

IVAM Product Market “High-tech for Medical Devices” at COMPAMED 2019

November 18-21, 2019, hall 8a

The COMPAMED, which takes place annually co-located to the MEDICA trade fair, is the leading international marketplace for suppliers of medical manufacturing. Exhibitors from all over the world will be coming to Düsseldorf in autumn to present their components and technologies to an expert audience.

Especially in the field of medical devices for mobile diagnostics, therapy and laboratory equipment, ever more powerful and digitalized solutions are required. For this reason, the demand for miniaturization of medical components continues to grow rapidly. With 55 exhibitors, the Product Market "High-tech for Medical Devices" initiated by the **IVAM Microtechnology Network** is COMPAMED's largest joint area. This year again, the IVAM area in Hall 8a is characterized by a high degree of internationality. The exhibitors come from Germany, Switzerland, France, the USA, the Netherlands, Austria, Great Britain, Greece and Spain.

The companies and research institutions will be presenting a wide range of innovations and solutions for medical technology on-site. The exhibitors will showcase miniaturized components and high-tech microelectronics, intelligent sensors for smart applications, 3D printing, RFID technologies, high-precision tools and functional coatings, and microfluidic processes that enable improved diagnostics.

In addition, the **COMPAMED HIGH-TECH Forum** in Hall 8a will provide insights into research and development, explain technology trends in the industry and present information on the relevant foreign markets for medical technology. Around 70 international speakers and moderators will give expert presentations, lead discussion rounds and matchmaking sessions to establish contacts on all four days of the show. The most popular topics of recent years will continue to be in vogue and will again be represented at the forum this year with a session: "Printed Electronics/3D-Printing", "Laser and Photonics Applications", "Smart Sensor Solutions", "Microfluidics for Diagnostics and Life Sciences".

Innovative sensors for diagnostics and monitoring applications

CiS Forschungsinstitut fuer Mikrosensorik GmbH develops and optimizes microsystem technologies for the customer-specific development of silicon-based sensors and sensor systems. Based on these competencies, an advanced sensor concept has been realized, which for the first time makes it possible to continuously measure cardiovascular parameters such as blood pressure, heart rate, oxygen saturation in the ear non-invasively in everyday life. The optical method is based on photo plethysmography, which in combination with specially optimized optical sensors enables pulse wave analysis.

ES Systems has developed a new generation of medium isolated MEMS capacitive pressure sensors suitable for applications with harsh environmental conditions. Each sensor integrates a MEMS capacitive pressure sensor die, and a CMOS ASIC. The capacitive principle of the operation has significant advantages over the widely used piezoresistive one. Tests have shown that the sensor can withstand up to 100x bar overpressure. The sensors are provided calibrated and compensated at various temperature and pressure ranges from 1 bar to 400 bar.

At COMPAMED 2019, **Fraunhofer Institute for Microelectronic Circuits and Systems IMS** will present the latest developments in the field of artificial intelligence for microelectronics and sensors and machine learning on embedded systems. These include pressure sensor systems for medical applications, such as theranostic implants, cerebral pressure sensor and tactile hand pressure sensors.

Innovative **Sensor Technology IST AG** is a world-leading manufacturer of physical, chemical and biological sensors. The product portfolio consists of thin- and thick-film platinum and nickel RTD temperature sensors, thermal mass flow sensors, capacitive humidity sensors, humidity modules, conductivity sensors and biosensors. The sensors are characterized by their accuracy and consistency in various measurement conditions.

Additionally, as a development & technology partner, IST AG provides consulting, development and production of customized sensors.

The biosensor from **Jobst Technologies GmbH** allows the simultaneous measurement of glucose, lactate, glutamine or glutamate even from complex mixtures such as whole blood. The flow-through biosensor can analyze or continuously monitor glucose and lactate at 48 samples per hour with the first glucose and lactate monitor for critically ill patients (Eirus, Getinge). The miniaturized sensor can be used in-vivo for subcutaneous or intravascular applications. In combination with micro-pumps the biosensors enable self-calibrating, auto-sampling portable analyzers.

Sensirion AG is a manufacturer of innovative sensors for the measurement and control of gas and liquid flow, differential pressure, humidity, temperature, volatile organic compounds (VOC), CO₂ and particulate matter (PM_{2.5}). The flow and environmental sensors enable safe and reliable devices for ventilation, anesthesia, drug delivery, diagnostic and e-health applications. The product highlights at this year's COMPAMED are the flow platform for respiratory applications, the world's smallest differential pressure sensor for smart inhalers and a liquid sensor for drug delivery (infusion).

SMI - Silicon Microstructures, Inc. is a premier semiconductor sensor company developing and manufacturing MEMS based pressure sensor solutions for challenging medical applications. The products are suitable for pressure measurement in medical devices, like CPAP or dialysis. As calibrated solutions with digital and analog output signal, they work in a small space. The IntraSense line of in-vivo sensors enables pressure sensing anywhere in the human anatomy. The biocompatible sensor and pre-attached wires for signal transmission fit into a 1-French tube and allow for easy integration into invasive medical equipment.

Microfluidic components and systems enable modern, mobile diagnosis and therapy devices

HNP Mikrosysteme produces micro annular gear pumps. These pumps are ideally used where fast and highly precise dosage is required. Five series guarantee a flow rate from 1 µl/h to 1152 ml/min. mzt-pumps are characterized by low pulse delivery, minimal dead volume, long service life, small dimensions, powerful materials and ease of maintenance. The company offers the development of OEM pumps, comprehensive application-specific consulting and technical support. Application possibilities amongst others are in the field of life science and analytical instrumentation.

IMT Masken und Teilungen AG develops microfluidic chips and flow cells for tomorrow's biotechnology and offers flexible process equipment from design consulting to prototyping to scalable manufacturing. IMT specializes in complex glass microfluidic components facilitating for multiplexing, accurate position of analytes, increased signal to noise, decreased fallout rate, exact dosage of extremely small volumes. The products are used in the areas of NGS flow cell, organ-on-a-chip, lab-on-a-chip, single-cell analysis, cell enrichment and sample preparation.

microLIQUID's experienced NPD/NPI team take products all the way from product development to small- and large-scale manufacturing. The applications range from point of care at hospitals, immunoassay tests at veterinary clinics, single-cell analysis systems at the world's leading cancer R&D centers, to even personal drug delivery devices at local pharmacies, and automated systems at IVF clinics.

Micronit is a key supplier of microfluidic and MEMS components for applications in life science research, medical devices and in-vitro-diagnostics worldwide and has been manufacturing these products for more than 15 years. Micronit's lab-on-chip and MEMS solutions are used in areas like genomics (e.g. next-generation sequencing), single-cell analysis, point-of-care diagnostics, organ-on-chip and cell culturing, drug delivery, and medical MEMS-based devices. Micronit has extensive experience in microfabrication technologies used for prototyping and volume manufacturing of microfluidics and MEMS products.

TTP Ventus introduces the award-winning Disc Pump range, which are enabling innovation in portable and wearable devices across the medical and life sciences sectors. The pumps deliver high pressure and flow, silent operation, pulsation-free flow, millisecond response time high-precision controllability – all in a tiny package. The pumps are suitable for applications spanning blood pressure

monitoring, capnography, compression therapy, vacuum prosthetics, thoracic drainage, MRI compatible instruments, point-of-care diagnostics and microfluidics.

Micro Systems UK Ltd. will be displaying microfluidic droplets and distribution components at the fair. The company utilizes its knowledge and experience in micro manufacturing to demonstrate a micro production mold which has two components, one to produce a droplet generator and a second to produce a mixing manifold for generating water-in-oil droplets or oil droplets in-water. The microfluidic component incorporates 150x150 micron channels with a mixing chamber of 50x50 microns. Any microfluidic design within the micro function area can be incorporated.

At COMPAMED, **CG.TEC Injection** will demonstrate its know-how in the field of microfluidics, e.g. for lab-on-a-chip applications. The injection is made in a clean-room ISO 7 (class 10 000) with a wide range of polymers (COC, PS, PC, TPX, PEEK...). The cartridge template is up to 100x80mm, detail size down to 7 µm and radius down to 1.3 µm. Additive 3D manufacturing allows a complete "Atelier Dedienne 3D" for the mass production of functional parts.

VICI AG International presents an entire chromatographic system in a small 6x6" footprint. With True Nano 360 µm fittings, flow rates as low as 10 nL/min, and pressure up to 1500 bar (22000 psi), this system provides split-free injections as close to the detector as possible. This allows the use of high efficiency columns, packed with micro particles for an order of magnitude increase in theoretical plates and plate height. Pump options include single and multiple pump configurations as well as isocracy and gradient options. Each pump head has an integrated pressure transducer to monitor and adjust a solvent.

High-tech microelectronics and electronic components for reliable and durable wearables

AEMtec GmbH, a leading European provider of hybrid micro and optoelectronic applications, develops, qualifies and produces complex modules for the medical sector, such as wearables, handhelds, diagnostics, medical equipment, imaging and acoustic systems and laboratory diagnostics. AEMtec meets high quality assurance and is ISO 13485 (Medical) certified. Innovative technologies (UBM, SBA, Dicing, COB, FC, SMD, Box-Build) reduce delivery times and costs.

The **CorTec GmbH** enables communication between the nervous system and artificial intelligence. CorTecs Brain Interchange technology is an implantable system that records and stimulates brain activity chronically for long-term use. As a closed-loop system, it can control stimulation online, based on brain activity recorded simultaneously. In addition, the company is providing single individual components like flexible electrodes or high-channel encapsulations together with electronics and software. They are characterized by the same set of features: high precision, high flexibility in design and high number of channels.

Microdul AG specializes in high-quality microelectronics. The company's three business lines are customized modules, thick-film and mixed-signal low-power ASICs. With ISO 13485, the company's core competence is in producing cutting-edge micro miniature modules for medical and industrial applications, such as implants, hearing aids or modules for use in healthcare.

SMT ELEKTRONIK GmbH is an expert for the development, production and the full service of electronic assemblies and devices. Customers could enter the project on every step of the process chain with the help of the specifically created EMS-Preflight method. SMT ELEKTRONIK works from the very beginning in series – ranging from design and series production to a reliable service. EMS-Preflight evaluates simultaneously the four key factors of the series-reliable assembly production and navigates the customer's product idea precisely into the market.

The **Fraunhofer Institute for Reliability and Microintegration IZM** works on advanced integration techniques for innovative medical devices. Applications range from ultraminiaturized implants, cardiovascular diagnostic catheters to wearables for multisensor monitoring. The researchers use high-end processes like flex circuit integration, stretchable electronics and wafer level high-density integration to enable next generation medical electronics. Sensors and wireless interfaces complement these technologies. Risk analysis and biocompatibility assessment ensure compliance with the Medical Device Regulation.

FEIG ELECTRONIC develops and manufactures RFID components for installation in medical devices and for process optimization in hospitals as well as hybrid barcode systems and wearables for material supply and e-Kanban. For integration into respiratory or in-vitro diagnostic devices numerous RFID modules are offered, which clearly identify samples, reagents or attached accessories. To optimize processes in hospitals, RFID readers are used for the identification of beds, textiles or medicines, as well as patients undergoing various treatment steps.

Optiprint introduces new products in the field of flex and rigid flex PCBs at COMPAMED 2019. These include flex- and flex-rigid PCB's, ultra-thin rigid multilayer PCBs for interposer applications (chip-packaging solutions), ultra-fine line structures line/space < 25 µm, printed circuit boards with ticer foil, thin film resistor technology or FaradFlex capacity foil, DIG, EPIG or ISIG, as alternative surface to ENEPIG. These surface treatments are particularly suited for gold wire bonding.

LEMO is the acknowledged leader in the design and manufacture of precision custom connection and cable solutions. LEMO's high quality push-pull connectors are found in a variety of challenging application environments including medical, industrial control, test and measurement, audio-video and telecommunications. LEMO has been designing precision connectors for seven decades. Offering more than 75,000 combinations of product that continue to grow through custom-specific designs, LEMO and its affiliated sister companies currently serve more than 100,000 customers.

Northwire, Inc. is a responsive partner for developing and manufacturing customized technical cables, coil cords and complete interconnectivity solutions. The company offers technical cables tailored to unique application. Cables are often subsequently processed in a product development project. In the case of deadlines, complex cable specifications or official approvals may be overstretched. Northwire assists with custom cable projects to resolve any connectivity issues.

Optical components, systems and assemblies for life science applications

Berliner Glas develops, manufactures and assembles high-performance optomechanical and optoelectronic assemblies and systems according to ISO 13485. International medical device manufacturers receive support from the idea to the mass production, so that innovations reach the market faster. Berliner Glas offers a comprehensive range of OEM solutions for life science, dental as well as for endoscopy and surgery, including autoclavable lenses, prism assemblies and 3D medical imaging cameras, with 4K resolution and fluorescence option.

Driving innovation in micro-optics, **FISBA AG** excels in the design and manufacturing of singlets, compound elements and micro systems enabling ultra-compact imaging solutions for life science applications. The company offers volume production processes to ensure high accuracy and repeatability for microlenses starting at diameters 0.3 mm. FISBA FISCam is a customizable micro camera for minimally invasive surgery and diagnostics and performs with its high resolution and tiny diameter. FISBA RGBeam is a customizable laser module offering precise alignment and adaptable wavelength.

JENOPTIK presents the JENOPTIK SYIONS system at COMPAMED 2019. The platform includes innovative imaging technologies in a partially standardized form. These can be combined into a customized complete solution and optimally adapted to the system and application requirements. JENOPTIK SYIONS supports live cell imaging and flow cytometry as well as molecular diagnostics. Proven Jenoptik modules are combined in JENOPTIK SYIONS into an efficient, miniaturized digital imaging solution that offers customers easy integration into the software and system environment of their instruments.

Mikrop AG is a manufacturer of miniaturized optics for high-tech applications. Its core business has been the development, production and assembly of miniaturized optics for 35 years. Spherical lenses, optical assemblies and high-quality miniature lenses are made. The products meet the highest precision requirements and are available in diameters from 0.3 mm to 15 mm. Mikrop serves the markets of endoscopy, medical engineering, machine vision and micro sensors. The product range includes micro objectives, micro lenses and micro cameras.

SwissOptic AG, a company of the Berliner Glas Group, is a provider of optical key components, assemblies and systems. The company supports international medical device manufacturers from concept to volume production and helps to accelerate innovations to be first to market. The range of OEM solutions is based on a broad technology portfolio, which is constantly being expanded and brought up to date. This enables the implementation of ideas on the edge of technical feasibility.

VIAOPTIC AG is a leading supplier for customized polymer optics for automotive, sensor, illumination and medical applications. The range of performance ranges from optic design, tooling, injection molding to coating and assembly. One of VIAOPTIC's areas of expertise is the optical development as well as the production and inspection of plastic lenses and complete LED modules for medical lamps. Products can be found in the areas of molded optics and assemblies. The services of VIAOPTIC are system development, optic design, CAD, prototyping, tool shop, injection molding, coating and assembling.

Volpi AG – OEM partner of IVD and life sciences companies – develops and manufactures, certified against ISO 13485, customized smart optoelectronic modules for molecular diagnostics, clinical chemistry, digital microscopy, microbiology, immunoassay, point of care, and cell based testing. These custom-specific module solutions shorten time to market. The services span all disciplines from systems engineering to development, prototyping, lean manufacturing, and life cycle management throughout the product life cycle.

Zünd precision optics is a reliable partner in medical technology for high-quality planar optical components and systems from 0.2 mm up to 50 mm in various shapes. The added value includes grinding, lapping, polishing, coating, varnishing and curing of optical glasses, quartz and glass ceramics. Zünd supports customers in the development of components and assemblies with the highest precision and cleanliness requirements from the prototype to serial production.

Micro- and nanocoatings with special properties

Specialty Coating Systems provides Parylene conformal coatings and technologies for the medical device industry. Ultra-thin and pinhole-free, SCS Parylenes are biocompatible, and biostable and offer excellent moisture, chemical, and dielectric barrier properties to protect components in numerous industries.

Surfix BV presents its state-of-the-art nanocoatings for micro and nano devices such as biosensors and microfluidics. Surface modification technologies provide devices with the desired surface properties, either uniform or patterned with superior spatial resolution. The nanocoatings can be applied on various inorganic and polymer materials, and even inside microfluidic channels. Whether control of wettability (hydrophobic, hydrophilic), anti-biofouling or biofunctionalization is required, Surfix helps to exploit any device's full potential.

Laser technology and photonics innovations for medical devices and manufacturing processes

At the fair, **CODIXX AG** informs about colorPol polarizers made for different applications in life science. Special benefits for the polarizers are a high transmission up to 97 %, an exceptional contrast ratio of more than 50 db, a resistance against UV radiation and most chemicals as well as an operating temperature from -50° to +400° C. Whether as a single part for laboratories or serial component for optical sensors or imaging, colorPol polarizers are custom-made with different sizes and properties for UV, visible and IR wavelength ranges.

COHERENT Munich GmbH & Co. KG specializes in industrial picosecond laser systems. The ExactCut is a compact laser fine cutting system for processing thin and thick metals and alloys, as well as brittle materials like sapphire, PCD, and ceramics. StarCut Tube SL is a high-precision cutting system for medical implants (e.g. stents) or instruments. Exact Mark is suitable for marking and black marking (UDI) of stainless steel devices in the medical device technology. In addition, the standard systems for manual welding, IPM for reliable processes, MicroWeld are used for finest welds and IQ / OQ for FDA documentation according to GMP.

With 540 employees and more than 19,500 m² net floor space, the **Fraunhofer Institute for Laser Technology ILT** is one of the most important contracting research and development institutes of its sector worldwide. Its experts develop and optimize laser beam sources and laser processes. In close cooperation with its clients, it uses laser technology to solve tasks for production, measurement technology, environment, energy, medical technology and biotechnology, all done in real life situations.

EPIC is the industry association that promotes the sustainable development of organizations working in the field of photonics in Europe. The members encompass the entire value chain from LED lighting, photovoltaic solar energy, photonics integrated circuits, optical components, lasers, sensors, imaging, displays, projectors, optic fiber and other photonics-related technologies.

Multiphoton Optics offers a 3D printer platform, software and prototyping as well as engineering support for high-precision 3D printing of many materials, without the need for assembly and post-processing. Additive and subtractive fabrication can be integrated into standard 2D process work flows, providing high-precision 3D prototyping of miniaturized designs in automated, scalable processes for products in medical packaging, photonics, micromechanics, micro-optics, information and communication technology or IoT.

Micreon GmbH is a prestigious contract manufacturer and technology consultant for micromachining with femtosecond lasers. Micreon develops, manufactures and finishes components for medical technology, electronics, the pharmaceutical industry, toolmakers and automobile manufacturers.

Research and development for miniaturized medical technology solutions of the future

At the COMPAMED, the **Fraunhofer Institute for Electronic Nano Systems ENAS** introduces R&D activities from its business unit "Technologies and Systems for Smart Health". The research is focused on the technical and technological aspects, especially in using micro and nanotechnologies for applications in the service of medical science, biology, and healthy living. The institute develops medical implants with miniaturized sensor and actuator systems, medical systems with wireless data and energy transfer as well as analytical systems using microfluidic and spectroscopic components.

Hahn-Schickard stands for industry-oriented, customer- and application-driven research as well as development and production in the field of microsystems technology. Microsystems technology enables innovative solutions. Developments such as smart implants, drug and micro-dosage systems, printed electronics for DNA analysis and medical diagnostic assistance systems will be on display. Hahn-Schickard offers customer-specific component and system development for optics modules, fluidics and sensor technology as well as their ISO 9001 certified production including packaging.

From its original background, the watch-making industry, **Static** has developed strong skills in the field of micro-technologies. Through the years, Static has gained a large experience in the field of biomaterials and applied mechatronics for the medical areas. With the manufacturing service Static helps to get customers to the market. Static is certified ISO 13485. The fields of skills are: biomaterials, electronics, mechanics, mechatronics, machining, assembly, injection molding, microfluidics and manufacturing.

Miniaturized components and high-precision processes for the manufacture of high-quality medical devices

Beutter GmbH & Co. KG is specialized in fine mechanical components of high manufacturing depth in small series. Besides mechanical engineering, aviation and astronautics and measuring instrument technology, Beutter supplies all areas of medicine technology. During production, all machining processes (turning, milling, grinding) and subcontractors qualified for special procedures are used. The company also supports the development and documentation. Beutter produces individual parts and assemblies for medical technology instruments, prostheses, implants up to risk class III and is certified according to ISO 13485.

Electromag SA is specialized in the development and production of ultra-quiet high-speed brushless DC motors. Electromag motors have been selected globally by leading equipment manufacturers in the field of ventilation (CPAP, bi-level, intensive care, therapy, neonatal), dentistry (implantology, endodontics), podiatry and surgery. Electromag offers comprehensive OEM services from design customization and responsive prototyping to fully industrialized series production. The company is ISO 9001 and 13485 certified.

Minitubes develops customized precision metal tubes and components that adapt to the most stringent requirements. Manufactured are more than 100 different alloys including implantable stainless steels, tantalum and precious metals with a diameter of 0.1 to 30 mm, thin and thick walls, tight tolerances and smooth surfaces. The products are used in stents, heart valves, endoscopes, IVD needles, surgical instruments, catheters and in chromatography. Components are made from prototype to mass production.

PI Ceramic, part of Physik Instrumente (PI), is one of the global leaders for piezoelectric ceramic products. In the field of medical technology, the company develops piezoelectric actuators and sensor components for applications such as surgical power ultrasound, vaporizers and implantable subassemblies. PI Ceramic supplies piezoceramic solutions for ultrasonic fluid and gas metering, pumps and valves as well as dispensing systems and miniaturized components for devices with limited assembly space, for example endoscopic applications.

SIM Automation features 60 years of experience in development, production and validation of feeding systems, automated assembly lines and End-of-Line test stands for products from the field of medical technology, automotive, electronics and consumer goods, which includes supply laser marking systems adapted to specific customer needs. At the COMPAMED the company shows a system for optical inspection of dimensional accuracy as well as cosmetic features of injection molded items, featuring "Deep Learning" Technologies. This system prevents the basis of SIM's standardized EOL cells.

Thomas Magnete GmbH is a manufacturer of electromagnetic actuators for medical technology, the automotive industry, mobile hydraulics and other technology-intensive areas. Together with customers, specialists, patients and food manufacturers, Thomas Magnete is developing the feeding pump CareFil. The enteral feeding pump is used when no natural food intake is possible. Medical aids must meet high quality standards, be simple and intuitive to use and reliable.

microsensys manufactures miniaturized tags for sample and instrument identification. These are sterilization-proof and applicable for the pre-cleaning of surgical utensils. They provide valuable data for clear-cut identification and process management, such as sterilization processes. The TELID 311.ac temperature data logger provides complete and efficient temperature monitoring during steam sterilization in autoclaves, at conditions up to + 134° C and 3 bars. The data logger, as part of the RFID sensor system solution, provides reliable temperature progress documentation during periodic checks.

Efficient networks for initial business contact

IVAM Microtechnology Network is an international association with members in the fields of microtechnology, nanotechnology, advanced materials and photonics. IVAM supports mainly small and medium-sized companies in bringing innovative technologies and products to market and thus securing advantages in international competition. Since 1995 IVAM has been supporting companies and institutions from all around the world. The central mission of the association is to create synergies and to support its members in exchanging knowledge, initiating joint projects and networking with each other and potential customers.

Further information and an exhibitor overview including contact data can be found at <https://ivam.de/events/compamed2019>.

Images for editorial use (including reference) can be downloaded at https://web.ivam.de/dl/Press_Images_IVAM_Compamed%2019.zip

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