Laser Micromachining

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Valerio Romano was born in Italy and is Swiss citizen. He received the physics M.Sc. degree in 1989 and the Ph.D. degree in 1991 from the University of Bern, Switzerland. His main research topics are microstructured fibers for laser applications and pulsed laser-materials interaction processes.
He holds two positions: one as a Professor for Applied Photonics at the Bern University of Applied Sciences (BFH-TI, Institute for Applied Lasers, Photonics and Surface Technologies) and one as a Lecturer and research group leader at the University of Bern. He is also coordinator of the *SLN Swiss National Fiber Lab (SNFL)*, a joint laboratory in the field of optical fibers. He is managing director of the Swiss Photonics and Laser Network SLN.

SNAPP:
The Swiss National Applicaton Laboratory for Photonic tools and Photonic manufacturing
SLN coordinates the activities of several Swiss laboratories that do research in industrially relevant fields. One of them is SNAPP, The Swiss National Application laboratory for Photonic tools and Photonic manufacturing (SNAPP). With SNAPP SLN can help to ensure continuity and protection of know how in an international competitive landscape.
The presentation gives some insight into the structure and into some activities of SNAPP.

Dr. Thomas P.
Pearsall

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Tom Pearsall is a pioneer developer of InGaAsP and the inventor of the InGaAs photodetector. He has also worked on Si-Ge materials and devices, making the first transistors and detectors from these materials. Pearsall started EPIC, The European Photonics Industry Consortium in 2003. He is a Fellow of the American Physical Society and a Fellow of the IEEE.

Material Microprocessing: Research opportunities in European project
Opportunities in microprocessing involve development of both new tools and new technologies. In addition, the European Commission is discovering the economic importance of European innovation around the world. We will discuss the state of the art in microprocessing and the opportunities presented in the next calls for proposal from the Commission.

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.

Advances in High Precision Laser Micromachining
Laser Micromachining is becoming an established technique for the creation of small features or parts in a large variety of materials. Recent advances in lasers have increased the choice of lasers available to users, including the availability of ultrafast lasers. A comparison is presented showing the benefits of nanosecond, picosecond and femtosecond laser pulses for laser ablation.

Prof. Dr.
Eric Audouard

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Eric AUDOUARD, Professeur des Universités.
Enseignement : Telecom Saint Etienne (Université Jean Monnet), spécialités : photonique et éthique professionnelle.
Recherche : laboratoire Hubert Curien (CNRS UMR 5516), spécialités : procédés laser ultra brefs.
Responsable Plate Forme Femtoseconde du pôle Optique Rhône Alpes, Responsable scientifique de l'équipement d'excellence *Ultra fast surface design*.

Marquage laser et traçabilité anti contre façon
La contrefaçon avancée des grandes marques et des produits de luxe est observée de plus en plus fréquemment ces dernières années. Afin de l'enrayer efficacement il est nécessaire de devancer sans cesse les contrefacteurs en développant de nouvelles solutions anti-contrefaçon.
A ce titre, grâce à sa compréhension et sa maitrise des interactions laser/matière, la société française Qiova SAS a développé un nouveau système optique/vision pour le marquage laser dédié à la traçabilité anti-contrefaçon.
Par un contrôle précis des propriétés du faisceau laser (forme, énergie, polarisation, etc.), et l'intégration d'un système de relecture et de contrôle adapté aux modifications induites à la cible, ce système innovant, adaptable en sortie de nombreuses sources et systèmes laser existants, permet la réalisation de marquage unique, de tailles variables (de l'ordre du millimètre jusqu'au micromètre) et ayant la particularité d'embarquer des informations de nature identifiante et/ou authentifiante.

Prof. Dr. Beat
Neuenschwander

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Dr. Beat Neuenschwander studied physics at the University of Bern and realized 1996 his PhD at the Institute of Applied Physics in the field of diode pumped solid state lasers. Since 2000 he is at the Bern University of Applied Sciences where he built up the laboratory for laser micro machining and the laser surface engineering group. The group activities are focused onto direct and assisted micro material processing with ns and ps laser pulses. Dr. Beat Neuenschwander lectures physics and applied laser technology. He is expert for the Suiss Commission for Technology and Innovation CTI.

Extreme precision with synchronised beam delivery
To obtain high precision normally the laser system is synchronized on the mechanical axes. For highly precise micromachining, today laser systems with ultra short pulses are used, but these systems can't be driven as slave and therefore the mechanical axes have to be synchronized on the laser pulse train. This was realized with a state of the art galvo scanner and allowed to process different materials with highest precision as it will be shown with examples.

Vincent
Rouffiange

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Vincent Rouffiange is Sales and marketing manager for Amplitude Systemes since 2007 and has 15 year experience in photonics.
Amplitude Systemes is a leading company in ultrafast laser with the widest range of technology and products available in the market.

Precision microfabrication with ultrafast lasers
Ultrafast laser applications is developing in many sectors as diverse as semiconductor, medical devices, anti-counterfeiting, display, thanks to the ability of these lasers to process material with extreme precision and with limited or without thermal effects. In ultrafast laser domain, femtosecond lasers are competing against its longer-pulsed picosecond cousin but have recently proved their significant advantages over them.

Dr.
Kurt Weingarten

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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 picosecond 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.

Industrial turn-key laser solutions for ultrafast micromachining
We review current developments in turn-key ultrafast laser systems for industrial micromachining and their applications.

Dr. Andreas Burn

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2005 – 2009 PhD, University of Bern, Institute of Applied Physics
2002 – 2003 M. Sc. in Physics, University of Bern, Institute of Applied Physics
2001 – 2002 Université Pierre et Marie Curie Paris and Université Paris-Sud, Orsay.
1997 – 2003 Studies in Physics, University of Bern and University of Fribourg

Ps-processing of PV thin films
Precise structuring of photovoltaic thin films is a key factor for increasing overall module efficiency. Today, nanosecond laser scribing processes are widely used in the production of amorphous and micro morph silicon thin film cells. However, in latest generation CIGS technologies the established laser processes no longer produce satisfactory results. Can we meet the challenge with ultrashort pulses?

Dr.
Gabriel Dumitru

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Dr. Gabriel Dumitru est responsable de la division CIH (composants pour l'industrie horlogère) chez Blösch AG, qu'il a rejoint en 2009. Auparavant il a travaillé dans la recherche et l'enseignement auprès des différentes Hautes Écoles, dernièrement à l'EPF de Zürich.
M. Dumitru est physicien et a soutenu sa thèse de doctorat à l'Université de Berne sur l'optimisation des surfaces tribologiques par ablation laser ns / fs. Il possède de l'expérience dans l'usinage laser, notamment dans celui concernant les surfaces revêtues, et la liste de ses publications scientifiques compte plus de 50 titres.

Laser ps et revêtements dans la fabrication des composants du mouvement et de l'habillage
L'usinage laser a déjà trouvé sa place dans la fabrication des composants de montres mécaniques, alors que souvent des pièces issues que de la technologie laser ne répondent pas intégralement aux exigences.
Les nouveaux matériaux, comme le silicium, trouvent de plus en plus leur voie vers le cœur des montres mécaniques. Néanmoins il se trouve que les revêtements, qui augmenteraient leurs performances d'une manière notable, ont encore du chemin à faire.
La conférence présentera l'intégration de l'usinage laser ps dans la fabrication des composants revêtus du mouvement (p.ex. échappement) et dans celle des éléments d'habillage (p.ex. cadran).

SLN
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