We are really happy to have this experience, and we hope this event opened the door for more interactions with Tekniska Museet!



Julia Rogal



Julia Lang

AIMES quest 2022



AIMES quest – a treasure hunt where kids temporarily became scientists themselves! A quest certificate was provided at the start of our area. The certificate was marked for every station they visited. After fulfilled the knowledge demos they received a bookmark as a price for their newly gain knowledge!

Start



1

First station in the AIMES quest was a demonstration of a real ventilator used in intensive care to artificially respire patients, hosted by a representative of Geringe.

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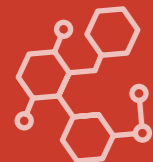


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3

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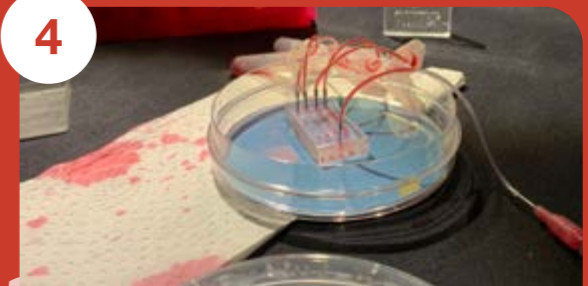
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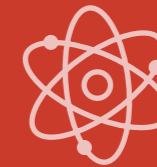
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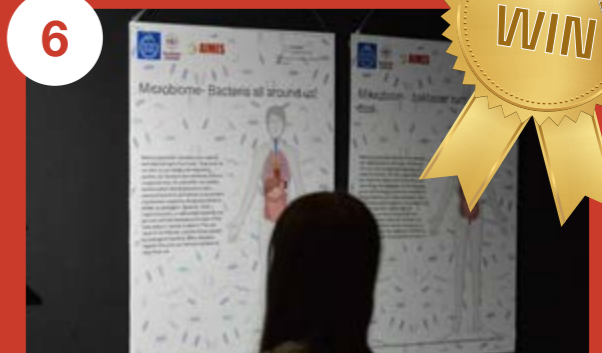
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6



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Sustainable Biomaterials for Medical Applications

AIMES hosted a workshop on Sustainable Biomaterials for Medical Applications in Biomedicum, KI Solna, at the end of November, together with Stockholm Material Hub. The workshop showcased research addressing the importance of sustainable biomaterials in multiple sectors related to medicine. Also, successful translation of research results to societal use was demonstrated by participating SMEs, founded based on the presented research. The SMEs included Afiyet, Cirqle Biomedical, Ebba Biotech, Richter Life Science, and Spiber Technologies.



Prof. A Richter-Dahlfors introduced the workshop, which attracted circa 50 participants from academy as well as industry and the private sector.



Victor Isaksen, CEO at Sting Bioeconomy, supports startups and business ideas in the field of bioeconomy, services or products that contribute to saving the Earth's finite resources. In his keynote Grow your business naturally, Isaksen put the spotlight on the remarkable global business opportunities offered by sustainable biomaterials.

Stockholm Material Hub is a Stockholm Trio initiative, aiming to “contribute to more advanced materials and their use, reaching national and global market through innovative approaches, for sustainable applications and towards stronger competitiveness by knowledge transfer and supporting development of SME in the Stockholm Region”. The hub is headed by Prof. Jiayin Yuan, Stockholm University, and the steering group members Prof. Mats Nilsson, SU, Prof. Agneta Richter-Dahlfors, KI, Prof. Mark Rutland, KTH, and Andreas Scheibenflug, Head of Business Ecosystem at Business Sweden.

Translation to societal use



Ferdinand Choong
KI, Assistant Professor

A core mission of AIMES is to facilitate the translation of research results into societal use. The work environment has been developed to promote the engagement in such activities. Our scientists are well trained and educated in how to identify an unexpected research result, file for protection of the intellectual property, and move further towards the

establishment of start-ups or collaboration with industry. With these skills and experiences, AIMES Team Leaders are often asked to provide input in this matter.

KI aims to be an attractive partner to companies and wants to further develop its business engagement, since collaboration with industry on research can bring many opportunities. However, such collaborations also come with challenges. Since there is a need for a central support function, work began in 2021 on mapping the collective experiences, reflections, and resources for industry collaboration across KI. The goal was to develop implementable recommendations towards the establishment of a support function for industry collaboration in research. Assistant professor Ferdinand Choong was recruited as a member of a KI project group aiming to collect experiences and competences within industry collaboration. The group should describe processes on how to create an institutional memory, map the ongoing industry collaboration within research at KI, develop internal and external webpages to enable industry collaboration within research, and develop a financial and organizational model on how such support for industry collaboration could be launched.

In 2022, the group had created the comprehensive report “Industry collaboration support – KI”, which details

the mission, vision, focus areas, personnel, and services necessary for a support function to facilitate industry collaboration for interested parties across all levels at KI. Yet an important component of the report is paired websites for internal and external users to interface with the support function and to gain access to information and resources for industry collaboration.

The input from AIMES Team Leader Dr. Ferdinand Choong has been one essential component in the establishment of the report, which will form the base of intersectoral collaborations that are necessary to fulfil the KI Strategy 2030 and the United Nations Sustainable Development Goals.



Science-to-society

ENTREPRENEURIAL ENGAGEMENT AND INDUSTRIAL COLLABORATION

As a forerunner in Sweden for implementing research results into societal impacts, AIMES offers an innovative research environment that promotes entrepreneurial thinking. Patents

emerging from creative projects driven by AIMES scientists form the foundation of start-up companies. Here are examples of what we have achieved so far:



Offers an innovative non-hormonal contraceptive based on mucus engineering.



Offers Optotracing for dynamic visualisation of nanostructures related to neurodegenerative diseases, bacterial infections, and plant biomaterials.



Offers living platforms that emulate the complexities of human biology to enable unprecedented insights into human biology and health



Offers intelligent sensing technologies applicable to the Med-, Bio-, Food-, Agro- and Green-Tech industries.

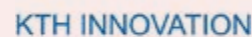
Collecteve AB

Collecteve is making human-specific advanced *in vitro* models.

Societal impact is also achieved via collaborative research projects that embrace a variety of stake-holders, including industry.



Science parks and incubators interacting with AIMES scientists



New hormone-free contraceptive

During 2022 Cirqle Biomedical where Thomas Crouzier is a co-founder and CSO and Organon, a global women's healthcare company, entered into a research collaboration and exclusive license agreement for a novel investigational non-hormonal, on-demand contraceptive candidate and aim in that way to create a breakthrough for the health of women.

The partnership has a deal value of \$ 360 million. Turning abstract theories and findings into tangible improvements for individuals and communities, is crucial for solving the pressing challenges and enhance the overall well-being of the future society. As we at AIMES consider the Science-to-society approach one of our main objectives, we are particularly proud to congratulate Thomas Crouzier and his Team in their progress of testing an innovative contraceptive method, a vaginal gel, that preclinical studies have shown prevents sperm from reaching the egg.



Thomas Crouzier
Researcher KTH, affiliated researcher AIMES, KI & CSO Cirqle Biomedical



According to numerous scientific studies, some forty per cent of all pregnancies are unplanned, a figure that is consistent across nations, rich and poor. One of the main reasons for this is the lack of contraceptive use. Reasons cited for abstaining from contraceptives include inconvenience and concerns about the side-effects.

The vaginal gel developed by Team Crouzier can function as a new hormone-free contraceptive. The gel reinforces the natural barrier found on the cervix and prevents the sperm from reaching the egg and it can be applied in seconds.

More info at

<https://www.organon.com/news/organon-and-cirque-biomedical-enter-research-collaboration-and-license-agreement-for-investigational-non-hormonal-on-demand-contraceptive-candidate/>

Dr Crouzier is optimistic for a future for the vaginal gel. He notes that concerns among women of potential adverse mental side effects to hormone-based contraceptives have risen and many prefer alternative hormone-free methods.

Science communication

Disseminating knowledge is essential to transform society by advancing technology, informing policymaking, promoting health literacy and contributing to economic growth.

AIMES want to interact and encounter in different levels and in diverse channels since we are convinced that the puzzle can only be complete with all the pieces of the so-

ciety. We aim to meet all from school children, our future leaders, to policy makers and industrial stakeholders, taking the decision today.

In 2022, Center scientists and their research have been featured in physical-, digital- and hybrid conferences, TV interviews and podcasts, press releases, webinars, symposium, and video abstracts.

Team Leader Anna Herland and her work was featured on the Wallenberg foundation grant news on a collaboration to establish models of rare diseases.
<https://kaw.wallenberg.org/en/research/recreating-congenital-disorders-chip>



FOTO: FREDRIK PERSSON

Welcome to Ebba Biotech's Webinar

Thursday, 24th February 2022



About Us

- Swedish company started in 2015
- Interdisciplinary collaboration

Our Products - Optotracer

- Fluorescent tracer molecules labelling macromolecular components



- Fast
- Simple
- Stable
- Non-toxic
- Accurate



Team Leader Ulrica Edlund connected with an intersectoral audience on a webinar hosted by Ebba Biotech, talking about her revolutionary work with Carbotrace, nanomaterials, and the discovery and characterization

of renewable resources for biorefinement. Ulrica are also hosting several high school classes yearly for visits at KTH and popular science lectures about polymer materials".
<https://www.youtube.com/watch?v=dB1K9bL5FCM>



Team Leader Erica Zeglio was interviewed in HER Frequency podcast, a platform to initiate discussions about opportunities and issues surrounding women in with professions in Science, Technology, Engineering and Math.
<https://youtu.be/bzJ4g4PTZGU?feature=shared>



FOTO: JOAKIM LINDBERG



FOTO: JOAKIM LINDBERG

Team Leader Karl Svennersten was mentioned in the Karolinska University hospitals magazine "Karolina" in an article showcasing the hospital's efforts with weekend surgery to decrease the waiting list for cancer surgery.

<https://www.karolinska.se/om-oss/centrala-nyheter/2023/01/lordagssatsningens-sista-operationshelg/>

Karl is also member of the expert committee for urinary tract diseases in the Drug Therapeutic Committee and the Health and Medical Care Administration of the Region Stockholm, Sweden who publishes the Wise List which contains those drugs that have been recommended and Informatics.



FOTO: ANNA NILSEN

Team Leader Peter Nilsson, his group, and their work developing tracer molecules to shine a light on Alzheimer's research was featured in Linköping University's press release of their recent publication titled 'Whole-brain microscopy reveals distinct temporal and spatial efficacy of anti- $A\beta$ therapies' <https://liu.se/en/news-item/peter-nilssons-molecules-shine-a-light-on-alzheimers-research>

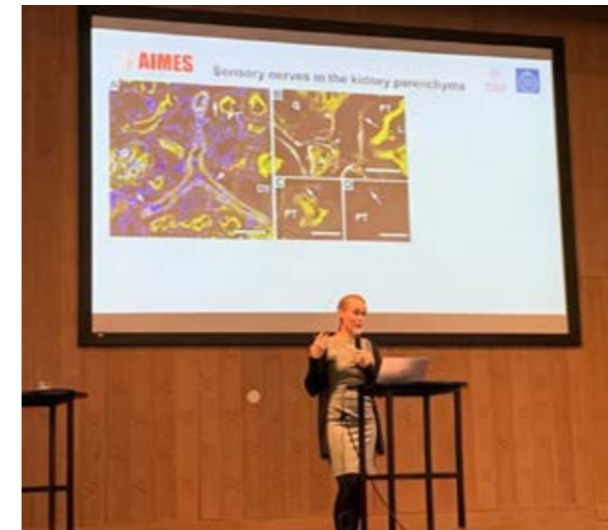


Linda Thörn, Augusto Marcelli and Erica Zeglio.

Public events with scientists can have a transformative impact on society as a platform to bridge gaps between scientists and all sectors.

In 2022, Erica Zeglio and Linda Thörn met with the 2021 Nobel Laureate Prof. Giorgio Parisi at the Italian Institute of Culture. Invited by the collaborator Augusto Marcelli, Scientific Attaché of the Italian Embassy in Stockholm.

AIMES members also took part in a retreat arranged by Department of Neuroscience. Team Leaders Keira Melican and Anna Herland presented the neuro related ongoing science at AIMES as well as the center activities and education.



Mucin gels for HIV prevention. Cow mucus provides the basis for a synthetic prophylactic gel developed to protect against HIV and herpes transmission. The lubricating gel proved 70 percent effective in lab tests against HIV, and 80 percent effective against herpes.

<https://www.kth.se/en/om/nyheter/centrala-nyheter/non-hormonal-gel-proves-effective-at-helpling-mucus-block-sperm-1.1210700>

<https://www.kth.se/en/om/nyheter/centrala-nyheter/mucus-based-lubricant-proves-highly-effective-against-hiv-and-herpes-1.1191313>

Cervical mucus reinforcement for contraception. Team Crouzier are part of a collaborative study that has made progress in the testing of an innovative contraceptive method, a vaginal gel, that preclinical studies have shown prevents sperm from reaching the egg.

<https://news.ki.se/scientists-develop-a-new-hormone-free-contraceptive>

<https://www.svt.se/nyheter/hormonfritt-preventiv-medel-for-kvinnor-testas>

https://www.youtube.com/watch?v=pFtZuMy8-fM&list=PPSV&ab_channel=URPlay



Our research environment

To ensure high quality and security we continue to develop our environment and routines to meet the needs of the intrinsically interdisciplinary project that are carried out in our environment in Biomedicum BSL2 facilities.

Lab manager Elham Jalalvand and Operation Controller Linda Thörn team up and assure that compliance to the regulatory frameworks governing our research is carried out. Structures, routines and communication are crucial for AIMES environment and we are constantly working to facilitate and develop best practice.

AIMES encourage dual affiliations: the main position at one university and an affiliation to the other. Team Leaders can complement their main group at one university (e.g. KTH) with a sub-group at the other (e.g. KI).

AIMES is physically located in Biomedicum at KI, Campus Solna, hosted at the Department of Neuroscience. The safety level of laboratories and animal facility permits work with human material and disease-causing microorganisms. Members have access to local infrastructure in Biomedicum and to core facilities at KI and KTH.

Project carried out at AIMES are of fundamental as well as applied character. The philosophy of the Pasteur's Quadrant opens for basic science and technological innovation to thrive at AIMES. By assessing the Technology Readiness Level of our projects, the maturity of new technologies is monitored in all progression phases, thereby supporting translation towards societal use.

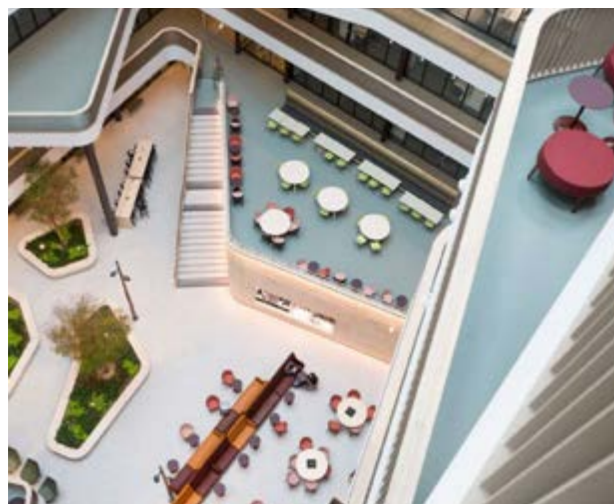


Linda Thörn

Elham Jalalvand

AIMES Management Group

Agneta Richter-Dahlfors	Director
Ulrica Edlund	Vice Director
Linda Thörn	Operations Controller
Keira Melican	Chair, Board of Research
Anna Herland	Chair, Board of Education
Ferdinand X. Choong	Chair, Board of External collaboration



Why AIMES?

The AIMES concept focuses on the combination of biomedical, clinical, material, and engineering sciences, serving as a facilitator for collaborative and transdisciplinary research. Collaboration is a great way to foster young researchers to develop leadership skills by giving them the chance to interact with diverse groups of people, take on different roles and responsibilities, and build networks.

Aside research, AIMES is dedicated to outreach and education activities. Such activities provide researchers in all stages of their careers with the chance to take on leadership roles in projects, teams, or initiatives, which offer hands-on experience in leadership and help to develop creativity. The popular science display at Tekniska museet in 2022 is a brilliant example.

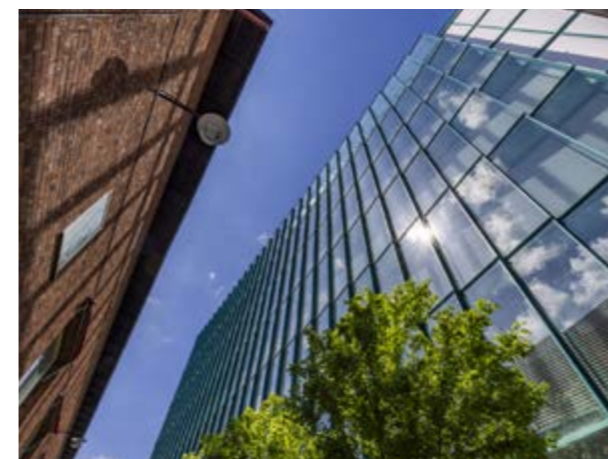
Transdisciplinary work require people open to new ideas and perspectives. AIMES is committed to be an attractive hub for collaboration and co-creation allowing our researchers to address complex research challenges that cannot be solved by one dicipline alone. That is how we can make true impact.

AIMES provides a unique interdisciplinary research environment and platform with state-of-the-art intellect and infrastructure resources, which allows natural collaboration between engineering and medical disciplines. The research environment of AIMES enables and facilitates our interdisciplinary research activities in a way that cannot be achieved anywhere else. It further promotes our goals to address and implement both fundamentally and industrially relevant issues of societal and sustainable relevance at the highest scientific level.



Ulrica Edlund

Inger Odnevall





Infections and biofouling caused by bacteria and biofilm affects many layers of society: good health, food security, good manufacturing practices etc. Choong furthers our knowledge of biofilm physiology and pathogenicity and develops new strategies for infection treatment, biofilm detection and removal, and biofilm antimicrobial

susceptibility testing. He also drives the discovery, development and validation of novel optical sensing techniques for real time in situ detection of polymeric materials in bacterial biofilm, and in the renewable resources lignocellulose biomass and algae. This will aid in the optimization of current processes for a move towards a circular bio-economy.

Ferdinand Choong

PhD, Assistant Professor in Microbiology and Glycobiology, AIMES, KI



Mucus is a hydrogel that covers the wet epithelium of our eyes, nose, respiratory, gastrointestinal, and reproductive tracts. With an ability to hydrate and lubricate surface, this thin layer protects epithelia from dehydration, shear stress, and viral/bacterial attacks. Crouzier works at the interface of

chemistry, biology and material science. Examining mucus from the view of materials engineering, he deepens our understanding of mucus biology, and develops new ways to assemble mucins into materials with useful medical application, exemplified by a non-hormonal contraceptive.

Thomas Crouzier

PhD, Researcher in Glycoscience, KTH Affiliated Researcher, AIMES, KI



Committed to develop new green materials from renewable resources, Edlund develops methods to extract polymers and monomers from terrestrial (wood, agricultural residues such as kernels, leaves, stems of locally produced biomass) and marine (algae) sources

from which she designs renewable functional materials. Activities include synthesis, surface modification, characterization, materials design, and recycling. Many inventions stem from her work: bioplastics, films, coatings, microspheres, and hydrogels.

Ulrica Edlund

PhD, Professor in Polymer Technology, KTH Affiliated Researcher, AIMES, KI



Developing new drugs is a major challenge for society and industry. Systems closely mimicking human organs, so-called Organs-on-chip, will improve our understanding of diseases and promote drug development. Herland applies microengineering and bioengineering technologies to recreate body-like environments, primarily of the brain and its vasculature, as she wants to understand the interactions

between neurons and neurovascular cells in terms of metabolic function and neuronal activity. She also develops organic bioelectronic interfaces to mammalian cells and bacteria, optoelectronic interfaces to mammalian cells, and nanopores/gaps for single biopolymer identification. Herland works closely with pharma industry, studying the distribution and effects of drugs.

Anna Herland

PhD, Associate Professor in Hybrid Bioelectronic Systems, KTH Researcher, AIMES, KI

In her position as Affiliated Researcher, Löffler takes the opportunity to split her time between research at AIMES and active engagement in a start-up company commercializing the optotracer technology, which has been developed at AIMES.

With a deeply interdisciplinary track-record in academic research, spanning fields of neuroscience, biosignal analysis, neuroengineering, material science, electrochemistry as well as microbiology & infection, Löffler is the liaison for technology transfer from lab-to-market. The terms 'technology-

readiness-level' and 'intellectual property' are matters of continuous discussion with students and colleagues in her team that is exploring the potential for 'Organic Electronics in Infection'. Specifically, together with postdoc Sanhita Ray, the team investigates how biofilm formation can be detected or modulated using electrically conductive polymer materials. They are using optotracers as reporters for biofilm structure and morphology. On top of that, the team is working on digital tools that simply drawing intelligence from optotracer data.



Susanne Löffler

PhD, Assistant Professor in Organic Bioelectronics for Bacterial Infection, KI

Human skin hosts a wide range of bacteria, and *Staphylococcus aureus* (*S. aureus*) is one of the most common. Human skin differs significantly from animal skin in terms of structure and immunological function. To understand how methicillin resistant *S. aureus* (MRSA) causes infection on otherwise healthy human skin, Melican have developed humanized in vivo models of infection:

human skin tissue models and a xenograft in vivo model. She also studies the dynamics of pyelonephritis - infection of the kidney by uropathogenic *Escherichia coli*. Using cutting-edge techniques, including intravital imaging, she deciphers the dynamic host-pathogen interplay during infection, which is essential for the development of new treatments.



Keira Melican

PhD, Researcher in Tissue Microbiology, AIMES, KI

An in-depth understanding of diseases is essential for development of diagnostic tests and treatments. A class of optoelectronic material with remarkable potential in detecting disease associated markers may be key to such understanding. Nilsson pioneers the design and synthesis of thiophene-based ligands, generating a new class of optoelectronic

material with many applications. The multimodal, chemically defined ligands create the next generation material for molecular imaging, diagnostics and therapeutics. The technology helps us to deepen our understanding of neurodegenerative diseases such as Alzheimer's disease, as well as bacterial infections and cancer.



Peter Nilsson

PhD, Professor in Organic chemistry, Linköping University, Affiliated researcher, AIMES, KI



The Odnevall team conducts fundamental and applied studies on metallic surfaces with and without organic coatings (such as products, massive surfaces, micron- and nano-sized particles) with the goal of investigating how the material-, surface and corrosion properties, as well as transformation/dissolution properties change over time at different environmental-, societal and occupational exposure conditions. Interdisciplinary studies are conducted to assess possible relationships between these properties and the (eco)toxic potency upon contact with humans and aquatic organisms. Examples of such studies include toxic effects that may

occur by inhalation and/or by skin contact of engineered and non-intentionally formed metallic (nano)particles, or in contact with high touch metallic surfaces, ecotoxicity of engineered metallic nanoparticles on various aquatic organisms and when using metals in contact with food and beverages. Results of ongoing research have major implications for how metals are used and regulated, and are crucial for proper environmental and health risk assessments and handling of metals. The research is done in close collaboration with industry, societal actors, governmental actors and academic partners.

Inger Odnevall

PhD, Professor in Surface Chemistry and Corrosion Science, KTH
Affiliated researcher, AIMES, KI



Quality healthcare builds on the availability of accurate patient information. Innovative concepts of health monitoring are developed by scientists at the interface of medicine and engineering, in the area of biosensors and bioelectronics. Parlak combines bioelectronics, materials sciences, and biology to develop biosensors that monitor health and disease. Health monitoring is achieved by the new concept “wearable electronics”,

which in the form of a skin patch can sense compounds in sweat as a person exercise. For disease monitoring, Parlak focus on bacterial infections, as he generates novel tools that provide extremely detailed information of bacterial biofilms. The highly innovative science thus tackles two key areas of critical importance to all of us: our health status versus disease.

Onur Parlak

PhD, Assistant Professor in Biosensors and Bioelectronics in Medicine, AIMES, KI



Salmonella enterica causes more than 350 000 deaths annually. Better understanding of the infection pathogenesis is needed. Rhen study the complex infection pathogenesis of *Salmonella*. He identifies the functions of virulence factors during bacterial interactions with immune cells, the gene expression profiles of bacteria growing within immune cells, and he explores pathways enabling bacterial biofilm formation. Persistent

infection is also studied. As *Salmonella*, as a species, is becoming ever so more resistant to clinically applicable antibiotics a special focus is placed on periplasmic endopeptidases involved cell peptidoglycan endopeptidases. A common denominator for these enzymes is that they are involved in the turnover of peptidoglycan, the target of beta-lactam antibiotics.

Mikael Rhen

PhD, Professor in Microbial Pathogenesis, MTC, KI
Affiliated researcher, AIMES, KI

Infections are multifaced phenomena difficult to recreate and study. By integrating knowledge and techniques of medical and engineering science, Richter-Dahlfors uses advanced techniques when studying the integrated pathophysiology of bacterial infections. Acknowledging the need for better analytical tools to advance research, she develops, tests and disseminates novel

methods and technologies. Of special note is conducting polymers that allow rapid, precise, and real-time monitoring of information pertinent to healthy and diseased conditions. Due to the generic nature of the methods, she has expanded her work to also include plant science. To bring science to affect change in society, she works closely with industry.

Agneta Richter-Dahlfors

PhD, Professor in Cellular Microbiology, AIMES, KI
Guest Professor in Chemistry and Biotechnology, KTH



Affordable, robust, and accurate diagnostic tests are essential to rapidly determine the condition of the patient. Russom employs microfluidic technologies to develop point-of-care tools for many applications. This technology allows sorting of rare circulating tumour cells for cancer diagnostics, and isolation of bacteria from blood for molecular analysis. Committed to develop affordable

healthcare for all, Russom develops compact, portable, and robust devices for resource-limited settings in, where the prevalence of ubiquitous pathogens claims tens of thousands of human lives every year, mostly due to the lack of effective diagnostics and therapy. Eventually, this research may serve to introduce advanced molecular point-of-care tests in rural areas.

Aman Russom

PhD, Professor in Clinical Microfluidics, SciLifeLab, KTH
Affiliated researcher, AIMES, KI



Countless problems can happen when bacteria enter the urinary tract. An infection often results from bacteria trapped in stagnant urine. When stones block the urinary tract for a long time, urine backs up in the tubules within the kidney, causing excessive pressure that leads to swelling and eventually kidney damage. Being a urologist, Svennersten com-

bines his clinical and laboratory perspectives when addressing questions related to the involvement of bacteria in kidney stone formation, and how patients are best treated to prevent formation of kidney stones. He also examines the nervous control of the bladder, defining measures to improve the quality of life in patients with spinal cord injuries.

Karl Svennersten

MD, PhD, Affiliated researcher, Dept of Molecular Medicine and Surgery, KI
Affiliated researcher, AIMES, KI



Detecting physiological changes in the body, both massive and minute, is essential in the research of diseases and development of treatments. Organic electrochemical transistors (OECT) are devices capable of simultaneously controlling the flow of electronic and ionic currents. This unique feature renders the OECT the perfect technology to interface man-made electronics, where signals are conveyed by electrons, with the world of the living, where information exchange relies

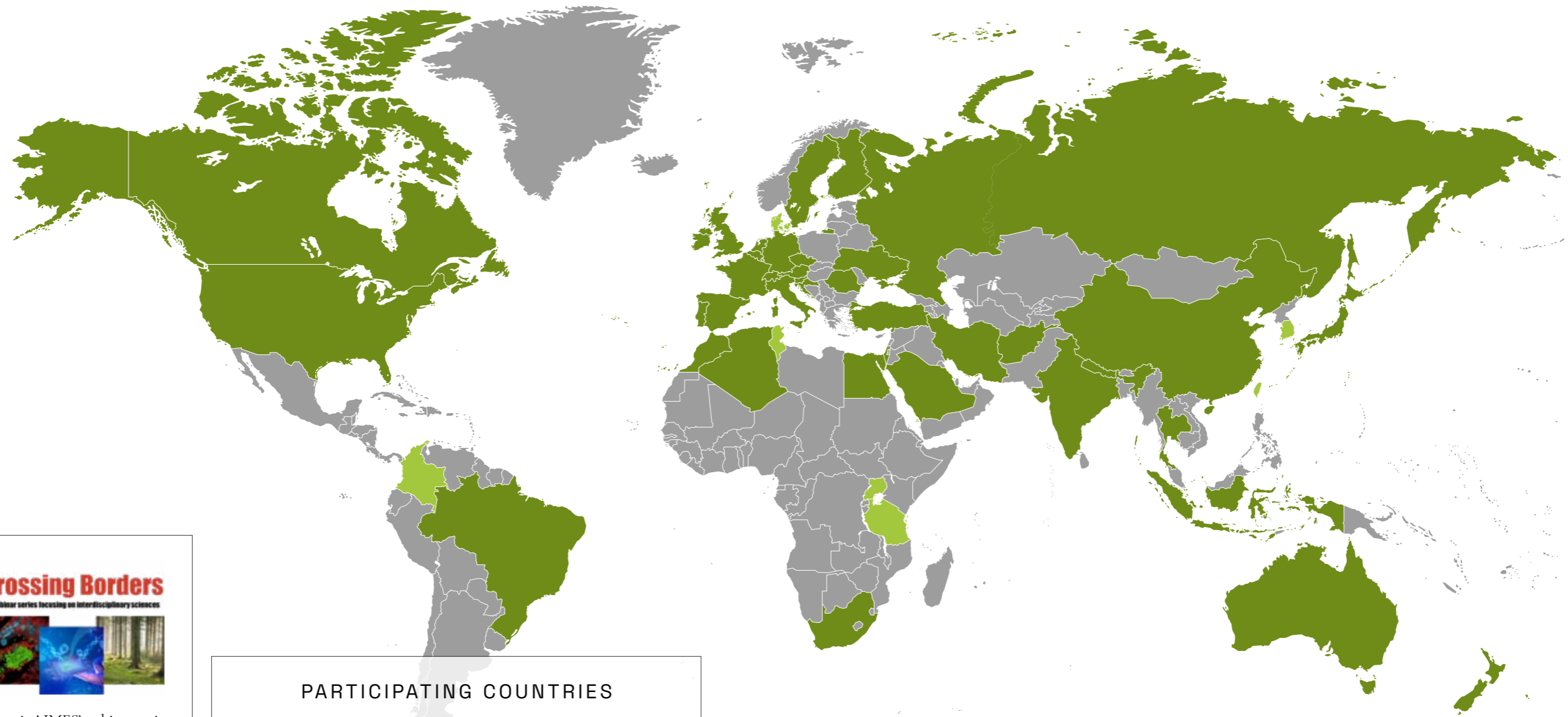
on chemical signals. Zeglio aims to advance current materials used for bioelectronic devices, leading to better performance, advanced functionalities for bio-interfacing, and stability. Her vision is to create a new generation of organic electronic materials that brings together device performance and sustainable design. The long-term goal is to develop devices that can seemingly interface with cells and tissues to sense and stimulate biological functions.

Erica Zeglio

PhD, Affiliated researcher, Division of Nanobiotechnology, SciLife Lab, KTH
Affiliated researcher, AIMES, KI



Connecting the world of interdisciplinary scientists



Crossing Borders is AIMES' webinar series focusing on interdisciplinary sciences. This year we hosted 12 webinars in a wide range of topics. The list of countries participating is still increasing, showing that the interest in disciplinary discussions is increasing around the globe. We are proud that this series attracts a broad audience from widely different areas of research. The pandemic showed us an opportunity to reach interdisciplinary scientists online all over the globe, the online webinars gather an international audience with a broad interest in interdisciplinary sciences. We are happy that the growing interest for the webinars includes participants from academia, health care and industry.

PARTICIPATING COUNTRIES

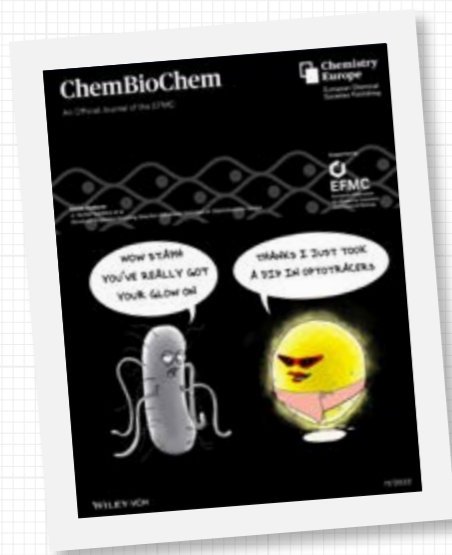
● New 2022	● + ● All countries 2022		
Colombia	Afghanistan	Indonesia	Slovenia
Taiwan	Algeria	Iran	South Africa
Uganda	Austria	Ireland	South Korea
Singapore	Belgium	Israel	Spain
Denmark	Brazil	Italy	Sweden
Tunisia	Canada	Japan	Switzerland
South Korea	China	Morocco	The Netherlands
Tanzania	Croatia	Nepal	Thailand
	Czech Republic	New Zealand	Turkey
	Egypt	Portugal	Ukraine
	Finland	Romania	United Kingdom
	France	Russia	United States of America
	Germany	Saudi Arabia	
	India	Singapore	

INTERNATIONAL COLLABORATION

- | | | |
|--|---|---|
| Chulalongkorn University, Thailand | Kinetikos Health, Portugal | The Centre Hospitalier Universitaire Vaudois, Switzerland |
| CNRS – Chimie Paris Tech, PSL University, France | Nipera, US | The Danish Epilepsy Centre, Denmark |
| Damia Mawad, University of New South Wales, Australia | Satakunta University of Applied Sciences, Finland | Topanalytica, Finland |
| Danish Technical University, Denmark | Tampere University, Finland | University of Copenhagen, Denmark |
| Ege University, Turkey | Technical University of Munich, Germany | University of Porto, Portugal |
| Institute for Advanced Studies in basic Sciences, Iran | Teknos, Finland | Wan Yue, Sun Yat-Sen University, China |
| ISKU interior, Finland | Tel Aviv University, Israel | |
| | Terasaki Institute, USA | |

Illustration of selected research

PUBLISHED BY AIMES SCIENTISTS IN 2022



Structural properties dictating selective optotracer detection of *Staphylococcus aureus*

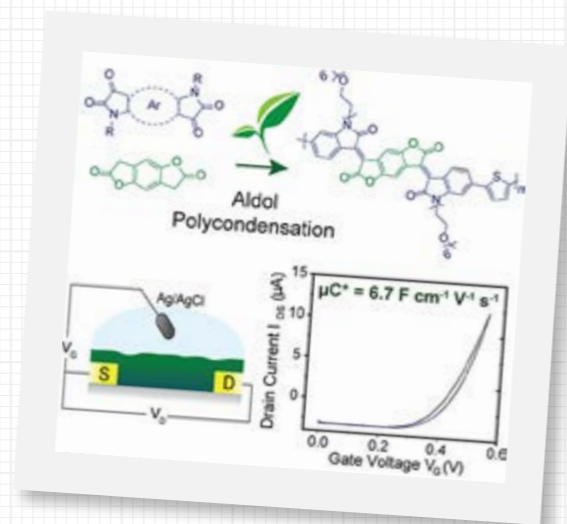
K. Butina, L. Lantz, F. X. Choong, A. Tomac, H. Shirani, S. Löffler, K. P. R. Nilsson, A. Richter-Dahlfors
ChemBioChem 2022, 23, e202100684.

Optotracers are conformation-sensitive fluorescent tracer molecules that detect peptide- and carbohydrate-based biopolymers. Here, we investigated the structural properties providing optimal detection of *Staphylococcus aureus*. We show that the chemical structure and photophysics of these molecules are key tunable characteristics in the development of optotracers for selective detection of bacterial species.

Green synthesis of lactone-based conjugated polymers for n-type organic electrochemical transistors

Wang, Y., Zeglio, E., Wang, L., Cong, S., Zhu, G., Liao, H., Duan, J., Zhou, Y., Li, Z., Mawad, D., Herland, A., Yue, W., McCulloch, I.
Advanced Functional Material, 2022, 32, 2111439.

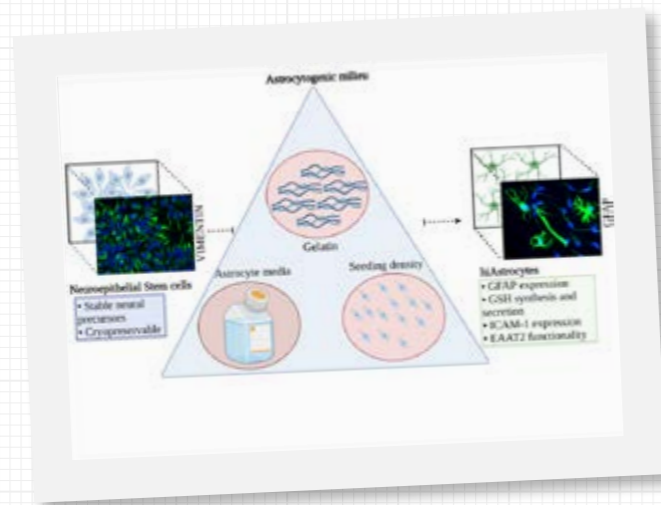
We demonstrate how lactone building blocks can be incorporated into the backbone of D-A copolymers in order to achieve a sustainable polymerization strategy combined with the high performance needed for n-type organic electrochemical transistors (OECTs). All the polymers are synthesized via Aldol polycondensation. The p(C-T)-based OECT achieved μC^* of $6.7 \text{ F cm}^{-1} \text{ V}^{-1} \text{ s}^{-1}$ and normalized maximum transconductance $g_{m,norm}$ of 0.8 S cm^{-1} .



Generation of human iPSC-derived astrocytes with a mature star-shaped phenotype for CNS modeling

Voulgaris, D., Nikolakopoulou, P. & Herland, A.
Generation of Human iPSC-Derived Astrocytes with a mature star-shaped phenotype for CNS modeling.
Stem Cell Reviews and Reports 18, 2494–2512 (2022).

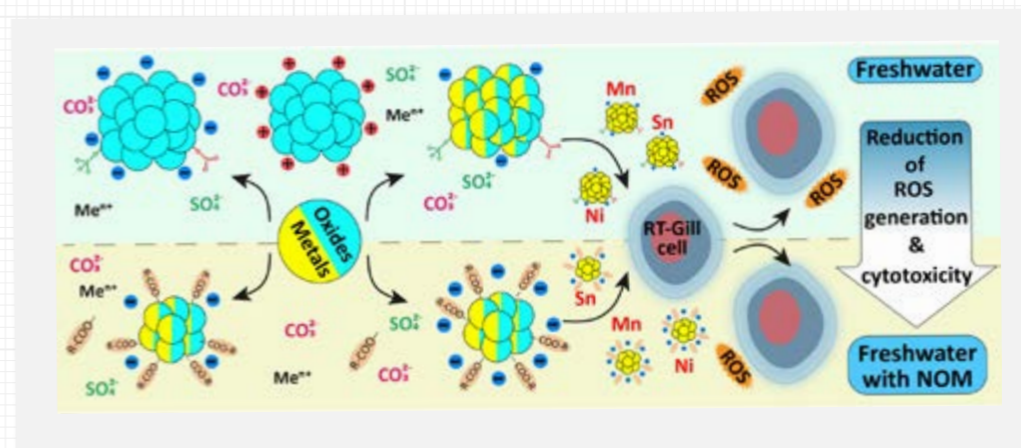
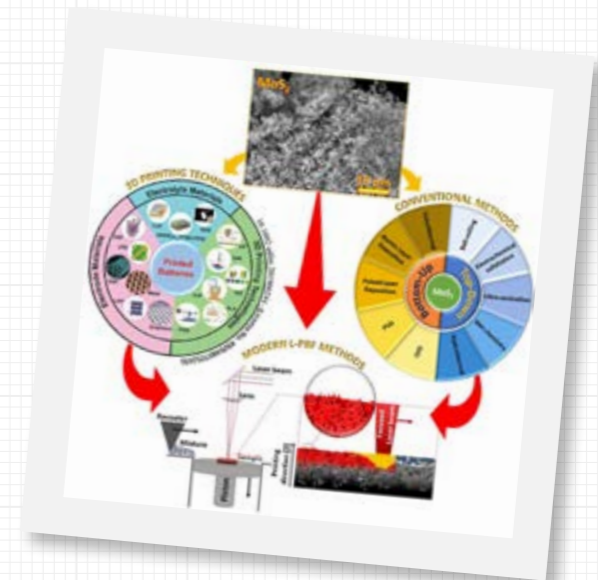
The Herland team has developed a protocol to generate a multifaceted astrocytic model that is suitable for in vitro modeling of CNS diseases as well as for personalized medicine.



Progress in additive manufacturing of MoS₂-based structures for energy storage applications – A review

Navid Alinejadian, Lauri Kollo, Inger Odnevall
Materials Science in Semiconductor Processing,
Volume 139, 2022, 106331.

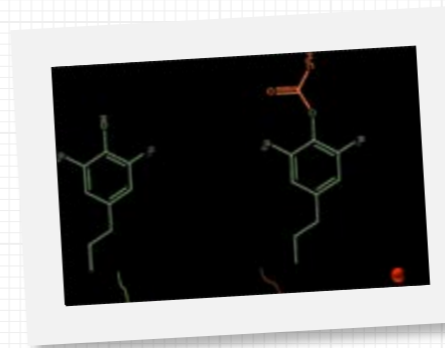
This review article discusses how the processing of prominent MoS₂-based functional structures by the novel additive manufacturing processes can provide complex structures for different electrochemical applications, particularly for energy conversion/storage systems.



Influence of natural organic matter on the transformation of metal and metal oxide nanoparticles and their ecotoxic potency in vitro

Alexander Khort, Marianne Brookman-Amissah, Jonas Hedberg, Tingru Chang, Nanxuan Mei, Annie Lundberg, Joachim Sturve, Eva Blomberg, Inger Odnevall, *NanoImpact*, Volume 25, 2022, 100386.

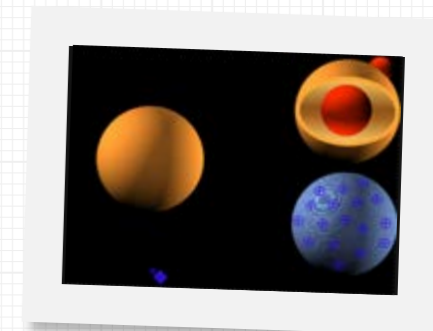
By analysing the toxicity of metal nanoparticles, it was found that adsorption of natural organic matter renders metallic nanoparticles negatively charged. Strong interactions with carboxylates result in enhanced metal dissolution. Also, time- and dose-dependent generation of reactive oxygen species was observed. Importantly, natural organic matter reduces the generation of intracellular reactive oxygen species in cells, thereby reducing the cytotoxicity of metallic nanoparticles.



Spheronized drug microcarrier system from canola straw lignin

Liming Zhang, Antonia Svärd & Ulrica Edlund.
Science and Technology of Advanced Materials, 2023, 24:1.

Canola, also known as rapeseed, is an annual plant of high commercial importance. The seeds are used for food oil, feed, and biodiesel. Here, we demonstrate how lignin isolated from the remaining straw can be used to generate regularly shaped spherical microparticles for drug delivery.



THE WORLD OF INTERDISCIPLINARY SCIENTISTS

The collaboration between the Stockholm Trio (Karolinska Institutet, - KTH Royal Institute of Technology - Stockholm University) and University of Tokyo has commenced by another fruitful year. Based on the theme co-organised by AIMES at the 2021 hybrid conference, AIMES scientists were invited by the Guest Editors Prof. Y. Teramura and Prof. H Cabral, to contribute to a Special issue on the theme Frontline Research on

Biomaterials-based Bioengineering for Future Therapy in STAM – Science and Technology of Advanced Materials. STAM is a leading open access, international journal for outstanding research articles across all aspects of materials science. The journal covers a broad spectrum of topics, with emphasis placed on the interdisciplinary nature of materials science and issues at the forefront of the field, such as medical and bioengineering applications.



CONTRIBUTIONS TO JOURNALS AND COMMITTEES

Inger Odnevall

Member of expert panel – SweNanoSafe, the Swedish National Platform for Nanosafety.
Scientific international expert in Steering Group on Testing and Assessment (STGA) of nanomaterials for the Organization for Economic Co-operation and Development (OECD)
Member and participant in the round robin study of OECD WNT Project 1.5 and Project 1.6 working groups on solubility and dissolution of nanomaterials and surface analysis of nanomaterials, respectively.
Member of the research grant evaluation panel - Materials Science (NT-17) at the Swedish Research Council (VR)

Ulrica Edlund

Editor of Carbohydrate Polymers (Elsevier; impact factor: 10.723). Associate editor of Cellulose (Springer Verlag; impact factor: 6.123).
Editorial board member of Polymer International (Wiley; impact factor: 3.213).

Editorial advisory board member of Biomacromolecules (ACS; impact factor: 6.978)

Keira Melican

Biosafety committee, Infection Network Committee, Swedish Society for Microbiology, journal referee.

Anna Herland

International Advisory board of Advanced Materials.
Advisory board of Applied Materials and Interfaces.

Onur Parlak

Special issue co-editor on the topic of wearable bioelectronics published by Biosensors and Bioelectronics Journal, Elsevier.

Special issue co-editor on wearable sensors for health monitoring published by Nature Communication Materials, Springer Nature.

SCIENTIFIC ACHIEVEMENTS AND AWARDS

Vetenskapsrådet

Erica Zeglio, Hongji Yan, Onur Parlak and Anna Herland, all active at AIMES and all awarded with grants from The Swedish Research Council (Vetenskapsrådet) 2022. We are happy to see that the environment created at AIMES gives the opportunities to conduct successful interdisciplinary research!

Hongji Yan

Researcher at KTH with affiliation to KI, Team Crouzier Starting Grant NT for the project: "Improving islet transplantation by developing immune-orchestrating gels for the microencapsulation of islets by microfluidics".



Erica Zeglio – Researcher at KTH with affiliation to KI, Team Leader at AIMES. Starting Grant NT for the project: "Biodegradable electronic polymers: from device components to in vivo monitoring technologies"

Onur Parlak – Assistant professor at KI, Team Leader at AIMES. Starting Grant M for the project: "Epidermal bioelektronik för infektionsövervakning i mänskliga hudår".

Anna Herland – Associate professor at KTH, Reseracher at KI, Team Leader and at AIMES.

VR 3R – KI for the project: "Refining neurovascular in vitro models" and VR-NT – KTH for the project: "2D and 3D in vitro models with organic electronic interfaces to electrogenic cells".

Team Melican

Keira Melican – Docent at KI, Team Leader and at AIMES. Was awarded an Interdisciplinary Synergy Grant from Novo Nordisk Fonden, in collaboration with University of Copenhagen, for the project: "Preventing invasive infections by hijacking bacterial communication".

**Team Edlund**

Ulrica Edlund – Professor at KTH with affiliation to KI, Team Leader at AIMES.
Funding from FORMAS (government research council for sustainable development).
For the project: Blue materials with green processes
Funding from Wallenberg Initiative Materials Science for Sustainability (WISE) for the project: Regenerable materials for water purification created from functional algal polymers.

Team Odnevall

Inger Odnevall – Professor at KTH with affiliation to KI, Team Leader at AIMES.
Funding from Vinnova for the project: "Sustainable and safe use of metals and metal alloys as food contact materials."
Project aims to achieve fundamental and applied understanding on how plant-based-food influence local corrosion, metal migration and surface characteristics of stainless steels used as food contact materials.
Funding from Nipera Inc., US, for a project to Uptake/transformation studies of nickel microparticles (MPs) and nanoparticles (NPs) in different human cell lines.

Team Zeglio

Erica Zeglio.
FORMAS, Research projects for early-career researchers for a project on Compostable organic sensors as a sustainable strategy for packaging digitalization.

Team Herland

Anna Herland.
SciLife Red Project grant and SciLife Red Postdoc Grant KTH Internationalisation grant.

Team Parlak

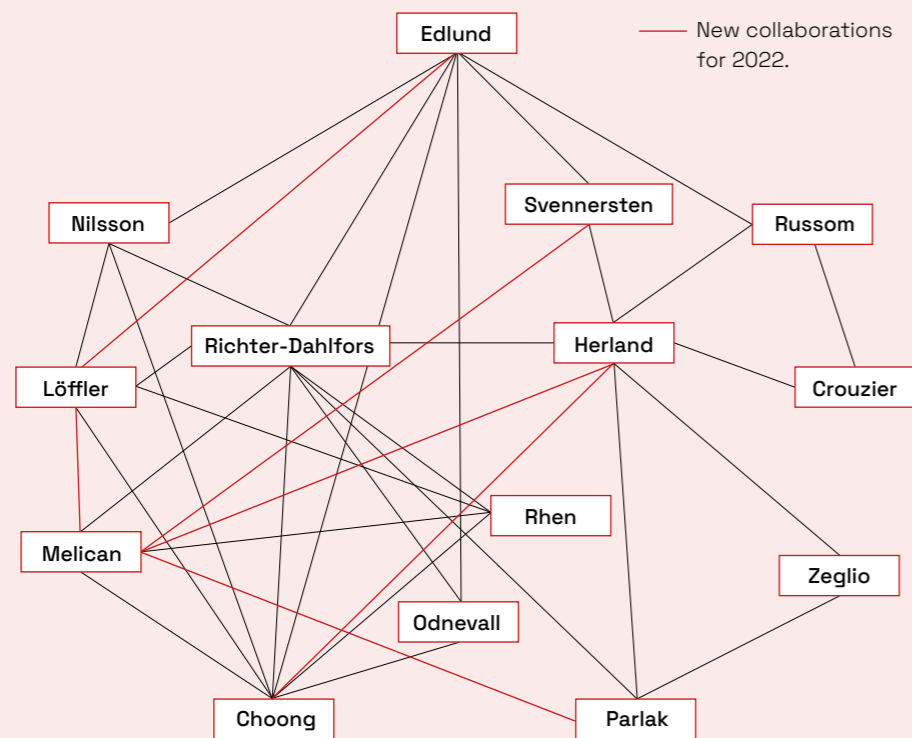
Onur Parlak.
Research Project by European Innovation Council Donation from Bo Rydin.
Pilot Project agreement with Essity AB

Research

A core mission of AIMES is to conduct interdisciplinary research of highest standard. In 2021, AIMES scientists published 44 scientific articles in 37 different leading and high-impact factor journals spanning across a wide range of disciplines.

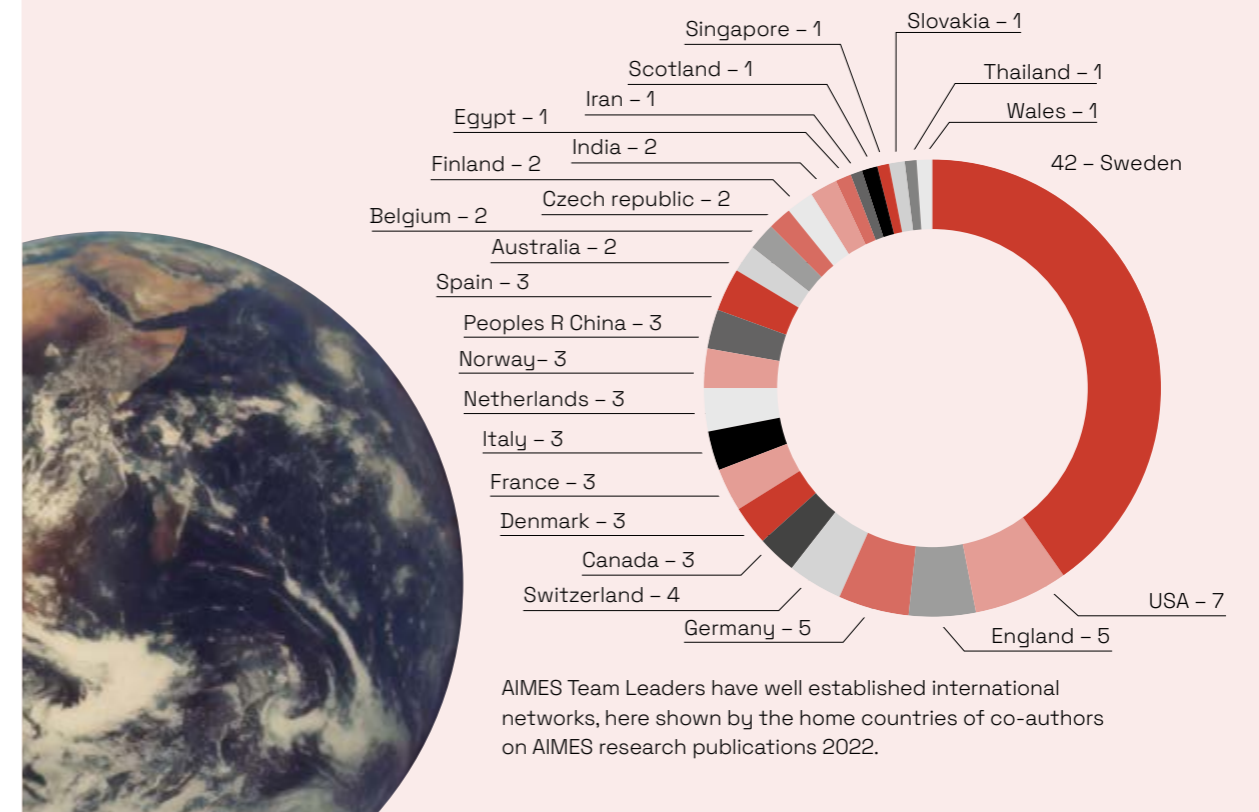
The interdisciplinarity of AIMES research is clearly witnessed from the assortment of journals presenting our work. These includes Nature Physics, Nature Communications, Advanced Functional Materials, ACS Nano, Advanced Healthcare Materials, Cell Reports Biofabrication, Lab on a Chip, PLOS Pathogens and NPJ Biofilms and Microbiomes.

INTERDISCIPLINARY COLLABORATIONS WITHIN AIMES



AIMES interdisciplinary environment aims to stimulate new collaborative interactions. The spider web illustrates how new and ongoing interdisciplinary collaborations have been established between the Team Leaders.

PUBLICATIONS IN INTERNATIONAL COLLABORATION



GUIDED BY THE UN SUSTAINABLE DEVELOPMENT GOALS

The interdisciplinary research performed by AIMES Team Leaders is financed by a range of national and international funding bodies. We thank all our funders and stakeholders, especially Karolinska Institutet, KTH Royal Institutet of Technology and Getinge, for the continues support in our work and outline to meet the global challenges of today.

Our work at AIMES is closely guided by the United Nations' Sustainable Development Goals (SDGs) outlined in Agenda 2030. While the 17 SDGs may appear independent, they are in fact closely interlinked. Effects on one end translate to others, interacting in complex ways not fully understood. The SDGs cut across all layers of the biosphere, society, and economy. In line with the goal of these directives, the research projects within AIMES aim to broadly target several SDG goals in one single project. We strongly encourage all our members, already on the level of tailoring master projects, to look broad and have the scope of the project to target at least two of the SDG goals.



SCIENTIFIC PUBLICATIONS

Reactive oxygen species formed by metal and metal oxide nanoparticles in physiological media-a review of reactions of importance to nanotoxicity and proposal for categorization
NANOMATERIALS

Topical reinforcement of the cervical mucus barrier to sperm
SCIENCE TRANSLATIONAL MEDICINE

Weathering and antimicrobial properties of laminate and powder coatings containing silver phosphate glass used as high-touch surfaces
SUSTAINABILITY

Corrosion challenges towards a sustainable society
MATERIALS AND CORROSION

Structural properties dictating selective optotracer detection of Staphylococcus aureus
CHEMBIOCHEM

An optotracer-based antibiotic susceptibility test specifically targeting the biofilm lifestyle of Salmonella
BIOFILM

Optotracing for live selective fluorescence-based detection of Candida albicans biofilms
FRONTIERS IN CELLULAR AND INFECTION MICROBIOLOGY

Current progress of interfacing organic semiconducting materials with bacteria
CHEMICAL REVIEWS

Protective vascular coagulation in response to bacterial infection of the kidney is regulated by bacterial lipid A and host CD147
PATHOGENS AND DISEASE

Effect of anticoagulant and platelet inhibition on the risk of bacteremia among patients with acute pyelonephritis: a retrospective cohort study
BMC INFECTIOUS DISEASES

Green synthesis of lactone-based conjugated polymers for N-type organic electrochemical transistors
ADVANCED FUNCTIONAL MATERIALS

A microfluidic contact lens to address contact lens-induced dry eye
SMALL

Whole-brain microscopy reveals distinct temporal and spatial efficacy of anti-A beta therapies
EMBO MOLECULAR MEDICINE

Medin co-aggregates with vascular amyloid-beta in Alzheimer's disease
NATURE

Hydrogels with protective effects against cellular oxidative stress via enzymatic crosslinking of feruloylated arabinoxylan from corn fibre
GREEN CHEMISTRY

Live detection of neural stem and glioblastoma cells by a luminescent conjugated oligothiophene derivative
NEURO-ONCOLOGY

Indirect 3D bioprinting of a robust trilobular hepatic construct with decellularized liver matrix hydrogel
BIOENGINEERING-BASEL

Portable quartz crystal resonator sensor for characterizing the gelation kinetics and viscoelastic properties of hydrogels
GELS

Metabolic assessment of human induced pluripotent stem cells-derived astrocytes and fetal primary astrocytes: lactate and glucose turnover
BIOSENSORS-BASEL

Self-assembly of chiro-optical materials from nonchiral oligothiophene-porphyrin derivatives and random coil synthetic peptides
CHEMPLUSCHEM

Synthetic mucin gels with self-healing properties augment lubricity and inhibit HIV-1 and HSV-2 transmission
ADVANCED SCIENCE

Proteophenes - amino acid functionalized thiophene-based fluorescent ligands for visualization of protein deposits in tissue sections with alzheimer's disease pathology
CHEMISTRY-A EUROPEAN JOURNAL

T cells in resolved allergic contact dermatitis steer tissue inflammation and MMP-12-driven tissue modulation
ALLERGY

SCIENTIFIC PUBLICATIONS

Engineering surfaces with immune modulating properties of mucin hydrogels
ACS APPLIED MATERIALS & INTERFACES

Comparison of lignin distribution, structure, and morphology in wheat straw and wood
INDUSTRIAL CROPS AND PRODUCTS

Layer-by-layer cellulose nanofibrils: a new coating strategy for development and characterization of tumor spheroids as a model for in vitro anticancer drug screening
MACROMOLECULAR BIOSCIENCE

Multiscale optical and optoacoustic imaging of amyloid-beta deposits in mice
NATURE BIOMEDICAL ENGINEERING

3D bioprinting of multi-material decellularized liver matrix hydrogel at physiological temperatures
BIOSENSORS-BASEL

The effects of cultivation deployment- and harvest-timing, location and depth on growth and composition of Saccharina latissima at the Swedish west coast
AQUACULTURE

Alpha-synuclein strain variability in body-first and brain-first synucleinopathies
FRONTIERS IN AGING NEUROSCIENCE

CelloZIFPaper: cellulose-ZIF hybrid paper for heavy metal removal and electrochemical sensing
CHEMICAL ENGINEERING JOURNAL

Generation of human iPSC-derived astrocytes with a mature star-shaped phenotype for CNS modeling
STEM CELL REVIEWS AND REPORTS

Synapsin III gene silencing redeems alpha-synuclein transgenic mice from Parkinson's disease-like phenotype
MOLECULAR THERAPY

Molecular design of an electropolymerized copolymer with carboxylic and sulfonic acid functionalities
SYNTHETIC METALS

Dual effect of TAT functionalized DHAH lipid nanoparticles with neurotrophic factors in human BBB and microglia cultures
FLUIDS AND BARRIERS OF THE CNS

Advanced materials and sensors for microphysiological systems: focus on electronic and electrooptical interfaces
ADVANCED MATERIALS

A Lab-in-a-Fiber optofluidic device using droplet microfluidics and laser-induced fluorescence for virus detection
SCIENTIFIC REPORTS

Harvest time can affect the optimal yield and quality of sea lettuce (Ulva fenestrata) in a sustainable sea-based cultivation
FRONTIERS IN MARINE SCIENCE

Bioorthogonally cross-linked hyaluronan-laminin hydrogels for 3D neuronal cell culture and biofabrication
ADVANCED HEALTHCARE MATERIALS

3D microvascularized tissue models by laser-based cavitation molding of collagen
ADVANCED MATERIALS

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ACTA NEUROPATHOLOGICA COMMUNICATIONS

Recent advancement in electrode materials and fabrication, microfluidic designs, and self-powered systems for wearable non-invasive electrochemical glucose monitoring
APPLIED MATERIALS TODAY

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