

Smart Laser Processing Conference 2014

SLPC2014

Tuesday, April 22

15:30-15:45 Opening

Room 413

Opening Remarks

15:30 Y. Okamoto, Okayama Univ., Japan

15:45-17:30 SLPC1 : Advanced Lasers and Optical Technologies for Smart Processing

Room 413

Chairs: A. Ostendorf, Ruhr Univ., Germany,

S. Wada, RIKEN, Japan

SLPC1-1 (Invited) Inline Coherent Imaging of Laser Materials Processing: Development, Diagnosis and Control

15:45 P. J. L. Webster ^{1,2)}, C. V. Vlack ¹⁾, C. M. Galbraith ²⁾, and J. M. Fraser ²⁾

¹⁾ Laser Depth Dynamics Inc., Canada,

²⁾ Queen's Univ., Canada

SLPC1-2 A New 60 W 355 nm Laser for Precision Manufacturing

16:15 R. Patel, J. Bovatsek, and A. Tamhankar
Spectra Physics, USA

SLPC1-3 Laser Processing by Using Multi-level Free-form 3D Micro-fabricated DOE

16:30 A. Hamano ¹⁾, A. Yamada ¹⁾, T. Takada ²⁾, and Y. Usuki ¹⁾

¹⁾ Material Research Laboratory, R&D Division, Furukawa Co. Ltd., Japan,

²⁾ R&D Planning Department, R&D Division, Furukawa Co. Ltd., Japan

SLPC1-4 The Study of the Phase Difference of Beam Splitters Structure in the Fiber-optic Mach-Zehnder Interferometer

16:45 J. T. Huang ¹⁾, C. H. Chen ²⁾, C. T. Wang ²⁾, and W. T. Wu ¹⁾

¹⁾ National Pingtung Univ. of Science and Technology, Taiwan, ²⁾ National Chung Cheng Univ., Taiwan

SLPC1-5 Development of the Path Generation Algorithm for Large-area Laser Pattern Using the Manual Input Control Point

17:00 K. Yoon, K. Kim, and J. Lee
Korea Institute of Machinery and Materials, Korea

SLPC1-6 Fiber-delivery and Compression of Milli-joule Femtosecond Pulses and Micromachining

17:15 B. Debord ¹⁾, M. Dontabactouny ¹⁾, M. Alharbi ¹⁾, C. Fourcade-Dutin ¹⁾, C. Hönninger ³⁾, E. Mottay ³⁾, Q. Mocaer ³⁾, L. Vincetti ⁴⁾, F. Jerome ^{1,2)}, and F. Benabid ^{1,2)}

¹⁾ GPPMM Group, Xlim Research Institute, France, ²⁾ GLOphotonics S.A.S, France,

³⁾ Amplitude Systèmes, France, ⁴⁾ Univ. of Modena and Reggio Emilia, Italy

Wednesday, April 23

8:30-10:00 SLPC2: Short Wavelength Applications

Room 313+314

Chairs: L. Li, The Univ. of Manchester, UK,

M. Katto, Univ. of Miyazaki, Japan

SLPC2-1 8:30

(Invited) Update of EUV Source Development Status for HVM Lithography

H. Mizoguchi ¹⁾, H. Nakarai ¹⁾, T. Abe ¹⁾, T. Ohta ¹⁾, K. M. Nowak ²⁾, Y. Kawasuji ¹⁾, H. Tanaka ¹⁾, Y. Watanabe ¹⁾, T. Hori ¹⁾, T. Kodama ¹⁾, Y. Shiraiishi ¹⁾, T. Yanagida ¹⁾, T. Yamada ¹⁾, T. Yamazaki ¹⁾, S. Okazaki ¹⁾, and T. Saitou ¹⁾

¹⁾ Gigaphoton Inc., Oyama Facility, Japan,

²⁾ Gigaphoton Inc., Hiratsuka Facility, Japan

SLPC2-2 9:00

(Invited) Laser Induced Front Side Etching Using Excimer Laser

Klaus Zimmer

Leibniz Institute of Surface Modification, Germany

SLPC2-3 9:30

Straight Through Hole Drilling in Machinable Ceramics

S. Nakamura ¹⁾, T. Miura ²⁾, and M. Tsuta ²⁾

¹⁾ Department of Electrical and Electronic Systems Engineering, Nagaoka National College of Technology, Japan, ²⁾ Electrical & Mechanical Systems Engineering Advanced Course, Nagaoka National College of Technology, Japan

SLPC2-4 9:45

Improvement of Junction Properties of ZnO Nanowire / GaN Heterojunction Using Selective Laser Processing

D. Nakamura, N. Tetsuyama, T. Shimogaki, M. Higashihata, and T. Okada

Kyushu Univ., Japan

----- Break (10:00-10:30) -----

10:30-11:45 SLPC3: Micro Nano Processing

Room 313+314

Chairs: John Lopez, Univ. of Bordeaux, CNRS, France,

M. Fujita, Institute for Laser Technology, Japan

SLPC3-1 10:30

(Invited) Laser Direct Writing of Graphene Patterns on Glasses under Ambient Condition

Y. Lu ¹⁾, W. Xiong ¹⁾, W. J. Hou ¹⁾, L. J. Jiang ¹⁾, J. F. Silvain ^{1,2)}, and L. Jiang ³⁾,

¹⁾ Univ. of Nebraska - Lincoln, USA,

²⁾ Institut de Chimie de la Matière Condensée de Bordeaux (ICMCB), CNRS, France,

³⁾ Beijing Institute of Technology, China

SLPC3-2 11:00

(Invited) Ultrashort Pulsed Laser Processing: Laser Quantum Ejection from Transparent Thin Film and Their Promising Applications

P. Herman ¹⁾, K. Kumar ²⁾, K. K. C. Lee ¹⁾, J. Li ¹⁾, S. Ho ¹⁾, and J. Nogami ²⁾

¹⁾ Department of Materials Science and Engineering, Univ. of Toronto, Canada,

²⁾ Department of Electrical and Computer Engineering, Univ. of Toronto, Canada

SLPC3-3 11:30

Laser Micromachining of Bio-absorbable Polymers: Impact of the Laser Process Parameters on the Machining Throughput and Quality

F. Hendricks ¹⁾, R. Patel ²⁾, and V. Matylitsky ¹⁾

¹⁾ High Q Laser, Newport Corp., Austria,

²⁾ Spectra Physics, Newport Corp., USA

----- Lunch Break (11:45-12:30) -----

12:30-14:15 SLPC4: Poster Session

Exhibition Hall C

SLPC4p-1

All-fiber Microfluidic Mach-Zehnder Interferometer for Detection of Calcium

Hydroxide

J. N. Wang¹⁾, W. T. Wu²⁾, C. H. Chen³⁾, and P. L. Shen¹⁾

¹⁾ National Yunlin Univ. of Science and Technology, Taiwan, ²⁾ National Pingtung Univ. of Science and Technology, Taiwan,

³⁾ National Chung Cheng Univ., Taiwan

SLPC4p-2 **A Study of the Reflective Cladding-off Cylindrical Fiber Sensor**

Y. T. Y. Kao, and W. T. Wu

National Pingtung Univ. of Science and Technology, Taiwan

SLPC4p-3 **Method for Measuring of the Contrast of Multi-Beam-Interference with a Gaussian Beam-shape**

M. Steger^{1,2)}, S. Boes²⁾, S. Thilker²⁾, and A. Gillner²⁾

¹⁾ Chair for Laser Technology, Technical Univ. Aachen, Germany, ²⁾ Fraunhofer Institute for Laser Technology, Germany

SLPC4p-4 **Holographic Vector Wave Femtosecond Laser Processing**

S. Hasegawa, and Y. Hayasaki

Center for Optical Research and Education (CORE), Utsunomiya Univ., Japan

SLPC4p-5 **Solid-state-like Fiber Lasers: Ultrahigh Repetition Rate Femtosecond Fiber Laser and Applications**

Z. Zhang, A. Wang, C. Li, X. Gao, G. Wang, and J. Zang

Peking Univ., China

SLPC4p-6 **Multifunctional Laser System for Micromachining of Various Materials**

M. Milenky, E. V. Raevsky, and D. L. Saprykin
Electronic Special Technological Equipment, Research & Development Institute, Russia

SLPC4p-7 **Demonstration of Heat Resistant Bragg Grating by Femtosecond Laser Processing for Vibration Monitoring**

A. Nishimura¹⁾, Y. Takenaka²⁾, T. Furuyama²⁾, T. Shimomura³⁾, T. Terada³⁾, and H. Daido³⁾

¹⁾ Japan Atomic Energy Agency, Kizugawa, Japan, ²⁾ A-Tech, Japan, ³⁾ Japan Atomic Energy Agency, Tsuruga, Japan

SLPC4p-8 **A Simplified Fabrication Technique for TFBG for the Simultaneous Measurement of Refractive Index and Temperature of Liquids**

A. Kameyama¹⁾, A. Yokotani¹⁾, and M. Katto²⁾

¹⁾ Faculty of Engineering, Univ. of Miyazaki, Japan, ²⁾ Center of Collaborative Research and Community Cooperation, Univ. of Miyazaki, Japan

SLPC4p-9 **The Absorption Property Change of Quartz in Micromachining by ns Pulsed CO₂ laser**

K. Yamasaki, H. Ikenoue, Y. Watanabe, D. Nakamura, and T. Okada

Kyushu Univ., Japan

SLPC4p-10 **Localized CO₂ Laser Smoothing of Defects on EUV Ti-doped Silica Substrates**

A. Cournoyer, M. Briand, and Y. Duval
INO, Canada

SLPC4p-11 **Formation of Periodic Nanowire Array by Femtosecond Laser Irradiation**

Y. Nakajima¹⁾, H. Shimizu²⁾, T. Shinohara²⁾,

and M. Terakawa²⁾

¹⁾ Department of Electronics and Electrical Engineering, Keio Univ., Japan, ²⁾ School of Integrated Design Engineering, Keio Univ., Japan

SLPC4p-12 **Periodic Grating Structures on Metal Self-organized by Double Pulse Irradiations**

L. Gemini¹⁾, M. Hashida¹⁾, T. Nishii¹⁾, Y. Miyasaka¹⁾, H. Sakagami²⁾, S. Inoue¹⁾, and S. Sakabe¹⁾

¹⁾ Kyoto Univ., Japan, ²⁾ National Institute for Fusion Science, Japan

SLPC4p-13 **Investigation of Micro-welding Characteristics of Si and Glass by Picosecond Pulsed Laser**

I. H. W. Nordin¹⁾, Y. Okamoto¹⁾,

I. Miyamoto²⁾, and A. Okada¹⁾

¹⁾ Okayama Univ., Japan, ²⁾ Osaka Univ., Japan

SLPC4p-14 **Thin Film CIGS Cell Scribing Using a High Energy Femtosecond Fiber Amplifier**

F. Morin¹⁾, Y. Zaouter¹⁾, C. Hönninger¹⁾, E. Mottay¹⁾, Q. Mocaer¹⁾, B. Dunne²⁾, R. D. Almeida³⁾, and J. P. Aguerre³⁾

¹⁾ Amplitude Systèmes, France, ²⁾ NEXCIS Photovoltaic Technology, France, ³⁾ Mondragon Assembly, France

SLPC4p-15 **Double-sided Laser-arc Hybrid Welding of High Strength Steel Thick Plate**

L. Li, J. Feng, and Y. Chen

Harbin Institute of Technology, China

SLPC4p-16 **Research Progress on the High Power Laser Processing Technique**

L. Feng, and A. Wu

Beijing Institute of Opto-Electronic Technology, China

SLPC4p-17 **Effects of Laser Peening Parameters on Plastic Deformation of Metallic Materials**

M. Tsuyama¹⁾, Y. Kodama²⁾, Y. Miyamoto²⁾,

I. Kitawaki²⁾, T. Shibayanagi³⁾,

M. Tsukamoto⁴⁾, and H. Nakano¹⁾

¹⁾ Faculty of Science and Engineering, Kinki Univ., Japan, ²⁾ Interdisciplinary Graduate School of Science and Engineering, Kinki Univ., Japan, ³⁾ Faculty of Engineering, Toyama Univ., Japan, ⁴⁾ Joining and Welding Research Institute, Osaka Univ., Japan

SLPC4p-18 **Experimental Study on CFRP Cutting with Nanosecond Laser in Air and Ar Gas Ambience**

Y. Sato¹⁾, M. Tsukamoto¹⁾, F. Matsuoka²⁾, K. Takahashi¹⁾, S. Masuno¹⁾, T. Ohkubo³⁾, and H. Nakano²⁾

¹⁾ Joining and Welding Research Institute, Osaka Univ., Japan, ²⁾ Department of Electrical Engineering, Kinki Univ., Japan, ³⁾ Department of Mechanical Science and Engineering, Tokyo Institute of Technology, Japan

----- Break (14:15-14:45) -----

14:45-16:00 SLPC5: Ultrashort Pulsed Laser Processing I

Room 313+314

Chairs: Y. Lu, Univ. of Nebraska-Lincoln, USA,

M. Terakawa, Keio Univ., Japan

SLPC5-1 (Invited) Parameters of Influence in Surface Ablation and Texturing of Metals Using

14:45

High-Power Ultrafast Laser

J. Lopez ¹, M. Faucon ², R. Devillard ¹, Y. Zaouter ³, C. Hönninger ³, E. Mottay ³, and R. Kling ²

¹ Univ. of Bordeaux, CNRS, France,

² ALPHANOV, France, ³ Amplitude Systèmes, France

SLPC5-2 15:15 (Invited) Double-pulsed Ultrafast Laser Welding of Glasses Toward Enhancement of Process Efficiency

K. Sugioka, S. Wu, and K. Midorikawa
RIKEN, Japan

SLPC5-3 15:45 Ultrafast Mechanisms in Semiconductor Micro- and Nano-processing by Temporally Shaped Femtosecond Laser Pulses

P. A Loukakos, M. Barberoglou, D. Gray, G. D. Tsididis, E. Stratakis, and C. Fotakis
Foundation for Research and Technology - Hellas, Greece

----- Break (16:00-16:30) -----

16:30-17:45 SLPC6: Ultrashort Pulsed Laser Processing II

Room 313+314

Chairs: P. R. Herman, Univ. of Toronto, Canada,

M. Hashida, Kyoto Univ., Japan

SLPC6-1 16:30 (Invited) Ultrafast Laser Processing: a New Route to Innovative Manufacturing

J. Choi
Department of Laser & Electron Beam Application, Korea Institute of Machinery and Materials, Korea

SLPC6-2 17:00 Monolithic Fabrication of Electrofluidic Glass Microchips Based on Femtosecond Laser Direct-write Technique

J. Xu, K. Midorikawa, and K. Sugioka
RIKEN Center for Advanced Photonics, Japan

SLPC6-3 17:15 Cutting Strengthened Glass Using Bursts of Picosecond Pulses from a MOPA Fiber Laser

D. Gay ¹, L. Desbiens ¹, S. Lavoie ², and Y. Taillon ¹

¹ INO, Canada, ² Allied Scientific Pro, Canada

SLPC6-4 17:30 Plasma Expansion During Laser Structuring of Metals with ps Pulse Bursts

C. Hartmann ^{1,2}, and A. Gillner ²

¹ Chair for Laser Technology, Technical Univ. Aachen, Germany, ² Fraunhofer Institute for Laser Technology ILT, Germany

Thursday, April 24

8:30-10:45 SLPC7: Additive Manufacturing and Advanced Surface Processing Room 313+314

Chairs: R. Poprawe, Fraunhofer Institute for Laser Technology ILT, Germany,

H. Nakano, Kinki Univ., Japan

SLPC7-1 8:30 (Invited) Opportunities and Challenges in Laser 3D Printing

B. Gu
Bos Photonics, USA

SLPC7-2 9:00 (Invited) Advanced Laser Processing Technology in BAMTRI

S. Gong
Beijing Aeronautical Manufacturing Technology Research Institute, China

SLPC7-3 Effect of Defects on Mechanical Properties of

9:30

316 Stainless Steel Fabricated by Selective Laser Melting

H. Li, B. Huang, L. Ding, Y. Wang, and S. Gong
Beijing Aeronautical Manufacturing Technology Research Institute, China

SLPC7-4 9:45 (Invited) Enhancement of Fatigue Properties of FSW Joints of A6061 Aluminum Alloy by Laser Peening

Y. Sano ¹, and K. Masaki ²

¹ Toshiba Corp., Japan, ² Okinawa National College of Technology, Japan

SLPC7-5 10:15 Laser Peening Systems and the Effects of Laser Peening on Aeronautical Metals Sheet

S. Zou, and S Gong
Beijing Aeronautical Manufacturing Technology Research Institute, China

----- Break (10:30-11:00) -----

11:00-12:15 SLPC8: Bio-medical and Photonics Applications Room 313+314

Chairs: E. Mottay, Amplitude Systemes, France,

K. Sugioka, RIKEN, Japan

SLPC8-1 11:00 (Invited) Novel Applications by Femtosecond Laser in Electronics and Medical Device Industries

C. W. Cheng ^{1,2}, C. Y. Lin ², P. H. Wu ², K. P. Chang ², J. B. Horng ², W. T. Wu ³, and K. L. Ou ^{4,5,6,7}

¹ National Chiao Tung Univ., Taiwan,

² Industrial Technology Research Institute, Taiwan, ³ National Pingtung Univ. of Science and Technology, Taiwan, ⁴ Taipei Medical Univ., Taiwan, ⁵ Research Center for Biomedical Devices and Prototyping Production, Taipei Medical Univ., Taiwan,

⁶ Research Center for Biomedical Implants and Microsurgery Devices, Taipei Medical Univ., Taiwan, ⁷ Taipei Medical Univ.-Shuang Ho Hospital, Taiwan

SLPC8-2 11:30 (Invited) Femtosecond Laser Generated Optically Generated Sub-100 nm Structures for Biomedical and Technical Applications

K. Koenig ¹, and A. Ostendorf ²

¹ Saarland Univ., Germany, ² Ruhr Univ., Germany

SLPC8-3 12:00 Femtosecond Laser Integration of High-performance Microoptical Devices into 3D Microchannel for Optofluidic Application

D. Wu ¹, J. Xu ², S. Wu ¹, K. Midorikawa ¹,

and K. Sugioka ^{1,2}

¹ Laser Technology Laboratory, RIKEN, Japan,

² RIKEN-SIOM Joint Research Unit, RIKEN, Japan

----- Lunch Break (12:15-13:15) -----

13:15-14:45 SLPC9: Processing of CFRP Room 313+314

Chairs: R. Patel, Spectra Physics, USA,

K. Washio, Paradigm Laser Research Ltd., Japan

SLPC9-1 13:15 (Invited) Laser Machining of CFRP Composite – a Comparison of Fibre, Nd:YAG, CO₂, DPSS and Picosecond Laser Processing

Lin Li

The Univ. of Manchester, UK

SLPC9-2 Investigations in Wavelength Adapted Laser

13:45 Remote Treatment of Fiber Reinforced Polymers

A. Klotzbach ¹, A. Fürst ^{1,2}, J. Hauptmann ¹, and E. Beyer ^{1,2}

¹ Fraunhofer Institute Material and Beam Technology, Germany, ² Technische Univ. Dresden, Germany

SLPC9-3 14:00 Micromachining of Thin CFRP with UV-ps Laser Pulses

M. Fujita ¹, H. Ohkawa ², M. Otsuka ², T. Somekawa ¹, Y. Maeda ², Y. Orii ³, K. Inaba ³, G. Okada ³, and N. Miyanaga ³

¹ Institute for Laser Technology, Japan,

² Kinki Univ., Japan, ³ Spectronix Corp., Japan, ⁴ Institute of Laser Engineering, Osaka Univ., Japan

SLPC9-4 14:15 Laser Cutting of CFRP by Q-CW Fiber Laser

H. Yoshida ¹, S. Yamazaki ¹, H. Fukagawa ¹, T. Tanaka ², T. Imai ², and H. Ogawa ²

¹ Gifu Univ., Japan, ² Technological Innovation Center GIFU, Japan

SLPC9-5 14:30 Influences of Laser Scanning Conditions for CFRP Processing with Fiber Laser

K. Takahashi ¹, M. Tsukamoto ¹, S. Masuno ¹, Y. Sato ¹, M. Matsushita ², K. Furukawa ², H. Yoshida ³, K. Tsubakimoto ³, H. Fujita ³, N. Miyanaga ³, T. Yamamura ⁴, M. Ishikawa ⁴, M. Fujita ⁵, H. Niino ⁶, Y. Harada ⁶, M. Muramatsu ⁶, M. Nishino ⁷, T. Kamiya ⁸, O. Matsumoto ⁸, T. Mano ⁸, S. Nakai ⁸, and H. Ogata ⁸

¹ Joining and Welding Research Institute, Osaka Univ., Japan, ² Shin Nippon Koki Co., Ltd., Japan, ³ Institute of Laser Engineering, Osaka Univ., Japan, ⁴ Advanced Laser Research Laboratory, Kataoka Corp., Japan,

⁵ Institute of Laser Technology, Japan,

⁶ Advanced Industrial Science and Technology, Japan, ⁷ Mitsubishi Chemical Co., Ltd., Japan,

⁸ Advanced Laser and Process Technology Research Association, Japan

----- Break (14:45-15:15) -----

15:15-17:00 SLPC10: Industrial Applications

Room 313+314

Chairs: B. Gu, Bos Photonics, USA,

K. Hirano, Nippon Steel & Sumitomo Metal Corp., Japan

SLPC10-1 15:15 (Invited) Laser-based Micro-processing for Electronics Industries

H. Zhang

Electro Scientific Industries, Inc., USA

SLPC10-2 15:45 (Invited) Laser Processing for Display Glass

S. Shimizu

Mitsuboshi Diamond Industrial Co., Ltd., Japan

SLPC10-3 16:15 Laser Drilling with ps Laser and ms Laser in Thermal Barrier Coated Single-Crystal Alloy

X. Zhang, R. Sun, W. Zhang, and S. Gong

Beijing Aeronautical Manufacturing Technology Research Institute, China

SLPC10-4 16:30 Smart Laser Tracking, Welding and Monitoring,

J. P. Boillot ¹, R. Simoneau ¹, J. C. Fontaine ¹,

J. A. Gaboury ¹, and N. Torii ²

¹ Servo-Robot Inc., Canada, ² Servo-Robot Japan, Japan

SLPC10-5 16:45 Freeform Beam Shaping for Industrial Technologies Based on Fiber or Fiber-coupled Lasers

A. V. Laskin, and V Laskin

AdlOptica GmbH, Germany

17:00-17:15 Closing

Room 313+314

Closing Remarks

17:00

M. Tsukamoto, Osaka Univ., Japan