The 4th Laser Ignition Conference 2016

LIC'16

Wednesday, May 18

9:00-12:10 OPIC Plenary Session Room 501+502

----- Lunch Break (12:10-13:30) -----

13:30-15:15 LIC+PLD+SLPC Joint Session 1 Room 301

Chair: K. Washio (Paradigm Laser Research, Japan)

13:30 **Introduction**
T. Taira[1], T. Jitsuno[2], and Y. Okamoto[3]
[1]Inst. Mo. Sci., Japan, [2]Osaka Univ., Japan, [3]Okayama Univ., Japan

SLPC5j-1 13:45 **(Invited) Optimized Design and Performance of Laser Ablation Systems for Paint and Coating Removal for Manufacturing and Maintenance of Vehicles and Airplanes**
Y. Kwon
Powerlase Photonics, UK

PLDj-1 **(Invited) High Performance Interference Coatings for Near Infrared High Energy Lasers**
C. Menoni
Colorado State Univ., USA

PLDj-2 **(Invited) Modeling of Laser Induced Damage and Usage at National Ignition Facility**
Z. Liao
Lawrence Livermore Nat. Laboratory, USA

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

15:45-17:20 LIC+PLD+SLPC Joint Session 2 Room 301

Chair: K. Washio (Paradigm Laser Research, Japan)

SLPC6j-1 15:45 **(Invited) Fiber Delivery of Ultrafast Lasers**
E. Mottay
Amplitude Systems, France

LICj-1 16:15 **(Invited) The Latest Technology Demand of the Internal Processing Type Laser Dicing Technology**
N. Uchiyama and T. Takahashi
Hamamatsu Photonics, Japan

LICj-2 16:45 **(Invited) From analytics to material processing: the versatile microlaser and its applications**
A. Kevorkian
Teem Photonics, France

17:15 **Closing**
K. Washio
Paradigm Laser Research, Japan

18:00-20:00 OPIC Reception Room 501+502

Thursday, May 19

9:00-10:00 LIC1: LIC plenary session Room **301**

Chair: T. Taira (Inst. Mol. Sci., Japan)

LIC1-1 9:00 **Opening remarks for LIC**
T. Taira
Inst. Mol. Sci., Japan

LIC1-2 9:15 **Message for LIC16 from OSA (tentative)**
M. Russell
OSA (The Optical Society), USA

LIC1-3 9:30 **Estimating the Size of the Photonics Market**
P. F. Hallett
SPIE (The International Society for Optics and Photonics), USA

LIC1-4 9:45 **Message from SFO for LIC'16**
B. Boulanger
SFO (La Société Française d'Optique), France

10:00-12:30 LIC2: Fundamental ignition studies Room 301

Chair: S. Gupta (Argonne Nat. Lab, USA)

LIC2-1 10:00 **(Invited) Laser Applications in Engine Combustion Research -Diagnostics and Ignition-**
K. Akihama
Nihon Univ., Japan

----- Break (10:30-10:45) -----

LIC2-2 10:45 **Optimizing double-pulse strategy for spray ignition**
N. Beheran[1], R. George[1,2], M. Orain[2], and L. Zimmer[1]
[1]Lab. EM2C, CNRS, CentraleSupélec, Univ. Paris-Saclay, France, [2]ONERA – The French Aerospace Lab. (DMPH/SLM), France

LIC2-3 11:00 **A comparative study of spark ignitions induced by high-power laser and by high-voltage electrodes**
Y. Takenaka, Y. Sako, K. Mikami, T. Johzaki, S. Namba, D. Shimokuri, and T. Endo
Depart. Mechanical Systems Eng., Hiroshima Univ., Japan

LIC2-4 11:15 **(Invited) Temporally and spectrally resolved measurement of spark discharge in a spark ignition engine**
N. Kawahara
Okayama Univ., Japan

LIC2-5 11:45 **Laser breakdown assisted long discharge ignition (LBALDI) - Ignition behavior in lean mixture-**
T. Ikemoto[1], Y. Fukumi[1], E. Takahashi[3], H. Furutani[4], O. Imamura[2], and K. Akihama[2]
[1]Graduate School of Industrial Tech., Nihon Univ., Japan, [2]College of Industrial Tech., Nihon Univ., [3]Energy Technology Research Inst., AIST, Japan, [4]Renewable Energy Res. Center, AIST, Japan

LIC2-6 12:00 **Comparison of Laser and Spark Ignition: Laminar Burning Velocity Measurements in Natural Gas/Air Mixtures**
B. Almansour, S. Alawadhi, and S. S. Vasu
CATER, Mechanical and Aerospace Eng. Depart., Univ. Central Florida, USA

LIC2-7 12:15 **Influence of maximum fluence and fluence volume on energy transfer and plasma evolution during laser ignition with passively**

Q-switched laser
M. Bärwinkel, S. Lorenz, R. Stäglich, and D. Brüggemann
Univ. Bayreuth, Germany

----- Lunch Break （12:30-13:30）-----

13:30-14:45 LIC3: Giant micro-photonics

Room 301

Chair: Y. Oki (Kyushu Univ., Japan)

LIC3-1 13:30 **(Invited) Total design of high power VCSEL pumped passively Q-switched micro-lasers for laser ignition**
T. Suzudo[1], K. Hagita[1], T. Ikeo[1], K. Izumiya[1], N. Jikutani[1], Y. Higash[1], and T. Taira[2]
[1]Ricoh Co. Ltd., Japan, [2]Inst. Mol. Sci., Japan

LIC3-2 14:00 **Multi-pulse oscillation of passively Q-switched micro-laser pumped by VCSEL module**
K. Hagita[1], T. Ikeo[1], Y. Ishikawa[1], Y. Higashi[1], N. Jikutani[1], T. Taira[2], and T. Suzudo[1]
[1]Ricoh Co. Ltd., Japan, [2]Inst. Mol. Sci., Japan

LIC3-3 14:15 **Development of a 0.3 GW Microchip-seeded Amplifier**
V. Yahia and T. Taira
Inst. Mol. Sci., Japan

LIC3-4 14:30 **808 nm range high power (QCW 200 W) fiber coupled VCSEL pump module for laser ignition**
K. Izumiya, Y. Ohkura, M. Numata, N. Arai, K. Ikeda, Y. Sasaki, N. Jikutani, and T. Suzudo
Ricoh Co. Ltd., Japan

14:45-17:00 LIC4: Advanced applications of giant-pulse microchip laser systems

Room 301

Chair: Y. Sato (Inst. Mo. Sci., Japan)

LIC4-1 14:45 **(Invited) Remote analysis technique under severe environments using LIBS**
H. Ohba[1], M. Saeki[1], I. Wakaida[1], T. Sakka[2], and B. Thornton[3]
[1]Collaborative Lab. Advanced Decommissioning Sci., JAEA, Japan, [2]Graduate School of Eng., Kyoto Univ., Japan, [3]Inst. Industrial Sci., Univ. Tokyo, Japan

LIC4-2 15:15 **(Invited) Development of UV Microchip Lasers for Compact MALDI Spectroscopy Systems**
R. Bhandari[1], K. Tojo[1], and T. Taira[2]
[1]Shimadzu Co., Japan, [2]Inst. Mol. Sci., Japan

----- Break （15:45-16:00）-----

LIC4-3 16:00 **(Invited) A Flange-Mounted UV Microchip Laser for Imaging Mass Spectrometry**
T. Sakamoto[1], K. Ohishi[1], Y. Furukawa[2], L. Zheng[3] and T. Taira[3]
[1]Depart. Appl. Phys., Kogakuin Univ., Japan, [2]Oxide Co., Japan, [3]Inst. Mol. Sci., Japan

LIC4-4 16:30 **(Invited) Development of Ultra-compact Pulse Lasers and Applications by Giant micro-photonics**
Y. Sano
ImPACT, Japan

17:00-18:00 LIC5: Laser ignition of energetic materials

Room 301

Chair: Z. Zhang (Univ. Beijing, China)

LIC5-1 17:00 **(Invited) Physical and Chemical Problems of Laser Ignition**
R. Shen, L. Wu, S. Chen, W. Zhang, J. Xu, and Y. Ye
Depart. Appl. Chem., Nanjing Univ. Sci. Tech., China

LIC5-2 17:30 **Application of laser-ignition systems in liquid rocket engines**
S. Soller[1], N. Rackemann[1], and A. Preuss[2]
[1]Airbus Safran Launchers GmbH, Germany, [2]Airbus Defense and Space, Germany

LIC5-3 17:45 **Laser ignition experiment of HAN-based monopropellant**
T. Katsumi, Y. Miyajima, and S. Kadowaki
Nagaoka Univ. Tech., Japan

Friday, May 20

9:00-10:45 LIC6: Advanced ignition systems for vehicular applications

Room 301

Chair: R. Bhandari (Shimadzu Co., Japan)

LIC6-1 9:00 **(Invited) Multi-point laser ignition for in-combustion event feedback control of an automobile engine**
G. Dearden[1], Z. Kuang[1], E. Lyon[1], H. Cheng[2], V. Page[2], and T. Shenton[2]
[1]Laser Group, School of Eng., Univ. Liverpool, UK, [2]Powertrain Control Group, School of Eng., Univ. Liverpool, UK

LIC6-2 9:30 **The effect of laser ignition on a homogenous lean mixture of an automotive gasoline engine**
A. Birtas[1], G. Croitoru (Salamu) [2], M. Dinca[3], T. Dascalu[2], N. Boicea,[1] and N. Pavel[2]
[1]Renault Technologie Roumanie, Romania, [2]Nat. Inst. Laser, Plasma and Radiation Phys., Lab. Solid-State Quant. Electron., Romania, [3]Faculty of Physics, Univ. Bucharest, Romania

LIC6-3 9:45 **(Invited) Laser Ignition Systems for Space Propulsion Applications**
C. Manfletti and M. Börner
DLR, Inst. Space Propulsion, Germany

LIC6-4 10:15 **Laser spark ignition of kerosene in Ma 2.52 supersonic flow**
X. Li[1,2], L. Yang[3], Y. Yu[1,2], J. Peng[1,2], X. Yu[1,2], and J. Liang[3]
[1]Nat. Key Lab. Sci. Tech. Tunable Laser, Harbin Inst. Tech., China, [2]Inst. Opto-electron., Harbin Inst. Tech., China, [3]College of Aerospace Sci. Eng., Nat. Univ. Defense Tech., China

LIC6-5 10:30 **Performance of an internal combustion engine using multi-point laser ignition under nitrogen dilution conditions**
T. Saito[1], Y. Suzuta[1], E. Takahashi[2], and H. Furutani[3]
[1]Depart. Mechanical Eng., Meisei Univ., Japan, [2]Research Inst. Energy Conservation, AIST, Japan, [3]Renewable Energy Research Center, AIST, Japan

----- **Break （10:45-11:00）** -----

11:00-12:00 LICp: Poster Session

Exhibition Hall A

Chair: S. Lorenz (Univ. Bayreuth, Germany)

LICp-1 **Passively Q-switched Nd:YAG/Cr^{4+}:YAG laser with multiple-beam output**
G. Croitoru (Salamu), O. V. Grigore, T. Dascalu, and N. Pavel
Nat. Inst. Laser, Plasma and Radiation Phys., Lab. Solid-State Quant. Electron., Romania

LICp-2 **Cryo-cooled Ho:CaF_2 laser pumped by Tm:fiber laser**
M. Jelínek[1], J. Cvrček[1], V. Kubeček[1], L. Su[2], D. Jiang[2], and W. Ma[2]
[1]Faculty of Nuclear Sci. Phys. Eng., Czech Technical University in Prague, Czech, [2]Key Lab. Transparent and Opto-functional Inorganic Materials, Shanghai Inst. Ceramics, Chinese Academy of Sci., China

LICp-3 **Surface Morphology Study of Some Cu-Ni reference alloys using Laser Induced Breakdown Spectroscopy**
S. A. Sheta[1], G. Di Carlo[2], G. M. Ingo[2], M. A. Harith[1]
[1]NILES, Cairo Univ., Egypt, [2]ISMN-CNR, Italy

LICp-4 **Suppression of amplitude modulation based on nonlinear absorption effect**
K. Cheng, H. Dong , J. Shen, H. Yu, B. Xu, and M. Xin
Shandong Inst. Spacecraft Electrical Tech., China

LICp-5 **1 kHz repetition rate, giant-UV-pulse generation in [100] Nd:YAG / [110] Cr:YAG micro-laser under intensive pulse pumping**
L. Zheng and T. Taira
Inst. Mol. Sci., Japan

LICp-6 **Polarization dependence of saturable absorption in Cr:YAG**
Y. Sato and T. Taira
Inst. Mol. Sci.

----- **Lunch Break （12:00-13:00）** -----

13:00-14:00 LIC7: Nonlinear optics

Room 301

Chair: N. Pavel (INFLPR, Romania)

LIC7-1 13:00 **(Invited) Terahertz-wave technology based on nonlinear optical effect and sub-nanosecond pulse laser**
Y. Takida and H. Minamide
Teraphotonics Lab., RIKEN Center for Advanced Photonics, RIKEN, Japan

LIC7-2 13:30 **Compact passive Q-switched planar-waveguide laser at 355 nm with intra-cavity frequency conversion**
K. Sakai[1], F. Shohda[1], H. Fukahori[2], and T. Yanagisawa[1]
[1]Information Technology R&D Center, Mitsubishi Electric Co., Japan, [2]Nagoya Works, Mitsubishi Electric Co., Japan

LIC7-3 13:45 **Temperature stable giant-pulse green micro-laser**
A. Kausas[1], P. Loiseau[2], G. Aka[2], Y. Zheng[3], and T. Taira[1]
[1]Inst. Mol. Sci., Japan, [2]PSL Research Univ., IRCP, Chimie ParisTech., France, [3]Shanghai Inst. Ceram., Chinese Acad. Sci., China

14:00-16:15 LIC8: Advanced ignition systems for stationary power generation

Room 301

Chair: T. Saito (Meisei Univ., Japan)

LIC8-1 14:00 **(Invited) Performance of SI and LI Spark Plugs and That of Spark Plugs Equipped With a Prechamber**
S. Gupta[1], B. Bihari[1], M. Biruduganti[1], N. Polcyn[2], J. U. Hwang[2], and K. Kanehara[2]
[1]Argonne Nat. Lab., USA, [2]DENSO International

LIC8-2 14:30 **Performance Benefits of Laser Ignition in a Natural Gas 6-cylinder Engine**
S. Gupta[1], B. Bihari[1], and M. Biruduganti[1], Qing Wang[2], and R. V. Leeuwen[2]
[1]Argonne Nat. Lab., USA, [2]Princeton Optronics, USA

LIC8-3 14:45 **(Invited) Designing the Flame Kernel Structure by the Laser Pulse Profile**
S. Lorenz and D. Brüggemann
Univ. Bayreuth, Germany

----- **Break （15:15-15:30）** -----

LIC8-4 15:30 **Minimum Operating Requirements for Laser Ignition in Gas Turbines**
J. Griffiths, A. Kirk, and C. Dowding
School of Eng., Univ. Lincoln, UK

LIC8-5 15:45 **(Invited) Characteristics of microwave-enhanced laser ignition**
J. Hayashi[1], C. Liu[1], F. Akamatsu[1], A. Nishiyama[2], A. Moon[2], and Y. Ikeda[2]
[1]Osaka Univ., Japan, [2]Imagineering, Japan

16:15-17:45 LIC9: Micro solid state photonics

Room 301

Chair: Y. Oki (Kyushu Univ., Japan)

LIC9-1 16:15 **(Invited) Magneto-optical Q-switching with magnetic garnet film**
T. Goto[1,2], R. Morimoto[1], J. W. Pritchard[3], T. Yoshimoto[1], H. Takagi[1], Y. Nakamura[1], P. B. Lim[1], M. Mina[3], T. Taira[4], and M. Inoue[1]
[1]Toyohashi Univ. Tech., Japan., [2]JST, PRESTO, Japan., [3]Iowa State Univ., USA. [4]Inst. Mol. Sci., Japan.

LIC9-2 16:45 **An energy adjustable linearly polarized passively Q-switched bulk laser with a wedged diffusion bonded Nd:YAG/Cr^{4+}:YAG crystal**
H. P. Cheng, C. Y. Cho, P. H. Tuan, and Y. F. Chen
Depart. Electrophysics, Nat. Chiao Tung Univ., Taiwan

LIC9-3 17:00 **Minimum air-breakdown energy using giant-pulse width tunable system based on microchip laser**
H. H. Lim and T. Taira

Inst. Mol. Sci., Japan

LIC9-4 **(Invited) Laser Ceramics**

17:15 H.Yagi, K.Muramatsu, and T.Yanagitani
Konoshima Chemical Co., Ltd., Japan

17:45-18:00 Closing

Room 301

Award and Closing remarks
T. Taira
Inst. Mol. Sci., Japan