

Volume: 25 No: 1
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THE OFFICIAL NEWSLETTER OF THE LASER INSTITUTE OF AMERICA

LIA TODAY

LAM 2017
BECOME PART OF THE LASER
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REVOLUTION
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A RICH PLATFORM FOR BUILDING
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Focus:
**ADDITIVE
MANUFACTURING**

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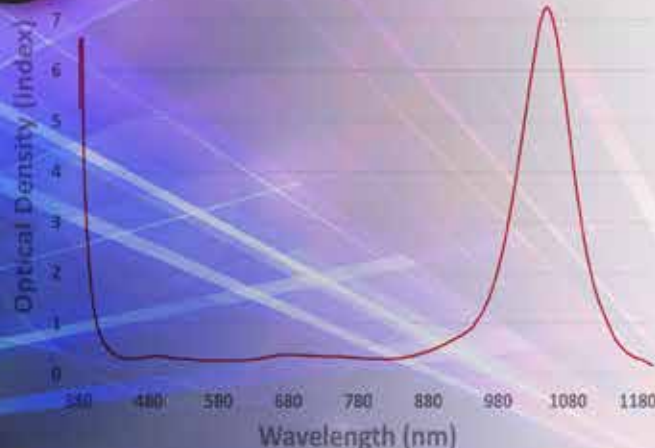
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LIA TODAY

THE OFFICIAL NEWSLETTER OF THE
LASER INSTITUTE OF AMERICA

LIA TODAY is published bimonthly to educate and inform laser professionals in laser safety and new trends related to laser technology. LIA members receive a free subscription to *LIA TODAY* and the *Journal of Laser Applications*® in addition to discounts on all LIA products and services.

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ABOUT LIA

Laser Institute of America (LIA) is the professional society for laser applications and safety. Our mission is to foster lasers, laser applications and laser safety worldwide.

We believe in the importance of sharing new ideas about lasers. In fact, laser pioneers such as Dr. Arthur Schawlow and Dr. Theodore H. Maiman were among LIA's original founders who set the stage for our enduring mission to promote laser applications and their safe use through education, training and symposia. LIA was formed in 1968 by people who represented the heart of the profession – a group of academic scientists, developers and engineers who were truly passionate about taking an emerging new laser technology and turning it into a viable industry.

Whether you are new to the world of lasers or an experienced laser professional, LIA is for you. We offer a wide array of products, services, education and events to enhance your laser knowledge and expertise. As an individual or corporate member, you will qualify for significant discounts on LIA materials, training courses and the industry's most popular LIA conferences and workshops. We invite you to become part of the LIA experience – cultivating innovation, ingenuity and inspiration.

CALENDAR OF EVENTS

Laser Safety Officer Training

Jun. 6-8, 2017 Denver, CO

Laser Safety Officer with Hazard Analysis*

Mar. 6-10, 2017 St. Louis, MO

Jun. 5-9, 2017 Denver, CO

Sept. 18-22, 2017 Chicago, IL

Oct. 16-20, 2017 Phoenix, AZ

Nov. 6-10, 2017 Miami, FL

*Certified Laser Safety Officer exam offered after the course.

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May 24-25, 2017 Novi, MI

Aug. 16-17, 2017 Novi, MI

Nov. 15-16, 2017 Novi, MI

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Mar. 4-5, 2017 St. Louis, MO

Jun. 3-4, 2017 Denver, CO

Aug. 12-13, 2017 New York, NY

Sept. 16-17, 2017 Chicago, IL

Oct. 14-15, 2017 Phoenix, AZ

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International Laser Safety Conference (ILSC®)

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International Congress on Applications of Lasers & Electro-Optics (ICALEO®)

Oct. 22-26, 2017 Atlanta, GA

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President's Message



by those that have come before me and continue the excellent job that Prof. Lin Li did as president in 2016.

As we look forward to 2017 and the future of LIA, there could be many potential changes. On the global scale, we will see how the UK's exit from the European Union may impact the economy of Europe, if not the world, and in turn, how the European companies that build and use lasers as well as the research organizations that support the technology will be affected. In the US, we also have the new Trump administration coming in with policies that could have positive or negative repercussions on the US economy and laser industry.

Another major "change" in 2017 that will directly impact LIA, is that we will be bidding farewell to Executive Director Peter Baker. It has been a pleasure and privilege to have worked with Peter over the years and I wish him well in his retirement. I have witnessed how his hard work and dedication to the LIA has made it what it is today. With Peter's departure, the Executive Committee is tasked to find the right person to take over at this position and lead the organization to a bright future.

The theme of "change" will be one that the new Executive Director, Executive Committee, Board of Directors and LIA staff will be facing. During my presidency, we will work to make changes in our conferences to increase their value to the participants. Likewise, LIA must respond to changes in the value it provides to both our individual and corporate members. The content of our literature and training must match the needs and preferred delivery method of our members.

As the internet has changed how we move information, LIA has become a more global organization supporting the world's laser processing needs. In 2017, we will need to see how to better serve not only our US members but also the global community.

I know that all of these changes cannot be fully accomplished during my presidency, but with the help of the laser community I hope to begin the process and to continue to move LIA in the right direction so we are ready to face 2018 and the future beyond.

I wish you a prosperous New Year in 2017 and hope you all are as excited as I am about the future ahead.

Paul Denney, President
Laser Institute of America

Executive Director's Message



Dec. 13, 2016 marked the 50th anniversary of my arrival in the US.

It started as a cold, lonely time in the Boston area, but gradually I met all of the people who made my life here so interesting, and made it a great place to live.

Now, 50 years later, as we approach LIA's 50th anniversary in 2018, we face some challenges and some opportunities. The challenges relate in part to the transition from me to a new leader, and in part to the changes we need to make as we approach our next half century. We need to adapt our products and services to a changing world, where laser R&D and manufacturing are on a global scale. We also need to understand the needs of our clients so we can provide the information and services they need in new and more effective ways.

All of this is a tall order for 2017 President Paul Denney and the Officers, Board and staff of LIA. So I ask all of our members to provide the maximum support, ideas, time and effort to help Paul and the team as they prepare for LIA's next 50 years.

Thank You!

Peter Baker, Executive Director
Laser Institute of America

New Leadership Search

With Peter Baker's upcoming retirement in April, the LIA Executive Committee has formed a search committee to find the next Executive Director to lead and carry out LIA's mission and goals. This is what Peter had to say about this position:

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If you or someone you know, is interested in the position and would like more information, submit your resume or request for additional information to LIA.EX.DIR@gmail.com.

LAM 2017

Become Part of the Laser Additive Manufacturing Revolution



BY MICHELLE L. STOCK

Additive Manufacturing (AM) has already made big headlines this year as companies such as GE and Ford have announced major initiatives. These headlines hint at the ways that AM processes will impact the manufacturing world and reinforce expectations that an increasing number of production parts will be produced using them. What's more, metal additive manufacturing has become the fastest growing segment of additive manufacturing as processes mature and the economics of the industrially-available tools become more compelling. As AM makes further inroads in many major industries, LIA's Laser Additive Manufacturing (LAM®) Workshop provides an unparalleled opportunity to meet with leaders in the development and deployment of laser-based additive manufacturing.

LIA is the world's premier and oldest organization promoting lasers and their applications and is in its ninth year hosting the LAM Workshop which will be held on Feb. 21-22, 2017 in Houston, TX. Well-known as an aerospace hub and home to strong medical and energy (including both traditional and renewable) sectors, the Houston region has become one of the top ranked US manufacturing cities and provides an ideal setting for advanced manufacturing meetings.

How do Lasers Impact Additive Manufacturing?

As LAM 2017 General Chair Prof. Milan Brandt explains, "The laser has played a pivotal role in the growth of metal AM systems globally in the last few years and will continue to do so in the future. Because it is at the 'heart' of metal AM technology, laser developments in terms of power, efficiency, beam quality and reliability parallel the growth and application of metal AM systems globally."

Brandt continues, "LAM 2017 will provide an opportunity for national and international practitioners involved with laser technology to discuss and explore the latest topics, challenges and progress in additive technology and applications." He adds that, "the new hot topics include nano-additive technology, medical applications and new software tools."

This year, LIA has tapped Brandt of RMIT University (Melbourne, Australia) as General Chair, along with John Hunter of LPW Technology (Pittsburgh, PA) and Prof. Minlin Zhong of Tsinghua University (Beijing, China) as Co-Chairs. Brandt brings 30 years of expertise in laser material processing to his work in additive manufacturing processes. Hunter is an expert in powder



Figure of a model of a bone and pelvis with lattice type titanium implant designed and manufactured at RMIT Centre for Additive Manufacturing.

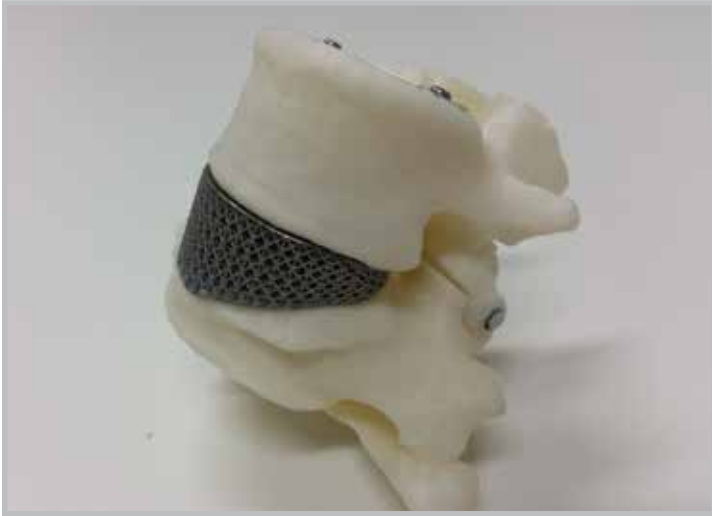


Figure of a spinal Ti lattice-based disc in a model of deformed lumbar vertebrae. The disc was manufactured at RMIT Centre for Additive Manufacturing and implanted into a patient in 2015.

manufacture for additive manufacturing. Zhong has a wealth of experience in laser micro- and nano- fabrication and laser surface engineering. With their background and knowledge, this year's workshop chairs have prepared an outstanding program that builds on past LAM Workshops, provides the latest updates, and peaks into the future.

The Program: AM Trends, Technologies, Applications & Something New

The LAM program will kick off with an overview of *Trends in Laser Additive Manufacturing* by major companies with high visibility to the state-of-the-art in additive manufacturing. The keynote presentation will be from Greg Morris discussing *Accelerating the Additive Revolution*. GE's already extensive activities in AM are undergoing a period of rapid evolution as new acquisitions such as Concept Laser are integrated. A pioneer in the use of AM for medical devices, Stryker Corporation, will be represented by Marc Esformes who will speak about *Additive Manufacturing of Medical Implants*. Arconic (formerly Alcoa) has also been deeply involved in AM as a material provider and John Barnes will close the session presenting *Arconic's Additive Manufacturing is about the Making*.

The first day sessions will continue with speakers from both academia and industry who will provide details on the building blocks of AM: materials, structures and design. To finish off the first day, the final session will focus on a new and exciting area of AM for micro- and nano- structures, and includes a talk on laser printing of graphene.

Day two will focus on technologies and applications. Wayne King of Lawrence Livermore National Laboratory (LLNL) will start the

program off with a keynote on *Simulation and Modeling of the Metal Powder Bed Fusion Additive Manufacturing Process*. Dr. King is an expert on the transition from conventional manufacturing methods to metal additive manufacturing, and LLNL has been a leader in simulation of laser-based AM. The program will continue with the latest updates on monitoring of AM processes and beam profiling and includes talks by Fraunhofer IWS and Siemens.

World-class Networking

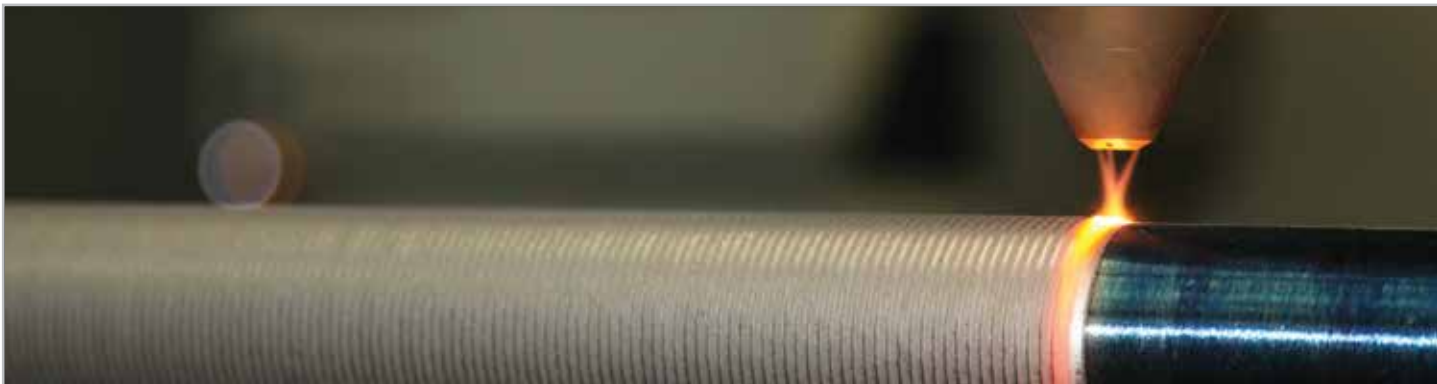
One of the highlights of LAM 2017 is the Exhibitor Reception, which caps off the first day of the Workshop. It provides an informal chance to interact with speakers, attendees, and also with LAM's sponsors, including Alabama Laser, American Cladding Technologies, Inc., Fraunhofer USA, IPG Photonics Corporation, Laserline Inc., LPW Technology, Inc., Optomec, OR Laser Technology, Inc., Polymet Corporation, Praxair Surface Technologies and TRUMPF Inc. The exhibition will include many key additive manufacturing suppliers. The Reception provides time to network, time to recharge over drinks and food, and most importantly, a chance to find solutions to your additive manufacturing challenges.



"This isn't just a workshop," said Jim Naugle, Marketing Director with LIA. "This is an opportunity to establish lifelong business relationships with experts in their respective fields. Our goal is for attendees to leave with more than business cards, we want them to leave with business partners."

The Must-attend AM Event

LAM 2017 will provide attendees with depth of knowledge in the major laser-based processing technologies, as well as the latest applications and trends. This is the go-to event for laser additive manufacturing. Don't miss out — visit www.lia.org/lam for more information and to register today. See you in Houston! ■



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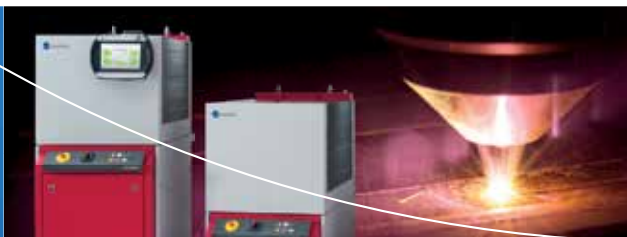
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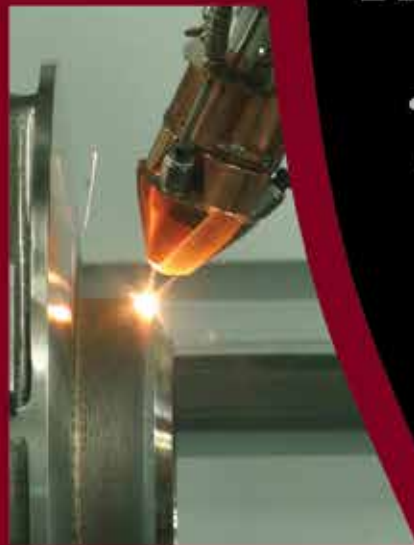
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Metal 3D Printing

A Machine Shop's 73 Year-old Journey in the Industry

BY WESLEY HART

Imperial Machine & Tool Co. took delivery of their first metal additive manufacturing (AM) machine in 2013 — a Selective Laser Melting system from SLM Solutions. The decision to invest was made after seeing one of these “metal 3D printers” in action, growing a component layer-by-layer from titanium. That demonstration made it clear to Imperial that this was powerful technology, and would play an integral role in the future of advanced manufacturing.



An SLM 280 HL and an SLM 280 HL “Twin-Laser” in Imperial’s additive manufacturing laboratory.

Over the last four years, the folks at Imperial have spent thousands of hours working with their additive machines. According to Christian G. Joest, Vice President of Sales and Business Development at Imperial, that’s what it takes to be successful. “Metal AM has come a long way since its inception, but it’s not a turn-key operation; you’ve got to put in the time to master your machines and lock down your process. Early adopters must be willing to problem solve and learn along the way. We understood that, and decided to make the investment — even though the path forward was not entirely clear.”

The “dive-in” approach employed by Imperial has provided them with unique and useful insight — especially for those wondering how additive manufacturing will affect their own business.

LIA invited Imperial to share some of their insight during a 30 minute presentation at the Industrial Laser Conference held at IMTS 2016. This article focuses on some of the key takeaways from that presentation.

Why Invest in Metal Additive Manufacturing?

Christian began the presentation by sharing some background on Imperial, and the primary reasons they decided to get into metal additive manufacturing.

“Imperial is a 73 year-old advanced manufacturing company. Since the 1940s, we’ve been known for tackling the most challenging machining and fabricating efforts in the industry. Our earliest work was for the military and we still do a large amount of work for the DoD, but over the years we’ve expanded to serve many other high-end sectors including the semiconductor, energy and optical equipment industries.

To be successful at challenging manufacturing projects, we rely on the most cutting edge manufacturing technology available; it’s one of the reasons we’ve remained competitive and relevant over the last seven decades and a big part of why we got into metal additive manufacturing. In the 40s that meant advanced Jig-boring machines, in the 70s it was CNC machining centers, and today it’s metal additive manufacturing. We wanted to get out in front of the technology.”

The second reason was more personal.

“The other reason we became involved in additive is because we’re a fourth-generation, family-run business. We consider investments in terms of decades and generations, and we believe metal AM will be required for success for the next generation of Imperial. We understood we wouldn’t see a financial return on our investment right away, but that wasn’t what was driving this decision; we wanted to begin developing expertise as early as possible.”

Christian went on to explain how the impact of additive will be felt across all industries in a variety of ways. For example, current Imperial customers working in laser and energy beam related industries are particularly interested in metal AM for the conformal cooling possibilities.

The Importance of Hybrid Manufacturing

As the presentation continued, Christian built to an important point, “It’s not just press print.”

Christian explained that customers are looking for high-quality end-use components. Additive manufacturing can help realize innovative new designs, but they are not pulled straight from the printer.

“Misconception comes with the territory; the technology is young. Most of the public doesn’t even know that printed parts are actually welded by laser to the build plate, and must be cut off!”



Precision machining a metal 3D printed component, part of the “Hybrid Manufacturing” approach.

To successfully yield end-use components Imperial had to develop a “hybrid manufacturing” approach — using their additive capabilities in conjunction with their traditional machining capabilities. For example, they might use their metal printer to manufacture a topology optimized hydraulic manifold with complex internal channels, but they still rely on high-precision CNC machining centers to mill special SAE threads and flatten critical mating surfaces. That’s in addition to the thermal conditioning operations Imperial performs to yield the best material properties. All of these steps must be planned and accounted for before manufacturing begins! This is a far cry from pulling an end-use component straight from the printer.

The Real-World Applications of 3D Printing

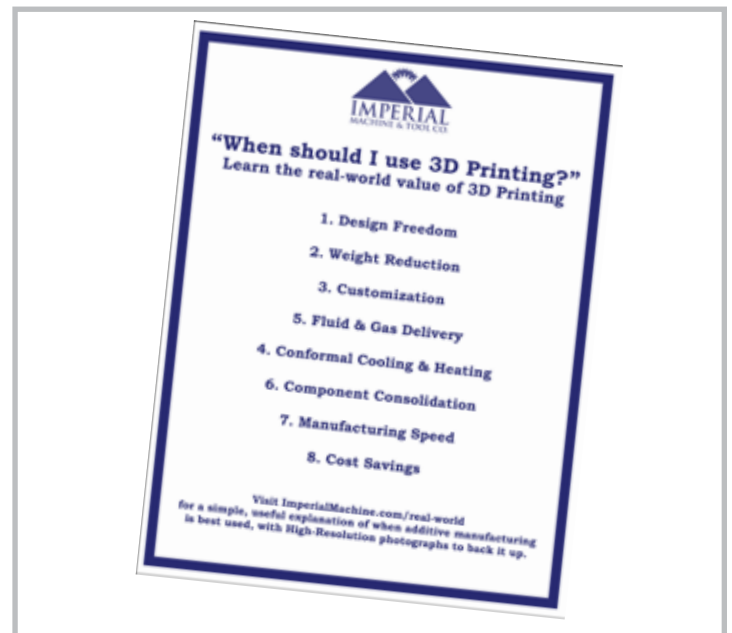
Christian went on to explain the education process that must occur when interacting with new customers; getting the most out of additive manufacturing requires an understanding of what it’s best used for.

“It doesn’t make sense to use a power drill when you need a hammer. A power drill may be a more advanced tool, but that

doesn’t mean it’s better than a hammer. You’ve got to choose the right tool for the right job.”

The value of AM is not in making the same part designed for CNC machining on a metal printer, it’s in realizing designs never before possible. Christian spoke of how Imperial works closely with their customers to ensure they understand the reality of when additive manufacturing makes sense, and when it does not.

“Over the years we developed a list that breaks down the best applications for additive manufacturing, based on our experience with customers and our background in manufacturing. Our goal is to provide a strong foundation for our customers to continue exploring from. Once customers understand these applications, they begin to think on their own about how additive manufacturing can positively affect their business and industry.”



A Look Toward the Future

As the presentation wound down, the focus turned to what it will take for metal AM to become mainstream. “You’re all here today because you’re interested in additive manufacturing on some level. That’s the first step. Don’t be afraid to explore further. You’re in the right place, at the right time in history to be a part of this emerging technology. Embrace the opportunity.” Metal additive manufacturing is already making a big impact for Imperial Machine & Tool Co. and their customers. How will metal AM affect you, and what you do? ■

Wesley Hart is the Marketing Director of Imperial Machine & Tool Co.

ILSC 2017

A Rich Platform for Building Safer Environments



BY MICHELLE WILLIAMS

The world's leading conference on laser safety returns in 2017, drawing professionals from a variety of industry backgrounds ranging from nurses and applications engineers to researchers and even government and military personnel. LIA's biennial International Laser Safety Conference (ILSC®) will be held on Mar. 20-23, 2017 at the Sheraton® Atlanta Airport Hotel in Atlanta, GA, with the goal of educating laser safety personnel on everything from bioeffects research to the best practices for Laser Safety Officers (LSOs).

Successfully prepared again by General Chair John O'Hagan of Public Health England, ILSC 2017 is comprised of three main parts: Laser Safety Scientific Sessions (LSSS), Medical Practical Applications Seminar (MPAS) and the Technical Practical Applications Seminar (TPAS). When asked about the value that ILSC brings to its attendees, O'Hagan said that the conference "provides a unique opportunity for both experienced laser safety specialists and newcomers to get together over four days. It attracts attendees from around the world, so that experiences can be shared, lessons learned and hopefully workplaces containing lasers are safe."

A new addition to this year's ILSC are the two Opening Plenary speakers who are both clinicians. "Jacques Abramowicz will speak about the World Health Organization task to develop Basic Safety Requirements and Fundamental Safety Principles for non-ionizing radiation, including laser radiation. Jeff Luttrull, who is an expert in diseases and surgery of the retina and vitreous, will talk about how lasers can be used to prevent blindness," remarked O'Hagan.

Every year, the LSSS addresses developments in regulatory, mandatory and voluntary safety standards for laser products and laser use. Chaired by Karl Schulmeister of Seibersdorf Laboratories, he emphasizes that the ILSC Scientific Sessions will continue to cover the most important topics to its attendees — including laser product safety, bioeffects, injury thresholds for the varying tissues of the eye and skin, as well as eyewear, outdoor lasers, high power lasers, materials processing and broadband incoherent radiation.

Dr. Schulmeister also noted that there are many first-time presenters contributing to the LSSS this year, "which shows that the interest and the 'discipline' of laser safety is ever growing

and developing — away from the historical main interest in user precautions to the safety of products, particularly of consumer products which will be soon ubiquitous."

The Medical and Technical PAS are designed to complement the Scientific Sessions by exploring everyday scenarios that the LSO and MLSO could encounter. The Medical PAS is a two-day seminar that will take place Mar. 20-21 and be Co-Chaired by Kay Ball (Otterbein University) and Certified Medical Laser Safety Officers (CMLSOs) Vangie Dennis (Emory Healthcare), Patti Owens (AestheticMed Consulting International), and Leslie Pollard (Southwest Innovative Solutions, Inc.), who have constructed this seminar around the theme of *Laser Safety: More than Smoke and Mirrors*. The MPAS will be particularly useful for MLSOs who work in operating rooms, surgical centers, aesthetic clinics and medical spas.

"Day one will include pertinent information regarding the hazards of surgical smoke and plume. The latest research will be presented," stated Owens. "Analyzing the toxicity of surgical plume, the impact of chronic exposure to second hand smoke, recommended respiratory protection, new international initiatives and organizations, along with future legislation for management of this health hazard."

Owens went on to add that "the second stimulating day will focus on management of collimated medical devices with exciting lectures addressing new applications of innovative laser technology, retinal and corneal injuries from exposure to lasers and Intense Pulsed Light, veterinary utilization of medical laser devices, Low Level Light therapy and PDT. Also, the role of the laser safety officer and how to produce positive safety outcomes for both staff and patient will be explored."

According to Kay Ball, "ILSC 2017 offers learning and networking opportunities to help health care professionals meet the challenges of laser technology. Advancements and exciting new information will be highlighted, while experts will be able to share their knowledge and experiences."

The two-day Technical PAS, on Mar. 22-23, is expected to provide LSOs with the knowledge they need to address more common laser safety issues and concerns for day-to-day operations in manufacturing, research and product development, as well as laser safety training and program setup. Co-Chairs and Certified Laser Safety Officers (CLSs) Eddie Ciprazo (UC Berkeley) and



Jamie King (Lawrence Livermore National Laboratory), are focusing on just that with the motif of *Back to the Basics – Laser Safety 101*.

Topics covered in the Technical PAS will range from determining Nominal Hazard Zones (NZH) to laser eye protection selection to what regulations apply. This seminar will start off on Wednesday with *So You are the LSO, Now What?* and will conclude on Thursday with *Resources for the LSO, Don't Reinvent the Wheel*. The newest and most anticipated addition to this year's TPAS will be an open forum panel discussion with the FDA.

According to King, LSOs of all experience levels will leave this seminar with a variety of valuable information. "From basic optics to cutting edge technologies and everything in between, it's here."

Additional highlights at ILSC include the Welcome Reception on Sunday, Mar. 19 at 4pm and the Awards Luncheon, taking place on Monday, Mar. 20 at 12pm. This two hour luncheon includes the presentation of the Wilkening and Rockwell awards. The Wilkening Award is being presented to Wesley J. Marshall of Laser Safety Specialties, recognizing his outstanding contributions to laser bioeffects research, development of human exposure limits and safety standards, and to applied laser safety. This year, the Rockwell Award is being bestowed on none other than ILSC General Chair John O'Hagan, for his outstanding contributions to laser safety education.

Attendees can expect plenty of networking opportunities at ILSC, promises O'Hagan. "Those new to laser safety can hear from world experts and build up their networks. Experienced laser safety professionals get the opportunity to hear about the latest research on bioeffects and practical solutions to laser safety problems. Having attended ILSC, you become part of a community, which can provide guidance and support throughout your laser safety career."

In addition to attending the seminars, the CLSO/CMLSO Appreciation Reception will be another great opportunity to hear first-hand from certified laser safety professionals. Taking place on Monday, Mar. 20, this reception honors LSOs with 10+ years of certification. Anyone with certification or an interest in LSO certification is welcome to attend.

Another networking opportunity for attendees to take advantage of is the Sponsor Reception on Tuesday evening, Mar. 21, from 5-7:30pm. This is the perfect time to interact with key safety companies including longtime Platinum Sponsors Honeywell Safety Products and Rockwell Laser Industries; Gold Sponsors ASC Z136, Kentek Corporation and Lighting Systems Design, Inc.; Silver Sponsors Buffalo Filter and Engility Corporation; and Bronze Sponsors BEAMSTOP'R Laser Barriers, Inc., Laser Safety Systems, LASERVISION USA, NoIR LaserShields, Ophir-Spiricon LLC and RT Technologies Inc.

"We look forward to welcoming friends to Atlanta for ILSC 2017," says O'Hagan. "If you haven't been before, make sure you say hello!"

For more information and to register for ILSC 2017, visit www.lia.org/ILSC. ■

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Introducing LIA's 2017 Officers

Meet the New President & Board of Directors

BY MICHELLE WILLIAMS



LIA's 2017 President, Paul Denney has been the Senior Laser Applications Engineer within the Automation Division of Lincoln Electric since 2010, where he has focused on furthering laser hybrid capabilities. Since earning his B.S. in Material Science and Engineering and his M.S. in Metallurgy at the Massachusetts Institute

of Technology, Mr. Denney has gained many years of metal research experience holding positions at Research Department C.F.&I. Steel Corporation, US Naval Research Laboratory (NRL), Westinghouse R&D Center, Applied Research Laboratory at Penn State, EWI, and most recently, Director of the Laser Applications Laboratory at CCAT.

Throughout his career, Mr. Denney has been involved in multiple societies and is currently a member of the American Society for Metals and the American Welding Society, where he has also served on the C7, C7C and C7D committees. He was the former US Editor for *Lasers in Engineering*, holds 30 US patents, received two ARL Penn State Technical Contribution Awards in 1989 and 1992, and was bestowed the R&D Top 100 Award in 1997.

In addition to being a member of LIA, Mr. Denney has been heavily involved in the organization since 1993, when he functioned as a Laser Materials Processing (LMP) Conference Co-Chair at ICALEO®. From there, he went on to become the LMP Conference General Chair in 1995 and 1996. When LIA announced the establishment of its Laser Additive Manufacturing (LAM®) Workshop, Mr. Denney jumped at the chance to get involved and has been the General and/or Co-Chair of the Workshop since its inception in 2009. On top of his contributions to LIA events, Mr. Denney has served on the Board of Directors from 1997 through 2015, when he joined the Executive Office as LIA's Secretary in 2015 and went on to be the President Elect in 2016.

As President, Mr. Denney's main goal this year is to build up LIA. With the retirement of Executive Director Peter Baker, he says that the most important goal is to find the right candidate that will be capable of building on all that Mr. Baker has accomplished in his 28 years with LIA and establish a bright future for the years to

come. Mr. Denney also plans to further the efforts of Immediate Past President Lin Li, to expand LIA's reach internationally. This expansion includes offering laser safety training for international users, holding conferences and workshops worldwide, and increasing international membership. Not only does Mr. Denney want to build on LIA's international membership, but he wants to reevaluate the current member benefits and improve what LIA can offer to make membership more appealing and accessible to all laser users – both international and domestic.

In his personal life, Mr. Denney enjoys being active either at the gym or rowing his own single scull. He resides in Cleveland, OH, only about a 10 minute walk from Lake Erie, with his wife of 10 years, Liz, who coincidentally he met in a Masters Rowing Club in Columbus, OH. Together, they have a 10 year-old daughter, Mira, who also enjoys the water, as well as their two beloved dogs Zoe and Daphne.

We wish Paul Denney the best of luck in all of his endeavors as this year's LIA president!



President-Elect Milan Brandt is a professor in Advanced Manufacturing for the School of Engineering, Technical Director Advanced Manufacturing Precinct and Director RMIT Center for Additive Manufacturing, RMIT University in Melbourne, Australia. Prof. Brandt earned his degree from Macquarie University in Sydney, before moving on

to work in the Department of Defense Materials Research Laboratory, CSIRO Division of Manufacturing Technology, and then established the first Industrial Laser Center in Australia. He is also the recipient of a number of awards, the author of over 200 publications, as well as a book on laser additive manufacturing. Prof. Brandt has been involved in LIA for 30 years. He has served on the Board of Directors, multiple organizing committees for ICALEO, LAM and PICALO – including serving as the PICALO General Chair in 2004 and 2006, and is currently a Senior Editor of LIA's *Journal of Laser Applications*® (JLA). As President-Elect, it is Prof. Brandt's goal to increase LIA's profile and influence both locally and globally, through new workshops and conferences that focus on LIA's mission of fostering lasers, laser applications and laser safety.



Treasurer Gilbert Haas holds a B.S. degree in Electrical Engineering from the University of Wisconsin and an A.S. degree in Laser Technology from North Central Technical College. In 1992, Mr. Haas founded Haas Laser Technologies, Inc., which designs and manufactures custom laser beam delivery components, laser beam measurement

equipment, and laser systems for industrial applications worldwide. Throughout his career, Mr. Haas has taught, lectured and published numerous papers. He holds several national and international patents in the field of industrial laser applications. In addition to his work in the laser industry, Mr. Haas purchased and repurposed an industrial building in 1999, which now operates under Flanders-Ironia, LLC as a successful industrial building complex. As LIA's Treasurer, Mr. Haas is eager to utilize his 24 years of business experience along with his career experience in the laser industry, to support and promote all of LIA's efforts.



Secretary Minlin Zhong is a full-time professor at the School of Materials Science & Engineering of Tsinghua University. He also functions as the Director of the Laser Materials Processing Research Center. He earned his bachelor degree in laser technology from Huazhong University of Science & Technology and his Ph.D. in

laser processing from Tsinghua University. Prof. Zhong has been the PI for 19 international cooperation projects, 40 domestic projects – both scientific and industrial – he has published 240 papers in journals, 70 papers in conferences, 18 patents and four book chapters. Prof. Zhong is an editorial member of *Light: Science & Applications*, Executive Editor-in-Chief of the *Journal of Chinese Lasers*, and a reviewer for numerous international journals. He has helped organize nine national conferences on laser materials processing in China and has been involved with numerous international conferences organized by LIA, OSA and SPIE. His involvement with LIA includes being the PICALO General Chair in 2008, receiving LIA's Fellow Award in 2010, and serving on the Board of Directors in 2005-2007, 2011-2013 and 2015-17. Presently, he serves as a Senior Editor of LIA's *Journal of Laser Applications*® (JLA). As part of LIA's Executive Office, Prof. Zhong intends to contribute his thirty-plus years of expertise to not only fulfill his responsibilities as Secretary, but to bridge LIA to the laser community in Asia.



Immediate Past President Lin Li graduated from Dalian University with his B.Sc. in Automatic Control before earning his Ph.D. and DIC in Laser Engineering from London University's Imperial College. In 2000, Prof.

Li became a full-time professor at the University of Manchester Institute of Science and Technology (UMIST) and founded their Laser Processing Research Center, where he is currently the Director. Prof. Li is a co-author of nearly 600 publications in laser processing, more than 340 publications related to laser materials processing and photonic sciences, and holds 47 patents. Prof. Li also serves on the editorial board of 12 international journals, including *Optics & Laser Technology*, *Lasers in Engineering*, and *CIRP Journal of Manufacturing Science and Technology*. His extensive international involvement in the laser community includes being a Fellow of the Royal Academy of Engineering, Past President of the International Academy of Photonics and Laser Engineering, and Vice President of the Association of Industrial Laser Users (AILU). He has also received multiple accolades including the Sir Frank Whittle Medal from the Royal Academy of Engineering, the Royal Society Wolfson Research Merit Award, and the University of Manchester's Researcher of the Year medal. Prof. Li has held many prominent positions within LIA, including an elected Fellow since 2007, serving on the Board of Directors from 2009-2013, Secretary in 2014, President in 2016, and has given annual presentations at ICALEO since 1986.

2017-2019 Board of Directors



Eckhard Beyer is the Executive Director of the Fraunhofer Institute for Material and Beam Technology IWS in Dresden, German, which engages in application-oriented research and development in the area of laser and surface technology. He graduated from the University of Technology Darmstadt with a diploma in physics and received his Ph.D. in physical engineering. Additionally, he is a full-time professor of laser and surface technology and Executive Director of the Institute of Manufacturing Technology. "During the term, I would like to act as contact to the German laser community, a contact to the Fraunhofer-Gesellschaft, as well as contribute to the field of laser materials processing in general." Prof. Beyer has been engaged in the coordination and organization of several international conferences, including ICALEO and LIM. He is also the author of approximately 550 publications and owner of about 65 patents.

(Continued on page 18)



Robert Braunschweig is the Managing Director of LASEA US, a position he was appointed to after his company B-Lasers had great success distributing LASEA products. Mr. Braunschweig received his M.S. in Lasers and Photonics from the School for Advanced Processes in Electronics and Optics in Orleans, France.

Over the last 20 years, Mr. Braunschweig has held positions at Continuum, Quantel, Dicon FiberOptics, Opotek, High Q Laser and Amplitude Systemes. Through his vast experience in R&D, product development, manufacturing, technical support, sales and business development, he has become an expert in the field, bridging research with industry. It is this extensive experience that will aid Mr. Braunschweig in his goal to “promote LIA’s conferences and encourage new opportunities to educate our community on ultrafast laser processing advances [and] work towards reinvigorating the laser scientific community to broaden exchanges between the industry and new innovators towards LIA’s mission.” Mr. Braunschweig has also co-authored several articles on ultrafast lasers and their applications and has been very active in ICALEO, serving on the organizing committee, participating in scientific review, and giving presentations.



Corey Dunskey is President and Founder of Aeos Consulting, Inc., where he assists technology and program development in laser and equipment companies. He earned his doctorate in Mechanical Engineering from the University of California, Berkeley and his past industry experience includes Chief Technologist at Concept Laser, Inc., senior

management and technical positions at Veeco Instruments, Coherent, Inc. and Electro Scientific Industries, Inc. He has also held positions at NASA and Sandia National Laboratories. On the Board of Directors, Dr. Dunskey’s goal is to “strengthen LIA’s connections to industrial users of lasers and laser systems by helping create, evaluate and distribute laser process information through LIA’s events and *Journal of Laser Applications*® (JLA). I will also focus on promoting deeper engagement throughout the term with existing members.”



Lucian Hand is President of Altos Photonics, where he has developed the EKSPALA-USA and Light Conversion USA brands. Since 2002, Mr. Hand has been responsible for technical sales, installation, user-training and technical support for lasers, laser systems and opto-mechanical components. With a B.S. in Physics from

Arizona State University, he has actively participated in design and development of high-energy lasers, with several reaching notable commercial success. “I intend to promote and support LIA in the pursuit of excellence in education and safety, and

ensure that LIA maintains financial health for long-term viability.” Mr. Hand has been active in LIA since 2002, maintaining Altos Photonics’ corporate membership and exhibiting at ICALEO and LME. Additionally, he is a member of the ANSI Z136.8 subcommittee for laser safety in research and development, where he has worked to ensure that the standard is matched to real-world research techniques.



Tracey Johnson has over 13 years of experience in the manufacturing marketing industry, as well as 20 years in tradeshow management. As part of LIA’s Board of Directors, “my intention will be to support the core values and objectives of the Association while injecting new ideas to grow membership, increase door attendance

at trade events, and seek opportunities to partner with other organizations to assist LIA in broadening our reach and strengthening our message.” Ms. Johnson’s experience includes four years on the Photoshop World Committee and two years in the Graphic Institute of America, Washington Chapter. Ms. Johnson received a design award by *HOW Magazine*, the trade show booth Refurbishment Award from *Exhibitor Magazine*, as well as two Guru awards from the National Association of Photoshop Professionals.



Markus Kogel-Hollacher earned an M.S. degree at the Fraunhofer Institute for Laser Technology in 1994 and his M.S. degree in physics two years later from the RWTH Aachen University in Germany. He then joined Precitec Optronik GmbH in Rodgau, Germany. In his position as head of R&D projects department in the Precitec Group,

he oversees national and international governmentally funded projects. Dr. Kogel-Hollacher later obtained his Ph.D. at the Technical University of Berlin, Germany in 2008. He has been a member of the LIA since 2002 and recently has served as a jury member of the Innovation Award Laser Technology. “I will continue promoting LIA activities in my daily work. I really like the philosophy of the LIA conferences, bridging gaps between science and industry, and so I want to bring the attractiveness of these events to young scientists and industry representatives.”



John Lopez has been the President Club Lasers et Procédés (CLP) – a French association of industrial laser users – since 2010. He graduated from the school of Physics and Chemistry of Bordeaux in 1993 and received his Ph.D. on laser ablation of polymers at the University of Bordeaux in 1997. He is currently a research engineer

for the French National Center for Scientific Research at the University of Bordeaux and is widely known as an expert in

laser micromachining. Dr. Lopez is actively involved in the global laser community and is the conference chair of the JNPLI international conference, he is on the board of both the French Photonics (CNOP) and the French national committee for laser safety (CNSO), for which he is a founding member. "I will use my network to promote LIA's activities in Europe and encourage French photonics industry and academics to join LIA. Furthermore, I will be eager to contribute in organizing joint events with European laser associations, such as AILU, Swissphotonics, Belgium photonics cluster or CLP, in order to build strong and perennial bridges between the United States and European laser communities."



Reinhart Poprawe holds a M.A. degree in Physics from California State University in Fresno and went on to earn his Ph.D. in Physics in Darmstadt, Germany. Subsequently, he joined the Fraunhofer Institute for Laser Technology (ILT) in Aachen in 1985, where he started as head of the Laser Oriented Process Development Department. Since 1996, he has been the Managing Director of Fraunhofer ILT and holds the University Chair for Laser Technology at the RWTH Aachen. Prof. Poprawe was elected as an SME Fellow in 1998, a Fellow of LIA in 2006, and in 2012, he served as LIA President. He also resides on many national and international boards, including chairing the RWTH-International Board. Prof. Poprawe is also the Rectors delegate for China. "During my term I will be committed to work to the improvement of ICALEO, especially the quality, impact and visibility of the *Journal of Laser Applications*® (JLA). Among others, we should benchmark international strategic programs like PHOTONICS21 (EU), Photonics2020 of BMBF (Germany), five-year plans on Photonics in China, and compare with activities in the US."



Michael Schmidt is a professor in the department of Mechanical Engineering at the Friedrich-Alexander University Erlangen-Nürnberg. He received his diploma in Electrical Engineering and continued to earn his Ph.D. on Process Control for Laser Spot Welds in Electronics Production. Prof. Schmidt's experience extends beyond the classroom – he is the CEO of Bayerisches Laserzentrum GmbH (blz), where he has been working on a further development of the exchange between academic basic research and industrial application. Prof. Schmidt is also engaged in several academic and economic organizations all over the world, including bayern photonics e.V. in Germany, Bavarian working group – networking research, and SAOT. He successfully furthered the implementation of a Laser Demonstration Center in Saint Petersburg, Russia and cooperates with the National Optics Institute in Quebec, Canada. He is a corporate member of

CIRP as well as LIA. In his term on LIA's Board of Directors, Prof. Schmidt "intends to support the academic and economic cooperation on international levels. Such an interaction will generate synergetic effects and could therefore be beneficial for the further development of laser technology – worldwide."



Bill Shiner received his B.S., EE and MBA from Northeastern University and is the Senior Marketing Advisor to the CEO of IPG Photonics in Oxford, MA – a manufacturer of fiber lasers and amplifiers sold to multiple markets including the telecomm, industrial, medical, scientific and government sectors. He has published numerous articles and made many presentations on the applications of laser technology. He serves on the *Photonics Spectra* Editorial Board and is an LIA Fellow. Previously, Mr. Shiner served on committees for LIA's LAM, LME and ICALEO conferences, LIA's Board of Directors, Executive Committee, and as a past president in 2007. "LIA has been a very important partner of mine throughout my career in lasers. LIA has assisted in keeping me abreast of the technology, as well as, providing a format to develop personal relationships that have greatly enhanced my success. As a member of the Board of Directors, I will continue to lend my opinion, guidance, support and ideas to assist wherever I can in the growth and success of the Laser Institute of America."



Robert J. Thomas is a Principal Research Physicist for the Air Force Research Laboratory's Airman Systems Directorate, where he has been a national leader in the areas of experimental and theoretical biomedical optics for the past 22 years. In 1989, he received a B.S. degree in Physics from Pittsburg State University in Pittsburg, KS and earned his Ph.D. in Physics from the University of Missouri in Columbia, MO in 1994. Dr. Thomas has authored and co-authored more than 50 peer-reviewed papers. He is a member of the American Physical Society (APS), the Directed Energy Professional Society (DEPS), the Institute of Electrical and Electronics Engineers (IEEE), and is a lifetime member of LIA. Dr. Thomas is also a Fellow of SPIE and LIA. He supports all of the ASC Z136 technical subcommittees and in his role on the Board of Directors, he plans to continue and "contribute information regarding the development of laser safety standards." Dr. Thomas has served as an organizer, contributor and session chair at the International Laser Safety Conference (ILSC®). In 2015, he also served as a past president of LIA and with that valuable experience he hopes to "assist the Executive Director and staff in strategic initiatives and activities that will celebrate the 50th year of LIA and set a course for its future." ■

(Continued on page 20)

2016-2018 Board of Directors

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FANUC CNC systems have been used as a motion control for lasers by many different manufacturers for many years. The FANUC Series 30i and 31i – MODEL LB CNCs feature pre-installed interfaces with intelligent software that enables highly efficient laser processing. FANUC CNC software comes with a full set of laser commands and diagnostic tools as well as powerful CNC software functions designed to significantly decrease cycle times and make processes easier.

Today FANUC offers a line of CO₂ laser systems and fiber laser systems ranging from 500 W to 6 kW. A unique feature of the FANUC fiber laser system is that it is compatible with the CO₂ laser – so users can use the same base while changing between fiber or CO₂ heads, depending on their needs.

FANUC CNCs have a reputation for performance, reliability and precision. FANUC CNC systems for lasers live up to that reputation while adding laser-specific controls features such as Laser Gap Control, beam path length compensation and 3D cutting.

FANUC joined LIA as a member in July 2016. As a new member, they appreciate receiving industry updates and networking provided by LIA and hope to continue to partner with them for many years to come. ■

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Written by Terri M. Bernhardt, in cooperation with FANUC America Corp.

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Repairing Defects in Fiber-reinforced Plastics More Efficiently

Fiber-reinforced plastics (FRP) are frequently used in the aeronautic and automobile industry. However, the repair of workpieces made of these composite materials is often less profitable than exchanging the part. In order to increase the lifetime of FRP parts and to make them more eco-efficient, Laser Zentrum Hannover e.V. (LZH) and Apodius GmbH want to combine a new measuring device for fiber layer orientation with an innovative laser-based repair process.

Defects in FRP pieces may be production or operation-related. Whether or not repair is cost-effective depends on the geometry of the defective area, the tools and repair process, and the automation possibilities. By using laser scarfing and subsequent patch repair, FRP pieces can be repaired with appropriate fiber orientation. The damaged material is ablated layer-by-layer either in a continuous or in a stepwise way. A precisely fitting replacement, a so called patch, is used to close the defective area. Afterwards, resin can be used to infiltrate and consolidate the new fiber layers. Thus, the repaired area becomes very strong.

For more information, visit www.lzh.de/en.

Satellite-based Laser Measurement Technology Against Climate Change

In the last few years, the Fraunhofer Institute for Laser Technology (ILT) has been developing satellite-based laser beam sources for climate research. The project ALISE (Diode-pumped Alexandrite Laser Instrument for next generation Satellite-based Earth observation) started in August 2016 and will run until July 2018. In cooperation with the Leibniz Institute for Atmospheric Physics (IAP) and Airbus Defence & Space, Fraunhofer ILT will be investigating the technical feasibility and the possible applications of a novel laser system for satellite-based observation of the world's climate.

The fight against global climate change poses one of the greatest challenges of the coming decades. To develop effective measures against global warming, scientists need climate models that reliably represent interrelationships in the atmosphere. Currently, there is insufficient data about such relationships at high altitude (mesosphere), where crucial processes for global air circulation occur. For the measurement of temperature and wind speed at this altitude, climate researchers rely on the modern resonance-lidar process.

For more information, visit www.ilt.fraunhofer.de

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All this wouldn't have happened without close collaboration with jewelry insiders. Wolfgang Illich, Product Line Manager at COHERENT-ROFIN, mentions: "We know a lot about lasers, but outstandingly practical solutions can only be developed in close cooperation with jewelry experts. Our sales partner Tobias Teigelkötter, a goldsmith and graduate designer from Werne, has been our consultant for 20 years now. He as well as many others made a large contribution to our success." Close cooperation with established goldsmiths is one part of COHERENT-ROFIN's strategy. Partnership with leading jewelry industry suppliers all over the world is another.

For more information, visit www.rofin.com.

LPW's US Operation Achieves AS 9120A

LPW Technology, the market leader in the development, processing and supply of high quality metal powders for the Additive Manufacturing (AM) industry, continues to extend its quality assurance standards. LPW Technology, Inc., the company's US operation located in Pittsburgh, PA, has been awarded AS 9120A & ISO 9001:2008, reflecting its parent company's achievements.

"LPW's ethos is to provide evidence-based quality assurance for its customers across the globe," comments John D. Hunter, General Manager of LPW Technology, Inc. "The award of the USA quality standards complements our UK achievements, where we've already attained ISO 9001:2008, ISO 13485:2012, AS 9100C and AS 9120A."

LPW Technology, Inc. was established in 2014 to meet strong demand for LPW's metal powders and industry knowledge from the North and South American AM market. A dedicated team provides comprehensive analytical services, product inventory, applications and sales support to the area.

For more information, visit www.lpwtechnology.com.

ANSI Z136.9

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Laser Light Technologies Inc.
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University of Colorado - Boulder
Boulder, CO

For a complete list of corporate members,
visit our corporate directory at www.lia.org/membership.

membership@lia.org | 1.800.34LASER

The annual meeting of ASC Z136 will be held on Sunday, Mar. 19, 2017, the day before the International Laser Safety Conference (ILSC®) commences at the Sheraton® Atlanta Airport Hotel, Atlanta, GA. The meeting is scheduled to begin at 9am EST; the meeting agenda will be available in early February.

Following the meeting, ASC Z136 members are invited to join in the pre-conference festivities at the ILSC Welcome Reception.

ASC Z136 meetings are open to the public; however, RSVP is requested to allow for adequate meeting space and meal planning purposes. If you have any questions regarding the annual meeting, would like a meeting agenda, and/or plan to attend as an observer, please contact Barbara Sams at bsams@lia.org or call +1.407.380.1553 for more information.

The table to the right shows the ancillary meetings that were scheduled at the time of publication. Meeting rooms will be posted onsite. For specific meeting details, please contact the working group/subcommittee chairperson directly.

We hope to see you there!

DAY/DATE	START TIME	FUNCTION	CONTACT
SAT, MAR 18	1:00PM	TSC-4	BILL ERTLE
	1:00PM	SSC-7	JIM SHEEHY
SUN, MAR 19	5:00PM	TSC-1	BRUCE STUCK
MON, MAR 20	9:00AM	TC 76 WG3	SHELDON ZIMMERMAN
TUES, MAR 21	7:00AM	SSC-1	SHELDON ZIMMERMAN
	1:00PM	SSC-6	ROBERT ALDRICH
WED, MAR 22	5:00PM	TSC-7	WES MARSHALL
THURS, MAR 23	8:00AM	SSC-4	JEFF PFOUTZ
	1:00PM	SSC-10	JAY PARKINSON
FRI, MAR 24	7:00AM	TC 76 WG1 & WG8	DAVID SLINNEY, KARL SCHULMEISTER

Help Make a Difference!

Apply for membership
on ASC Z136 or a Z136
subcommittee today at
www.z136.org!

- Build your career
- Network with industry leaders
- Have an impact on standards that affect you
- Earn BLS certification maintenance points
- Minimum time required
- Travel not required

Secretariat:



**Laser Institute
of America**
Laser Applications and Safety

ASC Z136
Safe Use of Lasers
Accredited Standards Committee

What's Ahead for the BLS

As we begin the new year, the Board of Laser Safety (BLS) is proud to announce the launch of its new website: www.lasersafety.org.

Reflecting our mission to provide a means for improvement in the practice of laser safety by providing opportunities for the education, assessment and recognition of laser safety professionals, the new website offers many convenient features. These include:

- Easy-to-read news feed that allows for the timely release of critical laser safety information
- Powerful cloud-based server that ensures speed and deliverability to all visitors
- Intuitive, responsive design that is easily navigable on all devices

With the main impetus being the promotion of laser safety through the certification of laser safety officers, the user-friendly platform has been enhanced by simplifying and restructuring pages for better understanding and a more logical flow of certification information. CLSOs and CMLSOs alike should

appreciate the revised pages on certification maintenance, streamlined to facilitate the renewal process. In addition to its new website, BLS now has a Facebook presence. Like us at www.facebook.com/Board-of-Laser-Safety.

Join us at ILSC

BLS certified laser safety officers – CLSOs and CMLSOs – are a major component in the organization and production of LIA's International Laser Safety Conference (ILSC®), especially when it comes to the Technical and Medical Practical Applications Seminars (see ILSC 2017 preview on page 14).

CMLSOs Vangie Dennis, Patti Owens and Leslie Pollard, along with Kay Ball comprise the MPAS leadership bringing us *Laser Safety: More than Smoke and Mirrors*. While CLSOs Eddie Ciprazo and Jamie King are taking TPAS *Back to the Basics – Laser Safety 101*. Many of the presentations scheduled will be given by BLS certified laser safety officers.

To recognize all CLSOs and CMLSOs in attendance, the BLS will host a reception Monday evening, Mar. 20. Considering certification? Join us at the reception to celebrate our LSOs with 10+ years of certification. RSVP to bls@lasersafety.org.

Certification for Medical Laser Safety Officers

Providing Professionals a Means for Improvement in the Practice of Laser Safety



Gain a Competitive Advantage by Becoming Certified Today!

- Elevate your status as an MLSO
- Stay up-to-date with industry changes
- Increase both confidence and credibility
- Demonstrate your commitment to the job
- Validate your employer's dedication to a safe working environment

LIA is committed to keeping the workplace safe from hazards associated with lasers. LIA formed an Alliance with the Occupational Safety and Health Administration (OSHA) to help achieve these goals.

OSHA and LIA recognize the value of establishing a collaborative relationship to foster safer and more healthful American workplaces. This Alliance provides LIA's members and others, including small businesses, with information, guidance and access to training resources that will help them protect employees' health and safety, particularly in reducing and preventing exposure to laser beam and non-beam hazards in industrial and medical workplaces. In addition, the organizations will focus on sharing information on laser regulations and standards, bioeffects lasers have on the eyes and skin, laser control measures and laser safety program administration.

OSHA: Worker Health & Safety should be an Integral Part of Sustainability Efforts

The US Department of Labor's Occupational Safety and Health Administration released a white paper, *Sustainability in the Workplace: A New Approach for Protecting Worker Safety and Health*, highlighting the importance of including worker safety and health in the growing movement toward sustainability and corporate responsibility.

Sustainability strives to balance social, environmental and economic considerations to achieve long term success and viability. Responsible firms currently embrace the triple bottom line of people, planet and profit to achieve sustainability goals. While these efforts have mostly focused on environmental issues, such as resource usage and emissions reductions, attention is now turning to other aspects of sustainability, including occupational safety and health (OSH).

"It is clear that more and more businesses are building the concept of sustainability into their operations," said Dr. David Michaels, Assistant Secretary of Labor for Occupational Safety and Health. "We believe the next innovation is integrating worker safety and health into these sustainability strategies."

The paper highlights ways in which sustainability can be leveraged to reimagine and identify innovative approaches for advancing safety and health.

These are only a small fraction of the opportunities that exist. Further engagement between OSHA, the OSH community, and the sustainability community can help identify new pathways for promoting a culture of safety and achieving a workplace that is truly sustainable.

For more information, visit www.osha.gov.



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*Does not include breakfast and luncheon sessions.

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The Laser Institute of America's official refereed publication, the *Journal of Laser Applications*® (JLA), an online-only journal, is complete with new features for a broader audience. JLA is hosted on AIP Publishing's robust Scitation online platform, providing the journal with great functionality and the ability to leverage a wide range of valuable discoverability features. JLA features nine topic sections, a faster peer-review process and a more functional website (jla.aip.org) that makes content easier to access and more interactive. Readers will find full-text HTML rendering featuring inline reference links and the ability to enlarge tables and figures by clicking on them. Among the new features are enhanced search functions with more options and better controls to explore returned content in more useful ways.

Effect of Various Dispersing Agents on the Stability of Silver Microparticle Dispersion & the Formulation of Uniform Silver Film by Laser Melting

BY ALEXANDER LETZEL, ELISABETH MAURER, MELANIE MEIXNER, REINHART POPRAWE, JOCHEN STOLLENWERK, SEBASTIAN HESSNER, KATHRIN LEHMANN, BILAL GÖKCE AND STEPHAN BARCIKOWSKI

We report on the substitution of silver nanoparticles' inks by silver microparticle dispersions as a material for the production of printable silver tracks by laser melting. This approach is promising, because it helps to reduce the production costs of such silver tracks. Though silver dispersions used as materials for laser melting mostly contain polyvinylpyrrolidone as a stabilizer, which results in the appearance of an undesired balling effect of silver during laser melting, the authors test stabilizers differing in molecular weight and functionality. The resulting differences in colloidal and physicochemical properties are investigated and related to the final silver layer quality.

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Announcing Upcoming Laser Safety Training in 2017

LIA is proud to offer a complete line of laser safety training courses for personnel in research, industrial and medical laser facilities. Onsite training is also available by contacting the LIA Education Department. All of LIA's courses are based on the ANSI Z136 Series of Laser Safety Standards.



Laser technology is evolving rapidly. What was previously considered safe might pose a danger today. Additionally, new technology often presents new hazards that you may not even be aware of. LIA courses are current with the latest ANSI standards, technological developments and industry advancements which provide you a leg up on any major changes that may impact your workplace or profession.

If you have already taken a laser safety training course LIA recommends that you refresh your knowledge with a laser safety course every five years, or whenever a standard is revised, as variables evolve and change within the industry.

To view the 2017 course catalog, visit www.lia.org/education.



ICALEO 2017 Call for Papers

Mark your calendar for LIA's International Congress on Applications of Lasers & Electro-Optics (ICALEO®), which will take place in Atlanta, GA, Oct. 22-26, 2017. ICALEO has a 35 year history as the conference where researchers and end-users meet to review the state-of-the-art in laser materials processing. Laser microprocessing and nanomanufacturing, as well as predict where the future will lead. From its inception, ICALEO has been viewed as the premier source of technical information in the field.

Now is the time to submit your abstract for this year's Congress! Each abstract should be a minimum of two paragraphs with approximately 200-400 words, written in complete sentences. Submitters can select the option to have their technical paper reviewed by a blind peer review process. The peer review panel will look for quality of research, relevance and significance of the findings. These papers will be identified as such in the ICALEO 2017 Technical Digest and Proceedings. The deadline to submit all abstracts is Mar. 7, 2017.

For more information, visit www.icaleo.org.



LASER World of PHOTONICS Provides Comprehensive Overview

The LASER World of PHOTONICS is the world's leading platform of the laser and photonics industry. Europe's largest World of Photonics Congress will be taking place in parallel with the trade fair.

The LASER World of PHOTONICS exhibition spans all aspects of the application of photonics – already established applications and industry newcomers and future markets alike.

The Bio-photonics is one of the trade fair highlight: ultrahigh resolution imaging, ever more accurate spectroscopy and laser systems are enabling doctors, biologists and chemists, but also pharmaceuticals and materials researchers as well, systematically to advance the boundaries of knowledge. Patients benefit in the form of improved diagnostics, therapies and less invasive operating procedures, in which surgeons work with lasers instead of scalpels and look deep into organs or blood vessels, without having to open the body in the process. Ophthalmology is also making rapid progress thanks to lasers.

After the successful premiere of STARTUP World in 2015, LASER World of PHOTONICS 2017 will once again provide a communication platform for young entrepreneurs. The world's leading trade fair will therefore be a meeting place for the most important companies in the photonics industry, from start-ups to the key players.

For more information, visit www.world-of-photonics.com.

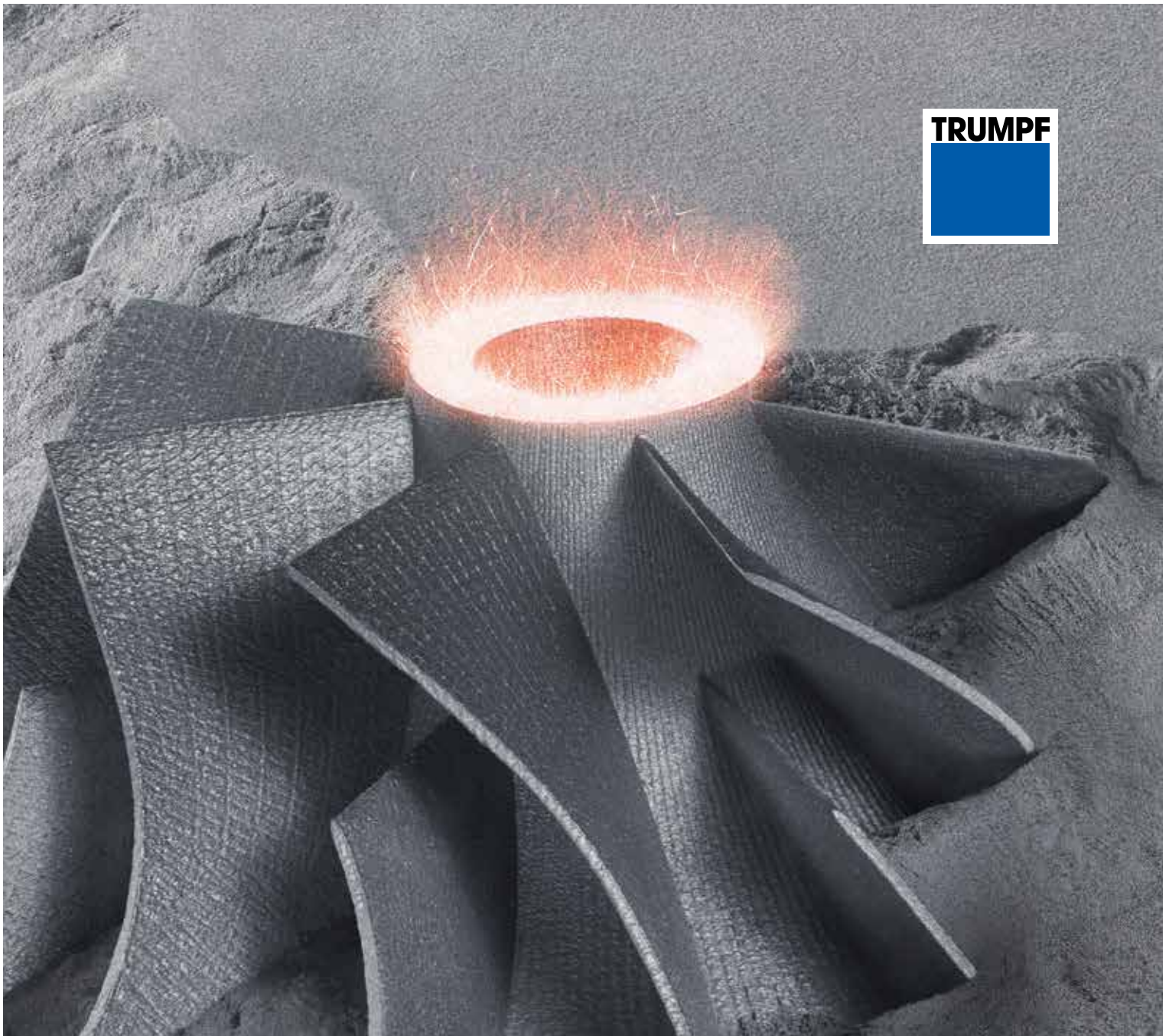
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Now, for a limited time, you can purchase LIA's *Laser Cutting Guide* at the discounted price of \$25, and \$20 for LIA members.

For more information and to purchase the guide, visit www.lia.org/store.



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