Microelectronics News

Fraunhofer MIKROELEKTRONIK

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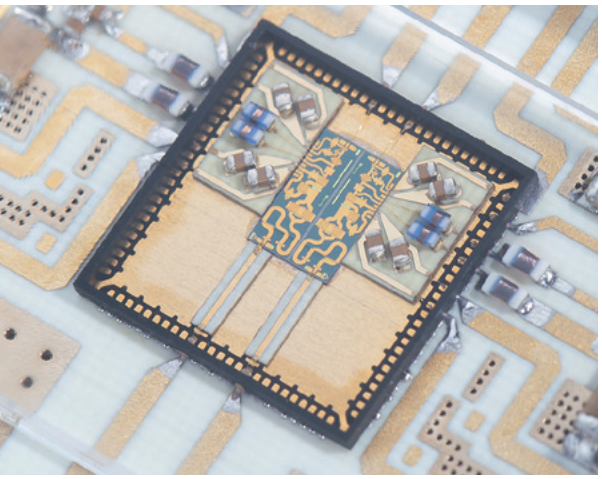
Networked sensors – energy-efficient and powerful



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The most important components in the Internet of Things (IoT) are tiny sensor nodes that collect information from their environment and pass it on. The problem is that the energy consumption of the nodes when projecting a "Trillion Sensor" future is enormous. Fraunhofer's lighthouse project, ZEPOWEL, sees nine institutes working on futuristic solutions for an energy-efficient IoT.

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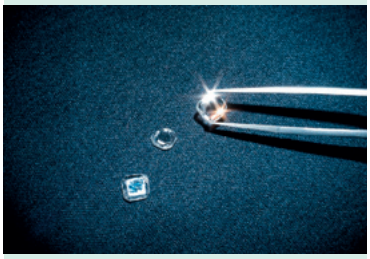

Fraunhofer IAF is contributing its knowledge of diamond-based devices. © Fraunhofer IAF

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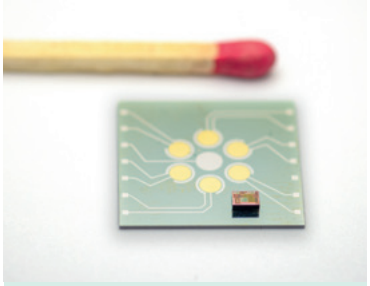

Mobile biosensor system. © Fraunhofer IIS / Udo Rink

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■ From the institutes

The smallest loudspeakers in the world

The world's first integrated MEMS-based miniature loudspeakers, developed by Fraunhofer IDMT and Fraunhofer ISIT offer impressive playback fidelity and low energy consumption.

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Radar Systems – little all-rounders on the road

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Detecting cancer tissue more precisely and faster with nanodiamonds

The number of new cancer diagnoses is rising. This is why Fraunhofer IAF is working on diamond-based optimization of magnetic resonance imaging (MRI) for cancer diagnosis applications.

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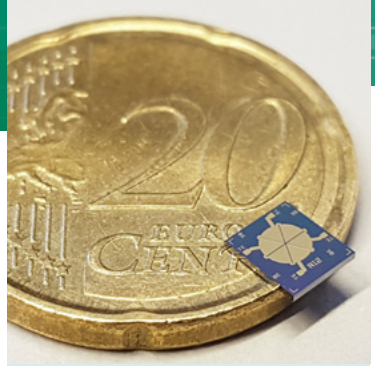
Events

Date	Event / WWW	Location	Group institutes involved
08/31 – 09/05	IFA – Consumer Electronics Unlimited https://b2c.ifa-berlin.de	Berlin, Germany	HHI
09/04 – 09/07	SMM 2018 www.fhr.fraunhofer.de/de/veranstaltungen/SMM2018.html	Hamburg, Germany	FHR
09/10 – 09/13	CoSeRa Workshop 2018 www.fhr.fraunhofer.de/de/veranstaltungen/5th-cosera-2018.html	Siegen, Germany	FHR
09/11 – 09/12	ESA Industry Space Days www.esa.int/ESA	Noordwijk, Netherlands	IAF
09/14 – 09/18	IBC 2018 https://show.ibc.org	Amsterdam, Netherlands	HHI
09/16 – 09/21	22nd International Conference on Ion Implantation Technology (IIT 2018) www.iit2018.org	Würzburg, Germany	IISB
09/18 – 09/21	InnoTrans 2018 – Weltleitmesse der Verkehrstechnik www.innotrans.de/en/AtAGlance	Berlin, Germany	IZFP
09/23 – 09/27	ECOC 2018 www.ecoc2018.org	Roma, Italy	HHI
09/23 – 09/28	European Microwave Week 2018 www.eumweek.com	Madrid, Spain	IAF
09/24 – 09/26	SISPAD 2018 www.sispad2018.org	Austin, USA	IIS
09/24 – 09/28	ION GNSS+ 2018 www.ion.org/gnss/index.cfm	Portland, USA	IISB
09/25 – 09/28	WindEnergy Hamburg www.windenergyhamburg.com/en	Hamburg, Germany	ISIT
10/09 – 10/11	it-sa 2018 www.it-sa.de/en	Nürnberg, Germany	AISEC
10/10 – 10/11	German MBE-Workshop www.mbe2018.de	Freiburg, Germany	IAF
10/14 – 10/17	International Conference on Planarization CMP Technology www.cmpugm.com/ICPT2018	Seoul, Republic of Korea	ISIT
10/17 – 10/18	Photonik Tage Berlin Brandenburg www.adlershof.de/termin/event/17-10-2018-photonik-tage-berlin-brandenburg	Berlin, Germany	IPMS
10/24 – 10/26	NDT 2018 | 10th International Symposium on NDT in Aerospace www.ndt-aerospace.com	Dresden, Germany	IKTS



Size comparison: The chip of a MEMS loudspeaker on a 20-cent coin. © Fraunhofer ISIT

The smallest loudspeakers in the world

They are only a few millimeters in size and the perfect fit for headphones, hearables, and hearing aids: the world's first integrated MEMS-based miniature loudspeakers. The loudspeakers are not only compact; they also offer impressive playback fidelity and low energy consumption. They were developed by Fraunhofer IDMT in Ilmenau and Fraunhofer ISIT in Itzehoe.

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With a membrane size of just 4 mm and a chip thickness of 0.4 mm, the fullrange loudspeakers cover the frequency range of 20 Hz to 40 kHz. When used in-ear, they achieve a sound pressure level of 110 dB. That is as loud as a rock concert. With reduced bandwidth, even up to 135 dB is possible.

Technological breakthrough in chip loudspeakers

The two Fraunhofer institutes have been working for three years on the joint research project "Smart Speaker – Smart MEMS Loudspeakers for Mobile Applications" developing energy-efficient and completely integratable loudspeakers on a chip basis: the Fraunhofer Institute for Silicon Technology ISIT is responsible for the development and pilot manufacture of piezoelectric microdrives as well as their integration into highly miniaturized intelligent microsystems. The Fraunhofer Institute for Digital Media Technology IDMT is concerned with the intelligent signal control of the miniature loudspeakers.

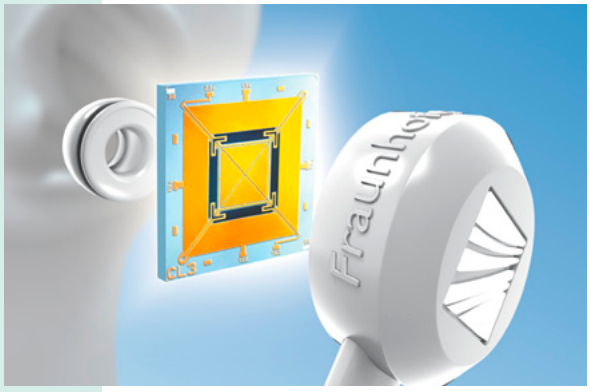
Positive resonance from industry

In March, the two research institutions presented their integrated MEMS loudspeaker technology in the form of an in-ear headphone at the annual conference of the German Acoustical Society (DEGA). They received very positive feedback from industry and science. "The punchy, balanced sound and the outstanding brilliance in the treble range were singled out for particular praise," according to Fabian Stoppel, project manager and head of the group for acoustic MEMS at Fraunhofer ISIT. The coordinator of the overall project, Prof. Bernhard Wagner from Fraunhofer ISIT, is convinced of the high performance of the acoustic microsystems, confirmed by the positive feedback from industry representatives: "Our loudspeakers already fulfill many market requirements for hearing aids, in-ear headphones, and hearables. They can operate on only 1-2 V and have high power reserve levels", Prof. Wagner is pleased to report.

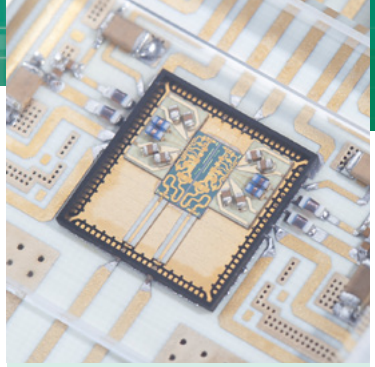
What's next? Adaptation for mass production, better performance, even lower energy consumption

The first success has been achieved. The institutes are currently working on optimizing the MEMS loudspeaker for deployment in in-ear headphones and devices with higher technological demands, such as cellphones, tablets, and laptops. "We have now reached a point where, from a technological point of view, the basic concept has been proved. Now we enter the optimization phase. Thanks to their intelligent actuation, in future, the loudspeakers will be able to offer long-term performance and sound quality in every application", explains Dr. Daniel Beer, project manager at Fraunhofer IDMT.

At Fraunhofer ISIT, loudspeakers based on new piezoelectric materials are currently being developed, and they will be both compatible with CMOS and more energy-efficient. This will further reduce power consumption and will allow cost-effective mass production in all large semi-conductor factories. The institute is also working on further reducing the size, and therefore cost, of the miniature loudspeakers, which will open up new fields of application and make MEMS loudspeakers attractive for use even in the low-cost segment.



The MEMS loudspeakers can be used for such applications as qualitative speech and music playback in headphones. © Fraunhofer ISIT



A power amplifier in a radio node for targeted data transmission for 5G. © Fraunhofer IAF

Networked sensors – energy-efficient and powerful

The most important components in the Internet of Things (IoT) are tiny sensor nodes that collect information from their environment and pass it on – and the applications are becoming ever more numerous and sophisticated. The problem is that the energy consumption of the nodes when projecting a "Trillion Sensor" future is enormous. Fraunhofer's lighthouse project, ZEPOWEL, sees nine institutes working on futuristic solutions for an energy-efficient IoT.

The figures speak for themselves: according to a study by the International Energy Agency, in 2013, the energy requirements of all networked devices worldwide corresponded to the total demand for electrical energy in Germany. Within the next few years, this need is projected double to 1140 TWh/a, with networked IoT accounting for a significant share of this growth. For this reason, it is important that the sensors as well as the associated systems become more energy efficient.

A vision of a self-sufficient sensor network

So far, industry and research have not come up with a comprehensive solution: for each application, a single IoT hardware is developed that is more or less energy-efficient. Fraunhofer wants to change that with its Towards Zero Power Electronics (ZEPOWEL) lighthouse project: nine Fraunhofer institutes are working on a scaleable and extremely energy-efficient hardware solution. On the one hand, the nodes themselves are to use much less energy; on the other, energy savings will be achieved at the system level. This means that communication with other systems will also save more energy. The long-term aim is to allow networked sensors to work completely self-sufficiently. In order to get gradually closer to this vision, the researchers are taking an approach that encompasses various aspects. One team, for example, is working on an ultra-low-power wake-up receiver. This receiver ensures that a sensor node does not have to transmit data continually, but rather "awakens" at a certain threshold or through an authenticated request from outside. The module developed in the project is expected to be 1000 times more efficient than existing standard radio solutions and responds only to authorized and cryptographically secured signals that are actually relevant for it.

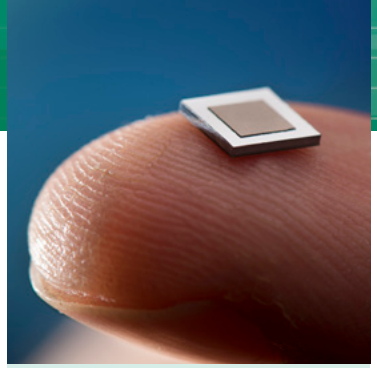
In order to optimize energy management within the node itself, project researchers are working on developing a "broadband harvester", a device that can "harvest" ambient energy. The energy harvested in this way is stored in a newly developed thin-film battery, which is integrated directly on the hardware chip. This fully integrated approach – encompassing a battery, a harvester, and an energy converter – is a unique feature of the vision of ZEPOWEL.

More accurate measurement with less energy

Innovative sensing concepts will make an important contribution, as well. This is addressed in an additional approach in ZEPOWEL: an air quality sensor will be coupled with a micro-pump. The pump will serve as a measuring amplifier by massively increasing the amount of supplied air. The result will be a sensor that can be built with much less intrinsic sensitivity, while at the same time the data obtained is far more accurate. Whereas today's sensors can deliver 5000 measurements at a power of 1250 mW, the developed sensor is expected to deliver twice as many readings per second with a power of less than 10 microwatts.

The sensor is intended to measure the fine particulate matter in cities. While this used to be extremely time-consuming and is currently only performed at a few nodes at the same time, the new technology is intended to enable a much denser grid and thus more accurate measurement. The intelligent networking of the nodes and the connection to common cloud platforms can be used to create a detailed model of fine particulate emissions in cities. The applications are numerous. For example, traffic flow control could be based on it, and navigation systems could adapt their routes to it independently.

In industry, networked environments mean improved productivity and safety. © MEV Verlag



A 5 × 5 mm² silicon micro-pump actively supplies the sensor with air, thus significantly reducing the response time. © Fraunhofer EMFT / Bernd Müller

Modular construction kit for every application

The ZEPOWEL lighthouse project has also set itself the goal to provide a modular concept for a large variety of applications, which will allow to implement a plug-and-play principle and remove the need for developing purely application-specific nodes,. "We offer a module for many applications: it's a plug-in system, like with Lego blocks. Click – and it works," explains Erik Jung from Fraunhofer IZM. The resulting platform consists of individual innovations created by the institutes; these innovations can then be combined as desired and matched with new commercial developments as well to offer a future proof platform. Depending on the application, users can then "cherry pick" their preferred game of components.

An overview of the partners:

The **Fraunhofer Research Institution for Microsystems and Solid State Technologies EMFT** is developing a highly integrated gravimetric CMOS particle sensor consisting of low-noise analog signal processing, a multi-channel, high-performance analog-to-digital converter, and subsequent digital signal processing. The system is complemented by a microactuator that allows on-demand media delivery. The actuators, driver electronics, and sensors are used modularly as a system-in-package (SIP) in the IoT node.

The **Fraunhofer Institute for Embedded Systems and Communication Technologies ESK** is principally involved with a focus on developing reliable communication systems. The institute works in the fields of communication technologies and architectures as well as design and safeguarding for the sectors of networked mobility, industrial communication, as well as smart grid and telecommunication.

The **Fraunhofer Institute for Applied Solid State Physics IAF** develops cost-effective and highly efficient power amplifiers and transceiver ICs for the mm-wave frequency range at 60 GHz on the basis of gallium nitride (GaN) on silicon. This approach translates high-performance GaN technology to low-cost silicon substrates for mass application.

The Fraunhofer Institute for Integrated Circuits IIS is working on the development of integrated ultra-low-power radio receivers for ISM bands with standard CMOS technology. In addition to the integration of the radio receiver, encryption procedures that enable secure wake-up processes with minimal power consumption are also to be investigated.

The **Fraunhofer Institute for Integrated Systems and Device Technology IISB** is conducting research on extremely compact power converters of the next generation, while at the same time reducing power loss to a minimum and developing novel technologies for predictive maintenance of cognitive systems.

The **Fraunhofer Institute for Integrated Circuits IIS, Division Engineering of Adaptive Systems EAS** is developing an ultra-low-power circuit for self-sufficient sensor applications. Included are components for universal conditioning and analog-to-digital conversion of various sensor signals that can be automatically migrated between different semiconductor technologies.

The Fraunhofer Institute for Photonic Microsystems IPMS is developing an ASIC that converts the energy absorbed by the broadband harvester into a charging voltage for the battery. Alternatively, the energy can also be stored on a capacitor. In addition, thin-film processes for the production of functional layers that contain lithium are being developed and evaluated in terms of the extent to which they can be used as nanometer-thin electrode and electrolyte materials for miniaturized lithium-ion rechargeable batteries in microelectronics.

In the project, the **Fraunhofer Institute for Silicon Technology ISIT** is developing a broadband energy harvester for mechanical and magnetic ambient energy. The efficiency of the silicon component is quadrupled compared to currently available harvesters.

The **Fraunhofer Institute for Reliability and Microintegration IZM** merges individual components into miniaturized modules that can then be assembled as a module kit depending on the intended purpose. In accordance with the demands for computing power, communication requirements, and energy availability, the appropriate CPU modules are selected and then programmed with firmware that is optimized for energy minimization.

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Mobile biosensor system

Until now, time-consuming laboratory tests were necessary to detect pollutants and contaminants in liquids. Now, a novel mobile biosensor system developed by Fraunhofer IIS in cooperation with the Swedish company CapSenze can quickly and reliably detect the presence of biochemical substances.

Fraunhofer IIS contributed the ASIC-based read-out electronics and implemented the measurement algorithm for sensor signal processing. The chip captures the sensor capacity with a measuring resolution of below 0.1 % and a power consumption of only a few microwatts. Integrating the ASIC reduces the system to the size of a matchbox, also making it suitable for mobile use. On account of the automatic control of all functions, the system works autonomously without the need for specially trained personnel.

Hunting for contaminants

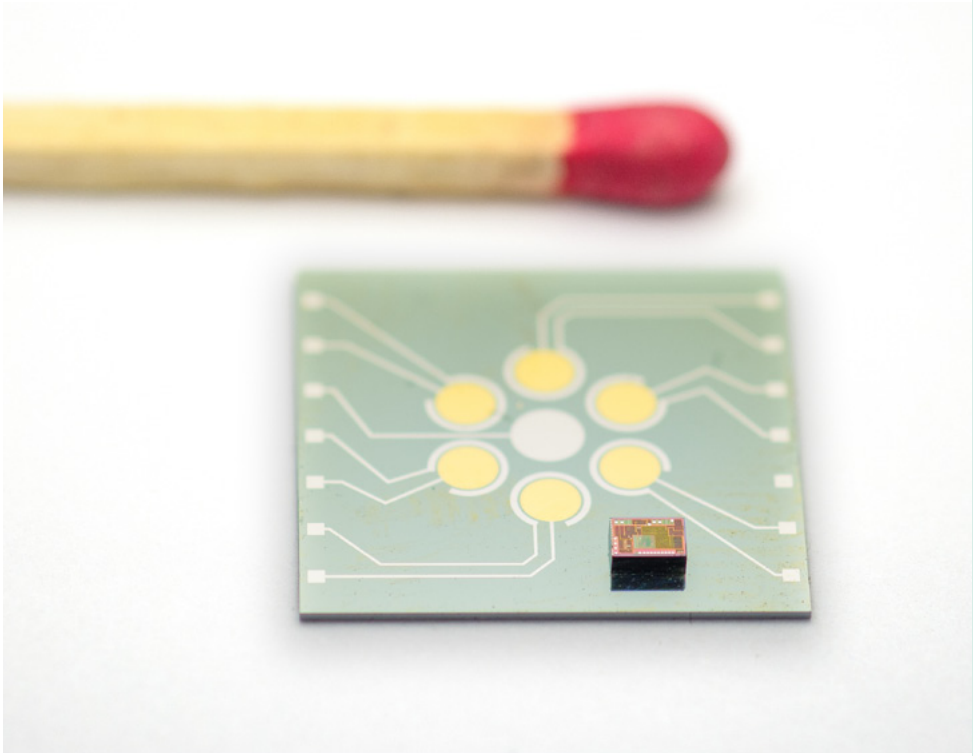
The results of the measurement are available within minutes. Up to six sensors for different substances can be integrated into the system. These supply precise measurement data in the pico-to-femtomole range. The technology employs molecularly imprinted polymers (MIPs), which form a specifically structured coating on a gold-plated electrode, much like a molecular "footprint" on the target substance. The electrode only reacts when the MIP coating comes into contact with the substance being searched for. This means that the substances can be unequivocally verified.

Applications

The biosensor system can be used to find trace elements of hormones, pesticides, and mycotoxins in water and water-soluble substances, even when the concentrations are in the micromole range. This opens up a wide range of possible applications from mobile food controls and the monitoring of entire food-production chains right up to doping tests.

More information can be found at:
www.iis.fraunhofer.de/en/ff/sse/sens/anw/umt.html

Within minutes, the sensor system can precisely detect even the smallest concentrations of contaminants in liquids. © MEV Verlag



The integrated read-out circuit from Fraunhofer IIS allows CapSenze's biosensor system to be reduced to the size of a matchbox. © Fraunhofer IIS / Udo Rink

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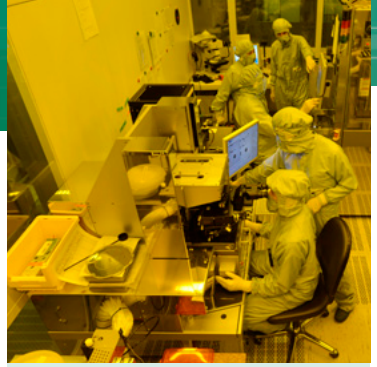

Development of algorithms for predictive maintenance and process correlation for vacuum pumps in semiconductor technology.
© Fraunhofer EMFT / Bernd Müller

Secure networked systems – the pathfinders for Industry 4.0

Monitoring of high-end production equipment is a central aspect of Industry 4.0. Within Munich's High Performance Center for Secure Connected Systems, Fraunhofer EMFT – together with Edwards GmbH and the Fraunhofer institutes ESK and AISEC – is working on establishing improved characterization for status monitoring of vacuum pumps.

The High Performance Center for Secure Connected Systems (SVS) offers its partner companies an interdisciplinary and application-oriented environment for systematic research in the areas of Industry 4.0, networked mobility, and smart health / smart homes. Edwards is a partner in the Industry 4.0 sector and a leading developer and manufacturer of modern vacuum products, exhaust cleaning solutions, and associated added-value services. With the PAMP (Predictive Advanced Maintenance for Pumps) project, the British company has been in a strategic partnership with SVS since the end of 2017. The project's specific focus is on status monitoring of high-quality vacuum pumps used in semiconductor production in conjunction with processing equipment. Digitization in production makes the step from preventive to predictive maintenance possible.

Fraunhofer EMFT cleanroom as a test environment

One emphasis of the work is on investigating the connection between process flows and pump behavior. The 200 mm CMOS semiconductor line at Fraunhofer EMFT, together with the many years of growing knowledge of process development and semiconductor manufacture among employees, offers the optimum environment for the monitoring of equipment in conjunction with vacuum pumps and correlation analysis. This can be taken as a starting point to improving the performance and service life of the components. The experts from Fraunhofer ESK and AISEC will develop secure and flexible communication solutions for networked factories. Among the items planned is a sensor set-up in Fraunhofer EMFT's cleanroom environment, which can be used to capture data from different positions within the infrastructure, as well as the preparation of a connected sensor node network, including a secure Internet of Things (IoT) infrastructure. In order to detect anomalies in the sensor data and to optimize the performance of the pumps, the project partners would also like to deploy innovative machine learning techniques.

Secure connection allows cross-location communication

Another important aspect is the use of secure, highly reliable wireless communication between devices, taking into account factors such as energy consumption, data throughput, data volume, and the specific requirements of a semiconductor manufacturing environment. This means that a secure connection needs to be implemented to exchange data, machine learning models, and the device status in real time between secure locations: on-site on the Fraunhofer EMFT CMOS line, remotely in the cloud, or at the Edwards company headquarters. This approach simplifies the development and deployment of analytical models while also reducing service response times. The aim is to provide a new reference architecture that fulfills the requirements of Industry 4.0 while also being tailored to the unique IP needs of semiconductor manufacturers.

Edwards iXM1800 vacuum pump.
© Edwards Ltd. 2018

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Detecting cancer tissue more precisely and faster with nanodiamonds

A nanodiamond polarizer is intended to optimize the MRI process for cancer diagnosis.
© romaset – Fotolia.com

The number of new cancer diagnoses has almost doubled in Germany since 1970 – making fast and precise diagnostic procedures even more crucial. This is why Fraunhofer IAF is working on diamond-based optimization of magnetic resonance imaging (MRI) for cancer diagnosis applications.

MRI is particularly gentle for patients because it works without any harmful chemicals or radioactive substances. Classic MRI uses magnetic fields to turn nuclear spin signals in the body's water molecules into three-dimensional cross-sectional images. As part of the "Revolutionary Cancer Diagnosis with Diamond Technologies – DiaPol" project, the Fraunhofer Institute for Applied Solid State Physics IAF and several partners are working to improve this technology.

Polarization with nanodiamonds

Within DiaPol, Fraunhofer IAF is optimizing the process used to manufacture flexible and mobile polarizers out of nanodiamonds with nitrogen vacancy centers in order to hyperpolarize external molecules. This hyperpolarization process does not require low temperatures, which makes it particularly fast and cost-effective.

Revolution in cancer diagnosis

Before examination, the external molecules are injected into the patient. The MRI signal is amplified, which significantly improves picture quality. This makes it easier for the tumor cells to be more clearly differentiated from healthy tissue and also to identify the cancer cell's exact stage. The time for patients to wait for their results is also reduced from several weeks to a few days, allowing for treatment to begin faster and giving patients and their loved ones certainty.

About the project:

As well as Fraunhofer IAF, DiaPol also involves the University of Ulm, NVision Technology GmbH, the Hebrew University of Jerusalem, and the Israeli Center of Diamond Technologies. The project is being funded by Germany's Federal Ministry of Education and Research (BMBF).

Further information can be found at www.iaf.fraunhofer.de/en/media/press-releases/nano-diamond.html

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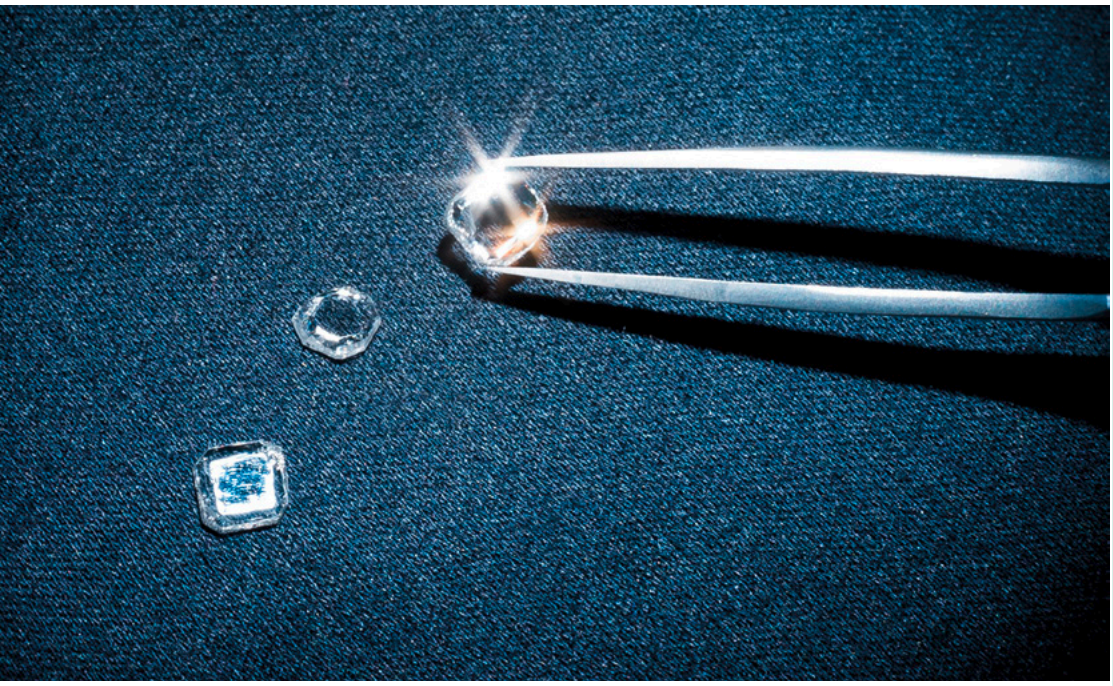
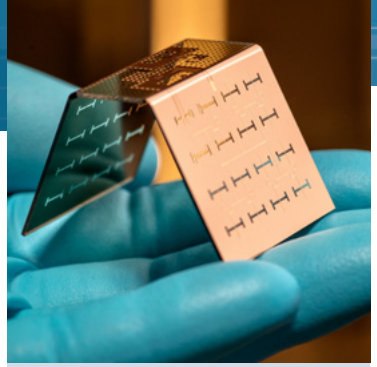


Fraunhofer IAF is contributing its knowledge of diamond-based devices. © Fraunhofer IAF



Flexible sensor platform for radar modules.
© Fraunhofer IZM / Volker Mai

Radar Systems – little all-rounders on the road

Radar Systems are used in many places and for many purposes: as parking assistance, motion sensors, or to help driverless cars monitor their surroundings. In order to satisfy the various demands on a radar system in a cost-efficient manner, Fraunhofer IZM is researching innovative packaging technologies for radar systems.

One typical application of radar systems is autonomous driving – here, a great deal of information needs to be processed. The limited data transfer capacity of a car's on-board network increases the response time – a disqualification when it comes to the day-to-day usability of self-driving vehicles. That is why the scientists are working on a sensor module with a decentralized signal processing unit and short response times. A sensor fusion between high-end camera systems and a 79 GHz radar system ensures that the information is captured securely and in full. The radar sensor determines vehicle spacing and speed, while the camera simultaneously performs classification tasks and evaluates all the information.

The researchers are also developing integrated high-frequency modules such as a flexible radar sensor that fits in the palm of your hand and can be deployed in a variety of applications: from human detection to finding a parking lot.

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New standards in positioning accuracy

Connected automated driving needs high-precision positioning systems. That is why, together with several industrial partners, Fraunhofer ESK tested new positioning technologies on the A9 digital freeway test track. For the first time, it was possible to obtain positioning accurate to the nearest centimeter throughout the test session, even at higher speeds.

This level of precision was attained during the test drive thanks to high-quality correction data. One particular challenge was in supplying the information efficiently and in real time. Multi-access Edge Computing (MEC) technology was tested as part of the trial and was compared with other technologies. MEC allows the simultaneous dissemination of regionalized correction data to all vehicles in a specific area. This reduces network traffic and is more cost-efficient.

Fraunhofer ESK designed and integrated the end-to-end connectivity solution, provided its VICTOR test vehicle equipped with test and reference receivers, and helped evaluate the data. In the next step, the partners intend to optimize the robustness of the receivers. They will continue the research by extending the test drives to the entire mobile network and by adding different driving maneuvers and speeds.

In addition to Fraunhofer ESK, Deutsche Telekom, Nokia, and Hexagon Geosystems were also involved in the project.

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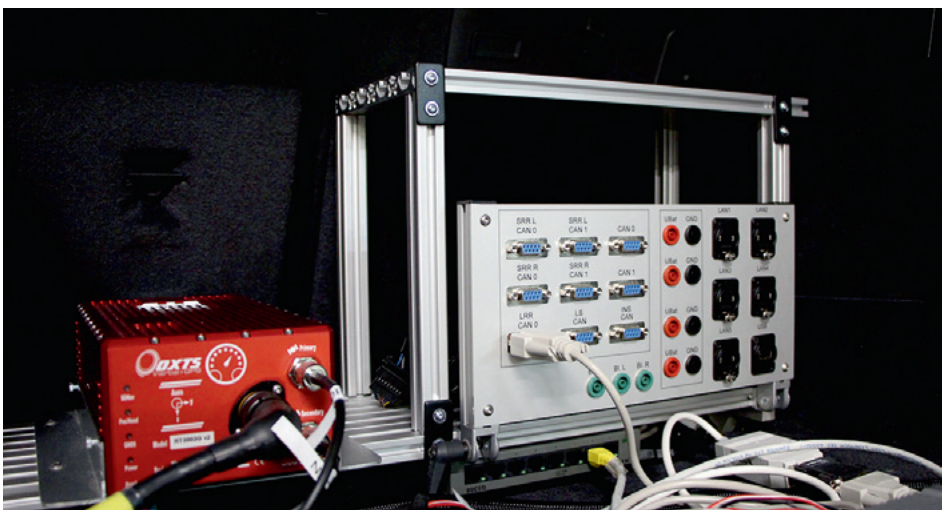


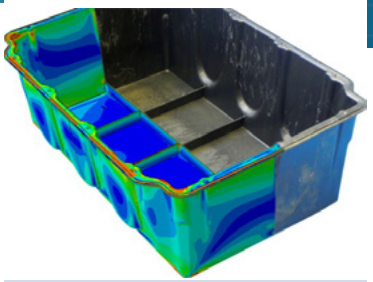
To relieve the car battery, the large panel in the trunk of the VICTOR test vehicle, and all other installed devices, are operated independently of the on-board electrical system. © Fraunhofer ESK

Holistic material characterization of plastics and fiber composites

Collaborating and networking - this is the contemporary response to today's technological and scientific challenges, which are becoming ever more complex. This is why the Fraunhofer Institutes IZFP, IWM, and LBF are offering a comprehensive portfolio for holistic material characterization of plastics and fiber composites for component design.

The collaboration comprises both the scientific approach and the industrial application of the solutions found. Clients will be provided with a combined, validated concept for their design and measuring methods instead of getting individual components. On-site methods for analyzing microscopic and macroscopic damage propagation are available as well as deducing and modeling damage mechanisms in numerical material and failure models.

For plastics and fiber composites, there are currently no concepts or experiences with these parameters that would allow using them for the design and dimensioning of components. There is now a very well-validated method that enables the necessary parameters to be determined.



Analysis of a long-fiber-reinforced battery housing.
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Obituary

On June 24, 2018, the Director of the Fraunhofer Institute for Integrated Systems and Device Technology IISB

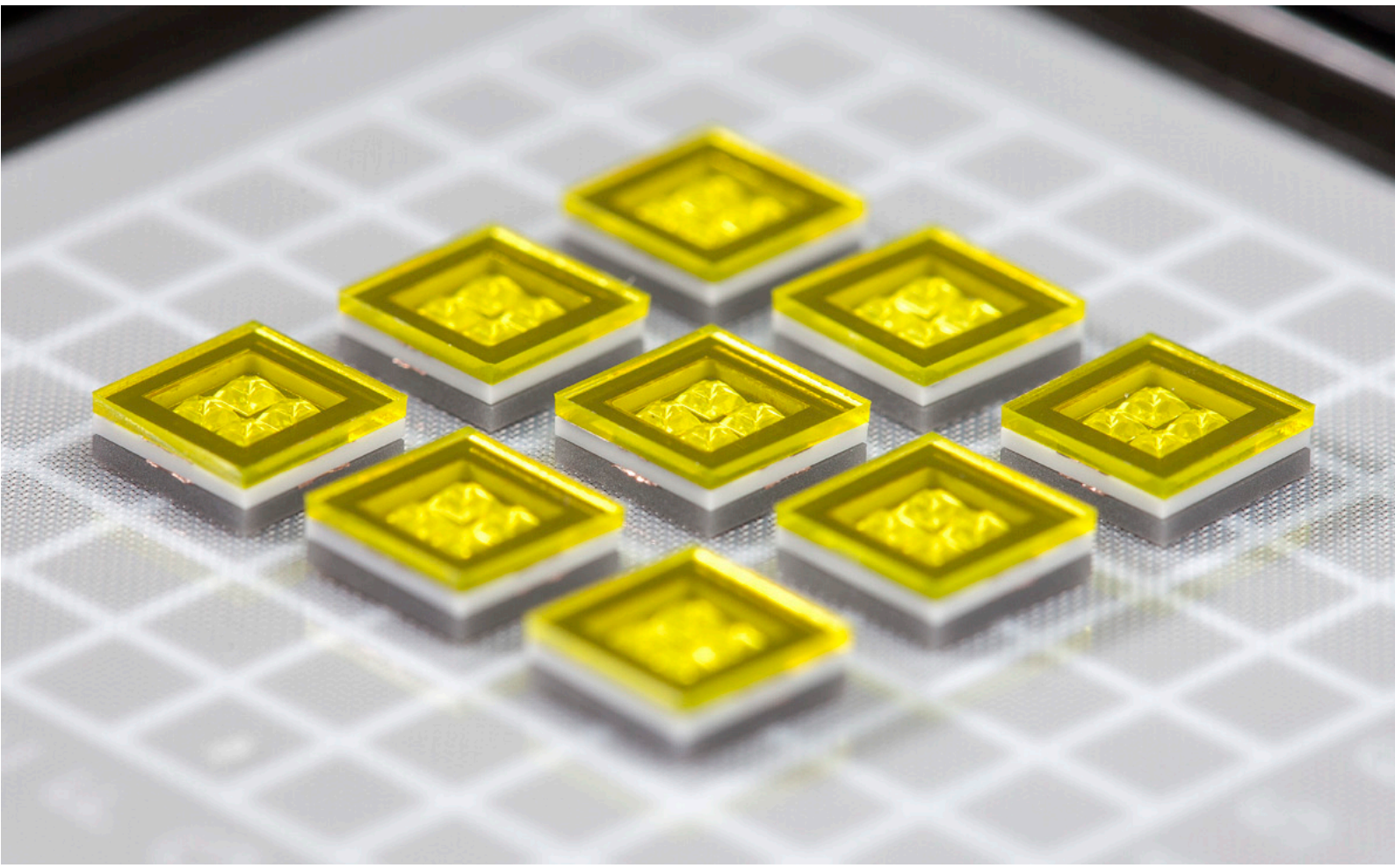
Prof. Dr. Lothar Frey

died suddenly and unexpectedly at the age of 60.

Prof. Frey was both holder of the Chair of Electron Devices at the Friedrich-Alexander-Universität Erlangen-Nürnberg and Director of Fraunhofer IISB. His visionary work led him to focus Fraunhofer IISB on the future-oriented topic of power electronics. His name is inseparable from the strong and sustainable growth that the institute has experienced. The outstanding working atmosphere is the result of his collegial and cooperative leadership style. Prof. Frey was a motivator, a driving force, and a mentor for the personal and professional development of many students, up-and-coming young scientists, and staff. With extraordinary dedication, he initiated and fostered strategic cooperation between various partners in industry, science, and government. He is one of the founding fathers of the Leistungszentrum Elektroniksysteme LZE. At a national level, he was the initiator of important forums for the promotion of young researchers.
Lothar Frey was born in Würzburg in 1958. He studied physics at the Julius-Maximilians-Universität Würzburg. In 1986, he completed his doctorate at the Faculty of Sciences. Three years later, he moved to Erlangen, where he started his career at the Fraunhofer-Gesellschaft as the head of the Analytics and Measuring Techniques group within the Fraunhofer Working Group AIS-B. In 2004, he qualified as a university lecturer at the Friedrich-Alexander-Universität (FAU) Erlangen-Nürnberg. Two years later, he was appointed Director of the Institute of Experimental Physics at the Technische Universität Bergakademie Freiberg. In 2008, Prof. Frey returned to Erlangen and took over the Chair of Electron Devices at the FAU and the directorship at Fraunhofer IISB.
Our thoughts go out to his family, particularly his wife and two daughters.

Prof. Martin März
on behalf of all colleagues at Fraunhofer IISB, at the Chair of Electron Devices and the Chair of Energy Electronics at the Friedrich-Alexander-Universität Erlangen-Nürnberg.

© Fraunhofer IISB / Anja Richter



Within the HeraKLED project, researchers at Fraunhofer IAF – in conjunction with Fraunhofer IKTS and Fraunhofer IZM – are developing polymer-free, hermetic white LEDs based on luminous ceramics. Here you can see 12 W high-performance LEDs in a 4 × 4 mm² SMT design. This new type of housing technology allows LEDs to be used in hotter or damper environments, or ones subject to chemical loads – such as in heavy industry. © Fraunhofer IAF

Editorial notes

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The Fraunhofer Group for Microelectronics, founded in 1996, combines the expertise of 17 Fraunhofer institutes, with a total of more than 3,000 employees. Its main focus is the preparation and coordination of interdisciplinary research projects, conducting studies and to assist in the process of identifying strategies.

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... today goes to Christoph Galle from the FMD

Mr. Galle, you are quite a new face at the Research Fab Microelectronics Germany (FMD). What have been your first impressions and what lessons have you already learned from this new type of cooperation?

My first impression is a very good one. So far I have met open and interesting people who are working on some fascinating research topics. That is a great way to get to know the quite complex structure of the Research Fab Microelectronics Germany.

You are a program manager at the FMD. What does your role entail?

As a program manager, I concentrate on tapping into new fields of application and new customers. There are already business developers at individual institutes working on this issue. Within FMD, the challenge is to identify and strategically develop cross-institute topics – in cooperation, naturally enough, with our partners at the Leibniz Institutes.

What specific projects are you currently working on?

Many institutes have expertise in the area of LiDAR: from the generation of laser beams to their deflection and the detection of reflected beams. This portfolio will be complemented by wide experience in the radar sector, which is also an important step on the way to fully automated driving. We'll approach these topics in conjunction with sensor data fusion.

Let's look into the future. What would you like to have achieved in five years' time?

Fascinating people make for fascinating projects. I would like to be able to look at a positive and innovative environment with creative colleagues.

Which of the projects being worked on by your colleagues in other Fraunhofer institutes interests you in particular?

I find Start-a-Factory at the Fraunhofer Institute for Reliability and Microintegration IZM very interesting. Start-up founders can come here to gain low-threshold access to high-tech equipment and to the experience of Fraunhofer IZM employees. It really is a superb opportunity.

What invention would you not like to do without in daily life?

My bicycle – it's not particularly complex, but it's certainly very useful and relaxing in everyday life.

What do you wish you had more time for?

If I had extra free time, I would do more sports and learn Finnish.

What song belongs to the "soundtrack" of your life?

That is a really good question. I can think of quite a few tracks. The Dropkick Murphys always put me in a good mood: "Do or Die"!

Where will your next journey take you?

"I'm Shipping Up To Boston" is another good song by the Dropkick Murphys. And that's my plan too: to visit Boston soon. Traveling in general is one of my biggest passions.

What was the last book you read?

Steppenwolf by Hermann Hesse. It's a classic and I can recommend it without hesitation. Right now, I'm reading Killing Commendatore by Haruki Murakami.

Last, but not least: can you tell us what motto you live by?

Live well, laugh well! And whatever you do, do it well!

Traveling is one of Christoph Galle's main interests; he spent a year in Valencia during his studies.
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Christoph Galle.
© Fraunhofer Mikroelektronik

About Christoph Galle:
Christoph Galle studied industrial engineering at TU Berlin. He then worked as a project manager promoting the economy of the state of Brandenburg. His duties focused on strategic advancement of cluster traffic, mobility, and logistics, as well as ICT, media, and the creative industry. He entered his position as a program manager at the FMD in February 2018. He is responsible for defining and establishing contact with strategic customers in the cross-institute fields of application of microelectronics.

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