

# LPM2017

The 18th International Symposium on Laser Precision Microfabrication

June 5 – 8, 2017

Toyama, Japan

<http://www.jlps.gr.jp/lpm2017/>

## *LPM2017 Tentative Program*

*updated April 7, 2017*

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Koji Sugioka

*RIKEN, Japan*

*Co-Chairs*

Hiroyuki Niino

*AIST, Japan*

Yongfeng Lu

*University of Nebraska-Lincoln, USA*

Michael Schmidt

*Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany*

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*University of Toyama, Japan*

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# Oral Session

Day 1: June 5, Monday

Main Hall

## Opening

Chair: Koji Sugioka, RIKEN, Japan

10:00 Opening Remark

Main Hall

## Plenary Session

Chair: Michael Schmidt, Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany

10:10 MoM-PL-1 **Plenary** A184

**Photonics beyond diffraction limit: Plasmon waveguide, cavities and integrated laser circuits**, Xiang Zhang<sup>1</sup>, <sup>1</sup>University of California, Berkeley, USA

10:50 MoM-PL-2 **Plenary** A215

**Giant micro-photonics for ubiquitous power lasers**, Takunori Taira<sup>1</sup>, <sup>1</sup>Institute for Molecular Science, National Institutes of Natural Science, Japan

11:30 MoM-PL-3 **Plenary** A206

**High-speed surface structuring using Direct Laser Interference Patterning – fundamentals, applications and technology transfer**, Andres Fabian Lasagni<sup>1</sup>, <sup>1</sup>Institute for Manufacturing Technology, Technische Universität Dresden, Germany

12:10 Lunch Break

Day 1: June 5, Monday

## 1. SS2-1 Optimisation of laser ablation processes using ultrashort pulse lasers I

Chair: Gediminas Raciukaitis, Center for Physical Sciences and Technology, Lithuania

14:00 Mo1-I-1 **Invited** A007

**Ultrafast laser processing of metals: Comparative studies of experimental and simulated transient optical properties**, Heinz P. Huber<sup>1</sup>, Stephan Rapp<sup>1</sup>, Jan Winter<sup>1</sup>, <sup>1</sup>*Department of Applied Sciences and Mechatronics, Munich University of Applied Sciences (MUAS), Germany*

14:30 Mo1-O-2 A107

**Multiple pulse laser induced breakdown spectroscopy for monitoring of femtosecond laser micromachining process in water**, Aurimas Baskevicius<sup>1</sup>, Ona Balachninaite<sup>1</sup>, Simas Butkus<sup>1</sup>, Domas Paipulas<sup>1</sup>, Valdas Sirutkaitis<sup>1</sup>, <sup>1</sup>*Laser Research Center, Vilnius University, Lithuania*

14:50 Mo1-O-3 **Student** A051

**Systematic study of refractive index modifications induced by ultrafast laser in bulk chalcogenide glasses**, Madhura Somayaji<sup>1</sup>, Ciro D'Amico<sup>1</sup>, Jean Philippe Colombier<sup>1</sup>, Johann Troles<sup>2</sup>, Razvan Stoian<sup>1</sup>, <sup>1</sup>*Laboratoire Hubert Curien, UMR 5516 CNRS, Université de Lyon, Université Jean Monnet, France*, <sup>2</sup>*Chemical Sciences Institute of Rennes, UMR 6226 CNRS, University of Rennes I, France*

15:10 Mo1-O-4 A076

**Nonlinear absorption of ultrafast laser pulses on thermal stress generation of chemically strengthened glass**, Arun Satyal<sup>1,2</sup>, Carlos Juan Hernandez Castaneda<sup>1,3</sup>, Yee Cheong Lam<sup>1,2</sup>, Hongyu Zheng<sup>1,3</sup>, <sup>1</sup>*SIMTech-NTU Joint Laboratory (Precision Machining), Nanyang Technological University, Singapore*, <sup>2</sup>*School of Mechanical & Aerospace Engineering, Nanyang Technological University, Singapore*, <sup>3</sup>*Machining Technology Group, Singapore Institute of Manufacturing Technology (SIMTech), Singapore*

15:30 Mo1-O-5 A155

**Femtosecond laser scribing of transparent conductive oxides in CIGS solar cells and their characterization by scanning spreading resistance microscopy**, Aiko Narazaki<sup>1</sup>, Tadataka Sato<sup>1</sup>, Hiroyuki Niino<sup>1</sup>, Hideyuki Takada<sup>2</sup>, Kenji Toriduka<sup>2</sup>, Jiro Nishinaga<sup>3</sup>, Kamikawa-Shimizu Yukiko<sup>3</sup>, Shogo Ishizuka<sup>3</sup>, Hajime Shibata<sup>3</sup>, Shigeru Niki<sup>4</sup>, <sup>1</sup>*Research Institute for Sustainable Chemistry, AIST, Japan*, <sup>2</sup>*Electronics and Photonics Research Institute, AIST, Japan*, <sup>3</sup>*Research Center for Photovoltaics, AIST, Japan*, <sup>4</sup>*Renewable Energy Research Center, AIST, Japan*

15:50 Coffee Break

## Room 2

## Room 3

## 3. Medical and biological applications

1

Chair: Alberto Piqué, US Naval Research Laboratory, USA

14:00 Mo2-I-1 **Invited** A171

**Biofabrication of thin layers and nanoparticles under controlled pulsed laser irradiation**, Ion N. Mihailescu<sup>1</sup>, Carmen Ristoscu<sup>1</sup>, <sup>1</sup>*Lasers Department, National Institute for Lasers, Plasma and Radiation Physics, Romania*

14:30 Mo2-O-2 A170

**Pulsed laser synthesis of bioactive thin layers with antimicrobial properties**, Carmen Ristoscu<sup>1</sup>, Laura Floroian<sup>2</sup>, Natalia Mihailescu<sup>1</sup>, Anita Visan<sup>1</sup>, Ana Jancovic<sup>3</sup>, Mariana Carmen Chifiriuc<sup>4</sup>, Ion N. Mihailescu<sup>1</sup>, <sup>1</sup>*Lasers Department, National Institute for Lasers, Plasma and Radiation Physics, Romania*, <sup>2</sup>*Transilvania University of Brasov, 29 Eroilor Blvd, 500036, Brasov,, Romania*, <sup>3</sup>*Innovation Center, Faculty of Technology and Metallurgy,, University of Belgrade, 11000 Belgrade,, Serbia*, <sup>4</sup>*Department of Microbiology, Faculty of Biology,, University of Bucharest, 060101 Bucharest,, Romania*

14:50 Mo2-O-3 A034

**Laser patterning of GaAs (001) functionalized with alkanethiol self-assembled monolayers**, Vivien Lacour<sup>1, 2</sup>, Celine Elie-Caille<sup>2</sup>, Therese Leblois<sup>2</sup>, Khalid Moumanus<sup>1</sup>, Jan J. Dubowski<sup>1</sup>, <sup>1</sup>*Université de Sherbrooke*, <sup>2</sup>*Université de Bourgogne Franche-Comté*

15:10 Mo2-O-4 **Student** A151

**Picosecond laser surface micro/nano texturing of stainless steel as a method to reduce the adhesion of bacteria**, Fatema Rajab<sup>1</sup>, Paul Benson<sup>2</sup>, Lin Li<sup>3</sup>, Kathryn Whitehead<sup>4</sup>, <sup>1</sup>*Laser Processing Research Centre, School of Mechanical, Aerospace and Civil Engineering, University of Manchester, UK*, <sup>2</sup>*Centre for Biomedicine, Manchester Metropolitan University, UK*, <sup>3</sup>*Laser Processing Research Centre, School of Mechanical, Aerospace and Civil Engineering, University of Manchester, UK*, <sup>4</sup>*Centre for Biomedicine, Manchester Metropolitan University, UK*

15:30 Mo2-O-5 A062

**Bio-inspired designing superhydrophobic and superoleophobic surfaces by femtosecond laser**, Feng Chen<sup>1</sup>, Qing Yang<sup>2</sup>, Jiale Yong<sup>1</sup>, Yao Fang<sup>1</sup>, Jinglan Huo<sup>1</sup>, Xun Hou<sup>1</sup>, <sup>1</sup>*State Key Laboratory for Manufacturing System Engineering and Shaanxi Key Laboratory of Photonics Technology for Information, School of Electronic & Information Engineering, Xi'an Jiaotong University, PR China*, <sup>2</sup>*School of Mechanical Engineering, Xi'an Jiaotong University, PR China*

15:50 Coffee Break

## 5. Fundamental aspects

Chair: Yoshiro Ito, Nagaoka University of Technology, Japan

14:00 Mo3-O-1 A168

**3D nano-fabrication using controlled Bessel-glass interaction in ultrafast modes**, Manoj Kumar Bhuyan<sup>1, 2</sup>, Praveen Kumar Velpula<sup>1</sup>, Madhu Somayaji<sup>1</sup>, Jean Philippe Colombier<sup>1</sup>, Razvan Stoian<sup>1</sup>, <sup>1</sup>*Laboratoire Hubert Curien, UMR 5516 CNRS, Université de Lyon, Université Jean Monnet, Saint Etienne, France*, <sup>2</sup>*RIKEN-SIOM Joint research Unit, RIKEN Center for Advanced Photonics, Wako, Japan*

14:20 Mo3-O-2 A214

**Determining optimal femtosecond laser-material processing via integrating two-temperature and thermal models**, Jie Qiao<sup>1</sup>, Lauren L. Taylor<sup>1</sup>, Ryan E. Scott<sup>1</sup>, <sup>1</sup>*Chester F. Carlson Center for Imaging Science, Rochester Institute of Technology, United States*

14:40 Mo3-I-3 **Invited** A096

**Laser micromachining of metals with ultra-short pulses: Factors limiting the scale-up process**, Beat Jeggi<sup>1</sup>, Stefan Remund<sup>1</sup>, Rene Streubel<sup>2</sup>, Bilal Goekce<sup>2</sup>, Stephan Barcikowski<sup>2</sup>, Beat Neuenschwander<sup>1</sup>, <sup>1</sup>*Institute of Applied Laser, Photonics and Surface Technologies ALPS, Bern University of Applied Sciences, Switzerland*, <sup>2</sup>*Technical Chemistry I and Center for Nanointegration, University of Duisburg-Essen, Germany*

15:10 Mo3-O-4 A166

**Open-air isotopic fingerprinting by laser-ablation mass spectrometry**, Yunshen Zhou<sup>1,2,3</sup>, Yao Lu<sup>1</sup>, Yongfeng Lu<sup>1</sup>, <sup>1</sup>*Electrical and Computer Engineering, University of Nebraska-Lincoln, USA*, <sup>2</sup>*Advanced Optowave Corporation, USA*, <sup>3</sup>*INNO Research Institute, INNO Laser, PRC*

15:30 Mo3-O-5 A125

**Thermal damage of carbon fiber reinforced plastics (CFRP) by IR fiber laser irradiation**, Hiroyuki Niino<sup>1</sup>, Yoshihisa Harada<sup>1</sup>, Akira Fujisaki<sup>2</sup>, <sup>1</sup>*AIST, JAPAN*, <sup>2</sup>*Furukawa Electric Co., Ltd., JAPAN*

15:50 Coffee Break

## 2. SS2-2 Optimisation of laser ablation processes using ultrashort pulse lasers II

Chair: Heinz P. Huber, Munich University of Applied Sciences (MUAS), Germany

16:20 Mo1-I-6 **Invited** A003

**Efficient metal and glass processing using high average power ultrafast laser**, John Lopez<sup>1</sup>, Konstantin Mishchik<sup>2</sup>, Kevin Gaudfrin<sup>3</sup>, Girolamo Mincuzzi<sup>3</sup>, Eric Audouard<sup>2</sup>, Eric Mottay<sup>2</sup>, Rainer Kling<sup>3</sup>, <sup>1</sup>UNIV BORDEAUX, CNRS, CEA, CELIA UMR5107, France, <sup>2</sup>AMPLITUDE SYSTEMES, France, <sup>3</sup>ALPHANOV, France

16:50 Mo1-O-7 **Student** A104

**Comparison of GHz, MHz and kHz femtosecond burst mode micromachining of invar foils**, Simas Butkus<sup>1,2</sup>, Martynas Barkauskas<sup>1,2</sup>, Domas Paipulas<sup>1</sup>, Valdas Sirutkaitis<sup>1</sup>, <sup>1</sup>Quantum electronics, Laser research center, Vilnius university, Lithuania, <sup>2</sup>MGF Light Conversion, Lithuania

17:10 Mo1-O-8 **Student** A126

**Sub-ns laser effective ablation of metals**, Paulius Gečys<sup>1</sup>, Andrius Žemaitis<sup>1</sup>, Mindaugas Gedvilas<sup>1</sup>, Gediminas Račiukaitis<sup>1</sup>, <sup>1</sup>Department of laser technologies, Center for Physical Sciences and Technology, Lithuania

17:30 Mo1-O-9 A105

**Optimizing the specific removal rate with the burst mode under varying conditions**, Beat Jaeggi<sup>1</sup>, Stefan Remund<sup>1</sup>, Yiming Zhang<sup>1</sup>, Thorsten Kramer<sup>1</sup>, Beat Neuenschwander<sup>1</sup>, <sup>1</sup>Institute for Applied Laser, Photonics and Surface Technologies ALPS, Bern University of Applied Sciences, Switzerland

17:50 close



## Room 2

4. Medical and biological applications  
2

Chair: Ion N. Mihailescu, National Institute for Lasers, Plasma and Radiation Physics, Romania

16:20 Mo2-I-6 **Invited** A015

**Laser-based methodologies for point-of-care diagnostics devices on paper**, Collin L. Sones<sup>1</sup>, Peijun J. W. He<sup>1</sup>, Ioannis N. Katis<sup>1</sup>, Robert W. Eason, <sup>1</sup>*Optoelectronics Research Centre, University of Southampton, United Kingdom*

16:50 Mo2-O-7 A180

**Femtosecond laser surface modification of an immunoassay microchip for spatially-localized antibody immobilization**, Kenji Goya<sup>1</sup>, Yusuke Fuchiwaki<sup>1</sup>, Masato Tanaka<sup>1</sup>, Toshihiko Ooie<sup>1</sup>, <sup>1</sup>*Health Research Insisute, National Institute of Advanced Industrial Science and Tachnology, Japan*

17:10 Mo2-O-8 **Student** A072

**Development of high-throughput cell sorting system utilizing femtosecond laser impulse**, Zhen-Yi Hong<sup>1</sup>, Takanori Iino<sup>1</sup>, Hiroki Hagihara<sup>1</sup>, Takanori Maeno<sup>1</sup>, Kazunori Okano<sup>1</sup>, Yoichiroh Hosokawa<sup>1</sup>, <sup>1</sup>*Graduate School of Materials Science, Nara Institute of Science and Technology, Japan*

17:30 Mo2-O-9 **Student** A073

**Ca<sup>2+</sup> signal activation and propagation in mouse myoblast cells triggered by femtosecond laser impulse**, Yuki Oshikawa<sup>1</sup>, Kazunori Okano<sup>1</sup>, Takanori Maeno<sup>1</sup>, Takanori Iino<sup>1</sup>, Ryohei Yasukuni<sup>1</sup>, Yoichiroh Hosokawa<sup>1</sup>, <sup>1</sup>*Graduate School of Materials Science, Nara Institute of Science and Technology, Japan*

17:50 close

## Room 3

## 6. Advanced laser processing

Chair: Jan J. Dubowski, Université de Sherbrooke, Canada

16:20 Mo3-O-6 A024

**Effect of picosecond laser based modifications of amorphous carbon coatings on lubricant-free tribological systems**, Tom Haefner<sup>1,2</sup>, Johannes Heberle<sup>1,2</sup>, Hubert Hautmann<sup>1</sup>, Rong Zhao<sup>3</sup>, Jennifer Steiner<sup>4</sup>, Stephan Tremmel<sup>3</sup>, Marion Merklein<sup>2,4</sup>, Michael Schmidt<sup>1,2</sup>, <sup>1</sup>*Institute of Photonic Technologies, Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany*, <sup>2</sup>*Erlangen Graduate School in Advanced Optical Technologies (SAOT), Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany*, <sup>3</sup>*Institute of Engineering Design, Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany*, <sup>4</sup>*Institute of Manufacturing Technology, Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany*

16:40 Mo3-O-7 A044

**High speed laser processing using a 3 kW single-mode fiber laser with a 20-m long delivery fiber**, Keisuke Uchiyama<sup>1</sup>, Shinya Ikoma<sup>1</sup>, Yuya Takubo<sup>1</sup>, Masahiro Kashiwagi<sup>1</sup>, Kensuke Shima<sup>1</sup>, Daiichiro Tanaka<sup>1</sup>, <sup>1</sup>*Fiber Laser Research Department, Advanced Technology Laboratory, Fujikura Ltd., Japan*

17:00 Mo3-I-8 **Invited** A131

**Overview on ultrafast laser applications and relevant markets in microelectronics industry**, Nam Seong Kim, <sup>1</sup>*Laser Applications Research Laboratory, EO Technics, Republic of Korea*

17:30 Mo3-O-9 A197

**Welding of thin section dissimilar metals with ns pulsed fiber lasers**, Masahashi Tsuchiya<sup>1</sup>, Jack Gabzdyl<sup>2</sup>, Audery Bourriez<sup>2</sup>, <sup>1</sup>*Laser, Sumitomo Heavy Industries, Japan*, <sup>2</sup>*Pulsed Laser Business Line, SPI Lasers Ltd, UK*

17:50 close

## Day 2: June 6, Tuesday

**Room 1**

### 7. SS2-3 Optimisation of laser ablation processes using ultrashort pulse lasers III

Chair: Beat Neunschwander, BUAS, Switzerland

9:00 Tu1-I-1 Invited A002

**System level tools for integrating laser micro processing modules in production lines**, Stefan S. Dimov<sup>1</sup>, <sup>1</sup>*Department of Mechanical Engineering, University of Birmingham, UK*

9:30 Tu1-O-2 A071

**Ultrashort pulse laser technology for processing of advanced electronics materials**, Jim M. Bovatsek<sup>1</sup>, Rajesh S. Patel<sup>1</sup>, <sup>1</sup>*Spectra-Physics, MKS Instruments, Inc., USA*

9:50 Tu1-O-3 Student A049

**In-fiber Mach-Zehnder interferometer fabricated by femtosecond laser micromachining assisted chemical etching for Bovine Serum Albumin sensing**, Zhengyong Li<sup>1</sup>, Changrui Liao<sup>1</sup>, Yiping Wang<sup>1</sup>, Ying Wang<sup>1</sup>, <sup>1</sup>*College of Optoelectronic Engineering, Shenzhen University, China*

10:10 Tu1-O-4 A116

**Improving fatigue properties of laser welded 2024 aluminum alloy using femtosecond laser peening**, Tomokazu Sano<sup>1</sup>, Takayuki Eimura<sup>1</sup>, Akio Hirose<sup>1</sup>, Seiichiro Tsutsumi<sup>2</sup>, Yousuke Kawahito<sup>2</sup>, Seiji Katayama<sup>2</sup>, Kazuto Arakawa<sup>3</sup>, Ayumi Shiro<sup>4</sup>, Takahisa Shobu<sup>5</sup>, Kiyotaka Masaki<sup>6</sup>, Yuji Sano<sup>7</sup>, <sup>1</sup>*Graduate School of Engineering, Osaka University, Japan*, <sup>2</sup>*Joining and Welding Research Institute, Osaka University, Japan*, <sup>3</sup>*Shimane University, Japan*, <sup>4</sup>*National Institute for Quantum and Radiological Science and Technology, Japan*, <sup>5</sup>*Japan Atomic Energy Agency, Japan*, <sup>6</sup>*National Institute of Technology, Okinawa College, Japan*, <sup>7</sup>*Toshiba Corporation, Japan*

10:30 Tu1-O-5 Student A036

**Experimental study on processing of polyamide bar with femtosecond laser**, Zhaoyang Zhai<sup>1,2</sup>, Wenjun Wang<sup>1,2</sup>, Xuesong Mei<sup>1,2</sup>, Xin Zhao<sup>3</sup>, Bo Han<sup>3</sup>, <sup>1</sup>*School of Mechanical Engineering, Xi'an Jiaotong University, China*, <sup>2</sup>*State Key Laboratory for Manufacturing Systems Engineering, Xi'an Jiaotong University, China*, <sup>3</sup>*Wuzhou Engineering Group Corporation LTD, China*

10:50 Coffee Break

### Poster I

Chair: Hiroyuki Niino, AIST, Japan

11:10 Short Presentations of the presenting authors for odd-numbered posters: Poster Session I (Room 1)

### Poster I

12:10 Poster Session I and Exhibition (Foyer on 3rd floor)

& Lunch Time (up to 13:50)

## Room 2

## 10. 3-D micro- and nano-fabrication 1

Chair: Xianfan Xu, Purdue University, USA

9:00 Tu2-O-1 **Student** A101

**Estimation of diffractive optics fabricated inside glass using a femtosecond laser**, Ibuki Yamaguchi<sup>1</sup>, Satoshi Hasegawa<sup>1</sup>, Yoshio Hayasaki<sup>1</sup>, <sup>1</sup>Center for Optical Research and Education (CORE), Utsunomiya University, Japan

9:20 Tu2-O-2 A023

**Aberration-free high NA focusing in transparent media**, Alexander Laskin<sup>1</sup>, Vadim Laskin<sup>1</sup>, Aleksei Ostrun<sup>2</sup>, <sup>1</sup>AdlOptica Optical Systems GmbH, Germany, <sup>2</sup>St. Petersburg National Research University ITMO, Russia

9:40 Tu2-I-3 **Invited** A127

**Mid-infrared surface sensing waveguides in silica glass: Monitoring of water microstructure and contaminants**, Airan Rodenas<sup>1</sup>, Javier Martinez<sup>2</sup>, Roberto Osellame<sup>3</sup>, Francesc Diaz<sup>2</sup>, <sup>1</sup>Istituto di Fotonica e Nanotecnologie (IFN), Consiglio Nazionale delle Ricerche (CNR), Italy, <sup>2</sup>Departament de Química Física i Inorgànica, Universitat Rovira i Virgili, Spain, <sup>3</sup>Dipartimento di Fisica, Politecnico di Milano, Italy

10:10 Tu2-O-4 A161

**Water-assisted laser drilling for miniature internal thread in glass and evaluation of its strength**, Reo Murakami<sup>1</sup>, Hiroyuki Nakagawa<sup>1</sup>, Shigeki Matsuo<sup>1</sup>, <sup>1</sup>Department of Mechanical Engineering, Shibaura Institute of Technology, Japan

10:30 Tu2-O-5 **Student** A120

**Residual heat in ultrashort laser drilling of metals**, Daniel Johannes Förster<sup>1,2</sup>, Rudolf Weber<sup>2</sup>, Thomas Graf<sup>2</sup>, <sup>1</sup>Graduate School of Excellence advanced Manufacturing Engineering GSaME, University of Stuttgart, Germany, <sup>2</sup>Institut für Strahlwerkzeuge IFSW, University of Stuttgart, Germany

10:50 Coffee Break

## Room 3

## 13. New ripple formation

Chair: Masaaki Sakakura, Kyoto University, Japan

9:00 Tu3-O-1 A173

**Modifications induced in bulk fused silica with double femtosecond laser pulse sequence**, Valdemar Stankevič<sup>1,2</sup>, Gediminas Račiukaitis<sup>1</sup>, <sup>1</sup>Laser department, Center for Physical Sciences and Technology, Lithuania, <sup>2</sup>ELAS, Ltd, Lithuania

9:20 Tu3-O-2 A080

**Formation of nanograting on tellurite glass by femtosecond laser irradiation**, Tetsuo Kishi<sup>1</sup>, Fatmah Ebrahim<sup>2</sup>, Ray Jay Jeng<sup>1</sup>, Nobuhiro Matsushita<sup>1</sup>, Tetsuji Yano<sup>1</sup>, Yves Bellouard<sup>2</sup>, <sup>1</sup>Materials Science & Engineering, Tokyo Institute of Technology, Japan, <sup>2</sup>IMT/STI, Ecole Polytechnique Fédérale de Lausanne, Switzerland

9:40 Tu3-O-3 A097

**Tuning stainless steel wetting properties by femtosecond laser-induced periodic surface structures**, Olga Varlamova<sup>1</sup>, Juergen Reif<sup>1</sup>, Rodica Borcia<sup>1</sup>, Sepehr Razi<sup>2</sup>, Debasish Sarker<sup>3</sup>, <sup>1</sup>Institute of Physics, BTU Cottbus-Senftenberg, Germany, <sup>2</sup>Amirkabir University of Technology, Teheran, Iran, <sup>3</sup>Experimental Thermal Fluid Dynamics, Helmholtz-Zentrum Dresden-Rossendorf, Germany

10:00 Tu3-O-4 A046

**Laser nano-structuring of pre-structured substrates**, Evangelos Skoulas<sup>1</sup>, Emmanuel Stratakis<sup>1</sup>, Georgy Airatovich Shafeev<sup>2, 3</sup>, Ekaterina Vladimirovna Barmina<sup>2</sup>, <sup>1</sup>Institute of Electronic Structure and Laser, Foundation for Research & Technology—Hellas, (IESL-FORTH), Institute of Electronic Structure and Laser, Foundation for Research & Technology—Hellas, (IESL-FORTH), Greece, <sup>2</sup>Wave Research Center, A.M. Prokhorov General Physics Institute of the Russian Academy of Sciences, Russian Federation, <sup>3</sup>National Research Nuclear University MEPhI, National Research Nuclear University MEPhI, Russian Federation

10:20 Tu3-O-5 A041

**The influences of surface plasmons and thermal effects on femtosecond laser-induced subwavelength periodic ripples on Au film by pump-probe imaging**, Tianqing Jia<sup>1</sup>, <sup>1</sup>State Key Laboratory of Precision Spectroscopy, East China Normal University, China

10:40 Coffee Break

**8. SS1-1 Lasers and nanoparticles in liquids -Fundamentals-**

Chair: Vincenzo Amendola, University of Padova,  
Italy / Weiping Cai, CAS Hefei, China

14:20 Tu1-I-6 **Invited** A004

**Origin of the nano-carbon allotropes in pulsed laser ablation in liquids synthesis**, David Amans<sup>1</sup>, Mouhmed Diouf<sup>1</sup>, Julien Lam<sup>1</sup>, Gilles Ledoux<sup>1</sup>, Christophe Dujardin<sup>1</sup>, <sup>1</sup>*Institut Lumière Matière, Univ Lyon, Université Claude Bernard Lyon 1, CNRS, FRANCE*

14:50 Tu1-O-7 A119

**Formation of alloy nanoparticles by laser ablation in liquid environment**, Vincenzo Amendola<sup>1</sup>, Elti Cattaruzza<sup>2</sup>, <sup>1</sup>*Chemical Sciences, University of Padova, Italy*, <sup>2</sup>*Department of Molecular Sciences and Nanosystems, Università Ca' Foscari Venezia, Italy*

15:10 Tu1-O-8 A047

**Balance of O<sub>2</sub> and H<sub>2</sub> content under laser-induced breakdown of aqueous colloidal solutions**, Ekaterina Vladimirovna Barmina<sup>1</sup>, Alexander Vladimirovich Simakin<sup>1</sup>, Georgy Airatovich Shafeev<sup>1,2</sup>, <sup>1</sup>*Wave Research Center, A.M. Prokhorov General Physics Institute of the Russian Academy of Sciences, Russian Federation*, <sup>2</sup>*National Research Nuclear University MEPhI, National Research Nuclear University MEPhI, Russian Federation*

15:30 Coffee Break

## Room 2

## Room 3

## 11. 3-D micro- and nano-fabrication 2

Chair: Shigeki Matsuo, Shibaura Institute of Technology, Japan

14:00 Tu2-O-6 A162

**3D biomimetic architectures in closed microfluidic structures created by ultrafast laser ship-in-a-bottle integration for evaluation of cancer cells migration,** Felix Sima<sup>1,3</sup>, Daniela Serien<sup>1</sup>, Dong Wu<sup>1</sup>, Jian Xu<sup>1</sup>, Hiroyuki Kawano<sup>2</sup>, Katsumi Midorikawa<sup>1</sup>, Koji Sugioka<sup>1</sup>, <sup>1</sup>SIOM Joint Research Unit, RIKEN, Japan, <sup>2</sup>Brain Science Institute, RIKEN, Japan, <sup>3</sup>CETAL, INFLPR, Romania

14:20 Tu2-O-7 A030

**Ship-in-a-bottle integration of 3D proteinaceous microstructures inside glass microchannel by two-photon cross-linking,** Daniela Serien<sup>1</sup>, Katsumi Midorikawa<sup>2</sup>, Koji Sugioka<sup>1</sup>, <sup>1</sup>RIKEN-SIOM Joint Research Unit, RIKEN Center for Advanced Photonics, RIKEN, Japan, <sup>2</sup>RIKEN Center for Advanced Photonics, RIKEN, Japan

14:40 Tu2-O-8 A033

**Fabrication of three-dimensional micro-structures in glass by picosecond laser micro-machining and welding,** Krystian L. Wlodarczyk<sup>1</sup>, Richard M. Carter<sup>1</sup>, Amir Jahanbakhsh<sup>1</sup>, Duncan P. Hand<sup>1</sup>, Robert R.J. Maier<sup>1</sup>, Mercedes Maroto-Valer<sup>1</sup>, <sup>1</sup>School of Engineering and Physical Sciences, Heriot-Watt University, United Kingdom

15:00 Tu2-O-9 A150 **Student**

**Fabrication of electro-optic tunable lithium niobate microresonators with integrated in-plane microelectrodes using femtosecond laser micromachining,** Min Wang<sup>1</sup>, Jintian Lin<sup>1</sup>, Zhiwei Fang<sup>1</sup>, Yingxin Xu<sup>2</sup>, Wei Fang<sup>2</sup>, Ya Cheng<sup>1,3</sup>, <sup>1</sup>State Key Laboratory of High Field Laser Physics, Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, China, <sup>2</sup>State Key Laboratory of Modern Optical Instrumentation, College of Optical Science and Engineering, Zhejiang University, China, <sup>3</sup>State Key Laboratory of Precision Spectroscopy, East China Normal University, China

15:20 Tu2-O-10 A201 **Student**

**Femtosecond laser assisted three-dimensional free-form fabrication of complex three dimensional metallic structures made of copper, silver and their alloys, embedded in fused silica,** Fatmah Ebrahim<sup>1</sup>, Raphael Charvet<sup>2</sup>, Cyril Denereaz<sup>2</sup>, Suzanne Verheyden<sup>2</sup>, Lea Deillon<sup>2</sup>, Andreas Mortensen<sup>2</sup>, Yves Bellouard<sup>1</sup>, <sup>1</sup>Galatea Lab, STI-IMT, Ecole Polytechnique Federale de Lausanne (EPFL), Switzerland, <sup>2</sup>Mechanical Metallurgy Laboratory, STI-IMX, Ecole Polytechnique Federale de Lausanne (EPFL), Switzerland

15:40 Coffee Break

## 14. Glass/Ceramic processing

Chair: Airán Ródenas Seguí, Istituto di Fotonica e Nanotecnologie (IFN) - Consiglio Nazionale delle Ricerche (CNR), Dipartimento di Fisica - Politecnico di Milano, Italy

14:00 Tu3-O-6 A133

**Effect of laser pulse duration on non-linear absorptivity and modification size in borosilicate glass,** Isamu Miyamoto<sup>1, 2</sup>, Kazuhiko Maeda<sup>1</sup>, Etsuji Ohmura<sup>1</sup>, <sup>1</sup>Osaka University, Japan, <sup>2</sup>Erlangen Graduate School of Advanced Optical Technologies (SAOT), Germany

14:20 Tu3-O-7 A052

**Drilling of through holes in sapphire and glass using femtosecond laser pulses,** Konstantin Mishchik<sup>1</sup>, Kevin Gaudfrin<sup>2</sup>, John Lopez<sup>2</sup>, <sup>1</sup>Amplitude Systemes, France, <sup>2</sup>CELIA UMR5107, Université Bordeaux CNRS CEA, France

14:40 Tu3-I-8 A055 **Invited**

**Stress dynamics in ultrashort pulse laser processing inside transparent materials,** Masaaki Sakakura<sup>1</sup>, Yasuhiko Shimotsu<sup>2</sup>, Kiyotaka Miura<sup>2</sup>, <sup>1</sup>Office of Society-Academia Collaboration for Innovation, Kyoto University, Japan, <sup>2</sup>Graduate school of engineering, Kyoto University, Japan

15:10 Tu3-O-9 A204

**Time resolved study of femtosecond laser induced micro-modifications inside transparent brittle materials,** Frank Hendricks<sup>1</sup>, Matthias Domke<sup>2</sup>, Heinz P. Huber<sup>3</sup>, Victor V. Matyilitsky<sup>1</sup>, <sup>1</sup>Spectra-Physics, Austria, <sup>2</sup>Vorarlberg Technical University, Austria, <sup>3</sup>Laser Center of Munich University of Applied Sciences, Germany

15:30 Coffee Break

## 9. SS1-2 Lasers and nanoparticles in liquids - Colloid Processing -

Chair: Shuichi Hashimoto, University of Tokushima, Japan / Tsuyoshi Asahi, Ehime University, Japan

16:20 Tu1-I-9 **Invited** A028

**Fabrication of colloidal Si nanoparticles by pulsed-laser irradiation of porous Si in liquid: Toward high productivity and size control,** Toshihiro Nakamura<sup>1</sup>, Ze Yuan<sup>2</sup>, Sadao Adachi<sup>1</sup>,  
<sup>1</sup>Graduate School of Science and Technology, Gunma University, Japan, <sup>2</sup>Faculty of Pure and Applied Sciences, University of Tsukuba, Japan

16:50 Tu1-O-10 A175

**Fabrication of metal phthalocyanine nanoparticles in organic solvents by nanosecond laser fragmentation,** Ryo Kihara<sup>1</sup>, Taisei HImeda<sup>1</sup>, Tsuyoshi Asahi<sup>1</sup>, <sup>1</sup>Department of Materials Science and Biotechnology, Ehime University, Japan

17:10 Tu1-O-11 A008

**Laser-induced fabrication of nanoholes on glass substrates exploiting gold nanoparticles,** Yuki Osaka<sup>1</sup>, Satoshi Sugano<sup>1</sup>, Shuichi Hashimoto<sup>1</sup>,  
<sup>1</sup>Department of Optical Science and Technology, University of Tokushima, Japan

17:30 Tu1-O-12 **Student** A066

**Laser parameter effects on submicrometer spherical particles synthesized by pulsed laser melting in liquid,** Shota Sakaki<sup>1</sup>, Naoto Koshizaki<sup>1</sup>, Hiroshi Ikenoue<sup>2</sup>, Takeshi Tsuji<sup>3</sup>, Yoshie Ishikawa<sup>4</sup>,  
<sup>1</sup>Graduate school of Engineering, Hokkaido University, Japan, <sup>2</sup>Department of Gigaphoton Next GLP, Kyusyu University, Japan, <sup>3</sup>Interdisciplinary Graduate School of Science and Engineering, Shimane University, Japan, <sup>4</sup>Nanomaterials Research Institute, National Institute of Advanced Industrial Science and Technology, Japan

17:50 close

## Room 2

## Room 3

## 12. 3-D micro- and nano-fabrication 3

## 15. Advanced materials processing

Chair: Guanghua Cheng, Xi'an Institute of Optics and Precision Mechanics, CAS, China

Chair: Juergen Reif, Brandenburg University of Technology, Germany

16:20 Tu2-O-11 A082

**Selective polymer powder deposition with microscale accuracy by vibrating nozzles in SLS machines**, Thomas Stichel<sup>1,3</sup>, Tobias Laumer<sup>1,2,3</sup>, Max Rath<sup>1</sup>, Stephan Roth<sup>1,3</sup>, <sup>1</sup>*Bayerisches Laserzentrum GmbH, Germany*, <sup>2</sup>*Erlangen Graduate School in Advanced Optical Technologies, Germany*, <sup>3</sup>*Collaborative Research Center (CRC) 814 "Additive Manufacturing", Germany*

16:20 Tu3-O-10 A158

**Synthesis of semiconductor microspheres by laser ablation**, Daisuke Nakamura<sup>1</sup>, Ryohei Tasaki<sup>1</sup>, Mitsuhiro Higashihata<sup>1</sup>, Akira Suwa<sup>2</sup>, Hiroshi Ikenoue<sup>2</sup>, <sup>1</sup>*Department of Electrical Engineering, Graduate School of Information Science and Electrical Engineering, Kyushu University, Japan*, <sup>2</sup>*Department of Gigaphoton Next GLP, Graduate School of Information Science and Electrical Engineering, Kyushu University, Japan*

16:40 Tu2-O-12 A045

**Laser-based quasi-simultaneous preheating for generating multi-material components with micro-sized structures in the boundary zone by laser sintering of polymer powders**, Tobias Laumer<sup>1,2,3</sup>, Thomas Stichel<sup>1,3</sup>, Michael Schmidt<sup>1-4</sup>, <sup>1</sup>*Bayerisches Laserzentrum GmbH, Germany*, <sup>2</sup>*Erlangen Graduate School in Advanced Optical Technologies, Germany*, <sup>3</sup>*Collaborative Research Center 814 "Additive Manufacturing, Germany*, <sup>4</sup>*Institute of Photonic Technologies, Friedrich-Alexander-University, Germany*

16:40 Tu3-O-11 A157

**Micrometer-scale photo direct machining of PDMS using laser plasma EUV light**, Tetsuya Makimura<sup>1</sup>, Hikari Urai<sup>1</sup>, Hiroyuki Niino<sup>2</sup>, <sup>1</sup>*Institute of Applied Physics, University of Tsukuba, Japan*, <sup>2</sup>*ISC, AIST, Japan*

17:00 Tu2-O-13 A017

**Fabrication of three-dimensional metallic nanostructures using multiphoton reduction**, Xianfan Xu, <sup>1</sup>*Purdue University, United States*

17:00 Tu3-I-12 **Invited** A186

**Laser printing using spatially modulated pulses**, Alberto Piqué<sup>1</sup>, R.C.Y. Auyeung<sup>1</sup>, S. A. Mathews<sup>1</sup>, N. A. Charipar<sup>1</sup>, H. Kim<sup>1</sup>, <sup>1</sup>*Materials Science and Technology Division, US Naval Research Laboratory, USA*

17:20 Tu2-O-14 A074

**High efficiency femtosecond laser microfabrication for functional microdevices**, Dong Wu<sup>1</sup>, Bing Xu<sup>1</sup>, Yanlei Hu<sup>1</sup>, <sup>1</sup>*Precision Machinery and Precision Instrument, University of Science and Technology of China, China*

17:30 Tu3-O-13 **Student** A111

**Beam shaping with optimized photonic crystals from chirp to numeric design**, Darius Gailevičius<sup>1</sup>, Vytautas Purlys<sup>1</sup>, Martynas Peckus<sup>1</sup>, Roaldas Gadonas<sup>1</sup>, Kestutis Staliunas<sup>2,3</sup>, <sup>1</sup>*Laser Research Center, Department of Quantum Electronics, Vilnius University, Lithuania*, <sup>2</sup>*Departament de Física i Enginyeria Nuclear, Universitat Politècnica de Catalunya, Lithuania*, <sup>3</sup>*Institució Catalana de Reserca i Estudis Avançats (ICREA), Spain*

17:40 Tu2-O-15 A210

**Preparation of large-area uniform silver nanocrystal arrays for SERS**, Wei-Wei Xu<sup>1</sup>, Shun Kamada<sup>2</sup>, Masaru Kamano<sup>1</sup>, Toshihiro Okamoto<sup>2</sup>, Lei Wang<sup>3</sup>, Bin-Bin Xu<sup>4</sup>, Masanobu Haraguchi<sup>2</sup>, <sup>1</sup>*Department of Creative Technology, Course of Chemical Engineering, Anan College of Technology, Japan*, <sup>2</sup>*Department of Optical Science and Technology, Faculty of Engineering, The University of Tokushima, Japan*, <sup>3</sup>*State Key Laboratory on Integrated Optoelectronics, College of Electronic Science and Engineering, Jilin University, China*, <sup>4</sup>*Centre of Excellence for Quantum Computation and Communication Technology, School of Physics, University of New South Wales, Australia*

17:50 close

18:00 close

## Day 3: June 7, Wednesday

### Room 1

#### 16. SS1-3 Lasers and nanoparticles in liquids - Applications -

Chair: Stephan Barcikowski, CENIDE, Germany / Hiroyuki Wada, Tokyo Institute of Technology, Japan

9:00 We1-I-1 Invited A121

**Fuel cell catalysts using graphene**, Junji Nakamura<sup>1</sup>, <sup>1</sup>*Faculty of Pure and Applied Sciences, University of Tsukuba, Japan*

9:30 We1-O-2 A009

**Functionality of ligand-free alloy nanoparticles for heterogeneous catalysis made by scaleable laser synthesis**, Galina Marzun<sup>1</sup>, Ina Haxhiaj<sup>1</sup>, Sebastian Kohsakowski<sup>1</sup>, Sven Reichenberger<sup>1</sup>, Stephan Barcikowski<sup>1</sup>, <sup>1</sup>*Technical Chemistry 1, University of Duisburg-Essen, Germany*

9:50 We1-O-3 Student A020

**Preparation of amorphous selenium nanoparticles and their nonlinear optical application**, Churong Ma<sup>1</sup>, Guowei Yang<sup>2</sup>, <sup>1</sup>*School of Materials Science & Engineering, Nanotechnology Research Center, China*, <sup>2</sup>*School of Materials Science & Engineering, Nanotechnology Research Center, China*

10:10 We1-O-4 Student A109

**Functionalization of 2PP-structures by embedding of laser-generated magnetic nanoparticles**, Alexander Kanitz<sup>1</sup>, Jannis Köhler<sup>1</sup>, Gordon Zyla<sup>1</sup>, Cemal Esen<sup>1</sup>, Maria del Mar Sanz<sup>2</sup>, Marco Maicas<sup>2</sup>, Evgeny Lev Gurevich<sup>1</sup>, Andreas Ostendorf<sup>1</sup>, <sup>1</sup>*Applied Laser Technologies, Ruhr-Universität Bochum, Germany*, <sup>2</sup>*Instituto de Sistemas Optoelectrónicos y Microtecnología, Universidad Politécnica de Madrid, Spain*

10:30 We1-O-5 Student A021

**Laser generated tantalum carbide nanoparticles for X-ray computed tomography imaging and ex vivo detection in mice as peroxidase mimetics**, Tongming Chen<sup>1</sup>, Xiumei Tian<sup>2</sup>, Guowei Yang<sup>1</sup>, <sup>1</sup>*State Key Laboratory of Optoelectronic Materials and Technologies, Nanotechnology Research Center, School of Materials Science & Engineering, School of Physics, Sun Yat-sen University, P. R. China*, <sup>2</sup>*Department of Biomedical Engineering, Guangzhou Medical University, P. R. China*

10:50 *Coffee Break*

### Poster II

Chair: Hiroyuki Niino, AIST, Japan

11:10 Short Presentations of the presenting authors for even-numbered posters: for Poster Session II (Room 1)

### Poster II

12:10 Poster Session II and Exhibition (Foyer on 3rd floor)

& Lunch Time (up to 13:50)



## Room 2

## Room 3

## 19. Micro-structuring

Chair: Yoshiki Nakata, Osaka University, Japan

9:00 We2-O-1 A083

**Laser processing of nanofiber tissue scaffolds**, Marco Götze<sup>1</sup>, Abdul Mannan Farhan<sup>1,2</sup>, Tobias Kürbitz<sup>3</sup>, Olaf Krimig<sup>1</sup>, Sven Henning<sup>3</sup>, Andreas Heilmann<sup>2,3</sup>, Georg Hillrichs<sup>1</sup>, <sup>1</sup>Engineering and Natural Sciences, University of Applied Sciences Merseburg, Germany, <sup>2</sup>Electrical and Electronic Engineering, Mechanical and Industrial Engineering, University of Applied Sciences Anhalt, Germany, <sup>3</sup>Biological and Macromolecular Materials, Fraunhofer Institute for Microstructure of Materials and Systems Halle (S.), Germany

9:20 We2-O-2 A075

**The effect of ultrafast laser fabricated surface micro/nano structures on reactive spreading kinetic**, Yingchuan Zhang<sup>1</sup>, Lei Liu<sup>1</sup>, Guisheng Zou<sup>1</sup>, Aiping Wu<sup>1</sup>, Yunhong Norman Zhou<sup>1,2</sup>, <sup>1</sup>Department of Mechanical Engineering, State Key Laboratory of Tribology, Tsinghua University, Beijing, China, <sup>2</sup>Department of Mechanical Engineering, University of Waterloo, Waterloo, Canada

9:40 We2-O-3 A043

**Experimental investigation of speckle pattern creating techniques for digital image correlation**, Chao-Ching Ho<sup>1</sup>, Dong-shen Wu<sup>2</sup>, Yuan-Jen Chang<sup>2</sup>, Jin-Chen Hsu<sup>2</sup>, Chia-Lung Kuo<sup>2</sup>, S.-K. Kuo<sup>3</sup>, <sup>1</sup>Graduate Institute of Manufacturing Technology and Department of Mechanical Engineering, National Taipei University of Technology, Taiwan, <sup>2</sup>Department of Mechanical Engineering, National Yunlin University of Science and Technology, Taiwan, <sup>3</sup>Iron and Steel Research and Development Department, China Steel, Taiwan

10:00 We2-O-4 A098

**Surface functionalization of metals by laser texturing**, Nerea Otero<sup>1</sup>, Sara Vidal<sup>1</sup>, Pilar Rey<sup>1</sup>, Pablo Romero<sup>1</sup>, <sup>1</sup>Laser Applications Centre, AIMEN, Spain

10:20 We2-O-5 Student A084

**Rapid nanostructuring using multi-beam-interference with consecutively overlapped ultrashort laser pulses**, Chao He<sup>1,2</sup>, Michael Steger<sup>2</sup>, Arnold Gillner<sup>1,2</sup>, <sup>1</sup>Chair for Laser Technology LLT, RWTH Aachen University, Germany, <sup>2</sup>Micro and nanostructuring, Fraunhofer Institute for Laser Technology ILT, Germany

10:40 Coffee Break

## 22. Surface treatment

Chair: Masaki Hashida, Kyoto University, Japan

9:20 We3-O-1 A149

**New laser surface texturing method enabling high processing speeds**, Jiri Martan<sup>1</sup>, Denys Moskal<sup>1</sup>, Martin Kucera<sup>1</sup>, <sup>1</sup>New Technologies Research Centre (NTC), University of West Bohemia, Czech Republic

9:40 We3-O-2 Student A139

**Investigation of Nd<sup>3+</sup>:YAG laser aided surface texturing to improve the tribological characteristics of piston ring**, V. Ezhilmaran<sup>1</sup>, L. Vijayaraghavan<sup>1</sup>, N. J. Vasa<sup>2</sup>, N. K. Cherian<sup>3</sup>, <sup>1</sup>Department of Mechanical Engineering, Indian Institute of Technology Madras, India, <sup>2</sup>Department of Engineering Design, Indian Institute of Technology Madras, India, <sup>3</sup>India Pistons Ltd, Indian Institute of Technology Madras, India

10:00 We3-O-3 A093

**Grain boundary engineering of SUS304 by laser shocking and annealing**, Zhen Yu Gu<sup>1</sup>, Xiao Xu<sup>1</sup>, Wen Feng<sup>1</sup>, Sen Yang<sup>1</sup>, <sup>1</sup>School Materials Science and Engineering, Nanjing University of Science and Technology, P.R. China

10:20 We3-O-4 Student A138

**Enhancing light trapping and minority carrier lifetime of a-Si thin films using nanosecond laser treatment**, Esther Blesso Vidhya Y<sup>1</sup>, Nilesh Jayantilal Vasa<sup>1</sup>, <sup>1</sup>Engineering Design, Indian Institute of Technology Madras, India

10:40 Coffee Break

**17. SS3 Laser processes for packaging of high power electronics and energy storage systems**

Chairs: Arnold Gillner, Fraunhofer-Institut für Lasertechnik ILT, Germany

14:00 We1-I-6 **Invited** A146

**Laser based joining processes for battery assembly and high power electronics - recent results and future applications**, Alexander Michael Olowinsky<sup>1</sup>, Simon Britten<sup>1</sup>, André Häusler<sup>2</sup>, Johanna Helm<sup>1</sup>, Sören Hollatz<sup>1</sup>, <sup>1</sup>*Ablation and Joining, Fraunhofer Institute for Laser Technology, Germany*, <sup>2</sup>*Chair for Laser Technology, RWTH Aachen University, Germany*

14:30 We1-I-7 **Invited** A212

**Laser processing of SiC target with instant surface excitation using femtosecond double pulse beam**, Terutake Hayashi<sup>1</sup>, <sup>1</sup>*Kyushu University, Japan*

15:00 We1-I-8 **Invited** A160

**Novel laser slicing technology for SiC, KABRA**, Kazuya Hirata<sup>1</sup>, Ryohei Yamamoto<sup>1</sup>, Yoko Nishino<sup>1</sup>, Yukio Morishige<sup>1</sup>, Kunimitsu Takahashi, <sup>1</sup>*Engineering R&D Division, DISCO Corporation, Japan*

15:30 We1-O-9 A092

**Fundamental study on slicing method of gallium nitride by ultrashort pulsed laser**, Togo Shinonaga<sup>1</sup>, Motoki Ota<sup>1</sup>, Yasuhiro Okamoto<sup>1</sup>, Akira Okada<sup>1</sup>, <sup>1</sup>*Graduate School of Natural Science and Technology, Okayama University, Japan*

15:50 Coffee Break

## Room 2

## 20. Ultra-short laser processing 1

Chair: Rudolf Weber, IFSW, University of Stuttgart, Germany

14:00 We2-O-6 **Student** A112

**Design and fabrication optically transparent infrared radiating energy device by laser ablation**, E. Manikandan<sup>1</sup>, B. S. Sreeja<sup>1</sup>, S. Radha<sup>1</sup>, <sup>1</sup>*Electronics & Communication Engineering, SSN College of Engineering, India*

14:20 We2-O-7 **Student** A070

**Chemical wet etching on a rear surface of silicon substrate assisted by an infrared femtosecond laser via non-linear absorption processes**, Khanh Phu Luong<sup>1</sup>, Rie Tanabe<sup>1</sup>, Yoshiro Ito<sup>1</sup>, <sup>1</sup>*Department of Mechanical Engineering, Nagaoka University of Technology, Japan*

14:40 We2-O-8 **Student** A038

**Micro welding of copper and glass with a gap by a femtosecond fiber laser pulses**, Satoshi Matsuyoshi<sup>1</sup>, Yusuke Mizuguchi<sup>1</sup>, Atsushi Muratsugu<sup>2</sup>, Takayuki Tamaki<sup>3</sup>, Wataru Watanabe<sup>1</sup>, <sup>1</sup>*Department of Electrical & Electronic Engineering, Ritsumeikan University, Japan*, <sup>2</sup>*Science Technology Entrepreneurship Laboratory, Office for University-Industry Collaboration, Osaka University, Japan*, <sup>3</sup>*Department of Control Engineering, National Institute of Technology, Nara College, Japan*

15:00 We2-O-9 **Student** A068

**Cu micropatterning using femtosecond laser reduction of Cu<sub>2</sub>O nanospheres**, Yukinari Kondo<sup>1</sup>, Mizue Mizoshiri<sup>1</sup>, Junpei Sakurai<sup>1</sup>, Seiichi Hata<sup>1</sup>, <sup>1</sup>*Department of Micro-Nano Systems Engineering, Graduate School of Engineering, Nagoya University, Japan*

15:20 We2-O-10 **Student** A143

**Femtosecond laser assisted fabrication of 3D anatase TiO<sub>2</sub> for photocatalytic degradation**, Jinlong Lu<sup>1</sup>, Ting Hung<sup>1</sup>, Rongshi Xiao<sup>1</sup>, <sup>1</sup>*Institute of Laser Engineering, Beijing University of Technology, China*

15:40 Coffee Break

## Room 3

## 23. Film deposition and synthesis

Chair: Aiko Narazaki, AIST, Japan

14:00 We3-I-5 **Invited** A113

**Advanced thin films prepared by ultraviolet laser-assisted chemical solution processing for electrical and optical applications**, Tetsuo Tsuchiya<sup>1</sup>, Tomohiko Nakajima<sup>1</sup>, Iwao Yamaguchi<sup>1</sup>, <sup>1</sup>*Advanced Coating Technology Research Center, National Institute of Advanced Industrial Science and Technology (AIST), Japan*

14:30 We3-O-6 **Student** A140

**Pulsed laser deposition and laser annealing of SiC thin films**, Emmanuel Paneerselvam<sup>1</sup>, Nilesh J Vasa<sup>1</sup>, Mitsuhiro Higashihata<sup>2</sup>, Daisuke Nakamura<sup>2</sup>, Ramachandra Rao M S<sup>3</sup>, <sup>1</sup>*Department of Engineering Design, Indian Institute of Technology Madras, Chennai, India*, <sup>2</sup>*Graduate School of Information Science and Electrical Engineering, Kyushu University, Fukuoka, Japan*, <sup>3</sup>*Department of physics, Indian Institute of Technology Madras, Chennai, India*

14:50 We3-O-7 **Student** A094

**Fabrication of square-shaped depressed cladding waveguides in transparent materials with slit-shaped femtosecond laser beams**, Yang Liao<sup>1</sup>, Peng Wang<sup>1,2,3</sup>, Jia Qi<sup>1,2,3</sup>, ZhengMing Liu<sup>1,2,3</sup>, Wei Chu<sup>1</sup>, Ya Cheng<sup>1,4</sup>, <sup>1</sup>*State Key Laboratory of High Field Laser Physics, Shanghai Institute of Optics and Fine Mechanics, China*, <sup>2</sup>*School of Physical Science and Technology, Shanghai Tech University, China*, <sup>3</sup>*University of Chinese Academy of Sciences, China*, <sup>4</sup>*State Key Laboratory of Precision Spectroscopy, East China Normal University, China*

15:10 We3-O-8 **Student** A198

**Picosecond laser-induced electrical resistance changes in graphite oxide**, Romualdas Trusovas<sup>1</sup>, Gediminas Račiukaitis<sup>1</sup>, Jurgis Barkauskas<sup>2</sup>, Gediminas Niaura<sup>3</sup>, Algimantas Lukša<sup>4</sup>, Jurgis Bukauskas<sup>4</sup>, <sup>1</sup>*Department of Laser Technologies, Center for Physical Sciences and Technology, Lithuania*, <sup>2</sup>*Department of Inorganic Chemistry, Faculty of Chemistry, Vilnius University, Lithuania*, <sup>3</sup>*Department of Organic Chemistry, Center for Physical Sciences and Technology, Lithuania*, <sup>4</sup>*Department of Physical Technologies, Center for Physical Sciences and Technology, Lithuania*

15:30 Coffee Break

**18. Direct writing 1**

Chair: Tetsuya Makimura, University of Tsukuba,  
Japan

16:20 We1-I-10 **Invited** A048

**Laser direct printing of micro-optical elements,** Marti Duocastella<sup>1</sup>, Salvatore Surdo<sup>1</sup>, Simonluca Piazza<sup>1</sup>, Alberto Diaspro<sup>1</sup>, <sup>1</sup>*Istituto Italiano di Tecnologia*

16:50 We1-O-11 A087

**UV laser photo-polymerization of elastic 2D/3D structures using photo-curable PDMS (polydimethylsiloxane),** Oliver Suttman<sup>1</sup>, Kotaro Obata<sup>1</sup>, Yasutaka Nakajima<sup>2</sup>, Arndt Hohnholz<sup>1</sup>, Jürgen Koch<sup>1</sup>, Mitsuhiro Terakawa<sup>2,3</sup>, Ludger Overmeyer<sup>1</sup>, <sup>1</sup>*Production & Systems Department, Laser Zentrum Hannover e.V., Germany*, <sup>2</sup>*School of Integrated Design Engineering, Keio University, Japan*, <sup>3</sup>*Department of Electronics and Electrical Engineering, Keio University, Japan*

17:10 We1-O-12 **Student** A110

**Down-scaling of organic-inorganic 3D polymer lattices through pyrolysis,** Darius Gailevičius<sup>1</sup>, Linas Jonušauskas<sup>1</sup>, Danas Sakalauskas<sup>2</sup>, Simas Šakirazanovas<sup>2</sup>, Roaldas Gadonas<sup>1</sup>, Saulius Juodkazis<sup>3,4</sup>, Vygantas Mizeikis<sup>5</sup>, Kestutis Staliunas<sup>6,7</sup>, Mangirdas Malinauskas<sup>1</sup>, <sup>1</sup>*Laser Research Center, Department of Quantum Electronics, Vilnius University, Lithuania*, <sup>2</sup>*Department of Applied Chemistry, Vilnius University, Lithuania*, <sup>3</sup>*Faculty of Engineering and Industrial Sciences, Swinburne University of Technology, Australia*, <sup>4</sup>*Melbourne Center for Nanofabrication, Australian National Fabrication Facility, Australia*, <sup>5</sup>*Research Institute of Electronics, Shizuoka University, Japan*, <sup>6</sup>*Departament de Física i Enginyeria Nuclear, Universitat Politècnica de Catalunya, Spain*, <sup>7</sup>*Institucio Catalana de Reserca i Estudis Avançats (ICREA), Spain*

17:30 We1-O-13 A156

**Laser-induced  $\mu$ -plasma (LI $\mu$ P) in a confinement mode as an effective tool for transparent materials processing,** Vadim Veiko<sup>1</sup>, Andrei Samokhvalov<sup>1</sup>, Roman Zakoldaev<sup>1</sup>, Maksim Sergeev<sup>1</sup>, <sup>1</sup>*Laser Systems and Technologies, ITMO University, Russia*

17:50 Break

**Banquet**

18:30 from the venue to Banquet on foot

19:00 Banquet (ANA Crowne Plaza Toyama, Room "Ohtori" on 3rd floor)

## Room 2

## 21. Ultra-short laser processing 2

Chair: Ya Cheng, Shanghai Institute of Optics and Fine Mechanics, CAS, China

16:20 We2-O-11 A059

**Nano-crystal in photo-thermal refractive glass preparing with fs laser and thermal development**, Guanghua Cheng<sup>1</sup>, Yunjie Zhang<sup>1</sup>, <sup>1</sup>*State Key Laboratory of Transient Optics and Photonics,, Xi'an Institute of Optics and Precision Mechanics of CAS, China*

16:40 We2-O-12 A165

**Plasma dynamics in ultrashort pulsed laser processing of transparent materials**, Matthew R Ross<sup>1</sup>, Christian A Rothenbach<sup>2</sup>, Anping Liu<sup>1</sup>, <sup>1</sup>*Optical Physics, Corning Incorporated, USA*, <sup>2</sup>*Measurement Control System, Corning Incorporated, USA*

17:00 We2-I-13 Invited A130

**Femtosecond laser hyperdoping crystal: Principle and applications**, Qiang Wu<sup>1</sup>, Jianghong Yao<sup>1</sup>, Chunling Zhang<sup>1</sup>, Jiwei Qi<sup>1</sup>, Jingjun Xu<sup>1</sup>, <sup>1</sup>*School of Physics, Nankai University, China*

17:30 We2-O-14 A202

**Plasmon-less Raman enhancement mechanism induced by dense networks of nanoparticles produced by femtosecond lasers**, Yves Bellouard<sup>1</sup>, Erica Block<sup>1,2</sup>, Jeff Squier<sup>2</sup>, Jean Gobet<sup>3</sup>, <sup>1</sup>*GALATEA LAB, STI-IMT, Ecole Polytechnique Federale de Lausanne (EPFL), Switzerland*, <sup>2</sup>*School of Physics, Colorado School of Mines, USA*, <sup>3</sup>*CSEM SA, Switzerland*

17:50 Break

## Room 3

## 24. Industrial applications

Chair: Yasuhiro Okamoto, Okayama University, Japan

16:20 We3-I-9 Invited A026

**Femtosecond laser architecture for high throughput industrial micromachining**, Julien Pouysegur<sup>1</sup>, Martin Delaigue<sup>1</sup>, Nicolas Bonnett<sup>1</sup>, Birgit Weichelt<sup>1</sup>, Franck Morin<sup>1</sup>, Jorge Sanabria<sup>1</sup>, Ludovic Hebrard<sup>1</sup>, Clemens Hoenninger<sup>1</sup>, Eric Mottay<sup>1</sup>, <sup>1</sup>*Research & Development, Amplitude Systemes, France*

16:50 We3-I-10 Invited A099

**Anti-resonant fibres for flexible high peak-power beam delivery**, Richard Mark Carter<sup>1</sup>, Fei Yu<sup>2</sup>, William J. Wadsworth<sup>2</sup>, Jonathan D. Shephard<sup>1</sup>, Jonathan C. Knight<sup>2</sup>, Duncan P. Hand<sup>1</sup>, <sup>1</sup>*Institute of Photonics and Quantum Sciences, Heriot-Watt University, UK*, <sup>2</sup>*Centre for Photonics and Photonic Materials, University of Bath, UK*

17:20 We3-I-11 Invited A205

**Polygon scanner systems for laser microprocessing**, Ronny De Loor<sup>1</sup>, Lars Penning<sup>2</sup>, Beat Neuenschwander<sup>3</sup>, Beat Jaeggi<sup>4</sup>, Bogdan Voisiat<sup>5</sup>, Gedmininas Račiukaitis<sup>6</sup>, <sup>1</sup>*Next Scan Technology, Belgium*, <sup>2</sup>*Next Scan Technology, Belgium*, <sup>3</sup>*Bern University of Applied Sciences, Switzerland*, <sup>4</sup>*Bern University of Applied Sciences, Switzerland*, <sup>5</sup>*Center for Physical Sciences and Technology, Lithuania*, <sup>6</sup>*Center for Physical Sciences and Technology, Lithuania*

17:50 Break

## Day 4: June 8, Thursday

## Room 1

## 25. Direct writing 2

Chair: Mizue Mizoshiri, Nagoya University, Japan

9:00 Th1-O-1 A114**Comparative study of refractive index sensing based on three different long-period grating configurations by pulsed ArF excimer laser,**Jian-Neng Wang<sup>1</sup>, Wei-Te Wu<sup>2</sup>, Chien-Hsing Chen<sup>3</sup>,  
*<sup>1</sup>Department of Civil and Construction Engineering, National Yunlin University of Science and Technology, Taiwan, <sup>2</sup>Department of Biomechatronics Engineering, National Pingtung University of Science and Technology, Taiwan, <sup>3</sup>Department of Electro-Optical Engineering, National Taipei University of Technology, Taiwan*9:20 Th1-O-2 A081**Reversible deformations of laser-written 3D photoresist structures,**Sima Rekstyte<sup>1</sup>, Domas Paipulas<sup>1</sup>, Mangirdas Malinauskas<sup>1</sup>, Vygantas Mizeikis<sup>2</sup>,  
*<sup>1</sup>Laser Research Center, Vilnius University, Lithuania, <sup>2</sup>Research Institute of Electronics, Shizuoka University, Japan*9:40 Th1-O-3 **Student** A031**Fiber-surface Bragg grating waveguide for refractive index measurement,**Chupao Lin<sup>1</sup>, Changrui Liao<sup>1</sup>, Jun He<sup>1</sup>, Ying Wang<sup>1</sup>, Yiping Wang<sup>1</sup>,  
*<sup>1</sup>Key Laboratory of Optoelectronic Devices and Systems of Ministry of Education and Guangdong Province, College of Optoelectronic Engineering, Shenzhen University, China*10:00 Th1-O-4 **Student** A039**Regulation of the porous structure of graphene based materials by laser-induced,**Fangcheng Wang<sup>1,2,3</sup>, Kedian Wang<sup>1,2,3</sup>, Xia Dong<sup>1,2,3</sup>, Xuesong Mei<sup>1,2,3</sup>, Zhaoyang Zhai<sup>1,2,3</sup>,  
*<sup>1</sup>School of Mechanical Engineering, Xi'an Jiaotong University, China, <sup>2</sup>State Key Laboratory for Manufacturing Systems Engineering, Xi'an Jiaotong University, China, <sup>3</sup>Shaanxi Key Laboratory of Intelligent Robots, Xi'an Jiaotong University, China*10:20 Th1-O-5 **Student** A035**Fabrication of silver/PDMS composite microstructures by using femtosecond laser,**Yasutaka Nakajima<sup>1</sup>, Kotaro Obata<sup>2</sup>, Manan Machida<sup>1</sup>, Jürgen Koch<sup>2</sup>, Oliver Suttman<sup>2</sup>,  
Mitsuhiro Terakawa<sup>1,3</sup>,  
*<sup>1</sup>School of Integrated Design Engineering, Keio University, Japan, <sup>2</sup>Laser Zentrum Hannover e.V., Germany, <sup>3</sup>Department of Electronics and Electrical Engineering, Keio University, Japan*

10:40 Coffee Break

## Room 2

## 27. Micro-fabrication of functional structures

Chair: Duncan P. Hand, Heriot-Watt University, UK

9:00 Th2-O-1 **Student** A135

**Hybrid laser scribing and chemical etching technique using pulsed Nd<sup>3+</sup>: YAG laser to fabricate controlled micro channel profile,** Srinagalakshmi Nammi<sup>1</sup>, Sooraj S<sup>1</sup>, Nilesh J Vasa<sup>1</sup>, Balaganesan G<sup>2</sup>, Anil C Mathur<sup>3</sup>, <sup>1</sup>Department of Engineering Design, Indian Institute of Technology Madras, India, <sup>2</sup>Department of Mechanical Engineering, Indian Institute of Technology Madras, India, <sup>3</sup>Antenna Mechanical Design Division, Indian Space Research Organization, India

9:20 Th2-O-2 **Student** A016

**Fabrication of quad band terahertz planar antenna by laser ablation,** E. Manikandan<sup>1</sup>, B. S. Sreeja<sup>1</sup>, A. Elakkiya<sup>1</sup>, S. Radha<sup>1</sup>, <sup>1</sup>Electronics and Communication Engineering, SSN College of Engineering, India

9:40 Th2-O-3 A088

**Laser printed multifunctional plasmonic structures and surfaces,** Sergey Syubaev<sup>2</sup>, Aleksandr Nepomnyashchiiy<sup>2</sup>, Aleksandr Kuchmizhak<sup>1,2</sup>, <sup>1</sup>School of Natural Sciences, Far Eastern Federal University, Russia, <sup>2</sup>Institute of Automation and Control Processes (IACP), Far Eastern Branch of Russian Academy of Science (FEB RAS), Russia

10:00 Th2-O-4 A018

**Preparation of microscopy sample using picosecond laser micromachining prior to ion milling,** Aurélien Sikora<sup>1</sup>, Lahouari Fares<sup>2</sup>, Jérôme Adrian<sup>2</sup>, Vincent Goubier<sup>2</sup>, Anne Delobbe<sup>3</sup>, Antoine Corbin<sup>3</sup>, Thierry Sarnet<sup>1</sup>, Marc Sentis<sup>1</sup>, <sup>1</sup>LP3, Aix Marseille Univ, France, <sup>2</sup>STMICROELECTRONICS, France, <sup>3</sup>Orsay Physics, France

10:20 Th2-O-5 **Student** A103

**Resistance measurement of dissimilar laser welds,** Pascal Schmalen<sup>1</sup>, Peter Plapper<sup>1</sup>, <sup>1</sup>RUES, University of Luxembourg, Luxembourg

10:40 Coffee Break

## Room 3

## 29. Drilling and cutting 1

Chair: Chung-Wei Cheng, National Chiao Tung University, Taiwan

9:00 Th3-O-1 A164

**Laser ablation cutting of yttria-stabilized zirconia plate using picosecond green laser,** Susumu Nakamura<sup>1</sup>, <sup>1</sup>Department of Electrical and Electronic Systems Engineering, National Institute of Technology, Nagaoka College, Japan

9:20 Th3-O-2 **Student** A054

**Ultrafast laser helical drilling of three-dimensional shaped holes using synchronized adaption of energy deposition,** Chao He<sup>1,2</sup>, Jannik Bühring<sup>2</sup>, Frank Zibner<sup>2</sup>, Arnold Gillner<sup>1,2</sup>, <sup>1</sup>Chair for Laser Technology LLT, RWTH Aachen University, Germany, <sup>2</sup>Micro and nanostructuring, Fraunhofer Institute for Laser Technology ILT, Germany

9:40 Th3-O-3 **Student** A085

**Preparation of samples for micro-mechanical tests using femtosecond laser ablation,** Manuel Johannes Pfeifenberger<sup>1</sup>, Severin Jakob<sup>1</sup>, Anton Hohenwarter<sup>2</sup>, Daniel Kiener<sup>2</sup>, Stefan Wurster<sup>2</sup>, Reinhard Pippan<sup>1</sup>, <sup>1</sup>Erich Schmid Institute, Austrian Academy of Sciences, Austria, <sup>2</sup>Department of Materials Physics, Montanuniversität Leoben, Austria

10:00 Th3-O-4 **Student** A136

**Nano second, pico second and femto second laser assisted micro-scribing of copper thin films,** S. Sooraj<sup>1</sup>, Nammi Srinagalakshmi<sup>1</sup>, Nilesh Jayantilal Vasa<sup>1</sup>, J. Ramkumar<sup>2</sup>, <sup>1</sup>Engineering Design, Indian Institute of Technology Madras, India, <sup>2</sup>Mechanical Engineering, Indian Institute of Technology Kanpur, India

10:20 Th3-O-5 **Student** A152

**An improved scanning strategy for long pulsed laser drilling of carbon fiber textiles,** Stefan Janssen<sup>1</sup>, Markus Christian Eckstein<sup>1</sup>, <sup>1</sup>Drilling and Precision Cutting, Fraunhofer ILT, Germany

10:40 Coffee Break

**26. Direct writing 3**

Chair: Yves Bellouard, École Polytechnique  
Fédérale de Lausanne, Switzerland

11:00 Th1-O-6 A079

**Tailoring of 3D optical perfect absorber metamaterials using direct laser write technique**, Vygantas Mizeikis<sup>1</sup>, Ihar Faniayeu<sup>1,2</sup>,  
<sup>1</sup>Research Institute of Electronics, Shizuoka University, Japan, <sup>2</sup>Department of Radiophysics and Electronics, Gomel State University, Belarus

11:20 Th1-O-7 A064

**Ultrafast direct laser writing near-infrared spectro-interferometer in bulk GLS chalcogenide glass**, Ciro D'Amico<sup>1</sup>, Guillaume Martin<sup>2</sup>, Manoj Bhuyan<sup>1</sup>, Johann Troles<sup>3</sup>, Etienne Le Coarer<sup>2</sup>, Razvan Stoian<sup>1</sup>, <sup>1</sup>Laboratoire Hubert Curien, Jean Monnet University, Saint-Etienne, France, <sup>2</sup>IPAG, Grenoble Alpes University, Grenoble, France, <sup>3</sup>Chemical Sciences Institute, University of Rennes I, Rennes, France

11:40 Th1-O-8 A078

**P- and n-type thermoelectric micropatterns fabricated by femtosecond laser reduction of CuO/NiO nanoparticles**, Mizue Mizoshiri<sup>1</sup>, Junpei Sakurai<sup>1</sup>, Seiichi Hata<sup>1</sup>, <sup>1</sup>Department of Micro-Nano Systems Engineering, Graduate School of Engineering, Nagoya University, Japan

12:00 Th1-O-9 A208

**Ablation-cooled laser-material processing**, C. Kerse<sup>1</sup>, H. Kalaycıoğlu<sup>1</sup>, P. Elahi<sup>1</sup>, B. Çetin<sup>1</sup>, D. K. Kesim<sup>1</sup>, Ö. Akcaalan<sup>1</sup>, S. Yavaş<sup>1</sup>, M. D. Aşık<sup>2</sup>, B. Öktem<sup>1</sup>, H. Hoogland<sup>3</sup>, R. Holzwarth<sup>3</sup>, F. Ömer İlday<sup>1</sup>, <sup>1</sup>Bilkent University, Turkey, <sup>2</sup>Hacettepe University, Turkey, <sup>3</sup>Menlo Systems GmbH, Germany

12:20 Lunch break



## Room 2

## Room 3

## 28. Ultra-short laser processing 3

Chair: Yoichiroh Hosokawa, Nara Institute of Science and Technology, Japan

11:00 Th2-O-6 A142

**Recovery of grating formation in PMMA fabricated with femtosecond laser Bessel beam,** Wataru Watanabe<sup>1</sup>, Yu Matushiro<sup>1</sup>, Koji Hatanaka<sup>2</sup>, Saulius Juodkazis<sup>3,4</sup>, <sup>1</sup>Department of Electrical & Electronic Engineering, College of Science and Engineering, Ritsumeikan University, Japan, <sup>2</sup>Research Center for Applied Sciences, Academia Sinica, Taiwan, <sup>3</sup>Faculty of Science, Engineering and Technology, Swinburne University of Technology, Australia, <sup>4</sup>Melbourne Center for Nanofabrication, Australian National Fabrication Facility, Australia

11:20 Th2-O-7 A178

**Reduction of ablation rate on silicon surface irradiated by a double-pulse beam,** Masaki Hashida<sup>1,2</sup>, Shinichiro Masuno<sup>1</sup>, Yuki Furukawa<sup>1,2</sup>, Mitsuhiro Kusaba<sup>3</sup>, Hitoshi Sakagami<sup>4</sup>, Shunsuke Inoue<sup>1,2</sup>, Shuji Sakabe<sup>1,2</sup>, Masahiro Tsukamoto<sup>5</sup>, <sup>1</sup>ARCBS, Institute for Chemical Research, Kyoto University, Japan, <sup>2</sup>Department of Physics, Graduate School of Science, Kyoto University, Japan, <sup>3</sup>Department of Electronics, Information and Communication Engineering, Osaka Sangyo University, Japan, <sup>4</sup>National Institute for Fusion Science, Japan, <sup>5</sup>JWRI, Osaka University, Japan

11:40 Th2-O-8 A025

**Influence of wavelength on glass welding by ultra-short laser pulses,** Kristian Cvecek<sup>1,4</sup>, Florian Stenglein<sup>1</sup>, Isamu Miyamoto<sup>3,4</sup>, Michael Schmidt<sup>1,2,4</sup>, <sup>1</sup>Bayerisches Laserzentrum GmbH, Germany, <sup>2</sup>Institute of Photonic Technologies, Friedrich-Alexander-University of Erlangen-Nuremberg, Germany, <sup>3</sup>Osaka University, Japan, <sup>4</sup>Erlangen Graduate School in Advanced Optical Technologies, Friedrich-Alexander-University of Erlangen-Nuremberg, Germany

12:00 Th2-O-9 A132

**Nonlinear laser absorption process in glass based on rate equation model,** Isamu Miyamoto<sup>1, 2</sup>, Kristian Cvecek<sup>3</sup>, Michael Schmidt<sup>3, 4</sup>, <sup>1</sup>Osaka University, Japan, <sup>2</sup>Erlangen Graduate School of Advanced Optical Technologies (SAOT), Germany, <sup>3</sup>Bayerisches Laserzentrum, Germany, <sup>4</sup>Institute of Photonic Technologies, Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany

12:20 Lunch break

## 30. Drilling and cutting 2

Chair: Toshihiko Ooie, AIST, Japan

11:00 Th3-I-6 A134

**Picosecond laser drilling of micro holes in spinnerets for cellulose fibres,** Rudolf Weber<sup>1</sup>, Anne Feuer<sup>1</sup>, Thomas Arnold<sup>1</sup>, Thomas Graf<sup>1</sup>, Johanna Spoerl<sup>2</sup>, Antje Ota<sup>2</sup>, Frank Hermanutz<sup>2</sup>, <sup>1</sup>IFSW, University of Stuttgart, Germany, <sup>2</sup>ITCF, Institut fuer Textil- und Chemiefasern, Germany

11:30 Th3-O-7 A010

**Laser cutting with controlled fracture for ultrathin flexible glass,** Chwan-Huei Tsai<sup>1</sup>, Wen-Chian Luo<sup>1</sup>, Chang-Wei Cheng<sup>1</sup>, <sup>1</sup>Department of Mechatronic Engineering, Huaan University, Taiwan

11:50 Th3-O-8 A118

**Excimer lasers microfabrication for interposer materials made of industrial glass and organic matter,** Hiroaki Oizumi<sup>1</sup>, Masakazu Kobayashi<sup>1</sup>, Kouji Kakizaki<sup>1</sup>, Toshio Mimura<sup>1</sup>, Junichi Fujimoto<sup>1</sup>, Hakaru Mizoguchi<sup>1</sup>, <sup>1</sup>Gigaphoton Inc., Japan

12:10 Lunch break

**Main Hall**

**31. Joint Session**

Chair: Yongfeng Lu, University of Nebraska Lincoln, USA

14:00 ThM-I-1 **Invited** A187

**Nonlinear laser lithography, going from 2D to 3D**, Fatih Ömer Ilday<sup>1, 2</sup>,  
<sup>1</sup>Department of Electrical and Electronics Engineering, Bilkent University,  
 Turkey, <sup>2</sup>Department of Physics, Bilkent University, Turkey

14:30 ThM-I-2 **Invited** A199

**Laser based micro fabrication systems for electronics packaging**,  
 Haibin Zhang<sup>1</sup>, <sup>1</sup>Director Technology Development, Electro Scientific Industries,  
 Inc., USA

15:00 ThM-I-3 **Invited** A200

**Laser micro and nanoprocessing: Current trends and future prospects**, Arnold Gillner<sup>1</sup>, <sup>1</sup>Leiter Kompetenzfeld Abtragen und Fügen,  
 Department Manager Ablation and Joining, Managing Director Fraunhofer  
 Group Light and Surfaces, Fraunhofer-Institut für Lasertechnik ILT, Germany

**Main Hall**

**Closing**

Chair: Hiroyuki Niino, AIST, Japan

15:30 Outstanding Awards

Closing Remark

16:00 close

# Poster Session

June 6, 11:10 Short Presentations of the presenting authors for odd-numbered posters: Poster Session I (Room 1)

June 6, 12:10 Poster Session I and Exhibition (Foyer on 3rd floor)

June 7, 11:10 Short Presentations of the presenting authors for even-numbered posters: for Poster Session II (Room 1)

June 7, 12:10 Poster Session II and Exhibition (Foyer on 3rd floor)

The presenting authors for odd-numbered posters should be present in front of their posters during 12:10-13:50 on June 6, while even-numbered posters, during 12:10-13:50 on June 7.

P-1 **Student** A108

**Resiliency of fs-laser 3D lithography made microlenses to  $\sim$ GW/cm<sup>2</sup> intensity 300 fs 515 nm light**, Linas Jonušauskas<sup>1</sup>, Darius Gailevičius<sup>1</sup>, Roaldas Gadonas<sup>1</sup>, Mangirdas Malinauskas<sup>1</sup>, <sup>1</sup>*Department of Quantum Electronics, Faculty of Physics, Vilnius University, Lithuania*

P-2 **Student** A005

**Phase-shifted fiber Bragg grating fabricated with femtosecond laser radiation and its application**, Yong Du<sup>1</sup>, Yueli Zhang<sup>1</sup>, Tao Chen<sup>1</sup>, Jinhai Si<sup>1</sup>, <sup>1</sup>*Department of Electronic science and technology, Shaanxi Key Lab of Information Photonic Technique., School of Electronic and Information Engineering, Xi'an Jiaotong University, China*

P-3 A128

**Polarization-dependent periodic nanostructure embedded in semiconductor**, Yasuhiko Shimotsuma<sup>1</sup>, Yuta Nakanishi<sup>1</sup>, Masaaki Sakakura<sup>2</sup>, Kiyotaka Miura<sup>1</sup>, <sup>1</sup>*Department of Material Chemistry, Graduate School of Engineering, Kyoto University, Japan*, <sup>2</sup>*Society-Academia Collaboration for Innovation, Kyoto University, Japan*

P-4 A129

**Influence of double pulse irradiation on ablation area by femtosecond laser with different delay time**, Masahito Katto<sup>1</sup>, Takaaki Sugihara<sup>2</sup>, Shoichi Kubodera<sup>3</sup>, Masahiro Tsukamoto<sup>4</sup>, Masanori Kaku<sup>2</sup>, Atsushi Yokotani<sup>2</sup>, <sup>1</sup>*CRCC, University of Miyazaki, Japan*, <sup>2</sup>*Faculty of Science and Engineering, Soka University, Japan*, <sup>3</sup>*Faculty of Engineering, University of Miyazaki, Japan*, <sup>4</sup>*Joining and Welding Research Institute, Osaka University, Japan*

P-5 A141

**Morphology of separated glass substrates after ultrashort laser microwelding**, Takayuki Tamaki<sup>1</sup>, Masaki Yokota<sup>1</sup>, Wataru Watanabe<sup>2</sup>, <sup>1</sup>*Department of Control Engineering, National Institute of Technology, Nara College, Japan*, <sup>2</sup>*Department of Electrical & Electronic Engineering, College of Science and Engineering, Ritsumeikan University, Japan*

P-6 A144

**Welding of PMMA and metal by ultrashort fiber laser**, Yusuke Mizuguchi<sup>1</sup>, Satoshi Matsuyoshi<sup>1</sup>, Atsushi Muratsugu<sup>2</sup>, Takayuki Tamaki<sup>3</sup>, Wataru Watanabe<sup>1</sup>, <sup>1</sup>*Department of Electrical & Electronic Engineering, College of Science and Engineering, Ritsumeikan University, Japan*, <sup>2</sup>*Science Technology Entrepreneurship Laboratory, Office for University-Industry Collaboration, Osaka University, Japan*, <sup>3</sup>*Department of Control Engineering, National Institute of Technology, Nara College, Japan*

P-7 A061

**Femtosecond laser direct writing compound eye microlens array on curved surface**, Hao Bian<sup>1</sup>, Feng Chen<sup>1</sup>, Qing Yang<sup>2</sup>, Guangqing Du<sup>1</sup>, Jiale Yong<sup>1</sup>, Xun Hou<sup>1</sup>, <sup>1</sup>*State Key Laboratory for Manufacturing System Engineering and Shaanxi Key Laboratory of Photonics Technology for Information, School of Electronic & Information Engineering, Xi'an Jiaotong University, PR China*, <sup>2</sup>*School of Mechanical Engineering, Xi'an Jiaotong University, PR China*

- P-8 A060  
**Fabrication of complex three-dimensional metallic microcoils based on femtosecond laser micromachining**, Qing Yang<sup>2</sup>, Feng Chen<sup>1</sup>, Hao Bian<sup>1</sup>, Guangqing Du<sup>1</sup>, Jiale Yong<sup>1</sup>, Xun Hou<sup>1</sup>, <sup>1</sup>State Key Laboratory for Manufacturing System Engineering and Shaanxi Key Laboratory of Photonics Technology for Information, School of Electronic & Information Engineering, Xi'an Jiaotong University, PR China, <sup>2</sup>School of Mechanical Engineering, Xi'an Jiaotong University, PR China
- P-9 A209  
**Femtosecond laser induced plasmonic nanoimprinting for large-area surface texturing**, Lei Wang<sup>1</sup>, Xiao-Wen Cao<sup>1</sup>, Qian-Kun Li<sup>1</sup>, Qi-Dai Chen<sup>1</sup>, Hong-Bo Sun<sup>1,2</sup>, <sup>1</sup>State Key Laboratory on Integrated Optoelectronics, College of Electronic Science and Engineering, Jilin University, China, <sup>2</sup>College of Physics, Jilin University, China
- P-10 A189  
**Formation of crack-free SiO<sub>2</sub> thin film by F<sub>2</sub> laser induced photochemical modification of hard silicone coating film on polycarbonate**, Hidetoshi Nojiri<sup>1,2</sup>, Masayuki Okoshi<sup>1</sup>, <sup>1</sup>Electronics and Information Engineering, National Defence Academy, Japan, <sup>2</sup>Development office, Renias Co., Ltd., Japan
- P-11 A106  
**Microchip laser based on a photonic crystal**, Darius Gailevičius<sup>1</sup>, Volodymyr Koliadenko<sup>2</sup>, Vytautas Purlys<sup>1</sup>, Martynas Peckus<sup>1</sup>, Victor Taranenko<sup>2</sup>, Kestutis Staliunas<sup>3,4</sup>, <sup>1</sup>Laser Research Center, Department of Quantum Electronics, Physics Faculty, Vilnius University, Lithuania, <sup>2</sup>International center "Institute of Applied Optics" NAS of Ukraine, Ukraine, <sup>3</sup>Departament de Física i Enginyeria Nuclear, Universitat Politècnica de Catalunya, Spain, <sup>4</sup>Institucio Catalana de Reserca i Estudis Avançats (ICREA), Spain
- P-12 A029  
**Surface alloying of titanium using a nanosecond laser with a light-transmitting resin**, Takuto Yamaguchi<sup>1</sup>, Hideki Hagino<sup>1</sup>, <sup>1</sup>Technology Research Institute of Osaka Prefecture, JAPAN
- P-13 A022  
**Continuous trench micromachining on PMMA substrate using visible-LIBWE**, Hui-Fang Chang<sup>1</sup>, Wei-Chen Kao<sup>1</sup>, Wing-Kiu Yeun<sup>1</sup>, Klaus Zimmer<sup>2</sup>, Ji-Yen Cheng<sup>1, 3, 4, 5</sup>, <sup>1</sup>Research Center for Applied Sciences, Academia Sinica, Taiwan, <sup>2</sup>Leibniz-Institut für Oberflächenmodifizierung e. V., Germany, <sup>3</sup>Institute of Biophotonics, National Yang-Ming University, Taiwan, <sup>4</sup>Biophotonics and Molecular Imaging Research Center (BMIRC), National Yang-Ming University, Taiwan, <sup>5</sup>Department of Mechanical and Mechatronic Engineering, National Taiwan Ocean University, Taiwan
- P-14 A042  
**Study on copper surface wetting transformation by UV laser fabrication**, Qing Weng<sup>1</sup>, Xiaozhu Xie<sup>1</sup>, Ronghong Che<sup>1</sup>, Xin Wei<sup>1</sup>, Wei Hu<sup>1</sup>, Qinglei Ren<sup>1</sup>, <sup>1</sup>School of Electro-Mechanical Engineering, Guangdong University of Technology, China
- P-15 A122  
**Cross-section analysis for irradiation modes of  $\mu$ -grooves manufactured with the laser-induced etching**, Kwang H. Oh<sup>1</sup>, Dong Seob Kim<sup>1</sup>, Jae Yong Oh<sup>1</sup>, <sup>1</sup>Laser Center, Jeonnam Technopark, Stiftung, Republic of Korea
- P-16 A147  
**Ablation depth control of ITO thin film using a beam shaped femtosecond laser**, Hoon-Young Kim<sup>1,2</sup>, Won-Suk Choi<sup>1,2</sup>, Young-Gwan Sin<sup>1,2</sup>, Suk-Young Ji<sup>1,2</sup>, Jin-Woo Jeon<sup>1,2</sup>, Sung-Hak Cho<sup>1,2</sup>, <sup>1</sup>Nano Machining Laboratory, Korea Institute of Machinery & Materials, Korea, <sup>2</sup>Department of Nano-Mechatronics, University of Science and Technology, Korea
- P-17 A154  
**Single shot LIBWE for laser marking of glass materials**, Tadatake Sato<sup>1</sup>, Aiko Narazaki<sup>1</sup>, Hiroyuki Niino<sup>1</sup>, <sup>1</sup>Research Institute of Sustainable Chemistry, National Institute of Advanced Industrial Science and Technology (AIST), Japan
- P-18 A177  
**Morphological characteristics of micro holes drilled by IR, visible and UV ultrashort pulse lasers in hard metals**, Jae Yong Oh<sup>1</sup>, Dong Seob Kim<sup>1</sup>, Kwang H. Oh<sup>1</sup>, <sup>1</sup>Laser Advanced System Industrialization Center, Jeonnam Technopark, Republic of Korea

- P-19 A011  
**Controls of surface quality in pulsed laser micromachining on lithium niobate**, Tepei Onuki<sup>1</sup>, Hiroataka Ojima<sup>1</sup>, Jun Shimizu<sup>1</sup>, Libo Zhou<sup>1</sup>, <sup>1</sup>*Intelligent systems engineering, Ibaraki University, Japan*
- P-20: Cancelled
- P-21 Student A191  
**Polarisation control in direct laser interference ablation setup for flexible generation of periodic patterns**, Simonas Indrišiūnas<sup>1</sup>, Bogdan Voisiat<sup>1</sup>, Mindaugas Gedvilas<sup>1</sup>, Gediminas Račiukaitis<sup>1</sup>, <sup>1</sup>*Department of Laser Technologies, Center for Physical Sciences & Technology, Lithuania*
- P-22 Student A190  
**Optimisation of P3 laser scribing process in thin-film solar cells**, Edgaras Markauskas<sup>1</sup>, Paulius Gečys<sup>1</sup>, Gediminas Račiukaitis<sup>1</sup>, <sup>1</sup>*Department of Laser Technologies, FTMC, Lithuania*
- P-23 A203  
**Optical arrangement of gold nanoparticles by array of Bessel-like beams**, Evaldas Stankevicius<sup>1</sup>, Mantas Garliauskas<sup>1</sup>, Gediminas Raciukaitis<sup>1</sup>, <sup>1</sup>*Department of Laser Technologies, Center for Physical Sciences and Technology, Lithuania*
- P-24 Student A037  
**3D printing of enhanced green fluorescent protein by femtosecond laser direct writing**, Masashi Abe<sup>1</sup>, Daniela Serien<sup>2</sup>, Mitsuhiro Terakawa<sup>1,3</sup>, Hiroyuki Kawano<sup>4</sup>, Atsushi Miyawaki<sup>4</sup>, Katsumi Midorikawa<sup>5</sup>, Koji Sugioka<sup>2</sup>, <sup>1</sup>*School of Integrated Design Engineering, Keio University, Japan*, <sup>2</sup>*RIKEN-SIOM Joint Research Unit, RIKEN Center for Advanced Photonics, RIKEN, Japan*, <sup>3</sup>*Department of Electronics and Engineering, Keio University, Japan*, <sup>4</sup>*RIKEN-Brain Science Institute, RIKEN, Japan*, <sup>5</sup>*RIKEN Center for Advanced Photonics, RIKEN, Japan*
- P-25 Student A067  
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