Biomedical Photonics

University Bern, Wednesday, 3th of November 2010

Dr.
Christoph Harder

President Swisslaser.net (SLN), Schindellegi SZ
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Dr. Christoph 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 of SLN

PD Dr.
Martin Wolf

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PD Dr. Martin Wolf, Ph. D.
Biomedical Optics Research Laboratory, Division of Neonatology, University Hospital Zurich
President of Biomedical Photonics Network BMPN

· 1990 M.S. degree in electrical engineering ETHZ
· 1997 Ph. D. in Biomedical Engineering/Optics ETHZ
· 1999 Postoc Laboratory for Fluorescence Dynamics at the University of Illinois at Urbana-Champaign, USA
· Since 2002 head of the Biomedical Optics Research Laboratory at the Division of Neonatology, University Hospital Zurich

Introduction of bmpn

Dr.
Michael Reinert

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PD Dr. med. Michael Reinert ist Mitglied und Sekretär der Schweizerischen Gesellschaft für Neurochirurgie und der American Association of Neurological Surgeons sowie verschiedenen nationalen und internationalen Gesellschaften. Die Forschungsschwerpunkte sind auf dem Gebiet des posttraumatischen Hirnmetabolismus sowie der Entwicklung von minimalinvasiven, endoskopisch- und endovaskulär assistierten chirurgischen Behandlungen. Die Forschungsunterstützung beinhaltet mehrere peer-reviewed schweizerische und internationale Projekte. PD Dr. med. Michael Reinert ist Principal Investigator einer Multizenterstudie, welche den Effekt von einem künstlichen Sauerstoffträger auf den posttraumatischen Hirnmetabolismus untersucht. Die Publikationsliste von PD Dr. med. Michael Reinert umfasst 50 Arbeiten wovon 40 Originalarbeiten, 2 Fallbeschreibungen, 8 Buchkapitel und Buchbeiträge.

Nanoshell Assisted Laser Tissue Fusion: An Opportunity for Bypass Surgery
Laser Tissue soldering (LTS) is conventionally limited by the lack of reproducibility especially due to the changing content of the energy absorber Indocyanine Green (ICG). Using nanoshells, the chromophore can successfully be bound into the polymer scaffold. With optimally chosen settings of irradiation time, nanoshell coating and scaffold properties, our improved LTS procedure has the potential of a clinical applicable anastomosis technique.

Juan Mata Pavia

Biomedical Optics Research Laboratory (BORL)
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Dipl.-Ing. TH / Doktorand

3D near-infrared imaging based on a single-photon avalanche diode sensor

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Valeria Musi

Optics and Photonics Technology Laboratory
Institute of Microengineering (IMT), EPFL Lausanne
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Collaboratrice scientifique

Plasmonic, Bloch surface waves and Nano-photonic Elements for Bio-Sensing Application

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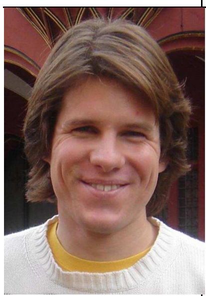

Jona Kottmann

Laser Spectroscopy and Sensing
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Academic Staff

Laser-based photoacoustic sensing of glucose in aqueous samples

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Markus Belau

The Maret Group, Soft Matter Physics, Fachbereich Physik, Universität Konstanz, D
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PhD student

Non-Invasive Measurement of Skeletal Muscle Contraction with Time-Resolved Reflectance and Diffusing-Wave Spectroscopy

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Dr. Ch. Rathjen

Ziemer Ophthalmic Systems AG, Port BE
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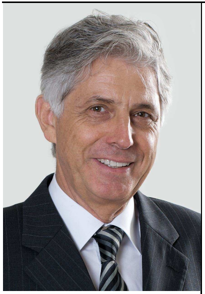
Education: Mechanical engineer (univ. degree in mechanical engineering), PhD in metrology (applied physics). Employment: university (education), CERN (development), Ziemer (innovation management). In particular 20 years experience in optics.

Femto-Lasers in Ophthalmic Systems
Femto second laser have found their first application on industrial scale in ophthalmology. The talk will summarize basic concepts of femto second laser tissue interaction. Challenges are highlighted to realise the first mobile turnkey operation system that truly fulfils the old dream of a surgical laser blade.



Dipl. Phys.
Reinhard Jenny

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Reinhard Jenny is CTO of the Volpi Group where he started as head of R&D in 1991. He graduated at TU-Graz in 1976 as a physicist. From 1977 to 1982 he worked with BBC in optical metrology for turbomachines. In 1983 he started work in integrated optics at ETH-Zurich. From 1986 to 1991 he managed optical design projects at Gretag AG.

Efficient Lighting in Medical Technology
Medical diagnostics and surgery often use white light for high contrast illumination or stimulation. The demand for intense and uniform light used for measurements and for therapy is rapidly increasing. High resolution cameras supersede traditional visual techniques. Upcoming high brightness LEDs, dedicated fibre optics and light shaping devices are efficient components to fit the needs of lighting in medical technologies.

Dr.
Kurt Weingarten

Time Bandwidth Products AG (TBP), Zürich
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Kurt received his PhD and Masters in Electrical Engineering at Stanford University, where he developed ultrafast electro-optical measurements on integrated circuits using ps lasers, and a BSEE at Georgia Tech in Atlanta.
Kurt founded Time-Bandwidth Products in 1995 to develop simple, robust ultrafast mode-locked lasers for scientific and industrial applications. He founded the VC-funded telecom start-up GigaTera in 2000, which was later acquired by TBP in 2003.

Lasers to see, cut, and move
Lasers are used in biomedical applications to image, to cut, and to manipulate microscope living objects. We present recent progress in single laser sources which promise to provide all three functionalities, including new results of the large EU project Fast-Dot.

Prof. Dr.
Theo Lasser

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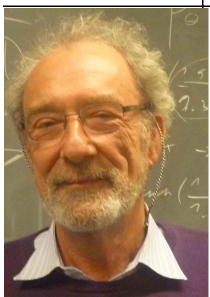
Prof. Theo Lasser is full professor at EPFL since 1998 and is heading the Laboratoire d'Optique Biomédicale (LOB). He and his team investigate new optical methods for biological and medical applications.
A particular research focus is on functional imaging based coherent imaging and its application in medicine as Optical Coherence Microscopy, high speed Laser Doppler Imaging, high-resolution fluorescence microscopy and single molecule spectroscopy dedicated to medicine and lifesciences.
Before joining EPFL he pursued an industry career at Carl Zeiss starting in the central research division and in his last assignment as director of Carl Zeiss Research in Jena.

Coherent Imaging - from cells to molecule
Imaging is key for medical diagnosis and provides new insights for the life sciences. Structural information complemented by functional information made possible by new optical techniques like Fourier Domain Optical Coherence Microscopy (FDOCM) opened new perspectives for analysing tissue and cell function.
We will present selected examples ranging from diabetes small organ visualization to single molecule imaging with a strong emphasis on the underlying optical concepts, and conclude with an outlook for coherent imaging.



Prof. Dr.
Jaro Ricka

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Jaro Ricka received his PhD at the University of Bern, to where he returned after the postdoc-years at MIT to lead a research group at the Institute of Applied Physics. His working field is optic/photonic methodology (in particular photon counting and timing) with applications in the interdisciplinary area between physics, chemistry and biology.

Photonics for functional monitoring of ciliated airway epithelia
In daily life we are little aware of the enormous surface of contact between our body and the environment: the inner surface of our lung is about the size of a tennis court. Clearly, this delicate surface must be carefully protected and continuously cleaned from inhaled pollutants, such as dust, smoke or exhaust aerosols as well as from bacteria and viruses. This is achieved by the so-called muco–ciliary escalator: Inhaled particles are entrapped in the visco-elastic mucus layer covering the epithelial surfaces, and the mucus carpet is continuously propelled towards pharynx by coordinated action of ATP fueled supramolecular motors, called cilia. Despite many years of research on this undoubtedly vital topic we are still far from final answers to basic questions. How and why does the mucociliary escalator work, and why it sometimes does not. For example, what exactly is the effect of nano-particulate pollutants (fine particles) which we are warned off by epidemiologists. For photonics, there are plenty of opportunities to contribute to the interesting field of research. I will briefly outline recent example(s) from our department.