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: LASER SAFETY | Volume 18 NO. 2 | MARCH / APRIL 2010

LASER SAFETY

What type of training do you need? pg. 8

Laser Additive Manufacturing pg. 6

Impact in Asia pg. 12

Laser Institute of America

Laser Applications and Safety

13501 Ingenuity Drive, Suite 128 | Orlando, FL 32826 | Phone: 407.380.1553 | Fax: 407.380.5588 | www.laserinstitute.org

IN THIS ISSUE

FEATURES

DEPARTMENTS

ADVERTISERS

LIA TODAY

THE OFFICIAL NEWSLETTER OF THE LASER INSTITUTE OF AMERICA

LIA TODAY is published bimonthly and strives 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.

The editors of *LIA TODAY* welcome input from readers. Please submit news-related releases, articles of general interest and letters to the editor. Mail us at *LIA TODAY*, 13501 Ingenuity Drive, Suite 128, Orlando, FL 32826, fax 407.380.5588, or send material by e-mail to lia@laserinstitute.org.

2010 LIA OFFICERS

EDITORIAL STAFF

BUSINESS STAFF

CALENDAR OF EVENTS

Laser Safety Officer Training
July 13-15, 2010 | Chicago, IL
Dec. 7-9, 2010 | Clearwater, FL

Laser Safety Officer with Hazard Analysis*
June 7-11, 2010 | Boston, MA
Sept. 27 - Oct. 1, 2010 | Anaheim, CA
Nov. 1-5, 2010 | San Antonio, TX
**Certified Laser Safety Officer exam offered after the course.*

Medical Laser Safety Officer Training*
Sept. 18-19 2010 | Boston, MA
Nov. 6-7 2010 | San Diego, CA
**Certified Medical Laser Safety Officer exam offered after the course.*

Advanced Medical LSO Training*
Sept. 9-12, 2010 | Atlanta, GA
**Certified Medical Laser Safety Officer exam offered after the course.*

Advanced Laser Safety Officer Training*
May 11-13, 2010 | Orlando, FL
**Certified Laser Safety Officer exam offered after the course.*

LAM Workshop 2010
May 11-12, 2010 | Houston, TX

ICALEO® 2010
Sept 27-30, 2010 | Anaheim, CA

LIA SUPPORTED CONFERENCES

Lasers in Action at LASYS
June 8-10, 2010 | Stuttgart, Germany

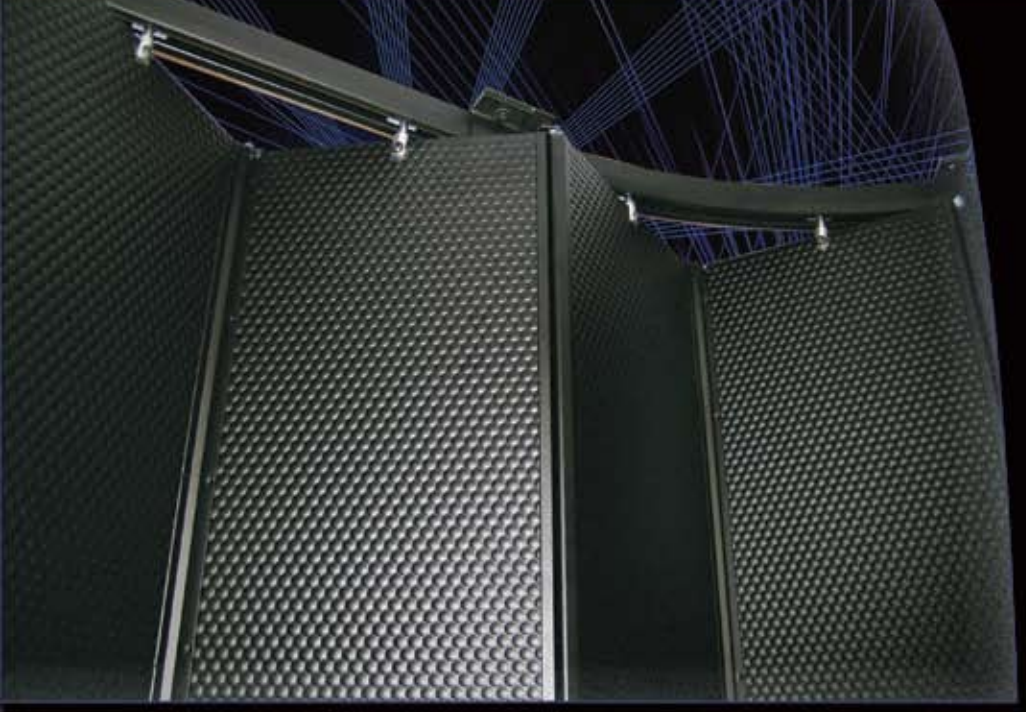
ANGEL 2010 EOS Conference on Laser Ablation and Nanoparticle Generation in Liquids
June 29 – July 1, 2010 | Engelberg, Switzerland

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.



LASER SAFETY BARRIERS

EVER-GUARD®
Laser Curtains

Ever-Guard® retractable curtains are the most protective laser barriers available commercially. Designed for low and high power laser radiation, these curtains offer the flexibility of a fabric curtain with the protection of a metal barrier. Each system is built to individual requirements and is rated for 1200 W/cm² for 3 minutes. Available in stock sizes any width and height up to 8 feet. Custom sizes also available.

FLEX-GUARD™
Laser Curtains

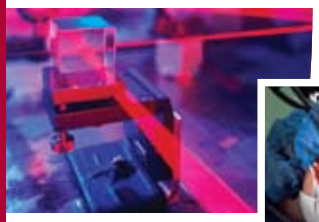
Flex-Guard™ heavy duty matte finish fabric is ideal for blocking diffuse and low power laser radiation. Durable and flame retardant materials are suspended from ceiling- or floor-mounted coated black steel track engineered for low-friction operation. Virtually any configuration is possible using curves, by-pass rollers and other accessories. Each system is rated up to 200W/cm² for 100 seconds and is available in stock and custom sizes.

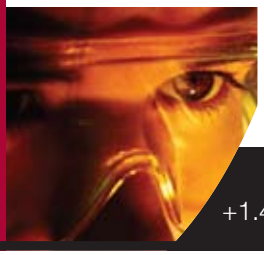
Inquire about our laser auditing, laser safety training, and laser consulting services presented by experienced laser experts.

KENTEK®
"Laser Smart Products"®

components accessories containment signs/labels education eyewear

Int'l: +1 603•223•4900 • Fax: 603 435•7441 – Email: info@kenteklaserstore.com • Web: www.kenteklaserstore.com





The 2011 International Laser Safety Conference (ILSC®) is a comprehensive 4-day conference covering all aspects of laser safety practice and hazard control. Technical sessions and workshops will address developments in regulatory, mandatory and voluntary safety standards for laser products and laser use.

Featuring:

- Laser Safety Scientific Sessions
- Technical Practical Applications Seminar
- "Hot Topic" Luncheon
- Awards Luncheon
- **New for 2011!** Medical Practical Applications Seminar – Earn contact hours while experiencing cutting-edge presentations

The World's Leading Conference on Laser Safety

ILSC®

INTERNATIONAL LASER SAFETY CONFERENCE

March 14 - 17, 2011

Doubletree Hotel San Jose
San Jose, CA, USA

Presented by:

Laser Institute of America
Laser Applications and Safety

For more information please contact the LIA:
+1.407.380.1553 | 1.800.34.LASER | ***www.laserinstitute.org/ilsc*** | *conferences@laserinstitute.org*

FOCAL POINTS

Interactive Training for Medical Laser Safety©

Coming Soon! Pre-Sale Now Available.
Call the LIA Office for more details.

A Cost-efficient Training Tool for all Health Care Professionals using Class 3B and Class 4 lasers and laser systems!

As a key part of your facility's laser safety program, FOCAL POINTS ensures your compliance with the regulations set forth by the Joint Commission and OSHA as well as fulfilling the ANSI Z136.3 Safe Use of Lasers in Health Care Facilities training requirements.

FOCAL POINTS is vital in assisting health care professionals understand fundamental information regarding lasers and their safe use.

LIA is the secretariat of the ANSI Z136.3 committee who writes the standard for health care laser safety, so improve the health of your medical laser safety program by getting your training straight from the source!

Order your copy of *FOCAL POINTS – Interactive Training for Medical Laser Safety©* *(Pub #318)* today!

Order online at **www.laserinstitute.org/store** or call toll-free **1.800.34.LASER**

◀ Preview Online

Price:
Member: $450
Non-Member: $495

Contact LIA for Site License Information

Laser Institute of America
Laser Applications and Safety

PRESIDENT'S MESSAGE

LIA is positioned as the portal to the laser applications community, encompassing scientists through manufacturers and fabricators. The *Journal of Laser Applications®* (JLA) and *LIA TODAY* have evolved to provide rapid communication for this community by offering online access as well as print versions. However, readers, both LIA members and non-LIA members, have the "want" for near instantaneous access to information that creates continuous opportunities for LIA to rapidly disseminate information to a broader market.

JLA was established as a peer-reviewed scientific journal to provide idea exchange for scientists and engineers to foster new technology development for existing and new laser processing applications. Submitted papers are reviewed by qualified scientists familiar with particular research areas that confirm experimental results and observation or question them for better clarity and understanding. It is this questioning of results and rebuttals that creates a platform for sound science. Involvement and activity among all LIA scientists and engineers is necessary to expedite this review process; those that submit papers should provide time to review the research of other submitters on a timely basis. The intent is to provide quality content as JLA broadens its market. LIA is evaluating proposals to improve this process and to expand the exposure of JLA to scientists and engineers outside the immediate LIA community.

For the industrialists who are results-driven and want descriptive information on implementation of technology into applications, *LIA TODAY* is evolving to broaden its dissemination of information in this area. Magazine articles highlighting technology implementation and new applications can be accommodated. Authors of these types of articles should submit to this periodical.

Support these periodicals by submitting articles and participating in a timely review process. Quality and expanded content is critical for increased, recognized exposure to the global technical community.

Nathaniel Quick
President
Laser Institute of America

EXECUTIVE DIRECTOR'S MESSAGE

This month LIA holds the annual meeting of the Accredited Standards Committee (ASC) Z136, which develops and revises the ANSI Z136 series of laser safety standards. LIA is the secretariat and we are responsible for seeing that the committee and numerous subcommittees carry out their work in accordance with procedures approved by ANSI, the American National Standards Institute.

Committee and subcommittee members do important work making sure that latest safety research and knowledge is incorporated into the standards, which form the basis of every successful laser safety program. If you meet a committee member, thank them for their good work. If you would like to join a committee and contribute to standards development, please contact LIA's Standards Director Barbara Sams at bsams@laserinstitute.org.

In order to execute a comprehensive laser safety program, it is prudent for the Laser Safety Officer (LSO) or Medical Laser Safety Officer (MLSO) to receive training. LIA has offered standards-based courses of all kinds for over a quarter of a century, ranging from one day to four-and-a-half days, in locations around the country, on-site or online (see www.laserinstitute.org/education for more details).

In addition to this comprehensive and authoritative schedule of courses, LIA is also an OSHA alliance partner. As part of this program we jointly develop OSHA training aids and we train OSHA inspectors around the country in laser safety.

For those organizations demanding the highest standards, our affiliate organization, the Board of Laser Safety, has developed a certification program that includes education, training, experience and an examination (see www.lasersafety.org for more details). Those who pass the program and exam become Certified Laser Safety Officers (CLSOs) or Certified Medical Laser Safety Officers (CMLSOs) and wear the designation with pride.

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

SOME THOUGHTS ON LASER ADDITIVE MANUFACTURING

Highlights from the plenary presentation that will be given at the Laser Additive Manufacturing (LAM) Workshop May 11 in Houston.

By W.M. Steen

Laser additive manufacturing is possibly the fastest growing area of laser material processing research, if not also in laser applications. It is certainly one of the more entertaining and exciting areas in which to work. To see something grow where nothing had been before is one of the wonders of nature, where growth is also by an additive process. In this article, the history of laser cladding is discussed, the current concerns presented and some thoughts on the future for low-volume direct manufacture considered.

A BIT OF HISTORY

Building things has always been an additive process, be it by nails, screw, solder or welding. What the laser has introduced is precise additions by weld build, or polymerization, to create solid objects of great detail. This is a far cry from the early weld build methods patented by Baker in 1925[1]. The new additive methods called "rapid prototyping" or "low-volume manufacture" are now numerous, some of which are listed in Table 1 below.

Few of these processes make usable metal objects. They mainly make plastic models that can be used in a subsequent casting process. I would like to confine this article to direct metal fabrication, which includes laser direct casting (melting processes) and hybrid forging processes.

It was in the late '70s that laser cladding with pre-placed powder was first practiced[2]. The problem with pre-placed powder consolidation was a weak interface bond[3]. At this time, which was around 1980, Rolls Royce asked us at Imperial College to try blowing the powder into the laser generated melt pool. Without a powder feeder this was tricky. So we got a drinking straw and filled it with powder and then blew it into the beam for a rather short run. The result was sufficiently convincing that Rolls Royce patented the process so that they would not be cut out if someone else made a patent. Their first industrial application came in 1981 for the hard facing of nimonic turbine blade interlock shrouds for the RB211 engine[4]. This application was followed swiftly by Pratt and Witney in 1983 for their JT8 and JT9 engines. Previous patents concerning layer manufacture by P. Ciraud in 1973[5] and the concept of selective laser sintering (SLS) by Housholder in 1979[6] had introduced the concept of laser weld build processes, but not by powder blowing. By the 1980s, a laser cladding process had been born which as you all know has progressed into an industry in its own rights.

It had, and still has, its problems that needed to be understood concerning the metallurgy and shape of the deposited track and efficiency of the process. Height control during wall building was one particular problem, currently solved by in-process temperature sensing and control, such as that from Jyoti Mazumder's group in Michigan[7] or by controlling the powder flow design as in Fearon's work at Liverpool[8].

Table 1. Some of the main rapid prototyping and rapid manufacturing processes.

Method	Accuracy mm/m	Casting materials	Speed	Application area	Approx. cost of equipment
Selective laser sintering(SLS)	0.005	Thermoplastics, metal powders	Average to good	A (less detailed) D, F,	$0.2-1M
Direct metal deposition(DMD)	0.005	Metal powders	Average to good	C, D, E, F	$0.3-1.5M
Laminated object manufacture (LOM)	0.01	Paper, metal sheets	Good	A (less detailed) G, H	$10-240k
Stereolithography (SLA)	0.003	Photopolymers	Average	A, B, C, E, F, G	$75-800k
Fused deposition method (FDM)	0.005	Thermoplastics, eutectic metals	Poor	A, B, C, F, G	$15-300k
3D printing (3DP)	0.005	Various materials	Excellent	A, I, J, F	$20-70k

Areas of application:

A – Models for fit and form testing
B – Trade show and marketing parts
C – Rapid manufacture of small detailed parts
D – Rapid manufacture of larger parts
E – Fabrication of specialized manufacturing tools
F – Patterns for investment casting
G – Patterns for urethane & RTV moulding
H – Larger parts for sand casting
I – Color models for finite element analysis, FEA and other engineering related applications
J – Architectural and landscape models

WHERE ARE WE NOW?

ICALEO® conferences for the past few years have had a special section on rapid prototyping and direct metal deposition accounting for some 20 papers each year. The topics being addressed are:

- Micro structures of specific alloy deposits. Grain growth, phases, residual stress, cracking, and porosity.
- Process control and in-process sensors for height, composition, weld pool dimensions.
- Process methods: Improvement in speed and deposition rate, vibration, beam shaping by diffractive optic elements (DOE), two-photon polymerization.
- Special coatings: graded composition, bio-compatible coatings, wear, hardness, corrosion.
- Computing aspects: tool path optimization and theoretical models of the process.

Applications are appearing in many industries, but particularly in aerospace for repair and weld build of turbine blades and the medical industry for personalized prosthesis.

SO WHAT OF THE FUTURE?

a) New bonding methods such as O'Neill's supersonic forge welding process, the Laser Cold Spray (LCS) process[9] in which high velocity powder impacts onto a laser heated spot to form a fully dense clad.

b) New materials: graded compositions, MMCs and the formation of alloys in-situ.

c) New scale: The fine focus of a laser beam is reduced even further by polymerization processes that need two photons to cause polymerization as in the work of Ostendorf[10]. Currently, non-linear optical events such as this have hardly been studied by

the engineering community.

d) New structures:[11] beams like bones, reinforcing ribs like leaves; redesigned brackets and parts. Never before has the internal structure of a casting been something that could be designed. One might wonder what can be devised with this new freedom.

e) Hand-held cladding tools similar to the glove box laser welders for jewelry work would free the artist from the constraints of programming a CNC system.

f) New sensing technologies particularly for adaptive control for in-situ repair processes.

g) Improved process conditions: powder catchment efficiency, wire feed systems, surface finish.

h) New applications: in-situ repair, micro-artifacts, ultra light ball bearings, personalized prosthesis.

A BRIGHT OUTLOOK

Additive manufacturing has an impressive array of potential growth points. The applications are sure to grow as lasers and the delivery systems improve. The potential for hand-held systems would be like magic in the hands of the artistic craft community. Computing and adaptive controls may allow the development of in-situ weld repair systems for turbine blades or some such application. Low volume, accurate manufacturing systems would be very useful in out-of-the-way places such as space, aircraft carriers, or remote oil wells. But coming up behind all this is the growing interest in nanotechnology and the manufacture of micro parts – for which the laser is also well placed.

I started this article with an analogy to nature, with which we still have much catching up to do. How about a self-repairing turbine blade or a build process that automatically structures itself for the stresses that the component will have to endure? The future for additive manufacture is as certain as nature itself.

But what is likely to hold up the development of these processes is lack of formal training in what optical energy can do. There should be departments in universities for optical engineering as there is today for electrical and mechanical engineering. Currently there is only one center, at CREOL (College of Optics and Photonics at the University of Central Florida, Orlando, Fla.), which seems out of scale with the expected and current use of optical energy. ■

William Steen is professor emeritus at The University of Liverpool, Liverpool, Great Britian.

References

[1]*Baker R. (1925) "Method of making decorative articles" US patent No. 1,533,300.*

[2]*Gnanamuthu D.S. (1974) "Laser cladding" US patent 3952180 filed 12/04/1974*

[3]*Powell J., Henry P.S., Steen W.M. "Laser cladding with preplaced powder: analysis of thermal cycling and dilution effects" Surface Engineering 4 (2) (1988), pp 141-149.*

[4]*MacIntyre R.M., "Laser hardfacing of RB211 turbine blade shroud interlocks," Applications of Laser in Material Processing, ASM conf. Los Angeles ed. Metzbower E.A. Jan (1983) pp 230-240.*

[5]*Ciraud P. "Verfahren und vorrichtung zur herstellung beliebiger gegenstande aus beliebigem schmetzbarem material" German patent publ DE 2263777, priority filed Dec 28 1971, publ July 5, (1973).*

[6]*Housholder R. "Molding process" US patent 4247508, filed 12/3/1979, publ Jan 27th, (1981).*

[7]*Cai G-S, Zuo B-R, Tait R.W., Harding K.G., Peng H., Azer M. "Vision-based feed back control of deposition height for laser consolidation" Proc Congress (ICALEO 2005) pp 856-861.*

[8]*Fearon E, Watkins K.G., "Optimisation of layer height control in direct laser deposition" Proc. 23rd International Congress on Applications of Lasers and Electro-Optics 2004 (ICALEO 2004) 4-7 October 2004, San Francisco. Publ LIA, Fl, paper 1708.*

[9]*Bray M., Cockburn A., O'Neill W. "The laser-assisted cold spray process and deposit characterisation" Surface coatings Technology 203 (2009) 2851-2857*

[10]*Passinger S., Ohrt C., Seidel A., Cheng W., Chikov B., Ostendorf A. "High speed fabrication of 3D microstructures by two-ophoton polymerisation technique" Proc. 27th International Congress on Applications of Lasers and Electro-Optics 2008 (ICALEO 2008) 20-23 October 2008, Temecula, CA, Publ LIA Fl USA paper M1203.*

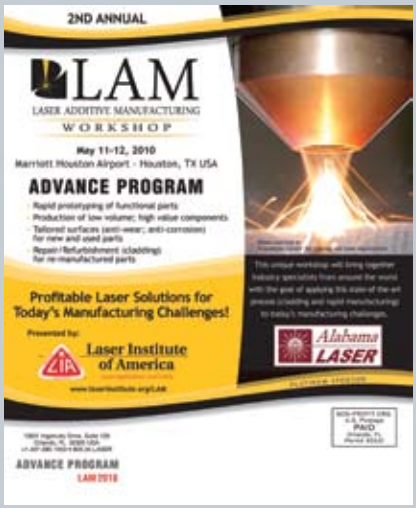
[11]*Emmelmann C., Petersen M., Goeke A. "Laser free form fabrication for aircraft applications" The Laser User publ. AILU UK Issue 57 winter (2009) pp 22-23.*

LAM ADVANCE PROGRAM NOW AVAILABLE

The advance program for LIA's second Laser Additive Manufacturing Workshop (LAM) is now available. LAM brings industry specialists, executives, users and researchers from around the world to show how cladding and rapid manufacturing can be applied effectively and affordably to today's manufacturing challenges. This workshop, to be held May 11-12, 2010 in Houston, TX, will have a significant impact on the widespread industrial implementations of laser additive manufacturing.

Topics will include laser cladding for aerospace, automotive, DOD, heavy equipment, oil and gas, and power generation; new cladding techniques for component repair and general manufacturing, and research, development and international applications of additive manufacturing.

Visit **www.laserinstitute.org/LAM** to download the Advance Program, to register, or for more information on LAM 2010.



LASER SAFETY TRAINING BY LIA

The Laser Institute of America (LIA), as secretariat of the ANSI Z136 series of laser safety standards, the foundation of laser safety programs nationwide, has dedicated its resources to fostering lasers, laser applications and laser safety worldwide. In fact, LIA offers a complete line of laser safety training courses for personnel in research, industrial and medical laser facilities. LIA's specialized training courses and seminars related to laser safety cover virtually all genres of laser use.

TEST TIME

So how do you know if you or your staff needs training? Here's a quick little quiz to try that should provide an indication of the level of competency of your laser users. (This quiz is based on the ANSI Z136 series of laser safety standards, as are all of LIA's courses.)

1. Solids, liquids, and gases are examples of which one of the following?
   - A. An excitation system
   - B. A lasing medium
   - C. An optical resonator
   - D. A laser property

2. According to the ANSI Z136.1-2007 *Safe Use of Lasers* standard, training programs shall be provided for users of which laser classes?
   - A. Class 2, 2M, 3R, 3B and 4 lasers
   - B. Class 3R, 3B and 4 lasers
   - C. Class 3B and 4 lasers
   - D. Class 4 lasers only

3. Which type of reflection is caused when a beam strikes a mirror-like surface?
   - A. Direct
   - B. Intrabeam
   - C. Diffuse
   - D. Specular

4. A sensor card does which of the following?
   - A. Converges the laser beam.
   - B. Re-directs the laser beam.
   - C. Encloses the laser beam.
   - D. Produces a visible spot at the location of the beam.

5. The visible portion of the electromagnetic spectrum is generally defined as which of the following wavelength ranges?
   - A. 100 nm to 400 nm
   - B. 400 nm to 700 nm
   - C. 1 micron to 1.5 microns
   - D. 1040 nm to 10600 nm

How did you do? Whether you're new to laser safety, or more experienced, your goal is to uphold the highest standard of laser safety. If you find that training is needed, LIA can help. At LIA, our mission is to help you achieve your goal by offering the most comprehensive laser safety training programs available.

(Answers: B, C, D, D, B)

TRAINING TIME

Here's an explanation of the different types of training provided by LIA.

Laser Safety Officer Training Course (LSO) is designed to provide participants with the knowledge required to perform the duties of a laser safety officer as described in the *American National Standards Institute (ANSI) Z136.1-2007 Safe Use of Lasers* standard. This course was designed for all levels of experience involved in industrial, military, educational or research applications of lasers. It is tailored to fit the needs of safety professionals, engineers, laser operators, technicians and other professionals assigned the duties of LSO who are not required to perform hazard analysis calculations.

Advanced Laser Safety Officer Training Course is to provide in-depth knowledge on laser safety issues, laser hazard assessment and laser safety calculations. Topics covered include important updates to standards, laser bioeffects, laser and optical measurements and laser safety calculations of MPEs, NHZ, etc. Through LIA's Advanced LSO Course, you will have the opportunity to gain new skills and increase proficiency in laser safety issues, hazard assessment, and laser safety calculations.

Medical Laser Safety Training Course (MLSO) – As an LSO at a medical facility, you have a unique set of responsibilities. Not only is laser safety a top priority to protect your staff, but it is critical to protecting your patients. Our MLSO training program addresses the specific laser safety protocols as they relate to medical and health care environments. Designed to give operating room personnel a basic foundation, you will gain valuable knowledge and understanding of laser biophysics, tissue interaction and laser safety in a medical environment.

Advanced Medical Laser Safety Training Course takes students beyond the basics with an in-depth and thorough look at laser biophysics, tissue interaction and laser delivery in a medical environment. Additionally, our experienced LIA instructor will provide a valuable hands-on demonstration on multiple laser systems, surgical smoke plume management, anesthesia

con't page 10

LIA BOOKSTORE

Nothing is more powerful than knowledge, and with publications from the Laser Institute of America, you're getting more than 40 years worth of know-how from the leading professionals in laser technology. From national safety standards to instructional how-to guides on laser applications, these items are necessities for laser users in all environments. The knowledge and power of the optical revolution is at your disposal. Let the LIA be your guide! Visit **www.laserinstitute.org/store/** today to browse our many selections.

protocols and laser safety protocols according to the *ANSI Z136.3 Safe Use of Lasers in Health Care Facilities* standard.

ON-SITE TRAINING

With our on-site training solutions, you will save on travel expenses and have more control over the training schedule and content. Plus, you can set a higher safety standard by training your entire staff at one time, providing an enhanced level of consistency and compliance. Following are the in-house laser safety programs currently offered by LIA.

Basics of Laser Safety provides a non-mathematical, intuitive framework for understanding the basics of lasers and laser safety. It provides a general overview of laser physics, hazards and control measures, as well as laser safety standards and regulations.

Industrial Laser Safety – During this one-day course taught at your facility, our expert instructor will teach your staff the issues and hazards associated with using high-powered lasers in manufacturing. The course also presents methods of controlling these hazards to help ensure a safer working environment.

Laser Safety Officer is designed to teach the administrative duties of the LSO as described in the *ANSI Z136.1 Safe Use of Lasers* standard. With a focus on safety program development and administration, the course covers lasers and optics, applications, laser bioeffects, hazard analysis, non-beam hazards and control measures.

Medical Laser Safety Officer is a comprehensive in-house course that will provide participants with the first-hand knowledge required to perform the vital duties of an LSO in a medical facility.

Medical Laser Safety Awareness Course covers the clinical, technical and administrative aspects of running safe and productive laser services in hospital, surgical and medical facilities.

Medical Hands On Skills Validation – Have you ever thought it would be helpful to have someone show your medical team in person the best safety practices when using YOUR laser system? LIA's most popular in-service medical laser safety program does just that. This one-day, in-service program is designed to demonstrate the laser physics and safety as it relates to your specific wavelengths.

Laser Safety in the Lab is designed to offer solutions and cost effective options to anyone who is providing laser safety support in a research setting, academic, national laboratory, designated research facility or commercial firm. Topics included are program structure, control measures and non-beam hazards in a research setting, safety protocols, training options and obtaining user cooperation.

WHY CHOOSE LIA?

LIA has been setting the standards in laser safety training for over 40 years. In fact, LIA trains more LSOs than any other organization in the world. Other laser safety organizations come to LIA for education and training resources. Our knowledgeable instructors are among the most experienced experts in the laser industry, and many sit on the ANSI standards committees.

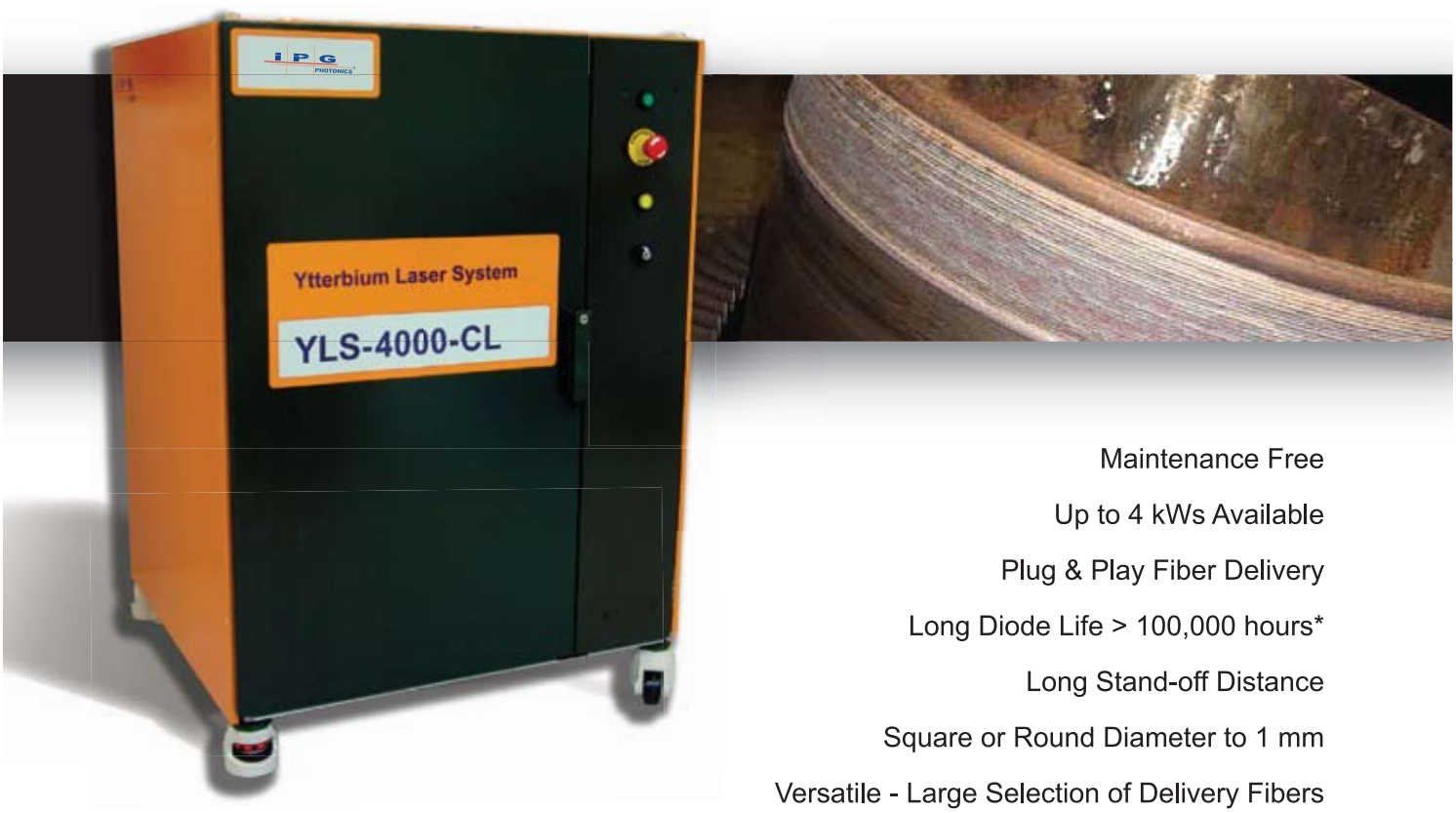
Developing and implementing a successful laser safety program is a top priority for you and your organization. LIA is your laser safety authority! Visit www.laserinstitute.org or call 1-800-34-LASER to get your training started. ■

ONLINE LASER SAFETY COURSES

With LIA's online laser safety courses, you have the opportunity to gain more knowledge in less time. Our online laser safety training courses are the most comprehensive and convenient, enabling you to access coursework when and where it's convenient for you. Additionally, the online courses are budget-friendly because they eliminate travel expenses. For more information, visit **www.laserinstitute.org/store/Online+Courses**.

IPG PHOTONICS' NEW CUSTOMIZED FIBER LASER

FOR CLADDING, BRAZING, ANNEALING & HEAT TREATING



Maintenance Free

Up to 4 kWs Available

Plug & Play Fiber Delivery

Long Diode Life > 100,000 hours*

Long Stand-off Distance

Square or Round Diameter to 1 mm

Versatile - Large Selection of Delivery Fibers

More Cost Effective than Direct Diode Systems

Single Wavelength

*Estimated MTBF

IPG PHOTONICS®

The Power to Transform®

The World's Leading Provider of High Power Fiber Lasers & Fiber Amplifiers

www.ipgphotonics.com

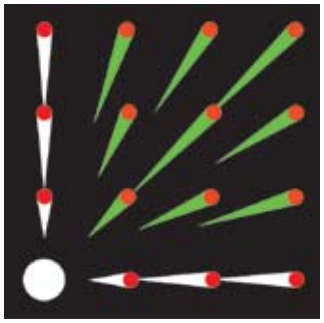
+1 (508) 373-1100

sales.us@ipgphotonics.com

IPGP NASDAQ LISTED

IMPACT IN ASIA

LASER World of PHOTONICS CHINA 2010 on track to become the leading laser and photonics show in Asia.



China's leading photonics exhibition, LASER World of PHOTONICS China, began its yearly exhibitions in Shanghai in 2006. Since that time, LASER World of PHOTONICS China has confirmed its role as the most important platform for laser and optics technology in the People's Republic of China. The growth in exhibitor participation combined with the increase in attendee quantity and quality provided ample evidence that the laser and photonics market in China has a promising future.

Held March 16-18, 2010 in Shanghai and with 275 exhibitors from 17 countries, LASER World of PHOTONICS China set a new record with an all-time high of exhibitors and visitors. The number of exhibitors increased 25% over the previous year, and had total attendance of 25,243, an increase of 15%. The trade fair also expanded its exhibition space by 27%.

LASER World of PHOTONICS China 2010 had more overseas visitors, especially from Taiwan, Japan and Korea. Aside from the laser industry, many of the visitors come from national key industries such as manufacturing, solar energy, shipbuilding, automotive, electronics and semiconductor, illustrating the wide applications lasers have in different industries and research environments.

INTERNATIONAL IMPACT

Many exhibitors, domestic as well as international companies, chose LASER World of PHOTONICS China as an ideal platform to launch their new products on a truly international stage. Key international LIA corporate members who participated consisted of Trumpf, Coherent, IPG, GSI, Newport, and nLight.

The 5th LASER World of PHOTONICS China records all-time high of exhibitors and visitors.

Guenther Weinmann, general manager of Trumpf China, said, "LASER World of PHOTONICS China this year is the best show ever. We are quite satisfied with the visitor quantity and quality. I hope it will keep growing as it has during the past five years."

The breakdown of visitors reveals considerable increases in those from management, R&D, and procurement. Bo Gu, general manager of IPG (Beijing) Fiber Laser Technology Co., Ltd. commented, "We will handle LASER World of PHOTONICS China as our most important event every year, because it is now becoming the biggest laser trade show in China, and even in Asia. We hope the organizer will build up the brand to form a tripartite with LASER World of PHOTONICS in Germany and a laser trade show in America."

CONFERENCE PROGRAM

This growing trade fair again joined hands with Electronica & Productronica China, SEMICON China and the CPCA Show under the umbrella of the Shanghai International IT and Electronics Fair (SIIEF). This synergy produced China's largest electronics and photonics trade show and provided attendees with a comprehensive platform for communicating and sharing ideas.

Additionally, the Optics Frontier 2010 Conference looked at cutting-edge laser technologies and recent challenges and a training course, Workshop on Optical Design and Inspection, was held during the show to complement the Optics Frontier conference. Industry-leading experts and decision-makers from various public authorities, universities and research institutes, and executives from international corporations took part in the events.

ACCOMPANYING EVENT DISCUSSES INDUSTRY TRENDS

Another highlight at the show was the LIA-sponsored event: The 5th International Conference on Laser Processes and Components (LPC 2010), which discussed laser micro processing, macro processing, optics components and laser systems, and facilitated cooperation and exchanges between the laser-photonics research community and industrial applications. LPC runs on the show grounds (during show hours) and is organized by the Chinese Optical Society, Munich Trade Fairs, Laser Zentrum Hannover and LIA. LIA has supported this event for the past four years.

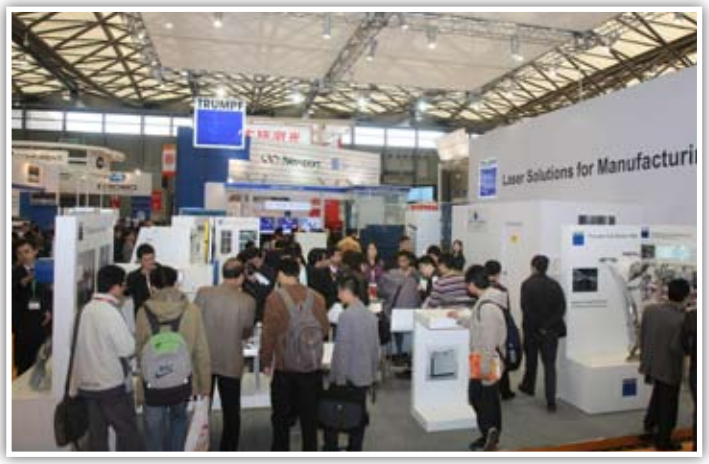
The program contains a mix of Chinese, European and North America presenters and features individual papers on

con't page 14

laser processing technologies, laser components and current developments and trends in laser technology. Total attendance this year was around 400 according to show organizers. LIA will continue to support this event and the trade fair in order to establish its international presence.

LASER World of PHOTONICS China 2011 will be held at Shanghai New International Expo Center, Shanghai, People's Republic of China, from March 15-17, 2011. For more information, visit **www.world-of-photonics.net**. ■

The Laser Institute of America's booth at LASER World of PHOTONICS China.



Many exhibitors, domestic as well as international, chose LASER World of PHOTONICS China as the platform to launch their new products on a truly international stage.

POM's Direct Metal Deposition (DMD) Technology is a patented, state-of-the-art, laser-based additive manufacturing technology with closed loop control for metal synthesis and metal component fabrication directly from CAD data using powdered metal and a laser beam.

Commercial DMD systems offer:

- Turnkey Integration with a user friendly HMI
- Patented Co-axial Nozzle with multiple powder feeders
- Patented Closed Loop Feedback System for neat net shape
- CO_2, Fiber delivered Diode and Disc Lasers
- 3/5 Axis moving optics and rotary tables
- Both CNC and Robot Platforms
- Small, Medium and Large Work Envelops
- DMDCAM – a 5-axis additive manufacturing software
- DMDVision – Vision system for quick and precision part pick up and easy toolpath generation
- Inert gas chamber for processing reactive materials, like Titanium, Molybdenum, Niobium etc.

The POM Group, Inc.
2350 Pontiac Road, Auburn Hills, MI 48326
P: (248) 409-7900
Email : info@pomgroup.com

www.pomgroup.com

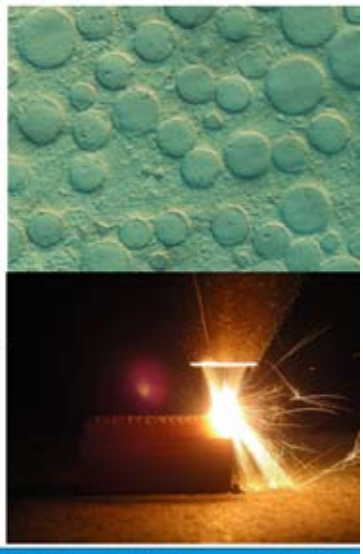
DURUM USA

Laser Cladding Powders.

Ni based alloys
Fe based Alloys
Co based Alloys
Tungsten carbides (FTC, SFTC, Macro...)
Vanadium carbides

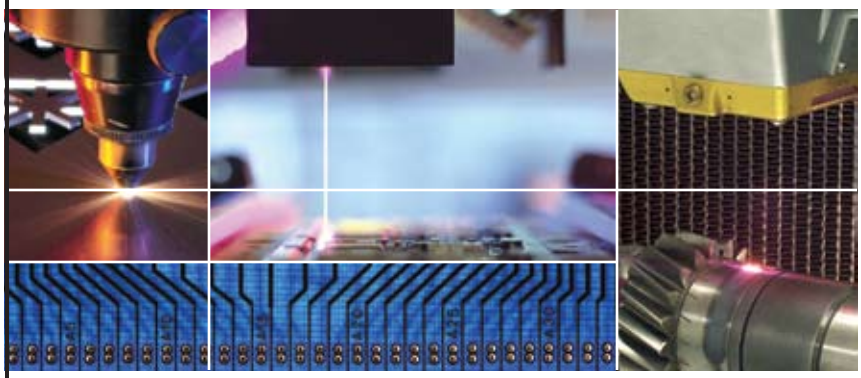
Custom blended powders for specific application.

PTA Powders, Thermal spray powders, wires, HVOF...



11133 I-45 South, Building I / Conroe, TX
77302 USA
1-888-267-0387 / fax : 936-539-2470

Precision, Power and Performance.



Coherent helps systems integrators and end users in many different industrial applications improve total cost of ownership by providing a range of highly reliable, high-performance laser sources, all of which offers its own particular advantages and processing characteristics.

Coherent's CO_2 lasers offer the highest power (>1 kW) per size ratio available for sealed lasers. Our Direct Diode technology offers excellent wall-plug (electrical conversion) efficiency, which is many times higher than for any other laser types.

Stop by our display at LAM 2010 to learn more about solutions for your material processing needs, or call us at 800-527-3786.

COHERENT®

tech.sales@Coherent.com
www.Coherent.com
toll free: (800) 527-3786
phone: (408) 764-4983

Benelux +31 (30) 280 6060
China +86 (10) 6280 0209
France +33 (0)1 6985 5145
Germany +49 (6071) 968 0

Italy +39 (02) 34 530 214
Japan +81 (3) 5635 8700
Korea +82 (2) 460 7900
UK +44 (1353) 658 833

Superior Reliability & Performance

LIKE NO OTHER

The new Sperian New York™ offers unrivalled laser protection with the perfect blend of comfort and style. We have combined the timeless look of the tortoise shell pattern with spring hinges and wire core temples for the ultimate in comfort and high-end styling. Intricate metal accents not only enhance the design, but also create a highly protective laser-resistant frame…like no other.

For more information, call
1-800 500-4739 or visit
www.sperian.com

SPERIAN
Protection you can trust

CORPORATE MEMBER PROFILE | CVI MELLES GRIOT

LIA Corporate Member CVI Melles Griot serves the semiconductor, biotech, industrial, commercial, aerospace and research industries, and is a leading global supplier of photonics products including optical components and systems, lasers, motion-control systems, laser measurement instrumentation and opto-mechanical hardware. Placing equal focus on customer service and innovative research, CVI Melles Griot is a major OEM supplier, proficient in high-volume fabrication of standard and custom optical components, advanced thin-film coatings and complex optical systems incorporating lasers, optics and alignment systems.

COMPANY BACKGROUND

Founded in 1959 and headquartered in Albuquerque, New Mexico, CVI Melles Griot operates manufacturing facilities in New Mexico, California, New York, the British Isles, Japan and South Korea with sales representatives and distributors located worldwide.

CVI continuously maintains an extensive depth of technological and applications expertise. Their seasoned design and development teams represent disciplines in laser physics, optical design, thin-film coating technology, mechanical and thermal management, electronics, software development, manufacturing, and quality engineering. In total, more than a third of the company's employees are engineers and scientists. Additionally, a portfolio of more than 125 patents is owned by the company, 100 of which are in solid-state laser technology.

COMPANY PRODUCTION

CVI Melles Griot is dedicated to innovation and customer service by offering a full spectrum of design and manufacturing expertise, and maintaining an unique build-your-own catalog that allows customers the flexibility to customize parts to their specific application.

CVI's 130,000-square-foot production facility is equipped with specialized tooling and automated assembly and test systems organized to achieve product uniformity, quality and low cost. The company's experienced applications engineering personnel are available to address custom applications. For example, custom engineering of EOAs and assemblies includes full system performance analysis and optimization, illumination design, stray light analysis, shock and vibration testing, design to weight and size constraints. The company is ISO 9001 certified.

COMPANY PRODUCTS

CVI Melles Griot gets you what you need, when you need it. From the UV to the IR the company offers unmatched breadth and flexibility in lasers, optical components, and electro-optical assemblies. CVI's extensive catalog, along with their custom and build-to-print capabilities, deliver solutions from prototype to high-volume, OEM quantities.

From its beginnings in 1979, CVI Melles Griot Laser Group established itself as a premier manufacturer of laser-based light sources. This was accomplished through a customer-centric philosophy that delivers the exact solution the customer needs. The Laser Group manufactures three basic types of lasers: gas lasers (helium neon, helium cadmium and ion lasers), diode-pumped solid-state (DPSS) lasers and semiconductor diode laser assemblies with output ranging from the ultraviolet to the near infrared. Thirty-one years and nearly three million units later, CVI Melles Griot is widely known as a stable, reliable source for laser-based components and subsystems to the global marketplace.

CVI manufactures a variety of standard and custom lenses, mirrors, prisms, filters and other optical components and offers custom optics and multi-element lens assemblies in OEM production quantities and custom coatings for OEM specific applications for manufacture in a Class 10,000 clean room environment. A complete line of critical laboratory items that support efficient and safe operation as well as supplies and equipment for the proper care, cleaning and handling of optical components including collimation testers, test targets, infrared viewers, small tools and laser safety eyewear is also offered.

WORKING WITH CUSTOMERS

Since the offerings from CVI Melles Griot are so wide and varied, the company publishes a catalog of all their products. There is also a technical guide explaining how everything works, and most recently the company has released a capabilities brochure that explains what CVI can do to for a customer's project.

With a strong core of engineering and development expertise, CVI Melles Griot maintains an ongoing commitment to technology development, state-of-the-art equipment and world-class manufacturing processes and management systems. For more information, visit **www.cvimellesgriot.com**. ■

ASC Z136 UPDATE

By Thomas E. Johnson

ANNUAL LASER SAFETY MEETING

AN OVERVIEW OF Z136.1

The ANSI Accredited Standards Committee (ASC) Z136 met in San Jose, Calif. on March 12, 2010. Early in the day, Dr. David Sliney gave a presentation on the Vertical and Horizontal Aspects of the ANSI Z136.1 Standard. Changes were initiated in 2005 to simplify Z136.1, and move the other Z136 standards to "vertical" rather than "horizontal" standards. The reasoning is that the current Z136.1 document covers all applications, which leads to a lack of specific guidance in some applications, and overly restrictive requirements in others. The concept is to have multiple vertical standards that are highly specific, rather than many horizontal standards. Ideally, Z136.1 would be horizontal, containing only the information that is common to all applications. Vertical standards would contain application-specific information (ranging from telecommunications to medical, outdoors to manufacturing, education to exhibits, and everything in-between). The vertical standards would then be independent of each other for the specific applications. Ultimately, you would not need to refer to multiple documents for each application, as is the current case. The Z136.1 would then contain definitions, hazard evaluation and classification, and the most fundamental concepts of control measures and maximum permissible exposures (MPEs). Simplification of the laser safety standards is a key, long-term goal of the changes. This simplification is still a goal, and based on the revisions in progress, it will be attained in the next five to 10 years.

STANDARD REVISIONS

Revision of the Z136.1 *Safe Use of Lasers* is in progress. Originally conceived as having only incremental changes, a host of significant changes are expected. Some anticipated changes to the document include changing wavelength units to nm, except to those wavelengths > 3.0 μm, which will be in micrometers. Section 4, Control Measures, has been completely rewritten and revised, with new definitions, tables and figures. The entire medical surveillance section was modified, with most of the materials moved to an appendix. The UV intrabeam exposure time will probably be changed to 100 s, rather than 30,000 s. The transmission of optics (was in 2000, not in 2007 standard) will once again be included. It is now a requirement to have laser safety eyewear for Class 3B lasers if you are in the NHZ (nominal hazard zone).

The maximum permissible exposure limit (MPE) for the 1.1 to 1.4 micron region where the retinal to cornea hazard transition occurs will now have dual limits, resulting in more relaxed MPEs in this region. This will involve a change to the C_C factor from 1.15 to 1.4 microns, making it dependent on both wavelength and exposure duration. Also impacting the MPEs will be revised factors for C_E. Furthermore, the MPEs will be reduced slightly in the microsecond to the ns region. Rules regarding repetitive pulses, especially the use of $n^{1/4}$ will be changed. Note that these MPE updates will eventually appear in the ICNIRP and ACGIH guidelines.

The committees have worked hard to improve the tables and figures to make them more logical, consistent and easier to use. Expect changes to a_{max} to make it time dependent. The examples in appendix B have been redone, since the MPE formulas were changed to units of nm, and more examples have been added. The committees are also trying to harmonize the current signage with Z535 requirements.

MEMBERS WANTED

At the conclusion of the meeting, a presentation was given challenging the committee to recruit new members to each subcommittee as well as to the main consensus body (ASC Z136). Key elements to remember and share are

- This is your opportunity to shape the standards, and
- You can do this by email and via the z136.org website if travel is an obstacle.

If you are interested in participating, please contact Barbara Sams at bsams@laserinstitute.org or call 407-380-1553.

Travel not an obstacle? The next ASC Z136 meeting will be in San Jose in March, 2011. We'd love to see you there. ■

Thomas E. Johnson is with Colorado State University and a Health Physics Society representative to ASC Z136.

BLS UPDATE

Plan now to attend the 6th annual Laser Safety Officers Workshop to be held July 27-29, 2010. This year's workshop will be hosted by Lawrence Berkeley National Laboratory in Berkeley, Calif. For the last five years, a core group of laser safety officers (LSOs) from the Department of Energy (DoE) National Laboratories have coordinated this annual laser safety workshop. These workshops feature presentations on topics not typically found in standard laser safety training, and solutions to real-world laser safety issues by experts in the field.

Nobel Prize winner Charles Townes is scheduled to open the event with a presentation on the laser. Sessions to be covered this year include: discussion of Terahertz radiation and lasers, veterinary medicine and lasers, laser accidents, training suggestions, lasers in biotechnology, an audit review panel, and mini-workshops on the three primary laser safety calculation software programs available on the market.

The BLS will host a breakout "Q&A" session to answer questions on certification, and allow the opportunity to network with the CLSOs and CMLSOs in attendance. Please join us at this one-of-a-kind workshop. Visit the LBNL website, **http://www-afrd.lbl.gov/LSOW/**, for the draft agenda, registration and housing information.

Any questions please contact Ken Barat, kbarat@lbl.gov, or Martha Condon, MHCondon@lbl.gov. ■

CHAPTER CORNER

LIA Northern California Chapter Launched

The first meeting of the Northern California Chapter of the LIA will be held on Wednesday, April 21, 2010, at the Bella Mia Restaurant, San Jose, Calif. and will feature Ken Caldeira from Stanford University as invited speaker discussing "Climate Change for Technologists."

Caldeira will present some of the latest information on climate change, as well as discuss whether technologists, especially those working in high-tech industries, can do anything on either a personal or a professional level to reduce the negative effects of climate change.

To set the scene, there will also be an introduction by a laser industry veteran who specializes in the use of lasers in the photovoltaic industry. We look forward to an interesting and stimulating evening with many great networking opportunities.

Caldeira was designated one of the eight "Science Heroes of 2008" by *New Scientist Magazine*. He was also listed as #36 in *Rolling Stone* magazine's list of top 100 people who are changing America. Caldeira is an adviser to Bill Gates on climate and energy issues, and is currently a member of National Academy panel preparing to report to Congress on "America's Climate Choices."

RSVP to Kathleen Pollack (kpollack@laserinstitute.org) or call 407-380-1553. Please register early as we expect this event to be 'sold out.' For more information, visit **www.laserinstitute.org/membership/chapters/northern_california**.

LASER INSIGHTS

Laser Insights is a new feature to give insight into the very latest developments of laser materials processing and the possible applications. These overviews are designed to provide perspective on the content and applications of the papers presented at our conferences and workshops. Visit ***www.laserinstitute.org/laserinsights*** *to begin your search.*

SELECTIVE LASER SINTERING, *by Li Xiaogang*

Selective laser sintering (SLS) is an important branch of laser rapid manufacturing that has been developing based on laser cladding technology. With the development of laser manufacturing, SLS plays an important role in the commercial realm. In some cases, vertical sintering/cladding using laser to repair big parts in work site is inevitable. In this paper, an approach of laser vertical sintering with a magnetic field has been explored. The powder was paved on a substrate with a magnetic field. The experiment system of laser vertical sintering includes iron powder, iron substrate, magnet and iron shelf. The iron shelf can sustain the weight of iron powder and iron substrate and a tight part with specific thickness and shape could be made under the control of a magnetic field. During the entire operation the powder can be controlled easily and a clean workplace can be achieved. The magnetic field can help to improve the quality of crystallization during sintering/melting. In laser vertical sintering/cladding, the liquid downward mobility leads to more width of molten pool, which is a great help for improving the molten pool's spreadability. To some extent, using a laser beam to sinter powder vertically has an obvious advantage of its process mechanism, which has potential applications in industry.

LASER-ASSISTED PROCESSING OF 3D BIOCERAMIC STRUCTURE, *by R. Comesaña, F. Lusquiños, J. del Val, T. Malot, A. Riveiro, F. Quintero, M. Boutinguiza, P. Aubry, J. Pou*

A common challenge in regenerative medicine is the repair of bone defects produced by severe trauma, tumors resection, or congenital deformity. When the defect is relatively large, bone self-healing is not produced by the body, and the so-called critical-size defect requires an implant or bone graft material addition to perform osseous reconstruction. These days, the scientific community is putting much effort in the development of synthetic material implants capable to replace the lost bone and to mimic its biological functions.

Within the scenario of the different materials with potential as bone substitution implants, the bioactive ceramics are strategically positioned, not only showing biocompatible behaviour as certain metallic alloys and polymers, but in addition leading to osteointegration when placed within the human body. The ceramic biomaterial not only avoids adverse body reaction, but also promotes bone cell proliferation and directly bonds to human bone.

The Applied Physics Department at the University of Vigo (Spain), in collaboration with ERDT laboratory at Arts et Métiers Paris Tech (France), addressed bioactive ceramics processing by rapid prototyping based on laser cladding. The aim of the work was the assessment of the processing capabilities of this laser-assisted technique to produce bioceramic implant materials to overcome the problem of cranial defects restoration. Processed material thermal cycle and processing atmosphere extensively influence the mechanical and microstructure properties of the processed ceramic, which play a crucial role in the obtained material bioactivity and resorbability in biological conditions.

The benefits of this approach are a shaped bioactive implant tailored to the patient requirements, produced from the three-dimensional data from the patient diagnosis, by a very dynamic processing technique and in short reaction time. Molds construction, addition of non-bioactive binders and postprocessing treatments are avoided using this technique. The surgical procedure time is reduced and migration of graft material particles is avoided by keeping the bioactive material within the desired geometry after implantation. ■

YC52

Cladding Head with Integrated Sensors

With integrated sensors that remotely monitor the focus optic protection glass, incoming laser power and temperature of cladding melt point; plus its guided, homogeneous powder distribution and slim line design, even components with complicated shapes are accessible using the YC52 The shield gas feed system even allows cladding when the head is in an extreme position. For any automated production where expensive, delicate, wear-resistant components need cladding, the YC52 is the optimal system.

Contact a Precitec Sales Engineer at 248.446.8100 to find out more.

PRECITEC

PRECITEC NORTH AMERICA • 28043 CENTER OAKS CT. • WIXOM • MI 48393

WELCOME NEW MEMBERS

CORPORATE MEMBERS

- **Maren Corporation, New Philadelphia, OH**
- **Northwest Laser Safety, Tracy, CA**
- **Photonics Industries International, Inc., Bohemia, NY**
- **Swedish Welding Commission, Stockholm, Sweden**
- **Telsar Laboratories, Inc., Alton, IL**

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

INDIVIDUAL

Aundrea Juarez, Marysville, CA
Margaret Ashton, Boulder, CO
Suhash Ghosh, East Hartford, CT
Walter Barrionuevo, Dunedin, FL
Jeff Young, Albany, GA
Darius Wolny, Round Lake Park, IL
Patricia Dudgeon, Indianapolis, IN
Kenneth Sicard, Jasper, IN
Brian Coleman, Junction City, KS
Leigh Drori, Cambridge, MA
Pascal Miller, Groton, MA
Scott Reitsma, Marlborough, MA
Gurvis Davis, APG, MD
Ed Slesak, Dearborn, MI
Tom Egeler, Zeeland, MI
Haiping Shao, Plymouth, MN
Darrel Hellman, Bismarck, ND
Donna Kenney, Salem, NH
Paul, Bellscheidt, Pennington, NJ
Edward Braunig, Somerville, NJ
David Hauber, Schenectady, NY
Blake McAllister, Columbus, OH
David Press, Grove City, OH
Todd Rockstroh, Maineville, OH
Robert Henning, New Philadelphia, OH
Karen Schofield, Portland, OR
Deborah Harris, Charleroi, PA
Daniel Kritikos, Meadville, PA
James Arthur, Pittsburgh, PA
Michael Albanese, West Point, PA
Carl Spencer, Graniteville, SC
Craig Blue, Oak Ridge, TN
Richard Akins, McKinney, TX
Leslie Pollard, Richardson, TX
Edward Early, San Antonio, TX
Jennifer Watson, San Antonio, TX
William Parker, Waitsfield, VT
Mary Johnston, Burien, WA
Elaine Hodgson, Hamilton, Bermuda
James Booth, Vancouver, BC, Canada
Thomas Grainge, Niagara Fall, ON, Canada
Sandro Rocco, Niagara Falls, ON, Canada
Daniel Evkovich, North Welland, ON, Canada
Kevin Zeoli, Thorold, ON, Canada
Howard Bargman, Toronto, ON, Canada
Mike Cavasin, Welland, ON, Canada
Denis Cirocco, Welland, ON, Canada
Jonathan Clark, Welland, ON, Canada
Andrew Climenhaga, Welland, ON, Canada
Jesse Cote, Welland, ON, Canada
Kevin Davies, Welland, ON, Canada
Shawn Kafal, Welland, ON, Canada
Jamie Lemay, Welland, ON, Canada
Donald Letourneau, Welland, ON, Canada
Michael Misztal, Welland, ON, Canada
Mark Ricard, Welland, ON, Canada
Alex Right, Welland, ON, Canada
Shelley Simmons, Welland, ON, Canada
Matthew Szymanski, Welland, ON, Canada
Bruce Thomson, Welland, ON, Canada
Nicholas Turner, Welland, ON, Canada
Dheepak Venkatachalam, Welland, ON, Canada
Jose Villa, Welland, ON, Canada
Matthew Watts, Welland, ON, Canada
Annie Mercier, Quebec, QC, Canada
Neng Liu, Sherbrooke, QC, Canada
Yoshiro Ito, Nagaoka, Japan
Rui Vilar, Lisboa Codex, Portugal
Amelia Almeida, Lisbon, Portugal
Ali Ihsan Koruk, Senica, Slovinia

MEMBER INNOVATIONS

COHERENT LAUNCHES A FIRST

Coherent, Inc., Santa Clara, Calif., has expanded its Sapphire™ family of compact CW visible lasers with the first 514 nm (green) offering based on the company's OPSL technology. With a choice of four different output powers ranging from 20 to 100 milliwatts, these cost-effective Sapphire 514 LP lasers provide a compact (125 mm x 70 mm x 34 mm) and extremely reliable all-solid-state alternative to legacy ion technology at this important green wavelength.

For applications currently using ion lasers, the small footprint and high electrical efficiency of Sapphire 514 LP lasers facilitates and simplifies integration into OEM instrumentation with their reduced physical, electrical and thermal demands. These new lasers have a total power budget of less than 60 Watts. For applications already using Sapphire LP lasers at other visible wavelengths, adding this new 514 nm excitation capability is simple because these lasers provide identical form, fit and function, including the same interface (analog, RS232, USB). Applications for Sapphire 514 LP lasers span several areas of life sciences such as flow cytometry, confocal microscopy, DNA sequencing, high-throughput drug discovery and diagnostic imaging. For more information, visit **www.Coherent.com**.

SPECTRA-PHYSICS INTRODUCTIONS

Spectra-Physics®, Santa Clara, Calif., a Newport Corporation Brand, announces a new addition to its Tristar™ family of Q-switched diode-pumped solid-state (DPSS) industrial lasers. The high-repetition-rate Tristar 355-2 is ideal for high throughput LED scribing and provides over 2 W of 355 nm output at 90 kHz and a short pulse width of less than 25 ns. Features include a motorized third harmonic crystal shifter for stable UV power over the life of the product, a unique automatic laser purification system (ALPS) to actively clean the UV laser cavity and significantly extend laser life, and automatic data logging for cradle-to-grave product and process traceability. Other key applications for the Tristar include rapid prototyping, marking, and stereolithography. For more information, visit **www.newport.com/tristar**.

Additionally, Spectra-Physics has introduced the Pulseo 355-10, a new addition to its Pulseo® family of Q-Switched diode-pumped solid-state (DPSS) industrial lasers. The Pulseo 355-10 provides 10 W of 355 nm output at 90 kHz with a short pulse width of <23 ns. Key applications are crystalline silicon photovoltaic solar cell manufacturing processes such as dicing, drilling, and marking. Visit **www.newport.com/pulseo** for more information.

OPHIR-SPIRICON'S CIRCULAR LASER ENERGY SENSORS

Ophir-Spiricon, San Francisco, Calif., has introduced the PD300-R line of circular photodiode sensors. Identical in performance to the company's popular PD300 laser detectors, the PD300-R feature round geometry for easy mounting and centering on collinear optical bench systems. SM-1 mounting threads on all components ensure a fit with most optics. The sensors are designed to detect a wide range of light levels, from 500 picoWatts to 3 W. Each device has a built-in filter that reduces the light level on the detector and allows measurements up to 30 mW without saturation. A second, removable filter allows measurement up to 3W. Four models are available and will work with all Ophir smart meters and PC interfaces, including the Orion PE, Nova, Nova II, Vega and LaserStar meters as well as the Juno and Pulsar PC interfaces. For more information, visit **www.ophir-spiricon.com**.

NEWPORT'S FIBER DEVICE

Newport Corporation, Irvine, Calif., has introduced a new coherent anti-stokes raman scattering (CARS) optimized supercontinuum generation fiber device. Designed for use with 800 nm femtosecond lasers, the SCG-800-CARS contains 12 cm, highly nonlinear photonic crystal fiber with zero dispersion points at ~775 and ~945 nm. Two closely-spaced, zero-dispersion wavelengths enable a stable, low-noise supercontinuum generation that also allows control of the spectral shape by tuning the pump wavelength. The fiber ends are sealed and mounted in quartz ferrules, with the polarization axis aligned to a line on the end of the device. The nonlinear supercontinuum fiber is mounted in a robust, 25 mm diameter, 120 mm long aluminum housing which can be easily mounted on a translation stage. The innovative, preassembled product features a sealed end-facet with beam expansion for easy coupling, making this an ideal, turnkey solution for spectroscopy and microscopy applications. For more information, visit **www.newport.com/CARS**. ■

ANNIVERSARY CELEBRATION IN AACHEN

The Fraunhofer Institute for Laser Technology ILT, Aachen, Germany, will celebrate its 25th anniversary at the 8th International Laser Technology Congress AKL'10, which will be held May 5 to 7, 2010, in the historic city of Aachen. This will provide the occasion for a laser show of innovations that are set to shape the sector in the coming years. As the organizer of AKL'10, the Fraunhofer ILT is looking forward to welcoming more than 400 guests, who will be able to benefit from three days of in-depth information about trends and applications in laser technology. The institute's staff of 300 develop processes, systems and beam sources for laser manufacturing and laser measurement. Its customers represent a wide range of industrial sectors, from medical engineering to the auto and aviation industry. For more information or to register for AKL'10, visit **www.lasercongress.org**.

IPG PHOTONICS ACQUIRES PHOTONICS INNOVATIONS

IPG Photonics Corporation, Oxford, Mass., has acquired the outstanding shares of privately-held, Birmingham, Alabama-based Photonics Innovations, Inc. (PII), a maker of active and passive laser materials and tunable lasers for scientific, biomedical, technological and eyesafe range-finding applications. The acquisition allows IPG to expand its product offerings to the middle infrared (approximately 2 to 5 micron). PII's core capabilities include novel optical and laser materials fabrication, solid state and tunable laser design and optical and sensing systems development. The acquisition is expected to have no material effect on IPG's financial results for the remainder of the year. Financial terms were not disclosed.

"With the acquisition of Photonics Innovations, we plan to enhance IPG's product portfolio in middle-infrared spectral range – an exciting emerging market," said Valentin Gapontsev, IPG Photonics chairman and CEO. "The combining of our state-of-the-art fiber laser technology with PII's proprietary transition metal doped ZnS and ZnSe based crystal laser materials has opened exciting opportunities to build new perfect hybrid laser sources in the range 2 to 5 um for various applications."

"We are delighted to join IPG Photonics," commented Sergey Mirov, president of Photonics Innovations, Inc. "As a result of this merger, the combined company now has significantly more resources and the ability to target many new applications in biomedical, sensing, instrumentations, advanced systems and material processing. IPG is a natural strategic fit for PII and we believe this will benefit both companies' customers."

For more information, visit **www.ipgphotonics.com**. ■

VOLUNTEERS NEEDED FOR NEW LIA GUIDES

The Laser Institute of America (LIA) has announced a volunteer project for members who are experts in the fields of laser welding, joining, cladding and additive manufacturing. It is our goal to produce two guides – the *LIA Guide to Laser Welding and Joining* and the *LIA Guide to Laser Cladding and Additive Manufacturing* – which will be based on this subject matter.

The guides will help promote laser usage in welding, joining, cladding and additive manufacturing, especially to those interested in the possibilities and potential these techniques represent. These publications will be viewed by the laser processing community as invaluable resources in their business and research endeavors. They will provide a basic overview of each application, concentrating mostly on the practical aspects of these fast-growing fields of laser technology.

The *LIA Guide to Laser Welding and Joining* and the *LIA Guide to Laser Cladding and Additive Manufacturing* will each be written by a team of experts in the respective fields in cooperation with the LIA. The LIA is looking for contributing authors for these books. If you are an engineer or researcher who works in these areas and would be interested in participating in the development of these guides, please contact Chandler Gifford at cgifford@laserinstitute.org or call 1-800-345-2737 ext. 14.

LIA STAFF ADDITIONS

The LIA would like to welcome two new staff members. Kristi Brokaw and Katie Matlock have joined the LIA staff as full-time conference coordinators.

Katie Matlock is currently pursuing her bachelor of science degree with honors at the University of Central Florida, with an anticipated graduation date of December 2010. She brings a fresh and innovative approach to conference planning and management, as evident in the 2009 ICALEO® conference. Kristi Brokaw brings over five years experience in event planning and management in the visual simulation and training industry as well as the not-for-profit arena. She also contributed her talents to help make the ICALEO 2009 conference a success, as well as spearheading the planning of the PICALO 2010 conference. Their sights are now set on the ICALEO 2010 and ILSC® 2011 conferences.

LIA JOINS LASERFEST AS PARTNER

LIA is pleased to announce it will be participating as a partner of LaserFest, the celebration in 2010 to mark the 50th anniversary of the development of the first laser. LaserFest partners are organizations, including universities, research institutions, museums and corporations that help promote the 50th anniversary of the laser through self-hosted programs and initiatives.

"The invention of the laser laid the foundation both for Nobel-Prize-level scientific accomplishments and for many of today's most important technologies," said Anthony Siegman, member of the LaserFest Technical Advisory Committee. "Members of organizations like the Laser Institute of America have helped further the advancement of laser technology throughout the 20th and 21st centuries. The impact of this invention is felt everywhere in our daily lives, and the importance of this achievement will be reflected in the depth and breadth of LaserFest activities."

Through its collaboration in LaserFest, the scientific community will honor the pioneers who made possible the discovery, development and application of the laser, as well as inform students, educators, legislators, funding agencies and the general public about the impact of the laser and the importance of scientific and technological innovation. Educational outreach will focus on raising awareness of the laser as a transformative technology by highlighting today's laser innovations and tomorrow's possibilities. For more information about supporting LaserFest, visit **www.LaserFest.org**.

ILSC CALL FOR PAPERS

The 2011 International Laser Safety Conference (ILSC®) will be held Mar. 14-17 in San Jose, Calif. ILSC is a four-day comprehensive conference covering all aspects of laser safety practice and hazard control. LIA is currently seeking abstracts for the conference in the areas of safety standards, bioeffects, practical laser safety, laser safety training, control measures, outdoor laser use and safety, eye protection and measurements to name just a few. All abstracts must be submitted by Aug. 15, 2010. To submit an abstract online, visit **www.laserinstitute.org/ilsc**.

MARK YOUR CALENDARS

The 29th International Congress on Applications of Lasers & Electro-Optics (ICALEO® 2010) will be held Sept. 27-30, 2010 in Anaheim, Calif. ICALEO 2010 will include three conferences, the Laser Materials Processing Conference, the Laser Microprocessing Conference, and the Nanomanufacturing Conference as well as a Poster Presentation Gallery, the Laser Solutions Short Courses, a business forum and plenty of networking opportunities. 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, laser and energy field manufacturing, laser business development, and more.

For more on ICALEO or for sponsorship information, visit **www.icaleo.org** or contact LIA's conference department at 800-34-LASER or e-mail **icaleo@laserinstitute.org**. ■

JLA UPDATE

The *Journal of Laser Applications*® offers the latest refereed papers by leading researchers in the laser community. Look for the online version at **www.laserinstitute.org/subscriptions/jla**. To view the journal online, please make sure your membership is current. In addition, articles are now posted online as the production cycle is completed ensuring timely publication.

The JLA is published four times a year by the LIA in February, May, August and November. It is sent to all LIA members as a member benefit. For nonmembers 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://scitation.aip.org/jla/alert.jsp**.

Laser Institute of America
Laser Applications and Safety

13501 Ingenuity Dr., Suite 128
Orlando, FL 32826

LAM

LASER ADDITIVE MANUFACTURING WORKSHOP

May 11-12, 2010
Marriott – Houston Airport • Houston, TX, USA

Register Now!

This unique workshop will bring together industry specialists from around the world with the goal of applying this state-of-the-art process (cladding & rapid manufacturing) to today's manufacturing challenges.

General Chair:
Paul Denney, Connecticut Center for Advanced Technology

Sponsor Committee Chair:
Bill Shiner - IPG Photonics Corp.

Plenary Chair:
Jim Sears - South Dakota School of Mines & Technology

Aerospace
Automotive
DOD
Heavy Equipment
Oil & Gas
Power Generation

Presented by:
Laser Institute of America
Laser Applications and Safety

www.laserinstitute.org/conferences • +1.407.380.1553 • lam@laserinstitute.org