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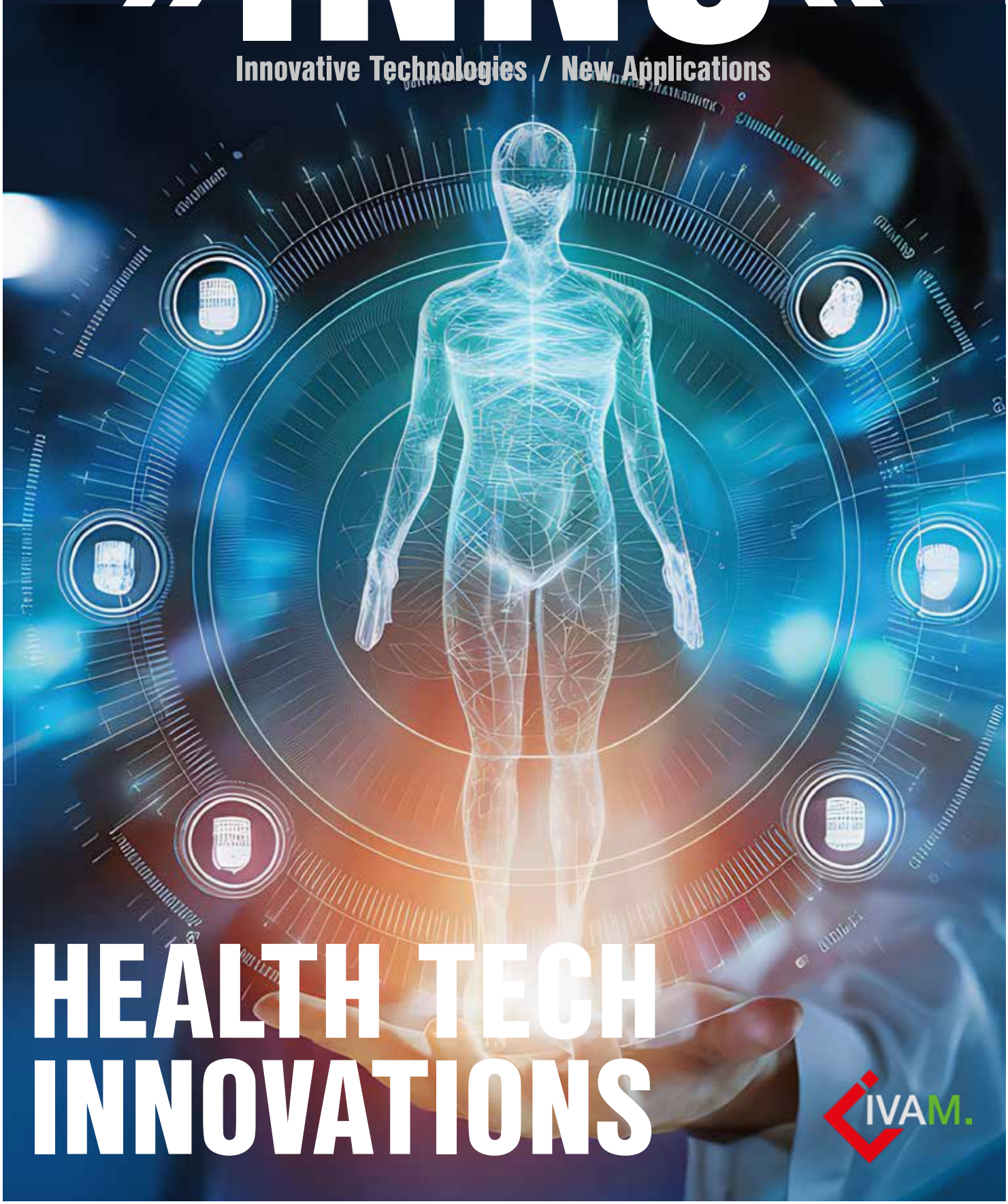
#89

Innovative Technologies / New Applications



HEALTH TECH INNOVATIONS

IVAM.

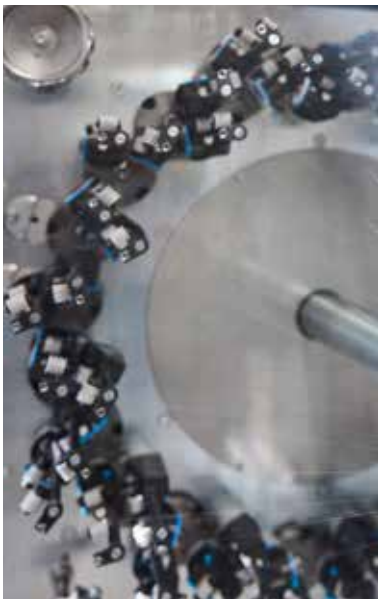
CONTENTS

INNO 89

14

Sustainable Parylene Coatings for Medical Devi

In the rapidly advancing world medical technology, selecting t materials and coatings can sig impact the safety,



06

Robot-assisted Laser Procedure Aims to Minimize Surgical Risks

In ageing societies, back problems have become a widespread debilitating condition. In many cases, the underlying cause is spinal canal stenosis.

22

Innovation Platform for

COMPAMED Special on Pa

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the right
nificantly

04

Nitinol: Revolutionizing Medical Applications

Nitinol, a smart material known for its shape-memory effect, stands out as one of the most fascinating phenomena in material science.

Medical Technology
ges 22 - 31

»INNO 89«
Health Tech Innovations

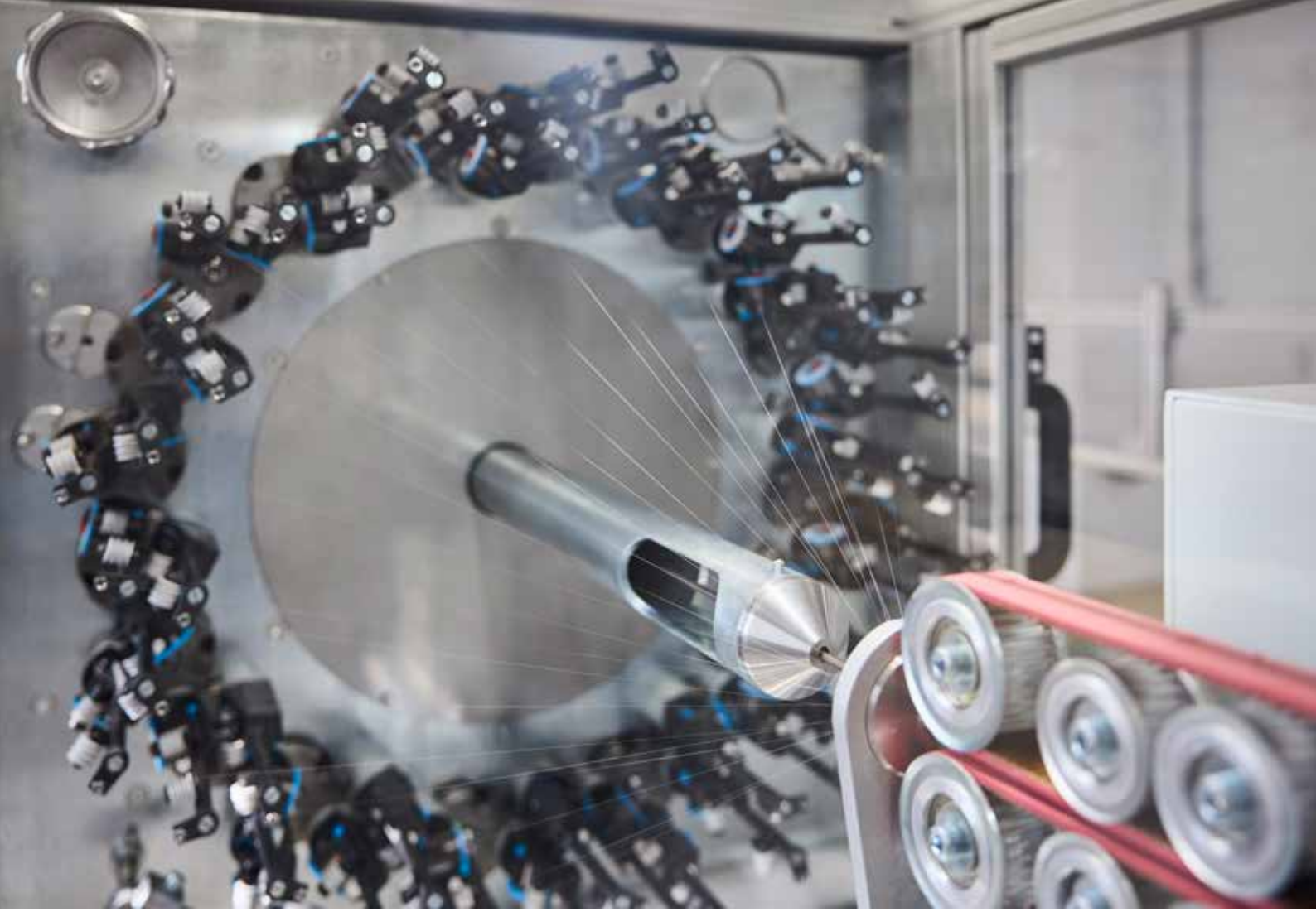
Welcome to this special edition of INNO, where we journey into the future of Health Tech Innovations

In these pages, you'll find an inspiring showcase of the latest breakthroughs from IVAM members, capturing the incredible progress happening in medical technology. Our contributors share exciting advances that promise to shape patient care and enhance treatment outcomes, from Nitinol's transformative role in medical applications to pioneering robot-assisted laser procedures that aim to reduce surgical risks. We also explore custom fluidic solutions pushing the boundaries of microfluidics, along with sustainable Parylene coatings that highlight a commitment to eco-conscious medical device design. And for those eager to bring innovation to life more quickly, we dive into streamlined processes that accelerate development from individual components to active implant systems.

As you navigate this special issue, you'll also find an exhibitor overview and a stand map for companies at the IVAM joint stand, as well as the full agenda for the COMPAMED HIGH-TECH FORUM on pages 28-31. Here's to an inspiring read and a truly rewarding visit!

Warm regards,

Mona Okroy-Hellweg



Nitinol braiding technology enables complex 3-dimensional implants visible under X-ray. Source: Alleima

Dr. Bernd Vogel

NITINOL: REVOLUTIONIZING MEDICAL APPLICATIONS

Nitinol, a smart material known for its shape-memory effect, stands out as one of the most fascinating phenomena in material science. Its unique properties make it highly attractive for medical applications, yet processing nitinol presents significant challenges. Alleima, a company with over 20 years of experience in nitinol processing, is at the forefront of overcoming these obstacles.

The medical revolution of nitinol and processing methods

In 1962, William J. Buehler discovered the shape-memory properties of nickel-titanium alloys at the Naval Ordnance Laboratory, naming the alloy family nitinol. This discovery revolutionized the medical device industry.
Traditional materials like stainless steel and titanium lack the flexibility and elasticity of living tissues, leading to biomechanical incompatibility and issues such as the loosening of bone implants. Nitinol, however, closely mimics the properties of living tissue, making it ideal for implants. Its super-elasticity has paved the way for vascular implants like self-expanding stents, filters, and grafts, significantly advancing medical procedures.
The American Standard of Testing Material (ASTM) committee has developed standards for nitinol

used in medical devices and implants. These standards define testing methods and specifications for nitinol in various forms, such as wire, tube, and sheet. However, without in-depth knowledge, these standards can be too broad, leading to material variation from different suppliers. Nitinol's properties are highly sensitive, with slight changes in nickel content or cold work significantly affecting its behavior.
"I am working with a team of experienced materials specialists, development and mechatronics engineers, quality managers, and skilled operators to overcome these barriers and automate the processing as much as possible to achieve smart manufacturing for a smart material," says Dr. Bernd Vogel, a recognized nitinol expert who has been fascinated with nitinol processing since starting his university studies 30 years ago.

Challenges in joining and industrial automation

When nitinol is part of an assembly, carefully considering joining methods is crucial. Nitinol can be welded to itself using a laser or e-beam, but welds lack super-elastic properties and should be placed where minimal deformation occurs. Joining nitinol with other materials like titanium or stainless steel is challenging. Successful methods include soft soldering with aggressive fluxes, resistance welding, and diffusion welding. Mechanical options like crimping or shrink-fitting are generally preferred. Alleima is one of the companies globally that can offer joining as a core capability.

The industry also faces difficulties in converting nitinol fabrication into industrial automation due to the material's sensitivity to processing conditions. Medical products made from nitinol are often handcrafted with low automation, making the process dependent on the worker and difficult to validate. The high variety of needed versions of implants like stents makes automated processes less profitable. However, mass production of nitinol articles, such as super-elastic guide wires used in surgical procedures, has been successful due to their consistent demand and performance benefits.

Shape-restoring applications

Shape-restoring applications form the largest family of medical instruments made from nitinol. These products are temporarily deformed for introduction into the body and return to their original shape without temperature changes. They are used for various functions, including loops, snares, retractors, and baskets for removing foreign bodies and blood clots. In urology, stone retrieval baskets are in high demand, allowing for some degree of automation in their manufacturing process.

Recommendations for using nitinol in medical applications

When manufacturing medical devices, quality is paramount, followed by productivity and profitability. Whether using manual operations or automated processes, partnering with an experienced nitinol processor is essential. Understanding the effects of cold work, heat treatment, strain rate, and cycle number on material properties is crucial for achieving the desired stress-strain behavior and ensuring the success of nitinol-based medical devices. Alleima, has built up a process that supports customers to realize their ideas by leading them through each stage of the challenging development process of nitinol, all the way to market approval.

Alleima - Business Unit Medical
https://www.alleima.com/nitinol

Alleima provides the design and development of complex medical components that are calibrated to fit the application. A core competence is processing nitinol wire, sheets, and tubes. Source: Alleima

ROBOT-ASSISTED LASER PROCEDURE AIMS TO MINIMIZE SURGICAL RISKS

Spinal canal stenosis – a bony narrowing of the spinal canal – can be agonizing. If it presses on the spinal cord, it comes to chronic pain and paralysis. Surgical intervention is often the only solution: In Germany alone, 111,000 cases are treated every year. However, since stenosis is close to the spinal cord, bony decompression, in which the constrictions are removed using high-speed milling, is risky. A robot-assisted, optically monitored laser procedure, which is currently in the pre-development stage at the Fraunhofer Institute for Laser Technology ILT in Aachen, could help to minimize the risk of such procedures in the future.

In ageing societies, back problems have become a widespread debilitating condition. In many cases, the underlying cause is spinal canal stenosis. Bony constrictions form in the spinal canal, which press on the spinal cord. Chronic pain and signs of paralysis are the result. In around 111,000 cases in Germany alone, they become so severe that only surgical decompression of the spinal canal can help. Surgeons use high-speed cutters to open up the spinal canal to remove the constrictions that are growing inside.

Risky procedure on the spinal canal

Such procedures are challenging for the surgeons. While milling requires high contact pressure and thus physical strength, the close proximity to the spinal cord and nerve roots requires dexterity. In 1.5 percent of operations, the high-speed rotating milling head nevertheless comes into contact with the nerve tracts. In this case, those affected are at risk of bladder and rectal incontinence or paraplegia. In addition to personal suffering and loss of life quality for those treated, such catastrophic surgical procedures are associated with psychological stress for the medical teams and considerable followup costs for the healthcare system. To minimize the risks of surgeries near critical neuronal structures, a research team led by Dr. Achim Lenenbach, head of the Laser Medical Technology and Biophotonics Department at the Fraunhofer ILT, is driving forward robotically assisted laser surgery systems. A solution for gentle skull opening for neurosurgical procedures is already well advanced. Here, a short-pulse laser replaces the milling machine. In addition, the cutting depth is continuously measured using optical coherence tomography (OCT). “We intend to use this approach for surgical procedures on the spine in the future,” he explains. A patent application has already been filed for the idea of a robotically assisted laser surgery system for the precise and safe cutting of bones.

Short-pulse laser and OCT measurements for precise hard tissue cuts

The principle of such laser surgery systems is based on ablating the bone tissue with nanosecond laser pulses. The short pulse duration not only has the advantage of minimal thermal interaction with the surrounding-

“The long-term research goal is to establish robotically assisted laser procedures for cutting hard tissue as the gold standard for operations close to critical structures.”

material, which prevents carbonization of the cut edges and promotes the healing process, but also ensures a high degree of microsurgical precision. This is because a local thermomechanical effect only occurs where the infrared laser pulses hit the hard tissue: The water stored in the bone vaporizes explosively and creates micro-craters in the bone.

To achieve the ablation rates required in surgical practice in a gentle cutting process, a spray mist system moistens the surface of the bone while a galvo scanner guides the laser focus along the intended cutting line. This also reduces the thermal stress on the surrounding tissue. For use in spinal canal operations, it is also essential to monitor the cutting process. For this purpose, the cutting laser beam is superimposed with an OCT measurement beam which the scanner also guides over the bone surface. The system detects the cutting area in three dimensions: the beam penetrates the bone tissue and can determine the thickness of the remaining bone lamella at the bottom of the kerf from a residual thickness of approximately 400 µm. The OCT measurement carried out synchronously with the cutting process is therefore the key to reliable - and highly safety-relevant - control of the cutting process based on the residual bone thickness. Once the individually defined residual thickness has been reached, the cutting process should stop automatically. The surgeons can then lift off the loosened bone with little effort and without risk to the nerve tracts in the spinal canal.

High technology for safe medical care

Based on the scheduled optical monitoring and precise control of the laser cutting process, our procedure could prevent serious injuries to the spinal cord and nerve roots in future,” explains Lenenbach. At the same time, the use of the system is expected to minimize complications that often unnecessarily prolong hospital stays after spinal canal stenosis operations. For spinal operations, the Fraunhofer researchers are planning a further development of their existing applicator, which is designed for operations on the head. This contains the optical functional elements such as the scanner and

optical lenses and guides the focused cutting laser and OCT measuring radiation along the incision line. This applicator now needs to be miniaturized and designed as an ergonomic handpiece so that surgeons can also carry out the currently automated cutting process manually. The surgeon is to be supported by a collaborative robotic system for precise manual guidance of the applicator. The research team is also planning to address another previously unsolved problem during further development: While a milling cutter has direct contact with the bone and provides surgeons with direct haptic feedback, this feedback must be provided via a detour in the non-contact laser cutting process. The researchers are planning to use the sensors and actuators of a collaborative robot (cobot) for this purpose. This is because the cobot's force-torque sensor system determines the force effect on the robot arm, which the actuator system can then use to provide the operator with haptic feedback when manually guiding the laser applicator.

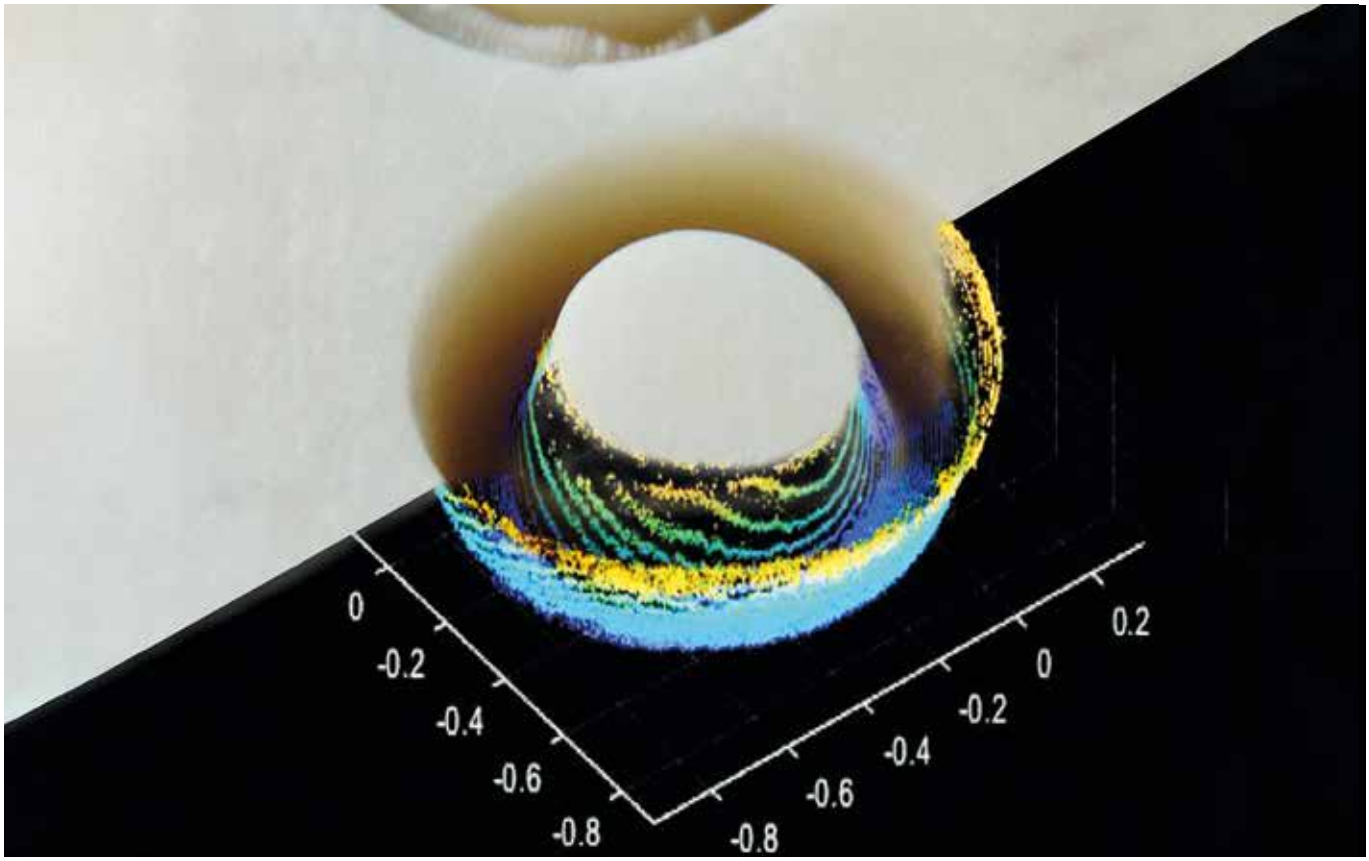
If the haptic feedback of the cobot is combined with the OCT sensor technology, the feed of the handpiece can be controlled by the surgeon based on the force effect so that it only takes place when the cutting process has locally reached the defined residual thickness. Iteration of the local microcut and feed, combined with efficient hard tissue removal, will result in a quasi-continuous cutting process.

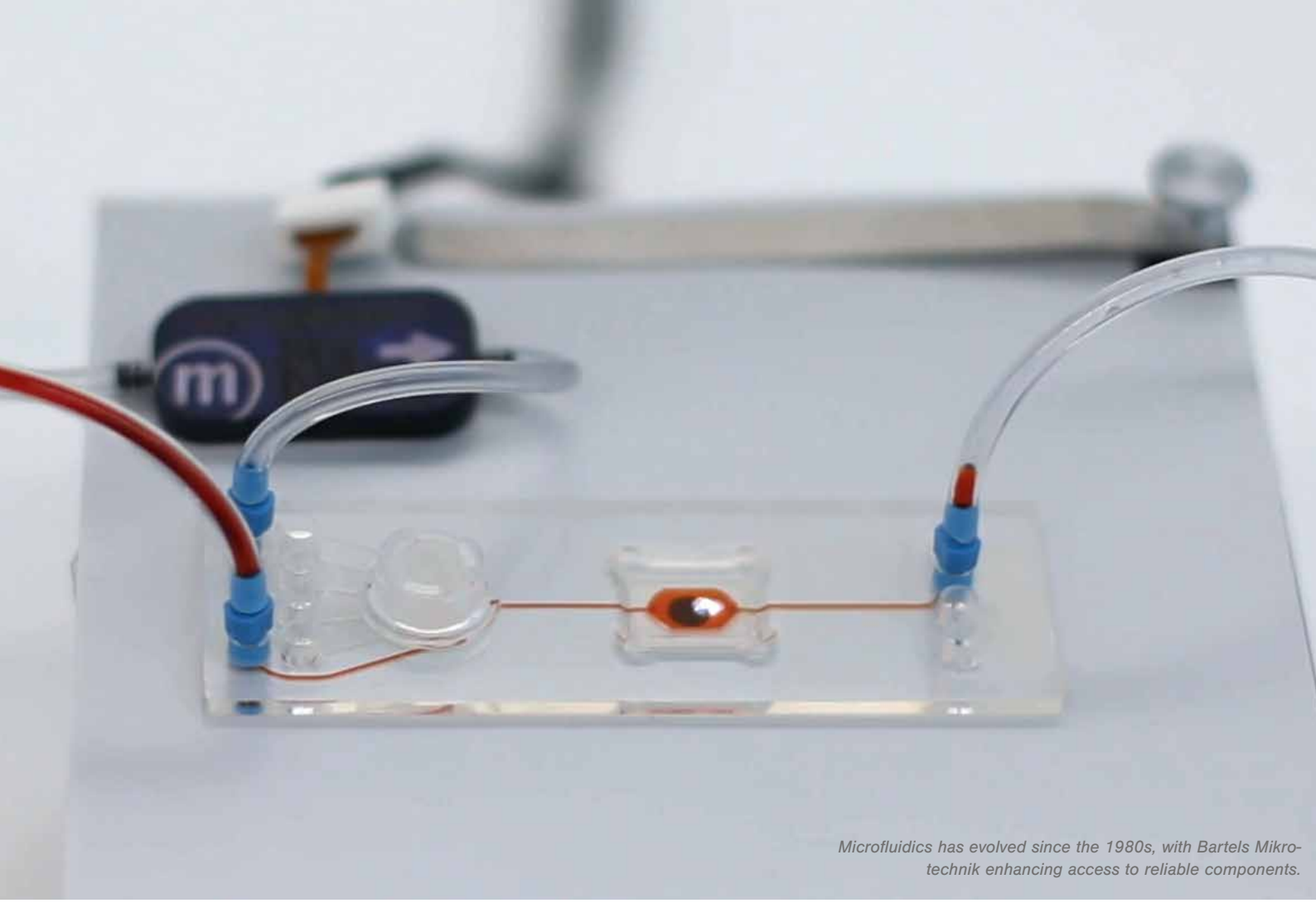
Haptic and visual feedback for surgeons

In addition to haptic feedback, the surgeon's visual orientation is crucial for the safety of semi-automated laser surgery. The laser surgery system is therefore to be linked with surgical planning software and a navigation system. In such an integrated system, the laser-generated incisions can be visualized in real time in the preoperatively generated image data. Surgeons could follow on the monitor how deep their incision has already penetrated the bone and how close they are to neuronal risk structures. In the planned research project, the development of the surgical planning and navigation software will be the responsibility of industry partners with proven expertise in this field. "The laser surgery system developed at our institute could implement the preoperatively planned incisions with sub-millimeter precision," says Lenenbach.

The long-term research goal is to establish robotically assisted laser procedures for cutting hard tissue as the gold standard for operations close to critical structures. This could relieve hundreds of thousands of patients from the fear of the consequences of spinal cord injuries during such operations, which become a bitter reality for thousands of patients worldwide every year.

Fraunhofer Institute for Laser Technology ILT, Aachen, DE
https://www.ilt.fraunhofer.de





Microfluidics has evolved since the 1980s, with Bartels Mikrotechnik enhancing access to reliable components.

Fabio Torriero

CUSTOM FLUIDIC SOLUTIONS: ADVANCING MICROFLUIDIC SYSTEMS

History of Microfluidics and Classification in the Gartner Hype Cycle

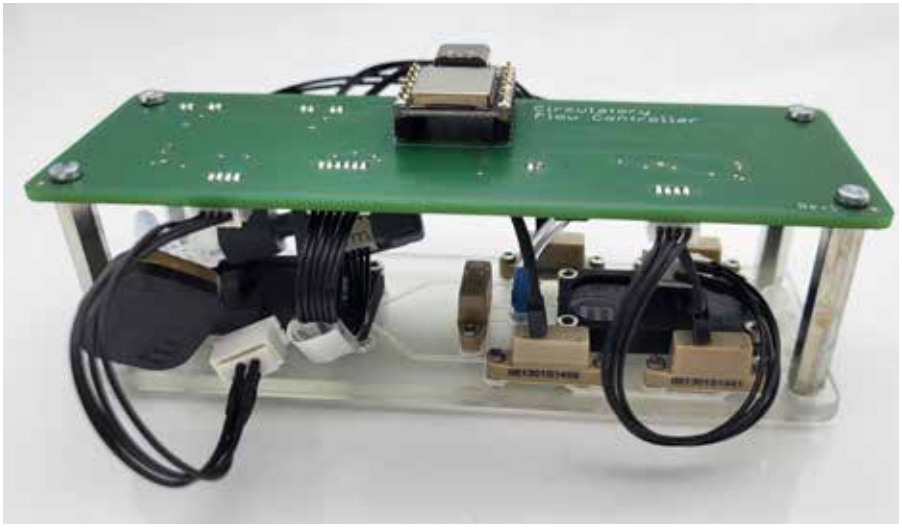
Microfluidics, which deals with the manipulation of the smallest amounts of liquids on a microscopic scale, began in the 1980s, primarily in biotechnology and analytics. Applications such as lab-on-a-chip systems enabled chemical and biological reactions to be carried out in miniaturized formats, revolutionizing laboratory processes. In the following decades, microfluidics expanded into areas such as medicine, environmental monitoring, and electronics.

In relation to the Gartner Hype Cycle, microfluidics initially experienced a phase of inflated expectations, followed by consolidation, where more realistic applications came to the forefront. One result of this maturation is the entry of established providers into the market. Companies like Bartels Mikrotechnik recognized this trend and now offer industrialized products such as micropumps, microsensors, microvalves, as well as microfluidic chips and manifolds. This development has significantly facilitated access to microfluidics, allowing innovators to rely on proven, robust components.

Bartels Mikrotechnik is a pioneer in this industrialization. By providing ready-made solutions and access to a broad product portfolio, Bartels supports both small start-ups and established companies in implementing microfluidic technologies. Their products, such as the Bartels Pump | BP7, exemplify this availability and ease the integration into complex systems.

Microfluidics Today

Today, microfluidics is indispensable in various industries. In medicine, microfluidic systems are used for point-of-care diagnostics, while in the pharmaceutical industry, they enable high-throughput screenings. In environmental monitoring, the technology plays a key role in performing precise analyses.



Bi-directional flow controller for loop pumping and switching

The state of microfluidics has evolved beyond individual applications. There is now a large range of standardized microfluidic components that allow developers to create complex systems more quickly and cost-effectively. Companies like Bartels Mikrotechnik have played a significant role in making this technology accessible to a broader market. With their Microfluidic Shop, where micropumps, valves, and chips are available, Bartels simplifies and speeds up the implementation of microfluidic systems.

With their expertise in microfluidics, electronics, and software, Bartels not only offers individual components but also provides tailored complete solutions for specific applications. This helps reduce development efforts while creating highly functional and robust systems that can be used in various industries.

Challenges in Developing Microfluidic Systems

The development of complex microfluidic systems poses significant challenges for engineers and developers. Particularly, the combination of microfluidic chips and manifolds with active components such as micropumps, microvalves, and sensors requires specialized expertise in three key areas: microfluidics, electronics, and software.

Microfluidics: One of the biggest challenges is the precise control of liquids on a microscopic level. Bartels Mikrotechnik offers solutions specifically designed for precise liquid control. With their innovative micropumps, such as the Bartels Pump | BP7, liquids can be controlled precisely and repeatably, which is crucial for the functionality of microfluidic systems.

Electronics: The control of micropumps and microvalves in microfluidic systems requires specialized electronic solutions. Bartels Mikrotechnik provides the necessary electronics to efficiently control the various components of a system. The electronics are designed to seamlessly communicate with the microfluidic components, ensuring smooth operation.

> **In relation to the Gartner Hype Cycle, microfluidics initially experienced a phase of inflated expectations, followed by consolidation, where more realistic applications came to the forefront.**

Software: Software is the third important aspect in the development of microfluidic systems. Bartels Mikrotechnik has developed software solutions that allow all components of a microfluidic system – from pumps to valves to sensors – to be monitored and controlled in real-time. This ensures that systems function precisely and stably, which is essential for applications in fields such as diagnostics and pharmaceuticals.

Solution Provider

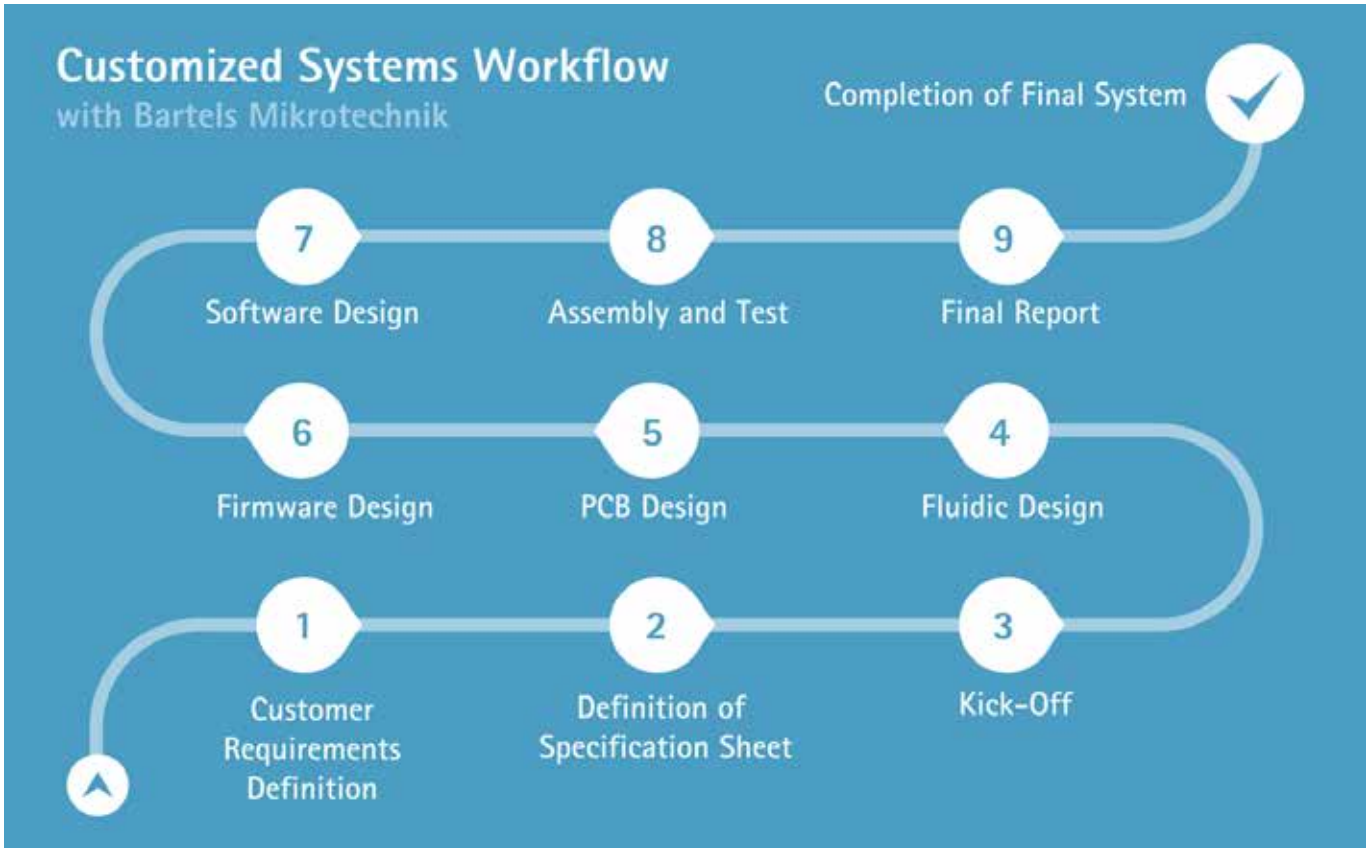
Bartels Mikrotechnik simplifies the development of complex microfluidic systems through a combination of standardized and customized solutions. By providing micropumps, valves, chips, and manifolds tailored to market requirements, the company significantly reduces barriers to implementing microfluidics. Bartels Mikrotechnik combines its expertise in microfluidics, electronics, and software, enabling them to develop and industrialize highly complex microfluidic systems efficiently. These interdisciplinary challenges necessitate close collaboration among engineers from various fields.

Their customized systems feature a quick turnaround time of just 2 to 4 weeks, significantly accelerating the implementation process. Additionally, customers receive a detailed Bill of Materials that ensures transparency regarding the components involved. The manufacturing and delivery of these systems are cost-efficient, benefiting companies of all sizes. Bartels Mikrotechnik also emphasizes customizable connection options for both microfluidic and electronic components, allowing businesses to tailor their systems to specific requirements.

With this comprehensive approach and multidisciplinary expertise, Bartels Mikrotechnik is well-positioned to support companies in successfully implementing microfluidic technologies and streamlining their development processes.

Bartels Mikrotechnik GmbH, Dortmund, DE
https://bartels-mikrotechnik.de

The collaborative process from requirements to final delivery



COMPAMED HIGH-TECH FORUM by IVAM.

Microfluidics Hands-on Session

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Event Link:

Hall 8a, G40
Düsseldorf, Germany

Tuesday, 12.11.2024
5:10 PM - open end

Dick Molin

SUSTAINABLE PARYLENE COATINGS FOR MEDICAL DEVICES

In the rapidly advancing world of medical technology, selecting the right materials and coatings can significantly impact the safety, reliability and compliance of medical devices. Among these materials, Parylene coatings have emerged over the last 5 decades as a leading choice for many medical device manufacturers. Offering a combination of biocompatibility, environmental sustainability and robust protective properties, Parylene coatings are setting a new standard in the industry. This article explores the applications of sustainable Parylene coatings in medical devices, highlighting their benefits and addressing regulatory considerations.

Understanding Parylene Coatings

Parylene is a family of high-performance polymers used extensively as a conformal coating in various industries, including medical device manufacturing. The most commonly used variants in the medical field include Parylenes N and C, Parylene HT and ParyFree. What sets these coatings apart is their ability to be applied through a vapor deposition process as ultra-thin, uniform layers that conform to complex geometries, providing excellent moisture, chemical and dielectric barrier properties

Key Benefits

1. Biocompatibility: Parylene coatings are biocompatible and biostable, complying with ISO 10993 and USP Class VI standards, making them suitable for long-term implants, tissue-contacting and externally communicating devices.

2. Environmental Sustainability: Parylene N and ParyFree are PFAS-free and halogen-free, aligning with global efforts to eliminate targeted substances from medical devices.

3. Durability and Protection: These coatings offer exceptional durability, providing reliable protection against corrosion, moisture and chemicals, which is essential for medical devices subjected to the harsh conditions of medical environments.

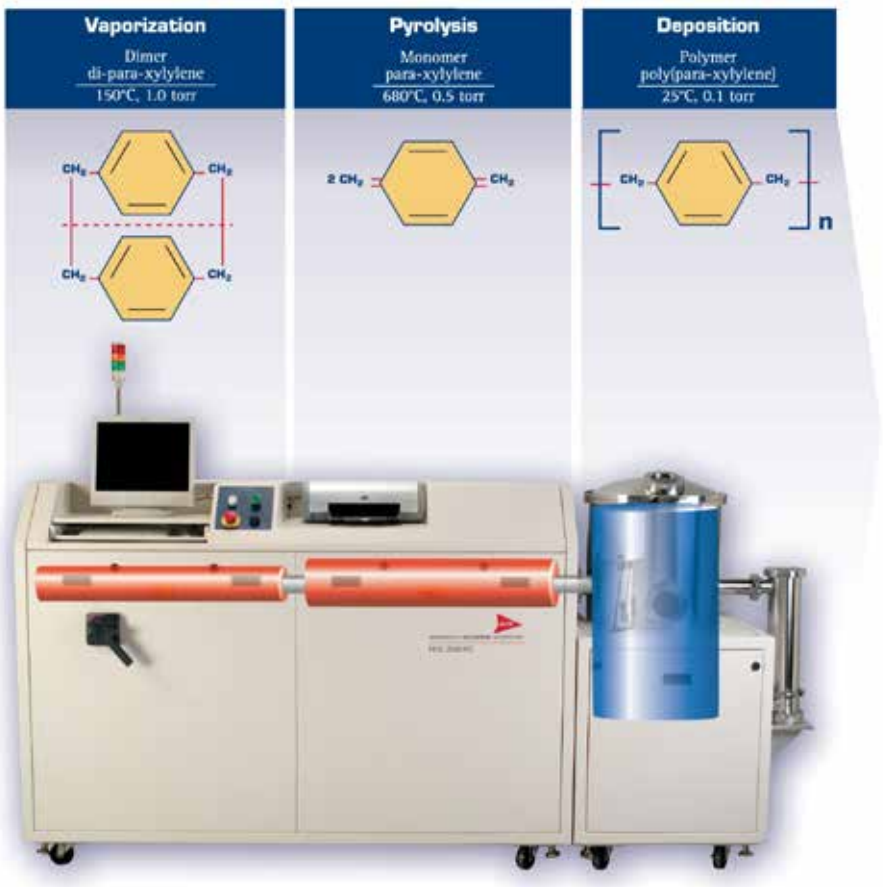
4. Lubricity: With low coefficients of friction, Parylene coatings enhance the lubricity of medical wires and components, improving device performance and reducing wear.

Applications of Parylene in Medical Devices

Balloon Catheters and Mandrels

Balloon catheters play a critical role in minimally-invasive procedures such as balloon angioplasty and stent delivery. A strong bond between the balloon and catheter is essential to withstand the high inflation pressures during use. Parylene coatings provide the necessary dry-film lubricity, ensuring that wire-forming mandrels used in the manufacturing process can be easily withdrawn without damaging the bond.

> **“In the rapidly advancing world of medical technology, selecting the right materials and coatings can significantly impact the safety, reliability and compliance of medical devices.”**



PFAS-FREE & HALOGEN-FREE COATINGS

Guidewires

In advanced catheter technologies, guidewires require coatings that can provide both lubricity and protection. Parylene coatings are ideal for these applications due to their ability to form uniform protective layers on complex shapes, improving both safety and performance.

Long-Term Implants

For long-term implantable devices such as pacemakers and stents, Parylene coatings offer unparalleled biocompatibility and biostability. They protect device components from body fluids and environmental factors, enhancing the longevity and reliability of the implants.

Wearable Medical Devices

Wearable medical devices, such as glucose monitors and heart rate sensors, are essential for continuous patient monitoring. Parylene conformally coats even the smallest and most intricate components, protecting electronics from sweat and moisture to ensure they perform reliably.

Drug Delivery Systems

Parylene's non-reactive and biostable properties make it ideal for advanced drug delivery systems like infusion devices, syringes and implantable pumps. The coatings create a contamination-barrier, safeguarding the therapeutic compounds' efficacy by preventing degradation and other adverse solution and tissue reactions.

Regulatory Considerations and the Future of Medical Device Coatings

With regulatory bodies around the world increasingly focusing on environmental and safety standards, the use of PFAS-free and halogen-free coatings is becoming crucial. The European Union in particular is working towards more stringent regulations on fluorinated polymers, making Parylene N and ParyFree attractive alternatives for medical device manufacturers looking to reliably protect their devices.

As technology advances, the requirements for medical device coatings will continue to increase too. The versatility and sustainability of Parylene coatings position them as a key component in the future of medical device manufacturing. By choosing Parylene, manufacturers can ensure that their devices meet the highest standards of safety, performance and environmental responsibility.

In conclusion, as the medical device industry continues to innovate, the importance of selecting the right materials and coatings cannot be overstated. Parylene coatings offer a sustainable and effective solution for manufacturers seeking to enhance the performance and safety of their devices. With their unique combination of biocompatibility, environmental sustainability and protective properties, Parylene coatings are well-equipped to meet the challenges of modern medical device manufacturing.

Specialty Coating Systems - World Headquarters, Indianapolis, US

https://scscoatings.com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ACCELERATE MEDICAL DEVICE DEVELOPMENT

FROM COMPONENT TO ACTIVE IMPLANT SYSTEM

Electrical signals are the core drivers of brain function and the body's neural networks, in both health and disease. Over the past few decades, advances in medical device development have enabled new treatments that restore balance to diseased neural systems. Through electrical stimulation, these devices can promote healthier body functions across a wide range of conditions. The field of implantable devices continues to evolve, with a growing focus on developing technologies that not only enhance existing therapies but also unlock entirely new treatments. CorTec supports medical device companies by providing technologies that accelerate their path to success.

The brain controls a multitude of functions - from movement over perception up to complex cognitive functions. If neural activity gets out of control, the consequences are correspondingly serious. Neurological and psychiatric diseases already account for a third of health care costs, with a tendency to rise according to demographic trends. As various indications are being investigated, companies continue their work to develop implantable devices and solutions for the treatment of neurological diseases, and as research progresses, the ideas of engineers and inventors around the globe come to live.

The path from an idea to a medical product is very long and the regulatory requirements are enormous. The market for medical devices is dominated by big players that set hurdles for emerging companies to establish themselves on the market with their innovative devices. To enable innovation and to accelerate time to market, CorTec has opened up the portfolio of own developed technologies. The technology portfolio is based on the CorTec Brain Interchange System, an

active implantable brain implant that is capable of bi-directional communication with the brain. Like many other companies the idea was born to revolutionize the neurotech landscape by bringing such a novel technology into the hands of researchers and clinicians worldwide. The difference for CorTec: it is not only a device that is developed for a specific indication, but a platform technology that shall serve the development of various novel treatments.

A Technology Portfolio that sets CorTec apart from others

In 10 years of intensive research and development work, CorTec has developed the worldwide unique CorTec Brain Interchange™ System for brain signal sensing and therapeutic brain stimulation. In comparison to current systems, the Brain Interchange can dynamically adapt stimulation to the situation of the patient, where current systems are only able to stimulate at constant rates without considering the changing needs of the patient.

Laser-micromachined °AirRay™ electrode arrays provide reliable interfaces for permanent brain recordings and therapy delivery. Being very soft and flexible, they allow for easy implantation and gently fit to the curvature of the brain.

A biocompatible ceramic encapsulation hermetically encloses an implanted electronics unit that preprocesses the data. A key component of this system is a custom-made microchip (ASIC) developed in cooperation with the Institute of Microelectronics at the University of Ulm (Prof. Maurits Ortmanns). It amplifies neuronal signals in many independent channels (currently 32) and digitizes them at high sampling rate (currently 1 kHz) while, at the same time, allowing for swift and

“Electrical signals are the core drivers of brain function and the body’s neural networks, in both health and disease.”

flexible switching between recording and stimulation mode.

Thanks to an inductive power supply via an external unit, the implant works without a battery. This eliminates the need for surgical replacement when battery power decreases (as is still the case in many of today's implantable systems). Via the same external unit, brain signals are transmitted wirelessly to a Computer Unit for processing.

Reaching goals in Medical Device Development faster

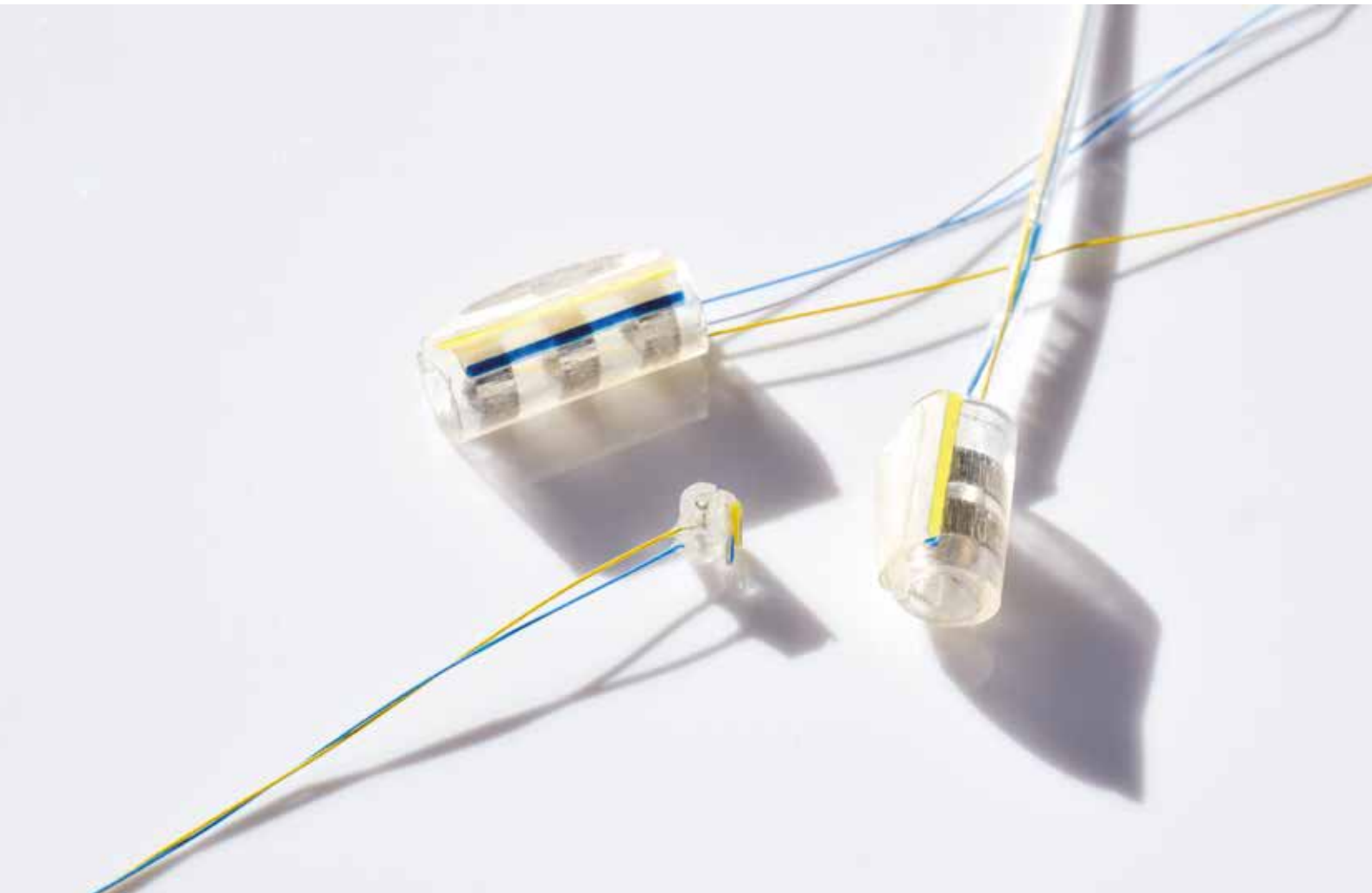
The creation of medical devices that can help patients in a new way or to improve existing technologies is bound to time consuming development, validation and regulatory steps. Companies that are creating novel devices and novel treatment options have to come up with ways to shorten their time to market and find reliable partners that help them during their development work.

The Brain Interchange System has recently been approved for its first clinical study in an Investigational Device Exemption (IDE) Study for stroke rehabilitation. By opening up the extensive technology portfolio that derives from the Brain Interchange system, CorTec is enabling companies to profit from the developmental work. CorTec's goal is to design a system that can be adapted to the individual requirements of applications.
By adapting the Brain Interchange Technology or its individual components to other devices and indications, CorTec is paving the way for more reliable and robust devices that are able to go to market in shorter periods of time. By partnering up with Medtech Companies, CorTec accompanies the device development from idea to market and offers a vast portfolio of services and development work to create specific components.

Customer-specific component development involves adaptation of AirRay Electrode technology to various shapes and sizes. Solutions for the surface of the brain, the spinal cord and also nerves can be realized, based on our proprietary AirRay electrode technology. Another component is the ceramic hermetic encapsulation used in the Brain Interchange System, which can be adapted to specific user requirements. The realization of hermetic ad non hermetic high channel implant housings is possible. In addition, CorTec is accompanying their customers projects with testing, validation and characterization of components and systems.

CorTec GmbH, Freiburg i.Br., DE

https://www.cortec-neuro.com



Neurology implant : brain activity signal captation
electrode - welding - biocompatibility
Bildquelle: Carthera / STATICE

COMPAMED 2024

INNOVATION PLATFORM FOR MEDICALTECHNOLOGY

From November 11 to 14, 2024, COMPAMED in Düsseldorf will open its doors to bring together international visitors and exhibitors to showcase the latest technologies and trends in medical technology. The IVAM Joint Pavilion, located in Hall 8a (Booth G40), will be a key attraction and serve as a central meeting point for companies, researchers, and decision-makers presenting advanced solutions in micro- and nanotechnology, photonics, and new materials.

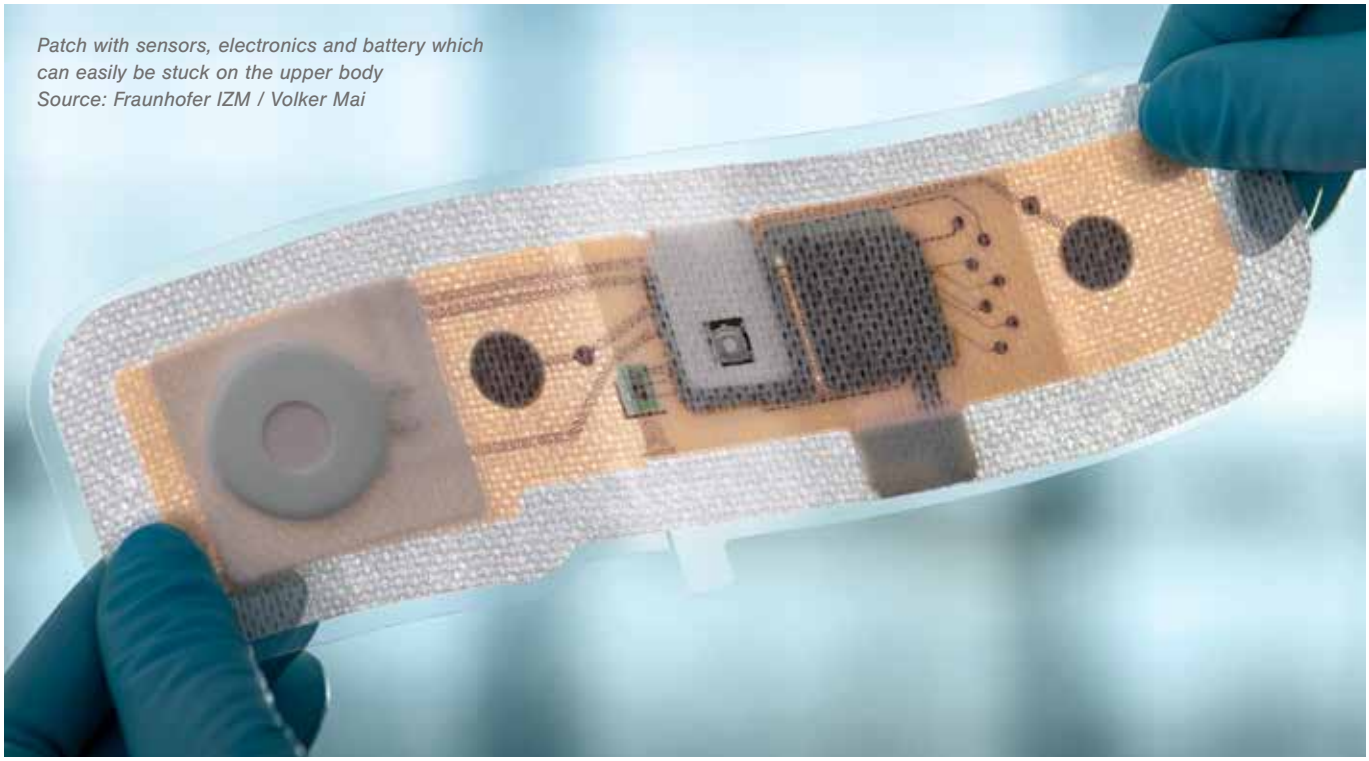
With over 600 m² of exhibition space, the IVAM Joint Pavilion provides a platform for 40 companies and research institutes from eleven countries to showcase cutting-edge components and systems for medical technology. The countries represented include Germany, Belgium, Switzerland, France, Finland, Sweden, Japan, Taiwan, the Netherlands, China, and the USA. Exhibitors will present high-precision components like micro-pumps, miniature valves, sensors, ultra-fine wires and tubes, as well as microelectronic and microfluidic systems that enable a new generation of smart and reliable medical devices.

Technology Highlights at the IVAM Joint Pavilion

The exhibited technologies provide insights into key developments in medical technology and cover a wide range of applications:

Digital Diagnostic Solutions: Systems that use BioMEMS technology to enable real-time diagnostics, with mobile data transfer that optimizes medical care.

Optical and Photonic Technologies: Advanced light guides and probes



Patch with sensors, electronics and battery which can easily be stuck on the upper body
Source: Fraunhofer IZM / Volker Mai

that support tissue-friendly laser applications in minimally invasive medicine, improving precision in medical laser guidance.

Coating and Material Innovations: Biocompatible coating technologies that protect against moisture, chemicals, and electrical influences, useful for applications in medical technology as well as aerospace.

Micro- and Nanotechnology Components: Precision parts such as micro-pumps, miniature valves, and microelectronic systems developed for specialized applications in medical technology.

Focal points of the trade fair: Networking and experts' forum

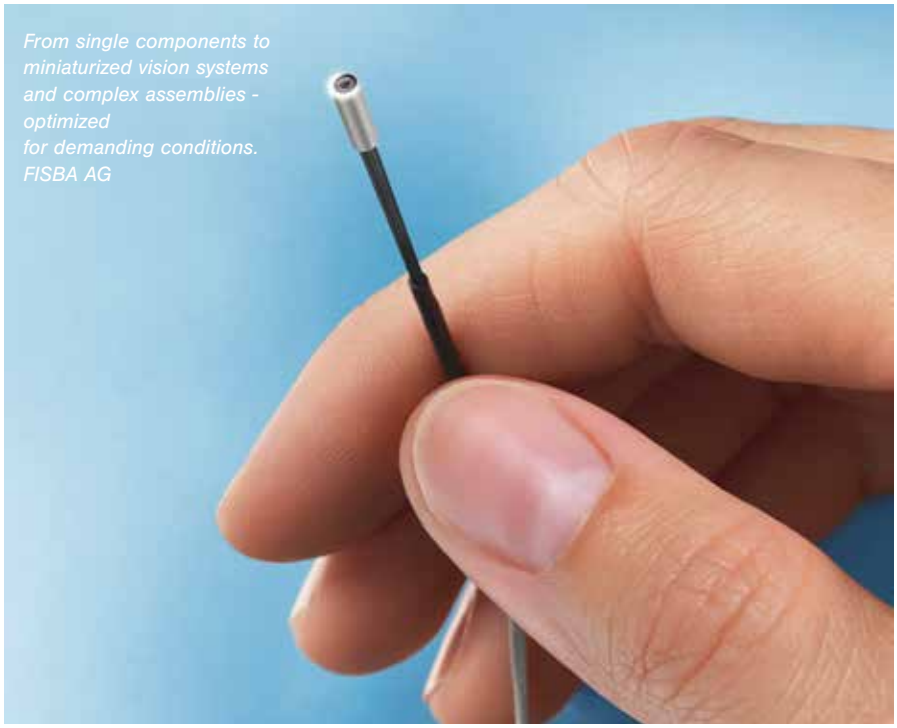
In addition to the exhibition at the IVAM Joint Pavilion, COMPAMED offers various forums and networking events that encourage exchange among international industry professionals. The COMPAMED HIGH-TECH FORUM, also located in Hall 8a, will feature sessions on topics such as "Laser & Photonic Applications," in cooperation with the European Photonics Industry Consortium (EPIC), and "Europe meets USA - High-Tech for Medical Devices," which promotes transatlantic cooperation between manufacturers and users in medical technology. An international networking event on November 13 will round off the program, promoting dialogue along the entire value chain.

COMPAMED as a Hub for Innovation

In recent years, COMPAMED has established itself as the leading trade fair for suppliers in medical technology. Alongside the world's largest medical trade fair, MEDICA, COMPAMED hosts over 800 exhibitors and more than 4,200 exhibitors from MEDICA, attracting over 81,000 visitors from the global healthcare sector. The IVAM Joint Pavilion offers visitors from around the world a unique opportunity to learn about the latest technological developments and make connections that will shape the future of medical technology.

IVAM Microtechnology Network

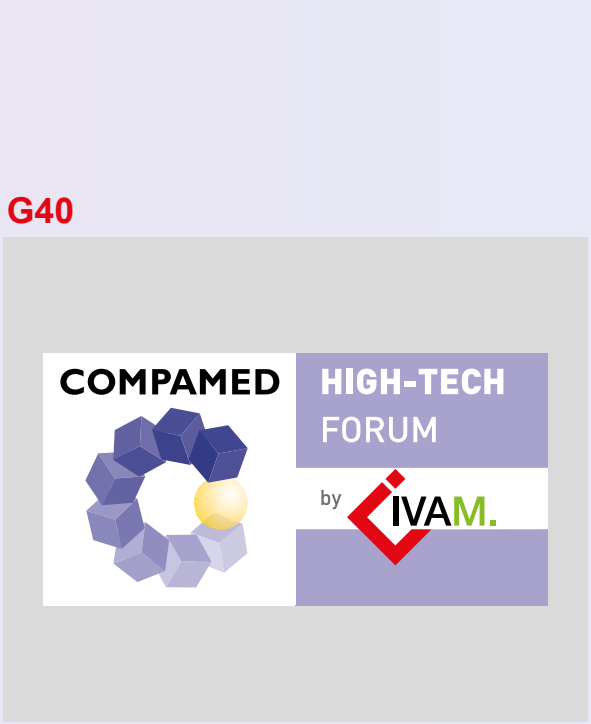
https://www.ivam.de/events/compamed_2024



From single components to miniaturized vision systems and complex assemblies - optimized for demanding conditions. FISBA AG

Laserdrilled nozzle with 2000 holes that have a diameter of 15µm
Source: LightPulse

COMPAMED/MEDICA IVAM PRODUCT MARKET HIGH-TECH FOR MEDICAL



DEVICES

November 11 - 14, 2024
Hall 8a
F19, F29, F35, F39, G19, H19, H23, H29

H19

H19.4 EPnP Medical		H19.5 CorTec
	Meeting Room	
H19.2 PLA GIKEN		
		H19.7 Mabuchi Motor Electromag
H19.1 Jenoptik & SwissOptic		

H23.5 VICI AG International

H23.7 Coherent

H23.8 KYBURZ SAPPHIRE

G19

G19.1 IMT Masken und Teilungen	Storage	G19.4 Fraunhofer IMS
G19.7 FISBA		G19.5 Fraunhofer ENAS

F19

F19.1 Specialty Coating Systems	Storage	F19.4 Microdul	
F19.8 LightFab	F19.6 LightPulse		F19.5 Fraunhofer ILT

COMPAMED HIGH-TECH FORUM BY IVAM

COMPAMED

Hall 8a, Booth G40

MONDAY, NOVEMBER 11

11:05	*Opening*	

GLOBAL REGULATORY STRATEGIES FOR MEDICAL DEVICES: NAVIGATING MDR COMPLIANCE IN THE EU AND U.S. MARKET ENTRY

Session Chairs: Erik Jung, Fraunhofer IZM, Berlin, DE & Dr. Victoria Jakobi, IVAM, Dortmund, DE

11:15	*From Concept to Compliance: Streamlining Medical Device Development, Manufacturing and Regulatory Pathways*	**Stephan Hüwel**, Jüke Systemtechnik, Altenberge, DE **Dr. Jens Waldmann**, adjutem GmbH, Bad Zwischenahn, DE
11:45	*Navigating U.S. Market Entry: Leveraging IVD Service Providers for Compliance and Device Integration*	**Dr. Patrick Vaughan**, DCN Dx, Carlsbad, US
12:05	*Break*	

SMART SENSOR SOLUTIONS

Session Chairs: Erik Jung, Fraunhofer IZM, Berlin, DE & Dr. Victoria Jakobi, IVAM, Dortmund, DE

12:10	*Innovations in Wearable Patches for Healthcare – from Wound Management to Elderly Care*	**Erik Jung**, Fraunhofer IZM, Berlin, DE
12:30	*Active Implantable Technologies - for Neuro and Beyond*	**Patrick Daubinger**, CorTec GmbH, Freiburg, DE
12:50	*Innovative Magnetic Solutions for Medical Implants & Devices*	**Darrell Joyce**, Dexter Magnetic Technologies, Elk Grove Village, US
13:10	*Sensor Technologies for Lab-On-Chip and Organ-On-Chip Platforms*	**Andreas Morschhauser**, Fraunhofer Institute ENAS, Chemnitz, DE
13:30	*Smart Technologies for Neural Implants*	**Kira Heinrich**, Fraunhofer Institute IMS, Duisburg, DE
13:50	*Continuous Biosensors in Critical Care Applications: Lactate, Glucose and Beyond*	**Gerhard Jobst**, Jobst Technologies GmbH, Freiburg, DE
14:10	*Conformal Coating Choices for Advanced Medical Devices*	**Aaron Clark**, Specialty Coating Systems - World Headquarters, Indianapolis, US
14:30	*How Quantum Magnetic Field Sensors Enable a New Type of Human-Machine-Interface*	**Dr. Katharina Jag-Lauber**, Q.ANT GmbH, Stuttgart, DE
14:50	*Reliable Mass Flow Measurement and Critical No-Flow Detection in Liquids and Gases*	**Zuzana Pronayova**, Innovative Sensor Technology IST AG, Ebnat-Kappel, CH
15:10	*Influence of Polyurethane Chemistry Microstructure on Biosensors and Foreign Body Response*	**Aylvin Dias and Jayme Paullin**, dsm-firmenich, Geleen, NL
15:30	*Ultra Low Power Vital Sign Sensor System with RTLS*	**Chihcheng Lu**, Biosensetek, Morristown, US
15:50	*Smallest Sensors for Greatest Innovation: The Future of Nanotechnology in Smart Sensors*	**Dr. Konstantin Kloppstech**, digid GmbH, Mainz, DE
16:10	*Sustainable Solutions for Deep-Drawn Metal Components with Finite Element Analysis (FEA) and Digital Twins*	**Andreas Hellmann**, STÜKEN MEDICAL, Rinteln, DE
16:30	*End of Session*	

TUESDAY, NOVEMBER 12

LASER AND PHOTONICS APPLICATIONS - EPIC TECH WATCH

Session Chair: Antonio Castelo, EPIC – European Photonics Industry Consortium, FR

10:40	*Driving Life Sciences Innovation Through Optical Solutions*	**Josip Lucic**, FISBA AG, St. Gallen, CH
11:00	*Applications for Micro-Optics in Life Science*	**Auri Ripoll**, Focuslight Technologies Inc., Xi'an, CN
11:20	*Enhancing the Future of Microscopy: Collaborative Venture with Osaka University's AMATERAS Initiat*	**Axel Haunholter**, OptoSigma Europe SAS, Munich, DE
11:40	*Laser Based Manufacturing in Medical Product Development*	**Maximilian Brosda**, Fraunhofer Institute ILT, Aachen, DE
12:00	*Emerging AM Technologies: Potential Solutions for the Future of Medical Technology?*	**Dr. Chóngliàng Zhòng**, Fraunhofer Institute IFAM, Dresden, DE
12:20	*Biophotonics: From Concept to Accelerated Product Development with MedPhab*	**Ray Burke**, Tyndall National Institute, Cork, IE
12:40	*Miniaturized LED Solutions for Endoscopic Applications*	**Dr. Wolfgang Huber**, Chips 4 Light GmbH, Sinzing, DE
13:00	*When Photonics meets Micro-Assembly*	**Paul Runyan**, Accumold, Ankeny/Iowa, US
12:45	*Micromechanical Performance of Fluoropolymer Coatings in the Design and Manufacturing of Interventional Catheters*	**Kyle Hedges**, Applied Plastics, Norwood, US
13:00	*The Benefits of a Medical Device Contract Coating Specialist for you Coating Needs*	**Isabelle Faggianelli**, PERCIPIO ROBOTICS, Besancon, FR
13:20	*One Tool, Many Possibilities – Microprocessing with Ultrafast Lasers*	**Dr. Christian Freitag**, LightPulse LASER PRECISION, Stuttgart, DE
13:40	*Miniaturized Photonics Components for Spectral Sensing in the Medical Field*	**Dr. Ljiljana Durdevic**, HAMAMATSU PHOTONICS, Massy Cedex, FR
14:00	*Temperature Control in Lasers and Medical Equipment Using Coolant-Free Liquid Chillers*	**Michael Craig**, Humphrey Products, Kalamazoo, US
14:00	*Reimagining Electrodes and Wearable Device*	**Reinhard Sottong**, Ferrotec Europe GmbH, Unterensingen, DE
14:20	*Seamless Integrations of Miniaturized Optical Systems to Unleash Innovative and Multifunctional Capabilities in Medical Devices' Manufacturing*	**Renato Mutton**, FEMTOprint SA, Agno, CH
14:40	*Enhanced Diagnostics in Surgery with Multispectral Illumination & Imaging – MS-I2*	**Hannes Weise**, JENOPTIK Optical Systems GmbH, Jena, DE
15:00	*tba*	**Antonio Gomes**, OptaSensor GmbH, Nuremberg, DE
15:20	*Break*	

IVAM FOCUS GROUP SESSION: MICROFLUIDICS SESSION PART I: INTEGRATION AND COMBINATION OF MICROFLUIDIC COMPONENTS GENERATING SOLUTIONS FOR LIFE SCIENCES

Session Chair: Florian Siemenroth, Bartels Mikrotechnik GmbH, Dortmund, DE

15:40	*Functionalized Microfluidic Devices*	**Dr. Thomas Kuckelhorn**, SCHOTT Technical Glass Solutions GmbH I SCHOTT Minifab, Jena, DE
16:10	*Where Photonics meet Microfluidics - Glass Flow Cells for Life Sciences*	**Dr. Anton Malovichko**, IMT Masken und Teilungen AG, Greifensee, CH
16:30	*Low Cost µ-fluidic Cartridges for High Volume In-Vitro Diagnostics*	**Marc Augstein**, velixX GmbH, Mannheim, DE
16:50	*Hollow Microneedle Fabrication and Characterization for Interstitial Fluid Extraction in Minimally Invasive Biosensors*	**Tom Enderlein**, Fraunhofer Institute ENAS, Chemnitz, DE
17:10	*Hands-on-Session*	**Florian Siemenroth**, Bartels Mikrotechnik GmbH, Dortmund, DE **Dr. Claudia Gärtner**, microfluidic ChipShop GmbH, Jena, DE **Dr. Elfi Töpfer**, microfluidic ChipShop GmbH, Jena, DE
17:30	*End of Session*	

WEDNESDAY, NOVEMBER 13

10:25	*Opening*	**Dr. Jens Ebnet**, Ebnet Medical GmbH, Schwerin, DE **Dr. Victoria Jakobi**, IVAM, Dortmund, DE

EUROPE MEETS USA - HIGH-TECH FOR MEDICAL DEVICES

Session Chair: Dr. Jens Ebnet, Ebnet Medical GmbH, Schwerin, DE & Dr. Susette Germer, MedTech Project Consultant, Leipzig, DE & Dr. Victoria Jakobi, IVAM, Dortmund, DE & Dr. Jana Schwarze, IVAM, Dortmund, DE

10:35	*An Overview of the US Healthcare Devices Market*	**Jun Peng**, P&L Scientific Inc., Coral Gables, US
10:50	*Navigating Medical Device Markets: Synergies Between the EU, UK, and Switzerland*	**Ludger Moeller**, MDSS USA LLC, Chicago, US
11:05	*31 Flavors of Coatings: The Importance of Selecting the Right Coating for Your Medical Device*	**Todd Paulsen**, Formacoat, Chaska, US
11:20	*World Leader in Auto Retraction Safety Injection, IV Catheters and Blood Collection Devices*	**Russell Kuhlman**, Retractable Technologies Inc, Little Elm, US
11:35	*Building the Future: Manufacturing IoT-Enabled Medical Devices*	**Albert van de Liefvoort**, Providence Enterprise, Newport Beach, US
11:50	*Never Miss a Beat: Body-Worn AI, Faster and Safer*	**Giancarlo Candela,** Ambiq Micro, Inc., Austin, US
12:05	*Advancing POC/OTC Diagnostics: Innovations in Test Development for New Co-Dx PCR Platform*	**Seth Egan**, Co-Diagnostics, Inc. (Co-Dx), Salt Lake City, US
12:20	*Evolution of Point of Care Testing Hosted by Solventum*	**David Franta**, Solventum, St. Paul, US
12:35	*Innovative/Disruptive Technologies for Ultrafast Detection of all Human Cancers from Liquid Biopsy and Instant Detection of Infectious and Pandemic Diseases from Saliva*	**Dr. Ramesh Babu**, InteGen LLC and RVDS LLC, Orlando, US
12:50	*Wireless Video Solutions for the OR*	**Dr. Uri Kanonich**, Teradek Medical, Irvine, US
13:05	*High Performance Magnetics for Medical Therapies*	**Darrell Joyce**, Dexter Magnetic Technologies, Elk Grove Village, US
13:20	*Sustainability Through Collaboration and Material Innovations*	**Dr. Ned Burnett**, Saint-Gobain, Brighton, US
13:35	*Optical Filters: Small Components, Big Impact*	**Almut Bailly**, Chroma Technology GmbH, Bellows Falls, US
13:50	*Specialty Optical Fibers for Minimal Invasive Diagnostic and Treatment - Imaging, Sensing, and Power Delivery Via One Fiber*	**Udo Fetzer**, OFS Fitel, LLC, Norcross, US
14:05	*Humphrey Products - Pneumatic & Fluid Control Experts*	**Hubbard Humphrey**, Humphrey Products, Kalamazoo, US
14:20	*Improving the Success Rates of Processing Non-Invasive Samples*	**Randy Nagy**, Gentueri Inc., Verona, US
14:35	*Thermal Time-Of-Flight Oxygen Sensors and Applications for Medical Devices*	**Dr. Liji Huang**, Siargo Ltd, Santa Clara, US
14:50	*Bridging the Gap in High Tech Micro Molding Solutions*	**Alex Anderson**, Accumold, Ankeny, US **Emmet Hanly**, Avem, Galway, IE
15:05	*Wearable Electrodes for Analytics*	**Jonathan Knotts**, Creative Materials Inc, Ayer, US
15:20	*Improving Your Wearables One Layer at a Time*	**Aditi Subramanian**, Flexcon Company Inc., Spencer, US **Amit Roy**, Flexcon Company Inc., Spencer, US
15:35	*Advance Technologies in Orthopaedic Casting*	**Dr. Pankajkumar Chhatrala**, OrthoHeal Inc, Coppell, US
15:50	*End to End Silicone Solutions for Medical Device Market*	**Agnes Berman Pivnik**, QMD, Pepper Pike, US
16:05	*Designing with Silicone*	**Jocelyn Piccolo**, Avantor - NuSil, Carpinteria, US
16:20	*Versatile Polymers for Healthcare: TPE, PVC and Sustainable Solutions*	**Derek Laffey**, Teknor Apex Company, Pawtucket, US

16:35	*Exploring PVC and Emerging Non-PVC Materials for Medical Applications*	**Dr. Jan-Pleun Lens**, The Cooley Group, Pawtucket, US
16:50	*Advancing Catheter Manufacturing: The Role of Coated Mandrels*	**Kyle Hedges**, Applied Plastics LLC, Norwood, US
17:05	*Sustainable Alternatives for PFAS Based Materials in Medical Devices*	**Harold Smelt**, dsm-firmenich, Exton, US
17:20	*Unlocking New Frontiers: Revolutionary Noninvasive Neuromodulation for Psychiatric Disorders, Insomnia, and Pain*	**Brian Burke**, Electromedical Products International, Inc., Mineral Wells, US
17:35	*End of Session*	**Dr. Jens Ebnet**, Ebnet Medical GmbH, Schwerin, DE **Dr. Victoria Jakobi**, IVAM Microtechnology Network, Dortmund, DE
17:45	*Opening Networking Europe meets USA: Networking, Snacks and Drinks in the IVAM Lounge (Hall 8a, booth F29) (participation free of charge for exhibitors and visitors)*	**Ryan Klemm**, Messe Düsseldorf North America, Chicago, US **N.N.,** IVAM, Dortmund, DE
19:00	*End of Networking*	

THURSDAY, NOVEMBER 14

MICROFLUIDICS SESSION PART II: STAIRWAY TO ANALYTICAL HEAVEN – FROM PROTOTYPE TO VIABLE LAB-ON-A-CHIP PRODUCT

Session Chair: Dr. Claudia Gärtner, microfluidic ChipShop GmbH, Jena, DE & Dr. Elfi Töpfer, microfluidic ChipShop GmbH, Jena, DE

11:00	*Easy Scaling: A new Bonding Technology for Fast and Scalable Manufacturing of Microfluidics*	**Bas-Jan Hoogenberg**, Bondus B.V., AW Zwolle, NL
11:20	*Scaling up Lab-On-A-Foil Production of Consumables for Invitro Diagnostics Applications*	**Ulrich Trog**, JOANNEUM RESEARCH Forschungsgesellschaft mbH, Graz, AT
11:40	*The Microfluidics Innovation Hub: Microfluidic Product Development from Design to Prototype to Product*	**Dr. Divesh Baxani Kamal**, Microfluidics Innovation Hub, Graz, AT
12:00	*Versatility of R2R Imprint Processes for Biomedical Application*	**Dr. Jan Robert Kafka**, Inmold A/S, Nivå, DK
12:20	*Completing the Fluidic Handling Puzzle*	**John Watson**, LEE Ventus (Part of The Lee Company), Cambridge, GB
12:40	*Design Your Lab – Standardization Considerations in Microfluidic Component Development*	**Dr. Claudia Gärtner**, microfluidic ChipShop GmbH, Jena, DE **Dr. Elfi Töpfer**, microfluidic ChipShop GmbH, Jena, DE
13:00	*Break*	

MEDICAL TECHNOLOGY FROM TOKYO

Session Chair: Ryo Tsuchiya, Deloitte Touche Tohmatsu LLC, Tokyo, JP

13:30	*Opening and Greeting*	**Deloitte Tohmatsu**, Deloitte Tohmatsu **Tokyo Metropolitan Government**, Tokyo Metropolitan Government
13:35	*Sensor for Skin Cancer Diagnostic Device*	**Moe Tanaka**, SEMITEC Corporation Co. Ltd., Tokyo, JP
13:40	*Chukoh Products for Endoscopes and Catheters*	**Nobuaki Oshima**, Chukoh Chemical Industries Co. Ltd., Tokyo, JP
13:45	*Solution for „Fixation“*	**Kosuke Chiba**, ALCARE Co., Ltd., Tokyo, JP
13:50	*Reception and free Networking with Tokyo Pavilion Exhibitors*	**Tokyo Pavilion exhibitors and all attendees**
14:30	*Closing*	**Tokyo Metropolitan Government**, Tokyo Metropolitan Government

GLOBAL CONFERENCE ON INNOVATION AND PRODUCTION IN BERLIN

2,000 experts, decision-makers, and innovators from leading manufacturers around the world gathered in Berlin for the inaugural "ZEISS QUALITY INNOVATION SUMMIT" to discuss how to turn these challenges into opportunities. For three days, the summit provided an interactive platform where industry leaders explored the latest innovations in metrology, quality assurance, and global manufacturing trends and discussed how to turn today's challenges into opportunities.

Under the theme "The Future of Metrology", the event focused on current trends shaping modern manufacturing, such as artificial intelligence (AI), automation, digitalization, and decarbonization. More than 50 speakers from leading manufacturing companies shared valuable insights on how to harness these technologies to meet rapidly changing demands. In this way, participants could learn from other industries and exchange with peers while gaining a firsthand look at the latest innovation in metrology hardware and software solutions, that empower companies to meet new quality requirements and drive innovation.

Highlights of the Summit

Attendees were able to learn from industry-specific keynote speakers across different industries like automotive, aerospace, machinery, medical, power & energy, and electronics, and witnessed how cross-industry insights can inspire transformative solutions. Panel discussions provided practical strategies, e.g. by leveraging AI and automation to improve production efficiencies.

In addition to the immersive talks, an extensive exhibition and conference area showcased the latest metrology innovations. Attendees experienced firsthand how AI, automation, and digitalization are revolutionizing quality assurance. ZEISS also presented new key applications to foster decarbonization. For example, automated battery inline inspection for electric cars to fuel electrification or fast blade measurement to increase efficiency of airplanes. This exhibition, paired with interactive sessions and demonstrations, reinforced the role of ZEISS as a trusted partner across industries.

The event created an inspiring environment to foster new partnerships that will be pivotal in driving future success.
ZEISS remains committed to leading the metrology industry into the future, continuously pushing the boundaries of innovation.

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SCAN ME

INNOVATIONS BETWEEN HYDROGEN AND MOBILITY

On January 22, 2025, the IVAM Microtechnology Network, in collaboration with the detect network and the AMA Association for Sensors and Measurement, will host the first SensorNetwork³ Symposium in Dortmund. Under the theme “Sensors, Technologies, and Innovations Between Hydrogen and Mobility,” the event will bring together leading experts from the fields of sensors, microsystems technology, and IoT to discuss groundbreaking innovations, current trends, and industry challenges.

The rapid developments in energy and mobility sectors are driving the need for new solutions. The energy transition and the shift towards sustainable mobility present both major challenges and immense opportunities for industry and society. The SensorNetwork³ Symposium serves as an ideal platform to actively shape this transformation and advance pioneering technologies for a sustainable future.

Program topics:

- Hydrogen Technologies:
  The Key to a Sustainable Energy Transition?
- The Future of Mobility: Transformed by Sensors
- Pushing Boundaries:
  Innovative Technologies for Tomorrow’s Sensors
- Trends or Visions: The Limits of Sensor Technology?

In addition to expert presentations, networking is a key focus: Participants are invited to connect during the pre-event evening program, at a networking lunch, or through in-depth discussions during a World Café session. Members of the partner networks will especially benefit from exclusive opportunities for dialogue and exchange on the latest sensor industry developments.

https://www.ivam.de/events/SensorNetworkSymposium

GET TO KNOW IVAM MICROTECHNOLOGY NETWORK - JOIN A Q&A SESSION

Have you ever thought about whether your company could benefit from a membership in a network? Perhaps an IVAM membership may be the right solution for current challenges in your microtech-, biotech- oder deeptech-company! We cordially invite you to get to know the network better. You are welcome to bring specific questions, which we will then answer personally. Additionally you have the possibility to arrange an individual appointment.

membership@ivam.de

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EVENTS

05 Nov 24

SPOTLIGHTS DER MIKRO- UND NANOTECHNOLOGIE @

Teil 22: Waferbonden

11-14 Nov 24

COMPAMED 2024

Product Market “High-tech for Medical Devices” and “COMPAMED HIGH-TECH FORUM” Düsseldorf, Germany, DE

13 Nov 24

EUROPE MEETS USA - PART 5 AT COMPAMED

High-tech for Medical Devices, Düsseldorf, Germany, DE

20 Nov 24

MID WEEK COFFEE BREAK - FRAUNHOFER ITEM @

Virtual technology talk between IVAM Members

21 Nov 24

IVAM FOCUS GROUP SENSORS @

Kick Off: From Development to Application

26 Nov 24

GET TO KNOW IVAM @

Information event about the network and the benefits of membership

09-10 Dec 24

MICRO/NANOTECHNOLOGY, MEDTEC AND LIFE SCIENCES: SHAPING THE FUTURE

In cooperation with Fraunhofer ENAS and Tohoku University, Sendai, JP

22 Jan 25

SENSORNETWORK³ SYMPOSIUM

Sensors, Technologies and Innovations between Hydrogen and Mobility, Dortmund, Germany, DE

04-06 Feb 25

MD&M WEST 2025

Medical Design & Manufacturing - IVAM presents Micro Nanotech Area in Hall C, Anaheim Convention Center, CA, US

20 Feb 25

GET TO KNOW IVAM @

Information event about the network and the benefits of membership

26-28 Feb 25

ASIA PHOTONICS EXPO 2025

Discover the Future of Photonics with IVAM, Singapore, SGP

21-22 May 25

IVAM HIGHTECH SUMMIT 2025

Tech United: Bridging Nations, Building Future, Dortmund, Germany, DE

10-12 Sep 25

MEDICAL FAIR THAILAND 2025

Special Exhibiting Area ”Manufacturing Processes and Components for Medical Technology’, Bangkok, Thailand’

17-20 Nov 25

COMPAMED 2025

Product Market “High-tech for Medical Devices”: A hub for high-tech solutions and medical innovations. Team up with IVAM to pave your way to trade fair success! Düsseldorf, Germany, DE

09-11 Sep 26

MEDICAL MANUFACTURING ASIA 2026

Manufacturing Processes for Medical Technology, Marina Bay Sands, Singapore, SG

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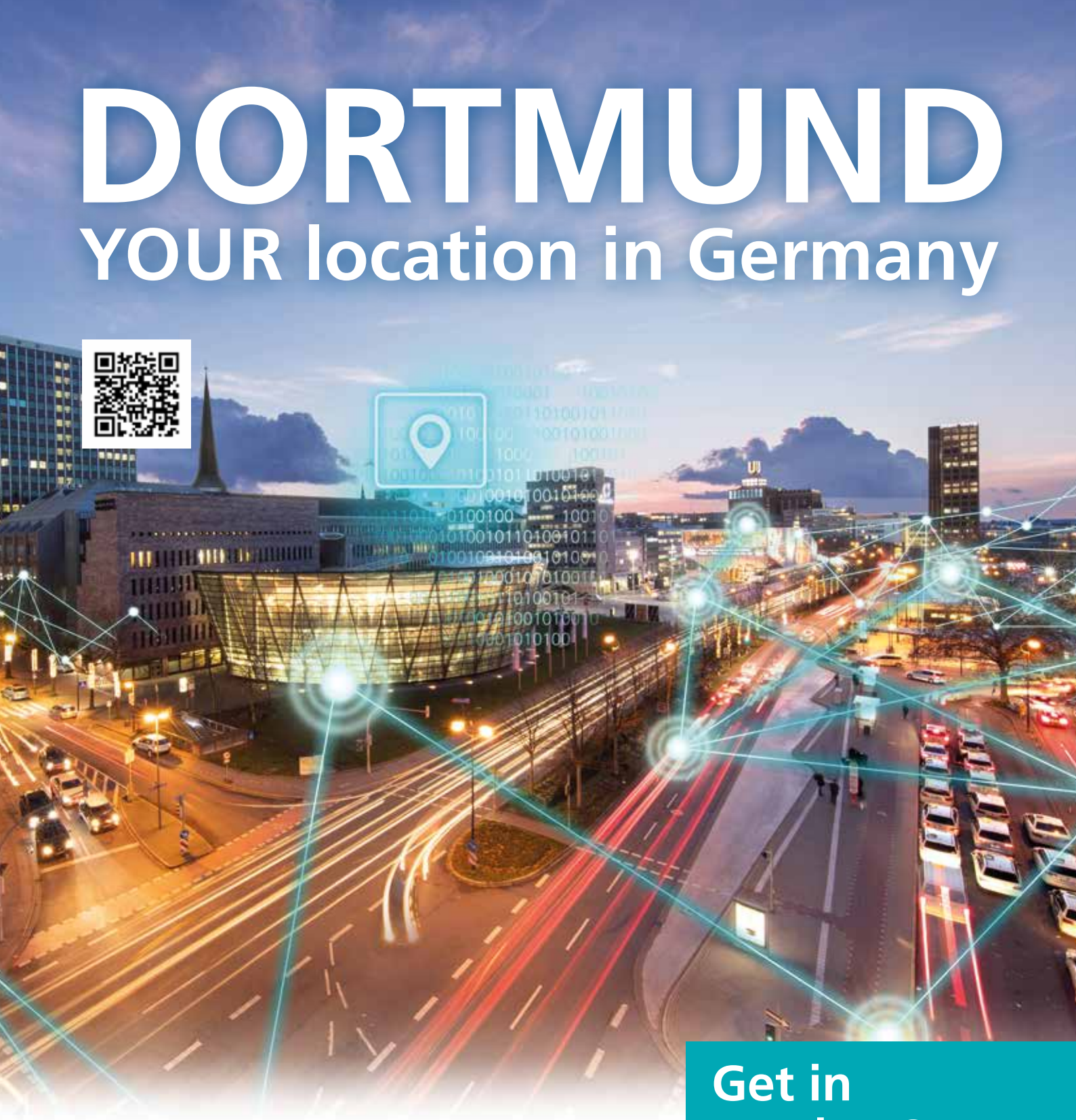

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