

**Executive Report 2023**

# Creating impact together.



**Adaptive innovation through dynamic partnerships**



# Editorial

**Holst Centre**  
**Executive Report**

# Creating impact together.

**Adaptive innovation through  
dynamic partnerships**

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The great transitions in our society require a much more agile and adaptive approach to innovation. On the one hand because technology is developing at an ever-increasing pace. On the other hand, because challenges in for instance healthcare, energy supply and mobility are complex and multidisciplinary. Companies are challenged to successfully launch products and services with disruptive technology in these fast-changing circumstances, while struggling to keep risks, development costs and time to market within acceptable margins.

# Holst Centre is able to anticipate and address the industry's needs and societal challenges effectively

## Impact through innovation

In order to succeed you need ecosystems of open and dynamic collaborations of partners along the value chain. An **'innovative way of innovating'**, that Holst Centre has been practicing successfully for more than 18 years. Thanks to our dynamic partnerships with universities, knowledge institutions, governments, and businesses, **Holst Centre is able to anticipate and address the industry's needs and societal challenges effectively.** This open innovation model fosters agile collaborations, allowing us to independently chart our course based on input from all stakeholders. To illustrate this open innovation model and its outcomes, this Executive Report includes three maps showcasing the ecosystems where Holst Centre is currently engaged.

## Establishing dynamic collaborations

Next to that, partners benefit from **Holst Centre's neutral position.** As an independent research centre, we nurture precompetitive innovation. At the same time we keep a broader perspective by creating innovations that not only stimulate national and European economic activities, but also **contribute to societal challenges.** We express our gratitude for the ability to establish and sustain these dynamic collaborations, a feat made achievable through the support of funding from national and EU projects.

## Future electronics

With this approach Holst Centre has successfully contributed to Dutch leadership in semiconductor innovations for flexible and wireless electronics, setting international standards. Few people know that **almost every Bluetooth device used today contains technology that was originally developed at Holst Centre.** Similarly the technology for flexible displays that you see today in mobile devices, like the foldable OLED displays, was developed at Holst Centre. Now, we are taking the next big step towards Future Electronics. Devices that are more sustainable, offer clever chip packaging, use edge AI, and are significantly more energy-efficient.

## Integrated photonics

Another key development is integrated photonics. In less than a year, Holst Centre became an essential part of the integrated photonics ecosystem, by **combining knowledge from imec and TNO on the design, prototyping, testing, and manufacturing processes of photonics,** but also by connecting to the extensive PhotonDelta ecosystem. Last year's visit by King Willem-Alexander to Holst Centre and PhotonDelta was a great acknowledgment of our efforts and the economic potential of integrated photonics.

## Medical technologies

Due to an ageing population and the rise of chronic diseases, Europe faces potentially unsustainable health and care costs. At Holst Centre, **improving healthcare, and making it more affordable, has been one of the top priorities from the very start, and we will continue to contribute to advanced medical technologies.** We have successfully launched our health patch platform and smart, non-invasive wearables, and even implantables that significantly improve health control. Another focus area is organ-on-a-chip. We have used our expertise in flexible electronics, sensing and large-area manufacturing for creating a next-level organ-on-chip architecture. Due to the scalability of this cost-effective solution, we can accelerate the development of new treatments and medication, such as those for neurodegenerative and cardiovascular diseases, while reducing animal testing needs.

## Energy storage

The last few years has made it clear that for a successful green energy transition there is a need for using the same manufacturing principles for advanced energy storage solutions. **By using our acclaimed thin-film electronics technology we can create sustainable, fast-charging batteries with higher energy density that are essential for our energy transition.** And we are now also developing novel solutions for high efficiency low cost electrolysers. These and numerous other promising innovations, cultivated within Holst Centre's ecosystems, will ensure the sustained long-term economic growth and earning potential of our region, nation, and continent.

## Ton van Mol

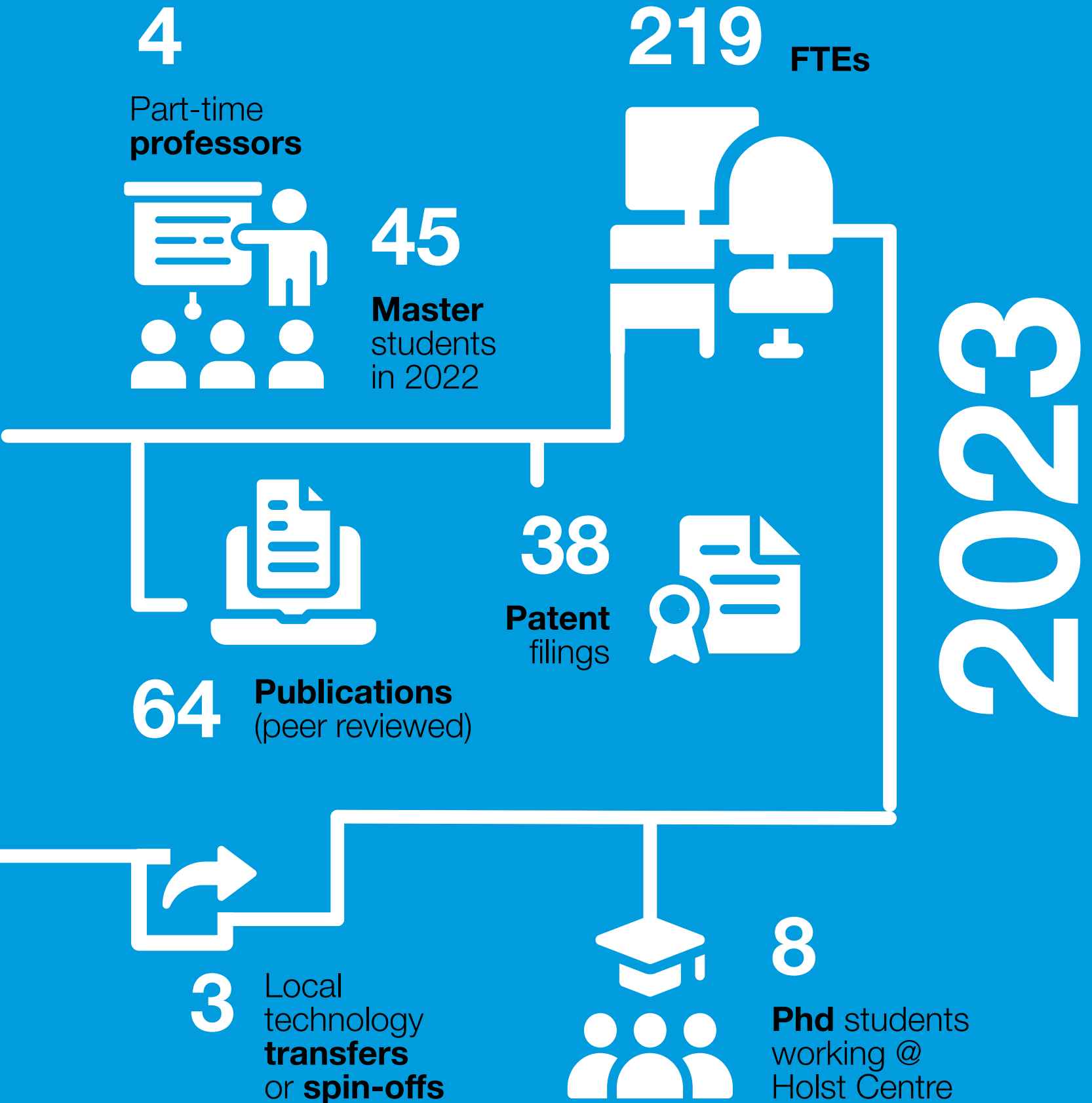
Director TNO  
at Holst Centre

## Kathleen Philips

Director imec  
at Holst Centre

# Facts & figures

	Regional NL collaborations	25
	Total number of partnerships	55
	Dutch partners within funded projects (EU and national)	112



 **47** Turnover (in M €)

 **51** Ongoing funded projects

# Highlights



**From launching multiple start-ups and spin-offs to hosting a visit from the King to our laboratories, 2023 has been an exhilarating year.**

### ■ Royal interest in photonics

King Willem-Alexander explored integrated photonics at Eindhoven's High Tech Campus, learning its value chain and significance for the Netherlands and Europe. The King toured Holst Centre's lab, witnessing photonics applications across sectors. Signify, Effect Photonics, Delta Diagnostics, Quix Quantum, and Lionix representatives detailed the value chain stages, emphasizing solutions for societal challenges.

### ■ Advancing workplace vitality

To enhance the well-being of working individuals, partners including Holst Centre, Fontys, TU/e, HTCE, and Twice have established the Workplace Vitality Hub. In 2023, we engaged approximately 60 students from diverse disciplines to tackle office vitality topics. We bolstered our position as a knowledge centre by hosting and delivering presentations at key events like the Workplace XPerience event. Our research activities are structured around specific tracks, such as data-driven workplace, physical office environment, and mental health. Additionally, we initiated two funded projects wherein the hub functions as a living lab for open innovation, co-creation, validation, and scale-up efforts. TNO Healthy Living has joined the Hub, contributing relevant expertise to the field.

### ■ Holst Centre scale-up Onera raises €30 million

Onera Health has developed technology enabling comprehensive sleep research at home, replacing the need for hospital or clinic visits. By 2023, this Holst Centre scale-up secured €30 million in new funding. Investment firms EQT Life Sciences and Gimv Life Sciences, alongside existing investors like Brabantse Ontwikkelings Maatschappij, contributed to this funding round. With this capital infusion, Onera has entered the next stage of development, paving the way for expansion opportunities in Europe and the US.

### ■ Scaling up sustainable electronics

TracXon, a spin-off recently co-founded by TNO at Holst Centre, is a major step towards manufacturing of sustainable electronics. Circuits on flexible films printed with special conductive inks, replace traditional copper plated circuits and solders on a hard surface. The process was developed at Holst Centre, specialised in thin-film applications. Meanwhile, TracXon has completed a manufacturing plant for hybrid printed electronics.

### ■ Holst Centre Innovation Day showcasing Visions of the Future

Our annual Innovation Day took place at the futuristic Evoluon in Eindhoven, serving as a platform for showcasing Holst Centre's visions of the future. At the demo-market, our experts unveiled their latest innovations, including a miniature workplace vitality hub. Alongside, industry leaders such as Smart Photonics, NXP, and others shared insights into the latest advancements in photonics, semiconductors, and medical technology, inspiring the audience.



**Watch the aftermovie of Innovation Day 2023**

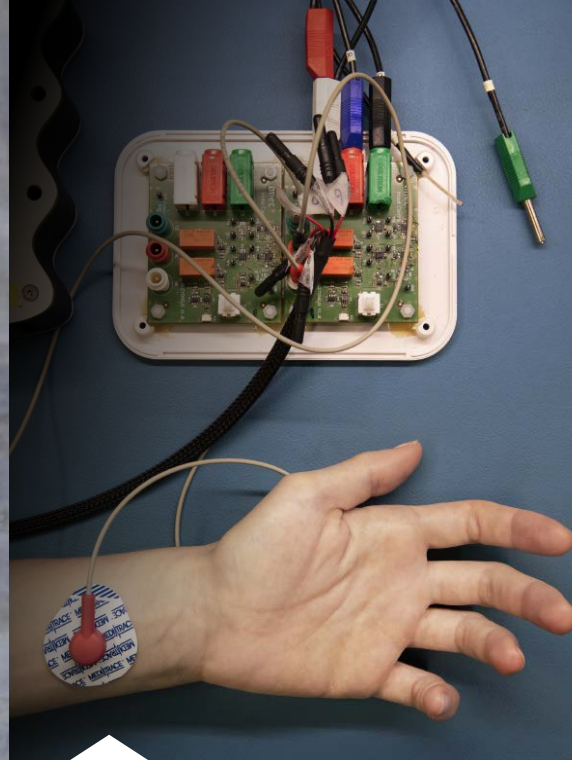


### ■ Wearable stress relief

Leveraging the ground-breaking printed, flexible electronics technology pioneered by TNO at Holst Centre, the spin-off Touchwaves specializes in human-centric wearables. Among their most promising innovations is the MYSATM shirt, initially crafted to assist in stress reduction. However, as the founders persist in advancing the technology, its potential applications have expanded to encompass alleviating anxiety, PTSD, and other conditions that significantly impact people's daily lives.



Left to right:  
Charlotte Kjellander,  
Pauline van Dongen  
and Caroline Ruijg.



### ■ A battery-powered doctor

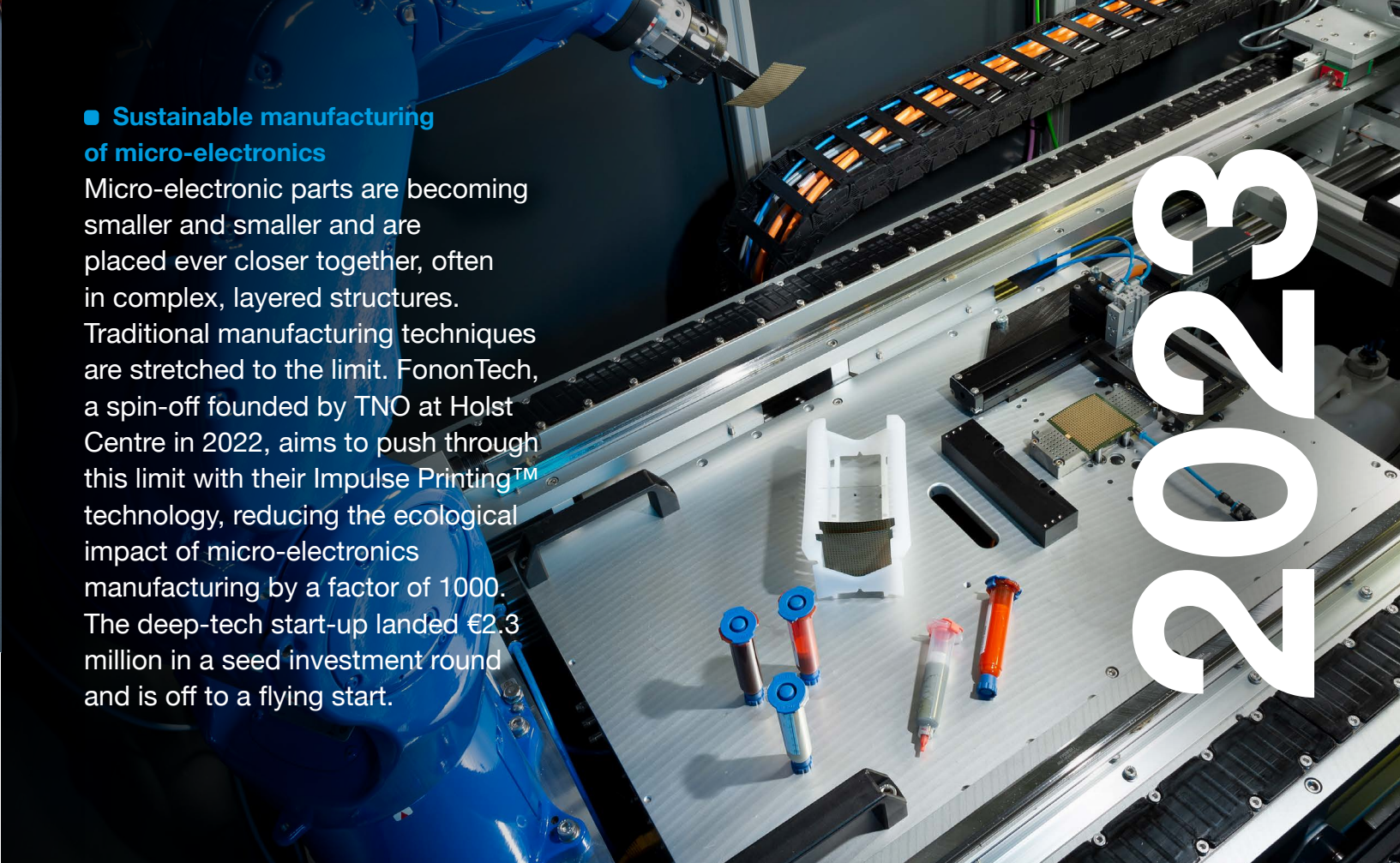
Belgian and Dutch labs are poised to launch a new wave of wearables, as highlighted in Ilka De Bisschop's article 'A battery-powered doctor' in November's National Geographic, showcasing Holst Centre's wearable sensors' transformative impact on healthcare. Geert Langereis, Health Research Programme Manager at imec's Holst Centre, emphasizes the broader societal benefits of more precise monitoring, extending beyond individual patients.



Read the  
National  
Geographic  
article

### ■ Sustainable manufacturing of micro-electronics

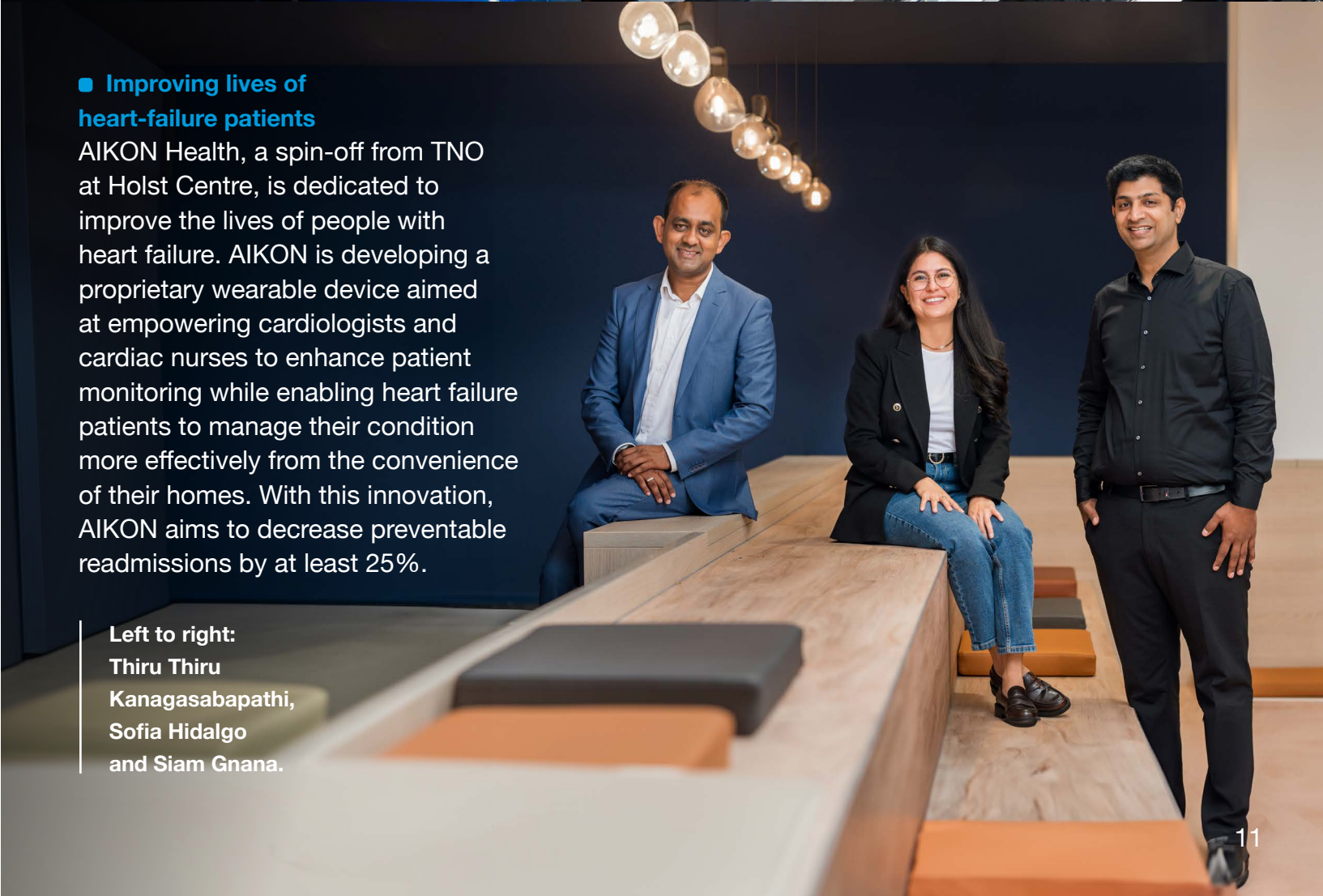
Micro-electronic parts are becoming smaller and smaller and are placed ever closer together, often in complex, layered structures. Traditional manufacturing techniques are stretched to the limit. FononTech, a spin-off founded by TNO at Holst Centre in 2022, aims to push through this limit with their Impulse Printing™ technology, reducing the ecological impact of micro-electronics manufacturing by a factor of 1000. The deep-tech start-up landed €2.3 million in a seed investment round and is off to a flying start.



### ■ Improving lives of heart-failure patients

AIKON Health, a spin-off from TNO at Holst Centre, is dedicated to improve the lives of people with heart failure. AIKON is developing a proprietary wearable device aimed at empowering cardiologists and cardiac nurses to enhance patient monitoring while enabling heart failure patients to manage their condition more effectively from the convenience of their homes. With this innovation, AIKON aims to decrease preventable readmissions by at least 25%.

Left to right:  
Thiru Thiru  
Kanagasabapathi,  
Sofia Hidalgo  
and Siam Gnana.



# Sustainable electronics

Learn from **Stephan Harkema**, Program Manager for Sustainable Electronics, and **Christian Bachmann**, Program Director for Wireless Sensing and Edge AI, how Holst Centre addresses the issue of e-waste and the environmental impact of electronics while discovering new applications for low-power wireless chips and UWB.

## What is Holst Centre's specialty in this field?

Stephan Harkema

“ At Holst Centre, our focus is on enhancing every aspect of the electronics lifecycle. We strive to create a sustainable type of electronics that incorporates plastics, metals and electronic components, designed for disassembly or repair at the end of its life. Holst Centre is acknowledged for having a successful design concept for dismantling electronic parts based on printed electronics, enabling the separation of approximately 90% of plastics from the printed metals and electronic components.

Dismantling these electronics extends our recycling options to beyond shredding and incineration, leading to higher recovery rates for components, plastics and precious metals. Moreover, leveraging our expertise in low-power chips allows us to further decrease total energy consumption, thus mitigating the overall impact of electronics. The synergy between different domains is where innovation truly happens, reflecting our approach at Holst Centre. Improving both chips and plastic handling is crucial for creating sustainable electronics.

Christian Bachmann

“ I agree; it's the diversity of disciplines and backgrounds that fosters innovation. We are globally recognized for our low-power chip design R&D, particularly in wireless chips. Our goal is to minimise power consumption, enabling devices with very small batteries or even no batteries at all. Our primary focus is on Ultra-wideband (UWB) technology, innovating beyond the state-of-the-art and exploring new and promising applications.



Stephan Harkema

### Role

**Program Manager Sustainable Electronics**

### Achievements

**19** papers  
**17** patents

### Expertise

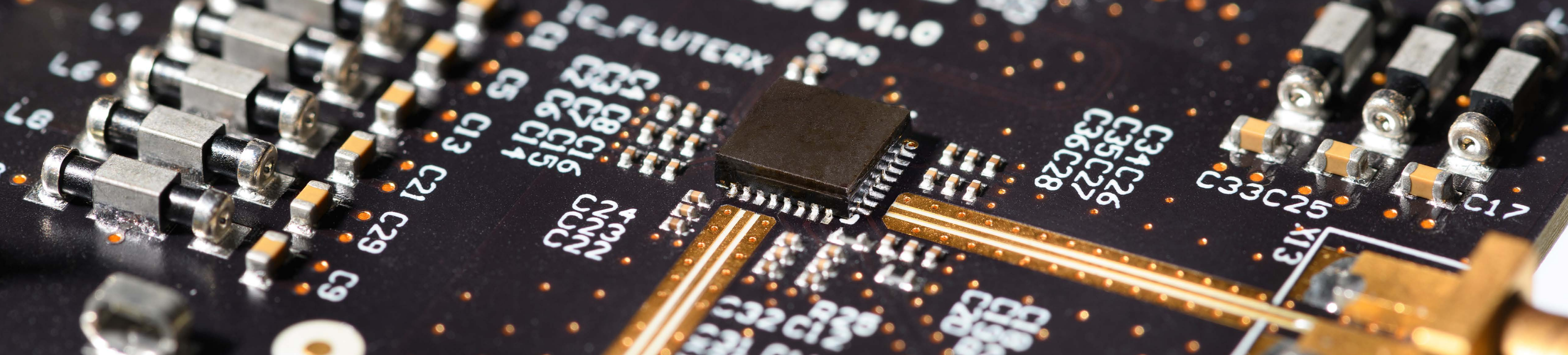
In-mold electronics, sustainability, circular economy, opto-electronic devices, light management.

## What has been the most significant recent breakthrough?

Christian Bachmann

“ Last year, we introduced an ultra-low-power UWB chip that consumes 10 times less power than the current state-of-the-art. Simultaneously, we are exploring new features and applications for low power UWB combined with Edge AI, i.e., very low power AI compute. Beyond distance measurement, localisation, and wireless communication, radar sensing with UWB holds promising applications.

An important use-case is within the automotive industry for in-cabin sensing to detect if an infant is left behind in the car. This feature is becoming mandatory, crucial for OEMs and tier-1 suppliers to meet safety standards.



**Christian Bachmann**

**Role**

**Program Director  
Wireless Sensing  
and Edge AI**

**Achievements**

**60+**  
patents and papers

**Expertise**

Wireless Circuits  
& Systems

**Stephan Harkema**

“ We are also involved in the automotive ecosystem; with our in-mold structural electronics (IMSE), we seamlessly integrate plastics with electronics.

Christian’s chip could be one of the components seamlessly integrated into the car’s interior as an IMSE part. A recent breakthrough is our successful demonstration of repairing IMSE structural components with production flaws. We were able to disassemble the part, repair it, and overmold it again. This reduces waste costs for manufacturers with fewer losses of chips and other valuable components. Using the same method, we can effectively recycle IMSE parts. Other future developments include reducing the overall environmental impact by replacing silver with copper and using recycled or bio-based plastics.

**What’s the potential societal impact of Holst Centre’s innovations?**

**Stephan Harkema**

“ The market’s sense of urgency is growing due to stricter regulations. More industries, including the automotive sector, will have to comply with the EU’s Ecodesign for

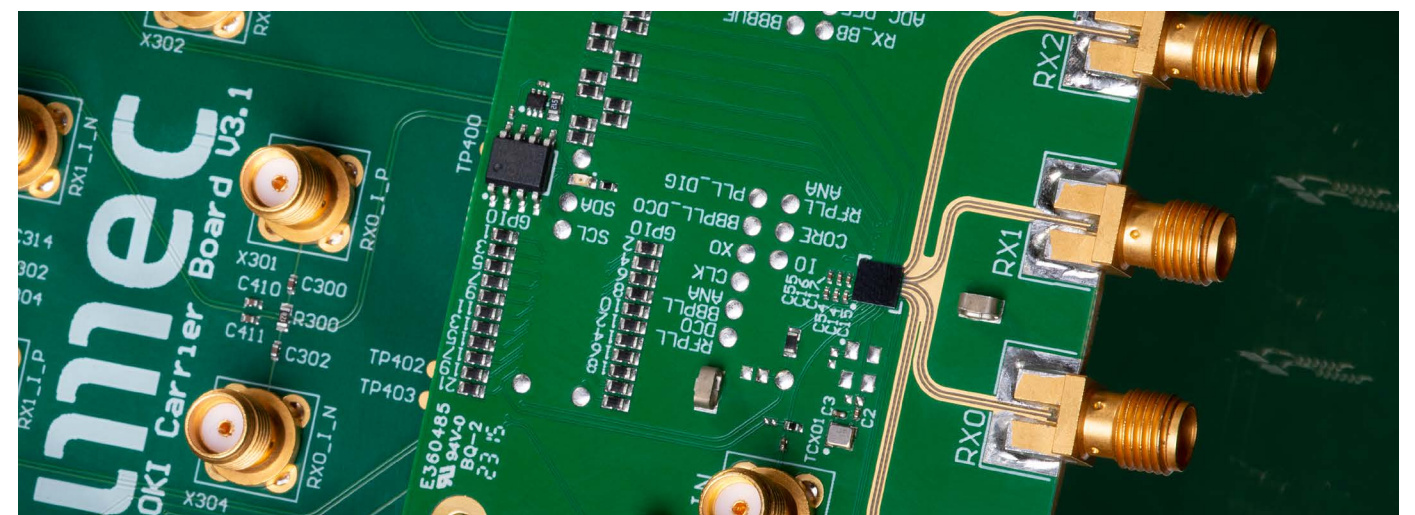
Sustainable Products Regulation, which will mandate that components need to be durable, repairable, and recyclable, although the definition leaves room for interpretation.

We aim to contribute to the automotive domain through our sustainability research on in-mold electronics, developing free-form components that are both repairable and recyclable. Sustainable electronics could significantly reduce the global footprint of electronics, as some of our concepts

may be transferrable to conventional electronics as well.

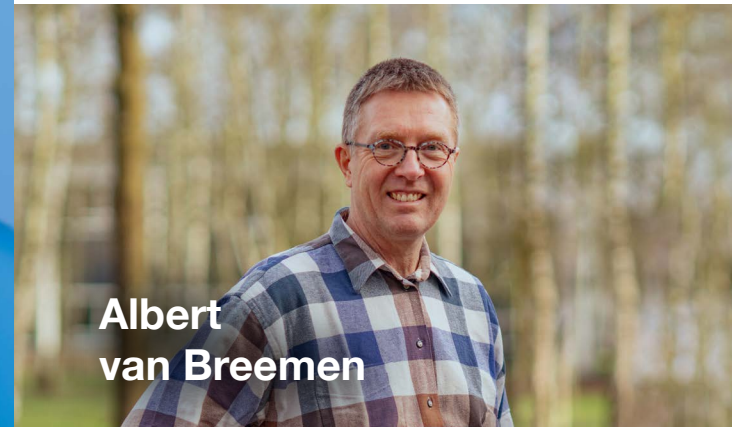
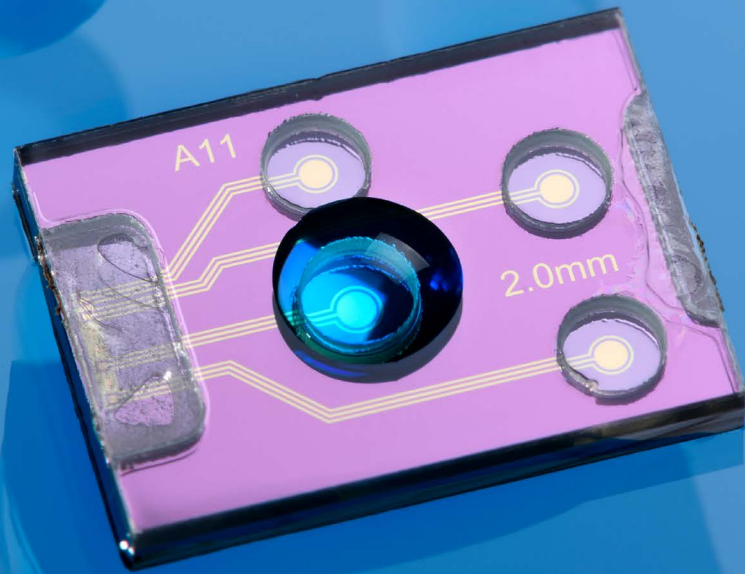
**Christian Bachmann**

“ Our technology enables the design of smaller and smarter, low-power electronics, which will significantly impact overall power usage. Simultaneously, new UWB applications can enhance battery management, improving the energy efficiency of batteries. In the industrial domain, UWB will contribute to the efficiency and sustainability of automation, particularly in robotics and logistics.



# Organ-on-chip

Organ-on-chip (OoC) technology holds the potential to decrease reliance on animal testing and enhance the efficiency of drug discovery processes. Holst Centre is making significant contributions to the OoC ecosystem through the incorporation of advanced microfluidics, electronics, and sensors into an efficient multi-well plate format. Program manager **Albert van Breemen** and Principle member of the technical staff, **Marcel Zevenbergen** provide updates on the latest developments and share their insights into the future.



**Albert van Breemen**

#### Role

**Program manager**

#### Expertise

Scalable and cost-effective manufacturing technology, materials science.

#### Achievements

**100<sup>+</sup>**

patents and scientific papers

## What is Holst Centre's specialty in this field?

**Albert van Breemen**

“ At Holst Centre, we are deploying the technology we previously developed for flat panel displays and image sensors. By combining it with additive technology we create a scalable and cost-effective manufacturing platform for the organ-on-chip domain. Using this platform we combine key technology building blocks like microfluidics, electronics and sensors with organ models from TNO Healthy Living and Work. To stimulate uptake by industry, we integrate our technology into a standardized format called the multi-well plate, the default format used in life science, pharmaceutical, and analytical research as well as in clinical

diagnostics. Unique to our approach is that the large-area flat panel technology can be used to manufacture all these building blocks, and allows for an easy integration of different functionalities in a multi-well plate.

## What has been the most significant recent breakthrough?

**Albert van Breemen**

“ We have achieved success in employing scalable and cost-effective materials to manufacture and integrate microfluidics and sensing electrodes into the multi-well plate. These innovations have been biovalidated for specific single-organ OoC applications, specifically gut-on-chip and brain-on-chip. Our ongoing efforts involve expanding the number of building blocks and applications, such as liver-on-chip and heart-on-chip. The ultimate goal is to advance this technology towards multi-organ OoCs that authentically mimic the complexity of the human system. This advancement will expedite the availability of better and safer drugs for patients more rapidly than ever before.





**Marcel Zevenbergen**

“ Enormous cost and time savings in the development process of new drugs can be achieved by measuring various biochemical processes and biomarkers simultaneously directly in the multi-well plate. We have a proven track record in developing highly durable sensors that maintain consistent measurements even in challenging biochemical conditions. Furthermore, we have successfully combined these sensors into a single device that will ultimately be integrated into the multi-well plate.

predictive value of these animal tests are increasingly questioned. There is a notable shift towards organ-on-chip technology due to its improved predictability and reliability. Both the European Medicines Agency (EMA) and the US Federal Drug Agency (FDA) now endorse OoC as a reliable alternative with promising future prospects. The goal is twofold: demonstrating the drug’s effectiveness and predicting any unwanted toxic side effects on other organs. Frequently,

such side effects only become apparent in the final stages of a clinical trial, leading to substantial delays and high costs. It is anticipated that OoC will reduce the number of drug candidates with low efficacy and high safety risk advancing to clinical trials by up to 80%. This advancement promises society with better and safer drugs reaching the market faster at a lower cost, with their effects demonstrated on human tissue. Additionally, it is expected to significantly decrease the reliance on laboratory animals in drug development processes.”



**What’s the potential societal impact of Holst Centre’s innovations?**

**Albert van Breemen**

“ Animal models are presently utilized for pre-clinical drug screening before progressing to clinical trials. However, the reliability and



**Marcel Zevenbergen**

Role	Achievements
Principle member of technical staff	40+ papers
Expertise Biochemical sensing.	12 patents

**Marcel Zevenbergen**

“ I believe in the future of personalised medicine, where OoC can play a pivotal role in achieving significant breakthroughs. OoC allows for in-depth exploration of how individual cells respond to specific medicines. This technology holds the potential for broader applications in personalised therapies, such as CAR-T cell therapy, in the battle against cancer.

The development of novel and highly integrated sensing devices has provided essential insights into these intricate biological systems.

# Energy storage

To meet global climate objectives, a rapid and drastic change in our current energy mix is essential. Sustainable electrification and electricity storage play a crucial role in achieving this energy transition.

Research Manager **Auke Kronemeijer** elaborates on how Holst Centre employs its patented thin-film processes to develop the next generation of sustainable batteries and electrolyzers, effectively accelerating electricity storage and hydrogen production.

## What is Holst Centre's specialty in this domain?

Auke Kronemeijer

“ At Holst Centre, our extensive and successful legacy lies in utilizing thin-film processes for crafting applications such as flexible displays, OLED lighting, X-ray and fingerprint imagers. Globally recognized for our core expertise, we specialize in depositing ultra-thin layers of material on 3D microstructures with exceptional precision. Our advanced thin-film processes, such as the state-of-the-art spatial Atomic Layer Deposition (sALD) being commercialized by start-ups in the region, are instrumental in producing batteries and electrolyzers that deliver next-level performance, safety, and sustainability.

## What are the most significant recent breakthroughs?

“ At Holst Centre, we adhere to a well-defined roadmap for battery technology. In the past year, we successfully showcased our ability to leverage thin-film and microstructure processes in creating batteries with enhanced capacities and longer lifespans. We initiated the application of this technology to the anode part of batteries, leading to the successful spin-off and scale-up of LionVolt. TNO start-up LeydenJar has achieved success in creating a pure silicon anode with an extremely high energy density, paving the way for the development of powerful and compact batteries offering an increased battery capacity of up to 70%.



**Auke Kronemeijer**

### Role

**Research Manager  
Thin-Film  
Electronics**

### Achievements

**80<sup>+</sup>**  
peer-reviewed papers  
and conference  
proceedings.

### Expertise

Extensive experience in shaping and managing collaborative R&D programs in the domain of flexible and large-area electronics.

Additionally, we have demonstrated the efficacy of our sALD technology in extending battery life, enabling market entry for startups such as SparkNano, SALD and Kalpana. Concurrently, we are focused on replacing the flammable electrolyte to develop a safer and more sustainable solid-state battery, with the next frontier involving enhancing the battery cathode through a dry-process coating that significantly reduces energy consumption. These interconnected technologies synergistically strengthen each other, paving the way for the next generation of batteries.

## What's the potential societal impact of Holst Centre's innovations?

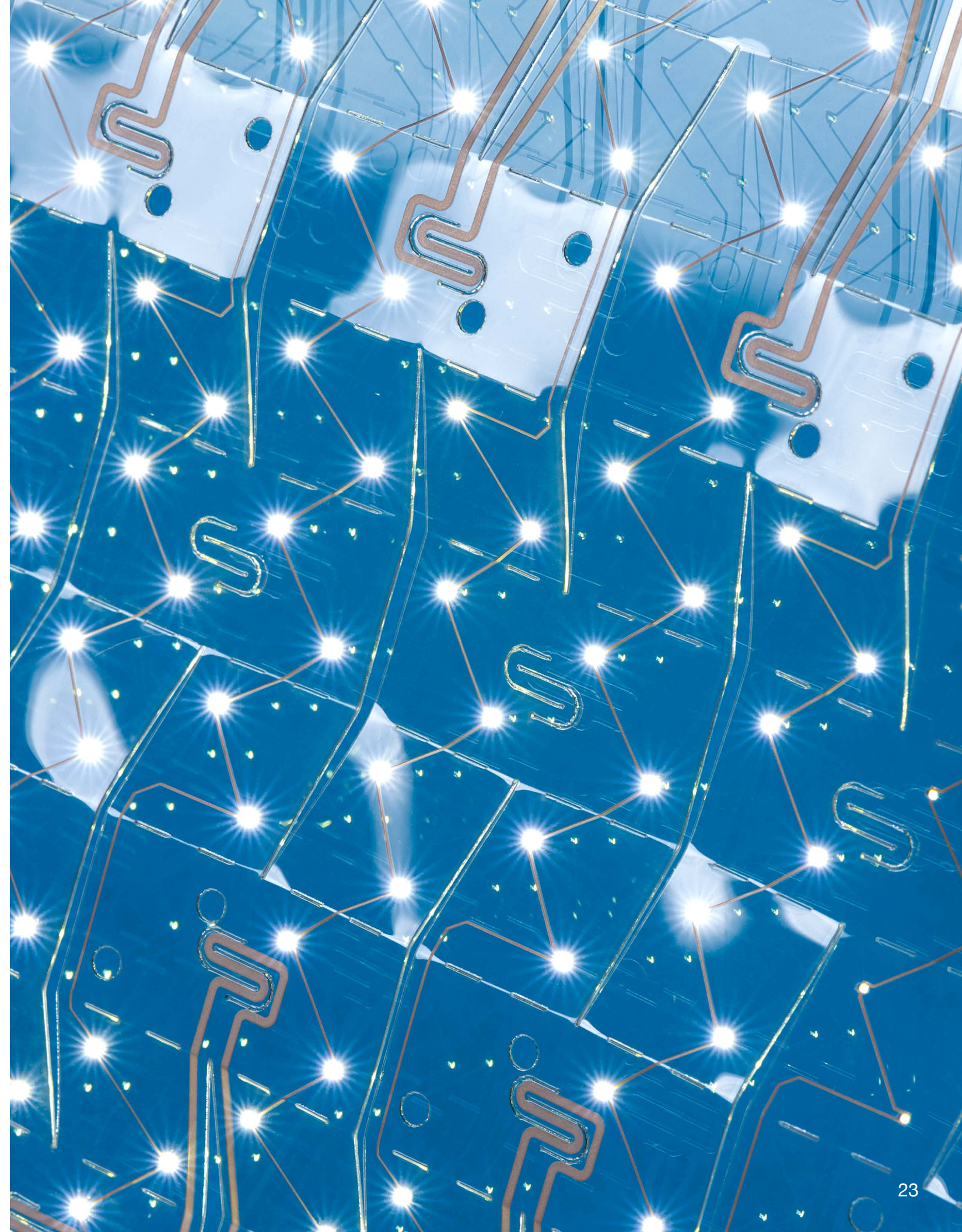
“ The energy transition is not just about a shift in energy sources but also a transition in materials. Our goal is to contribute to the long-term sustainability of batteries, reducing geopolitical dependencies. To achieve this, creating economic perspectives for the Netherlands and establishing a thriving market are crucial. While the electric vehicle (EV) market is highly developed and primarily driven by large numbers, Dutch technologies could truly make a difference in the automotive sector. However, we recognize the need for a stepping-stone to further scale up our activities. Through the Battery Competence Cluster Nederland (BCC-NL), the Dutch platform organization for battery



technology with leading the next-generation roadmap, we are currently directing our focus towards heavy-duty applications. Dutch producers of trucks, boats, and construction machinery require batteries with specific power outputs, and we are well-equipped to develop these battery packs based on Dutch cell technologies while ensuring a stable supply chain. It's a win-win situation.

## What are your hopes for this technology for the near future?

“ In the wake of our battery initiatives, we are charting a course for electrolyzers. Leveraging the same processes, we aim to develop electrolyzers with significantly enhanced conversion performance. For the PEM (proton-exchange membrane) type electrolyzers we focus on, iridium is a critical component. However, the current iridium supply poses a challenge. To meet the projected hydrogen production goals for 2030, we would require 250% of today's annual iridium production. Through our thin-film processes, we have demonstrated a remarkable reduction in the required iridium amount by a factor of 200, while maintaining the same performance. Additionally, we are in the process of creating dedicated 3D microstructures that will further enhance the efficiency of electrolyzers. To effectively combat climate change, we need solutions that are inherently sustainable. The Netherlands is well-positioned to achieve success in alternative production technologies and materials for the next generation of batteries and electrolyzers that embody true sustainability.



# Implantables for health

Alongside wearables, we are witnessing the emergence of implantables designed to address chronic diseases. These devices incorporate sensors and actuators, seamlessly connected to the external environment through companion wearables, with the aim of achieving closed-loop solutions. **Geert Langereis**, Program Manager of Health Research at Holst Centre, provides insights into recent developments and breakthroughs in the realm of implantables.



**Geert  
Langereis**

#### Role

**Program Manager  
Health Research**

#### Expertise

Semiconductor technology for health applications: lab-on-a-chip, photonics, MEMS, electrochemistry, electrophysiology.

#### Achievements

**60<sup>+</sup>** publications

**48<sup>+</sup>** patents of which 16 US patents

- IEEE Milestone Award, Compact Disc Technology (2009)
- Distinguished Research Associate position at the TU/e (2023)

## What is Holst Centre's specialty in this domain?

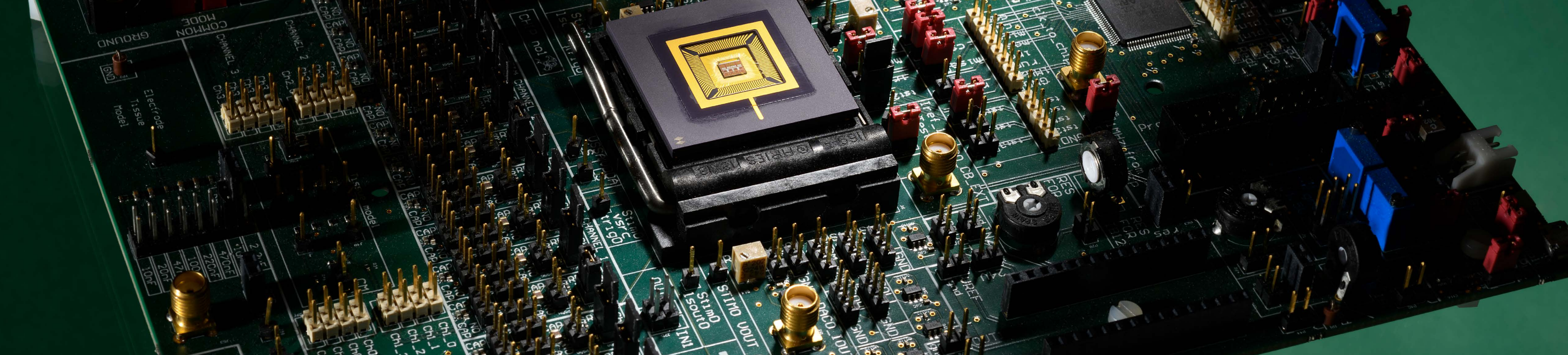
Geert Langereis

“ At Holst Centre, we boast competence teams capable of addressing the entire spectrum of health device technology development. Our expertise spans material science, enabling us to create devices that are smaller, more flexible, and energy-efficient. We possess the know-how to transmit data or energy from inside to outside the body, and we excel as sensor specialists. By integrating these capabilities, we can generate innovative concepts from a health application perspective, validating

them through clinical trials. Once validated, we can develop pioneering products using either off-the-shelf components or dedicated integrated circuit (IC) designs, always leveraging core Imec nanotechnology. Our learning process is enriched by addressing development questions from start-ups and larger healthcare companies, simultaneously preparing for the future through long-term research. This research focuses on building blocks for creating the next generation of wearable-implant combinations tailored for chronic diseases.

## What is the most significant recent breakthrough?

“ Electrical stimulation of the peripheral nervous system provides a relatively non-invasive means to access organ functions and the brain. This technique can modulate blood pressure and inflammatory responses, among other applications. While vagal nerve stimulation is currently utilized in treating epilepsy, it comes with certain side effects due to the stimulation of the entire vagal nerve. In 2023, we successfully demonstrated a method for locally stimulating the vagal nerve, paving the way for future therapies without side effects. The implementation involves applying novel stimulation patterns to a cuff around the nerve, achieved through a dedicated silicon chip. This precision in vagal nerve stimulation can enhance spleen control, and it marks just the beginning, offering a vast spectrum of possibilities for disease treatment. Additionally, we are developing photonic measurement methods that can stand alone or integrate into a closed loop with our



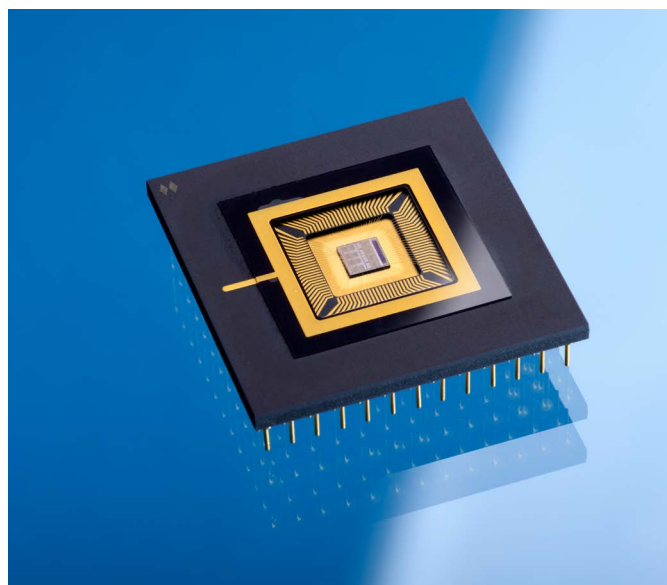
health implants. Another breakthrough is our speckle-based sensing method, where utilizing coherent laser light has resulted in four funded projects and garnered interest from a customer in the automotive industry. This technology enables the measurement of vital signs such as heart rate and breathing rate, either in contact with the skin or from a distance.

## What's the potential societal impact of Holst Centre's innovations?

“ The increasing prevalence of chronic diseases is placing a significant burden on our healthcare system. Currently, our healthcare heavily relies on pharmaceutical solutions, which can be expensive and show limited efficacy. At Holst Centre, we envision health technology becoming an integral part of everyone's lives. To effectively address chronic diseases, we believe solutions must

operate in close proximity to, or even inside the human body.

Our Implantables for Health program focuses on developing platforms for peripheral-nerve-based Bioelectronic Medicine (BEM) and artificial organs. These innovations have the potential to revolutionize medical practices, significantly enhancing healthcare outcomes. Implantables possess the capability to tackle critical bodily malfunctions. As



technology advances and the acceptance of in-body devices grows, we anticipate deploying implantables for less critical and more subtle conditions. Closed-loop neurostimulators will pave the way for new therapies and adaptive, selective solutions, ultimately improving the quality of life. Patients will no longer feel constrained by their condition, as they regain the ability to actively participate in everyday life.



## What are your hopes for this technology for the near future?

“ We aspire to establish ourselves as a competence center for artificial organs and bioelectronic medicine, aiming to transform the landscape of pharmaceutical solutions. Presently, for severe conditions like epilepsy, Parkinson's, or heart problems, individuals may receive an implantable stimulator (a pacemaker), but this is typically reserved for cases where resistance to drugs is observed.

In the future, we envision the emergence of new therapies in bioelectronic medicine that will target a broader range of diseases. The initial focus will be on pain and inflammatory-based conditions, such as rheumatoid arthritis. Imec is poised to play a crucial role in driving this transition.

# Funded projects

2023 proved to be a highly productive year for Holst Centre, marked by over 50 funded research and innovation projects. Here's a glimpse into six of our latest endeavors.

## AMPERE

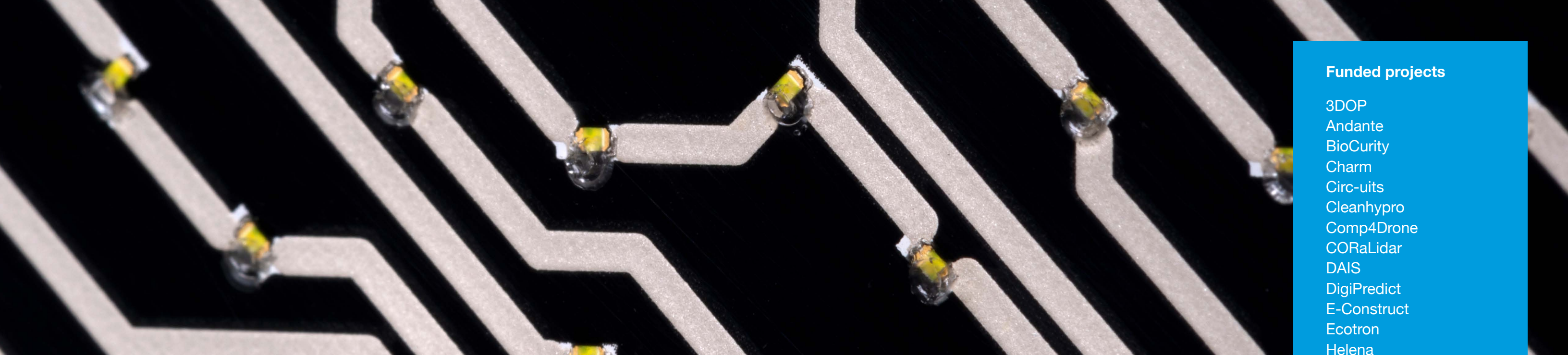
The AMPERE project, initiated on April 1<sup>st</sup>, 2021, is at the forefront of advancing hybrid additive manufacturing (AM) methods. This ambitious endeavour is steered by a consortium of 10 preeminent research and industrial partners from Germany and the Netherlands. The project's goal is to establish reliable and scalable AM techniques for crafting multi-functional mechatronic systems with integrated mechanical, electrical, and optical features. Designed to support both small-scale, customised production and large-scale manufacturing exceeding 10,000 units, AMPERE leverages smart processes to forge novel 4D mechatronic products. The project's innovation is showcased through three exemplary product cases: cutting-edge LED luminaires, signal/power electronics, and medical devices, each surpassing current industry standards and exemplifying the hybrid manufacturing paradigm.

## CoRaLi-DAR

The EU-funded CoRaLi-DAR project will develop a low-cost, low-power and reliable advanced detection and ranging sensor system as a platform for the automotive market and beyond. The project aims at integrating in the same module both radio and light-based sensing, exploiting LiDAR's high-resolution capabilities and radar's strong reliability in adverse weather conditions. The full integration of photonics and electronics will reduce manufacturing costs and operational power. CoRaLi-DAR aims to strengthen European leadership and to foster open strategic autonomy thanks to the development of a multi-sensing photonic system for the automotive industry first, and for further application afterwards. Therefore, CoRaLi-DAR enhances and improves the existing value chain in the field of photonics by creating a single module integrating two chips to combine two technologies: radar and LiDAR to optimise the benefits from both technologies.

## UNICORN

To reach climate targets, the EU must reduce its emissions from the transport sector. It is also important to improve the efficiency of our transport system and pave the way for zero-emission mobility. The EU-funded UNICORN project will increase the circularity-driven functional integration of electronics in automotive. It will do so by embedding eco-design principles and ensuring net beneficial effect on climate change mitigation. Specifically, the project will design and develop innovative green and circular technologies for automotive electronics. These include lightweight, low impact and bio-based materials, as well as the implementation for material circularity. UNICORN will establish a vision and roadmap to ensure functional electronics support EU mobility climate targets.



### **KIDNEW works**

KIDNEW works on a ground-breaking technology to enable an implantable artificial kidney with better functional kidney replacement therapy (KRT) than currently available, without a need for immunosuppressive drugs and at reduced costs. Chronic kidney disease, and its end stage Kidney Failure are a worldwide and ever-growing health crisis. Patients with Kidney Failure largely depend on in-clinic dialysis, which typically requires them to travel to the hospital/clinic three times per week for a four-hour dialysis session. This places a heavy burden on the patient's life and autonomy, and on European health care systems. Human kidneys contain millions of identical nephrons, working in parallel. KIDNEW combines chip technology and biology to integrate millions of artificial nephrons within an implantable artificial kidney.

### **SUBLIME**

The SUBLIME project is dedicated to accelerating the adoption of electric vehicles (EVs) to address the EU's transport-related greenhouse gas emissions, which constitute a significant portion of the region's overall emissions. The initiative targets consumer-driven technical challenges, focusing on reducing EV costs and enhancing their long-distance travel and fast-charging capabilities. At the heart of SUBLIME is the development of a sulfide electrolyte-based solid-state battery cell, promising high capacity and voltage stability. This battery technology is not only inherently safe but also operable at room temperature, ensuring vehicle reliability across various conditions. The project prioritises the creation of interfaces that facilitate rapid lithium-ion transport and exhibit robust mechanical properties, contributing to the component's stability. SUBLIME's goal is to advance this technology to Technology Readiness Level (TRL) 6 and confirm its scalability for large-volume manufacturing. By 2030, SUBLIME aims to provide a roadmap for market entry, supported by a consortium of strong European partners.

### **I3-INSHAPE**

The I3-INSHAPE project supports mature SME-led innovations in the commercialisation and scale-up phases to capture opportunities in this fast-growing global market. As such I3-INSHAPE contributes to solving the problem of increasingly inactive lifestyles across the general population, recognised as a major cause of increased levels of chronic and endemic diseases across the population (diabetes, heart disease, Alzheimer and cancer). The importance of vitality, mentally and physically, is greater than ever. Within the ecosystem of the Elis Innovation Hub, imec focusses on innovations @work, with the Workplace Vitality Hub (of which imec and TNO are two of the founding partners) as a living lab and co-creation space. The I3-INSHAPE consortium wants to link key challenges for SMEs identified to data-driven growth, upscaling innovations and bringing them to the market: 1) improving interregional connections to building value chains and expanding market presence, 2) digitalisation of services & products and better access to data, and 3) business and innovation support: user-driven innovation, scale-up, commercialisation and access to financing.

### **Funded projects**

- 3DOP
- Andante
- BioCurity
- Charm
- Circ-uits
- Cleanhypro
- Comp4Drone
- CORaLidar
- DAIS
- DigiPredict
- E-Construct
- Ecotron
- Helena
- HyPerStripes
- Icare4CVD
- Inno4Health
- InShape
- Internet of Water
- Internet of Neurons
- KIDNEW
- Learn
- LoLiPoP
- MADRAS
- Mem-Scales
- Mid4Automotive
- Moore4Medical
- NerveRepack
- NeuroKit2E
- Newlife
- NextPerception
- PEROXIS
- Plantar
- PreventCKD
- Rebecca
- Stimulus
- StormBots
- SUBLIME
- SuperIoT
- Sustronics
- TREASURE
- Unicorn

# Partnerships



# Start-ups & spin-offs

AIKON  
HEALTH

tracxon  
BEING IN TOUCH

onera

FononTech

AMSYSTEMS

TOUCHWAVES

AXELERA  
ARTIFICIAL INTELLIGENCE

KEIRON

bloomlife

LionVolt

LIFESENSE GROUP

SPARKNANO

## Contact

Holst Centre  
+ 31 40 27 74 000  
contact@holstcentre.com  
[www.holstcentre.com](http://www.holstcentre.com)

High Tech Campus 31  
5656 AE Eindhoven  
The Netherlands

P.O. Box 8550  
5605 KN Eindhoven  
The Netherlands

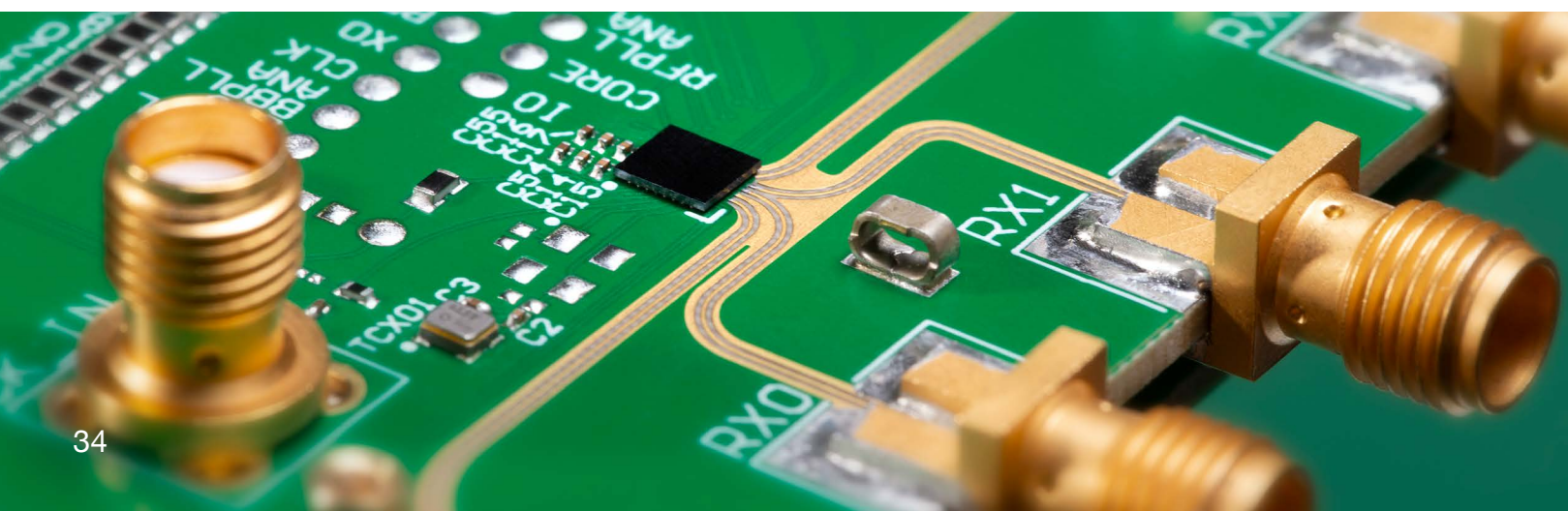
## Colofon

Design  
Factor Tachtig

Text  
Han Thoma, Drift Agency

Print  
De Digitale Drukker

Project management  
Sara Joosten, TNO at Holst Centre  
Carolien van der Leegte, imec at Holst Centre





Established in 2005 by imec and TNO, Holst Centre is located at the heart of Eindhoven's High Tech Campus. It features a 250-strong team of innovative minds (comprising 30 nationalities) that is deeply rooted in the 'Brainport' ecosystem of high-tech companies, all while being part of a unique international partner network. And we are deeply committed to nurturing entrepreneurship and kick-starting promising technology start-ups. Our robust partnerships span across industry, government, academia, and educational institutions, bolstering the Dutch industrial landscape while creating societal impact.

