

WORKSHOPS AND LAB COURSES 2018



For updates please check:
www.izm.fraunhofer.de/events

FRAUNHOFER IZM
WORKSHOPS AND
LAB COURSES 2018

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FRAUNHOFER IZM

As part of the Fraunhofer Society, Fraunhofer IZM is fully dedicated to the world of applied research and commissioned industrial research. The Institute's role in the Fraunhofer Society is the development of assembly and interconnection technology and system integration in multi-functional electronics.

With more than 350 members of staff, our Institute produces revenue of approx. €30 million, including around 80 percent from research commissions. In addition to our main premises in the heart of Berlin, Fraunhofer IZM also maintains a presence in the electronics powerhouse of Dresden. The Institute benefits from its close cooperation with the Technical University of Berlin and other science and research institutes. Since the foundation of the Institute, cooperation with the TU Berlin has been ongoing and productive in particular in the area of basic industrial research and is reflected in the combined role of the Institute's director as full professor at the university.

The four departments of Fraunhofer IZM are committed to the advancement of science and technology. Innovative trending topics as well as established fields of practice are being promoted across disciplinary and technological boundaries. We have long understood that the application of new products has direct relevance for their original development.





LAB
COURSE

WORKSHOP

CUSTOM
EVENTS

WORKING-
GROUP
INDUSTRY

TECH
DAY

OUR EVENT FORMATS IN BRIEF

■ WORKSHOP

In our workshops, you have a chance to build up a solid store of knowledge about many aspects of system integration and interconnection technology in electronic systems. This can be a first introduction to a novel field of practice that is pushing the state of the art or a refresher on the established knowhow in an area that Fraunhofer IZM has long been helping to develop. You can expect lectures, group discussions, and optional practice demonstration or laboratory tours. Depending on the contents, the workshops will be offered over one or two days.

■ LAB COURSE

Be a part of a small and dedicated group of up to 12 participant and get a close-up introduction to innovative technologies and learn to use the equipment yourself. Our lab courses are offered as applied practitioners' courses and in combination with more theoretical training in the form of lectures and group discussions. Each course usually takes between two and three days.

■ WORKING GROUP INDUSTRY

The working group is a forum dedicated to discussing and exploring the challenges and solutions in research and practice with our partners in the industry. The members meet regularly throughout the year to share and get involved in new trends and developments. The working groups are organized and hosted by Fraunhofer IZM.

■ TECH DAY

The one-day events are a great opportunity to experience and learn more about the core competences and cooperation ventures of the Institute. Alongside other interested participants from science, politics, and industry, you will get a good insight into the newest technological developments in a given field. See our lectures, lab tours, and discussion forums to find the best way for you to benefit from the offerings of Fraunhofer IZM.

■ CUSTOM EVENTS

You want to offer a larger group of your staff training in a specific subject matter or area of expertise? Then book a very special custom training at your company or at the Berlin premises of Fraunhofer IZM. We will work with you to prepare the precise contents and topics for your needs.

Contact us:

Georg Weigelt

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Event will be held in German



Event will be held in English

OVERVIEW 2018

EVENTS AT A GLANCE

February

- 01.02. ■ Environmental Radar Sensors (Tutorial)
- 02.02. ■ Environmental Radar Sensors (Lab Course)
- 14.02. ■ System Reliability in Assembly and Interconnection Technology
- 20.02. ■ Compliant Environmental Management in the Electronics Industry
- PhoxLab: Independent Platform for Photonics in Data Centers

March

- 14.–16.03. ■ Bare-Die Processing and Assembly in Flip-Chip and Die-Attach Technologies
- 15.03. ■ Reliability is No Accident! – Design, Material, Technology, Simulation, Test
- 20.03. ■ Customized Silicon-Based Sensors

April

- 19.04. ■ New Trends and Technologies in Advanced Packaging
- Low-Cost Packaging-Platform for Photonic Components

May

- 14.–15.05. ■ EMC in Power Electronics (Workshop)

Spring

- EMC Optimized Design (Lab Course)
- Structurally Integrated Electronics
- Combined COB-SMT Assembly Processes

June

- 04.06. ■ System Reliability in Assembly and Interconnection Technology
- 12.–13.06. ■ Photonic Packaging: Sub-micron Assembly
- 14.06. ■ Compliant Environmental Management in the Electronics Industry
- 20.–22.06. ■ Compact Wirebonding Seminar

September

- 23.–27.9. ■ Optical Interconnect in Data Centers

October

- 08.–10.10. ■ Modern Power Semiconductors and their Packaging
- 10.10. ■ System Reliability in Assembly and Interconnection Technology
- 18.10. ■ Conformable Electronics

OVERVIEW 2018

EVENTS AT A GLANCE

November

- 06.11. ■ Compliant Environmental Management in the Electronics Industry
- 07.–09.11. ■ Compact Wirebonding Seminar
- 08.–09.11. ■ Reliability Assessment of Microelectronic Systems
- 28.–30.11. ■ Bare-Die Processing and Assembly in Flip-Chip and Die-Attach Technologies

Fall

- SMD Component Embedding into PCBs
- WLP & Sensor Integration
- Wide-Bandgap User Training
- Polymer Ageing and Microelectronic Package Reliability
- EMC Optimized Design (Lab Course)

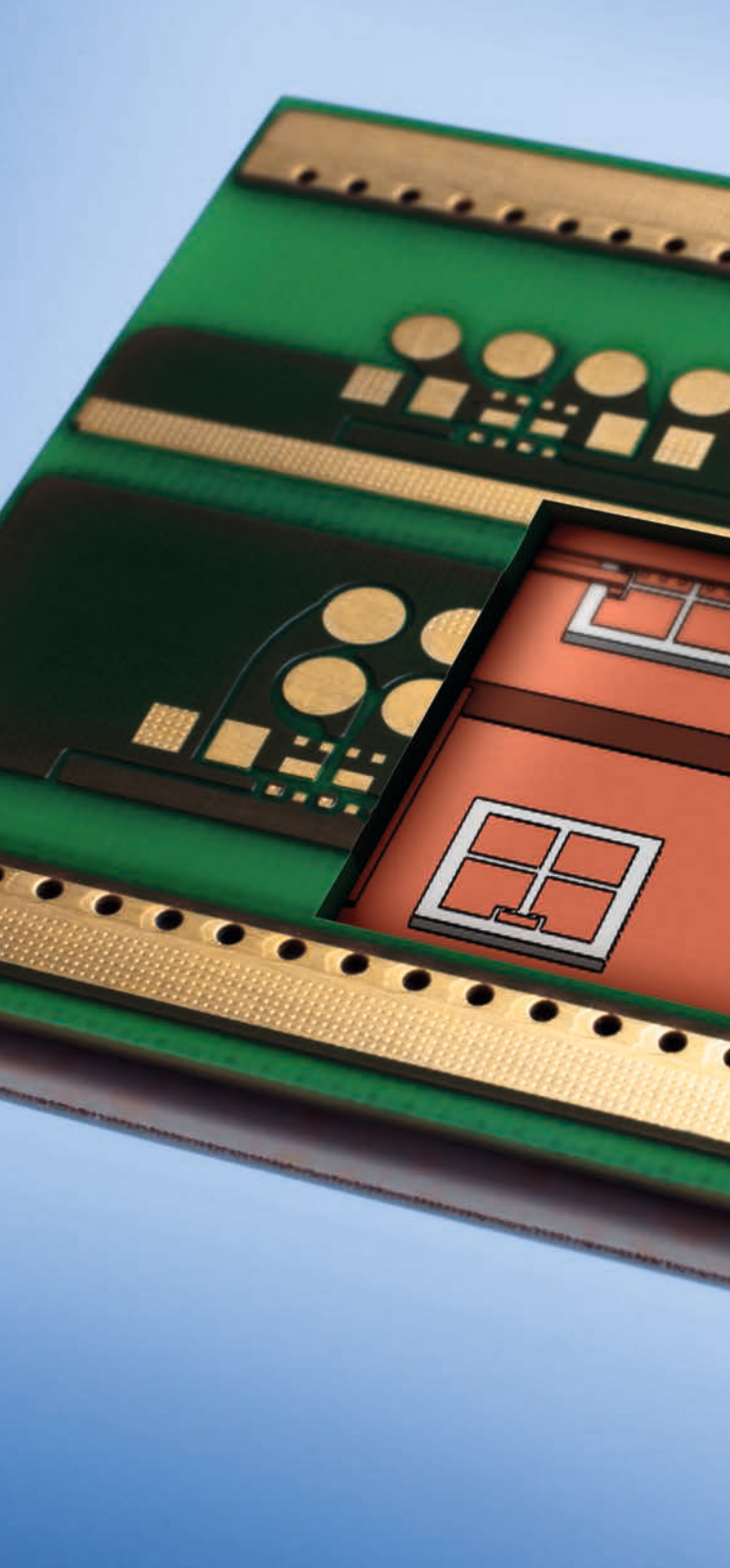
Winter

- Power-Optimized Electronics

■ SYSTEM DESIGN ■ MATERIALS & RELIABILITY

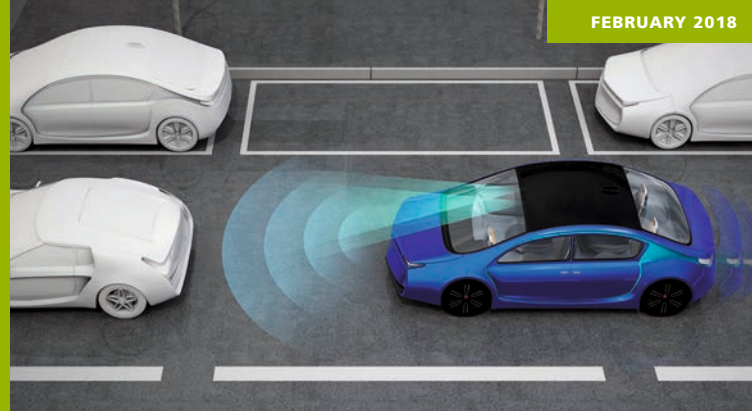
■ INTEGRATION TECHNOLOGIES





SYSTEM DESIGN

TUTORIAL ENVIRONMENTAL RADAR SENSORS



Contents

- Theoretical foundations of high frequency technology with particular focus on radar
- Basics of radar sensors, structures and applications
- Use cases for radar technology and their application
- Trends in radar technology and prospective use cases

This tutorial offers a comprehensive introduction to radar sensor technology. It introduces the necessary fundamentals of high frequency technology with particular emphasis on radar systems and outlines the functions and different applications of essential components of radar systems. A focus lies on the special conditions for applying the technology, including environmental factors in the detection area and depth resolution. The tutorial also considers new technologies influencing the evolution of radar sensors.

Please note:

This tutorial introduces the basics of high frequency technology and suitable antennas and prepares you for the next day's practical lab course.



Duration

1 day

Date

01.02.2018

Venue

Fraunhofer IZM, Berlin

Costs

480 €

Target Group

Development, construction, and production engineers and technicians, in particular in the automotive and automotive supplies, mechanical engineering, electrical engineering, and medical technology sectors

More

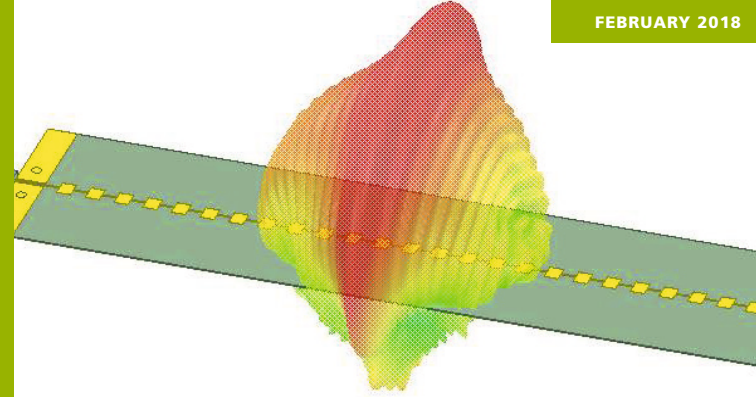
Information

www.izm.fraunhofer.de/t_2

Contact

Christian Tschoban
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LAB COURSE ENVIRONMENTAL RADAR SENSORS



Contents

- Structure and function of the components of a radar sensor
- Selecting the applicable components
- Constructing and commissioning a 24 GHz radar system
- Identifying and analyzing defects and their root causes

This lab course familiarizes you with the different components of a radar system in terms of their function and possible application. You build and use a 24 GHz system as a teaching model to learn about typical faults and understand their root causes and suitable strategies for avoiding them. You will conduct your own tests and get acquainted with the versatile applications of radar systems. You will also learn to handle relevant interferences and master the modules' specific challenges.

Please note:

Since the lab course requires a basic grasp of high frequency effects in radar sensor applications, we offer a tutorial on the basics of high frequency technology and antenna systems on the previous day.



Duration

1 day

Date

02.02.2018

Venue

Fraunhofer IZM, Berlin

Costs

800 €

Target Group

Development, construction, and production engineers and technicians, in particular in the automotive and automotive supplies, mechanical engineering, electrical engineering, and medical technology sectors.

More

Information

www.izm.fraunhofer.de/lc_3

Contact

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WORKSHOP EMC IN POWER ELECTRONICS – ELECTRO MAGNETIC COMPATIBILITY

Advances in semiconductor technology drive power electronics to higher efficiencies and compact system designs. This progress comes along with an increasing effort to comply with EMC requirements. With dense placement, electromagnetic coupling between components raises influence on system behavior. Integration as a response to the market demands intensifies the challenges. The design becomes more complex and leads to significantly higher development costs.

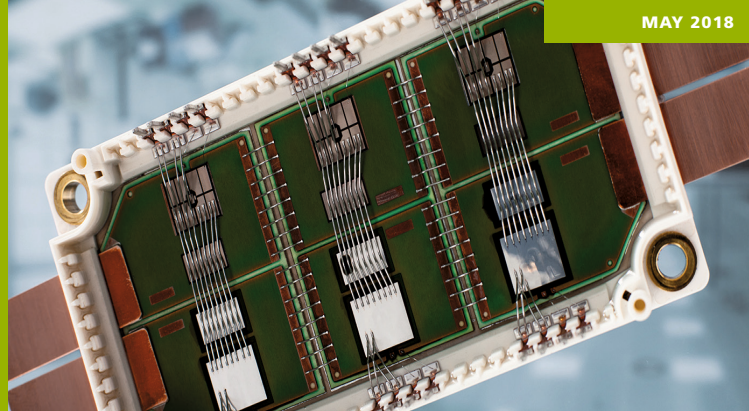
The EMC in Power Electronics Tutorial is a response to the increasing importance of EMC. It provides an overview on EMC phenomena and introduces methodologies to handle EMC questions.

The tutorial is organized jointly by the European Center for Power Electronics (ECPE) and Fraunhofer IZM Berlin.

Please note:

The tutorial is a supplement to the EMC Lab Course and intended for the training of young engineers and engineers from neighboring disciplines.

All presentations and discussions will be in English.



Duration

2 days

Dates

14. – 15.05.2018

Venue

Vienna, Austria

Target Group

Engineers and technicians from the development and production of power electronic systems

More

Information

www.izm.fraunhofer.de/ws_4

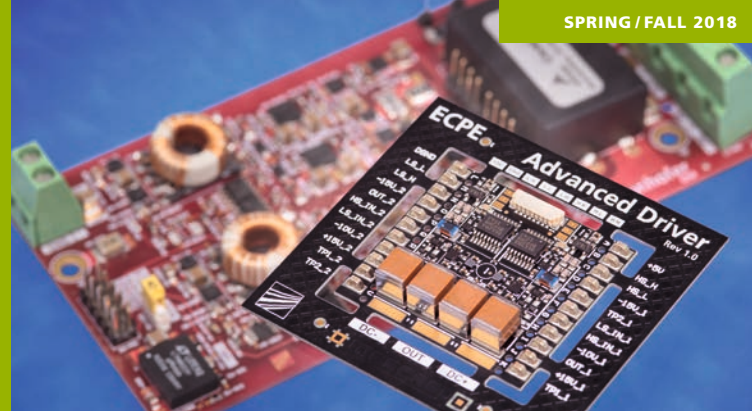
Contact

Lena Somschor

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LAB COURSE EMC OPTIMIZED DESIGN – PARASITICS IN POWER ELECTRONICS



Designing power electronic circuits requires a deep understanding of its electromagnetic compatibility (EMC). This has to be acquired individually by every engineer starting with power electronics, which is costly and time-consuming. This Lab Course gives an insight into the underlying effects of EMC in power electronics by directly carrying out experiments.

Various examples for good solutions are shown and finally every attendant designs his own system that will be checked by the course instructor.

The Lab Course is organized jointly by the European Center for Power Electronics (ECPE) and Fraunhofer IZM Berlin.

Please note:

The Lab Course will be offered once in English and once in German language.



Duration

2 days

Dates

Spring 2018 (English)

Fall 2018 (German)

Venue

Fraunhofer IZM, Berlin

Target Group

Engineers and technicians from the development and production of power electronic systems

More

Information

www.izm.fraunhofer.de/lc_5

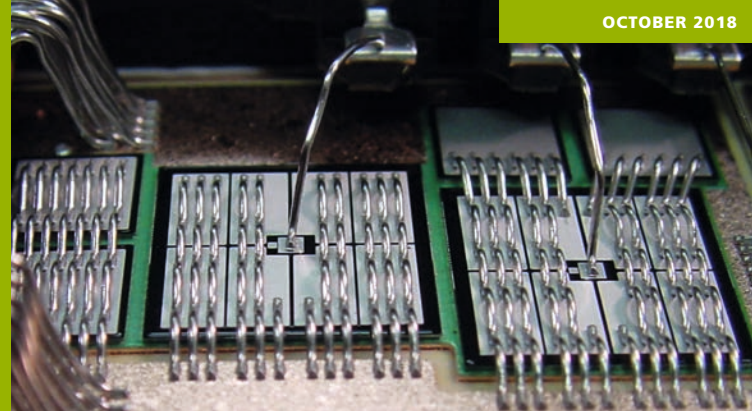
Contact

Lena Somschor

lana.somschor@ecpe.org

WORKSHOP

MODERN POWER SEMICONDUCTORS AND THEIR PACKAGING



The main component of modern power electronics circuits is the semiconductor power switch. This course presents the fundamentals of power switches operations from a physical point of view, together with the specific peculiarities and the reason to use them in a special application. An overview on different packaging technologies and their properties, advantages and disadvantages, is also given. Requirements from the applications and possibilities to tackle them with a semiconductor package solution will be proposed.

The course is divided into two parts.

Part one tackles semiconductors and their theory:

- Basics like pn junction fundamentals, bipolar and field effect transistors
- comparison between semiconductor materials like silicon, SiC and GaN
- fundamental mechanisms taking place during switching operation
- driving technologies for power semiconductors

Part two introduces packaging theories:

- Introduction, analyzing and discussing packaging technologies for modern power semiconductors
- Interconnection solutions

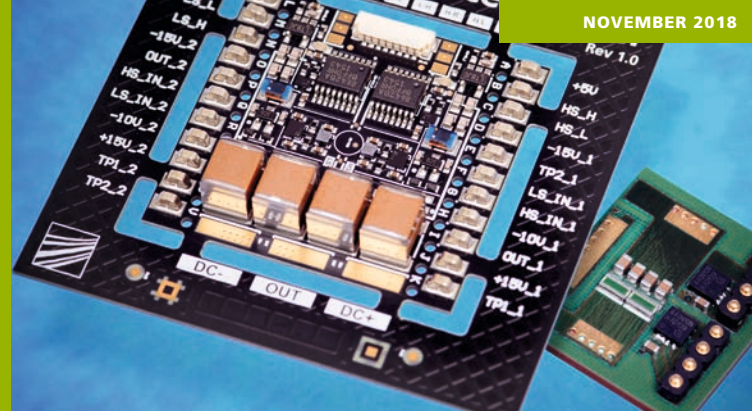
The participants will be grouped and asked to team work on a real design. A final 1-day lecture is included where groups will compare and discuss the achievements and the design choices.



Duration	3 days
Dates	8.10 – 10.10.2018
Venue	Aalborg University, Aalborg, Denmark
Costs	6,000 DKK for PhD students 8,000 DKK for the Industry
More Information	http://phdcourses.dk/Course/54589
Contact	Prof. Eckart Hoene eckart.hoene@izm.fraunhofer.de



WORKSHOP WIDE-BANDGAP USER TRAINING



Wide-bandgap-semiconductors (WBG) are the next generation of power electronics. ECPE is currently cooperating with Japan on SiC and GaN based systems. This tutorial was initially prepared in the framework of the CLINT-WPE project to convey practical know-how to engineers working with SiC and GaN devices.

Efficient system integration is the key to exploit the full potential of WBG-semiconductors. Power electronics developers need to take into account that high switching speed and frequencies and high power density establish special demands on other system components.

This 2-day tutorial addresses all aspects of WBG system integration - from the choice of semiconductor components to design options and how to cope with parasitics, EMC and inductance at high switching frequencies. Another topic is test methods – both for electric tests of new power semiconductor components as well as robustness and reliability of modules and systems.



Duration

2 days

Date

November 2018

Venue

t.b.d.

Target Group

This event is intended for engineers and technicians who work with WBG devices. Efficient system integration and practical aspects are core components of this course.

More

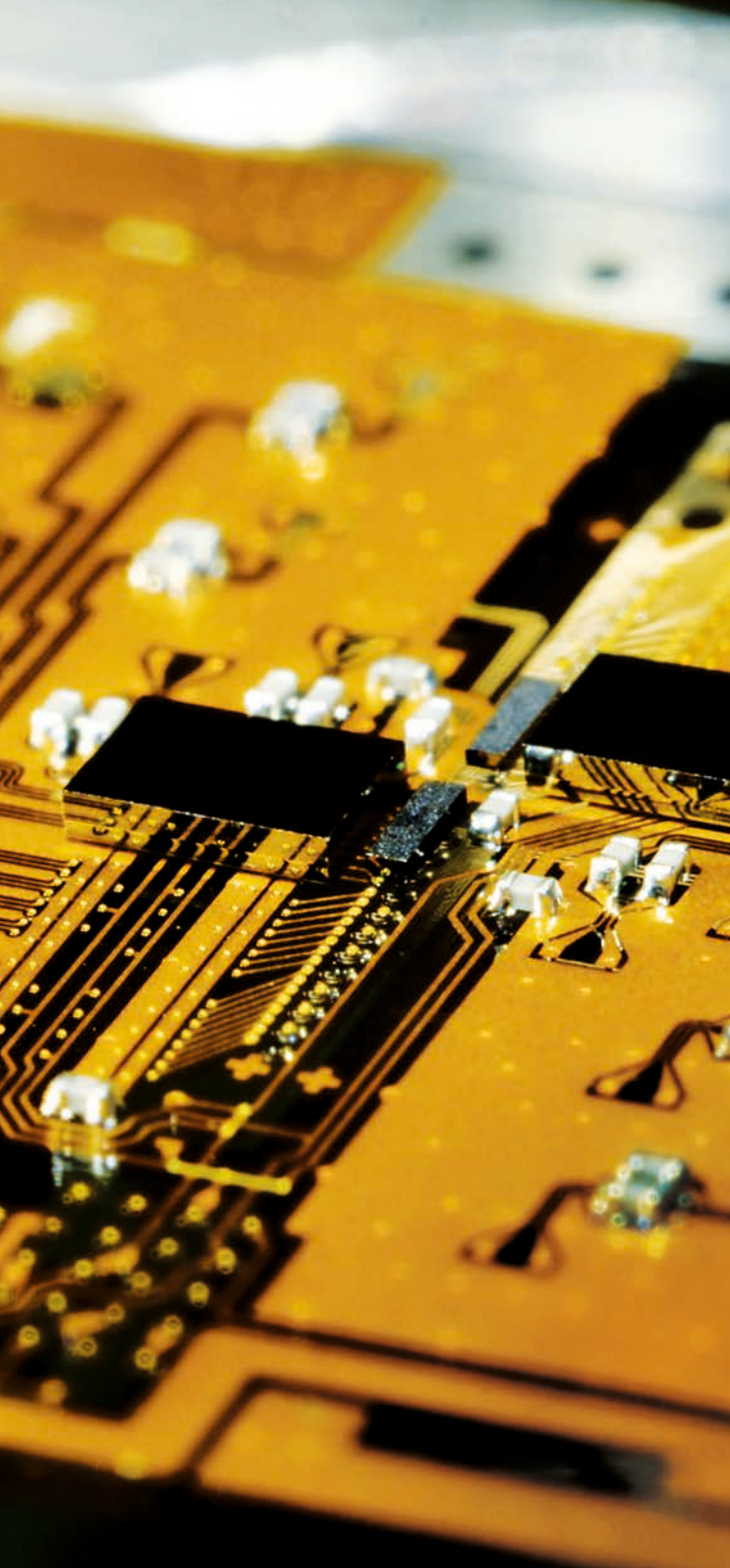
Information

www.izm.fraunhofer.de/ws_18

Contact

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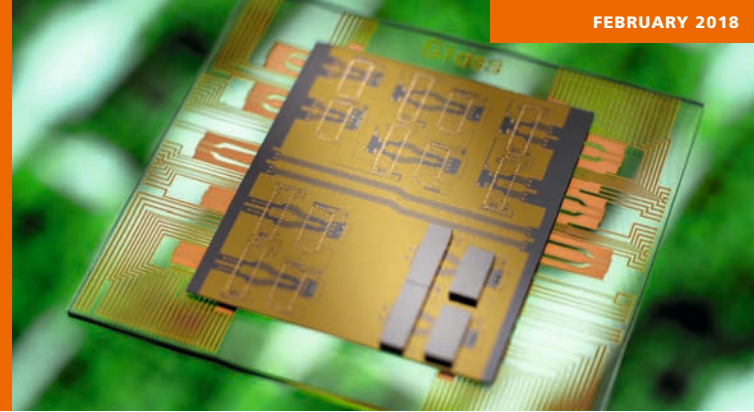


INTEGRATION TECHNOLOGIES



WORKSHOP

PHOXLAB: INDEPENDENT PLATFORM FOR PHOTONICS IN DATA CENTERS



Contents

- Digitising European industry
- Benefit from digital innovations
- Low entry barrier to access European R&D infrastructure

PhoxLab is an independent neutral platform for benchmarking and showcasing of photonics components and solutions for different hierarchy levels (on-chip, chip-to-chip, board-to-board, rack-to-rack) in data centers, which has the mission to sustain the results of various European projects. The results and demonstrators of several EU projects such as PhoxTroT, Sepianet, L3Matrix are consolidated in a platform for the benefit of European industry, clusters, academia and research, R&D projects, and EU- and national project consortia.

The platform will first of all support benchmarking and showcasing of photonic interconnect solutions, further provide services for the individual needs such as design, fabrication, packaging, training based on the gained know-how and experience of its partners and European projects. Here the strategy is to conserve the unique position of European R&D and its role and accelerate the exploitation processes by sustaining the results and outcomes of European projects.



Duration

1 day

Date

February 2018

Venue

Fraunhofer IZM, Berlin

Costs

The event is free, but registration is mandatory.

Target Group

Photonic interconnects community (public policy makers, CEO, CTO, senior scientist, early stage researcher, ...)

More

Information

www.phoxlab.eu

Contact

Dr. Tolga Tekin

tolga.tekin@izm.fraunhofer.de

TUTORIAL

CUSTOMIZED SILICON-BASED SENSORS



Contents

- The technical foundations of silicon sensors
- Micro-mechanical sensors
- Sensor design and construction (simulation)
- Sensor production technologies
- Flex-integration technologies

Piezoresistive silicon-based sensors are cost-efficient, simple to integrate, and ready for use almost everywhere. They have become a ubiquitous part of modern life. Their extremely low prices are only possible with a very high degree of standardization in production, leading to a proliferation of cheap, but highly standardized sensors. Building or buying custom sensors is disproportionately more expensive.

This was the situation that gave rise to the Silicon Micro-Sensor project, dedicated to creating a means of making the many advantages of piezoresistive silicon sensors available in custom or low-production-run setups.

This tutorial showcases the project and the new opportunities it offers for its partners in industry. You will be introduced to the basics of custom application-specific silicon sensors by analyzing an acceleration pressure sensor.



Duration	1 day
Date	20.03.2018
Venue	Fraunhofer IZM, Berlin
Costs	480€
Target Group	Engineers and technicians working in the development and construction of silicon sensors, in particular in the automotive and automotive supplies, mechanical engineering, and electrical engineering sectors

More Information Contact

www.izm.fraunhofer.de/t_12
 Prof. Ha-Duong Ngo
ha-duong.ngo@izm.fraunhofer.de

WORKSHOP NEW TRENDS AND TECHNOLOGIES IN ADVANCED PACKAGING

Contents

- The importance of electronic packaging for the semiconductor industry: New technologies and market trends
- Overview of technologies for 3D-integration
- Technologies for panel level packaging (embedding)
- Materials for RDL including material characterization (electrical and mechanical properties, aging effects, adhesion and copper diffusion)
- Assembly for bare dies, WLPs and 3D integration

New device technologies and applications with their ever increasing performance and functionality are driving the requirements and innovation for assembly and packaging. The technology boundaries between semiconductor technology, packaging and system design are becoming blurred. As a result chip, package and system designers will have to work closer together than ever before in order to drive the performance for future microelectronic systems. This tutorial will give an insight on technologies and materials within this complex topic.



Duration

1 day

Dates

19.04.2018

Venue

Fraunhofer IZM, Berlin

Costs

480 €

Target Group

Scientists and engineers involved in advanced packaging: Process technology, materials and equipment

More

Information

www.izm.fraunhofer.de/ws_6

Contact

Dr. Michael Töpfer
[michael.toepper@](mailto:michael.toepper@izm.fraunhofer.de)
izm.fraunhofer.de

TECH DAY

STRUCTURALLY INTEGRATED ELECTRONICS



Contents

- Design for manufacturing
- Integrated mechanical and electrical design
- Reliability of structurally integrated electronics
- A workflow for integrated design and production processes

A brief introduction to generative production processes in the electronics industry

To capture data in use, electronics systems are increasingly being integrated into mechanical structures like car tires, bridge piers, and even bone implants. This calls for an integrated design approach that adds the mechanical perspective to the traditional electronic concerns. It also needs to account for the setting and conditions of the end product in the use scenario.

The resulting design process becomes increasingly complex and requires the added competences of several specialized disciplines. This tutorial will introduce you to a design tailored for structurally integrated electronics that covers all of these aspects down to questions of reliability and feasibility for manufacturing. The starting point is an introduction to the potential and current limitations for structurally integrated electronics by introducing a real-life example.



Duration

1 day

Dates

Spring 2018

Venue

Fraunhofer IZM, Berlin

Costs

Free

Target Group

Development, construction, technology, production, and quality management engineers and technicians, in particular in the automotive, mechanical engineering, electrical engineering, and medical technology sectors.

More

Information

www.izm.fraunhofer.de/tt_15

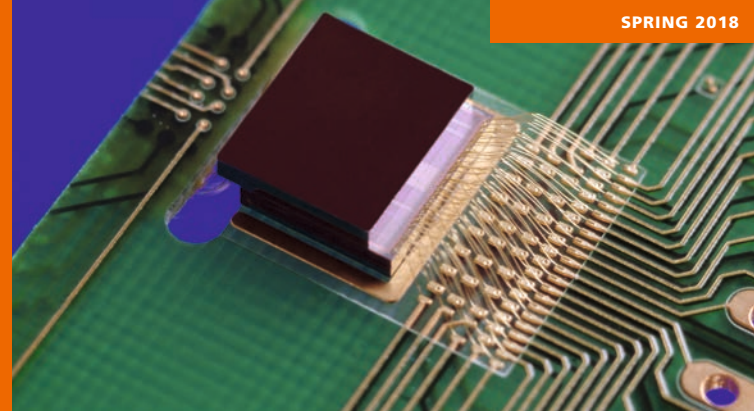
Contact

Erik Jung

erik.jung@izm.fraunhofer.de

WORKSHOP

COMBINED COB-SMT ASSEMBLY PROCESSES



Contents

- Technologies and use cases for combined COB – SMT assembly processes
- Typical substrates and their finishes
- Placement of bare dies and surface-mounted components
- Wire bonding technology
- Encapsulation
- Failure mechanisms, with particular focus on metals and polymers
- Destructive and non-destructive analyses

Chip-on-board technology for placing bare dies (naked chips) is used in combination with the surface mounting of passive components or packaged dies.

The essential processes used for the purpose, such as die attachment, wire bonding, or encapsulation, influence and affect each other, making the right assembly sequence, the properties of the substrate and components, and additional quality assurance essential for reliable electronics production.



Duration

1 day

Date

Spring 2018

Venue

Fraunhofer IZM, Berlin

Costs

480 €

Target Group

Specialists from the field of assembly and interconnection technology, production engineers (electronics assembly), quality managers in the electronics sector

More

Information

www.izm.fraunhofer.de/ws_7

Contact

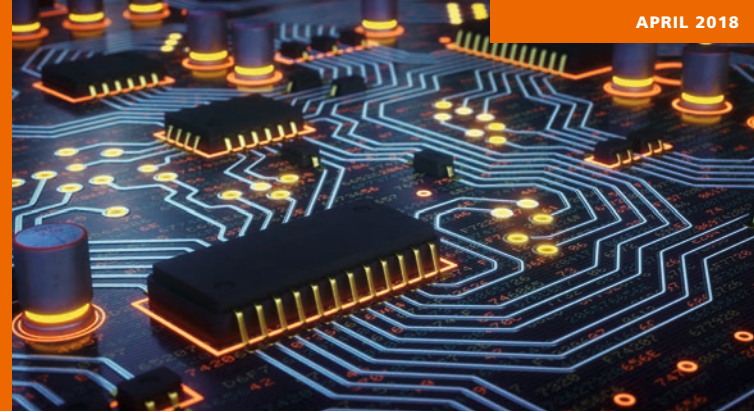
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izm.fraunhofer.de

TUTORIAL

LOW-COST PACKAGING- PLATFORM FOR PHOTONIC COMPONENTS



Contents

- The application of photonic components in optical networks
- A packaging platform as basis for product development
- Design rules
- Interfaces
- Use cases

Demand for elastic optical data communication networks and their constituent elements is set to increase for the foreseeable future. Different avenues are being pursued in the construction of the required components to cover the need for ever greater bandwidth. However, the high costs of these components is making their general application in the field prohibitively expensive.

Fraunhofer IZM has developed a low-cost packaging platform to empower smaller and medium-sized enterprises to keep up and excel in this innovative market.

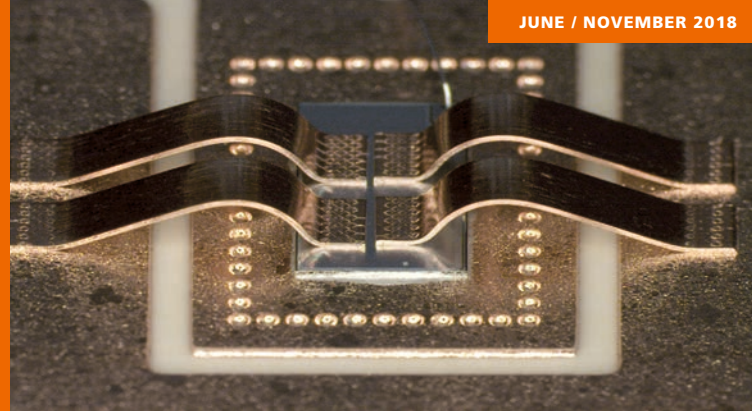
The tutorial will introduce you to the field of electro-optical networks, the design rules, and the relevant development tools. You will become acquainted with the technology platform developed by Fraunhofer IZM and find out how it can become a basis for your own product development.



Duration	1 day
Date	April 2018
Venue	Fraunhofer IZM, Berlin
Costs	480 €
Target Group	Designers / developers of photonic products
More Information	www.izm.fraunhofer.de/t_14
Contact	Dr. Tolga Tekin tolga.tekin@izm.fraunhofer.de

WORKSHOP

COMPACT WIREBONDING SEMINAR



Contents

- The world's most comprehensive introduction to wirebonding technology
- Foundations of interconnection technology
- Bonding processes in detail
- Visual and mechanical testing
- Reliability of bonds
- Practical work with bonding and test equipment

With more than 700 participants in over two decades, the wirebonding tutorial is the most popular and successful training offered by Fraunhofer IZM and is known and recommended by larger and smaller enterprises across Germany.

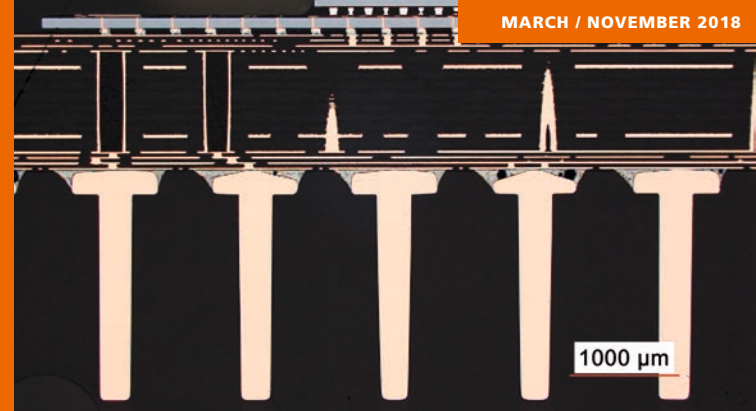
It offers you substantial technological know-how, from the basics to invaluable network and insider knowledge. No matter where you are coming from – chip-on-board technology, power modules, high frequency technology, microsystems, or other areas where wirebonding is becoming a gatekeeper technology for your business – your questions will be valued and answered here. You will love the experience.

The tutorial is hosted in partnership by Bond-IQ and Fraunhofer IZM.



Duration	3 days
Dates	20. – 22.06., 07.– 09.11.2018
Venue	Fraunhofer IZM, Berlin
Costs	2,250 €
Target Group	Project managers, innovators, developers, technology and strategy managers, SQM, quality managers, executive managers
More Information Contact	www.izm.fraunhofer.de/t_17 Stefan Schmitz stefan.schmitz@bond-iq.de

LAB COURSE

BARE-DIE PROCESSING AND ASSEMBLY IN FLIP-CHIP AND DIE-ATTACH TECHNOLOGIES**Contents**

- Basics of flip-chip and die-attach connections
- Foundations of polymer chemistry
- Analysis of polymers' material properties
- Process influences and quality testing
- Analysis methods and reliability
- Failure analysis
- Practical process and analytical technology exercises

Flip-chip technology allows the shortest signal paths at maximum miniaturization for highest productivity through the simultaneous connection of all contacts. Every process has its very unique challenges, lying in the enormous variety of possible substrates, metallization, and component design differences, especially in semi-conductors. Understanding the solutions in the market and their technological potential and limitations is a key competence for the design and development of good products and processes.

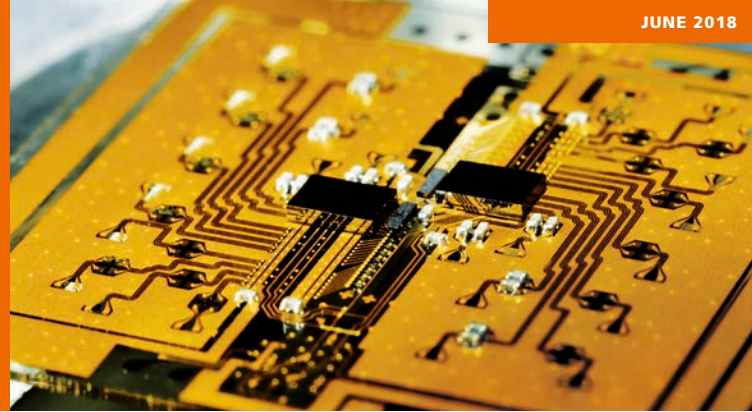
You can expect a good combination of theoretical input and practical exercises in the lab.

The lab course is hosted in partnership by Bond-IQ, Finetech GmbH and Fraunhofer IZM Berlin.



Duration	2.5 days
Dates	14. – 16.03., 28.– 30.11.2018
Venue	Fraunhofer IZM, Berlin
Costs	1,450 €
Target Group	Process managers, developers, executives, innovators
More Information	www.izm.fraunhofer.de/lc_20
Contact	Stefan Schmitz stefan.schmitz@bond-iq.de

WORKSHOP PHOTONIC PACKAGING: SUB-MICRON ASSEMBLY



Photonic integration is driven today both by the increasing demand of bandwidth in data communication for IoT and the interconnected micro-devices itself. Furthermore miniaturization in lightening and projection techniques, and a wide variety of optical sensors require new concepts to reduce cost and guarantee reliability. Photonic packaging is crucial and includes single packages, modules or subsystems comprising at least one optoelectronic device or micro-optical element and optical interconnects.

We see that there are many challenges to be taken by OEM manufacturers, suppliers and service assemblers to face the specific challenges regarding very tight tolerances. Sub-micron accuracy has to be achieved and maintained during operation.

Thus the Photonics Packaging Workshop at Fraunhofer IZM Berlin focuses on such sub-micron automated assembly technologies for optoelectronic and photonic integration on board, package and device level.



Duration	1.5 days
Dates	12. – 13.6.2018
Venue	Fraunhofer IZM, Berlin
Costs	780 €
Target Group	Engineers, decision-makers, scientists from microsystem technology, space, quantum optics, sensor technology
More Information	www.izm.fraunhofer.de/ws_8
Contact	Dr. Henning Schröder henning.schroeder@izm.fraunhofer.de

SYMPOSIUM 6TH OPTICAL INTERCONNECT IN DATA CENTERS SYMPOSIUM

Contents

- Enabling the data center
- Integrated photonics in the market place
- Advances in integrated photonics
- Where do we go next? Disruptive innovations

The symposium is focused on high-performance, low-energy and cost and small-size optical interconnects across the different hierarchy levels in data centers. We intend to draw out and discuss the key technology enablers and inhibitors to widespread commercial proliferation of photonic interconnect in »mega« data center environments and how the optical interconnect community can collectively help to address these.

The topics addressed will center on passive and active embedded photonic interconnect technologies including optical circuit boards, polymer and glass waveguides, III-Vs, silicon photonics, photonic crystals and plasmonics in data centers.

The event is free, but registration is mandatory. Registration includes admission to symposium sessions, coffee breaks, lunch.



Duration

1 day

Dates

23.– 27.09.2018

Venue

ECOC 2018 – 44th European Conference on Optical Communication, Roma/Italy

Costs

The event is free, but registration is mandatory.

Target Group

Photonic Interconnects community (public policy makers, CEO, CTO, senior scientist, early stage researcher, ...)

More

Information

www.I3matrix.eu

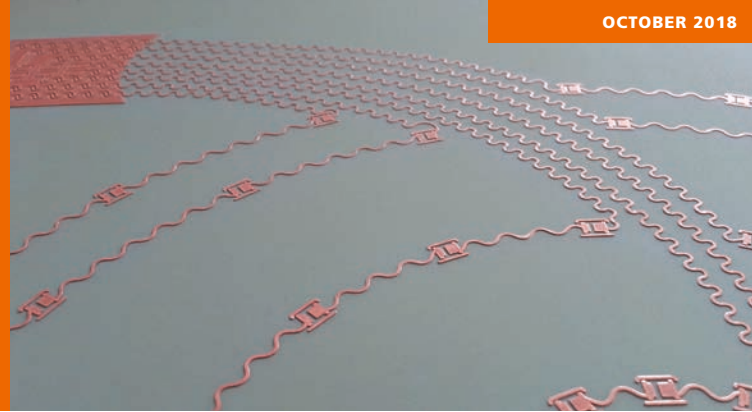
Contact

Dr. Tolga Tekin

tolga.tekin@izm.fraunhofer.de

WORKSHOP

CONFORMABLE ELECTRONICS



Contents

- Stretchable electronics as a threshold technology
- Forming technology in conformable electronics
- Use cases of automotive, consumer, and medical applications

Conformable electronics offers an enticing inroad into the world of dynamically formable, structural, three-dimensional electronics constructed with conventional planar processes. The move to the third dimension is reserved for the last act of the construction process.

The technology offers a versatile range of applications from Industrie 4.0 scenarios to the equipment of aircraft cabins or from medical technology to consumer electronics or even smart textiles.

Fraunhofer has a long track record of developing the essential threshold technologies in the field of elastic and textile electronics, including deep drawing and laminating processes. The tutorial offers you a comprehensive overview of the current state of conformable electronics. We will introduce you to the design tools and to our instruments that you can use for the development of your own products.



Duration

1 day

Date

18.10.2018

Venue

Fraunhofer IZM, Berlin

Costs

480 €

Target Group

Engineers and technicians working in research and development, construction, and technology functions, in particular in the automotive and automotive supplies, mechanical engineering, electrical engineering, and medical technology sectors

More

Information

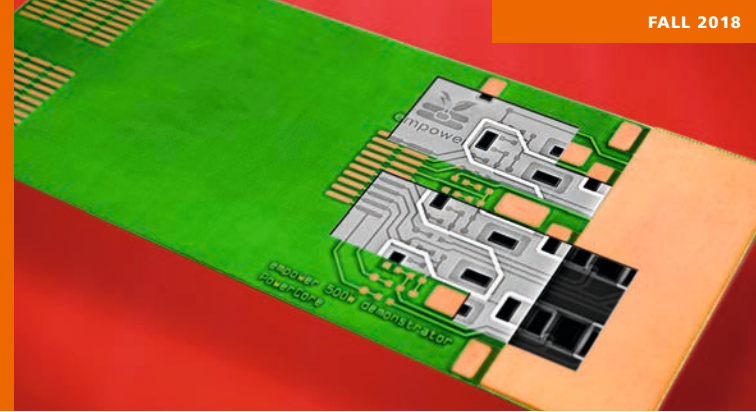
www.izm.fraunhofer.de/ws_9

Contact

Christine Kallmayer
christine.kallmayer@izm.fraunhofer.de

WORKSHOP

SMD COMPONENT EMBEDDING INTO PCBs



Contents

- General aspects of PCB embedding technologies:
Past, present, future
- PCB embedding of SMD components
- Design and build-up options and approaches
- Application examples

Embedding technologies of electronic components into printed circuit boards have evolved into a highly reliable and versatile approach for miniaturization of electronics. High throughput fabrication of miniaturized modules as using customized components and processes is established in leading edge circuit board houses.

However, embedding technology can also be employed for miniaturized electronics, using commercial SMD components for the build-up of the electronic system. These components are mounted onto inner layer of the printed circuit board and are subsequently laminated into the build-up layers.

The intention of the workshop is to provide a good understanding of the design rules and build-up options which are available in SMD embedding. Such embedded solutions can be realized with a reasonable budget for prototyping or small to medium-size production and are well accessible to small and medium-size companies by respectively equipped PCB manufacturers.



Duration	1 day
Date	Fall 2018
Venue	Fraunhofer IZM, Berlin
Costs	480 €
Target Group	Development engineers in the field of power electronics machining industry, robotics, automotive and suppliers
More Information	www.izm.fraunhofer.de/ws_10
Contact	Dr. Andreas Ostmann andreas.ostmann@izm.fraunhofer.de

WORKSHOP

WAFER LEVEL PACKAGING & SENSOR INTEGRATION

Wafer level packaging is a synonym for the whole technology spectrum enabling direct chip attachment on PWB or other substrates by flip chip interconnection. In contrast to pure bumping processes additional thin film wiring layers are required featuring a higher level of integration by embedding active or passive devices onto the chip. The technology is feasible for any kind of CMOS wafers but also for III/V or even sensors.

Contents

- Wafer bumping and multi-layer metallization
- Fan-in / fan-out wafer level packaging
- 2.5D / 3D Integration technologies
- MEMS and sensor packaging
- Wafer level capping and wafer bonding
- Assembly technologies (chip to chip, chip to wafer, chip/module to substrate)
- Realization and integration of sensors and sensor elements
- Analysis and measurements methods
- Electrical design and layout



Duration	1 day
Date	Fall 2018
Venue	Fraunhofer IZM, Berlin
Costs	480 €
Target Group	Development and construction engineers in the field of automotive and suppliers, industrial engineering and electronics

More Information
Contact www.izm.fraunhofer.de/ws_15
 Oswin Ehrmann
oswin.ehrmann@izm.fraunhofer.de

WORKSHOP POWER-OPTIMIZED ELECTRONICS

Contents

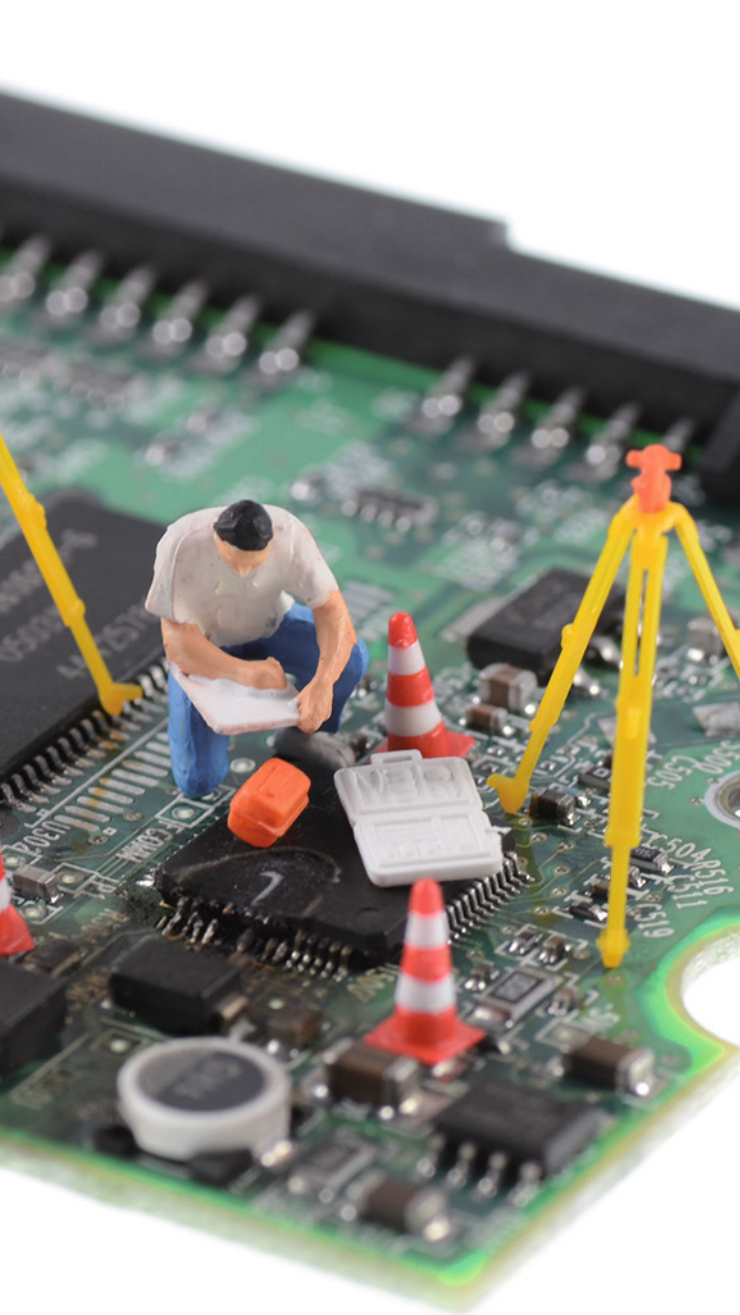
- Basics of energy-efficient system concepts for IoT
- Balancing of pre-analysis and data transfer in a dynamically developing environment
- Design methods for IoT sensor nodes

The Internet of Things demands novel components and system concepts that can achieve the high degree of autonomy needed in such IoT nodes, while keeping overall power consumption low in view of the sheer number of connected devices working together.

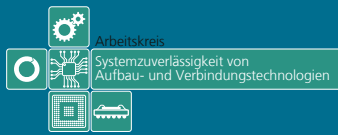
The workshop addresses these challenges and explores the potential of current technology. It covers the rich ground from the implementation of semiconductor chips or system design to the selection of a suitable network topology and introduces the results of the Fraunhofer Initiative »Towards Zero Power Electronics«.



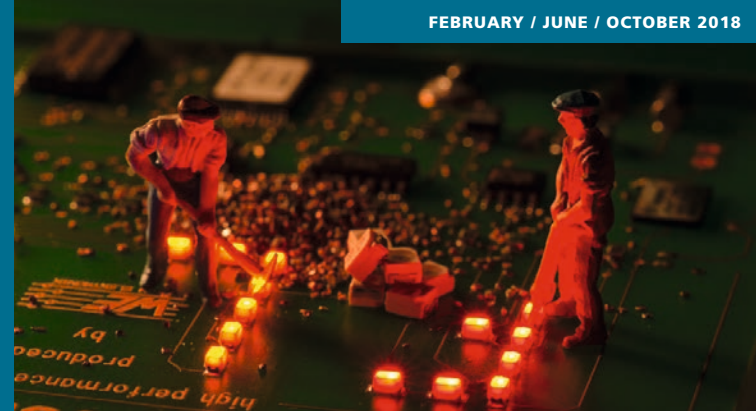
Duration	1 day
Date	Winter 2018
Venue	Fraunhofer IZM, Berlin
Costs	480 €
Target Group	Engineers and technicians with an interest in low-power electronics
More Information	www.izm.fraunhofer.de/ws_11
Contact	Erik Jung erik.jung@izm.fraunhofer.de



MATERIALS & RELIABILITY



INDUSTRY WORKING GROUP SYSTEM RELIABILITY IN ASSEMBLY AND INTERCONNECTION TECHNOLOGY



Contents

- Reciprocal effects between different components and assembly and interconnection technology and their impact on the overall system
- Procedural factors, whisker formation, electromigration
- Long-term reliability and the field behavior of complete systems
- Understanding the interplay between different fault mechanisms

Background:

With the introduction of lead-free connection technology in July 2006, the electronics industry has implemented parts of the EU's RoHS directive. In late 1999, Fraunhofer IZM founded an industry working group on lead-free interconnection technology to help the electronics industry achieve this transition in their processes. In 2013, this group became part of the working group on system reliability in mounting and interconnection technology.

The working group offers a forum for discussing challenges and solutions in research and industrial practice with partners in the industry.

The working group is supported by the association of the electrical engineering and electronics industry ZVEI (Zentralverband Elektrotechnik- und Elektronikindustrie e.V.) and the electronics designers' association FED.



Duration

1 day

Dates

14.02.2018*

04.06.2018**

10.10.2018*

Venue

* Fraunhofer IZM, Berlin

** Fairground, Nürnberg

Costs

995.00 € annual attendance fee per company

Target Group

Product development and quality assurance managers

More

www.izm.fraunhofer.de/ia_22

Information

Contact

Felix Wüst

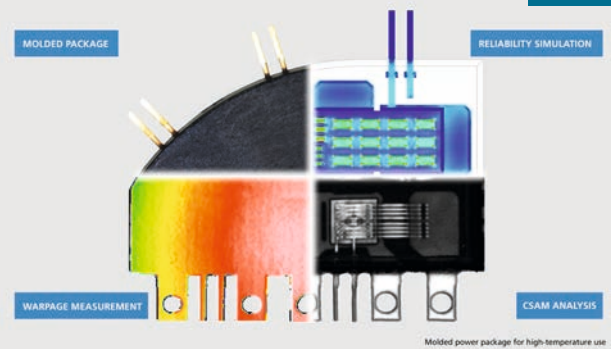
felix.wuest@izm.fraunhofer.de

WORKSHOP

RELIABILITY IS NO ACCIDENT! – DESIGN, MATERIAL, TECHNOLOGY, SIMULATION, TEST

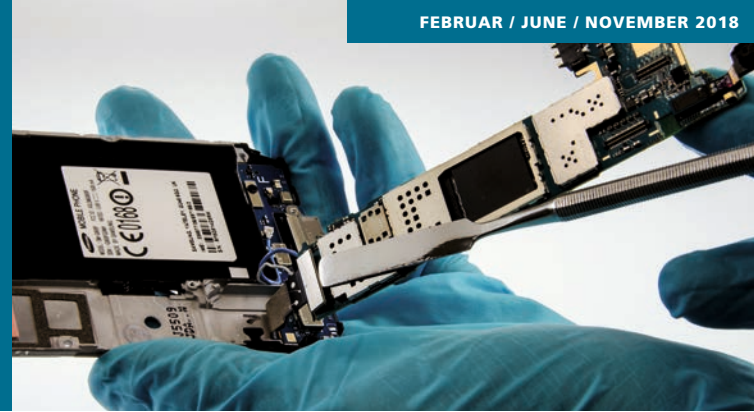
Modern electronic packaging combines a vast range of components (chips, sensors and actuators, micro-mechanical and micro-optical components etc.) with diverse means for system integration (different substrates, interconnections, packages). For the resulting mixed microsystems, the trend towards functional versatility, miniaturization, and increased real-world resilience often means that all possible types of materials (metals, organic and non-metal inorganic, or composite materials) have to come together in the tiniest of spaces.

This combination of different materials creates new challenges for typical stress scenarios, such as those caused by thermal cycling. Potential consequences include fatigue cracks in metals, forced fractures in chips, ceramics, or glass, or delamination, for instance at the interfaces between polymer and metal surfaces. This problem – the reliability of modern mixed microsystems – will be the focus of this event.



Duration	1 day
Date	15.03.2018
Venue	Fraunhofer IZM, Berlin
Costs	t.b.d.
Target Group	Engineers and technicians from the realm of microelectronic packaging
More Information	www.izm.fraunhofer.de/ws_14
Contact	Prof. Martin Schneider-Ramelow martin.schneider-ramelow@izm.fraunhofer.de

WORKING GROUP INDUSTRY COMPLIANT ENVIRONMENTAL MANAGEMENT IN THE ELECTRONICS INDUSTRY



Contents

- The status quo of domestic and international legislation on environment and electronics
- Methods and tools for developing environmentally sound products
- Declaring materials

Background

European and international legislation is constantly evolving: RoHS, REACH, and CLP are placing new demands on technology and materials management; WEEE is developing further, and the Eco-Design Directive is being applied to more and more product categories. Thresholds and limits are tightened and new standards introduced. Beyond these specific legal concerns, other current trends like carbon footprints, eco-assessments, new materials, and the issue of conflict minerals are affecting the work of electronics manufacturers.

The working group helps its members anticipate developments that affect how they design and produce fully compliant products. Challenges and solutions are discussed and empirically investigated with partners in science and industry. The working group is supported by Germany's digital industry association BITKOM and the electronics designers' association FED. It is organized and hosted by Fraunhofer IZM.



Duration

3 days

Dates

20.02., 14.06., 06.11.2018

Venue

Fraunhofer IZM, Berlin

Costs

995 € annual attendance fees per company

Target Group

Managers in environment management, CSR, risk management, technical sales, procurement, and supply chain management in the electronics industry; legal and consulting professionals working on environmental product standards; product testing managers, laboratory directors

More

Information

www.izm.fraunhofer.de/ia_23

Contact

Karsten Schischke
karsten.schischke@izm.fraunhofer.de

WORKSHOP

RELIABILITY ASSESSMENT OF ELECTRONIC SYSTEMS



Contents

- Definitions and terminology
- Norms and standards
- System analysis methods
- Simulation systems
- The impact of stress forces and failure processes
- Integrating aging models
- Managing norms and standards
- Realistic stress tests
- Interpreting and understanding test data
- Using reliability indicators
- Ensuring reliability by state monitoring

The tutorial is organized by the Institute's Department of Environmental and Reliability Engineering, which supports new technologies on their path towards full commercial maturity. The course introduces the methods and backgrounds of application-specific reliability assurance processes in the development and production of electronic systems.

The evening program on the first day will also offer an opportunity for the tutors and participants to share and discuss special aspects of their work.



Duration

2 days

Dates

08.–09.11.2018

Venue

Fraunhofer IZM, Berlin

Costs

980.00 €

Target Group

Quality managers and reliability engineers entrusted with managing or supporting decisions in product development and quality assurance

More

Information

www.izm.fraunhofer.de/ws_12

Contact

Dr. Johannes Jaeschke

[johannes.jaeschke@](mailto:johannes.jaeschke@izm.fraunhofer.de)

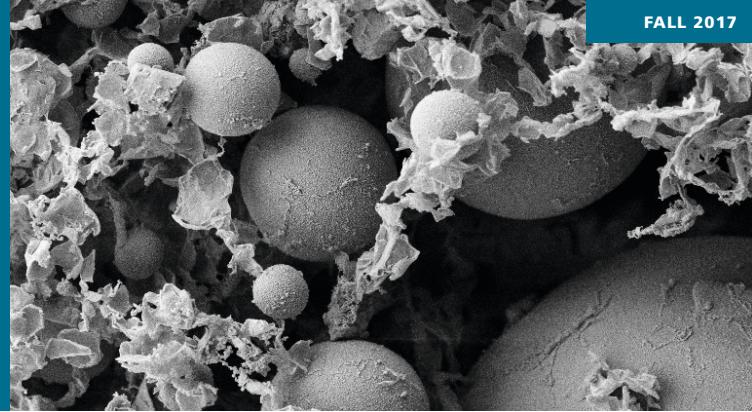
izm.fraunhofer.de

Dr. Stefan Wagner

[stefan.wagner@](mailto:stefan.wagner@izm.fraunhofer.de)

izm.fraunhofer.de

WORKSHOP POLYMER AGEING AND MICROELECTRONIC PACKAGE RELIABILITY



Contents

- Introduction of polymers used in microelectronics
- Important aspects of encapsulation technologies for reliable packaging
- Aging mechanisms of polymers
- Adhesion and interface degradation
- Test methods and selection criteria for polymers in microelectronics packaging
- Overview of state of the art measurement equipment
- Moisture and temperature induced changes in material properties
- Lifetime simulation by FEM taken polymer degradation into account
- Failure mechanisms related to polymer ageing

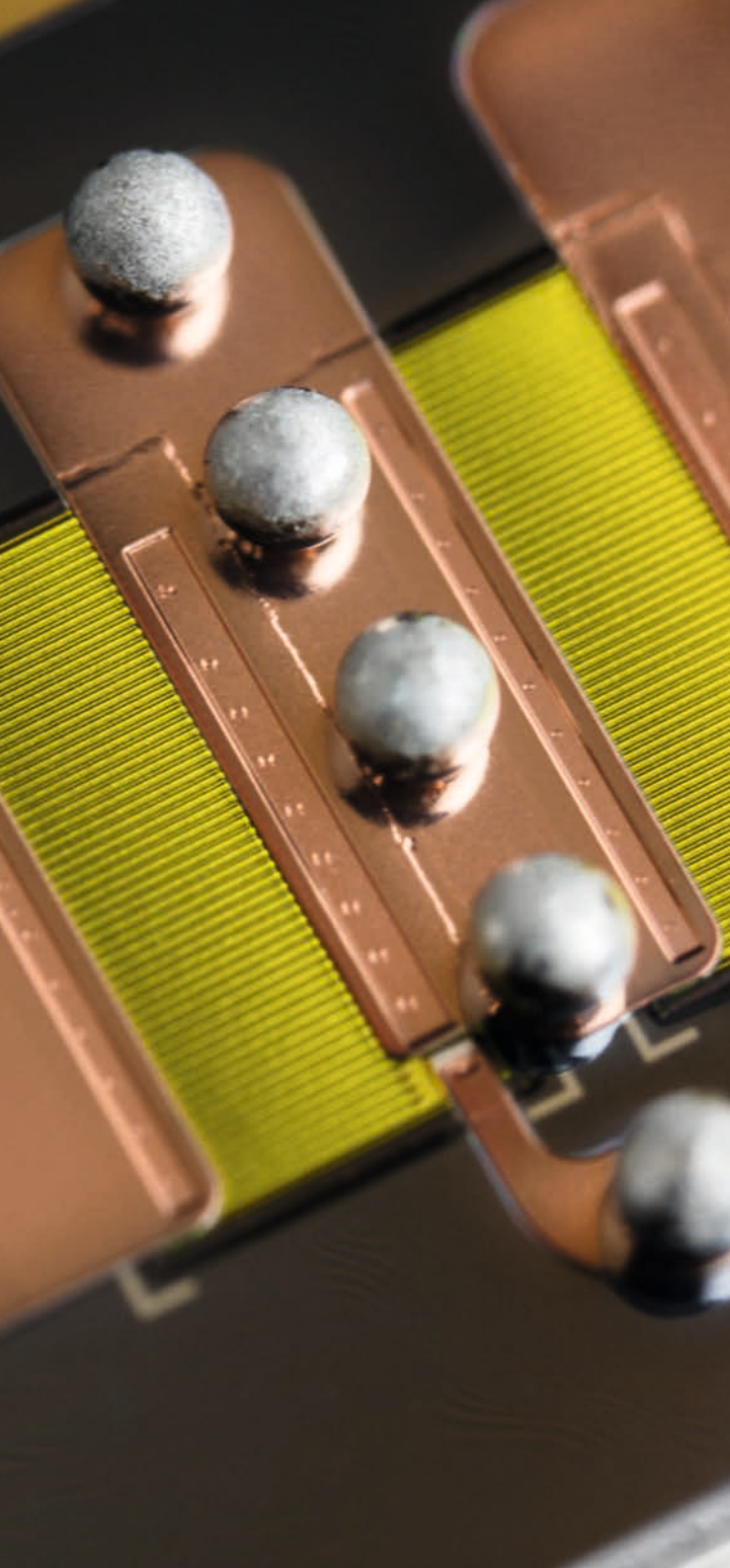
Many electronic products used in different applications, such as automotive or medical but even consumer are exposed to extreme loading profiles as high temperatures, random vibrations or humid and or wet environments. Lifetime demands of 10 years and above in combination with these challenging environments requires well known materials and broad knowledge on their behaviour over the entire lifetime.

Polymers are widely used in microelectronics packaging e.g. as interconnect material, encapsulants or substrate. But polymers age with time, temperature and humidity.

Aging means a change in properties including mechanical, thermo-mechanical or adhesion characteristics. All, key factors for reliable package solutions. Hence, knowledge on materials and their aging behaviour is essential for developing reliable microelectronics packages and systems.



Duration	1 day
Date	Fall 2018
Venue	Fraunhofer IZM, Berlin
Costs	480 €
Target Group	Engineers at management level in the field of microelectronic package design, development and reliability engineering
More Information	www.izm.fraunhofer.de/ws_13
Contact	Dr. Tanja Braun tanja.braun@izm.fraunhofer.de Dr. Ole Hölck ole.hoelck@izm.fraunhofer.de



**WHERE TO FIND
FRAUNHOFER IZM**

RESEARCH FAB MICROELECTRONICS GERMANY

One-stop shop for technologies and systems

To reinforce the position of Europe's semiconductor and electronics industry beside global competition, eleven institutes within the Fraunhofer Group for Microelectronics have, together with the Leibniz Institute for Innovations for High Performance Microelectronics (IHP) and the Ferdinand-Braun-Institut, Leibniz-Institut für Höchstfrequenztechnik (FBH), come up with a concept for a cross-location research factory for microelectronics and nanoelectronics.

The establishment of the Research Fab Microelectronics Germany will be a unique offering available to the German and European semiconductor and electronics industry. The cooperation of a total of 13 research institutes and more than 2,000 scientists is already the world's largest pool for technologies and intellectual property rights within the area of smart systems.

This new form of cooperation will make a major contribution to strengthening European industry's competitiveness internationally.



Contact

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izm.fraunhofer.de

www.forschungsfabrik-mikroelektronik.de

HIGH TECH FOR HARDWARE START-UPS »START-A-FACTORY«

Reshaping the Start-Up Ecosystem

Start-a-Factory wants to become the new iteration of the legendary Silicon Valley start-up garage: Equipped with high-tech facilities and tailored specifically to the needs of young enterprises, it creates a perfect opportunity for the step from the first idea to a tangible prototype ready for industrial production.

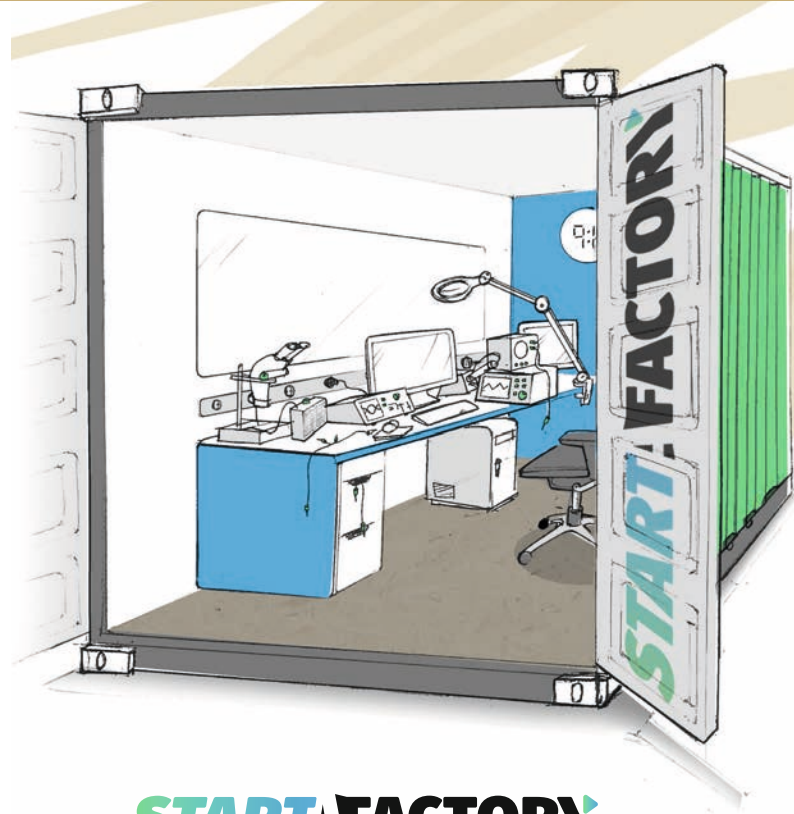
Services:

- Cost-efficient and flexible access to technology
- Individual solutions for later reproduction on standard equipment
- Space and facility use concepts
- Development and prototype construction
- Modular and adaptable for most environments

We invite all innovative SMEs and hardware start-ups in the early stages of development to test the implementation of their new products and develop the iterative processes needed for full-scale production.

Your Benefits:

- Flexible and modular laboratory facilities
- Access to Fraunhofer expertise for product and prototype development
- Advice on value chain optimization
- Tangible results in record time



START-A-FACTORY
advanced tools
for your ideas

Contact

Ulf Oestermann
ulf.oestermann@
izm.fraunhofer.de

www.izm.fraunhofer.de/saf

YOUNG TALENT AT FRAUNHOFER IZM

The future of our work depends on the talent and potential of the young researchers of tomorrow. We are committed to fostering that potential, which is why Fraunhofer IZM has been offering combined apprenticeships and vocational education as well as school and university internship placements for almost 20 years.

We have been expanding our activities in the area with school partnerships, Girls' Day activities, and the special Fraunhofer Talent Take Off. All of these give interested young people an insight into the vocational and academic education opportunities in STEM fields and into the unique world of the Fraunhofer Institutes.

Get Girls Going – Girls' Day at Fraunhofer IZM

The Girls' Day is the world's largest career inspiration initiative for girls in secondary education.

At Fraunhofer IZM, this year's Girls' Day on April 26, 2018, gives you a chance to get active in our laboratories and experience microelectronics up close and personal. All girls in school years 6 and 7 are welcome!

www.girls-day.de/



Talent Take Off – Get On Board

Our degree orientation program »Talent Take Off« gives you an exciting peek behind the curtains of applied research and will answer your questions about working at Fraunhofer. The project is meant for school and university students. It includes three modules, chosen to match your age and experience.

www.fraunhofer.de/talent-take-off

Long Night of the Sciences 2018

For Berlin's Long Night of the Sciences on June 9, 2018, Fraunhofer IZM and the Technical University's Research Center for Microperipheral Technologies will collaborate on an exhibition called »Interactive Microelectronics«. Visitors can tour the cleanrooms, which offer fly-on-the-wall insight into state-of-the-art microelectronic assembly techniques. Aspiring young surgeons can try their hand at endoscopic investigations of stuffed toys, using the world's smallest camera, an IZM innovation.

www.langenachtderwissenschaften.de

Contact

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ASSEMBLY TUTORIALS PRODUCTION LINE FUTURE FAIR PACKAGING

FRAUNHOFER IZM SMT IN JUNE 2018

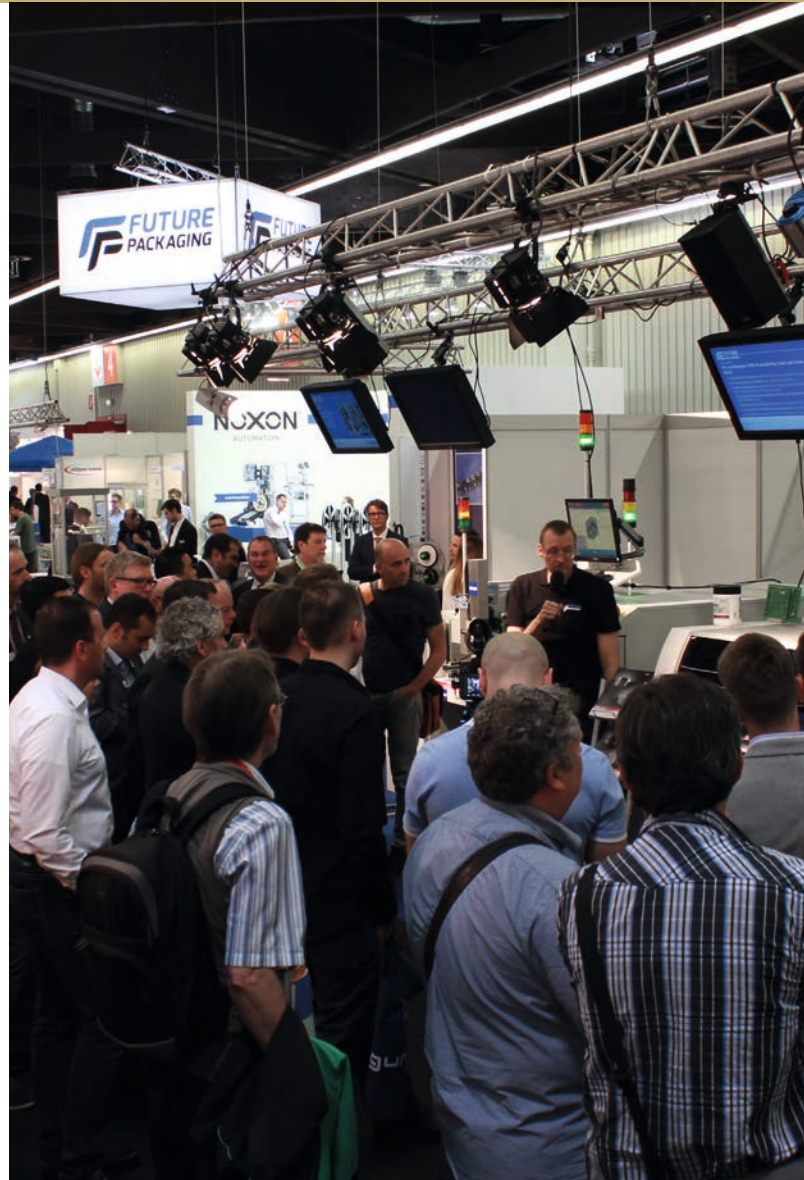
The SMT Hybrid Packaging is Europe's premier exhibition on system integration in microelectronics, focusing on design and development, circuit boards, components, assembly and interconnection technologies, and new testing equipment. We invite you to be there from 5 – 7 June 2018 and visit Fraunhofer IZM at Booth 258 in Hall 4.

Meet us for a chance to get a close-up look at the newest trends in assembly and interconnection technology on the frontlines of the IZM labs. We will introduce you to current applications in industrial and power electronics and showcase our newest research into WLP, substrate integration, assembly technology, and system reliability.

Future Packaging Production Line powered by Fraunhofer IZM

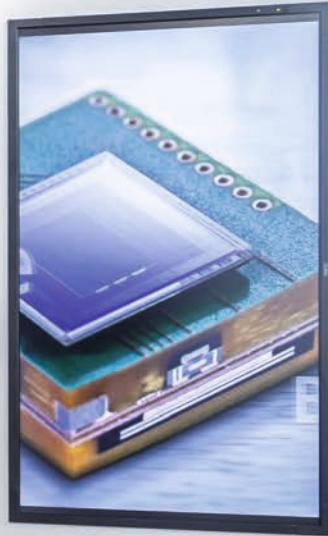
Hall 5 gives you an opportunity to see a complete production line in action and learn how modern assembly production is responding to the increasingly demanding standards expected by the markets and the users in the real world. With three live demonstrations per day, you have a chance to experience the entire production value chain and get an insight into the potential of the connected world of Industrie 4.0 and the Internet of Things.

Be there and get your business fit for the future!



 **Fraunhofer**
IZM

FRAUNHOFER-INSTITUT
FÜR ZUVERLÄSSIGKEIT UND
MIKROINTEGRATION IZM



SERVICE

REGISTRATION



Registrations

Please register for the event you are interested in latest four weeks before its scheduled date to help us plan the event. You will be sent a written confirmation of your registration, which constitutes the registration agreement, as well as a digital invoice. In events of limited group size, registrations will be assigned in the order of receipt. If an event is already fully booked, we will inform you about any available replacement dates.

Collection and Processing of Data

With your registration, you consent to the collection and electronic storing of your personal data. We will treat your personal data confidentially and process it solely for the purpose of organizing the events of Fraunhofer IZM in accordance with applicable data protection regulations. You have the right to withdraw your consent to the collection and processing of your data at any time.

Event Fees

The event fees are tax exempt in accordance with Sect. 4 Nr. 22a UStG and typically include the costs for organizing the event itself as well as the documents and catering during the event (beverages during breaks and lunch).

Cancellation Policy

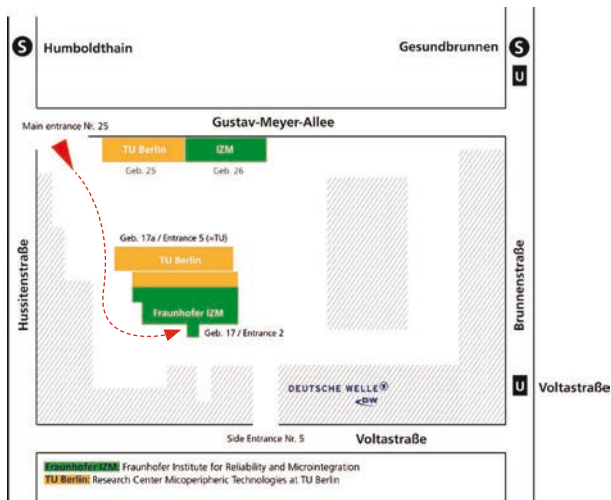
All cancellations must be made in writing, by email. No cancellation fees apply up to four weeks before the scheduled start of the event.

If we receive your cancellation up to one week before the scheduled start of the event, we will charge cancellation fees of 50% of the total amount. The full amount will be charged in the case of cancellations after that point. Alternatively, you can nominate a different attendee in your place.

Cancelled Events

Fraunhofer IZM reserves the right to cancel scheduled events if the required number of attendants is not met or in cases of force majeure. In these cases, the event will be rescheduled to an alternate date if possible. Should this not be possible, you are entitled to cancel your registration free of charge. Any attendance fees already paid will be reimbursed. Any claims to a reimbursement of travel or accommodation costs or loss of working hours are excluded.

HOW TO GET THERE



By Car

From the A115, take the A100 toward Hamburg/Wedding. The A100 turns into Seestraße. Continue straight ahead, then turn right into Müllerstraße, which turns into Chausseestraße. From here, turn left into Liesenstraße. At the roundabout, take the second exit into Scheringstraße, which turns into Gustav-Meyer-Allee. Be aware that the area within the S-Bahn (overhead rail) was designated a low-emission zone in 2010.

Only cars meeting specific low-emission standards are allowed in the zone.

By Rail

From Berlin Hauptbahnhof, catch the S-Bahn (overhead rail) line 5 toward Strausberg Nord) or 75 toward Wartenberg and get out at S-Bahnhof Alexanderplatz. Here, transfer to U-Bahn (subway) line 8 toward Wittenau and get out at U-Bahnhof Voltastraße. The institute is about 10 minutes walk from the subway station.

Per Air

From Tegel Airport, catch Bus 128 to the stop Osloer Straße. Transfer to the U-Bahn line 8 toward Hermannstraße and get out at U-Bahnhof Voltastraße. The institute is about 10 minutes walk from the subway station.

Berlin

Fraunhofer IZM Berlin
Gustav-Meyer-Allee 25
Building 17/3
13355 Berlin, Germany

HOTELS NEAR FRAUNHOFER IZM

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Alexanderplatz 7
10178 Berlin
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info@parkinn-berlin.com
www.parkinn-berlin.de

Wyndham Garden Berlin Mitte Hotel

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Hotel Grenzfall

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Mikroelektronik**
Deutschland

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and Microintegration IZM**

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