

3rd Gen Photovoltaics: CleanTech Day

CSEM Basel, 19 August 2009



Dr. Carsten Winnewisser
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Dr. Carsten Winnewisser received his diploma and PhD degrees in physics from Freiburg University, Germany in 1994 and 1999, respectively. After working as post-doc at the Freiburg Materials Research Center on the topic of white inorganic InGaN LEDs, he joined in 2001 JDS Uniphase in Zurich working on InGaAs optical pump lasers for Er-doped fiber amplifiers. In 2002 he joined CSEM and set up the Section Polymer Optoelectronics. Since 2009 Carsten Winnewisser is responsible for the Program Organic and Printed Electronics at CSEM headquarters in Neuchâtel.

Welcome



Dr. Christoph Harder
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



Dr. Berthold Schmidt
Glasgow UK

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Dr. rer. nat. Berthold Schmidt is currently Chief Operating Officer at Intense Ltd. In addition he's a member of the Swiss-CTI expert team for micro and nano technologies. Before joining Intense he was promoting the industrial High Power Laser group of Bookham in his role as Marketing Director. During his time as R&D manager at JDS Uniphase and later Nortel he was responsible for the development, qualification and implementation of 980nm high power pump laser diodes for telecom applications with their rigid reliability expectations.

Berthold Schmidt graduated from the Julius-Maximilians Universität at Würzburg, Germany. He received the M.Sc. from SUNY University at Albany, USA, and his PhD degree from the Technical University at Munich, Germany working on tunable twin guide (TTG) laser diodes. Schmidt holds an executive Bachelor of Business Administration degree from the GSBA in Zurich. He possesses various patents on the design of high power laser diodes and has (co)authored about 60 papers, conference papers and book chapters. Berthold Schmidt is a member of the SSOM, SPIE and IEEE.

Stabilisierungsmassnahmen (CTI Clean Technology Initiative)

Die Eidgenössischen Räte haben in der Märzsession der zweiten Stufe der konjunkturellen Stabilisierungsmassnahmen zugestimmt. 21,5 Millionen der insgesamt genehmigten 700 Millionen Franken fliessen in die Innovationsförderung und Forschungsunterstützung. Die finanziellen Mittel werden eingesetzt für die Aufstockung der F&E-Förderkredite, für die Lancierung eines Innovationschecks als Pilotprojekt und die thematische Sensibilisierung der Zielgruppen.



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Born 1974 in Basel, Stefan Oberholzer received a PhD degree in Physics from the University of Basel in the area of Nanoelectronics. After several years working in academic research abroad and in Switzerland he is since 2008 responsible for the photovoltaics and concentrated solar power research programmes at the Swiss Federal Office of Energy.

Swiss SFOE PV Program

The Swiss photovoltaics programme is part of Switzerland's energy research concept that is co-ordinated by the Swiss Federal Office of Energy (SFOE). The activities of the photovoltaics programme encompass research, development and implementation of photovoltaics and its various components ranging from fundamental research to market activities.

**Dr. Stefan Oberholzer
Ittigen BE**



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Ulrich KROLL, PhD
 2003 - until today Oerlikon Solar-Lab SA: Managing director of legal entity and Head of R&D in Neuchâtel
 1989 - 2003 Institut de Microtechnique, Université de Neuchâtel, Group of Prof. Arvind Shah: PhD thesis, R&D Project leader
 1983 - 1989 University of Konstanz (Germany), Group of Prof. E. Bucher: Physics study and diploma in Physics

From R&D to Industrialization of Thin Film PV at Oerlikon

Oerlikon Solar leading supplier of thin film silicon photovoltaic (PV) production equipment has achieved high efficiency levels for commercial thin film silicon PV modules. Recent results from the pilot production line of Oerlikon Solar in Switzerland show that full-size R&D Micromorph modules (1.4 m²) have 151 Watts initial output power. This has been obtained by a consequent and rigorous R&D optimization of small cells and mini-modules followed by a successful transfer to the large-area development.

**Dr. Ulrich Kroll
Neuchâtel**



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Toby Balthasar Meyer, Dr.sc.
 Born on August 12th 1966 in Basle, Switzerland. Swiss citizen.
 After studying in 1992 chemical engineering at Swiss Federal Institute of Technology in Lausanne (EPFL), he made his PhD thesis in 1996 on solid state dye solar cells in Prof. M. Graetzel's group at the EPFL. During his thesis studies, he founded Solaronix together with his twin brother Andreas in 1993. Since then, CEO of Solaronix.

All Screen Printed Dye Synthesized Organic Photovoltaics

After starting from explaining the principles of the dye sensitized solar cell technology, the various module constructions with their advantages and challenges are presented. Shown are also the latest results obtained in the laboratory and on the scaling-up of the DSC module production. Examples of original DSC modules for potential product applications are exhibited.

**Dr. Toby Meyer
Aubonne VD**



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Dr. Jens A. Hauch is the Director of R&D Operations and the manager of the German R&D site of Konarka Technologies. He is responsible for stability and packaging development of Konarka's innovative Power Plastic®. In 1998 he received a PhD degree in Physics from the University of Texas at Austin. Before joining Konarka in 2004, he worked for Siemens Corporate Technology.

Product Development for Organic Photovoltaics

Flexible solar cells based on Organic Photovoltaics (OPV) are widely expected to be the first truly low cost solar technology. OPV utilizes nano-junctions made from Fullerenes and semi-conducting polymers that result in ultra-thin solar cells which are produced in a low-cost and highly scalable printing process. While the technology is still in its early stages, first products with 3% efficiency and 3 years of lifetime are being realized.

**Dr. Jens Hauch
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1989 PhD organic chemistry, UNI Graz
 1989 - 1990 production chemist for Polyimide fibers (Lenzing AG, Austria)
 1990 - 2001 Ciba-Geigy, Switzerland, various positions in R&D as project/group leader in Photopolymers, incl 2 years in USA (L.A)
 2001 - 2004 head of R&D Photopolymer (Ciba - Huntsman)
 2004 - 2006 technology manager Power&Electronics (Huntsman)
 2006 - 2009 Global Marketing manager New Technologies/new markets (Huntsman)

Thin Film Barrier Coatings

Huntsman started activities in OE in 2006 by entering into partnership with TNO. With its partners from the Fast2Light consortium, Huntsman develops breakthrough device encapsulation technology protecting OLEDs from environmental impacts, guaranteeing prolonged lifetime and enabling flexible OLED lighting. This is achieved by thin film encapsulation stacks based on alternating organic/inorganic layers for which Huntsman is developing the organic materials.

**Dr. Bernhard Sailer
Basel**



Dr. Roland Hany
Dübendorf ZH

EMPA - Eidgenössische Materialprüfungs- und Forschungsanstalt, Dübendorf ZH
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Roland Hany received his PhD in Physical Chemistry from Uni Zürich. Since 1994, he is at EMPA and was engaged mainly with NMR spectroscopy in environmental sciences and chemistry on polyesters. Since 2005, he is leading the device group of the Lab for Functional Polymers; the research is focused on phase-separation processes of semiconducting materials for organic photovoltaics.

Novel Organic Materials for PV Applications

Solution-processable small organic molecules have favorable characteristics for optoelectronic thin-film applications. We review our progress with cyanine dyes to fabricate efficient all-organic bilayer solar cells, and explain the merits of these salt-like charged dyes to induce energy level shifts at ionic junctions, to produce dye aggregates and to pattern cyanine / fullerene blend films on submicron length scales.



Prof. Dr. Beat Ruhstaller
Winterthur ZH

ZHAW - Zürcher Hochschule für Angewandte Wissenschaften, Winterthur ZH
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Prof. Dr. Beat Ruhstaller is Head of the Institute of Computational Physics at the ZHAW School of Engineering.

Beat Ruhstaller studied physics at ETH Zurich and received a PhD degree from University of California Santa Cruz (USA) for his work on organic light-emitting diodes (OLEDs). After a postdoctoral research stay at the IBM Zurich Research Laboratory he joined the Zurich University of Applied Sciences (ZHAW) in Winterthur where he established an organic electronics modelling group and founded the spin-off company Fluxim.

Modeling of 3rd Generation Photovoltaic Cells

Photovoltaic cells based on organic semiconductor or dye-sensitized materials are thin film cells whose performance is dependent on the layer sequence and thickness due to governing optical and electronic processes. This presentation introduces numerical models for these processes and gives insight into solar cell characterization and optimization by simulation.



Dr. Giovanni Nisato
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Giovanni Nisato is the Section Head Polymer Optoelectronics of CSEM Basel, since January 2009, where his interest cover a wide range of organic semiconductor systems. In his previous positions at Philips Research in the Netherlands, he had the opportunity to lead several innovative projects, ranging from flexible large electronics for display applications to electronically-driven drug delivery devices. Aiming to demonstrate flexible polymer OLED displays, he formed and coordinated the EU-funded FLEXled consortium from 2002 to 2005. Previous polymer science research experience involves governmental lab work at NIST Gaithersburg, USA. Giovanni Nisato holds a PhD in physics from the ULP Strasbourg, France.

Printing Organic PV Cells

Energy generation in an environmentally and economically sustainable way is an open challenge for current and future generations. Organic photovoltaics are an attractive option for the future, given their potential for cost effective and very large scale deployment while maintaining attractive pay-back times. There remain several challenges, ranging from stability to efficiency and actual industrialization of the cells, to realizing these opportunities. The talk will present how CSEM Basel capabilities support further materials and device research in this area.



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Green Figures of Merit for Electrical Power Generation

Electrical power generation has a negative impact on the environment, most notably air pollution, greenhouse gases, radiation, skyline and dried out / backed up rivers. We will have a brief look at green figure of merits as well as regulatory incentives in different countries, which are driving photovoltaic technology development.