ICALEO®

42ND INTERNATIONAL CONGRESS ON
APPLICATIONS OF LASERS & ELECTRO-OPTICS

October 16-19, 2023
Palmer House Hilton • Chicago, IL

ADVANCE PROGRAM

ICALEO 2023 General Chair Welcome

Klaus Löffler
Precitec GmbH

Klaus Löffler is Managing Director at Precitec GmbH. He graduated from the IFSW University of Stuttgart. Since 1991 he is active in the laser industry starting as a laser development engineer. Many successful industrial laser applications in the industry have been based on his involvement. His driving force is the cooperation between research institutions and industrial end users on a global base to bring ideas into usable products in a fast way. He started his involvement with LIA in 1997 as a long-term member of the Executive Board and Advisory Board and has been President in 2013. He founded the LIA Running Club and is a Fellow of the LIA.

We are excited to host the world's leading international conference on Lasers and ElectroOptics in Chicago on October 16-19, 2023.

The Laser has been shown to have the potential to revolutionize solutions for major global challenges like energy usage and supply, global warming, and CO_2 footprint. Even the fusion energy breakthrough is based on laser technology. The conference, with peer-reviewed scientific and technical presentations, will focus on the newest results in Micro Applications, Macro Applications, Additive Manufacturing, Beam Shaping and Frontiers in Laser Applications. Additionally, the Battery Manufacturing and Artificial Intelligence in Laser Processing Tracks will give you an overview of the process combined with the newest advances in laser application results.

The Business Session will bring the business aspect and environment of the laser to the audience and the possibility to discuss with seasoned industry leaders from around the world.

Due to our great location in Chicago, we will leave the conference room on the last day for a unique experience as we travel to where "industrial lasers" live in three local factories.

Whether this is the first time you are hearing about ICALEO or you are a longtime attendee, you will find something of interest, new ideas, and an excellent opportunity to network with other laser specialists worldwide. Don't miss this opportunity to meet up with other laser professionals from around the world to learn, share, and make new friends.

You can find registration and more at icaleo.org. The Laser Institute of America Team and I look forward to seeing you in Chicago at ICALEO 2023!

P.S. Don't forget to join the laser running club, as we start each morning off with a breath of fresh air!

Welcome to Chicago!

Chicago is bursting with world-class, big city culture. But at its heart, it's a Midwestern city — which means a warm welcome and genuine hospitality. No matter who you are or what you love, you'll fit right in exploring famed restaurants, world-renowned museums, a jawdropping waterfront, groundbreaking music, Tony Award-winning theatres, iconic architecture designed by legendary architects, and over 300 parks and green spaces.

Average October Temperatures
60°F / 15°C High
44°F / 7°C Low

Chicago's Don't Miss List:
Cloud Gate ("The Bean"); Chicago Riverwalk; Navy Pier; Magnificent Mile; Deep Dish Pizza

ICALEO 2023 Registration Options

Registration may be completed online at icaleo.org/attend or by emailing icaleo@lia.org.

Early Bird Tier 1

Before July 24, 2023

Full Conference Registration
- Member: $975
- Non-Member: $1050
- Member Student* $645
- Non-Member Student*: $695

Single-Day Registration
- Member: $375
- Non-Member: $425

Early Bird Tier 2

July 24-September 4, 2023

Full Conference Registration
- Member: $1050
- Non-Member: $1125
- Member Student*: $645
- Non-Member Student*: $695

Single-Day Registration
- Member: $375
- Non-Member: $425

Standard Registration

After September 4, 2023

Full Conference Registration
- Member: $1125
- Non-Member: $1200
- Member Student*: $645
- Non-Member Student*: $695

Single-Day Registration
- Member: $375
- Non-Member: $425

To explore the fascinating world of manufacturing by visiting 3 local factories on Thursday, October 19th, choose the ticket option titled ***Full Conference with Thursday Factory Tours.*** This ticket will be an additional $30. Transportation and lunch will be provided.

Other Registration Options

Group Registrations

Companies can request a special group rate if registering more than 3 people. Email icaleo@lia.org for more information.

Media Partners/Cooperating Societies

If you are interested in becoming a media partner or are part of a cooperating society with LIA, please contact marketing@lia.org for more information on your registration options.

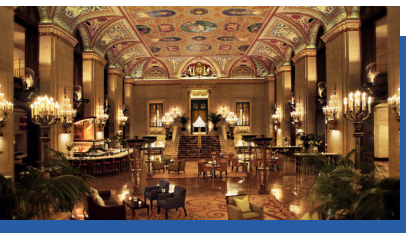
Guest Registration

We encourage guests to join us for the Welcome Reception, President's Reception and the Awards Luncheon! To purchase a Guest Registration in advance, please contact the LIA conferences team at icaleo.org. Guest registration availability may be limited on site.
Guest registration is $155 per guest.

Please Note:
All attendees must review and agree to the LIA Ethics Policy.

Full Conference Registration includes admission to all Receptions, Plenary Sessions, Technical Sessions and the Awards Luncheon.

Single-Day Registration includes admission to Technical Sessions and Receptions on specific registration date only.



Conference Location
Palmer House® Hilton Hotel
17 East Monroe Street,
Chicago, Illinois, 60603
+1.312.726.7500

A destination of choice for world leaders, dignitaries, and celebrities for over 150 years, Palmer House, a Hilton Hotel is the longest continuously operating hotel in North America. Soak up the unique energy of Chicago with many attractions right on our doorstep.

When booking through ICALEO, attendees receive free guest room internet access, as well as complimentary breakfast in the ICALEO Breakfast Lounge with fellow on-site attendees each morning Monday through Wednesday, all at a discounted group rate!

Deadline for Group Rate: ***Friday, September 29 at 5PM EDT***

BOOK TODAY

Sunday, OCT. 15

5:00pm
Welcome Reception

8:00pm
End of Day

Monday, OCT. 16

7:30am
Hotel Guest Networking Breakfast/Chair Appreciation Breakfast

9:00am
Opening Plenary Session

10:30am
Break

11:00am
Technical Session 1
- Macro: Welding and Joining 1
- Micro: Surface Functionalization and Ablation 1
- LAM: DEDAM Process and Materials 1
- FLA: Frontiers in Laser Processing
- Battery: Lasers in Battery Manufacturing

12:30pm
Lunch Break

2:00pm
Technical Session 2
- Macro: Welding and Joining 2
- Micro: Surface Functionalization and Ablation 2
- LAM: DEDAM Process and Materials 2
- FLA: Laser Manufactured Devices 1
- Battery: Battery Manufacturing and Joining

3:30pm
Break

4:00pm
Technical Session 3
- Macro: Welding: From Modeling to Applications
- Micro: Advanced Processing, Monitoring, and Simulation 1
- LAM: DEDAM Process and Materials 3
- FLA: Laser Manufactured Devices 2
- Battery: Laser Welding 1

6:30pm
President's Reception

9:30pm
End of Day

Tuesday, OCT. 17

7:30am
Hotel Guest Networking Breakfast

8:30am
Technical Session 4
- Macro: Advancements in Surface Engineering 1
- Micro: Advanced Processing, Monitoring, and Simulation 2
- LAM: DEDAM Process and Materials 4
- FLA: Advanced Laser Printing
- Battery: Laser Welding 2
- Beam: Improving Laser Beam Welding with Beam Shaping

10:00am
Break

10:20am
Technical Session 5
- Macro: Laser Processing of Plastics
- Micro: Transparent Materials Processing
- LAM: DEDAM Process and Materials 5
- Battery: Cutting
- Beam: Novel Technics in Beam-Shaping

11:30am
Lunch Break

1:00pm
Business Session

2:50pm
Break

3:20pm
Technical Session 6
- Macro: Welding and Joining 3
- Micro: Microelectronics 1
- LAM: PBFAM Process and Materials 1
- Battery: Surface Texturing
- Beam: Beam Shaping Applied to Novel Processes

4:30pm
Exhibitor Reception & Poster Gallery

8:30pm
End of Day

Agenda

Wednesday, OCT. 18

7:30am
Hotel Guest Networking Breakfast

8:30am
Technical Session 7
- Macro: Advancements in Surface Engineering 2
- Micro: Microelectronics 2
- LAM: PBFAM Process and Materials 2
- Battery: Battery Processing and Lasers
- Beam: Improving Laser Cutting with Beam Shaping
- AIL: Applications in Manufacturing 1

10:00am
Break

10:20am
Technical Session 8
- Macro: Welding of Aluminium
- LAM: PBFAM Process and Materials 3
- Beam: Improving Micro-Processing with Beam-Shaping
- AIL: Applications in Manufacturing 2

11:30am
LIA Annual Meeting & Awards Luncheon

1:30pm
Technical Session 9
- Macro: Advancements and Challenges in Laser Cutting
- LAM: PBFAM Process and Materials 4
- Beam: Numerical Simulations Applied to Laser Processes with Beam-Shaping
- AIL: Process Control

3:20pm
Break

3:50pm
Closing Plenary Session

5:00pm
Ice Cream Send Off

6:00pm
End of Day

Thursday, OCT. 19

8:30am
Departure from Palmer House Hotel

9:30am
Arrive at 1st Factory Site

11:00am
Rotate to 2nd Factory Site

12:30pm
Lunch Break

1:30pm
Rotate to 3rd Factory Site

3:00pm
Depart for Hotel

4:30pm
End of Day

Registration Hours

Sunday, October 15
2:00pm - 7:00pm

Monday, October 16
7:00am - 4:00pm

Tuesday, October 17
7:00am - 4:00pm

Wednesday, October 18
7:00am - 11:00am

Program is subject to change.

For e-mobility applications

Put your confidence in TRUMPF

Batteries are at the heart of every electric vehicle. High-grade battery cells and cell connectors are key when it comes to the efficiency of individual components. TRUMPF lasers weld sensitive components with the highest precision and reproducibility. The low heat input ensures ultimate protection of sensitive electronics throughout the process. With the green laser wavelength, highly reflective metals, such as copper, are welded spatter-free. The result? Large contact surfaces and monitored welding depths for optimum power transmission. With electric vehicles, every second counts so power needs to be transported fast and without loss. Put your confidence in TRUMPF – together we can build your success.

www.trumpf.com/s/emobility

Weld 97% Spatter-Free

Meet our Plenaries

CLOSING OPENING

Dr. Stefan Hengesbach

QuiX Quantum BV, Enschede, Netherlands

Quantum Computer

Dr. Wolfgang Braun

Epiray GmbH, Stuttgart, Germany

Thermal Laser Epitaxy (TLE): Transforming Materials Science through Laser-based Thin Film Deposition

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Dr. Felicie Albert

Lawrence Livermore National Laboratory in the National Ignition Facility, Livermore, CA, USA

Achieving Ignition on the National Ignition Facility

Prof. Achim Kapmker

RWTH Aachen University, Aachen, Germany

Role of Lasers as Game Changer in Battery Production

Prof. Claus Emmelmann

Hamburg University of Technology, Institute of Laser and System Technologies, Hamburg, Germany

Profitable and Certified Metal 3D Printing

ICALEO Cooperating Societies and Media Partners

sme · PHOTONICS MEDIA photonics.com · EPIC EUROPEAN PHOTONICS INDUSTRY CONSORTIUM · FMA · AHK German American Chambers of Commerce Deutsch-Amerikanische Handelskammern · GO Photonics · AIP Publishing

Highlights and Events

Welcome Celebration

Sunday, October 15 | 5:00pm

ICALEO's welcome celebration is always a memorably festive affair that brings together longtime and new attendees for an evening of snacks, beverages, and socializing. The Welcome Reception is the perfect place to interact with the ICALEO Conference Chairs and mingle with your colleagues in a fun and relaxed environment at ICALEO's kickoff networking event.

Appreciation Breakfast

Monday, October 16 | 7:30am

Program Committee members and session chairs are invited to attend this informative start to the week's events on Monday, October 16 at 7:30am. Both new and veteran session chairs will receive important session materials and audio-visual tips, along with any last-minute updates to the program. Please plan to arrive in time to fuel up for a strong start to an exciting conference.

Opening Plenary Session

Monday, October 16 | 9:00am

The ICALEO Opening Plenary session is designed to enthrall you. Kicking off days of informative technical sessions, two renowned speakers will present on new advances in lasers and photonics. You won't want to miss this enlightening plenary session!

LIA's Laser Running Club

6:30am | Monday, October 16; Tuesday, October 17; Wednesday, October 18

Meet with your colleagues for our traditional sunrise run. Enjoy running through beautiful Chicago while catching up with your fellow early risers. A tradition begun by former LIA President Klaus Loeffler, the LIA Laser Running Club keeps you energized during the conference. Meet us in the hotel lobby with your Laser Running Club shirt on! If you are a newcomer, we will provide you with a shirt. Learn more about how to participate at the ICALEO registration desk.

President's Reception

Monday, October 16 | 6:30pm

ICALEO's President's Reception is a celebrated event hosted by this year's LIA President Henrikki Pantsar. Taking place at an exciting secret location a few minutes from the hotel, you can expect the evening to be filled with good food, drinks, and fun!

Panel Session

Tuesday, October 17 | 1:00pm

The business session has returned to ICALEO this year. We have assembled a group of industry leaders and experts to dissect issues, challenges, and opportunities presented to our industry. Come and join us Tuesday afternoon and learn the deep insights of the laser business shared by our expert panelists.

Poster Gallery

Tuesday, October 17 | 4:30pm

For the first hour of the Exhibitor Reception poster submitters will be available by their poster to answer questions from judges and attendees. The posters will be displayed throughout the exhibit hall and will remain up for the duration of the reception, so be sure to check them out!

Highlights and Events

Laser Industry Exhibitor Reception

Tuesday, October 17 | 4:30pm

Enjoy drinks and hors d'oeuvres while sharing ideas with colleagues and suppliers. Discuss equipment and applications in a relaxed setting after the day's technical sessions. To participate as an ICALEO sponsor or exhibitor, contact the LIA Marketing Department at marketing@lia.org.

Sponsors and Exhibitors registered as of September 1st in alphabetical order:

AIP Publishing
Amplitude Laser Group
Bloom Lasers
Board of Laser Safety
BOS Photonics
Cailabs
Coherent
Couriertronics
Directed Light Inc.
DMG Mori
EKSPLA
Fraunhofer ILT
FMA
Gentec Electro-Optique, Inc.
GF Machining Solutions
Haas Laser Technologies, Inc.
LASEA
Laservision
Laser Mechanisms
Liburdi Automation
Light Conversion Ltd.
Nuburu
PowerPhotonic
Precitec
SPIE
TRUMPF Inc.
Winbro

**Sponsors are listed in blue font*

Headshot Booth

We are offering free professional headshots during the Exhibitor Reception! Availability will be on a first come, first serve basis. Find the booth during the reception or an LIA staff member for more information.

LIA Annual Meeting & Awards Luncheon

Wednesday, October 18 | 11:30am

Enjoy a plated lunch as LIA and its partners honor the best of the best at the annual ICALEO's Awards Luncheon. Be the first to congratulate the 2023 winners of the following awards:

Arthur L. Schawlow Award
William M. Steen Award
LIA Fellows
JLA Paper Award

The luncheon will also play host to LIA's Annual Meeting.

Closing Plenary Session

Wednesday, October 18 | 4:00pm

To close out the conference, we offer you a plenary session that will hopefully broaden your horizons a bit and give you something to think about on your way home. We hope to see you at this exciting session.

Ice Cream Send Off

Wednesday, October 18 | 5:40pm

Enjoy ice cream and a final networking opportunity after the Closing Plenary to celebrate the close of the conference.

Highlights and Events

Thursday Factory Tours

Thursday, October 19

After 3 days of sessions, it's time to explore the fascinating world of manufacturing by visiting 3 local factories on Thursday, October 19th.

This extraordinary opportunity to go behind the scenes of manufacturing includes stops at the TRUMPF Smart Factory, DMG Mori, and Bystronic Smart Factory! Get a chance to witness cutting-edge technologies, gain new perspectives, and engage with industry experts as you visit each of these facilities.

TRUMPF

TRUMPF Smart Factory

Located just outside of Chicago, in Hoffman Estates, Illinois, the TRUMPF Inc. Smart Factory opened in 2017 to give visitors an opportunity to experience connected manufacturing systems in a real-life environment. The Chicago Smart Factory illustrates many facets of a digitized and connected sheet metal process chain from the initial order for a sheet metal component to its design, manufacture, and delivery. The 50,000 square foot building is filled with the latest automated production technology and the shop floor demonstrates how TRUMPF machinery can be used by small and medium-sized contract manufacturers as well as larger customers for fully automated production. A walkway over the shop floor provides a bird's-eye look at the entire production system and its flow of material and information. And large digital displays in the control center allow visitors to monitor key process indicators from the ongoing production in real time. Learn more about the Industry 4.0 journey at TRUMPF's Smart Factory in Chicago.

DMG MORI

DMG Mori USA Headquarters

DMG MORI is a leading global manufacturer of machine tools and is driving holistic process integration based on technology integration, automation, and digitization for greater sustainability. In this "Global One Company", more than 12,000 employees work together to be a total solution provider for our customers. DMG MORI is represented in 43 countries worldwide - with 16 production sites and 113 sales and service locations.

In our 40th anniversary year as DMG MORI USA, the company marks another growth milestone in the USA with 13 locations featuring technology centers, showrooms, and the production facility DMG MORI Manufacturing USA in Davis, California. DMG MORI has built up an outstanding regional presence in the country, supporting local customers like no other. The company contributes to developing the skillset in the local workforce, which also serves the local communities.

Bystronic

Bystronic Smart Factory

Bystronic Americas is a subsidiary (consisting of the US, Canada, Mexico, and Brazil) of Bystronic Group, a Swiss OEM of machines that cuts and bends sheet metal and tube profiles. Bystronic has development and production locations in Switzerland, Germany, Italy, China, and the United States.

Join us for the ICALEO Event on Thursday, October 19th, 2023. We'll give you a tour of our state-of-the-art facility which is home to our Experience Center and Manufacturing facility and see first-hand the innovative technology that drives the machines behind the sheet metal industry! Live demos of our laser cutting, bending machines, and automation solutions will be on display for your viewing and inquiries. Come learn why Bystronic is your best choice in sheet metal processing!

To join in on this experience, choose the ticket option titled ***Full Conference with Thursday Factory Tours***. This ticket will be an additional $30. Transportation and lunch will be provided.

LIA Annual Awards

Arthur L. Schawlow Award

Outstanding Contribution to Basic and Applied Research in Laser Science and Engineering

The Arthur L. Schawlow Award recognizes outstanding, career-long contributions to basic and applied research in laser science and engineering leading to fundamental understanding of laser materials interaction and/or transfer of laser technology for increased application in industry, medicine and daily life. Examples of fields of contribution include the following in addition to many relevant topics:

- Laser spectroscopy and its application in materials processing and diagnostics
- Laser-aided materials processing
- Laser interaction with biological tissues
- Development of new lasers

The Schawlow honoree will be acknowledged at the LIA Awards Ceremony, during which the recipient will give an address.

Eligibility: Nominations are open to candidates who made outstanding contribution to basic and applied research in laser science and engineering. The recipient does not have to be a member of LIA but sustained service to LIA can be one of the additional contributions that is considered for the award. Nominations are active for three years.

Winner will be presented the award during the Awards Luncheon on Wednesday, October 18th.

William M. Steen Award

Organizations with Significant Innovation in the use of Lasers for Advanced Materials Processing

The prestigious William M. Steen Award for significant developments in laser material processing is named after one of the early pioneers in the subject. Laser Material Processing is one of the growth points in modern manufacturing. To bring focus to the many developments taking place and to promote the development of new ideas the LIA is making awards for the top idea of the year as adjudicated by a prize giving panel.

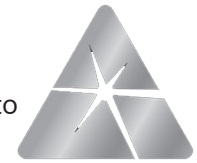
In order to qualify the innovative development should have experimental proof of concept in the use of lasers or monitoring of laser processes and should fit one of the criteria stated below:

- Open a new area of application for lasers.
- Be of benefit to manufacturing with lasers.
- Solve a problem either particular or general by the use of lasers.
- Show some novel sensing system by using optics or when monitoring laser processes.
- A development in photo chemistry.
- A development in photo-therapies.
- A development in 3D printings with lasers

Winner will be presented the award during the Awards Luncheon on Wednesday, October 18th.

LIA Fellows Award

LIA's most Prestigious Level of Membership



The grade of Fellow is the highest level of membership in the The Laser Institute. It is awarded to recognize members of the institute who have:
- Attained unusual professional distinction in the LIA mission areas of laser science and technology, laser applications and/or laser safety, and
- Provided outstanding service to their field.

Nominations are open to candidates who must have practiced the profession of laser science and engineering in academia, medicine, industry or government for at least 10 years, and whose membership is current. For exceptional candidates, the Executive Committee may waive the eligibility requirements.

Winner will be presented the award during the Awards Luncheon on Wednesday, October 18th.

Journal of Laser Applications (JLA) Best Paper Award

Excellence in Laser Applications Research

The Journal of Laser Applications Best Paper Award is given annually in recognition of outstanding laser applications research to the primary author of a selected paper published in the journal in the preceding three years. Each Editor nominates a single paper in their topical area for consideration by the full Editorial team based on the quality and significance of the work.

The winning author receives free registration to ICALEO and a Crystal Award.

Winner will be presented the award during the Awards Luncheon on Wednesday, October 18th.

Poster Award Contest

Recognizing Poster Presentation

This longstanding ICALEO showcase draws a crowd and inspires plenty of discussion. Join presenters as they answer your questions during the Exhibitor Reception on Tuesday where posters will be displayed. Check the ICALEO proceedings for accompanying manuscripts from presenters who submit them for publication. Posters will be available for viewing throughout the conference and will also be judged by a panel.

Prize winners will be announced during the Closing Plenary Session on Wednesday, October 18th.

Student Paper Award Contest

Recognizing Student Excellence

Not only does the student paper contest illuminate the great work of up-and-coming researchers, but cash awards will be presented to the first-, second- and third-place winners in each contest. Student papers accepted for competition will be judged by an international panel based on originality of topic/material presented, scientific and technical merit, and presentation quality.

Prize winners will be announced during the Closing Plenary Session on Wednesday, October 18th.

To view deadlines and nomination forms, please visit www.icaleo.org/industry-awards.

Laser Materials Macroprocessing

Laser macroprocessing of materials is required to fulfill todays manufacturing demands for a wide variety of applications. Attendees can expect a diverse range of sessions, including welding of mixed materials, plastic material processing, cutting of metals, and groundbreaking process monitoring techniques. Gain insights from industry experts, witness innovative advancements, and explore the latest trends in research. So, join us for a captivating exploration of innovative laser applications!

Track Co-Chairs

Verena Wippo
Laser Zentrum Hannover

Michael Schmidt
Bayerisches Laserzentrum

Sessions at a Glance

Monday
Macro 1: Welding and Joining 1
Macro 2: Welding and Joining 2
Macro 3: Welding: From Modeling to Applications

Tuesday
Macro 4: Advancements in Surface Engineering 1
Macro 5: Laser Processing of Plastics
Macro 6: Welding and Joining 3

Wednesday
Macro 7: Advancements in Surface Engineering 2
Macro 8: Welding of Aluminium
Macro 9: Advancements and Challenges in Laser Cutting

MONDAY, OCTOBER 16

Session Title	Chair	Time
MACRO 1: WELDING AND JOINING 1	**JAY OSWALD**	**11:00AM**

1. Laser Welding of Metal Ceramic Substrates for Power Electronics at 515 nm Wavelength - *Moritz Moeller, TRUMPF GmbH*

*2. Understanding the Coaxial Optical Coherence Tomography Signal During the Laser Welding of Hidden T-Joints - *Thorsten Mattulat, BIAS - Bremer Institut für angewandte Strahltechnik GmbH*

*3. The Influence of the Spatial Laser Energy Absorption on the Molten Pool Dynamics in High-Power Laser Beam Welding - *Xiangmeng Meng, Bundesanstalt für Materialforschung und -prüfung*

*4. Using Fiber or Rod? - The Influence of Different Filler Materials during CO_2 Laser Welding of Quartz Glass - *Michael Desens, Laser Zentrum Hannover e. V.*

Session Title	Chair	Time
MACRO 2: WELDING AND JOINING 2	**VERENA WIPPO**	**2:00 PM**

*1. Blue Diode Lasers – Evaluation of Capillary and Melt Pool Dynamics - *Luisa-Marie Heine, Laserline GmbH*

*2. Studies on Welding of Thin Stainless Steel Sheets With Pulsed Nano-Second Fiber Lasers in Butt Joint Configuration - *Aniruddha Kumar, Bhabha Atomic Research Centre*

*3. Fatigue behaviour of 8 mm thick steel butt joints performed with Hybrid Laser Arc Welding - *Jose M Sanchez-Amaya, Universidad de Cadiz*

4. Topology Optimized Lightweight Design through Additive Manufacturing: Laser Wire Deposition of a Train Side Wall Structure - *Holger Alder, Photon Laser Manufacturing GmbH*

Program subject to change.
* Denotes peer-reviewed paper.

Session Title	Chair	Time
MACRO 3: WELDING: FROM MODELING TO APPLICATIONS	**YUEWEI AI**	**4:00 PM**

*1. Challenges in Dynamic Heat Source Modeling in High-Power Laser Beam Welding - *Marcel Bachmann, Bundesanstalt für Materialforschung und -prüfung*

*2. Numerical Analysis of The Effect of The Oscillating Metal Vapor Plume on The Keyhole and The Molten Pool Behavior During Deep Penetration Laser Beam Welding - *Chunliang Yang, Bundesanstalt für Materialforschung und -prüfung*

*3. Numerical Analysis of The Effect of The Vapor Plume on The Keyhole and The Molten Pool Behavior During Deep Penetration Laser Beam Welding - *Fan Yang, Bundesanstalt für Materialforschung und -prüfung*

*4. New Possibilities for Laser Welding of Highly Loaded Transmission Components by Strategic Use of Simulation Methods - *Markus Wagner, Fraunhofer IWS*

TUESDAY, OCTOBER 17

Session Title	Chair	Time
MACRO 4: ADVANCEMENTS IN SURFACE ENGINEERING 1	**ALEXANDER KAPLAN**	**8:30AM**

1. Laser Processing with Picosecond and Femtosecond at 150W - *Tony S Lee, Coherent USA*

*2. Surface Wettability Patterning of Metal Additive Manufactured Parts via Laser-Assisted Functionalization - *Hongtao Ding, University of Iowa*

3. Application of the ABA Cladding Technique to a Wire Based Laser Cladding Process - *Laura Budde, Laser Zentrum Hannover e.V.*

*4. Effect of Wobble Parameters on Micro-Welding Bead Formation of AISI 316L Stainless Steel - *Milton Pereira, Federal University of Santa Catarina*

Session Title	Chair	Time
MACRO 5: LASER PROCESSING OF PLASTICS	**MONA NADERI**	**10:20 AM**

*1. Does the Color Really Matter? New Approach to Laser Transmission Welding for Design and Repair - *Julian Kuklik, Laser Zentrum Hannover e.V.*

*2. Experimental Evaluation of PMMA-ABS Transmission Welding Using Mold-Integrated Simultaneous Laser Welding Technology - *Woo-In Choo, Sogang University*

3. Laser Cutting of Semi-finished CFRTP Products for Better Resource Efficiency - *Hagen Dittmar, Laser Zentrum Hannover e.V.*

Session Title	Chair	Time
MACRO 6: WELDING AND JOINING 3	**LAURA BUDDE**	**3:20 PM**

*1. Welding of 20 mm Thick EH40 Steel by Means of a Single-pass Hybrid Laser-arc Welding Technique - *Simone Peli, Castellini Officine Meccaniche*

2. Mechanism-guided Approach for Porosity Reduction in Laser Welding of Thick Aluminum Sheets - *Jay Oswald, Arizona State University*

WEDNESDAY, OCTOBER 18

Session Title	Chair	Time
MACRO 7: ADVANCEMENTS IN SURFACE ENGINEERING 1	**HONGTAO DING**	**8:30AM**

1. Laser Generated Drops – Towards a Method Variant for Extended Surface Tension Measurement of Metals - *Alexander F H Kaplan, Luleå University of Technology*

*2. Texturing Skin-Pass Rolls by High-Speed Laser Melt Injection, Laser Ablation and Electrolytic Etching - *Philipp Warneke, BIAS - Bremer Institut für angewandte Strahltechnik GmbH*

*4. Enhancing Control of Air Bubbles in Water Flows through Laser-based Surface Wettability Patterning - *Hongtao Ding, University of Iowa*

Session Title	Chair	Time
MACRO 8: WELDING OF ALUMINIUM	**CHUNLIANG YANG**	**10:20 AM**

*1. Elucidating the Role of Molten Pool Shape in Preventing Solidification Cracking in Laser Welding Aluminium Alloys - *Venkat Vivek Pamarrthi, University of Warwick*

*2. Improving the Properties of Laser Beam Welded Thick Dissimilar Joints of Steel and Aluminum by Using Filler Material - *Oliver Seffer, Laser Zentrum Hannover e.V.*

*3. The Investigation of Molten Pool Characteristics in the High Speed Laser Welding of Aluminium Alloy by Numerical Simulation - *Yuewei Ai, Central South University*

Session Title	Chair	Time
MACRO 9: ADVANCEMENTS AND CHALLENGES IN LASER CUTTING	**MICHAEL SCHMIDT**	**1:30 PM**

*1. Laser Fusion Cutting: The Missing Link between Gas Dynamics and Cut Edge Topography - *Madlen Borkmann, Fraunhofer Institute for Material and Beam Technology IWS*

*2. Laser Cutting of Ceramic Matrix Composites - *Sundar Marimuthu, The Manufacturing Technology Centre*

*3. Reducing Environmental Risks in Laser Cutting: A Study of Low-Pressure Gas Dynamics - *Lewis C R Jones, Loughborough University*

*4. Numerical and Experimental Investigation of the Melt Removal Mechanism and Burr Formation during Laser Cutting of Metals - *Stoyan Stoyanov, Fraunhofer Institute for Laser Technology ILT*

*5. An Approach Towards the Application of Mobile Robots in Laser Materials Processing - *Thomas Kaster, RWTH Aachen University*

Laser Materials Microprocessing

The laser materials micro processing track features a variety of applications and innovative equipment for materials processing on the microscale with a strong focus on Ultrashort Pulsed Lasers. The sessions gather the latest and greatest advancements in their respective fields “Surface processing”, “Glass”, “Microelectronics”, and “Diagnostics and Modeling”, presented by world-leading companies and research organizations.

Track Co-Chairs

Jack Gabzdyl
TRUMPF

Rainer Kling
Alphanov

Andres Lasagni
Technische Universität Dresden / Fraunhofer IWS

Sessions at a Glance

Monday

Micro 1: Surface Functionalization and Ablation 1
Micro 2: Surface Functionalization and Ablation 2
Micro 3: Advanced Processing, Monitoring and Simulation 1

Tuesday

Micro 4: Advanced Processing, Monitoring and Simulation 2
Micro 5: Transparent Materials Processing
Micro 6: Microelectronics 1

Wednesday

Micro 7: Microelectronics 2

MONDAY, OCTOBER 16

Session Title	Chair	Time
MICRO 1: SURFACE FUNCTIONALIZATION AND ABLATION 1	**ANDRÉS LASAGNI**	**11:00AM**

1. Large Area Femtosecond Laser Surface Texturing for Improved Aerodynamic Performances - *Eric Mottay, Amplitude Laser Systems*

*2. Effect of Femtosecond Laser Textured Surface Morphology on the Icephobic Characteristics of Aluminum - *Balasubramanian Nagarajan, KU Leuven*

3. Novel 2D Periodic Surface Structures Fabricated by Femtosecond Laser Pulses with GHz Burst Mode - *Shota Kawabata, Tokyo University of Agriculture and Technology*

*4. Evaluation of Surface Tortuosity on the Corrosion Resistance of Organic Coatings Using Laser Textured Surfaces - *Milton Pereira, Federal University of Santa Catarina*

Session Title	Chair	Time
MICRO 2: SURFACE FUNCTIONALIZATION AND ABLATION 2	**JACK GABZDYL**	**2:00 PM**

1. The Influence of Ambient Atmosphere on LIPSS Formation in Stainless Steel: a Comparison between ps- and ns-Pulse Processing - *Peter Grergorcic, University of Ljubljana*

*2. Investigation of ns Single-Point Laser Ablation of Bronze under Different Incidence Angles and Pulses - *Esmaeil Ghadiri Zahrani, University of Freiburg*

3. GHz Long Burst for Femtosecond Laser Processing Optimization - *Eric Mottay, Amplitude Laser Systems*

4. Tackling Micro-processing Challenges with Beam Shaping - *Gwenn Pallier, Cailabs*

Program subject to change.
* Denotes peer-reviewed paper.

Session Title	Chair	Time
MICRO 3: ADVANCED PROCESSING, MONITORING AND SIMULATION 1	**EVANGELOS SKOULAS**	**4:00 PM**

1. Sensing Sound and Light for Monitoring Laser Microfabrication Processes - *Andres F Lasagni, Technische Universität Dresden*

2. Application of Closed-loop Controlled Laser Ablation for High Quality Processing - *Volkher Onuseit, University of Stuttgart, Institut fuer Strahlwerkzeuge IFSW*

*3. Material Removal in Laser Chemical Processing With Modulated Laser Power - *Yasmine Bouraoui, BIAS - Bremer Institut für angewandte Strahltechnik GmbH*

*4. Realization of an Ultrashort Pulsed Laser Robot System: Characterization, Limits and Application - *Daniel Franz, University of Applied Sciences Aschaffenburg*

TUESDAY, OCTOBER 17

Session Title	Chair	Time
MICRO 4: ADVANCED PROCESSING, MONITORING AND SIMULATION 2	**STEVEN KIDD**	**8:30AM**

*1. Revolutionize the Machining Process of Micro Components With Laser Technology – Case Studies - *Mark Keirstead, GF Machining Solutions LLC*

2. Advanced Synchronization of Optical and Mechanical Axis for Laser Engraving of Complex Design - *Paul Hervier, LASEA SA*

3. Laser Processing Macro Size Components with Sub-Micrometer Feature Size & Precision - *Bryan Germann, Aerotech*

*4. FEM Simulation and Experimental Correlation of Laser Micro Spot Welding with Top Hat Power Distribution for Conduction and Keyhole Regimes - *Luis Cedeño-Viveros, Institute of Advanced Materials for Sustainable Manufacturing (IAMSM)*

Session Title	Chair	Time
MICRO 5: TRANSPARENT MATERIALS PROCESSING	**RAINER KLING**	**10:20 AM**

1. Cutting High-Index of Refraction AR Glass with Tailored ps IR Pulse Bursts and Surface-Proximal Slit-Apertured Bessel Beams - *Jim Bovatsek, MKS Instruments Spectra-Physics*

2. Femtosecond Laser Processing of Ultra-Thin Glass and Polymers - *Bogusz Stepak, Fluence*

*3. Ultra-Short Pulse (USP) Laser Processing of Single Crystalline Diamonds (SCD) for Tooling Applications - *Kiran Michael, Institute of Machine Tools and Manufacturing (IWF), ETH Zurich*

Session Title	Chair	Time
MICRO 6: MICROELECTRONICS 1	**BEAT NEUENSCHWANDER**	**3:20 PM**

1. Selective Laser Ablation of Transition Metal Oxide Thin Films for SHJ Solar Cells - *Carlos Molpeceres, Centro Láser. Universidad Politécnica de Madrid (UPM)*

2. Surface Slotting on Thermal Barrier Coating with Ultrashort Pulse Laser for Aerospace Applications - *Hongqiang Chen, GE Research*

*3. Pulsed UV Laser-Assisted Doping of Semi-insulating 4H-SiC Substrates for MWIR Detector - *Chandraika (John) Sugrim, University of Central Florida*

WEDNESDAY, OCTOBER 18

Session Title	Chair	Time
MICRO 7: MICROELECTRONICS 2	**CARLOS MOLPERCERES**	**8:30AM**

*1. Exploring Laser Annealing as an Alternative Approach to Improve CZTS Thin Film Quality for Photovoltaic Cells - *Lewis C R Jones, Loughborough University*

*2. Acceleration of Femtosecond Reductive Laser Sintering of Copper(II) Oxide for Conductive Copper Patterns on Cyclic Olefin Copolymers - *Kay Bischoff, University of Applied Sciences Aschaffenburg*

3. Application of Ultrafast Laser Dicing in the Semiconductor Packaging Process - *Yung C Shin, Purdue University*

4. Direct Laser Writing of Highly Conductive Copper Micropatterns from Deep Eutectic Solvents - *Ilya I Tumkin, Ruhr-Universität Bochum*

Laser Additive Manufacturing

With new suppliers and devices entering the market, and a greater range of materials and material suppliers, Laser Additive Manufacturing is one of the highest growth areas within manufacturing globally. The Laser Additive Manufacturing track shines a spotlight on the latest techniques in additive manufacturing—covering technology, digital twins, materials, processes and applications. Don't miss out!

Track Co-Chairs

Milan Brandt
RMIT Centre for Additive Manufacturing

Thierry Marchione
Caterpillar

Sessions at a Glance

Monday
LAM 1: DEDAM Process and Materials 1
LAM 2: DEDAM Process and Materials 2
LAM 3: DEDAM Process and Materials 3

Tuesday
LAM 4: DEDAM Process and Materials 4
LAM 5: DEDAM Process and Materials 5
LAM 6: PBFAM Process and Materials 1

Wednesday
LAM 7: PBFAM Process and Materials 2
LAM 8: PBFAM Process and Materials 3
LAM 9: PBFAM Process and Materials 4

MONDAY, OCTOBER 16

Session Title	Chair	Time
LAM 1: DEDAM PROCESS AND MATERIALS 1	**THIERRY MARCHIONE**	**11:00AM**

1.Light Valve Technology for Rapid, High Resolution 3D Area Printing - *Selim Elhadj, Seurat Technologies*

*2. Process Development and Process Parameter Guidelines for Thin Wall Deposition with IN718 using Extreme High Speed Laser Material Deposition (EHLA 3D) - *Min-Uh Ko, Fraunhofer Institute for Lasertechnology ILT*

*3. Adaptive Powder Nozzle Setting for Enhanced Efficiency in Laser Metal Deposition - *Annika Bohlen, BIAS - Bremer Institut für angewandte Strahltechnik GmbH*

*4. The Melt Pool Dynamics on Different Substrate Materials in High-speed Laser Directed Energy Deposition Process - *Milan Brandt, RMIT University*

Session Title	Chair	Time
LAM 2: DEDAM PROCESS AND MATERIALS 2	**CHRISTOPH LEYENS**	**2:00 PM**

*1. Grain Size Manipulation by Wire Laser Direct Energy Deposition of 316L with Ultrasonic Assistance - *Jacob Mätje, Fraunhofer Institute for Material and Beam Technology IWS*

*2. Tailoring Material Properties of Duplex Stainless Steel by DED-LB/M and In-situ Alloying with Elemental Powders - *Andreas Maier, Bayerisches Laserzentrum GmbH*

*4. Influence of Post-processing Heat-treatment on the Mechanical Performance of AISI 410L Stainless Steel Manufactured by L-DED Process - *Milton Pereira, Federal University of Santa Catarina*

Program subject to change.
* Denotes peer-reviewed paper.

Session Title	Chair	Time
LAM 3: DEDAM PROCESS AND MATERIALS 3	**TED REUTZEL**	**4:00 PM**

*1. Characterization of Optical Emissions During Laser Metal Deposition for the Implementation of an In-Process Powder Stream Monitoring - *Philipp Hildinger, BIAS - Bremer Institut für angewandte Strahltechnik GmbH*

*2. Monitoring the Degree of Dilution During Directed Energy Deposition of Aluminium Bronze and H13 Tool Steel Using Optical Emission Spectroscopy - *Malte Schmidt, Jade University of Applied Sciences*

*3. Comparison and Analysis of Hyperspectral Temperature Data in Directed Energy Deposition - *Jorge Sanchez-Medina, Vrije Universiteit Brussel*

4. In-Situ Monitoring and Intermittent Controller for Adaptive Trajectory Generation During Laser-Directed Energy Deposition via Powder Feeding - *Farzaneh Kaji, University of Waterloo*

TUESDAY, OCTOBER 17

Session Title	Chair	Time
LAM 4: DEDAM PROCESS AND MATERIALS 4	**JANA KELBASSA**	**8:30AM**

*1. Latest Developments in Coaxial Multi-Wire High-Power Laser Cladding - *Frank Brückner, Fraunhofer Institute for Material and Beam Technology IWS*

2. Manufacturing of Large-scaled Components by Digital-Assisted Directed Energy Deposition - *Frank Brückner, Fraunhofer Institute for Material and Beam Technology IWS*

*3. Welding Between Confinements as a New Approach for High Deposition Rate Additive Manufacturing with Laser-Assisted Double Wire Welding With Non-transferred Arc - *Kai Biester, Laser Zentrum Hannover e.V.*

4. A Comparison of Wire-Laser and Wire-Arc Directed Energy Deposition Processes - *Nick Bagshaw, Fortius Metals Inc.*

Session Title	Chair	Time
LAM 5: DEDAM PROCESS AND MATERIALS 5	**DONGDONG GU**	**10:20 AM**

*1. Development of a Laser Preheating Concept for Directed Energy Deposition - *Fabian Bieg*

2. Laser Cladding (DED); A High-Speed-Imaging Examination of Powder Catchment Efficiency as a Function of Melt Pool Geometry - *John Powell, University of Nottingham*

3. Effects of Holding Temperature During Induction Heating-Assisted Laser-Directed Energy Deposition of Inconel 718 - *Junmyoung Jang, Hanyang University*

Session Title	Chair	Time
LAM 6: PBFAM PROCESS AND MATERIALS 1	**STEFAN KAIERLE**	**3:20 PM**

*1. Process Qualification, Additive Manufacturing, and Post Processing of a Hydrogen Peroxide / Kerosene Aerospike Breadboard Engine - *Samira Gruber, Fraunhofer Institute for Material and Beam Technology IWS*

*2. Powder Degradation as a Consequence of Laser Interaction: A Study of SS 316L Powder Reuse on the Laser Directed Energy Deposition (L-DED) Process - *Milton Pereira, Federal University of Santa Catarina*

*3. Development and Assessment of a Methdology for Abstraction of Topology Optimization Results to Enable the Substitution of Optimized Beams - *Tim Röver, Hamburg University of Technology*

WEDNESDAY, OCTOBER 18

Session Title	Chair	Time
LAM 7: PBFAM PROCESS AND MATERIALS 2	**CLAUS EMMELMANN**	**8:30AM**

1. Novel Multi-Material Lattice Structures Fabricated via Laser-Powder Bed Fusion Process - *Vito Errico, Politecnico di Bari*

*2. On the Limitations of Small Cubes as Test Coupons for Process Parameter Optimization in Laser Powder Bed Fusion of Metals - *Gunther Mohr, Bundesanstalt für Materialforschung und -prüfung*

3. Influence of Notch Effect on the Processibility of High-Speed Steel HS6-5-3-8 by Laser Powder Bed Fusion - *Tim Gerrit Lücke, Fraunhofer ILT*

*4. Influence of Temperature and Beam Size on Weld Track Shape in Laser Powder Bed Fusion of Pure Copper Using Near-Infrared Laser System - *Alexander Bauch, Fraunhofer Research Institution for Additive Manufacturing Technologies IAPT*

Session Title	Chair	Time
LAM 8: PBFAM PROCESS AND MATERIALS 3	**PASCAL AUBRY**	**10:20AM**

*1. Design and Assessment of an Additively Manufactured Schwarz Diamond Triply Periodic Minimal Surface Fluid-Fluid Heat Exchanger - *Tim Röver, Hamburg University of Technology*

2. Physics-Based High-Fidelity Modeling of Metal Additive Manufacturing Considering the Vapor Plume Dynamics and Laser Attenuation - *Yung C Shin, Purdue University*

*3. Numerical Analysis of Free Surface Evolution of Molten Pool on Inclined Substrate in Wire Feeding Laser Additive Manufacturing - *Yiyuan Wang, Central South University*

Session Title	Chair	Time
LAM 9: PBFAM PROCESS AND MATERIALS 4	**MIHAELA VLASEA**	**1:30 PM**

*1. Process Development for Laser Powder Bed Fusion of GRCop-42 using a 515 nm Laser Source - *Samira Gruber, Fraunhofer Institute for Material and Beam Technology IWS*

2. Process Speed Increase in Laser Powder Bed Fusion Thanks to Beam Shaping with Multi-Plane Light Conversion - *Adeline Orieux, Cailabs*

*4. Measure and Assessment of Geometrical Complexity for Additive Manufacturing Processes - *Tobias Häfele, University of Applied Sciences Saarbrücken*

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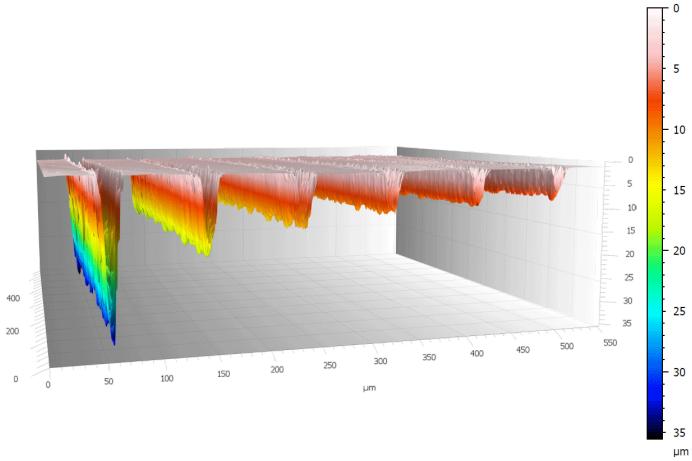

OCT 16TH 11 AM
ERIC MOTTAY
PRESENTS

"LARGE AREA FEMTOSECOND LASER SURFACE TEXTURING FOR IMPROVED AERODYNAMIC PERFORMANCES"

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Laser in Battery Manufacturing

The increasing global demand for high-performance, low-cost mass production of batteries calls for laser technologies in battery cell and systems production. In three focus areas - joining, cutting and surface functionalization - the Battery track will highlight the latest developments in academic research and industrial applications, including process optimization, optimized laser energy input, process control and scientific process understanding. Get inspired!

Track Chair

Christoph Leyens
Fraunhofer Institute for Material and Beam Technology IWS

Sessions at a Glance

Monday
Battery 1: Lasers in Battery Manufacturing
Battery 2: Battery Manufacturing and Joining
Battery 3: Laser Welding 1

Tuesday
Battery 4: Laser Welding 2
Battery 5: Cutting
Battery 6: Surface Texturing

Wednesday
Battery 7: Battery Processing and Lasers

MONDAY, OCTOBER 16

Session Title	Chair	Time
BATTERY 1: LASERS IN BATTERY MANUFACTURING	**CHRISTOPH LEYENS**	**11:00AM**

*1. Trends in Laser Applications in EV Battery Manufacturing - *Ralf Kimmel, TRUMPF Laser- und Systemtechnik*

*2. Laser Beam Welding of Thin Copper Wire and Thick Copper Busbar for the Application of E-motor Assembly - *Tianzhu Sun, University of Warwick*

3. High-Speed X-ray Imaging of Pore and Spatter Formation During Welding of Copper Pins - *Eveline N Reinheimer, University of Stuttgart, IFSW*

Session Title	Chair	Time
BATTERY 2: BATTERY MANUFACTURING AND JOINING	**ANDREAS WETZIG**	**2:00 PM**

*1. Ultrashort Pulsed Lasers and New Laser Wavelengths for Improved Battery Manufacturing - *Arnold Gillner, Fraunhofer Institute for Laser Technology*

*2. Effect of In-source Beam Shaping and Laser Beam Oscillation on the Electro-Mechanical Properties of Ni-plated Steel Joints for E-vehicle Battery Manufacturing - *Leonardo Caprio, Politecnico di Milano*

3. Laser Welding of E-mobility Materials for Electric Vehicle Battery Applications – The Challenges and the Latest Developments in Laser Technology

*4. Laser Seam Welding of Copper and Aluminium Thin Sheets by Pulsed Nano-Second Fiber Laser - *Aniruddha Kumar, Bhabha Atomic Research Centre*

Program subject to change.
* Denotes peer-reviewed paper.

Session Title	Chair	Time
BATTERY 3: LASER WELDING 1	**ARNOLD GILLNER**	**4:00 PM**

1. Novel Laser Stripping and Cleaning Approach to Enhance Laser Welding Quality of Electric Motor Hairpins - *JP Lavoie, Coherent*

2. Systematics for Increasing the Robustness of the Welding Process of Electric Drive Copper Hairpin Windings - *Matthias Branek, TRUMPF Laser- und Systemtechnik GmbH*

*3. Effects of Beam Shaping on the Weldability of Aluminium to Ni-coated Steel in Electric Vehicle Battery Applications - *Sharhid Jabar, University of Warwick*

TUESDAY, OCTOBER 17

Session Title	Chair	Time
BATTERY 4: LASER WELDING 2	**J. P. LAVOIE**	**8:30AM**

1. E-mobility Laser Welding Thanks to Beam-Shaping Based on Multi-Plane Light Conversion - *Adelline Orieux, Cailabs*

*2. Investigations on Laser Beam Welding of Thin Aluminum Foils with Additional Filler Wire - *Sarah Nothdurft, Laser Zentrum Hannover e.V.*

*3. Comparison of Melting Efficiency Between Blue, Green, and IR Lasers in Pure Copper Welding - *Yuji Sato, Osaka university*

4. Laser Welding without Filler Material of Aluminum Die-cast and Extruded Profiles for Battery Trays - *Axel Jahn, Fraunhofer Institute for Material and Beam Technology IWS*

Session Title	Chair	Time
BATTERY 5: CUTTING	**ANDREAS WETZIG**	**10:20 AM**

1. Battery Foil Cutting – Should You Use ns or ps Laser Sources? - *Jack Gabzdyl, TRUMPF Laser UK Ltd*

*2. High Speed Laser Cutting of Ultra-thin Metal Foils for Battery Cell Production - *Alessandro Ascari, University of Bologna*

Session Title	Chair	Time
BATTERY 6: SURFACE TEXTURING	**ANDRÉS LASAGNI**	**3:20 PM**

1. Ultra-fast Laser Texturing of Solid-state Electrolytes for Li-metal Batteries - *Deliang Guo, National Research Council Canada*

3. Optimizied Contact Resistance at Bolted Copper Busbars by Means of Ns-Laser Surface Treatment - *Mauritz Moeller, TRUMPF Laser- und Systemtechnik GmbH*

WEDNESDAY, OCTOBER 18

Session Title	Chair	Time
BATTERY 7: BATTERY PROCESSING AND LASERS	**GWEN PALLIER**	**8:30AM**

1. Processing Future Generation of Battery Electrodes with Advanced Laser and Coating Technologies - *Christoph Leyens, Fraunhofer Institute for Material and Beam Technology IWS*

2. Latest Application Developments Across EV-Industries with Overlaying Highly Brilliant Laser Beams of the Next Generation - *Oliver Bocksrocker, TRUMPF Laser- und Systemtechnik GmbH*

*3. Fundamental Study on High-quality Welding of Copper and Aluminum by Angled and Superposed Irradiation of Blue and Near-infrared Lasers - *Yuki Yamada, Okayama University*

*4. Inline Failure Detection in Laser Beam Welding of Battery Cells: Acoustic and Spectral Emission Analysis for Quality Control - *Johannes Heilmeier, F & K Delvotec Bondtechnik GmbH*

Beam Shaping for Laser Materials Processing

Beam-Shaping is becoming more and more important to laser material processing: for the scaling up of micro processing; for the speed increase in Laser-Powder Bed Fusion; for the e-mobility market for Copper Welding and for battery foils texturing; etc. The beam-shaping track will discuss the many solutions being developed inside the laser (double-core fiber lasers, coherent combining lasers...), and as external optics (DOE, SLM, MPLC...).

Track Co-Chairs

Dr. Alexander Olowinsky
Fraunhofer ILT

Gwenn Pallier
Cailabs

Sessions at a Glance

Tuesday

Beam 4: Improving Laser Beam Welding with Beam Shaping

Beam 5: Novel Technics in Beam-Shaping

Beam 6: Beam Shaping Applied to Novel Processes

Wednesday

Beam 7: Improving Laser Cutting with Beam Shaping

Beam 8: Improving Micro-Processing with Beam Shaping

Beam 9: Numerical Simulations Applied to Laser Processes with Beam Shaping

TUESDAY, OCTOBER 17

Session Title
BEAM 4: IMPROVING LASER BEAM WELDING WITH BEAM SHAPING

Chair
MARKUS KOGEL-HOLLACHER

Time
8:30AM

1. TBD - *TBD*

*2. Welding of Cast Aluminum Alloys for Power Electronics: In-Situ Synchrotron X-Ray Analysis of Different Laser Beam Shaping Technologies for the Prevention of Defects - *Mauritz Möller, TRUMPF Laser- und Systemtechnik GmbH*

*3. Laser Beam Welding of Brass with Combined Core and Ring Beam - *Daniel Maiwald, Laser Zentrum Hannover e.V.*

4. Fast Beam Oscillations Improve Laser Material Processing - *Jens Möller, Fraunhofer IWS*

Session Title
BEAM 5: NOVEL TECHNICS IN BEAM SHAPING

Chair
ALEXANDER OLOWINSKY

Time
10:20 AM

1. Temporal and Spatial Beam-shaping for Innovative Femtosecond Laser Microprocessing of Dielectrics - *Inka Manek-Hönninger, Université de Bordeaux (CELIA)*

2. Strategies for Reducing the Thermally Induced Focus-Shift in High Power Laser Cutting - *Markus Kogel-Hollacher, Precitec GmbH & Co. KG*

3. Validation of a Multi-spot M2 Measurement to the ISO 11146-1 - *Michael Scaggs, Haas Laser Technologies, Inc.*

Session Title	Chair	Time
BEAM 6: BEAM SHAPING APPLIED TO NOVEL PROCESSES	**ADELINE ORIEUX**	**4:00 PM**

1. Flexible and Highly Dynamic Beam Shaping Technologies for Additive Manufacturing - *Katrin Wudy, Technical University of Munich*

*2. Influence of Ring-shaped Beam Profiles on Spatter Characteristics in Laser-based Powder Bed Fusion of Metals - *Jonas Grünewald, Technical University of Munich*

*3. Analysis of Temperature Field in the Laser Cleaning Process of Curved Surface by Numerical Simulation - *Guangyu Dong, Central South University*

WEDNESDAY, OCTOBER 18

Session Title	Chair	Time
BEAM 7: IMPROVING LASER CUTTING WITH BEAM SHAPING	**EVELINE REINHEIMER**	**8:30AM**

1. Influence of Beam Shaping on the Geometries of the Cutting Front and Kerf to Maximize the Speed of Laser Cutting - *Markus Kogel-Hollacher, Precitec GmbH & Co. KG*

*2. Cutting Thick Aluminium Plates Using Laser Fusion Cutting Enhanced by Dynamic Beam Shaping - *Masoud Kardan, KU Leuven*

*3. Fiber Laser Cutting of Steel Plate by Twin Spot Beam Setting in Scanning Direction - *Yasuhiro Okamoto, Okayama University*

Session Title	Chair	Time
BEAM 8: IMPROVING MICRO-PROCESSING WITH BEAM SHAPING	**INKA MANEK-HÖNNINGER**	**10:20 AM**

1. Laser Beam-Shaping in the Industry - *Anne Henrottin, LASEA*

2. Defining the Right Criteria to Characterize a Shaped Beam for Laser Material Processing Applications - *Gwenn Pallier, Cailabs*

3. Fast IR-thermal Tracking of Laser Microprocessing with Multi-focus Mirror - *Denys Moskal, University of West Bohemia*

Session Title	Chair	Time
BEAM 9: NUMERICAL SIMULATIONS APPLIED TO LASER PROCESSES WITH BEAM SHAPING	**GWENN PALLIER**	**1:30PM**

1. TBD - *Andreas Otto*

*2. Elucidating the Effect of Circular and Tailing Laser Beam Shapes on Keyhole Necking and Porosity Formation during Laser Beam Welding of Aluminium 1060 using a Multi-physics CFD Approach - *Qamar Hayat, WMG, University of Warwick*

*3. Numerical Analysis of the Effect of Energy Distribution on the Symmetry of Aluminum Alloy During Laser Scanning Welding - *Yachao Yan, Central South University*

*4. The Analysis of Microstructure Evolution in the Weld During Dual Beam Laser Welding of Aluminum Alloy Based on Numerical Calculation - *Shibo Han, Central South University*

*5. Numerical Investigation of Bead Width Improvement at Interface in the Oscillating Laser Stake Lap Welding of Dissimilar Materials - *Jiabao Liu, Central South University*

Frontiers in Laser Applications

The Frontier in Laser Applications (FLA) track explores recent, cutting-edge applications of lasers, highlighting innovation across research and industry. The track will host presentations from a variety of fields: ***Advanced Laser Printing***, ***Liquid-Assisted Laser Manufacturing***, ***Laser Manufactured Devices***, and ***Frontiers in Laser Processing***. The sessions under the Frontier in Laser Application track promise to bring diverse and unique perspectives from real-world applications across laser manufacturing.

Track Co-Chairs

Eric Mottay
Amplitude Laser Group

Jared Speltz
University of Dayton Research Institute

Dr. Jiyeon Choi
Korea Institute of Machinery and Materials

Sessions at a Glance

Monday

FLA 1: Frontiers in Laser Processing
FLA 2: Laser Manufactured Devices 1
FLA 3: Laser Manufactured Devices 2

Tuesday

FLA 4: Advanced Laser Printing

MONDAY, OCTOBER 16

Session Title	Chair	Time
FLA 1: FRONTIERS IN LASER PROCESSING	**JARED SPELTZ**	**11:00AM**

1. Infrared Online Diagnostics for Pulsed Laser Micro-Processing - *Jirí Martan, University of West Bohemia*

2. Advanced Laser-induced Micro & Nano Surface Structuring for Photonic Applications - *Evangelos Skoulas, Biomimetic P.C.*

*3. Structures Tailoring of Laser Textured Stainless Steel for Antibiofouling and Antibacterial Applications - *Christophe Arnaud, Solutions Novika*

4. Fiber Delivery of UV Nanosecond Lasers using Hollow-Core Fibers - *Julien Didierjean, BLOOM Lasers*

Session Title	Chair	Time
FLA 2: LASER MANUFACTURED DEVICES 1	**SANGHOON AHN**	**2:00 PM**

1. Laser Microfabrication for Ionic Propulsion Systems - *Brian Canfield, University of Tennessee Space Institute*

*2. Liquid Immersion Laser Micromachining Using Ionic Liquids - *John Allman, University of Tennessee Space Institute*

*3. Laser Doping of n-type 4H-SiC with Boron using Solution Precursor for MWIR Optical Properties - *Gunjan Kulkarni*

4. Study of Selective Laser Etching Process with Various Etchants - *Jong Hyeok Kim, Korea Institute of Machinery and Materials*

Program subject to change.
* Denotes peer-reviewed paper.

Session Title	Chair	Time
FLA 3: LASER MANUFACTURED DEVICES 2	**ERIC MOTTAY**	**4:00 PM**

1. All-Glass Miniature GHz Repetition Rate Femtosecond Laser Oscillator - *Antoine Delgoffe, Ecole Polytechnique Fédérale de Lausanne*

*2. Guiding and Lasing Comparison of Nd: YAG Waveguide Lasers by Femtosecond Laser Inscription at 515 and 1030 nm - *Jie Qiao, Rochester Institute of Technology*

*3. Rapid Response Textile Dyeing: A Laser-enabled Manufacturing Process - *Toby Williams, Loughborough University*

4. Mid-IR Waveguide Beamsplitters in IG2 glass by Ultrafast Laser Inscription - *Jie Qiao, Rochester Institute of Technology*

TUESDAY, OCTOBER 17

Session Title	Chair	Time
FLA 4: ADVANCED LASER PRINTING	**PETER GREGORCIC**	**8:30 AM**

1. TBD - *John Middendorf, Laser Fusion Solutions*

*2. Adjustable Material Transfer in the Flexographic Printing Process Using Laser-Induced Microstructured Printing Forms for the Production of Polymer Optical Waveguides - *Alexander Wienke, Laser Zentrum Hannover*

3. 3D Micro/Nanofludic Structures Made of Fluor Polymer CYTOP using Two-Photon Polymerized Molds for High-Resolution Bioimaging - *Kotaro Obata, RIKEN Center for Advanced Photonics (RAP)*

4. Laser Bioprinting Using BA-LIFT: From Single Cell Isolation to Tissue Engineering - *Carlos Molpeceres, Centro Láser. Universidad Politécnica de Madrid*

Artifical Intelligence in Laser Processing

The track "Artificial Intelligence in Laser Processing" at ICALEO 2023 explores the fusion of AI and laser manufacturing. Discover cutting-edge research on optimizing laser processes and enhancing manufacturing efficiency. Explore AI's diverse applications in parameter optimization, quality prediction, real-time process monitoring, and control. Join us to unlock the potential of AI-driven solutions revolutionizing laser materials processing, delivering unprecedented precision, productivity, and innovation.

Track Co-Chairs

Dr. Bo Gu
BOS Photonics

Andreas Michalowski
University of Stuttgart

Sessions at a Glance

Wednesday
AIL 7: Applications in Manufacturing 1
AIL 8: Applications in Manufacturing 2
AIL 9: Process Control

WEDNESDAY, OCTOBER 18

Session Title	Chair	Time
AIL 7: APPLICATIONS IN MANUFACTURING 1	**ANDREAS MICHALOWSKI**	**8:30AM**

1. AI in Laser Cutting - Insights Into Recent Achievements - *Titus Haas, Bystronic*

*2. Prediction of Clad Quality in Laser Metal Deposition Using Dissimilar Materials: Performance Comparison of Machine Learning-Based Approaches - *Pascal Paulus, Saarland University*

*3. Predictive Modeling of Lattice Structure Design for 316L Stainless Steel using Machine Learning in the L-PBF Process - *Karim Asami, Hamburg University of Technology*

*4. Data-Driven Density Prediction of AlSi10Mg Parts Produced by Laser Powder Bed Fusion using Machine Learning and Finite Element Simulation - *Bastian Bossen, Hamburg University of Technology*

Session Title	Chair	Time
AIL 8: APPLICATIONS IN MANUFACTURING 2	**JENO SZEP**	**10:20 AM**

1. Optimizing the Ultra-short-Pulsed Laser Machining of Silicon and Germanium with Machine Learning for Highest Throughput and Quality - *Beat Neuenschwander, Bern University of Applied Sciences / Institute for Applied Laser, Photonics and Surface technologies*

3. Prediction of Hardness and Phase Distributions in Laser Heat Treatment of AH36 Steel Using Deep Learning - *Myeonggyun Son, Ulsan National Institue of Science and Technoloy*

Session Title	Chair	Time
AIL 9: PROCESS CONTROL	**BO GU**	**1:30 PM**

1. Real-Time Laser-Beam Absorptance Monitoring in Laser Welding Using Ai-Based Keyhole Reconstruction and Regression - *Kimoon Nam, Ulsan National Institute of Science and Technology*

2. Making the Virtually Invisible Visible - Sophisticated AI Models Based on Seamless In-Process Information Enable More Product Safety - *Markus Kogel-Hollacher, Precitec GmbH & Co. KG*

4. AI-Based Process Control for Laser Manufacturing Processes using Multi-sensor Conceptions - *Axel Jahn, Fraunhofer IWS*

*5. PRDevelopment and Comparison of Different Algorithms for Beam Stabilization in Ultrashort Pulsed Lasers Equipped to a 6-axis Robot - *Yongting Yang, University of Applied Sciences Aschaffenburg*

Student Papers and Posters

Each year, ICALEO encourage students from diverse academic backgrounds and institutions around the world to submit their work and be considered for the Student Paper Awards or Poster Presenter Awards. The bright young minds that participate have their work displayed during the conference, illuminating the great work of up-and-coming researchers and celebrating the brilliance and ingenuity of the next generation of laser pioneers.

Student Paper Organizing Chair

Dr. Markus Kogel-Hollacher
Precitec

Poster Submission Organizing Chair

JP Lavoie
Coherent

Poster Showcase - This longstanding ICALEO showcase draws a crowd and inspires plenty of discussion. Join presenters as they answer your questions during the first hour of the Exhibitor Reception on Tuesday where posters will be displayed. Check the ICALEO proceedings for accompanying manuscripts from presenters who submit them for publication. Posters will be available for viewing throughout the conference and will also be judged by a panel.

LASER MATERIALS MACROPROCESSING POSTERS

*Elucidation of Spatter Generation Mechanism in Keyhole Welding of Stainless Steel with 16 kW Disk Laser by In-situ Observation of Welding Dynamics - *Yoshiaki Kurita, Osaka University*

*Influence of Material Thickness and Laser Focus Position on Laser Cutting of Epoxy Mold Composites - *Jannis Kohl, Friedrich-Alexander Universität Erlangen-Nürnberg*

Finite Element Analysis and calibration of a Directed Energy Deposition process by thermocouples - *Knut Partes, Jade University of Applied Sciences*

Microstructure and performance of laser cladding high-performance repaired materials on U75V cross wing rails - *Beibei Zhu, Huazhong University of Science and Technology*

Effects of Cr content on microstructure and properties of single-pass laser-arc hybrid welded stainless clad steel plate - *Jiaming Cao, Huazhong University of Science and Technology*

*Processability of Thin-Powdered Inconel X750 and TiC Metal Matrix Composite by Laser-Directed Energy Deposition - *Milton Pereira, Federal University of Santa Catarina*

*The Influence of Laser Welding Parameters on the Springback of DP600 High-Strength Steel Thin Sheets - *Milton Pereira, Federal University of Santa Catarina*

*A New Thermal Solver for Mitigating Surface Temperature Instability Induced by Laser-Induced Heating - *Kaushik Iyer, Johns Hopkins University Applied Physics Laboratory*

*Comparison of surface integrity for Tungsten plate with CW and ultra short pulse laser - *Yuji Sato, Osaka University*

Program subject to change.
* Denotes peer-reviewed paper.

LASER MATERIALS MICROPROCESSING POSTERS

UV picosecond laser drilling of ABF material for printed circuit boards using laser burst mode and beam shaping - *Daniel Franz, University of Applied Sciences Aschaffenburg*

UV-femtosecond-laser structuring of silicon carbide - *Kay Bischoff, University of Applied Sciences Aschaffenburg*

*UV-ultrashort pulsed laser ablation of fused silica - *Yongting Yang, University of Applied Sciences Aschaffenburg*

Resonant mirror based Laser Direct Lithography - *Won Seok Chang, Korea Institute of Machinery and Materials*

Water and oil wettability customization by tailoring microstructured polymers - *Andres Lasagni, Technische Universität Dresden, Fraunhofer IWS*

Dopant Activation Annealing by of Si Using CW Laser of 532 nm - *Joonghan Shin, Kongju National University*

*Influence of process parameters on kerf width of nitinol stents manufactured by fiber laser cutting - *Luis Cedeño-Viveros Tecnologico de Monterrey*

Analysis of Flat-Top Nanosecond Green Laser Annealing Process for Semiconductor Si Wafers - *Nam Seong Kim, Laserssel Co., Ltd.*

*Surface morphology and ablation threshold of titanium in air and water irradiated by Nd:YAG laser - *Seki*

*Formation of Periodic Structure on SUS430 Irradiated by Nano Second Pulsed Laser and its Functionality of Antibacterial Effect - *Mikuru Okazaki, Tokai University*

Experimental Investigation of ns Laser Dressing Process of Metal-Bond Grinding Tools - *Esmaeil Ghadiri*

LASER ADDITIVE MANUFACTURING POSTERS

*Exploring the Influence of Hot-Wire Power Density on Wire Melting Behavior in Laser Directed Energy Deposition (L-Ded) - *Milton Pereira, Federal University of Santa Catarina*

In-situ Process Monitoring of Directed Energy Deposition Powder Flow to Detect Anomalies - *Sheila Moroney, Applied Research Lab, Penn State*

*Experimental evaluation of WC-Co alloy layer formation process by multi beam type laser metal deposition with blue diode lasers - *Kosei Yamamoto, Osaka University*

A Novel Scanning Strategy Considering Forming Quality and Build Efficiency in Laser Powder Bed Fusion - *Qiao Zhong, Huazhong University of Science and Technology*

*Effects of WC Content on Crack Initiation inside WC-Co Cemented Carbide Layers Processed by Laser Metal Deposition - *Yorihiro Yamashita, National Institute of Technology, Ishikawa College*

*Comparison with Blue and IR laser for Inconel fabrication in selective laser melting - *Yuji Sato, Osaka University*

*Fatigue Strength and Impact Toughness Dependence of PBF-LB Manufactured 316L Stainless Steel on Orientation and Layer Thickness - *Timo Rautio, Future Manufacturing Technologies/University of Oulu*

LASER IN BATTERY MANUFACTURING POSTER

A study on green laser welding characteristics of core materials for electric vehicles - *Hyunjong Yoo, Korea Insitute of Machinery and Materials*

FRONTIERS IN LASER APPLICATIONS POSTER

*Study of Efficient Removal Method of Concrete Surface by Fiber Laser - *Shoki Hamaoka, Ehime University*

ARTIFICIAL INTELLIGENCE IN LASER PROCESSING POSTERS

Prediction of the Interface width in Over lap Joint Configuration for Laser Welding of Aluminum Alloy Using Sensors - *Yoo-Eun Lee, Korea Institute of Industrial Technology*

*Solidification Cracking Identification Using Multiple Sensors and Deep Learning in Laser Overlap Welded Al 6000 alloy - *Cheolhee Kim, Korea Institute of Industrial Technology*

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