2007

26TH INTERNATIONAL CONGRESS ON APPLICATIONS OF LASERS & ELECTRO-OPTICS

ICALEO®

October 29 - November 1, 2007 • Hilton in the WALT DISNEY WORLD® Resort • Orlando, FL, USA

Congress General Chair: Yongfeng Lu, Univ. of Nebraska Lincoln, Lincoln, NE, USA

ADVANCE PROGRAM

REGISTER ONLINE

by September 13th & receive $50 off Early Bird Full Conference Registration

FEATURING:

- Laser Materials Processing Conference
- Laser Microprocessing Conference
- Nanomanufacturing Conference - **New for 2007!**
- Poster Presentation Gallery
- Laser Solutions Short Courses
- Business Development Session
- Networking with Industry Leaders & End Users

Presented by:

Laser Institute of America

Laser Applications and Safety

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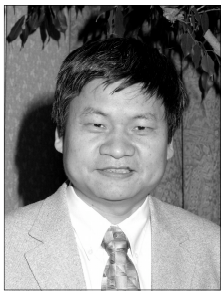
General Chair Welcome

Congress General Chair: Yongfeng Lu, Univ. of Nebraska Lincoln, Lincoln, NE, USA



Welcome to Orlando, The City Beautiful, for the 26th International Congress on Applications of Lasers & Electro-Optics (ICALEO® 2007). ICALEO® 2007 will feature three conferences on Laser Materials Processing, Laser Microprocessing, and Nanomanufacturing (new for 2007!) The Laser Materials Processing Conference covers a wide range of topics on macroscopic processes, applications, and related laser equipment and systems. This conference includes a number of highlight sessions such as Processing with High Brightness Lasers and Advances in Diodes for Pumping & Processing. A tribute session has been organized to honor the late Prof. Akira Matsunawa, a mentor and a pioneer in the laser community, for his remarkable contribution to the field of laser welding. The Laser Microprocessing Conference addresses special interests in processes and systems for microscopic applications, including highlight sessions such as Hybrid Processing: Chemically Assisted Laser Microprocessing. A joint session will be organized, with the Laser Materials Processing Conference, to address the issues in manufacturing of solar and energy devices. Lasers are playing increasingly significant roles in numerous fields, including manufacturing and nanotechnology. Nanomanufacturing is one of the areas in which lasers will make significant impacts. The new Nanomanufacturing Conference provides us a venue to seek new opportunities of laser applications that require multi-disciplinary knowledge bases.

The ICALEO® program committee has put together a very interesting program with a high number of contributions from research and engineering groups covering all parts of the world in areas of traditional and emerging laser applications. Don't miss this unique opportunity to improve your knowledge in the field of laser applications and make use of all the different networking opportunities ICALEO® has provided to its participants for more than a quarter of a century! Although there has been steady progress in laser applications during this 26-year period, the current dynamics in the industrial use of laser systems has never been higher than today.

The plenary session has outstanding speakers who will touch the new frontiers of laser technologies. With the scientific breakthroughs and continuous technological development, lasers are becoming faster, more powerful, and more colorful. The plenary session this year will feature talks on attosecond laser technology, lasers in entertainment, and future laser programs. In addition to the technical conferences on Laser Materials Processing, Laser Microprocessing, and the newly introduced Nanomanufacturing Conference, we have also organized a business development session which should be of particular interest for participants who like to gain more information and experience in laser business. Valuable experience will be presented, and there will be plenty of time to interact with colleagues and experts. The vendor reception will be an important networking opportunity to discuss individual ideas with representatives from industry. The Laser Solutions Short Courses are ideal for those who want to receive a complete overview on the state-of-the-art in specific areas. With all these opportunities, the 26th ICALEO® will be the pacesetter in the field of laser applications. I would be pleased to be able to meet all of you in Orlando!

Yongfeng Lu

General Chair: Yongfeng Lu • LIA President: William Shiner

LIA Executive Director: Peter Baker • LIA Director of Conferences: Beth Cohen

About LIA

Laser Institute of America (LIA), founded in 1968, is the professional society for Laser Applications and Safety. It is comprised of laser researchers, manufacturers, integrators, and end users working together to increase the use and safe application of laser technologies. LIA individual and corporate members receive significant discounts on all LIA materials, training courses, and conferences.

Fulfilling its mission of fostering lasers, laser applications, and laser safety worldwide, LIA is the secretariat and publisher of the American National Standards Institute (ANSI) Z136 series of laser safety standards. These documents provide a thorough set of guidelines for implementing a safe laser program. The ANSI Z136 series is recognized by OSHA, and is the authoritative series of laser safety documents in the United States. LIA also offers a wide array of products and services to thousands of end users. These include safety and applications publications, training videos, signs and labels, Laser Safety Officer training, and conferences.

Contact LIA for all your laser application and safety needs at 800.34.LASER, 407.380.1553 or www.laserinstitute.org.

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ICALEO® 2007 Conference Agenda*

Sunday, October 28

11:00am Registration Desk & LIA Bookstore Open

12:00pm LIA Board of Directors Meeting

4:00pm Meet & Greet Fiesta

Monday, October 29

7:00am Registration Desk & LIA Bookstore Open

7:15am Session Chair / Speaker Appreciation Breakfast

7:30am Early Morning Coffee

9:00am Plenary Session

10:30am Morning Break

Lunch on own

1:30pm
LMP #1: Aerospace Welding & Repair
LMP #2: Processing with High Brightness Lasers
LMP #3 & LMF #2 (Joint Session): Solar & Energy Device Manufacturing
LMF #1: Ultrafast Laser Processing I
Nano #1: Emerging Technologies in Nanomanufacturing
Short Course #1: State-of-the-Art Precision Motion Systems & their Applications in Advanced Laser Materials Processing

2:50pm Afternoon Break

6:00pm President's Reception

Tuesday, October 30

7:00am Registration Desk & LIA Bookstore Open

7:30am Attendee Continental Breakfast

8:00am
LMP #4: Direct Metal Deposition
LMP #5: Diode Laser Technology & Processing
LMP #6: Hybrid Welding
LMF #3: Fiber Laser Applications
Nano #2: Laser-assisted Nanomanufacturing
Short Course #2: Laser Process Monitoring & Control

9:40am Morning Break

Lunch on own

1:30pm
LMP #7: Tribute to Prof. Akira Matsunawa
LMF #4: Surface Modification
Nano #3: Nanostructured Materials
Business Development Session
Short Course #3: State-of-the-Art Beam Delivery Systems & Advanced Tools for Laser Materials Processing

4:00pm Vendor TableTop Display & Reception

Wednesday, October 31

7:00am Registration Desk & LIA Bookstore Open

7:30am Attendee Continental Breakfast

8:00am
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LMP #9: Advanced Processes
LMF #5: Device Manufacturing
LMF #6: Micro-welding, Structuring, Forming, & Packaging
Nano #4: Nanostructuring & Nanofabrication using Femtosecond Lasers
Short Course #4: Laser Beam Measurement & Analysis

10:00am Morning Break

10:20am
LMP #10: Alternative Joining Processes & Materials
LMP #11: Processing of Plastics
LMP #12: Drilling for Aerospace Applications
LMF #7: Hybrid & Other Novel Processing Methods
LMF #8: Deposition, Process Monitoring, Beam Shaping

12:30pm LIA Annual Meeting & Awards Luncheon

3:00pm
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LMF #9: Ultrafast Laser Processing II
LMF #10: Microprocessing I

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Thursday, November 1

7:00am Registration Desk & LIA Bookstore Open
Attendee Breakfast / Poster Presentation Gallery Q&A

8:40am
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LMP #16: Welding with High Brightness Lasers
LMP #17: Surface Processing I
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10:00am Morning Break

Lunch on own

1:30pm
LMP #19: Laser Systems & Equipment
LMP #20: Surface Processing II
LMF #12: Light Sources
LMF #13: UV & Biomedical Processing

4:00pm Farewell Break

*Program subject to minor changes

Plenary Session - New Frontiers of Lasers & Photonics

Session Chair: Yongfeng Lu, Univ. of Nebraska Lincoln, Lincoln, NE, USA
Monday, October 29 • 9:00am

New breakthroughs in fundamental laser science, inventions in laser sources and components, innovations in laser applications, and ever increasing business development have continuously provided laser and photonics communities with new excitement and opportunities. Science, engineering, commercialization, and probably government initiatives are the key factors contributing to the success of laser technologies. In this plenary session, we have three eminent leaders in science, business, and government to give talks on different aspects of new frontiers of lasers and photonics. Dr. Ferenc Krausz, Professor of Physics at LMU Muenchen and Director of MPQ in Garching, Germany, will give a presentation on his pioneering work on attosecond laser science and technology. Dr. Colin Seaton, Director of New Business Development in the display sector at Coherent, will speak about RGB laser sources for projection displays with current status and outlook. A third speaker will discuss Photonics in the 21st Century (more information to follow at www.icaleo.org.) Don't miss this enlightening plenary session.

Invited Plenary Speakers

Attosecond Physics
Ferenc Krausz, Max Planck Institute of Quantum Optics, Garching, Germany

RGB Laser Sources for Projection Displays: Current Status and Outlook
Colin Seaton, Coherent, Inc., Santa Clara, CA, USA

Photonics in the 21st Century
PHOTONICS21 (speaker to be announced)

President's Reception

Downtown Disney® Pleasure Island, MOTiON's Nightclub

Monday, October 29 • 6:00pm departure

Sponsored by: NORTHROP GRUMMAN

The opening day of ICALEO® features an evening reception hosted by LIA President Bill Shiner. Meet the LIA Executive Committee, Board of Directors, ICALEO® General Chair, Yongfeng Lu, Conference Chairs, Paul Denney, Xinbing Liu, and Haris Doumanidis. Join the LIA staff, mingle with old friends, and enjoy ICALEO® at Pleasure Island.

Pleasure Island is located in Downtown Disney and across the street from the Hilton WDW. Attendees will be escorted on a short walk to the President's Reception held at MOTiON's at 6:30pm and enjoy an evening of great food, drink and networking. Step outside the club and enjoy the MOTiON Lakefront, lights of Downtown Disney and a relaxing view of the water. The MOTiON Nightclub will remain private until 8:30pm; all reception attendees will receive a wrist band allowing entrance into all 7 Pleasure Island Clubs (valid for Monday evening only - $23 value!)

Disney's Pleasure Island is an adult playground like no other, visit and enjoy the "streetmosphere", shops and nightclubs. Music is in the air, videos rock the screens and there's an incredible choice of clubs. You can dance, rock, laugh and shop the night away and return to the Hilton at your leisure. All clubs are non-smoking; admittance (reception and/or clubs) and alcohol service will be for those with positive (over 21 years of age) identification – bring your driver's license or Passport (IDs will be checked for anyone who looks under 40 –please bring your ID!)

Enjoy a magical evening with your fellow attendees at MOTiON, Downtown Disney® Pleasure Island!

Meet & Greet Fiesta

Sunday, October 28 • 4:00pm

Sponsored by: IPG PHOTONICS — The leader in active fiber devices.

Join us Sunday afternoon for a Meet & Greet Fiesta Party! Start ICALEO® off right! See your old friends & colleagues and make new ones. Help us welcome our first time attendees. Casual dress required! Attendees will receive a drink ticket and plenty of Mexican munchies will be available! Don't miss the door prize drawings!

Speaker & Session Chair Appreciation Breakfast

Monday, October 29 • 7:15am

Speakers, Poster Presenters and Session Chairs are invited to the Kick-Off Breakfast Monday, October 29 at 7:15am. Speakers will be seated within their session and meet the session chairs and other speakers. Audio-Visual tips will be given as well as any last minute updates and an overview of the week. Please plan to arrive in time to attend this important breakfast.

LIA Annual Meeting & Awards Luncheon

Luncheon Sponsored by:

Award Sponsored by:

featuring the Schawlow Award Presentation

Wednesday, October 31 • 12:30pm

The 2007 Arthur L. Schawlow Award is presented to: Dr. Marshall G. Jones

Laser Institute of America first presented the Schawlow Award in 1982 to recognize individuals who have made distinguished contributions to applications of lasers in science, industry or education. The Award presentation consists of a silver medal, a $2,000 cash award and a framed citation. Awardees become Lifetime Members of LIA.

About Arthur L. Schawlow

Prof. Schawlow received a Nobel Prize for Physics in 1981 for "his contribution to the development of laser spectroscopy." He co-authored, with Prof. Charles H. Townes, the book Microwave Spectroscopy, and the first paper describing optical masers. For this latter work, the pair were awarded the Stuart Ballantine Medal by the Franklin Institute (1962), and the Thomas Young Medal and Prize by the Physical Society and Institute of Physics (1963). Prof. Schawlow was also awarded the Morris N. Liebmann Memorial Prize by the Institute of Electrical and Electronic Engineers (1964). As the first honoree in 1982 of this award, it is fitting that LIA's highest achievement award is given in Prof. Schawlow's name.

Congratulations to Newly Elected LIA Fellows:

Lin Li
William Roach
Robert Thomas
John Tyrer

Student Paper Award Contest

Announcing the 9th Annual ICALEO® Best Student Paper Award! LIA appreciates the importance of student contributions to ICALEO® by offering the opportunity to have their work recognized with this award. Students with accepted papers will be judged by an international panel on the following criteria: Originality of Topic/Material presented, Scientific and Technical Merit, and Presentation Quality. Professors do not judge their own student's papers. Prize winners will be notified after the conclusion of ICALEO® and will be announced through an article in the *LIA TODAY* newsletter featuring conference highlights.

Cash awards will be presented to 1st, 2nd, 3rd place winners
1st place paper will be published in the
Journal of Laser Applications®
(paper will go through peer review process)

Special Thanks to the ICALEO® International Advisory Board

David Belforte, Industrial Laser Solutions, Sturbridge, MA, USA

Eckhard Beyer, Fraunhofer IWS, Dresden, Germany

Jan J. Dubowski, Univ. de Sherbrooke, Sherbrooke, QC, Canada

Walter W. Duley, Univ. of Waterloo, Waterloo, ON, Canada

Rémy Fabbro, LALP (CNRS)/GIP GERAILP, Arcueil Cedex, France

J. Mike Green, Pro Laser Consultants, Abingdon, Oxon, UK

Anthony Hoult, SPI Lasers, Campbell, CA, USA

Marshall G. Jones, GE Global Research, Niskayuna, NY, USA

Vitali Konov, Natural Sciences Center at GPI, Moscow, Russia

Jyoti Mazumder, CLAIM, The Univ. of Michigan, Ann Arbor, MI, USA

Andreas Ostendorf, Laser Zentrum Hannover e.V., Hannover, Germany

Rajesh Patel, Spectra Physics, Mountain View, CA, USA

William M. Steen, The Univ. of Liverpool, Liverpool, UK

Sincere Thanks to the Cooperating Societies

Laser Materials Processing Conference

Conference Chair: Paul Denney, CCAT, East Hartford, CT, USA

Sponsored by:
LASAG
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Last year's 25th ICALEO® conference focused on how things had evolved over the years in lasers and with ICALEO®. While history can teach many things one major point is that things keep changing and improving especially in the area of lasers and optics. This is reflected in many of the papers that will be presented within the Laser Materials Processing Conference at the 26th ICALEO®. While laser processing has been an accepted process in manufacturing, researchers continue to expand the use of lasers in many ways. One of the drivers for this continued expansion is the development of new and improvements to existing solid state lasers (disk, fiber, and direct diode). The optical and operational characteristics of these new lasers have resulted in the displacement of existing lasers, ousting other processing technologies, and in the development of new processes. The result is that this year will have a session on high brightness lasers and a special session on recent developments in diode technology. In addition to new laser technologies, approaches to manufacturing needs are also a major topic at this year's ICALEO®. The ability to tailor a structure through Direct Metal Deposition (DMD) or to repair/refurbish a worn part are two major driving forces for research efforts in the additive manufacturing. The importance of these topics are reflected in two separate sessions. Also with more emphasis in manufacturing to use processes that are "under control and understood", there will be a session on "Modeling & Simulation" to help understand laser processing and a session on "Monitoring & Control" to insure quality. Lasers are also being called upon to make an impact on the earth's environment. The Laser Materials Processing and Laser Microprocessing Conferences are jointly sponsoring a session on how lasers are being used for "Green" applications which will have a positive impact on the earth and global warming. The remainder of the Laser Materials Processing Conference is populated with excellent papers that will be a great foundation to build on as ICALEO® heads into the next 25 years.

Program Committee:

Magdi Azer, GE Global Research, Niskayuna, NY, USA
Milan Brandt, Swinburne Univ. of Technology, Melbourne, Australia
Friedrich Dausinger, Institut für Strahlwerkzeuge, Stuttgart, Germany
Rémy Fabbro, LALP (CNRS)/GIP GERAILP, Arcueil Cedex, France
Anthony Hoult, SPI Lasers, Campbell, CA, USA
Seiji Katayama, Osaka Univ., Osaka, Japan
Alexander Kaplan, Luleå Univ. of Technology, Luleå, Sweden
Lin Li, The Univ. of Manchester, Manchester, UK
Edward Metzbower, U.S. Naval Research Lab, Washington, DC, USA
Tim Morris, TRUMPF Inc. Laser Technology Center, Plymouth, MI, USA
Mohammed Naeem, GSI Group, Inc. - Laser Division, Rugby, UK
William O'Neill, Univ. of Cambridge, Cambridge, Cambridgeshire, UK
Dirk Petring, Fraunhofer ILT, Aachen, Germany
Juan Pou, Univ. de Vigo, Vigo, Spain
Stanley Ream, EWI, Columbus, OH, USA
Antti Salminen, Lappeenranta Univ. of Technology, Lappeenranta, Finland
William Steen, The Univ. of Liverpool, Liverpool, UK
Rui Vilar, Instituto Superior Técnico, Lisboa Codex, Portugal

LMP Session 1: Aerospace Welding & Repair Monday, October 29 • 1:30pm

Session Co-chairs: Paul F. Jacobs, Laser Fare Inc., Narragansett, RI, USA; Ingomar Kelbassa, Lehrstuhl fuer Lasertechnik der RWTH Aachen, Aachen, Germany

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Laser Materials Processing Conference

Joint Session
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Session Co-chairs: Anthony Hoult, SPI Lasers, Campbell, CA, USA; Frank Vollertsen, BIAS, Bremen, Germany

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Session Chair: Paul Denney, Connecticut Center for Advanced Technology, East Hartford, CT, USA

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LMP Session 7: Tribute to Prof. Akira Matsunawa
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Session Chair: David Belforte, Industrial Laser Solutions, Sturbridge, MA, USA

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Laser Materials Processing Conference

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LMP Session 8: Welding of Ferrous Alloys Wednesday, October 31 • 8:00am

Session Chair: Edward Reutzel, ARL, The Penn State Univ., State College, PA, USA

Effects of High Speed Laser Welding on Thin Sheet Steels Applicable to Manufacture Three Piece Packaging Cans . . . . . .(801)
Pratik Shukla, Coventry Univ.

Analysis of the Various Melt Pool Hydrodynamic Regimes Observed during CW Nd-YAG Deep Penetration Laser Welding . . . . . .(802)
Rémy Fabbro, Frederic Coste, LALP (CNRS)/GIP GERAILP; Sonia Slimani, Francis Briand, Air Liquide

CW Nd:YAG Laser Welding of Dissimilar Sheet Metals . . . . . .(803)
M. Theron, C. Van Rooyen, L.H. Ivanchev, CSIR South Africa

Evaluation of Weld Porosity in Laser Beam Seam Welds: Optimizing Continuous Wave and Square Wave Modulated Processes . . . . . .(804)
Chad Ellison, Kevin Faraone, Honeywell FM&T; Jerome Norris, Matthew Perricone, R. Allen Roach, Sandia National Laboratories

Local Rigidity Increase of Sheet Metal Construction using Bead-on-Plate Laser Welds . . . . . .(805)
Heinz Haferkamp, Institut für Werkstoffkunde; Oliver Meier, Andreas Ostendorf, Mitja Schimek, Laser Zentrum Hannover e.V.

The Effect of Laser and Welding Parameters on Keyhole and Melt Pool Behavior during Laser Welding . . . . . .(806)
Antti Salminen, Anna Fellman, Lappeenranta Univ. of Technology

LMP Session 9: Advanced Processes Wednesday, October 31 • 8:00am

Session Chair: Veli Kujanpää, Lappeenranta Univ. of Technology, Lappeenranta, Finland

Fabrication of Fe-based Bulk Metallic Glass Components using Laser Additive Manufacturing . . . . . .(901)
Shawn Kelly, ARL, The Penn State Univ.

Development and Improvement in Laser Direct Joining of Metal and Plastic . . . . . .(902)
Yusuke Niwa, Yousuke Kawahito, Seiji Katayama, Osaka Univ.; Shuji Kubota, TOYOBO

Laser Modification of the End of Thin Metal Tube . . . . . .(903)
Katsuyoshi Hotta, Shojiro Miyake, Hajime Miyazawa, Nippon Institute of Technology

Laser Peening of MIG Welded Joint of Aluminum Alloys . . . . . .(904)
Muneharu Kutsuna, Hiroki Inoue, Nagoya Univ.; Kazuo Amano, Aichi Institute of Industrial Technology; Yuji Sano, Toshiba Corp.

Underwater Rock Drilling by CO2 Laser . . .(905)
Toshio Kobayashi, Satoru Umezu, Japan Drilling Co., Ltd; Kiyonobu Ohtani, Kazuyoshi Takayama, Tohoku Univ.; Komei Okatsu, Japan Oil, Gas and Metals National Corporation

Laser Assisted Machining of Commercially Pure Titanium . . . . . .(906)
Shoujin Sun, James Harris, Yvonne Durandet, Milan Brandt, Swinburne Univ. of Technology

LMP Session 10: Alternative Joining Processes & Materials Wednesday, October 31 • 10:20am

Session Chair: Tim Webber, IPG Photonics Corporation, Oxford, MA, USA

Technology Development on Dual Beam Laser Welding Mg Casting Alloys for Automotive Applications . . . . . .(1001)
Feng Lu, Mariana Forrest, Steve Logan, DaimlerChrysler Corp.

Nd:YAG Laser Welding of 5083 Aluminum Alloy using Filler Wire . . . . . .(1002)
Stefan Grunenwald, Veli Kujanpää, Antti Salminen, Lappeenranta Univ. of Technology

Laser Brazing of High-strength Steels . . . .(1003)
A. Wirth, C. Thomy, Frank Vollertsen, Bias; H. Laukant, U. Glatzel, Univ. of Bayreuth

Laser Penetration Brazing of Brass and Low Carbon Steel . . . . . .(1004)
Kai Chen, Rongshi Xiao, Youdong Pi, Peng Dong, Wuxiong Yang, Institute of Laser Engineering, Beijing Univ. of Technology

A Comparison of the Weld Properties between Laser Welding with and without Filler Wire of Rolled Mg Sheet for Automobile . . . . . .(1005)
Mok-Young Lee, RIST

Laser Beam Aluminum-steel Joints - Mechanical and Dynamical Properties - Detailed Microstructural Analysis of Intermetallic FeAl-Phases . . . . . .(1006)
Holger Laukant, Elisa Guimaraens, Uwe Glatzel, Metals and Alloys, Univ. of Bayreuth

LMP Session 11: Processing of Plastics Wednesday, October 31 • 10:20am

Session Chair: Klaus Kleine, Laserline, Santa Clara, CA, USA

Infrared Observations of a Laser Transmission Welding Process and Finite Element Modeling . . . . . .(1101)
Layla Mayboudi, A. Michael Birk, Gene Zak, Queen's Univ.; Phil J. Bates, Royal Military College of Canada

Computation of Temperature Fields for Laser Transmission Welding of Plastics . . . . . .(1102)
Thomas Frick, Bavarian Laser Centre

Laser Absorbing Dye Study . . . . . .(1103)
Tim Frech, EWI

Comparison of Process Monitoring Strategies for Laser Transmission Welding of Plastics(1104)
S. Mann, P. Abels, S. Kaierle, Fraunhofer ILT

New Applications of Laser Welding for Thermoplastic Polymer Composites . . . . .(1105)
Abed Stephane, CLFA Fraunhofer ILT

LMP Session 12: Drilling for Aerospace Applications Wednesday, October 31 • 10:20am

Session Chair: Dave Krattley, LASAG Industrial-Lasers, Buffalo Grove, IL, USA

The Influence of Processing Parameters on Laser Drilling of Hastelloy X . . . . . .(1201)
Robin Bright, Mark Aindow, Harris Marcus, Univ. of Connecticut Institute of Materials Science; Paul Jacobs, LFI, Inc.

Laser Design Characteristics and Parameter Variables and Their Impact on Percussion Hole Quality . . . . . .(1202)
Robert Wright, Univ. of Hartford; Paul Denney, Terri Marsico, Connecticut Center for Advance Technology

Methods of Employing Lasers in the Production and Repair of Cooling Holes used in the Latest Turbine Engine Designs . . . . . .(1203)
John Stackhouse, Martin Bull, Winbro Group Technologies

Laser Percussion Drilling: Enhanced Modeling Utility . . . . . .(1204)
J. Bornas, Tom Eppes, I.M. Milanovic, Devdas Shetty, Univ. of Hartford

Shape of Hole in Percussional Multi-pulse Laser Drilling . . . . . .(1205)
Matthieu Schneider, Maryse Muller, Laurent Berthe, Rémy Fabbro, LALP; Nicolas Revuz, Michel Jeandin, C2P

LMP Session 13: Modeling & Simulation I Wednesday, October 31 • 3:00pm

Session Chair: Shawn Kelly, ARL, The Penn State Univ., State College, PA, USA

Simulation of Thermal Stress in Induction-assisted Laser Cladding . . . . . .(1301)
Frank Brückner, Dietrich Lepski, Fraunhofer IWS; Eckhard Beyer, Fraunhofer IWS, TU Dresden LOT / IOF

Three Dimensional CFD Analysis of Laser Transmission Welding for LAP Joint . . . . .(1302)
Shankar Prasat Chaudhuri, John Debraman, Prabir Kumar Dey, Dipten Misra, Marimuthu Sundar, Dipak Kumar Bandyopadhyay, Jadavpur Univ.; Asis Kumar Nath, RRCAT

3D Laser Machining Model using an Artificial Neural Network . . . . . .(1303)
Gabriel Arias, Technical Univ. of Catalonia; Joaquim Ciurana, Girona Univ.; Xavier Planta, Javier Diaz, Ascamm

Investigation of Meltpool Characteristics and Correlations during Laser Cladding using a Finite Element Modeling Approach . . . . . .(1304)
Johannes Hofman, Univ. of Twente

Laser Materials Processing Conference

An Anisotropic Enhanced Thermal Conductivity Approach for Modelling Laser Melt Pools...(1305)
Shakeel Safdar, Andrew Pinkerton, Richard Moat, Lin Li, Mohammad Sheikh, Michael Preuss, Philip Withers, The Univ. of Manchester

Modeling of Laser Drilling Considering Multiple Reflection of Laser, Evaporation and Melt Flow . . . . . .(1306)
Etsuji Ohmura, Satoru Noguchi, Yoshinori Hirata, Osaka Univ.

LMP Session 14: Cutting & Drilling Wednesday, October 31 • 3:00pm

Session Chair: Flemming Olsen, Technical Univ. of Denmark, Lyngby, Denmark

Visualization of Events inside Kerfs during Laser Cutting of Fusible Metal . . . . . .(1401)
Peter Yudin, Oleg Kovalev, ITAM SBRAS

Reduction of Thermal Damage with Progressive Percussion Drilling . . . . . .(1402)
Leonard Migliore, Coherent, Inc.

Flow Separation Problem in Thick Section Kerfs . . . . . .(1403)
Peter Yudin, Aleksandr Zaitsev, ITAM SBRAS

Eliminating Striation in Laser Cutting of Mild Steel . . . . . .(1404)
Mohamed Sobih, Philip Crouse, Lin Li, The Univ. of Manchester

Parametric Study on CO2 Laser Cutting of Carbon Fibre Reinforced Plastic Composite . . . . . .(1405)
Antonio Riveiro, Blas Gómez, Félix Quintero, Fernando Lusquiños, Rafael Comesaña, Juan Pou, Univ. de Vigo

Effect of Steel Composition in Laser Assisted Oxygen Cutting of Thick Carbon Steel . . . .(1406)
Dipak Kumar Bandyopadhyay, Shankar Prasat Chaudhuri, Prabir Kumar Dey, Dipten Misra, Marimuthu Sundar, Jadavpur Univ.; Asis Kumar Nath, RRCAT

LMP Session 15: Monitoring & Control Thursday, November 1 • 8:40am

Session Chair: Eckhard Beyer, Fraunhofer IWS, Dresden Univ. of Technology, Dresden, Germany

Wireless Laser Welding Monitoring System for Automotive Application . . . . . .(1501)
Giuseppe D'Angelo, Andrea Terreno, Centro Ricerche FIAT

Influence of Temporal and Spatial Laser Power Modulation on Melt Pool Dynamics . . . . . .(1502)
Jens Gedicke, Alexander Olowinsky, Javier Artal, Fraunhofer ILT

Estimation of Penetration Depth by using Coaxial Image Monitoring during Laser Lap Welding . . . . . .(1503)
Cheolhee Kim, KITECH

Predictive Control for Direct Metal Deposition..(1504)
Jyoti Mazumder, Lijun Song, CLAIM, The Univ. of Michigan

Camera Based Process Control for Laser Cladding of Heat Sensitive Materials . . . . .(1505)
Aravind Jonnalagadda, Eric Stiles, Jan Kammann, Fraunhofer USA, CCLA

Development of Monitoring System for Laser Welding System of Thin Stainless Steel Sheets by Waveform Analysis . . . . . .(1506)
Naoki Kawada, Masashi Oikawa, Syunichi Iwaki, Tokyo Car Corporation; Hiroyuki Kumehara, Gunma Univ.

Parameter Study and Process Control on Laser Cladding for Direct Manufacturing of 3D Metallic Structures . . . . . .(1507)
Pascal Aubry, CEA / GERAILP

Spectral Analysis of CO2 Laser Welding Aiming to Separation of Weld Defects . . . . . .(1508)
Anna Fellman, Antti Salminen, Lappeenranta Univ. of Technology; Mikhail Vasilyev, CLAIM, The Univ. of Michigan; Pauli Fält, Markku Hauta-Kasari, Ville Heikkinen, Birgitta Martinkauppi, Univ. of Joensuu

LMP Session 16: Welding with High Brightness Lasers Thursday, November 1 • 8:40am

Session Chair: Holger Schlueter, TRUMPF, Inc., Farmington, CT, USA

High-power Fiber Laser Welding of Thick Section Steel at Low Welding Speed . . . . . .(1601)
Yusuke Amma, Eiji Ashida, Xudong Zhang, Hitach Ltd.; Seiji Katayama, Masami Mizutani, Osaka Univ.

Influence of Inclination Angle on Spatter Behavior at Welding with Lasers of Strong Focusability . . . . . .(1602)
Friedrich Dausinger, FGSW; Jan Weberpals, TGSW

New High Powered Disk Lasers for Industrial Welding Applications . . . . . .(1603)
Ruediger Brockmann, Kurt Mann, TRUMPF Laser

Study of the Phenomena of Fiber Laser-MIG/MAG Hybrid Welding . . . . . .(1604)
Anna Fellman, Antti Salminen, Lappeenranta Univ. of Technology

High Speed Fiber Laser Welding of Fuel Cell Metals . . . . . .(1605)
Stanley Ream, EWI

Laser Alloying of Aluminum using a Deep Penetration Process with Fiber Laser . . . .(1606)
K. Partes, G. Habedank, T. Seefeld, F. Vollertsen, BIAS

Welding of Ti-6Al-4V with Fibre Delivered Laser Beams . . . . . .(1607)
Paul Hilton, TWI Ltd.

Hybrid Welding of Thin Sheet Material with Single-mode Fiber Laser . . . . . .(1608)
Thomas Seefeld, Claus Thomy, Frank Vollertsen, BIAS

LMP Session 17: Surface Processing I Thursday, November 1 • 8:40am

Session Chair: Milan Brandt, Swinburne Univ. of Technology, Melbourne, Australia

Precipitating Behavior of In Situ Synthesized Multiple Carbide Particles in Laser Cladded MMC Coating . . . . . .(1701)
Chaofeng Wu, Wenjin Liu, Minlin Zhong, Tsinghua Univ.

Hot-wire Cladding Process Studies . . . . . .(1702)
Janne Nurminen, KETEK

Experimental Investigation of Residual Stresses Generated during Laser Cladding . . . . . .(1703)
Johannes Hofman, Univ. of Twente

The Influence of Various Surface Conditions during Laser Transformation Hardening . .(1704)
Tanya Fedotova, Tshwane Univ. of Technology; Ken Labuschagne, Sisa Pityana, Tshidiso Seleka, CSIR National Laser Centre

In-situ Synthesis of TiC Particles in Fe Matrix using Laser Cladding . . . . . .(1705)
Christ Prakash Paul, Mehrdad Iravani, Amir Khajepour, Stephen Corbin, Univ. of Waterloo

Laser Cladding of Al-Si/SiC Composite Coatings: Microstructure and Abrasive Wear Behavior . . . . . .(1706)
Amelia Almeida, Ramasamy Anandkumar, Rui Vilar, Instituto Superior Tecnico; Vaclav Ocelik, Jeff De Hosson, Univ. of Groningen

Cladding Efficiencies for Various Laser Systems . . . . . .(1707)
Richard Martukanitz, ARL, The Penn State Univ.

Corrosion Properties of Laser Surface Alloyed NiTi with Mo in Hank's Solution . . . . . .(1708)
Ng Ka Wai, The Hong Kong Polytechnic Univ.

LMP Session 18: Modeling & Simulation II Thursday, November 1 • 8:40am

Session Chair: Seiji Katayama, Osaka Univ., Ibaraki, Osaka, Japan

Simulation Based Design of Hybrid Laser Welding Processes . . . . . .(1801)
MinHyun Cho, Dave Farson, YongChae Lim, The Ohio State Univ.

Laser Direct Metal Deposition of Graded Ti-Ni Structures: Experiments and Thermal Modelling . . . . . .(1802)
Pascal Aubry, GERAILP; Rémy Fabbro, Patrice Peyre, LALP-GERAILP

Modeling of Energy Absorption during Laser Cladding with Preplaced Powder . . . . . .(1803)
Ryan McVey, Engineering Science and Mechanics Dept., The Penn State Univ.; Richard Martukanitz, Shawn Kelly, ARL, The Penn State Univ.

Nd:YLF/Nd:YAG Laser Absorption of Rough Metal Surfaces . . . . . .(1804)
David Bergstrom, Mid Sweden Univ.; John Powell, Laser Expertise Ltd.; Alexander F.H. Kaplan, Luleå Univ. of Technology

Modeling and Simulation of the Energy Deposition in Laser Beam Welding with Oscillatory Beam Deflection . . . . . .(1805)
Eckhard Beyer, IWS Dresden / TU Dresden; Achim Mahrle, TU Dresden / IOF - LOT

A Verified Model of Laser Direct Metal Deposition using an Analytical Enthalpy Balance Method . . . . . .(1806)
Andrew Pinkerton, Richard Moat, Shakeel Safdar, Lin Li, Michael Preuss, Philip Withers, The Univ. of Manchester

Laser Materials Processing Conference

The Simulation for a Convection-diffusion Phase Change Process during Laser Re-melting .....**(1807)**
Zhenxia LIU, Weidong Huang, Northwestern Polytechnical Univ.

A Coupled Time-dependent Numerical Simulation on Temperature and Stress Fields in Laser Solid Freeform Fabrication Process .....**(1808)**
Masoud Alimardani, Ehsan Toyserkani, Jan P. Huissoon, Dept. of Mechanical and Mechatronics Engineering, Univ. of Waterloo

LMP Session 19: Laser Systems & Equipment
Thursday, November 1 • 1:30pm

Session Chair: Friedemann Lell, Sauer GmbH, Kempten, Germany

Perimetric Sensor for the Detection and Following of Complex Seam Trajectories in Robotic Laser Welding .....**(1901)**
Ronald Aarts, Dimitrios Iakovou, Ben Jonker, Johan Meijer, Univ. of Twente

Additive Manufacturing and Repair: Where Do Lasers Fit In? .....**(1902)**
James Sears, South Dakota School of Mines & Technology

Shield Gas Effects on Remote CO2 Laser Welding of Thin Sheet Lap Joints .....**(1903)**
Craig Bratt, Linde Gas LLC

Experience with Shipyard Installation of a Hybrid Pipe Welding System .....**(1904)**
Edward Reutzel, ARL, The Penn State Univ.

Advances in Laser-deposition Equipment and Capabilities .....**(1905)**
Richard Grylls, Optomec

Novel Machine System for Two-sided Synchronous Laser Beam Hardening of Complicated Parts .....**(1906)**
Steffen Bonss, Jan Hannweber, Udo Karsunke, Stefan Kuehn, Marko Seifert, Frank Tietz, Berndt Brenner, Eckhard Beyer, Fraunhofer IWS

Process Control in Laser Manufacturing- Dream or Reality? .....**(1907)**
Michael Schmidt, Bayerisches Laserzentrum GmbH

LMP Session 20: Surface Processing II
Thursday, November 1 • 1:30pm

Session Chair: Thierry Marchione, Optomec, Albuquerque, NM, USA

High Chromium Coating by Laser Deposition of In 690 for Repairing Nuclear Power Plant Components .....**(2001)**
Qian Hao, Minlin Zhong, Tsinghua Univ.

Effect of High Power Diode Laser Surface Alloying on Wear Resistance of Tool Steels .....**(2002)**
Miroslaw Bonek, Leszek Dobrzanski, Silesian Univ. of Technology

Automated Laser Fabrication of High Performance Saw Blades .....**(2003)**
Christ Prakash Paul, Mehrdad Iravani, Amir Khajepour, Stephen Corbin, Univ. of Waterloo

Microstructure and Properties of Plasma Deposited and Laser Consolidated Chromium Oxide Coating .....**(2004)**
Jyoti Mazumder, Pravansu Mohanty, Jovan Stanisic, CLAIM, The Univ. of Michigan

Microstructures and Wear Resistance of Laser Surface Alloyed NiTi with High Mo Concentration .....**(2005)**
Ng Ka Wai, The Hong Kong Polytechnic Univ.

Thermal Fatigue Resistance of the Laser Alloyed 32CrMoV12-28 Hot Work Tool Steel .....**(2006)**
Krzysztof Labisz, Silesian Univ. of Technology

Ni19Cr10Si and Ni22Cr10Al1.0Y Claddings on Alloy 800H for High Carbon Activity Application .....**(2007)**
Muhammad Ejaz, Corrosion and Protection Centre; Zhu Liu, Robert Prescott, The Univ. of Manchester

Laser Industry Vendor Program Reception & TableTop Display

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Tuesday, October 30 • 4:00pm

The Laser Industry Vendor Program gives vendors and conference attendees the opportunity to discuss equipment and applications in a relaxed setting. After completion of the technical sessions, share wine, cheese and product ideas with your colleagues and suppliers! Limited space is still available! For more information on participating as a vendor, contact Beth Cohen at 407.380.1553 or e-mail: bcohen@laserinstitute.org. Alphabetical order; Registered as of May 29.

Aerotech, Inc.
Altos Photonics, Inc.
Amplitude Systemes
Applied Photonics, Inc.
Association of Laser Users
CLAIM, The University of Michigan
Coherent, Inc.
Connecticut Center for Advanced Technology
Continuum
CorActive High-Tech
Crafford-Laserstar Technologies
CREOL, Univ. of Central Florida
CVI Laser, LLC
Directed Light Inc.
Electro-Optics Technology, Inc.
EWI
Finn-Power International, Inc.
Fraunhofer USA, Center for Coatings & Laser Applications
GE Global Research
GSI Group, Inc. - Laser Division
High Q Laser (US), Inc.
II-VI Infrared
IPG Photonics Corporation
Kentek Corporation
Lambda Americas
LASAG Industrial-Lasers
Laser Focus World/Industrial Laser Solutions - Penwell
Laser Mechanisms, Inc.
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Newport Corporation
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OceanOptics, Inc.
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Photonics Spectra
PolarOnyx, Inc.
RAYLASE AG
Rockwell Laser Industries
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Laser Microprocessing Conference

Conference Chair: Xinbing Liu, Panasonic Boston Laboratory, Cambridge, MA, USA

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Laser microprocessing technologies continue to mature, and more and more applications with promising industrial/commercial outlook are being developed to take advantage of the laser's unique capabilities in micro-ablation/patterning/structuring. Laser microprocessing techniques are becoming indispensable enabling tools for a variety of industries that demand ever more precise features at micrometer or even smaller dimensions. The Laser Microprocessing Conference (LMF) of ICALEO® continues to be the global forum for scientists and engineers from advanced academic research labs and industrial R&D departments to discuss and exchange ideas and results in this dynamic and exciting field. This year, ICALEO® established a separate Nanomanufacturing Conference to highlight laser technology for the emerging field of nanoprocessing and nanomanufacturing. Therefore, LMF will focus on laser technology that produces micrometer-sized features, although a clear distinction is not always possible, just as the boundary between LMF and Laser Materials Processing Conference. For LMF topics, ultrafast laser processing continues to be a mainstay, as well as nanosecond pulse micro-drilling. Other sessions include fiber laser applications, surface modification, micro-welding/structuring/forming/packaging, device manufacturing, deposition and process monitoring, biomedical applications, and light sources for microprocessing. A highlighted session on hybrid and other novel processing techniques will be presented. A special session on solar and energy device manufacturing will be jointly organized with Laser Materials Processing Conference.

Program Committee:

Brian Baird, Electro Scientific Industries, Portland, OR, USA
Detao Du, General Atomics, San Diego, CA, USA
Bo Gu, GSI Group, Inc., Wilmington, MA, USA
Koji Ikuta, Nagoya University, Dept. of MicroNano System Engineering, Furicho, Chikusa-ku, Japan
Klaus Kleine, Laserline Inc., Los Gatos, CA, USA
Etsuji Ohmura, Osaka Univ., Osaka, Japan
Tatsuo Okada, Kyushu Univ., Hakozaki, Fukuoka, Japan
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Bill Shiner, IPG Photonics Corporation, Oxford, MA, USA
Kunihiko Washio, Paradigm Laser Research Ltd, Tokyo, Japan
Xiaoyan Zeng, National Engineering Research Center for Laser Processing, Huazhong Univ. of Science and Technology, Wuhan, China

LMF Session 1: Ultrafast Laser Processing I
Monday, October 29 • 1:30pm

Session Chair: Detao Du, General Atomics, San Diego, CA, USA

Femtosecond Laser Written Waveguides in LiNb03 for Nonlinear Applications (Invited Paper - 40 Minute Presentation) . . . . . .(M101)
Stefan Nolte, Jonas Burghoff, Jens Thomas, Antonio Ancona, Felix Dreisow, Andreas Tünnermann, Friedrich-Schiller-Univ. Jena

Via Hole Machining in Sapphire using an Ultrafast Laser . . . . . .(M102)
Nagaraj Batta, Shuichi Nagai, Ming Li, Panasonic Boston Lab

Femtosecond Laser Micro-structuring of Materials in the NIR and UV regime . . . . . .(M103)
Walter Perrie, Martin Sharp, Stuart Edwardson, D. Lui, J. Cheng, Z. Kuang, S. Semaltianos, Geoff Dearden, Ken G. Watkins, The Univ. of Liverpool; A. Baum, P. Scully, The Univ. of Manchester

Precise Patterning of Thin Films with High Repetition Rate Picosecond Fiber Laser . .(M104)
Harry Asonen, Jari Sillanpaa, Corelase

Selective Femtosecond Laser Micro-structuring of Photoresists and TCO . . . . . .(M105)
Pavlina Choleva, Stefan Partel, Sandra Zoppel, Vorarlberg Univ. of Applied Sciences; Max Lederer, HighQ Laser; Georg A. Reider, Vienna Univ. of Technology

Experiments and Characterization of Two Photon Polymerization using 1 KHz Femtosecond Laser System . . . . . .(M106)
Nitin Uppal, Panos S. Shiakolas, Univ. of Texas at Arlington

Joint Session: LMF Session 2 & LMP Session 3: Solar & Energy Device Manufacturing
Monday, October 29 • 1:30pm

Session Co-chairs: Anthony Hoult, SPI Lasers, Campbell, CA, USA; Frank Vollertsen, BIAS, Bremen, Germany

***Please see LMP Session 3, page 6 for detailed presentation information**

LMF Session 3: Fiber Laser Applications
Tuesday, October 30 • 8:00am

Session Chair: Stefan Kaierle, Fraunhofer ILT, Aachen, Germany

In-process Monitoring and Adaptive Control in 100W Fiber Laser Welding . . . . . .(M301)
Yousuke Kawahito, Masaharu Kawasaki, Seiji Katayama, Osaka Univ.

Laser Micro-perforation "On-The-Fly" as an Essential Step of a Novel Process Combination for Micro Sieve Production . . . . . .(M302)
Marc Baumeister, Klaus Dickmann, Laser Center Univ. of Applied Sciences Muenster; Frank Vollertsen, BIAS

Micromachining Performance Comparison between a Pulsed Nd:YAG Laser and a Single Mode Fiber Laser up to 200W Average Power . . . . . .(M303)
Mohammed Naeem, GSI Group, Inc. - Laser Division

Local Heating System using a Fiber Laser for Controlling Microstructures . . . . . .(M304)
Masahiro Tsukamoto, Toshiya Shibayanagi, Nobuyuki Abe, Joining and Welding Research Institute, Osaka Univ.; Yukihiro Soga, Takuto Yamashita, Osaka Univ.

Microcantilever Force Sensor Fabricated by Femtosecond Laser Micromachining . . . .(M305)
Mohammad Mayyas, Nitin Uppal, Panos S. Shiakolas, Univ. of Texas at Arlington

Low Heat Input Crack-free Cutting of Silicon using Near Infra-Red Fiber Lasers . . . . . .(M307)
Anthony Hoult, SPI Lasers

Micro-processing with a Novel Pulsed Fiber Laser . . . . . .(M308)
Anthony Hoult, SPI Lasers

Drilling of Silicon by Direct Irradiation of Laser Beam Transmitted through Optical Fiber .(M309)
Hitoshi Tokura, Hirofumi Hidai, Yoshinobu Yamashita, Tokyo Institute of Technology

LMF Session 4: Surface Modification
Tuesday, October 30 • 1:30pm

Session Chair: Tatsuo Okada, Kyushu Univ., Motooka, Fukuoka, Japan

Studies on the Surface Texturing by Pulsed Nd:YAG Laser . . . . . .(M401)
Adriana Soveja, Jean-Marie Jouvard, Dominique Grevey, Univ. de Bourgogne; Eugen Cicala, Univ. Politechnick of Timisoara, Mechanical Engineering Faculty

Effect of Laser Surface Modification on Crystallinity of Poly (Lactic Acid) . . . . . .(M402)
Anubha Bhatla, Y. Lawrence Yao, Columbia Univ.

Possibility of Producing a Superconductive Layer of Large Area on the Bulk Prepared by Press Forming of Bi System Superconductive Powder by Laser Surface Melting Method . . . . . .(M403)
Hiroyuki Shimizu, Hajime Miyazawa, Katsuyoshi Hotta, Nippon Institute of Technology

Surface Structuring of Polyimide by Pulsed Laser Ablation . . . . . .(M404)
Vitor Oliveira, Rui Vilar, Instituto Superior Técnico

Micro-scale Laser Peen Forming of a Single Crystal . . . . . .(M405)
Youneng Wang, Michelin America R&D Corp.; Yajun Fan, Sinisa Vukelic, Jeffrey Kysar, Y. Lawrence Yao, Columbia Univ.

Laser Microprocessing Conference

Selective Melt-mediated Laser Crystallization of Thin Film NiTi Shape Memory Alloys . . . . .(M406)
Andrew Birnbaum, Y. Lawrence Yao, Columbia Univ.

LMF Session 5: Device Manufacturing
Wednesday, October 31 • 8:00am

Session Chair: Brian Baird, Electro Scientific Industries, Portland, OR, USA

Laser-assisted Maskless Micro-deposition for Conformal Direct Writing of Optical Fiber Sensors . . . . . .(M501)
Hamidreza Alemohammad, Ehsan Toyserkani, Univ. of Waterloo

Fabrication of Micro-heaters by Laser Micro Cladding and Micro-pen Direct Writing . . .(M502)
Xiangyou Li, Xiaoyan Zeng, Huazhong Univ. of Science and Technology

Tunable Optical Filters in Silicon Carbide .(M503)
Sachin Bet, Aravinda Kar, UCF College of Optics and Photonics/ CREOL and FPCE; Nathaniel Quick, AppliCote Associates, LLC

Advanced Application of Direct Laser Process on Doped SnO2 Thin Films for Flat-panel Displays . . . . . .(M504)
Reo Usui, Ryohei Satoh, Yu Mihara, Eiji Morinaga, Yoshiharu Iwata, Osaka Univ.

Rapid Laser Patterning versus Wet-etch Lithography for Flat Panel Display Manufacture: A Technical & Commercial Comparison . .(M505)
Matt Henry, Jozef Wendland, Paul Harrison, Powerlase Ltd.; Duncan Hand, Heriot Watt Univ.

Development of Thin-film Laser Patterning System for Flat Panel Displays Manufacture . . . . . .(M506)
Chung Cheng, Industrial Technology Research Institute

LMF Session 6: Micro-welding, Structuring, Forming, & Packaging
Wednesday, October 31 • 8:00am

Session Chair: Xiaoyan Zeng, National Engineering Research Center for Laser Processing, Wuhan, People's Republic of China

TWIST- A New Method for the Micro-welding of Polymers with Fibre Lasers . . . . . .(M601)
Andrei Lucian Boglea, Alexander Olowinsky, Arnold Gilllner, Fraunhofer ILT

Laser-based Glass Soldering for MEMS Packaging . . . . . .(M602)
Cédric Chaminade, Alexander Olowinsky, Heidrun Kind, Fraunhofer ILT

Packaging of Micro-sensors with Laser-based Localized Bonding Processes . . . . . .(M603)
Q. Wu, S. Kloss, N. Lorenz, C. Wang, A. Moore, D.P. Hand, Heriot Watt Univ.

Laser-assisted Micro-forming with Laser-structured Sapphire Tools . . . . . .(M604)
Katja Samm, Laser Zentrum Hannover e.V.; Mahdi Terzi, Florian von Scotti, Jens Peter Wulfsberg, Helmut-Schmidt-Univ.

Laser Peen Forming for 2D Shaping and Micro Adjustment . . . . . .(M605)
Ken R. Edwards, Stuart Edwardson, Chris Carey, Geoff Dearden, Ken G. Watkins, The Univ. of Liverpool

Generation of NiTi-SMA-Microparts using Two Step Laser Sintering . . . . . .(M606)
Sonja Dudziak, Oliver Meier, Henrik Mewes, Andreas Ostendorf, Laser Zentrum Hannover e.V.

LMF Session 7: Hybrid & Other Novel Processing Methods
Wednesday, October 31 • 10:20am

Session Chair: Ming Li, Panasonic Boston Laboratory, Cambridge, MA, USA

Multi-beam Parallel Processing and Chemical Finishing of Silicon for Micro-cavities in Ink-jet Printer Heads (Invited Paper - 40 Minute Presentation) . . . . . .(M701)
Jun Amako, Seiko Epson Corp.

Laser Micromachining and Energy Field Manufacturing . . . . . .(M702)
Wenwu Zhang, Jeffrey Shaw, Bin Wei, Andrew Trimmer, GE Global Research

High Aspect Ratio Holes in Alumina Ceramic using a Double Laser Pulse Format . . . . .(M703)
Aaron Dodell, General Atomics

Recent Advances in Precision Machining of Various Materials with the Laser MicroJet® . .(M704)
Tuan Anh Mai, John Keith Stay, Synova SA

Benefits of Non-polar Assist Liquids as Alternatives to Water Assist in the Laser Machining of Silicon . . . . . .(M705)
Alan Conneely, Thomas Glynn, Helen Howard, Gerard O'Connor, National Centre for Laser Applications, NUI; Rory Jordan, Hewlett Packard

LMF Session 8: Deposition, Process Monitoring, Beam Shaping
Wednesday, October 31 • 10:20am

Session Chair: Michael Schmidt, Bayerisches Laserzentrum GmbH, Erlangen, Germany

Laser-assisted Diamond Deposition on Metals using Combustion-flame Method . . . . . .(M801)
Y.X. Han, H. Ling, M. Zhao, J. Sun, T. Gebre, Univ of Nebraska; Yongfeng Lu, Univ. of Nebraska - Lincoln

Deposition of the Ni-based Superalloy Films by Pulsed Excimer Laser . . . . . .(M802)
Jyoti Mazumder, Joonghan Shin, CLAIM, The Univ. of Michigan

Microstructural Characterization of Pulsed Laser-deposited Hydroxyapatite Thin Films on Ti-6Al-4V . . . . . .(M803)
Guru Dinda, Jyoti Mazumder, Joonghan Shin, CLAIM, The Univ. of Michigan

Automatic Calibration of a Confocal Scanner-based Laser Welding System . . . . . .(M804)
Nicolaj Stache, André Stollenwerk, Til Aach, Institute of Imaging and Computer Vision, RWTH Aachen Univ.; Jens Gedicke, Alexander Olowinsky, Fraunhofer ILT

Monitoring of the Micro-drilling Process by Detection of Laser-induced Shock Waves in Air . . . . . .(M805)
Friedrich Dausinger, Roland Gauch, Dmitrij Walter, Forschungsgesellschaft für Strahlwerkzeuge; Andreas Michalowski, Institut für Strahlwerkzeuge

Efficient Laser Material Processing using Beam Shaping Optics . . . . . .(M806)
Jim Bovatsek, Rajesh Patel, Newport-Spectra Physics

LMF Session 9: Ultrafast Laser Processing II
Wednesday, October 31 • 3:00pm

Session Chair: Martin Richardson, UCF School of Optics/CREOL, Orlando, FL, USA

Femtosecond Laser Micromachining of Metal Surfaces for Lubrication Enhancement . . .(M901)
Yuanjie Wu, Hae Woon Choi, Dave Farson, Yong Chae Lim, Rajiv Shivpuri, The Ohio State Univ.

Investigation on Laser Micro Ablation of Steel using ps-IR Pulse Bursts . . . . . .(M902)
Arnold Gillner, Claudia Hartmann, Fraunhofer ILT

Single and Multishot Ablation of NiTi using Femtosecond Laser Pulses . . . . . .(M903)
Panos S. Shiakolas, Nitin Uppal, Univ. of Texas at Arlington

Diagnostics of Melt Dynamics during Drilling with Ultrashort Laser Pulses . . . . . .(M905)
Friedrich Dausinger, Institut für Strahlwerkzeuge, FGSW; Andreas Michalowski, Institut für Strahlwerkzeuge; Dmitrij Walter, FGSW

Effect of Pulse Duration and Double Pulse Format on Drilling Rate and Hole Quality for Metals . . . . . .(M906)
Benjamin R. Campbell, Robert C. Campbell, Thomas M. Lehecka, Vladimir V. Semak, Jeffrey G. Thomas, The Penn State Electro-Optics Center

LMF Session 10: Microprocessing I
Wednesday, October 31 • 3:00pm

Session Chair: Kunihiko Washio, Paradigm Laser Research Ltd., Machida, Tokyo, Japan

Advanced Precision Laser Marking and Other Microelectronics Applications including Wafer Dicing, PCB Drilling/Trimming and Ito Trimming using Industrial Nano-second Lasers (Invited Paper - 40 Minute Presentation) . . . . . .(M1001)
Nam Seong Kim, Sangyoung Park, Seonghoon Kim, Wonchul Jung, Wangkyu Lim, EO Technics

Laser Micro-scale Parallel Processing for High Volume Manufacturing Applications . . . .(M1002)
David Braun, Jianhui Gu, Swarrop Kommera, Richard Oram, Hewlett Packard

Continued on Page 18...

Nanomanufacturing Conference - New for 2007!

Conference Chair: Haris Doumanidis, National Science Foundation, Arlington, VA, USA

As nanotechnology research and innovation are progressing at exponentially rising rates, their promise for unprecedented societal impacts requires that the manufacturing issues be explored. The Inaugural Nanomanufacturing Conference of ICALEO® is initiated in 2007 to address the producibility, predictability and productivity aspects of optical and laser-related nanotechnologies for nanomanufacturing and their scale-up for mass production. There are considerable outstanding research opportunities in far and near-field electromagnetic materials processing, optical manufacturing processes and industrial platforms, as well as their hierarchical multi-scale integration across interdisciplinary energetic domains with nano-mechanics, fluidics, thermodynamics, chemical and biological phenomena. This conference will highlight research in emerging nanomanufacturing technologies in laser nanopatterning, holographic lithography, nanoparticle generation, pulsed laser deposition and sintering, micro/nano-machining, multi-photon polymerization, laser-assisted characterization and scanning probe lithography/microscopy, for a variety of applications including nanocomposites, flexible electronics, photovoltaics, biosensors etc. The Nanomanufacturing Conference features internationally renowned research authorities as keynote and invited presenters from academe and industry, and will catalyze the establishment of a nanomanufacturing community within ICALEO®.

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Oliver Meier, Laser Zentrum Hannover e.V., Hannover, Germany
Andreas Othonos, Univ. of Cyprus, Nicosia, Cyprus
Claus Rebholz, R. Bosch GmbH, Germany
Mark Shannon, Univ. of Illinois at Urbana Champaign, Urbana, IL, USA
Panos Shiakolas, Univ. of Texas at Arlington, Arlington, TX, USA
Kody Varahramyan, Institute for Micromanufacturing, Ruston, LA, USA
Xianfan Xu, Purdue Univ., West Lafayette, IN, USA
Dongyol Yang, Korean Society of Precision Engineering, Korea

Nanomanufacturing Session 1: Emerging Technologies in Nanomanufacturing Monday, October 29 • 1:30pm

Session Chair: Haris Doumanidis, National Science Foundation, Arlington, VA, USA

Commercialization of Emerging Technologies: Proven Strategies for Success (Keynote Presentation - 40 Minute Presentation) . . .(N101)
Thomas Cellucci, Cellucci Associates, Inc.

Glucose Biosensor on Cellulose Microfibers Through Layer-By-Layer Nanoassembly (Invited Paper - 40 Minute Presentation) . . . . . .(N102)
Kody Varahramyan, Mangilal Agarwal, Q. Xing, Yuri Lvov, Louisiana Tech Univ.

Large Area Laser Parallel Nanopatterning of Lines and Curves by Particle Lens Arrays . . . . . .(N103)
Wei Guo, Lin Li, Zhu Liu, Zengbo Wang, The Univ. of Manchester

Application of Dynamic Maskless Holographic Lithography . . . . . .(N104)
Nathan J. Jenness, Robert L. Clark, Duke Univ.; Daniel G. Cole, Univ. of Pittsburgh

Nanostructure Fabrication and Characterization on Crystal Silicon Substrates using Laser-assisted Scanning Tunneling Microscope . . . . .(N105)
K.J. Yi, Univ. of Nebraska; Yongfeng Lu, Univ. of Nebraska - Lincoln

Conductive Paper Through Cellulose Microfibers/Carbon Nanotubes Composite . .(N106)
Kody Varahramyan, Mangilal Agarwal, Yuri Lvov, Z. Zheng, Louisiana Tech Univ.; Nicholas Kotov, The Univ. of Michigan

Multi-focus System for Two-photon Polymerization using Phase Modulated Holographic Technique . . . . . .(N107)
Kotaro Obata, Sven Passinger, Andreas Ostendorf, Boris Chichkov, Laser Zentrum Hannover e.V.

Nanomanufacturing Session 2: Laser-assisted Nanomanufacturing Tuesday, October 30 • 8:00am

Session Chair: Costas Grigoropoulos, UC Berkeley, Berkeley, CA, USA

Micro Laser Sintering using Aggregated Nanopowders (Keynote Presentation - 40 Minute Presentation) . . . . . .(N201)
Paolo Matteazzi, CSGI Consortium, Dept. of Chemistry

Fabrication of Flexible Electronics by Laser-Aided Processing of Nanoparticles (Invited Paper - 40 Minute Presentation) . . . . . .(N202)
Costas Grigoropoulos, Seng-Hwan Ko, Heng Pan, Univ. of California; Dimos Poulikakos, ETH

Laser Micromachining In-line Debris Control: An Investigation into the Viability of Excimer Profile Machining through Liquid Mediums . . . .(N203)
Colin Dowding, Jonathan Lawrence, Loughborough Univ.

Development of Highly Conductive Nickel-Coated Carbon Nanopaper Sheets by Pulse Laser Deposition . . . . . .(N204)
Jihua Gou, Univ. of South Alabama

Laser-assisted Generation of Metal Oxide Nanoparticles in Liquid: Characterization and Phase Investigation . . . . . .(N205)
Amin Abdolvand, Sohaib Khan, Philip Crouse, Marc Schmidt, Lin Li, Laser Processing Research Centre; Y. Yuan, Zhu Liu, Corrosion and Protection Centre

Laser Holographic Lithography for the Fabrication of 3-Dimensional Periodic Photonic Structures . . . . . .(N206)
Yuankun Lin, Isai Olvera, Kris Ohlinger, Univ. of Texas-Pan American; Zsolt Poole, Di Xu, Kevin P. Chen, Univ. of Pittsburgh

Nanoparticle Generation by Femtosecond Irradiation of a Photosensitive Zinc Phosphate Glass Containing Silver . . . . . .(N207)
Matthieu Bellec, Bruno Bousquet, Lionel Canioni, CPMOH, Univ. Bordeaux 1; Clemens Hönninger, Eric Mottay, Amplitude Systemes

Nanomanufacturing Session 3: Nanostructured Materials Tuesday, October 30 • 1:30pm

Session Chair: Dave Farson, The Ohio State Univ., Columbus, OH, USA

Two-Dimensional Carbon Nanostructures and Their Electrical Transport Properties (Invited Paper - 40 Minute Presentation) . . . . . .(N301)
Yihong Wu, Haomin Wang, Catherine Choong, National Univ. of Singapore

Enhancement of the Light Emission of Si Nanocrystals (Invited Paper - 40 Minute Presentation) . . . . . .(N302)
Ming Lu, Fudan Univ.

Nanoparticle Coalescence and Sintering: Molecular Dynamics Simulation . . . . . .(N303)
N. Wang, Stanislav Rokhlin, Dave Farson, The Ohio State Univ.

Optoelectronic Properties of Single Walled Carbon Nanotubes Functionalized with Photosensitive Ruthenium Complexes . . .(N304)
Harsh Chaturvedi, Jordan Poler, Univ. of North Carolina

Parametrical Study of Photonic Bandgap Structures Fabricated using Laser-assisted Chemical Vapor Deposition . . . . . .(N305)
H. Wang, Z.Y. Yang, Univ. of Nebraska; Yongfeng Lu, Univ. of Nebraska - Lincoln

Nanomanufacturing Conference

Nanomanufacturing Session 4: Nanostructuring & Nanofabrication using Femtosecond Lasers
Wednesday, October 31 • 8:00am

Session Chair: Kody Varahramyan, Louisiana Tech Univ., Ruston, LA, USA

Control of Structural Transitions in Materials Irradiated by Temporally Tailored Ultrafast Laser Radiation (Invited Paper - 40 Minute Presentation) .....**(N401)**
Razvan Stoian, Laboratoire Hubert Curien

Electrical Discharges at Small Gap Lengths Stimulated by Femtosecond Laser Pulses (N402)
Jian Chen, Hae Woon Choi, Dave Farson, Stanislav Rokhlin, The Ohio State Univ.

Effects of Ultrafast Laser Nanomachining in SiO2 .....**(N403)**
Yelena White, Xiaoxuan Li, William Hofmeister, UTSI

Adding Functionality to Metal Nanoparticles during Femtosecond Laser Ablation in Liquids(N404)
Stephan Barcikowski, Jurij Jakobi, Boris Chichkov, Laser Zentrum Hannover e.V.

Nano-particle Generation by Femto Second Laser Ablation .....**(N405)**
N. Semaltianos, Walter Perrie, Martin Sharp, C. Williams, Stuart Edwardson, Geoff Dearden, Ken G. Watkins, The Univ. of Liverpool

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Business Insight - Panel Discussion

Session Chair: Bo Gu, GSI Group, Inc., Wilmington, MA, USA
Tuesday, October 30 • 1:30pm

Do you ever want to know more about the real world of business? Come to this fantastic business insight panel discussion. Experts and business leaders discuss business and IP strategy, start-up issues, technology commercialization and product development, management and marketing techniques, and how to navigate the business environment. All who are in business or interested in business should attend.

A Disruptive Business Strategy for a Disruptive Technology
Osvaldo Coto, Nonbox Consulting; **Nathaniel Quick,** AppliCote Associates, LLC

Intellectual Property Considerations for High-Tech Start-ups
Joseph E. Gortych, Esq., Opticus IP Law, PLLC

Business Dynamics: From the Lab to the Entrepreneur. Taking Concepts and Converting Them into a Business
Neil Ball, Directed Light Inc.

Marketing…Opportunities for Growth from the Front Lines; How to help Marketing Lead Growth Initiatives in an Emerging Industry
Ellen McGuirk, Newport Corporation

Poster Presentation Gallery

Wednesday, October 31 & Thursday, November 1

Attendee Buffet Breakfast Sponsored by:

The Poster Presentation Gallery will be featured on Wednesday and Thursday of the conference. Join Authors Thursday morning for breakfast and sharing of ideas. Authors will be by their posters on Thursday morning from 7:00am - 8:30am to answer questions. All Poster Presentations will be included in the ICALEO® Proceedings.

Effects of Laser Parameters on Heat Distribution in a Cylindrical Sample .....(P501)
Jagdish Luthra, Univ. de Los Andes; Suranjana Luthra, Raitech

Selective Laser Deposition of Indium Tin Oxide (ITO) on Glass .....(P502)
Jonathan Lawrence, Loughborough Univ.

The Effect of Output Fibre Diameter when Welding Austenitic Stainless Steel with a Fibre Laser .....(P503)
Jongkol Iammi, Ian Pashby, The Univ. of Nottingham

Quantitative Analysis of Retained Austenite in Laser Melted Martensitic Stainless Steel ..(P505)
Tshidiso Seleka, Sisa Pityana, CSIR National Laser Centre; Marie Ulbrich, Vaal Univ. of Technology

Key Factors Influencing the Bend Per Pass in Laser Forming .....(P506)
Stuart Edwardson, Emile Abed, Chris Carey, Ken R. Edwards, Geoff Dearden, Ken G. Watkins, The Univ. of Liverpool; Konrad Bartkowiak, Fraunhofer USA

Sonic Agitation of the Sample Wafer during Excimer Machining for In-line Debris Control .....(P507)
Colin Dowding, Jonathan Lawrence, Loughborough Univ.

Influence Analysis of Process Parameters over 7075 Aluminum Alloy Laser Machining using Taguchi Technique .....(P508)
Gabriel Arias, Technical Univ. of Catalonia; Joaquim Ciurana, Girona Univ.; Xavier Planta, Javier Diaz, ASCAMM

Microstructure and Corrosion Resistance after Laser Cladding of Stainless Steel Powders...(P509)
Marleen Rombouts, Rosita Persoons, Willy Engelen, Jan Gedopt, VITO

Predictive Model for Thick Steel Laser Cutting Quality using Artificial Neural Networks ..(P510)
Dipak Kumar Bandyopadhyay, Shankar Prasat Chaudhuri, Prabir Kumar Dey, Dipten Misra, Marimuthu Sundar, Jadavpur Univ.; Asis Kumar Nath, Pream Singh, RRCAT

Observation of Humping Mechanisms during High-speed Welding with Brilliant Lasers .(P511)
Friedrich Dausinger, Axel Hess, FGSW

Laser Boronizing of Carbon Steels with Direct Diode Laser .....(P512)
Junji Morimoto, Taisuke Ozaki, Yutaka Katoh, KINKI Univ.; Shintaro Morimoto, Shintaro Morimoto, Nitia Steel Works, Ltd.; Nobuyuki Abe, Masahiro Tsukamoto, Joining and Welding Research Institute, Osaka Univ.

Weld Penetration and Welding Phenomena of Aluminum Alloy with High-power Fiber Laser...(P513)
Seiji Katayama, Yousuke Kawahito, Masami Mizutani, Hiroyuki Nagayama, Joining and Welding Research Institute, Osaka Univ.

Laser Weld Penetration Improvement by Laser Activation Process with Oxygen .....(P514)
Masami Mizutani, Seiji Katayama, Joining and Welding Research Institute, Osaka Univ.

Nanosecond 266nm Laser Ablation of Glasses at Near-threshold Conditions .....(P515)
Xinghua Li, Sean Garner, Corning Inc.

Comparison of Microstructures and Properties of Laser Surface-treated Thermally Sprayed and Laser-clad Coatings of Inconel 625 .....(P516)
Nauman Ahmed, K.T. Voisey, D.G. McCartney, I.R. Pashby, The Univ. of Nottingham

Modeling of the Direct Metal Laser Deposition Process: Application to Ti-6Al-4V .....(P517)
Arnaud Longuet, Centre des Materiaux des Mines de Paris

Micro-welding of Stainless Steel using a High Brightness 100W Fibre Laser .....(P518)
C.J. Kong, S. Williams, P. Colegrove, G. Lopes, Welding Engineering and Metal Science Centre, Cranfield Univ.

Gas Composition Effects on High Power Fibre Laser Welding of X100 Steel .....(P519)
C.J. Kong, S. Williams, Welding Engineering and Metal Science Centre, Cranfield Univ.; J. Fieret, C. Rand, The Priestley Centre, The BOC Group

Effects of Hybrid Welding Parameters on the Toughness of Weld Metal in Ship Structural Steel .....(P520)
Seung-Gab Hong, POSCO

Laser Heat Sealing of the Polymer Coated Steel Sheet .....(P521)
Tatsuhiko Sakai, Hirofumi Imai, Naoya Hamada, Hiroshi Nishida, Hirokazu Yokoya, Nippon Steel

Laser Pressure Welding of Zn-coated Steel and Pure Aluminum .....(P522)
Koji Nishimoto, Yoshihiro Okumoto, Tomoki Harano, Ken Atagi, Hiroo Fujii, Anan National College of Technology; Seiji Katayama, Joining and Welding Research Institute, Osaka Univ.

Laser Surface Melting of Tool Steels H13, O1 and D6 .....(P523)
HC Man, Hong Kong Polytechnic Univ.

Flexible Laser Cutting and Welding with the Combi-head and Up-to-Date Solid State Lasers ....(P524)
Frank Schneider, Dirk Petring, Fraunhofer ILT

Direct Metal Laser Sintering: Laser Processing of Precipitation Hardening Steels for Tooling Applications .....(P525)
Tatu Syvänen, Electro Optical Systems Finland Oy

Modelling of the Impact of Melt Surface Dynamics on a Photodiode Monitoring Signal in Laser Welding .....(P526)
Peter Norman, Luleå Univ. of Technology

Mechanical Characterization of Basalt using Shock Wave Induced by Laser: Application to Planetary Hypervelocity Impact Effect ....(P527)
Laurent Berthe, CNRS/ LALP; Natalia Bezaeva, Jerome Gattacceca, CNRS/CEREGE; Michel Boustie, CNRS/LCD; Pierre Rochette, CEREGE

Material Accretion Fabrication of Colmonoy 227- F .....(P528)
Andrea Angelastro, Sabina Luisa Campanelli, Giuseppe Casalino, Antonio Domenico Ludovico, Politecnico di Bari

What Customers in the Fabricating Business Really Want! .....(P529)
Jochen Deile, Jim Mozdzierz, TRUMPF Inc.

Laser Rapid Manufacturing at the Raja Ramanna Centre for Advanced Technology, India ...(P530)
Ashish Kumar Nath, Indian Institute of Technology; Christ Prakash Paul, Univ. of Waterloo; Pankaj Bhargava, P. Ganesh, T. Raghu, Raja Ramanna Centre for Advanced Technology

Delamination of Deposit during Automated Laser Fabrication- A Study .....(P531)
Mehrdad Iravani-Tabrizipour, Christ P. Paul, Amir Khajepour, Stephen Corbin, Univ. of Waterloo

Diamond Reinforced Metal Coating using Automated Laser Fabrication .....(P532)
Mehrdad Iravani-Tabrizipour, Christ P. Paul, Amir Khajepour, Stephen Corbin, Univ. of Waterloo

Novel Computer Generated Holographic Optics Modifying Beam Characteristics to Improve Metal Deposition Processes .....(P533)
Matthew Gibson, Rebecca Higginson, John Tyrer, Loughborough Univ.

Induction Heating Unit Equipped with Closed-loop PID Controller; Versatile Tool in Laser Cladding .....(P534)
Jari Tuominen, Petri Vuoristo, Tampere Univ. of Technology

Zinc Sulfide Optics for High Power Laser Applications .....(P535)
Stanley Ream, EWI

Rapid Fabrication of Electrical Discharge Machining (EDM) Electrodes by Laser Surface Cladding .....(P536)
Fernando Lusquiños, Rafael Comesaña, Antonio Riveiro, Félix Quintero, Juan Pou, Univ. de Vigo

Shear Testing of Laser Spotwelds .....(P537)
Gerald Knorovsky, Jerome Norris, Sandia National Laboratories; Matthew Perricone, R..J. Lee Group

Laser Soldering Technique for Pb-Free Solder .....(P538)
Sumio Nakahara, Kansai Univ., Dept. of Mechanical Engineering.

Tempering and Wear Resistance of Laser Cladded MMC Coating for Corrugated Rollers .....(P539)
Zhaoyong Qian, Minlin Zhong, Tsinghua Univ.

Weld Penetration and Phenomena in 10 kW Fiber Laser Welding .....(P540)
Seiji Katayama, Yousuke Kawahito, Keisuke Kinoshita, Naoyuki Matsumoto, Masami Mizutani, Osaka Univ.

Heat Transfer, Fluid Flow, and Solute Transfer during Multiple Track Laser Cladding of Low Carbon Steel .....(P541)
Xiuli He, Jyoti Mazumder, CLAIM, The Univ. of Michigan

Poster Presentation Gallery Continued …

Laser Micro Spin Forming . . . . . .(P542)
Danny MacCallum, Jeremy Palmer, Sandia National Laboratories; Gustav Roman, Univ. of Florida

High Speed Rotation Hardening of Steel Shafts and Holes with High Power Diode Lasers .(P543)
Guy Claus, WTCM-CRIF; Marko Seifert, Fraunhofer IWS

Quality and Properties of Laser-deposited Metals . . . . . .(P544)
Richard Grylls, Optomec

Multi Material Laser Cladding with Coaxial Powder Injection . . . . . .(P545)
Philippe Bertrand, ENISE

Process Control of Laser Beam Welded Small Section Aluminum Sheet . . . . . .(P546)
S. Kaierle, W. Fiedler, M. Dahmen, B. Regaard, Fraunhofer ILT

The Microsystems Fabrication by Precision Laser Microprocessing . . . . . .(P547)
Dumitru Ulieru, Romes SA; Alina Ciuciumis, National Institute for Research and Development in Microtechnologies; Elena Ulieru, SITEX 45 SRL

Laser Net Shape Manufacturing of Nickel-based Superalloys . . . . . .(P548)
Magdi Azer, GE Global Research Center; Guoshuang Cai, Xiaobin Chen, Xiaoping Huang, Yanmin Li, Yong Liu, Henry Peng, GE (China) Research & Development Center Co. Ltd.

3D Modelling of the Melted Bath Movements during Deep Penetration Welding . . . . . .(P549)
El-Hachemi Amara, Centre for Development of Advanced Technologies

New Applications with High Average Power Q-switched Nd:YAG Lasers . . . . . .(P550)
Markus Rütering, Wolfram Rath, Rofin Sinar Laser GmbH

Study of the Work Gas Flow on the Laser Cut Parameters in Tube Workpiece . . . . . .(P551)
Volodymyr Kovalenko, Laser Technology Research Institute; Ruslan Zhuk, National Technic Univ. 'KPI'

Effect of Process Parameters on the Residual Stress on 4140 Steel Induced by Laser Shock Peening . . . . . .(P552)
Yunfeng Cao, Benxin Wu, Yung Shin, Purdue Univ.

Microhole Drilling by a Picosecond Laser System . . . . . .(P553)
Wenqian Hu, Benxin Wu, Yung Shin, Galen King, Purdue Univ.

Laser Dicing of Electronics Printed Circuit Boards using a DPSS UV Nd:YVO4 Laser .(P554)
Xincai Wang, Z.L. Li, T. Chen, K.H.L. Li, B.K. Lok, J.L. Tan, D.K.Y. Low, Singapore Institute of Manufacturing Technology (SIMTech)

Laser Microprocessing Conference Continued…

Spatial Confinement Effects in Laser-induced Breakdown Spectroscopy . . . . . .(M1003)
X.K. Shen, J. Sun, Univ. of Nebraska; Yongfeng Lu, Univ. of Nebraska - Lincoln

Micro Drilling with Nd:YAG Lasers in the Nanosecond Regime . . . . . .(M1004)
Reiner Witte, Lasag AG

Multi-oxides Thin Film Formation on Iron-base Metal by YVO4 Pulsed Laser Color Marking . . . . . .(M1005)
Seisuke Kano, Hiroyuki Niino, Tadatake Sato, Hirofumi Shimura, AIST; Tomoyuki Togashi, Kaoru Itagaki, Itagaki Metals Co. Ltd.

Microvia Drilling with a Green Laser . . . .(M1006)
Chong Zhang, Aravinda Kar, UCF, College of Optics/CREOL; Nathaniel Quick, AppliCote Associates, LLC

LMF Session 11: Microprocessing II
Thursday, November 1 • 8:40am

Session Chair: Etsuji Ohmura, Osaka Univ., Suita, Osaka, Japan

High Quality Laser Micromachining of Silicon: A Crystallographic Comparison of Process Results Achieved with State-of-the-Art Tripled Nd:YAG and IR Lasers . . . . . .(M1101)
Werner Wiechmann, JDSU Corp.

Reduction of Micro-cracks during Laser Micro-machining of Silicon . . . . . .(M1102)
Siddhartha Bhowmik, Swaroop Kommera, Richard Oram, Hewlett Packard

Demonstrated Fossil-Fuel-free Energy Cycle using Magnesium and Laser (Invited Paper - 40 Minute Presentation) . . . . . .(M1103)
Takashi Yabe, Kunio Yoshida, Shigeaki Uchida, Tokyo Institute of Technology

Dimensional Accuracy Optimization of the Laser Milling Process . . . . . .(M1104)
Sabina Luisa Campanelli, Carmela Deramo, Antonio Domenico Ludovico, Politecnico di Bari

Comparison of ms and ns Laser Induced Material Transfer Techniques for the Patterning of CNT Emitters . . . . . .(M1105)
Chung-Wei Cheng, Industrial Technology Research Institute

Optical Trapping for Engineering Manufacture . . . . . .(M1106)
Stuart Edwardson, Walter Perrie, Martin Sharp, Geoff Dearden, Ken G. Watkins, The Univ. of Liverpool; Z.B. Wang, David Whitehead, Philip Crouse, The Univ. of Manchester

A Novel Laser Technique for Patterning Black Matrix in LCD Manufacture . . . . . .(M1107)
Jozef Wendland, Paul Harrison, Matt Henry, Powerlase Ltd.

LMF Session 12: Light Sources
Thursday, November 1 • 1:30pm

Session Chair: Bill Shiner, IPG Photonics Corp., Oxford, MA, USA

EUV and Debris Characteristics of a Laser-produced Tin Plasma using a Colloidal Tin Dioxide Jet Target . . . . . .(M1201)
Masanori Kaku, Masahito Katto, Shoichi Kubodera, Univ. of Miyazaki

Generation of Intense Vacuum Ultraviolet Radiations for Advanced Materials Processing . . . . . .(M1202)
Masahito Katto, Shoichi Kubodera, Atushi Yokotani, Masanori Kaku, Akira Hosotani, Univ. of Miyazaki; Noriaki Miyanaga, Kunioki Mima, ILE, Osaka Univ.

Development of a 53-W 343-nm UV Laser for Next Generation Material Processing . . .(M1203)
Santanu Basu, Sparkle Optics Corp.

High Pulse Energy Excimer Lasers for Nanotechnology . . . . . .(M1204)
Ralph Delmdahl, Coherent GmbH

High Energy, High Repetition Rate Yb-doped Fiber Chirped Pulse Amplifier . . . . . .(M1205)
Yoann Zaouter, Clemens Hönninger, Eric Mottay, Amplitude Systemes; Eric Cormier, Univ. Bordeaux 1

70-fs Pulses Produced by Parabolic Amplification in a Fiber Laser Amplifier . . . . . .(M1206)
Yoann Zaouter, Eric Mottay, Amplitude Systemes; D. Papadopoulos, Marc Hanna, Frederic Druon, Patrick Georges, Institut d'Optique

High Repetition Rate Ultrashort Pulse Picosecond Laser Amplifier . . . . . .(M1207)
Martin Delaigue, Clemens Hönninger, Eric Mottay, Amplitude Systemes

LMF Session 13: UV & Biomedical Processing
Thursday, November 1 • 1:30pm

Session Chair: Simeon Metev, BIAS, Bremen, Germany

UV Laser Processes for FPCB Cutting . .(M1301)
Yongwoon Chung, Jaehoon Lee, Dongsig Shin, Hyonkee Sohn, KIMM

A Selective Direct Patterning Process of Multilayer using Deep UV Laser . . . . . .(M1302)
JoongYong An, LG Electronics PERI

Characteristics of High-aspect Ratio Nanosecond Laser Ablation of Silicon at 355nm Wavelength . . . . . .(M1303)
Sedao, Alan Conneely, Gerard O'Connor, Thomas Glynn, National Centre for Laser Applications, NUI

Laser Micromachining of Surface Pores on Ti for Biomedical Application . . . . . .(M1304)
HC Man, Hong Kong Polytechnic Univ.

Influence of Femtosecond Laser Irradiation on Amino Acid . . . . . .(M1305)
Nobuyuki Abe, Masahiro Tsukamoto, Joining and Welding Research Institute, Osaka Univ.; Hitoshi Nakano, Norimitsu Tamai, KINKI Univ.

Picosecond Laser Micromachining of Biomedical Materials . . . . . .(M1306)
Assi Huttunen, Tampere Univ. of Technology/Institute of Biomaterials

Laser Solutions Short Courses

Short Course Chairs: Stefan Kaierle, Fraunhofer ILT, Aachen, Germany &
Kunihiko Washio, Paradigm Laser Research Ltd., Tokyo, Japan

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ICALEO® offers delegates an opportunity for a technical refresher or an insight into a new area of industrial photonics with the chance to attend a number of "hot-topic" solutions courses. A series of 5 short courses taught by industrial photonics experts will address fundamentals related to lasers, optics, material processing, and applications. These short courses have been chosen to complement the other ICALEO® activities and compliment the LIA experience. Conference participants are encouraged to attend these courses - no additional fee is required! We look forward to seeing you in Orlando!

Course 1: State-of-the-Art Precision Motion Systems & Their Applications in Advanced Laser Materials Processing
Monday, October 29 • 1:30pm

Jim Johnston, Aerotech, Inc., Pittsburgh, PA, USA

Successful laser processing often involves careful integration of several subsystems. This short course will focus on the use of 2D and 3D precision motion systems in a variety of laser applications and processes, including laser cutting, welding, ablating, and marking. Attention will be given to new control system advances that synchronize interactions between the motion system and the laser, along with reviewing the technologies behind direct drive linear and rotary motors, PWM and linear amplifiers, and control architecture. The course will also investigate sources of motion errors, including mechanical and control limitations with further discussion on design considerations to minimize these error contributions so that the highest degree of success can be achieved.

The objectives for this course are:

1. Exposure to broad range of applications utilizing coordinated motion in laser processing systems
2. Overview of general technologies behind precise motion control
3. Explore advanced control technologies enabling interaction between the laser and motion system
4. Understanding of design considerations to minimize error contributions during motion
5. Review interaction and importance of properly sizing motors and amplifiers with the load

Course level: Beginner

Course 2: Laser Process Monitoring & Control
Tuesday, October 30 • 8:00am

Markus Kogel-Hollacher, Precitec Optronik GmbH, Rodgau, Germany

On-Line process monitoring and control in laser materials processing does not inevitably comprise only the detection of secondary process emissions like plasma, heat or acoustic radiation, the on-line supervision of information surrounding the interaction zone between laser and workpiece is an important factor to guarantee constant process conditions. So all-embracing process control must include the three domains, pre-process, in-process and post-process area. This workshop summarizes the basics and recent progress in this field.

The objectives for this course are:

1. Gain an understanding of the origin of process emissions
2. Give an insight into the history and actual status of in-process monitoring
3. Describe adaptive sensor technology for the pre-, and post-process domain
4. Discuss the questions, if there is an advantage in combining different sensor technologies as regards to the reliability of the gained process information
5. Give an insight into the steps from just monitoring to close-loop-control

Course level: Beginner to Intermediate

Course 3: State-of-the-Art Beam Delivery Systems & Advanced Tools for Laser Materials Processing
Tuesday, October 30 • 1:30pm

Björn Wedel, HIGHYAG Lasertechnologie GmbH, Stahnsdorf, Germany

Content will be available shortly on ICALEO® web site.

Course level: Intermediate

Course 4: Laser Beam Measurement & Analysis
Wednesday, October 31 • 8:00am

Reinhard Kramer, Volker Brandl, PRIMES GmbH, Pfungstadt, Germany

The participants will learn about the set of fundamental beam parameters characterizing the optical performance of a laser beam. We will discuss available detection methods and measurement strategies for the most relevant beam parameters for different laser wave lengths from CO2-lasers to UV-lasers and power levels from 10 W to 20 kW. The influence of these beam parameters, e.g. polarization, laser power, spot diameter, and beam diffraction ratio, on some laser processes will be discussed. Examples will be presented that allow to find a link between alterations seen in the measurement data and the kind of error that occurred in the laser, beam path, or focussing optics. Applications of laser beam analysis are outlined.

The objectives for this course are:

1. Fundamental beam parameters describing the performance of a laser
2. A brief look at ISO 11146
3. Detection methods and measurement strategies for the most relevant beam parameters from 10 W to 20 kW
4. Links between what you see in the measurements and the corresponding problem in the laser / beam path / focussing optics
5. Typical applications of laser beam analysis in industrial processes and process development

Course level: Beginner to Intermediate

Course 5: Overview of Laser Beam Scanners for Materials Processing & An Introduction of Novel Beam Scanning Technology
Thursday, November 1 • 8:40am

Joe Dallarosa, Fraxel

Content will be available shortly on ICALEO® web site.

ICALEO® General Information

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Hilton in the WALT DISNEY WORLD® Resort
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Conference Registration

by September 13th & receive additional savings of $50 off Early Bird Registration

Registration can be completed in two ways - online or by down-loading a PDF registration form from www.icaleo.org. Complete a full conference registration online before September 13 & receive $50 off the published price. Full congress registration includes admission to the Plenary Session, Receptions (Meet & Greet Fiesta, President's, and Vendor Reception), all technical sessions, Laser Solutions Courses, Awards Luncheon, and a technical digest.

One-Day Registration includes admission to technical sessions, Laser Solution Courses and receptions on that day only, and a technical digest. (Award Luncheon is not included, but may be purchased separately.)

Student Registration includes admission to the Plenary Session, Receptions, all technical sessions, Laser Solution Courses, Award Luncheon and a technical digest. Valid student ID required to process registration. Student Registration will not be accepted on-site; students must be pre-registered by October 10.

Guests may attend the awards luncheon and all receptions by purchasing tickets. Please pre-register your guest so we may prepare a nametag. Early Bird registrants should be paid in full by September 13. Visa, MasterCard, and American Express will be accepted. You may send a check (US funds only, drawn on a US bank) payable to Laser Institute of America. Purchase orders must be paid in full by September 13 to qualify for discount. Bank transfers will not be accepted as payment.

Fees

Full Conference - Early Bird Registration
(payment received by September 13)
$695 Member $805 Non-member
$695 Cooperating Society $340 Student
$375 Retired LIA Member

September 14 – October 10
$745 Member $845 Non-member
$745 Cooperating Society $415 Student
$450 Retired LIA Member

October 11 - On-site
$795 Member $895 Non-member

One Day Conference Registration
Early Bird Registration
(payment received by September 13)
$275 Member $300 Non-member

September 14 – October 10
$305 Member $330 Non-member

October 11 - On-site
$335 Member $360 Non-member

On-site Registration Times

Sunday, October 28 11:00am – 4:00pm
Monday, October 29 7:00am – 5:00pm
Tuesday, October 30 7:00am – 5:00pm
Wednesday, October 31 7:00am – 4:00pm
Thursday, November 1 7:00am – 12:00pm
**Purchase orders will not be accepted for on-site registration.*

Proceedings

CD-Rom Proceedings will be available on-site (will not be shipped to you). It includes all submitted papers from ICALEO – LMP, Microprocessing, Nanomanufacturing, and Poster Presentations.

Payment received by September 12
(includes 6.5% tax)
$165.08 Member $202.35 Non-member

Payment Postmarked or Received after
September 13 (includes 6.5% tax)
$218.33 member $255.60 Non-member
**Please note: Sales Tax is added to the CD-Rom proceedings total price in accordance with local tax laws.*

Driving Directions

From the Airport:
Exit the Airport North and follow to 528 West. Follow 528 West until I-4. Take I-4 West to exit # 68 and make a right. Take to the next traffic light and make a left onto Hotel Plaza Boulevard. Follow for 1/2 mile and the Hotel will be on the left. Taking I-4 West to Exit 68 (SR 535). Right on SR 535 to first light (Hotel Plaza Blvd). Left on Hotel Plaza Blvd. Hotel will be 1/4 mile down on the left. Taking I-4 East to Exit 68 (SR 535)

Taking Florida Turnpike from Miami:
Left on Exit 249 (Osceola Parkway). Take Osceola Parkway until SR 535 Exit. Make a right on SR 535 and follow until Hotel Plaza Blvd. Make a left on Hotel Plaza Blvd and hotel will be 1/4 mile down on the left.

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Mears Transportation provides shuttle service to and from the Hilton in the Walt Disney World® Resort. Make your reservations in advance and avoid the line by going to www.mearstransportation.com. Transportation from the Airport to the Hilton WDW is $19 one way and $31 round trip. Print a coupon from the General Information page at www.icaleo.org.

Taxi Cab Service

Taxi Cab Service is available at Level 2 (baggage claim) of the airport. Transportation to and from the resort is approximately $45 to $55 per direction.

Rental Cars

Call Avis Rental Car at 800.331.1600 and mention AVIS worldwide discount number **J093783**

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Special Needs

If you have any special needs that we can address to make your participation more enjoyable, please contact LIA by Phone: 407.380.1553, Fax: 407.380.5588 or e-mail: icaleo@laserinstitute.org

Substitutions and Cancellations

We understand that circumstances may occur to prevent you from attending the conference. If you find that you cannot attend ICALEO®, you have several options:

1. Send a substitute. Substitutions can be made at any time - even on-site at the conference. (Please have the substitute bring your letter of confirmation to the registration desk.)

2. Refund of monies.*
**Note: Requests for refunds must be made in writing and received on or before September 13. There is a $75 processing fee applied to all refunds. All refunds will be processed after the conference. No refunds will be accepted after September 13. No refunds will be given for proceedings or tour package purchases.*

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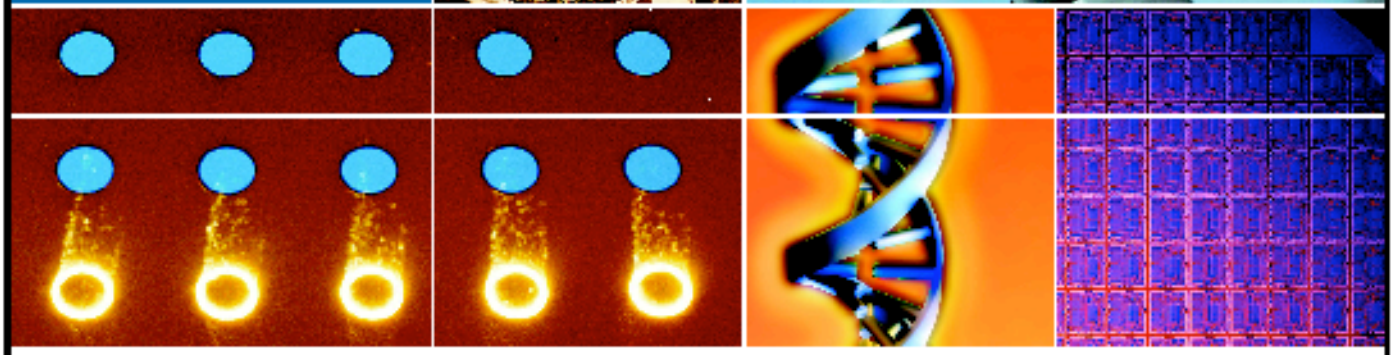

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