Photonics Packaging for Harsh Environments

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Helmut Knapp is Application Manager for Instruments & Tools for Life Sciences at CSEM. He holds a master degree in Physics from the Technical University Berlin and received his PhD in Biophysics at the Max-Planck-Institute for Biochemistry near Munich. Before joining CSEM in 2000 he worked in the Nanotechnology Group at the ETH . Now he manages the development and industrialization of micro technologies for life sciences applications.

Labtour

Dr.-Ing. Stefan Mohrdiek

Head Packaging and Optics, CSEM SA, Alpnach OW
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Stefan Mohrdiek is heading the packaging & optics activities at CSEM. The main focus of his work is on supervising programs and establishing new research platforms in microelectronics, enabling/targeting innovative packaging solutions and aligning the research strategy with industry needs and the company's existing research areas.
He received the master degree in electrical engineering with emphasis on communications engineering at the Technical University Darmstadt in 1990. The PhD in Optoelectronics he obtained working at the Deutsche Telekom Technology and Research Center in Darmstadt in 1995. The PhD was followed by a fellowship the Technical University Tampere in the semiconductor laboratories. When moving to Switzerland in 1998 he joined the semiconductor industry, developing applications for packaged semiconductor lasers. After 15 years he started at CSEM in 2013 with an overall experience of more than 20 years in the field of optoelectronics and packaging, about 50 scientific publications and a number of patents.

Welcome note

Dr. Laurent Aebi

Vice Director, MC-Monitoring SA, Givisiez France
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Mechanical engineer graduated from the ETH in 2005
PhD on non-destructive characterization of microstructures obtained in 2010
Since end of 2010 at MC-monitoring, current position Vice Director

Integrated fiber optics acceleration sensors for hazardous environments
To monitor end-winding vibration in power generators an integrated fiber optic acceleration sensor (FAS) is used. Specific test methods have been developed at MC-monitoring to validate the FAS-sensor robustness to face the hazardous environmental conditions and at least 10 years of continuous service operation. Results obtained in laboratories are presented and compared to available field measurements.

Dr. Max Stumpf

Development Engineer Laser and Photonics, Ruag Space, Zürich
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Max Stumpf received his PhD in 2010 from ETH following his research on ultrafast lasers for frequency comb generation. In the same year he joined RUAG Space in Zurich for the development of a space-based laser system for optical communication between satellite and ground. His professional interests include active and passive photonic technologies for various applications on satellite instruments.

Photonics Packaging for Space Environment
Space is a particular harsh environment for photonic packages. It imposes severe loads of shock, vibration, absolute temperatures, and thermal cycling, while requiring extreme reliability over years of operation in vacuum and under radiation. The talk outlines the connected challenges for photonic packages, it explains common strategies for qualification, and provides some examples of conclusions and successful devices.

Ulrich Stärker

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Ulrich Stärker, Physicochemist with strong background in optical measurement technology development and manufacturing. Mini- and satellite-based spectrometers with Spectrosolutions AG, fluorescence detection system for IVD, LST and medical devices with Volpi AG.

Life Science Tools and In-Vitro Diagnostics – Challenges for industrialization of OEM-solutions
This talk will give insights in the faced problem areas in the design solutions in the IVD & LST area. How do this challenges depend on the optical system sensitivity? What material and design constrains are posed on instrumentation in key applications?

Rony Jose James

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Rony Jose James, MSc. is a Senior R&D Engineer at CSEM. He is working at CSEM since 2007, focusing on hermetic sealing of microsystems and medical devices. He received his Master degree in Micro and Nano-Technology (2006, Helsinki University of Technology, Finland) and holds an engineering degree in Instrumentation and process control (2000, Malnad college of engineering, India). He has more than 8 years of experience in microsystem technologies, focusing on topics like reliability of BGA solder joints, hermetic sealing and feedthrough technologies for implantable devices, MEMS hermetic sealing, laser based bonding technologies and hybrid packaging. He also has experience on reliability testing and analysis of solder joints, especially with lead-free solders. He has been actively involved in long term implantable packaging projects and owns a patent on biocompatible packaging of long term implantable devices. He is currently also board member of the IEEE CPMT Swiss chapter.

Optical and RF transparent long-term biocompatible packages
Miniaturization of long term Active Implantable Medical Devices (AIMDS) using cutting edge technologies is necessary to enable next generation medical applications, focusing on recording and stimulation of physiological activities. We would like to present a novel packaging method, enabling this miniaturization with the additional advantage of Optical and Radio Frequency (RF) transparency.

Dietmar Bertsch

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Mr. Bertsch completed his diploma studies in engineering (HTL) at the NTB as a systems engineer wih a focus on materials engineering. Upon finishing his military service, he joined the Institute MNT in 2000, where he focuses on applied research and development for use industrial environments. He specializes on packaging of microsystems components, especially on bonding techniques and materials research and analysis.

Industry-Driven Packaging Solution: Delicate Devices in Harsh Environments
The speech covers specifications and solutions for industrial - level packaging for MEMS devices. Reaching from optical pressure gauges, LED packages to ultrathin hall sensors. The specifications vary from ultra high vacuum, autoclave ability, to minimal height. The methods shown extend from specially developed bonding methods to optimisation and combination of known processes to form a functioning package that can be manufactured in an industrial environment.

Dr. Lars Jeurgens

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Lars Jeurgens received his PhD in Materials Science at the Delft University of Technology in 2001. After working for the Dutch technology foundation, he took up a position as research group leader at the Max Planck Institute for Metals Research in Stuttgart in 2003. His research during this period was honoured with the Masing Gedächtnispreis of the Deutsche Gesellschaft für Materialkunde in 2008. Lars joined Empa, as the head of the laboratory for *Joining Technologies and Corrosion* in 2012.

Recent developments of joining technologies for ever more complex industrial requirements
The industrial demand to manufacture complex multi-material assemblies has grown exponentially. Fabricated components should be small, lightweight, efficient, sustainable, cost-effective and also exhibit extended service lifetimes under complex loading conditions in reactive environments. This talk addresses recent advancements in joining technologies at Empa to cope with the continuous miniaturisation and integration of heat-sensitive nano-materials and components at ever-lower processing temperatures.

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