

# BioPhotonics - Photonics in Life Sciences

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**Prof. Dr.  
Gerda Huber**

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Prof. Dr. Gerda Huber schloss ihr Studium am Biozentrum der Universität Basel mit einer Dissertation in Biochemie ab. Sie habilitierte an der Universität Basel (Spezialgebiet: Molekulare Neurobiologie). Nach Post-Doc Stationen am Friedrich-Miescher Institut und bei Ciba-Geigy (Biotechnologie) war sie bei Hoffmann-La Roche AG als Forschungswissenschaftlerin, dann als globale Programmmanagerin für integrierte Gesundheitslösungen tätig. Sie leitete anwendungsorientierte Forschung für Nervenerkrankungen und Wirkstoffsuche in Neurologie und Psychiatrie; im integrierten Gesundheits- und Diagnostikbereich war sie für die Divisionen Pharma und Diagnostik im Sinne von Business Development verantwortlich für die Entwicklung ganzheitlicher Behandlungskonzepte und personalisierte Medizin bei Nervenerkrankungen. Ab 2002 amtierte sie als Direktorin des Fachbereichs Technik und Leiterin Forschung & Dienstleistungen an der Fachhochschule Solothurn (Oensingen, Olten). Sie leitete 2005 die Gründung der Hochschule für Life Sciences FHNW in Muttenz und ist seit 2006 deren Direktorin.

**Welcome**



**Dr. Christian  
Bosshard**

**Manager Swissphotonics NTN**  
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Dr. Christian Bosshard is managing the Thin Film Optics Division of CSEM in Muttenz and serves as Managing Director of Swissphotonics. He received his degree in Physics (1986) and his doctorate (1991, Silver medal award) from ETH. Christian Bosshard is a Fellow of the Optical Society of America (OSA).

**Tabletop exhibition: Photonics and printable electronics**

The photonics and printable electronics activities at CSEM will be presented with several demonstrators:

- Nicolas Glaser, screen printed sensors
- Dr. David Kallweit, brand protection and security
- Luc Dümpelmann, optical sensing
- Dr. Nenad Marjanovic, hybrid printed electronics

**Moderation**



**Dr.  
Christoph Harder**

**President Swissphotonics, Schindellegi SZ**  
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Dr. Christoph S. Harder received the Electrical Engineering Diploma from the ETH in 1979 and the Master and PhD in Electrical Engineering in 1980 and 1983 from Caltech, Pasadena, USA. He is co-founder of the IBM Zurich Laser Diode Enterprise which pioneered the first 980nm high power pump laser for telecom optical amplifiers.

He has been managing during the last few years the high power laser diode R&D effort in Zurich expanding, working closely with a multitude of customers, the product range into 14xx pumps as well as 808 and 9xx multimode pumps for industrial applications. He has published more than 100 papers and 20 patents and has held a variety of staff and management positions at ETH, Caltech, IBM, Uniphase, JDS Uniphase, Nortel and Bookham.

**Introduction**



**Prof. Dr.  
Jérôme Faist**

**Quantum Optoelectronics group, Institut für Quantenelektronik ETH**  
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Jérôme Faist was born in Switzerland and obtained his PhD in Physics in 1989 from EPFL. He then worked successively at IBM Rüschlikon and Bell Laboratories. He was full professor in the University of Neuchâtel and then at the ETH Zurich.

His key contribution to the development of the quantum cascade laser was recognized by a number of awards that include the National Swiss Latsis Prize 2002. His present interests include the development of mid-infrared and terahertz quantum cascade lasers, the physics of strong light-matter coupling in small resonators and quantum dots intraband devices.

#### **QCL for biophotonics**

Quantum Cascade Lasers are now an optical source of choice in the mid-infrared (3-23 $\mu$ m) and terahertz (60-250 $\mu$ m) regions of the spectrum. While the original applications have focused originally to gas analysis, recent developments in broadband devices have opened new avenues for spectroscopy of broad absorption lines typical of biological media. Specifically, broadband devices based on external cavities, array of distributed feedback lasers and on newly developed quantum cascade optical frequency combs will be discussed.

## **Session 1: Instrumentation, Monitoring, Imaging**



**Dr. Yann Jérôme  
Michel Pascal  
Cotte**

**CEO, Co-Founder of Nanolive**  
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Dr. Yann Cotte started his basic studies in Physics at University of Würzburg, from where he received an international scholarship. After a M.Sc. from the State University of New York, he started a PhD in Optics and graduated from EPFL in 2012. He is author of more than 20 scientific publications, invited talks, and IP. His initiative and creativity brought him to be elected project leader of Venture lab and founder/president of the Optical Society of America (OSA) chapter at EPFL. He has lived and worked in France, Germany, the US, Switzerland, and Spain and is fluent in 4 languages.

#### **3D imaging of living cell**

Nanolive has developed a disruptive proprietary technology, which allows for the very first time to explore a living cell in 3D without damaging it. By experiencing the living cell in a completely new way, our 3D Cell-Explorer shows a comprehensive representation in color of its activity.



**Dr. Martin Forrer**

**Fisba Optik AG**  
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Martin Forrer is leading the research and development team at Fisba Optik AG since 2006. During the industrial engagement at Fisba he has developed successful customer products based on micro-optical designs and innovative fabrication technologies. His latest focus is the selection and implementation of the technologies needed for glass precision molding and for the design and production of miniaturized optical systems. He received the academic education as experimental physicist in laser physics and polymer physics from ETH. He performed his PhD thesis in the laser physics group at the University of Berne and his research postdoc work at the EPFL for medical laser applications.

#### **Endoscopy**

Fisba is leading in optical design and system engineering for precision optical systems and serves the customers from feasibility studies through to series production. Based on challenging market requirements, Fisba is succeeding in the trend for miniaturization with various high end micro-optical systems ranging from applications such as high power diode laser collimation, laser modules for **Computer To Plate (CTP)** printing and more recent innovations such as chip on the tip technology for flexible endoscopic imaging application and UV and *RGBeam* diodelaser combining several diode-laser wavelengths for customer applications such as micro-endoscopic illumination, life-time imaging, sensing and displays.



**Dr. Christian Vélez**

**Founder and CEO Exalos AG, Schlieren ZH**  
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Dr. Christian Vélez has a diploma with honors in physics from the ETH. During the time when he was finalizing the writing of his PhD thesis at the Institute of Quantum Electronics at the ETH in the laboratory of Prof. Hans Melchior, he managed to cover the global sales and marketing activities for B2B markets of optoelectronic devices at Opto Speed, Ticino. He was a member of the management team of Opto Speed Zurich AG (InP semiconductors), where he acted as Product Line Manager and Key Account Manager for the SLED product line. He successfully built up and managed the product line team consisting of two to eight persons. He developed new products and expanded them to serve customers in telecommunications, fibre optic sensors, medicine and gyroscope. He increased the product market position through the active involvement in the design activities with strategic customers. As a result, he was able to closed major design wins at key accounts, managing these programs from initial point of contact to engineering prototypes through to production.

**OCT for biophotonics**

Different light sources using **Optical Coherence Tomography (OCT)** will be presented, as they are being developed and produced by Exalos AG.  
This consists in particular in superluminescence light emitting diodes and fast tuned laser (swept source).

**Laptour NanoTechnology**

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**Laptour MedTech**

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## Session 2: Diagnostic, Treatment, Therapeutics



**Dr. Marc Schnieper**

**Section Head CSEM, Muttenz BL**  
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Dr. Marc Schnieper is leading the section *Integrated Sensing & Security* at CSEM Muttenz. He received his PhD from the University of Geneva with distinction where he worked on high resolution optical spectroscopy and *Raman* scattering. After joining CSEM, Dr. Schnieper worked on Subwavelength optics, micro-optical replication technologies for applications as security, brand protection, sensing, color filter light management, integrated optical microsystem.

**Printable and organic biosensors**

A fast and simple measurement of our environment is an increasing demand. We present fabrication technologies for disposable sensors for pH, Ions, glucose and immunoassay measurements. To be competitive these sensors have to be selective, sensitive, easy to handle and low cost. By using screen printing we can fabricate disposable sensors fulfilling all these specifications.



**Dr. Frédéric Mallard**

**Innovation & Systems / Technology Research Departement / Head of Sample Preparation & Processing Lab, BioMérieux SA, Grenoble, France**

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With a strong background in general physics and molecular and cell biology, Dr. Frédéric Mallard joined bioMérieux SA in 2002 to explore potential applications of micro- and nanotechnologies to in vitro diagnostics. In the last 10 years, his team has developed several breakthrough strategies to improve the performance of diagnostic methods, especially in the field of rapid microbiology for both clinical and industrial control applications.

**Towards (nearly) real-time medicine using micro-spectroscopy**

Fighting against infectious diseases, it is of utmost importance to clinicians to apply the right treatment at the right time. Classical microbiological tests can provide relevant information that would help orienting therapeutic decisions. However, these methods are based on bacterial growth which is a time-consuming process.

We will show in this presentation how optical methods, which can be used on much less biological material, could accelerate medical decisions and strongly increase the medical value of tests.

## Round Table



**Dr. Nikolaus Traitler**

**Innovation & Technology Manager at Innovative Solutions, Renens VD**

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Dr. Nikolaus Traitler works as an Innovation and Technology Manager for multiple companies, guiding them in the development of new technologies and responsible for protecting their inventions and for setting up strategic partnerships. Dr. Traitler holds a PhD in Physics from the University of Cambridge, UK, and previously worked for patent law firms in Silicon Valley.

**Lead of the round table**

Roundtable participants will offer an insight into the current trends and hurdles of photonics in Life Sciences. What are the opportunities and shortcomings? How do we bring together companies looking for solutions and technologies in search of an application? Panelists will raise awareness of the importance of multidisciplinary research and the potential of emerging technologies for new applications in diagnostic and treatment.



**Dr. Markus Ehrat**

**CTI Head Innovation Mentor at EK Biosciences GmbH, Magden AG**

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Dr. Markus Ehrat is partner of EK Biosciences GmbH and CTI Head Innovation Mentor since March 2012. Previously he was the managing director of the division Zeptosens, and a member of the management team of Bayer (Schweiz) AG. Until 2005, Dr. Ehrat was CEO and member of the board of directors of Zeptosens AG, formed in March 1999. Dr. Ehrat has published numerous articles in peer-reviewed scientific journals and has contributed to 18 patent applications and patents.

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