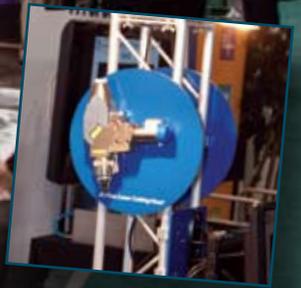
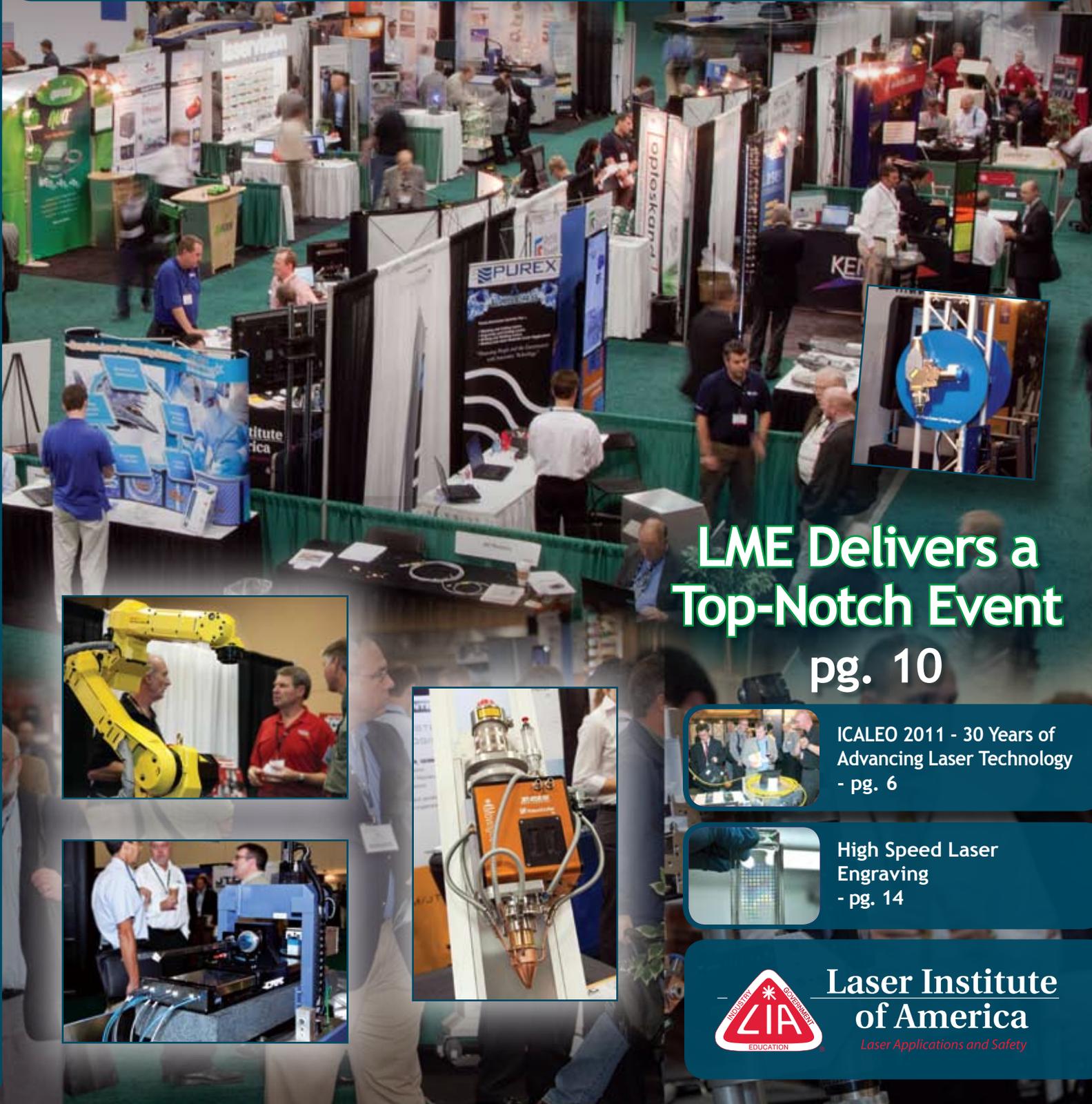




LIA TODAY

THE OFFICIAL NEWSLETTER OF THE LASER INSTITUTE OF AMERICA
The international society dedicated to fostering lasers, laser applications, and laser safety worldwide.

FOCUS: INDUSTRIAL LASERS | VOLUME 19 NO. 5 | SEPTEMBER / OCTOBER 2011

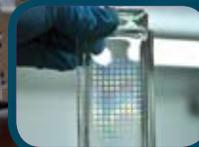


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Laser Institute of America

Laser Applications and Safety

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LIA TODAY

THE OFFICIAL NEWSLETTER OF THE LASER INSTITUTE OF AMERICA

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CALENDAR OF EVENTS

Laser Safety Officer Training

Dec. 6-8, 2011 | Orlando, FL
Feb. 27-29, 2012 | Phoenix, AZ

Laser Safety Officer with Hazard Analysis*

Jan. 30- Feb. 3, 2012 | Orlando, FL
Mar. 19-23, 2012 | New Orleans, LA
*Certified Laser Safety Officer exam offered after the course.

Medical Laser Safety Officer Training*

Nov. 12-13, 2011 | New Orleans, LA
Feb. 11-12, 2012 | Orlando, FL
*Certified Medical Laser Safety Officer exam offered after the course.

Industrial Laser Safety Officer

Dec. 13-14, 2011 | Novi, MI

Advanced Medical Laser Safety Officer Training

Feb. 23-26, 2012 | Atlanta, GA

Industrial LSO Training & Laser Applications Overview

Mar. 6-9, 2012 | Chattanooga, TN

ICALEO® 2011

Oct. 23-27, 2011 | Orlando, FL

LAM 2012

Feb. 29-Mar. 1, 2012 | Houston, TX

LME 2012

Oct. 23-24, 2012 | Schaumburg, IL

Visit www.lia.org for all course and event listings.

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.



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LIA's Industrial Laser Safety Package



Introducing LIA's Industrial Laser Safety Package - the one-stop shop for all of the needed information and references for any laser safety officer working in the industrial field. Included in this package is the **ANSI Z136.1 for Safe Use of Lasers** standard, the parent document and cornerstone of the Z136 series of laser safety standards.

Also included in this package is a copy of LIA's popular *CLSOs' Best Practices in Laser Safety*, as well as our practical quick reference guides, *LIA's Laser Safety Guide* and *LIA's Guide for Selection of Laser Eye Protection* — all essential to ensure your Laser Safety Program is compliant!

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PRESIDENT'S MESSAGE



What a year it's been for LIA. While it's nice to reflect on our latest successes as I prepare to step down as president, it's far more exciting to look ahead. Fresh on the heels of the unqualified success of the first Lasers for Manufacturing Event held on September 27th and 28th, October's ICALEO® promises to pack an even bigger punch.

On its 30th anniversary, ICALEO continues to push the limits of discussion about laser technology with a pair of cutting-edge plenary sessions. The opening session in particular is noteworthy for focusing on revolutionary advances in material nanoscience and photonics — General Chair Kunihiko Washio terms it the benefits of “disruptive innovation.” Add to that another comprehensive slate of processing workshops and solutions short courses, and this ICALEO shapes up to be the best yet.

But LIA has never been afraid to take a bold leap forward; witness the inaugural LME. We drew nearly a thousand attendees and more than 70 exhibitors to a unique workshop focused exclusively on connecting equipment vendors and users with specific needs. Feedback was overwhelmingly positive, and we're planning an even bigger event next year.

I've been honored to serve as LIA president this year, and leave very optimistic that the future of the LIA is bright.

I look forward to seeing you at ICALEO in LIA's home city of Orlando.

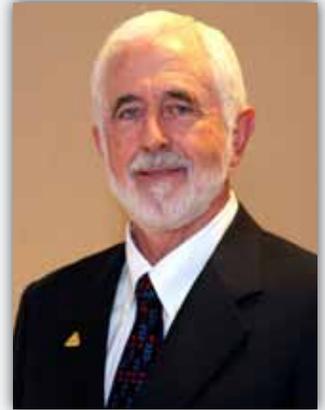


Stephen Capp
President, Laser Institute of America

EXECUTIVE DIRECTOR'S MESSAGE

HOME RUN!

That is what one happy exhibitor said about our inaugural Lasers for Manufacturing Event (LME). Every exhibitor I spoke to was very happy with the quality and quantity of the leads and all of them appreciated the fact that every attendee was interested in using lasers in their manufacturing operation.



Similarly, the attendees appreciated the tutorials we provided on the basics of lasers, systems, cost effectiveness and safety. These, together with the presentations and overviews in the show floor theater prepared attendees to meet with the exhibitors. Attendees also appreciated the fact that they did not have to hunt for laser and system vendors in a forest of clanking conventional machinery. As one exhibitor said, the experience for both exhibitors and attendees was “distilled to the essence.”

I felt, too, that by creating this event we are taking action to improve productivity, educate people on technology and create jobs while others are just creating excess CO₂ talking about it!

LME was the brainchild of the ever creative Bill Shiner of IPG. He worked tirelessly with me, the board and the LIA staff to make the Event a success. Thank you Bill!



Peter Baker, Executive Director
Laser Institute of America, pbaker@lia.org

ICALEO 2011 – A ONE-STOP SHOP FOR YOUR PHOTONICS EDUCATION

The International Congress on Applications of Lasers & Electro-Optics (ICALEO®), which has a 29-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, will be held Oct. 23-27 at the Hilton located in Walt Disney World® Resort in Orlando, FL. From its inception, ICALEO has been devoted to the field of laser materials processing at macro, micro and nanoscales and is viewed as the premier source of technical information in the field.



Each year ICALEO features areas of topical interest. This year's featured sessions include diode lasers for processing and pumping, laser process monitoring and control, laser processing of biological materials, lasers in nanotechnology and environmental technology, laser hybrid processing, laser manufacturing for alternative energy sources and laser business development.

"The ICALEO Program Committee has put together yet another strong program with a high number of contributions from researchers from both academia and industries all over the world in areas of traditional and emerging laser applications," explained ICALEO Congress General Chair Kunihiro Washio of Paradigm Laser Research Limited, Tokyo, Japan.

PLENARY SESSION

This year's plenary session will feature topics on material nanoscience, photonics and technologies for evolutionary innovation with a keynote given by Dr. Hongjie Dai, a professor



The vendor reception is a great place to learn the newest technologies direct from the supplier.

at the Department of Chemistry and Laboratory for Materials, Stanford University. The title of the keynote is "The Story and Prospects of Carbon Nanoscience and Technologies for Future Exciting Applications," and will give an overview of graphene- and carbon-nanotube-based nanoscience and their evolutionary future applications. The following presentations will cover fascinating topics on conversion of cement material to transparent metals and superconductors, quantum cascade lasers and their applications, as well as the magic of the dressed photons and their applications such as nanofabrication. This is one session you should not miss!

LASER MATERIALS PROCESSING

ICALEO 2011 will offer three conferences covering an expanding array of laser applications. The Laser Materials Processing Conference (LMP), organized by Conference Chair Stefan Kaierle of Fraunhofer ILT, Aachen, Germany, continues its theme on high speed and flexible macroscopic laser processing applications, equipment and systems. The laser is a fundamental tool in today's industrial production. The progress in high brightness processes brought on by advances and improvements in high power fiber, disk and direct diode lasers will be prominently featured.

"New enthusiasm is spreading around and the companies in the laser field tell new success stories of growth and expansion. This appears to be a fantastic starting point for ICALEO's 30th year," said Kaierle. "The LMP conference program is full of excellent contributions covering 18 sessions in many different application fields. In particular, a large amount of abstracts have been submitted to welding and rapid prototyping processes like selective laser melting and laser metal deposition. The understanding of processes in terms of modeling as well as quality monitoring and control are well covered."

LASER MICROPROCESSING CONFERENCE

The Laser Microprocessing Conference (LMF) will be chaired by Henrikki Pansar of Cencorp Corporation and will cover processes and systems for microscopic applications, especially those that take advantage of the small feature sizes and high precision offered by picosecond and femtosecond ultrafast lasers and wavelength optimization. As the overall economical setting is improving, more efforts are being directed towards research and development to discover future possibilities and maintain growth through innovation. For many years, trends that are visible in the conference have turned out to be great business opportunities during the successive years.

LMF will feature more than 80 technical papers, seven invited papers and a variety of application-oriented sessions such as photovoltaics, thin film processing, medical devices and biomedical applications, etc., highlighting the versatility of laser microprocessing.

Trends this year include laser surface modification, structuring, processing of transparent materials and different

micro deposition processes. General aspects of micromachining and ablation are well represented as well as thin film processing, photovoltaics, drilling, new optical concepts, laser sources and many others. The presentations introduce the latest and greatest advancements in their respective fields, presented by world's leading companies and research organizations.

NANOMANUFACTURING CONFERENCE

Yongfeng Lu, University of Nebraska – Lincoln, and Xianfan Xu, Purdue University, will co-chair the Nanomanufacturing Conference. The conference will explore topics in the still emerging, but rapidly advancing, field of nanotechnology and the role various lasers can play. Much progress has been achieved in laser direct writing for nano-machining, nanofabrication using femtosecond lasers and laser-assisted growth of nanostructures. This conference will highlight research in emerging nanomanufacturing technologies in 3-D micro/nanomachining, 2-photon lithography, digital fabrication, nanoparticle formation, surface nanostructuring and laser-assisted growth and epitaxy. These studies encompass a variety of applications, including photonic crystals, nanofluidic devices, opto-fluidic and nanoscale plasmonic structures.

BUSINESS FORUM, SHORT COURSES, PANEL DISCUSSION & CLOSING PLENARY

This year's Business Forum and Panel Discussion, a popular feature at ICALEO, organized by Neil Ball of Directed Light Inc. and Sri Venkat of Coherent Inc., will focus on photonics markets, opportunities and trends in the rapidly growing economies of BRIC (Brazil, Russia, India and China) nations. The panel discussion portion will address what industries within these nations are embracing; industrial laser technology, what applications have gained acceptance and what the future holds for the expansion of laser technology in their regions. In addition, insight with regard to regulatory issues such as government funding and policy towards the photonics industry will be provided. An overview of educational institutions and research centers will also be addressed.

The Laser Solutions Short Courses, organized by Silke Pflueger of Laserline, Inc., are ideal for those who want to receive

SCHAWLOW AWARD

Laser Institute of America first presented the Arthur L. Schawlow Award in 1982 to recognize individuals who have made distinguished contributions to applications of lasers in science, industry or education. The award presentation consists of a silver medal, a \$2,000 cash award and a citation. Awardees become lifetime members of LIA. The 2011 Arthur L. Schawlow Award will be presented to Professor Berthold Leibinger during the annual meeting luncheon held during ICALEO 2011.



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a complete overview on the state-of-the-art in specific areas of interest to participants. They are being held the day before the main conference, enabling all attendees to participate without time restrictions during the technical sessions. The short courses have been selected to complement the papers offered at ICALEO by offering fundamentals and in-depth information on measurement techniques, systems and processes. They are taught by industrial photonics experts, and offer ICALEO attendees valuable insight into details not usually covered by the latest results presented in the technical papers – for no additional fee.

The Closing Plenary session is a joint LMP and LMF session featuring strategies, limits and challenges for advanced laser processing with two invited and three contributed presentations. LMP Chair Stefan Kaieler will give the first invited presentation on “Strategies of R&D and International Networking Towards the Evolution of Future Laser Materials Processing.” Following this, a distinguished researcher, Prof. Minlin Zhong of Tsinghua University, China, will give the second invited presentation on “Vision on Frontiers of Laser Manufacturing Research.” The following three contributed presentations will discuss various approaches towards realizing higher-throughput and more efficient laser materials processing.

NETWORKING

The opening day of ICALEO features an evening reception hosted by LIA President Stephen Capp. Meet the LIA Executive

Committee, Board of Directors and ICALEO Chairs. Join the LIA staff and mingle with old friends at this exciting event!

The Vendor Reception is a popular venue for attendees to learn about the latest products, meet the industry representatives who are working in the laser applications market and will be a valuable networking opportunity.

“One of the key benefits ICALEO offers has always been the great social atmosphere and networking opportunities for the attendees. This will prove particularly helpful in these turbulent times brought on by factors that have nothing to do with lasers!” said Washio.

The Advance Program, which gives details on conference events, speakers and topics, is available to download at www.icaleo.org. Should you have any questions on ICALEO 2011, e-mail icaleo@lia.org or call 407-380-1553. Hope to see you in Orlando, the City Beautiful, Oct. 23rd! ■

CITY BEAUTIFUL

Orlando, the “City Beautiful,” is home to numerous attractions, including major theme parks such as Walt Disney World®, Universal Studios™ and SeaWorld®, excellent museums, over 170 golf courses, extensive shopping and dining options, and spectacular nighttime entertainment. Combine this with an enticing tropical climate and Orlando is clearly an ideal location to experience ICALEO and more with colleagues, friends and family.



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LME DELIVERS A TOP-NOTCH PROGRAM

By Geoff Giordano

The undisputed heavyweights of laser manufacturing convened at the Laser Institute of America's inaugural Lasers for Manufacturing Event to spotlight the 21st-century opportunities lasers promise for novice and veteran users alike.

The message of the Event — the first of its kind by a U.S.-based organization — was clear: lasers are the key to advancing manufacturing.

Drawing nearly 900 attendees and more than 70 exhibitors, LME made good on its promise to deliver an educational session that offered direct access to top-tier vendors and industry leaders with decades of expertise. Geared to highlighting the efficiency and potential return on investment afforded by laser-based applications, LIA crafted a wide-ranging program that

LME 2011 LIA'S LASERS FOR MANUFACTURING EVENT

gave attendees key insights into how to apply the technology in industries as diverse as automotive, aviation and aerospace, medical devices and power generation.

"This Event is helping to create good-paying jobs, it's helping to improve American competitiveness and it's educating people on the technology they need," asserted LIA Executive Director Peter Baker. "We are doing what the president and the government are only talking about doing."

Held Sept. 27-28 at the Renaissance Schaumburg Convention Center Hotel in Schaumburg, IL, LME provided a soup-to-nuts overview of the rudiments of choosing lasers, using them safely, creating production systems and realizing a solid profit. Advances in laser cutting, welding, cladding and drilling were the emphasis, but attendees also got a look at more far-out leaps in advanced additive manufacturing with 3D printing and laser sintering.

One of the most compelling aspects of the uniquely focused

event was the technical showcase theater, a stage for exhibiting companies to discuss their processes in 10-to-20-minute presentations. The show's intimate configuration fostered a collegial atmosphere in which business partners old and new were able to catch up, discuss new ventures and advise practitioners who came from as far as Russia, Turkey, Egypt, Japan and Korea.

"It's a remarkable turnout for the first show," enthused Wayne Penn, president of Alabama Laser, who gave his presentation on creating laser systems before manning his booth. "I got a lot of processing questions. It's been mostly a consulting day. I've sent people all over (the exhibit floor). They have real problems and they need real solutions, and for a lot of them lasers are probably the right solution."

Solution seekers — and the merely curious — ranged from those in the earliest stages of developing businesses, to firms seeking advice to further ongoing projects, to finance firms and investment bankers catching up with clients and connecting with new players in the field. In addition to soliciting information from firms including IPG Photonics, TRUMPF Inc, Laser Mechanisms, Laserline, Lincoln Electric, Fraunhofer, Coherent, ABB, Laserage and others, attendees were able to visit LIA's "Ask the Expert" booth for guidance.

"I had one guy asking about a battery welding application (and) another guy asking about glass processing; they do automotive glass mirrors and asked about laser scribing," said Robert Mueller of NuTech Engineering, who manned the expert booth both days. "There are enough lasers in automotive now that they're starting to look around and go, 'OK, where else can I do it? Management is comfortable to a certain extent with existing applications; now we can look around a bit farther.'"

THE MEAT OF THE MATTER

Appropriately enough, Tom Kugler of Laser Mechanisms kicked off the first LME with a comprehensive one-hour look at the broad array of lasers available (you can view his presentation and others by visiting www.laserevent.org/education/downloads). As with many of the show's sessions, Kugler's was standing room only and generated a flurry of post-talk questions.

Penn followed with his presentation detailing a variety of options for assembling manufacturing systems, cautioning that process development beforehand is vital to success — and avoiding expensive reconsiderations down the road.

"A laser is just another tool in the toolbox — it is not a magic wand," he advised. "I've received phone calls after conferences like this and the person will say, 'My application is this, that and the other. I spent \$750,000; I've got this, I've got that and I've got the other thing and I can't get it to work. Where's my problem?' And (I say), 'Gee, I'm sorry, but you really bought the wrong kind of system and laser for that problem.' They went through that process of building it in-house not leaning upon the understanding



The LME educational courses were well attended.

and the bad experiences that others have gone through.”

Mueller offered a comparison of traditional and laser-based manufacturing methods, noting the advantages of remote laser welding vs. resistance spot welding; laser vs. press blanking; and hybrid laser welding (HLAW) vs. multipass MIG welding. In general, he concluded:

- Remote laser welding is up to 20 times faster and perfect for high-volume production.
- Laser blanking is good for low-volume work because of the ability to produce a variety of parts without the exorbitant expense of creating specific tooling for a mechanical press. Parts for specialty vehicles are a particularly good candidate for lasers. For example, the convertible version of a car might require different body work and structures and only have a production run of 20,000 units.
- HLAW is also good a high-volume technique, particularly effective at long welds (ideal for shipbuilding, pipeline and heavy-equipment work).

Lastly, LIA Education Director Gus Anibarro educated attendees about the beam and non-beam hazards associated with lasers. While stressing the damage lasers can do to eyes and skin, he also pointed out how to avoid such injuries by choosing the proper laser enclosures and wearing the correct eyewear based on the appropriate optical density rating for a particular application. (view the LIA’s full range of laser-safety publications, courses and online resources at www.lia.org/education).

“The most hazardous class, which is probably your working laser, is a Class 4,” Anibarro told his audience, noting that such lasers are a hazard when viewed directly or seen by diffuse reflections, and are a fire hazard that can also produce air contaminants. “The most notable skin injuries are holes through fingers and third-degree burns. I have heard of people (who have) gotten a best-buy date marked right into their forearm.”

CUTTING-EDGE KEYNOTES

Furthermore, four half-hour keynote addresses at the technology showcase theater — conveniently located at the entrance of the exhibit floor — gave attendees up-to-the-minute crash courses in how lasers are being employed in 21st-century



Todd Rockstroh of General Electric speaking on the Impact of Laser Technology on Aerospace during the industry highlights on the show floor.

manufacturing.

GE Aviation consulting engineer Todd Rockstroh discussed how lasers produce highly sophisticated aviation turbine blades and overcame maintenance issues for the B1 bomber fleet in the early 1990s.

Auto-industry consultant Mariana Forrest, who spent 30 years at Chrysler, provided a survey of the industry’s increasing embrace of lasers to create more and more parts. She noted that major manufacturers Ford, Dodge, Chrysler, Audi and Mercedes-Benz have begun employing lasers in more ways since around 2005.

Additive manufacturing expert Bill O’Neill of Cambridge University piqued attendees’ interest with envelope-pushing applications such as the “Airbike,” built by the European Aeronautic Defense and Space Company from the ground up solely with lasers and nylon powder. And, he noted, patient-specific prosthetics are being built with lasers.

In the medical realm, Roberto Alzaga of Medtronic addressed how lasers are perfect for creating highly sensitive, highly regulated patient devices. The superior aesthetics enabled by lasers are particularly important for reinforcing doctor and patient perception of the quality of such units.

THE BOTTOM LINE

The economics benefits of lasers were painted in stark figures. For instance:

- Penn said that, early in their existence, laser job shops working with tolerances of 0.005 inches to 0.010 inches were able to reduce the cost of some parts from about \$70 to \$3.
- Rockstroh said GE could save \$15,000 to \$20,000 per jet engine with two new applications on the company’s “critical technologies” list that are slated go into production in late 2012 and 2013.
- O’Neill noted that biomedical companies using lasers to build patient-specific cranial, leg, shoulder, elbow and other implants are winning over insurance companies “because the down time in surgery is far less (reduced by up to 50 percent).”
- O’Neill also said lasers allow users to go from “art to part” with the ability to create 3D models “without paying \$50,000 a year per seat” to software vendors.

“Often we’re not looking at just part cost; it’s the full cost associated with the total operation,” O’Neill stressed. “If you can build a part without assembling it, you’ve got massive savings in assembly time. You might have increased time for the production,



Dr. Bill O’Neill of Cambridge University speaking on the Impact of Laser Technology on Additive Manufacturing during the industry highlights on the show floor.

LME con't from page 11

but the downstream savings can be significant, and they need to be explored in much greater detail.”

Furthermore, he noted, “Modern additive fabrication have pretty much zero waste; you put your material where you want it, when you want it and in what particular quantity (you want it).”

THE FINAL ANALYSIS

As LME progressed, vendor and exhibitor alike praised



Attendees at the IPG booth.

the amount of traffic the show generated and the amount of information available.

“It’s a good opportunity for everybody to learn about all the technologies in the same place,” said Octavio Islas, an automotive product engineer with Magna/Cosma in Mexico. “You can get a lot of information from all the suppliers. If you have any specific requirement, you have people with a lot of knowledge and experience, and they can tell you about your application and all the details.” (For more testimonials about LME, visit www.laserevent.org/testimonials).

“(At other shows) you get lost between the drill bits and the cutting oil,” Klos said. “If you’ve ever looked at a laser application, this is the right place to come. Everybody’s here; look at this room. We’ve talked to a steady stream of people we’ve never met before, and we also had a steady stream of people who just bought our technology and came to reaffirm that this was a good decision.”

LME will return to Schaumburg Oct. 23-24, 2012. More information will be available soon at www.laserevent.org.

“It was a very successful start,” said LIA President Stephen Capp, CEO of Laserage in Waukegan, IL. “The people I talked to were very pleased with the ability to come and just focus on equipment vendors that are very industry specific. I was very pleased at the turnout and we’re looking forward to putting together a bigger and better event next year.”

SAVE THE DATE FOR 2012!

Mark your calendars now for the 2012 LME, which will be held in Schaumburg, IL Oct. 23-24. Plan now so as to not miss this exclusive event for lasers in North America. Visit www.laserevent.org for more information. ■

LME 2011

LIA'S LASERS FOR MANUFACTURING EVENT



Tom Kugler of Laser Mechanisms addressing the crowd on the Main Laser Types Used for Manufacturing - Key Properties and Key Applications.



Attendees perusing the TRUMPF booth.





LaserStar Technologies Corp. displays their commitment to quality in the field of laser marking.



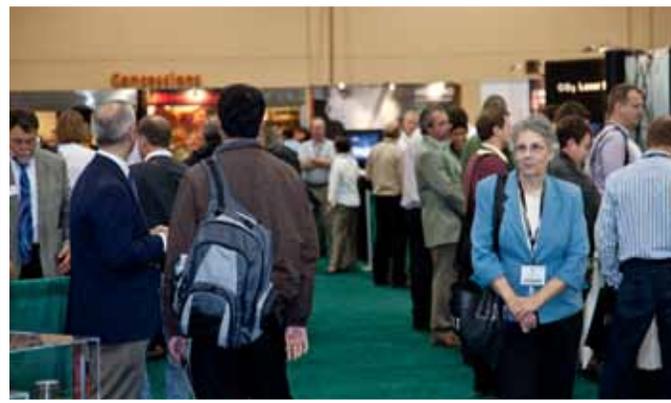
The keynote presentations attracted a large audience.



Attendees speaking to Laser Mechanisms' staff at their booth.



Wayne Penn of Alabama Laser speaking to the crowd on Laser Systems – Key Components and Options, above, and below, Lincoln Electric displays the latest in robotic technology and more!



HIGH-SPEED LASER ENGRAVING IN ANTI-COUNTERFEITING

By Eric Mottay

Counterfeiting is a major and global problem for the pharmaceutical industry, with extremely important societal and economic consequences. It is estimated that 10 percent of global pharmaceutical sales are counterfeit products, with a much higher ratio in Africa and parts of Asia. In addition to serious health issues, especially in developing countries, the revenue loss for the pharmaceutical industries is estimated at more than \$16 billion. Counterfeiting is also a new and relatively safe domain of expansion for organized crime and terrorist organizations.

Laser marking has penetrated a wide range of industries and is today used for traceability and product identification in markets as diverse as automotive, micro-electronics, semiconductor, photovoltaic, medical and packaging industries.

However, the pharmaceutical industry faces specific challenges that have until now limited the use of laser technology for anti-counterfeiting purposes:

- The identification mark should be as close to the primary package as possible, e.g. the syringe versus the cardboard box it comes in, or the vial versus the palette.
- The marking process should not alter the product.
- The mark should be tamper-proof and easy to read.
- The process speed should be compatible with the production environment.

ALTERNATIVE SOLUTIONS

Alternate technological solutions include inkjet printing and radio-frequency identification (RFID). Inkjet printing is widely used, still is vulnerable to tampering, adds additional consumables and leads to additional production steps. RFID, although well suited for remote checking of a batch, is not compatible with the primary package. Surface engraving by laser is also attractive, but may lead to physical alteration of the container and is also vulnerable to tampering by polishing the code.

Laser internal engraving is therefore today the only technological solution that fulfills all the criteria of the pharmaceutical industry. However, this approach brings serious

constraints to the choice of the laser source. The laser intensity at the focus should be sufficient for marking, ruling out continuous wave lasers. The container should be transparent to the laser emission, ruling out UV lasers. Finally, the container integrity should be preserved, which prevents the use of nanosecond infrared lasers: Due to the thermal nature of the laser-matter interaction, micro-cracks are created that can propagate over time and ultimately lead to glass fracture.

The recent development of industrial-class ultrafast lasers enable internal marking without any damage to the container. Because of the extremely high optical intensity and very short pulse duration delivered by ultrafast lasers, there is no heat dissipation during the interaction process, which means that there is no micro-crack formation. Therefore, since the individual spots can be made very small, it is also possible to achieve virtually invisible marking, and yet to guarantee reliable reading under proper lighting.

A first generation of internal engraving systems using diode-pumped Ytterbium ultrafast lasers was developed in 2004 by an industrial consortium, with the support of the European Union. In 2007, a company called TrackInside was formed to exploit the commercial potential of the technology in industrial environments. Because of the moderate average power of the laser used, this first generation system was first implemented in the luxury industry, which has the same technical requirements than the pharmaceutical industry, but needs lower production speed.

The development of high-power industrial ultrafast fiber lasers enabled the development of a second generation equipment, dedicated to the pharmaceutical industry. While maintaining the quality of the ultrafast laser internal engraving technology, the average power of the laser enables a marking speed compatible with the requirements of pharmaceutical industries. Additional developments were conducted related to the scanning speed, the software control, mechanical handling, to guarantee high quality marking at speeds up to 15 containers per second.

The TrackInside system has a very high accuracy and its flexible engraving process can create a 500 x 500 μm data matrix in less than 40 mm, as well as logos and text, on a field up to 60 x 60 mm. The readability of the marking is rated as grade A-AIM, i.e. the most stringent international regulation.

Ultrafast lasers are today at the nexus of several key technological advances – strong innovation in the scientific community gives rise to an increasing number of industrial application. At the same time, as the average power of ultrafast lasers increases, more of these applications reach the level where industrial deployment is economically competitive,

further increasing the drive for further laser developments. Let us expect ultrafast lasers to play an ever increasing role in industrial



Examples of internal glass marking using ultrafast lasers.

Making Innovation a Reality

- Contract Research and Development
- Laser welding and Brazing
- Remote Welding and Cutting
- Patented Laser Cladding Technology
- Outside and Inside Diameter Laser hardfacing



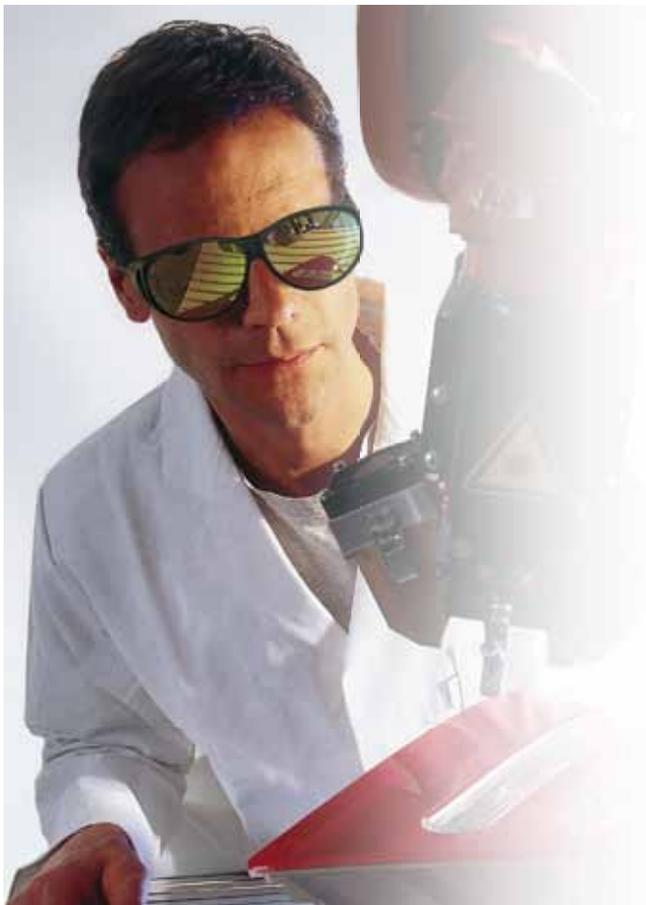
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processes, touching on many aspects of our daily life. ■

Eric Mottay is the CEO of ultrafast lasers manufacturer Amplitude Systemes.



Ultrafast lasers are helping lead a revolution in anti-counterfeiting measures.



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SOLVING MUD CIRCULATION IN OIL WELLS

By M. Bakhtbidar, M. Ghorbankhani and M.R. Kazemi Asfeh

When lasers were invented in 1960, they were called “a solution looking for a problem.” Since then, they have become ubiquitous, finding utility in thousands of highly varied applications in every section of modern society, including consumer electronics, information technology, medicine, industry, entertainment and the military.

Laser drilling is the process of removing material from a solid structure by irradiating it with a laser beam. Laser drilling refers to removing material with a pulsed laser, but it is possible to remove material with a continuous wave laser beam if the laser intensity is high enough.

There is a need for a new method of drilling oil and gas wells. Here we describe the results of research on laser-rock interaction with various samples that are from different Earth layers called formation. The laser-rock interaction idea was funded by Gas Technology Institute (GTI), the U.S Department of Energy (DOE), the U.S Air force and Argonne National Laboratory.

EXPERIMENT INTENTIONS

Reducing drilling costs in an environmentally sensitive manner is critical, so we decided to initiate three years of studies and experiments. These experiments had the goal of determining the effect of several types of the fluids under atmospheric conditions by saturated or submerged samples, downhole pressure and temperature and rock structure on laser-rock interaction.

Samples of sandstone, limestone and shale were prepared for laser beam interaction experiments with a CO₂ laser to determine how the beam’s size, power, exposure time and downhole conditions can be effected on the amount of energy transferred to the rock for the purpose of rock drilling. Table 1 gives a list of rock samples’ physical properties used in this analysis. The current

study indicated that the high-power fiber laser represents a technology that is more economically effective to



Figure 1. Rock samples after laser operation from left to right: Limestone, Shale, and Sandstone



Figure 2: Laser drilling cutting (Mag. 12X)



Figure 3. Air pump setup on laser machine

Samples	Depth (ft)	Volume (cm ³)	Weight (gr)	Porosity (%)	W _s (gr)
* Sandstone-1	2691	33.314	79.35	8.52	82.19
Sandstone-2	2806	30.722	80.22	-	-
Sandstone-3	3025	34.389	82.8	-	-
* Limestone-1	5106	12.722	35.2	1.96	35.45
Limestone-2	5146	12.756	33.83	-	-
Limestone-3	5207	12.756	38.48	-	-
* Shale-1	6873	13.193	36.74	2.27	37.04
Shale-2	7649	12.251	35.73	-	-
Shale-3	8006	13.193	34.03	-	-

Table 1. Physical properties of rock samples (*. Saturated sample) - (W_s, Weight after saturation) (Depth, The depth which taken sample)

operate, capable of remote operations and requires considerably less maintenance and repair. In addition, the team was interested in determining the behavior of water in the pores of the sandstones and other rocks. Figure 1 shows the three samples after lasing with a CO₂ laser pulse system.

We came up with several conclusions regarding the purification improvement, application of air pump (air amplifier) to remove rock cuttings and laser-rock interaction operations. Ordinary oil and gas well drilling with a laser hasn’t accomplished much in practice so far and all results are in the stage of research. This is due to the fact that the replacement of it with rotary drilling has some demerits, the most important of them are as follows:

- 1) The flow of mud circulation causes the transferred power to be decreased toward the rock surface.
- 2) Delivery of a laser’s power from a source that is at the surface to bottom of the well.

Purifying operations is important for cuttings removal and clearing the path for the beam to deliver to the rock. Dust, debris and cuttings will absorb the beam and therefore, less energy will be delivered to the rock sample. The dust, debris and cuttings present loss of energy in terms of specific energy. Figure 2 shows actual laser cutting and dust from laser rock drilling. This photo has been magnified with a camera 12 times. The purifying methods improved by adjusting the distance between the purifying nozzle to the rock sample surface and the angle of purify and the flow pressure. The optimized angle was found to be 28°-40° and the optimized distance from the target was 1 inch. In this experiment,

we had limited facilities, so the laser system and air pump used in this research had low power. However, by using this power we determined precision results. The angle and the distance were the most efficient in removing the dust and debris that allows the energy to be delivered to the sample. Figure 3 shows the air pump set up on the actual experiment.

In ideal conditions, if the purification is efficient, then the

laser should create a typical hole identical to the shape of the beam, the hole created in the sample should match the shape of the beam (figure 4).

SPECIFIC ENERGY

Specific energy (SE) is defined in this experimental work as the amount of energy required to remove a unit volume of rock. From the mass removed, the specific energy can be calculated as in equation 1:

$$SE = \frac{\text{Energy input}}{\text{Volume removed}} = \frac{E}{V_r} = \frac{P_{avg} * T}{V_r} \quad (1)$$

SE: Amount of energy required to remove a unit of rock

P_{avg} : average power of laser (W)

T: Timer of laser radiation(s)

V_r : Volume removed (cm^3)

We calculated SE values based on hole dimension method. We calculated V_r by hole diameter after lasing operation and depth of penetration for each sample.

Comparing the air amplifier methods with the nozzles is presented in figure 5 (amplifier vs nozzles). The result shows that nozzles are more efficient than the amplifier, the nozzles for the gas to flows in a narrower path and the debris and the dust escapes from the sides of the hole.

The laser system used in this experiment was working at 100 percent power and a velocity of 10mm/s with spiral tools from center to outside with 40 spins in 1 centimeter in 66 seconds.

COMPARISON OF SAMPLES

The amount of necessary energy for the drilling unit of dry samples (SE) in sandstone is less in comparison with the other samples. This specific energy is almost 32 to 36 kJ/cm^2 for sandstone, 34 to 42 kJ/cm^3 for limestone and 42 to 45 kJ/cm^3 for shale.

However, we can see an interesting conclusion here. The specific energy for saturated samples was completely the reverse of the specific energy for unsaturated samples. The range of SE is almost 31 kJ/cm^3 in shale, 59 kJ/cm^3 in limestone and 84 kJ/cm^3 in sandstone. So, the amount of drilling speed (what we call, in petroleum engineering as a rate of penetration) in shale is more than sandstone. Figure 6 indicates this matter clearly. ■

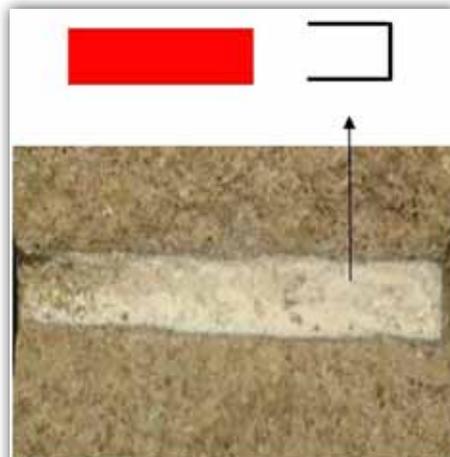
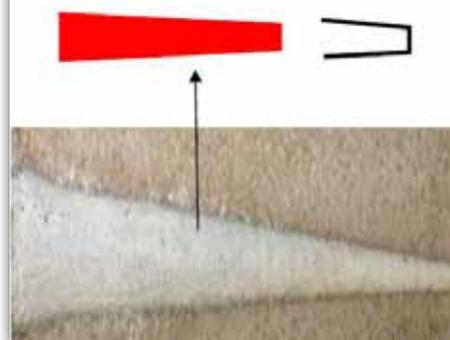


Figure 4. Effect of beam shape on resulting hole



Mahdi Bakhtbidar, Mohsen Ghorbankhani and Mohammad Reza Kazemi Asfeh are with the Young Research Club, Azad University of Omidieh Branch.

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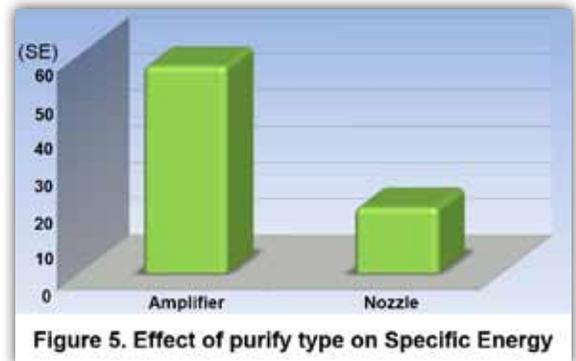


Figure 5. Effect of purify type on Specific Energy

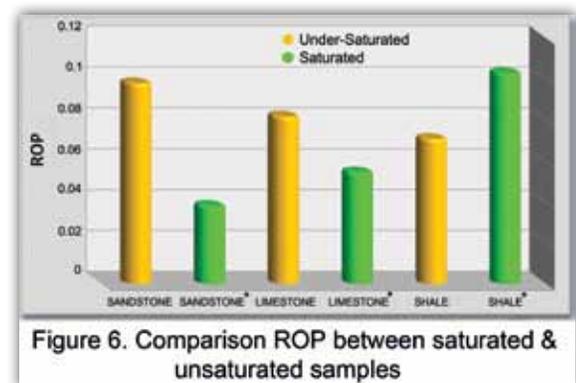


Figure 6. Comparison ROP between saturated & unsaturated samples



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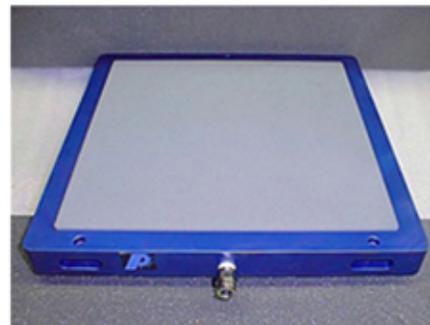
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CORPORATE MEMBER PROFILE

FRAUNHOFER USA CENTER FOR COATINGS & LASER APPLICATIONS

LIA Corporate Member Fraunhofer USA Center for Coatings and Laser Applications (CCL) provides innovative research and development services based on its expertise in coating technologies and laser applications.

Fraunhofer, a non-profit organization and LIA member since 1999, provides research services to its customers who include federal and state governments, multinational corporations and small- to medium-sized companies. The overall aim of the entire Fraunhofer organization is to bridge the gap between research and industry by providing top-notch applied research services to its customers, helping to enhance their competitive edge.

FRAUNHOFER ORGANIZATION

Fraunhofer USA is a wholly owned subsidiary of Fraunhofer-Gesellschaft which has over 80 research units, including 60 Fraunhofer Institutes at different locations in Germany. Fraunhofer Gesellschaft has an annual research budget of 1.66 billion euros. The majority of the 18,000 staff are qualified scientists and engineers.

Fraunhofer CCL, located in Plymouth, MI, has a close partnership with its parent institute Fraunhofer IWS, which is



located in Dresden, Germany. Fraunhofer also networks with companies that provide state-of-the-art technology in the field of coating and laser technologies.

Since its inception in the USA over 15 years ago, Fraunhofer CCL has been working in a wide range of industries in the U.S. including automotive, alternative energy, aerospace, and oil and gas. During this time, Fraunhofer has helped to develop and transfer laser technology into production for a wide range of applications and industries such as:

- Automotive roof welding (Fraunhofer CCL received the Henry Ford Technology Achievement Award in 2007 for work on the F150 Truck program).
- Lithium ion battery welding (now in volume production at a major li-ion battery manufacturer in Michigan).
- Automotive powertrain welding (various production installations).
- Laser cladding (now in volume production at various customer facilities throughout the USA and Canada)

APPLICATIONS

The Laser Applications Division carries out research and prototype applications development in the field of laser materials processing. The division has a wide range of expertise in laser processing technology, including laser hybrid welding technology, remote welding, laser cutting, laser cladding and laser heat treatment.

In the field of laser cladding, Fraunhofer CCL works together with Fraunhofer IWS to develop novel powder nozzle technology

for both precision fine cladding and high deposition rate cladding.

“Our new ‘induction assisted laser cladding’ process enables significantly higher deposition rates to be achieved whilst improving clad deposit quality, which is of particular interest to the oil and gas industry and for remanufacturing applications where higher productivity rates are demanded. A wide range of specialist nozzles have been developed for applications such as laser cladding inside of tubes and pipes (ID cladding) and for aerospace applications such as turbine build up cladding (direct metal deposition) applications,” said Fraunhofer CCL’s Laser Applications Division Director Craig Bratt.

KEEPING CURRENT

Asked where he’s seen the most growth in recent years, Bratt responded, “In terms of demand for laser applications and technology, all industrial sectors have grown significantly over the last five years, in particular automotive, alternative energy and oil and gas have seen a rapid increase in adoption of new laser technology with many new production applications being implemented.”

“The major change over the years that has been made at Fraunhofer CCL has been the advancement of solid-state laser technology, enabling more efficient high-power fiber delivered lasers, which are now beginning to replace CO₂ lasers for many applications. If you took a walk around our lab 10 years ago, you would have seen predominantly CO₂ lasers, whereas today you would see mostly state-of-the-art solid-state lasers from companies such as IPG, Laserline, Rofin Sinar and TRUMPF. These lasers range from 5 to 10 kW power, and are enabling a whole new range of applications to open up from high speed remote cutting and welding through to high deposition rate cladding. High power lasers today are cheaper and more efficient than ever before and this is leading to ever increasing industrial demand for both laser technology and our laser applications development expertise,” said Bratt.

Fraunhofer CCL sees great value in being an LIA Corporate Member. “The LIA provides a unique forum for networking, training and promotion opportunities for the American laser industry and we have found it invaluable over the years,” he said.

For more information, visit www.ccl.fraunhofer.org/. ■



Laser cladding and nozzle development are part of CCL’s activities.

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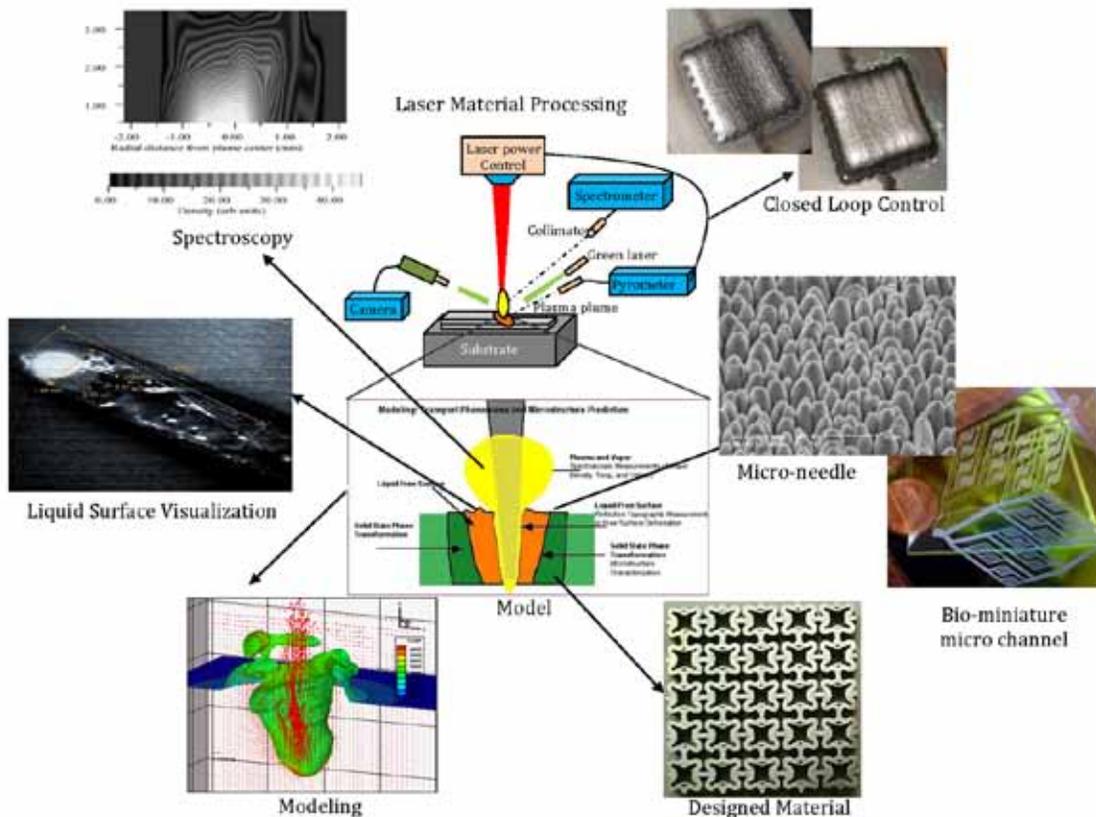
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ASC Z136 UPDATE

SAVE THE DATE!

Save the Date! The ASC Z136 2012 Annual Meeting is scheduled for Friday, February 17, 2012 in sunny Orlando, FL.

This year we are going to treat our volunteers like royalty! The meeting venue will be at the Holiday Inn Resort Orlando – The Castle. Located on International Drive, The Castle is a medieval-themed palace, unique among other Orlando hotels.

As we get closer to the meeting date, additional details will be released, including hotel rates and ancillary meetings.

Reserve your space today! ASC Z136 Subcommittee Chairs – If you would like to hold a subcommittee meeting prior to or immediately following the annual meeting, please contact Barbara Sams at bsams@lia.org or by calling 407-380-1553. We have meeting space available starting on Wednesday, February 15 through Saturday, February 18. Meeting space is available on a first-come, first-serve basis. ■



HOW TO PARTICIPATE

If you are interested in participating on ASC Z136 or any of its subcommittees, please contact Barbara Sams at 407-380-1553 or e-mail bsams@lia.org. To view committee activities or apply online, go to www.z136.org.

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BLS UPDATE

As the year comes to a close, many CLSOs and CMLSOs are focusing their attention on certification maintenance (CM). After successfully achieving certification, a certified LSO is required to maintain that certification to ensure he/she stays current on new technologies and other advances in the field.

The CM cycle is a three-year cycle that begins on January 1 of the year following the year in which the individual passed the exam and ending on December 31 of the third year. At the end of the cycle, the CLSO/CMLSO must recertify by documenting his/her development activities and submitting them to the Board of Laser Safety for review. A minimum of 10 CM points must be obtained over the course of the CM cycle.

A brief overview of the CM categories follows:

- 1) Laser safety experience
- 2) Attendance and successful completion of a laser safety course/training
- 3) Publication of laser safety or application related articles
- 4) Teaching laser safety outside of your company or organization
- 5) Membership in a laser-safety related professional/technical organizations
- 6) Active participation in a laser safety standards or regulations committee
- 7) Attendance at laser safety or applications professional

conferences or meetings

8) Presentations or poster papers at laser safety professional conferences or meetings

9) Writing exam questions (must be accepted by the BLS Review Board)

10) Related professional certifications; review of approved laser-related journal articles

If the CLSO/CMLSO wishes to maintain certification but cannot achieve the 10 CM points, he/she may be able to retake the exam.

For more information, please refer to the Board of Laser Safety website at www.lasersafety.org/certification-maintenance. If you have questions regarding CM activities, contact the BLS at 407-380-1553 or e-mail Jennifer Craft at jcraft@lasersafety.org. ■





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MICRO-HOLE DRILLING ON CEMENTED TUNGSTEN CARBIDE BY ULTRA SHORT LASER PULSES

by Khai Pham Xuan, Kazuya Saginawa, Rie Tanabe, Yoshiro Ito
Recently, high precision molds for small products are being highly required in many industrial applications, especially in information communication technology. Mold materials with high hardness, such like cemented tungsten carbide (WC-Co), are difficult to machine by classical chip-removal techniques and the electrical discharge machining (EDM) is mainly used technology in microfabrication of hard materials.

SCRIBING OF THIN FILMS WITH PICOSECOND LASER PULSES FOR CIGS SOLAR CELLS

by P. Gečys, G. Račnikaitis, M. Gedvilas, A. Braun, S. Ragnow
Low material consumption, the possibility of deposition on large areas, use of cheap and flexible substrates make the thin-film

photovoltaic elements the most promising technology to achieve a significant cost reduction in solar electricity. Interest in complex multilayered solar cells has increased recently because of low production costs and scalability through a roll-to-roll process. CIGS has been established as the most efficient thin-film technology in converting sunlight into electricity with the theoretical limit as high as 27% and a record value of 20.2% achieved in laboratory.

MICRODRILLING OF SHEET MATERIALS WITH FEMTOSECOND LASER PULSE SHAPED BY COMPUTER GENERATED HOLOGRAM

by H. Kawashima, M. Yamaji, Jun'ichi Suzuki, S. Tanaka
The technique of laser shock process (LSP) is an advanced surface treatment, which import high pressure shock wave induced by laser beam into target materials to improve their performance. The fatigue life of the materials is prolonged by times through changing the stress distribution. The hardness and strength are increased remarkably and corrosion resistance is improved after LSP. ■

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JLA UPDATE

The JLA is published four times a year by the LIA in February, May, August and November. It is available electronically to LIA members as a member benefit. To view the journal online, please make sure your membership is current.



The Laser Institute of America has made its official publication the *Journal of Laser Applications*® (JLA), an online-only journal, complete with new features for a broader audience. JLA is hosted on AIP Publishing's robust Scitation online platform, providing the journal with greater functionality and the ability to leverage a wide range of valuable discoverability features. JLA now features nine topic sections, a faster peer-review process and a more functional website (<http://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.

For non-members of LIA, call the American Institute of Physics at 1-800-344-6902 for subscription information. To receive your JLA table of content e-mail alerts, sign up at http://lia.aip.org/alerting_services/toc_alerts

Research Highlights

Innovative Approach of Joining Hybrid Components

Joining of dissimilar materials is gaining more and more importance especially in the automotive industry. The latest international initiatives concerning the average fleet CO₂-emissions are forcing manufacturers to reduce fuel consumption and exhaust gas output. This can mainly be achieved by reducing the weight of the vehicles. New methods for weight optimization have been enabled by material selections adapted to local strength requirements.

Direct Manufacturing of Net-Shape Functional Components/Test Pieces for Aerospace, Automotive and Other Applications

Laser consolidation is a novel computer-aided manufacturing process being developed by the Industrial Materials Institute of National Research Council of Canada. This rapid manufacturing process produces net-shape functional metallic parts layer-by-layer directly from a computer-aided design model by using a laser beam to melt the injected powder and resolidifying it on the substrate.

View complete articles at jla.aip.org.

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MEMBER INNOVATIONS

COHERENT OFFERS MORE LASERS

The HighLight D-Series, a new range of diode laser systems from Coherent, Inc., Santa Clara, CA, delivers both high power and an increased range of “smart” output beam shapes. The HighLight D-Series includes products with output powers of 2.8 kW, 4 kW, 6 kW and 8 kW (all at 975 nm), thus addressing the varying requirements of the worldwide industrial market. Free space beam delivery preserves the inherent brightness of the diode laser source and enables the use of an optical system with a large (275 mm) working distance. Together, these factors translate directly into enhanced laser capabilities in industrial processing applications.

Coherent has also expanded its Sapphire™ line of compact, CW, visible lasers with several ultra-narrow linewidth models. Specifically, these new Sapphire SF lasers are available at wavelengths of 488 nm and 532 nm, and feature single longitudinal output to achieve a linewidth of less than 1.5 MHz. For more information on either product line, visit www.coherent.com.

NEW STARLAB SOFTWARE

Ophir Photonics Group, Logan, UT, recently introduced StarLab 2.20, laser measurement software that converts a PC into a multi-channel laser power/energy station. The newest version of the software includes support for the BeamTrack sensors; they combine multiple measurement functions in a single device: power,

energy, beam position and beam size. StarLab provides an easy-to-use, PC-based application that graphically displays, processes and logs all these measurements. With StarLab 2.20, laser sensors can be displayed separately or multiple data sets can be displayed in one graph. For more information, visit www.ophiropt.com.

NEWPORT'S NEWEST

Newport Corporation, Irvine, CA, has introduced the new series of FMS Precision Linear Stages. The high precision, motion control stages are designed for use in surface profiling, tribology and contact (stylus) and non-contact metrology (white light interferometry). Ideal for surface metrology applications, Newport's FMS linear stages are available in three travel options: 100 mm, 200 mm and 300 mm.

Also from Newport are new vacuum-compatible LTA series actuators and the URS50B rotation stage for research and industry. These products are compatible to 10 x e-6 hPa (7 x 10e-6 torr) vacuum and are designed for integration in critical sample positioning or beam management processes in vacuum environments. These newly-designed vacuum stages feature a motor-mounted encoder that is extremely useful in detecting the stall of a stepper motor. The encoder also offers improved position repeatability, a critical factor in many research and commercial applications in vacuum environments. For more information on either, visit www.newport.com. ■

MEMBERS IN MOTION

TRUMPF RECEIVES AWARD

TRUMPF has once again been honored with the Bosch Supplier Award in the Machinery and Equipment category. The award places TRUMPF among the few Bosch suppliers that have received the coveted award for the second time in a row. With this award, Bosch recognizes companies that have provided outstanding services in the manufacture and delivery of products or services in the past two years, especially with regard to quality, pricing, reliability, technology and continuous improvement.

This is the twelfth year since 1987 that Bosch has conferred the supplier award that is advertised worldwide and is issued every two years. TRUMPF received its first award in 2007. Due to the financial and economic crisis, there was no award given in 2009. This year's award was issued in seven categories to a total of 60 suppliers from 14 countries.

SAVE THE DATE!

Fruanhofer ILT will be hosting the 9th International Laser Technology Congress AKL'12 in Aachen, Germany May 9-11. Laser manufacturers and users will learn about the latest trends, and gather ideas for future activities at Germany's leading forum for applications of laser technology in the production environment. Over 500 participants, 70 conference speakers and 30 sponsors will attend this event. Additionally, the organizers plan to offer an even wider range of educational seminars. For more information, visit www.lasercongress.org.

NEWPORT ACQUIRES OPHIR

In October, Newport Corporation, Irvine, CA, completed the acquisition of Ophir Optronics Ltd., a global leader in precision infrared optics, photonics instrumentation and three-dimensional non-contact measurement equipment, for \$8.43 per share in cash. Ophir is headquartered in Jerusalem, Israel, with manufacturing operations in Israel and the U.S. and sales offices in the U.S., Japan and Europe. Newport Corporation is a leading global supplier of advanced technology products and systems to customers in the scientific research, aerospace and defense/security, microelectronics, life and health sciences and precision industrial manufacturing markets. For more information, visit www.newport.com.

PATENT FOR MULTIPHOTON IMAGING

Spectra-Physics®, a division of Newport Corporation, has been issued a U.S. patent 7,962,046 for its DeepSee technology for multiphoton imaging. Used in both the industry-leading Mai Tai® DeepSee and the recently announced InSight™ DeepSee products, the pioneering technology enables automated, deep 3-D imaging of live tissue in neuroscience, cell biology and other advanced biological applications. The new patent expands the company's portfolio of fundamental patents covering ultrafast laser technologies. For more information, visit www.newport.com.

SAVE THE DATE FOR LAM 2012

Join us for LIA's 4th annual Laser Additive Manufacturing Workshop (LAM) 2012 to learn from industry specialists from around the world with the goal of applying these state-of-the-art processes (cladding, sintering and rapid manufacturing) to today's manufacturing challenges. LAM 2012 offers quality technical sessions and networking opportunities to discuss equipment and



applications with vendors and your peers. This year, LAM will be held February 29-March 1, 2012 at the Sheraton North Houston at George Bush Intercontinental in Houston, TX.

Topics will include laser cladding for aerospace, automotive, DoD, heavy equipment, oil and gas and power generation as well as R&D and international applications of additive manufacturing.

Sponsor opportunities are available as this workshop will provide a unique opportunity to market your company's products and services to new customers and new prospects. Meet face-to-face with manufacturing engineers and managers, process/R&D engineers, applications and construction engineers, system integrators and more. For more information about sponsorships, contact Jim Naugle at 407-380-1553, jnaugle@lia.org or visit www.lia.org/conferences/lam.

SAVE THE DATE FOR LME 2012

Mark your calendars now for the 2012 LME, which will be held in Schaumburg, IL Oct. 23-24. LME 2012 will be the place to see the latest in laser technology, network with the industry's elite and find solutions to current and future manufacturing needs.



The mission of LIA's Lasers for Manufacturing Event (LME) is to provide a one-stop event for companies interested in integrating laser technology into their production. Attendees will learn about laser choices, beam delivery, automation equipment, safety considerations, applications development and meet exhibitors that supply these products and services.

Plan now so as to not miss this exclusive event for lasers in North America. Visit www.laserevent.org for more information.

LIA PUBS DISCOUNTS

Act now to get your hot summer sale reading materials from LIA! During this special you can get 20% off LIA's *Guide to Laser Cutting* for \$40 (member price: \$32) and the *Laser Safety Guide*,

a handbook for all laser personnel that outlines potential hazards for all types of lasers and provides easy to understand guidelines for controlling laser hazards for \$21.60 (member price: \$17.60). *Hybrid Laser Arc Welding, Introduction to Laser Technology, 3rd Edition* and *Understanding Lasers: An Entry-Level Guide, 3rd Edition* are being offered at member pricing; \$225, \$127 and \$83 respectively.

We've saved the best for last! The *ANSI Z136.1 – Safe Use of Lasers* is 30 percent off this summer. The parent document and cornerstone of the Z136 series of laser safety standards, the *ANSI Z136.1 (2007)* provides guidance for the safe use of lasers and laser systems by defining control measures for each of the four laser classes. It is recommended that this standard be obtained by all laser end users and is a must for users of class 3B and 4 lasers.

Now is the time to invest in the foundation of a successful laser program! To order these publications at the discounted prices, which are good until Oct. 31, visit www.lia.org/store and enter the discount code LMETODAY11.

INDUSTRIAL LSO COURSE IN DECEMBER

An Industrial Laser Safety Officer course will be held at IPG Photonics Corporation, Midwest Operations, Novi, MI on Dec. 13-14, 2011. This course is a two-day non-mathematical approach designed to teach the duties of laser safety officer as described in the *ANSI Z136.1 Safe Use of Lasers* standard to users of industrial lasers. Information on lasers and optics, bioeffects, beam and non-beam hazards, control measures and training requirements are covered. Emphasis is placed on laser safety program development and administration. This course meets all LSO training requirements outlined by ANSI and OSHA and is worth 2.0 BLS CM points by the Board of Laser Safety.

To register, visit www.lia.org/store/course/ILSO1211A or contact LIA at 800-34-LASER. Cost is \$550 or \$500 for LIA members.

NEW ENGLAND CHAPTER TO MEET IN NOVEMBER

The Boston University Photonics Center will be hosting the fall meeting of LIA's New England Chapter on Wednesday Nov. 30, 2011 from 5–7 p.m. The technical presentations will focus on laser applications in microfluidics, and be followed by a dinner reception. Thomas J. Dudley, the assistant director of the Photonics Center, will present an overview of work being conducted by faculty, staff and students, particularly in microfluidics and biophotonics. The featured technical presentation will be 3D microstructures in glasses and sapphire by in-volume selective laser-induced etching from work by Martin Hermans, Maren Hörstmann-Jungemann, Dagmar Schaefer and Jens Gottmann at Aachen University/Fraunhofer Institute, Aachen, Germany.

The technical program will be followed by a networking dinner. Cost for the dinner is \$40 per person with advance reservations required. E-mail membership@lia.org to RSVP. ■



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February 29 - March 1, 2012

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