Laser Micromachining and Laser Surface Engineering for Watch Industries and Medical Technology

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Dr. Christoph Harder

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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. Jean-Edouard Communal

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Jean-Edouard Communal combines scientific knowledge with international sales experience.
With a PhD in laser physics from Trinity College Dublin, and a Post-doctorate in Italy his strong technical background was put to use as a sales engineer for Andor Technology in France, Spain and Portugal for 4 years before joining Teem Photonics 3 years ago as Europe and Asia sales manager.

Passively Q-switched microchip lasers
For high quality micromachining, ultrafast lasers are unanimously claimed as the best albeit most costly tools. The Picospark™ is a fibre amplified, hundreds of picoseconds PQS microlaser designed to achieve ultrafast processing quality at nanoseconds economics with reduced footprint. We present results of material processing including marking, scribing and cutting of metals, glasses, polymers, semiconductors and ceramics.

David Naman

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David Naman received his diploma in mechanical engineering in 1998. After 3 years of work experience at Chromalloy France (machine design and application of CO_2 and Nd:YAG lasers), he joined LASAG AG in 2001. Since then he is working as an engineer in LASAG's applications lab. He has a broad knowledge of various kinds of industrial drilling, cutting and welding applications. One of his major fields of interest is laser cutting of medical stents.

Découpage laser des stents médicaux
Laser cutting of medical stents
Laser cutting of medical stents is considered to be a reference benchmark for laser cutting at its highest precision and quality. The reason is a unique combination of high demands regarding cutting quality and precision, and the dynamics of the handling systems, not to mention the characteristics of the processing materials and the required optimization of all marginal conditions in the process. Laser cutting of nitinol stents will be discussed as an example.

Dr. Steve Norman

SPI Lasers UK Ltd, Southampton UK
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Dr Steve Norman has been with SPI since 2000 and was appointed CTO in 2006. Steve has played a pivotal role in the development and qualification of the company's high-power fiber laser products and in his present role, Steve has wide ranging responsibilities for the current and future technology platform for the company, and an extensive involvement within the Laser community.

Fibre Lasers for Medical Devices and Applications
Medium-power optical fibre lasers operating in the 1um region have proven their capabilities in the cutting, welding and sintering of medical devices and implants.

This paper reviews the design, performance and application of SPI's CWM lasers in advanced medical device manufacturing, including applications in stent cutting, welding, and prosthesis manufacture. We also consider the direct application of 1.55um fibre lasers in medical aesthetics.

Prof.
Christoph Meier

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Christoph Meier obtained a mechanical engineering diploma degree from the School of Engineering, HTL Biel, and a master's degree in Physics from University of Neuchâtel. Since 1991 he has been working at the Bern University of Applied Science. In 2001, he was elected professor of optics and is now head of the optics group (OptoLab).

Optical 3D Tomography
Optical Coherence Tomography OCT is a 3D imaging modality with widespread applications in Ophthalmology and in other medical fields like Cardiology, Dermatology and Dentistry. The principles of OCT are highlighted in a brief introduction and the performance and limitations are discussed. Some of the recent state of the art systems are presented as well as possible application in industrial quality control.

La tomographie à cohérence optique OCT, est un mode d'imagerie 3D avec des applications très répandues en ophtalmologie ainsi que dans d'autres applications médicales comme la cardiologie, la dermatologie et la dentisterie. Une brève introduction consacrée aux principes de base de l'OCT est donnée, suivie d'une discussion des possibilités et limitations. Quelques systèmes actuelles sont présentés, ainsi que les possibles applications dans le domaine du contrôle de qualité

Dr. Eric Mottay

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Dr. Eric Mottay is the president and CEO of Amplitude Systemes, France, a company he founded in 2001 and which is now a leader in diode-pumped ultrafast lasers. Eric graduated from the Ecole Superieure d'Optique, Orsay, in 1985, and has since specialized in laser development and manufacturing. He previously developed and brought to the market numerous solid-state lasers in different positions in Europe and the United States.

Lasers ultrabrefs pour le micro-usinage de précision
Les lasers ultrabrefs s'imposent comme outil essentiel dans de nombreuses applications de micro-usinage de précision. Leur très forte puissance crête permet le traitement de tout type de matériaux, tandis que leur très courte durée élimine les effets thermiques et offre une grande qualité d'usinage et une très bonne résolution. Nous présenterons l'état de l'art de la technologie laser, ainsi que des exemples d'applications.

Ultrafast lasers are gaining rapid acceptance for many precision micromachining applications. The extremely high optical power allows to process virtually any material, while the ultrashort pulse duration eliminates thermal deposition and enables high quality and small feature size. We will present the current status of laser technology and examples of applications.

Rafael Barcos

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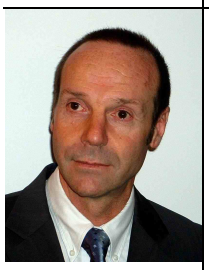
Depuis 1998, Rafael Barcos est actif dans le domaine des lasers industriels. Tout d'abord comme coordinateur de vente puis comme responsable de marché pour la prestigieuse marque de lasers LASAG, société du Swatch Group à cette époque. En 2005, le concept de conseil offert par Barcos solutions à vite séduit le marché horloger ce qui peu de temps après, en 2008, donna naissance à BS-Optics Sàrl. Ces deux entités sont à ce jour actives et présentent une croissance constante.

Laser intelligent au service de la précision horlogère
Toute machine présente un ratio coût/complexité constant et le domaine horloger demande une précision aux limites des possibilités mécaniques. Seul moyen de démocratiser des opérations laser est l'usage de systèmes intelligents. Accouplé à des technologies modernes, l'usinage du laser devient un outil à la portée de petites manufactures désireuse d'internaliser du savoir faire sur la fabrication de composants clé du mouvement.



Michel Normandon

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Michel Normandon dispose d'une expérience vieille de vingt cinq ans dans le domaine des lasers industriels. Il a notamment participé au développement, en Suisse, d'un laser Nd:YAG SLAB de grande puissance pour le perçage profond d'éléments aéronautiques.

Usinage et micro usinage laser et faisceau d'electrons
Laser and Electron beams in the Machining and Micro-machining domains
Lasers and electron beams welding technics have been introduced in the assembly industry for a quite long time and have significantly evolved over the years. The presentation will introduce comparisons of these two technics – each of them using high energy focused beams – in their respective industrial applications.
In particular, we will discuss about the quasi-unlimited depth of penetration for copper welding applications and also about how the *magnetic mixing* of a melted bath of aluminum permits exceptional quality welds even in alloys containing lots of chemical elements.
We will show how a laser could economically replace an E-beam in titanium for the medical domain but also for welding applications in aeronautics and aero spatial microelectronics.

Céline Bansal

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With a double Master's degree in "Trade and International Business management" from Lille University (France) and in "European management Strategy" from Staffordshire University (UK), Céline Bansal started her career in the IT industry as an International Business Development Manager at Wolfram Research (Mathematica Software) and then joined Oxford Lasers in January 2010 taking charge of the European market for the sales of micro machining subcontract.

Micro usinage laser des matériaux transparents
Laser Micromachining of Transparent Materials
This presentation will cover the difficult area of Laser Micromachining of Transparent Materials using a variety of laser sources and techniques. A number of different applications will be presented covering a wide variety of industries.

Dr.
Gabriel Dumitru

BCI Group - Blösch Ressourcen AG, Grenchen SO

Dr. Gabriel Dumitru studied Technical Physics at the University of Bucharest, where he graduated 1994, and he received his PhD 2002 from the University of Bern with a thesis on the ns- and fs- laser ablation of tribological surfaces.
He worked for the Institute of Applied Physics Bern, for the University of Applied Sciences Northwestern Switzerland and the Laser Materials Processing Group at Inspire AG / ETH Zürich. Dr. Dumitru authored or co-authored more the 50 research works, participated in various R&D projects on the laser processing of metals and ceramics and organized continuing education courses for industry personnel. Dr. Dumitru is Board Member of the SwissLaser.Net professional association.

Moderation