



# 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 16 NUMBER 3 | MAY/JUNE 2008

In celebration of LIA's 40th anniversary, LIA TODAY is honoring the advancements in laser applications by featuring articles written by the professionals who have contributed to this beneficial technology over the past four decades.

## PICALO PEAKS IN THE PACIFIC

By Milan Brandt

LIA's 3<sup>rd</sup> PICALO (Pacific International Conference on Applications of Lasers and Optics) was held in Beijing, China from April 16 to 18, 2008. Building on the first two PICALOs held in Australia, this conference attracted the largest number of delegates and vendors and proved an excellent source of information and networking opportunities. The conference general chair, Minlin Zhong from Tsinghua University, Beijing, attracted many international, regional and local researchers and suppliers to present and share the latest developments in industrial lasers and applications.

LIA President Andreas Ostendorf opened the conference and welcomed attendees on behalf of LIA Executive Director Peter Baker, who unfortunately due to illness could not make the event. Ostendorf, in front of the packed auditorium of some 300 delegates, summarized the history of PICALO and its aim of promoting the use of industrial lasers for macro and micro processing in the Pacific region.

In his opening remarks, Zhong also welcomed attendees to Beijing and compared the event to the forthcoming Olympics in terms of pushing the scientific boundaries for laser technology, materials and processing. (*Con't. pg. 6, see PICALO*)

## BEYOND THE BEAM RECOGNIZING NON-BEAM LASER SAFETY HAZARDS

By Heather Teague

According to ANSI Z136.1-2007 *Safe Use of Lasers*, non-beam hazards are defined as a class of hazards that do not result from direct human exposure to a laser beam.<sup>1</sup> In other words, there is an entire class of physical hazards associated with lasers that go beyond the beam.

Why is it important to pay attention to non-beam hazards? Historically, the only reported deaths related to lasers have been as a result of exposure to non-beam hazards — not direct exposure to a laser beam. In 2003, five people died from electrocution, which is a non-beam hazard. In that same year, three people died as a result of an endotracheal tube fire. The fire was caused by a laser igniting the tip of the endotracheal tube during laser surgery in the airway passage. Fires are also classified as a non-beam physical hazard.

"When a laser safety officer conducts a laser audit, one of the things he or she should look for are the non-beam hazards that may be present in the environment where the laser is being used," said Gus Anibarro, (*Con't. pg. 10, see Non-beam*)

## IN THE NEWS

### Laser Attacks on Aircraft

In late March, six aircraft flying into Sydney Airport were hit in a coordinated attack by blinding green lights in what safety officials say is the city's worst laser attack. Air traffic controllers closed the approach flight path and diverted incoming aircraft to a different runway. Air Services Australia said it was the first recorded "cluster attack" in which three or four people used lasers to make a coordinated attack on aircraft coming into the airport over heavily populated suburbs.

New South Wales Police Minister David Campbell vowed to change the law to classify powerful laser beams as illegal weapons. Federal Home Affairs Minister Bob Debus said the government would look at banning imports of laser lights, with exemptions for legitimate use. The government was looking at stiffer penalties for shining a laser light at an aircraft than the existing two years' jail, he said. Last year, penalties under the Civil Aviation Act for shining laser beams at aircraft were increased to two years' jail and fines of up to \$30,000.

Civil Aviation Safety Authority spokesman Peter Gibson said the attacks were increasing (*Con't. pg. 21*)

Don't miss **Do You Have What It Takes? Laser Safety Equipment** on page 12.



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# 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*<sup>®</sup> in addition to discounts on all LIA products and services.

The editors of *LIA TODAY* welcome input from their 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](mailto:lia@laserinstitute.org).

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### CALENDAR OF EVENTS

#### Laser Safety Officer Training

July 14-16, 2008	Nashville, TN
Aug. 11-13, 2008	Denver, CO
Dec. 8-10, 2008	Orlando, FL

#### Laser Safety Officer with Hazard Analysis

June 9-13, 2008	Chicago, IL
Sept. 15-19, 2008	San Francisco, CA
Nov. 3-7, 2008	Boston, MA

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#### Advanced Concepts in Laser Safety

Aug. 11-13, 2008	Orlando, FL
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#### Medical Laser Safety Officer Training

Sept. 19-20, 2008	Boston, MA
Nov. 14-15, 2008	Phoenix, AZ

Certified Medical Laser Safety Officer exam offered after each course.

#### ICALEO<sup>®</sup> 2008

Oct. 20-23, 2008	Temecula, CA
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#### ILSC<sup>®</sup> 2009

Mar. 23-26, 2009	Reno, NV
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### ABOUT LIA

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

Laser Institute of America started with the sole intention of turning the potential of a powerful new technology into a viable industry. The LIA was forged from the heart of the profession – a network of developers and engineers – people who were actually using lasers. These were the first “members” of the LIA, the people who decided that sharing new ideas about lasers is just as important as developing them. The belief, as it remains today, is to promote laser applications and their safe use through education, training, and symposia.

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## PRESIDENT'S MESSAGE



Science – not fiction! Sometimes I have asked myself, “What will be next in the laser business?” During the last few years we have seen tremendous developments in high power fiber lasers and disk lasers with ultrahigh brilliance, femtosecond lasers with a pulse length of only a few wave cycles, which are now routinely used in eye surgery, or semiconductor

lasers with output powers in the kW range that can be coupled into a few hundred micron fibers. What a few years ago appeared to be science fiction has now become reality.

Is there still space for something new, do we still need much better lasers, or is there an end or have we reached a peak in development, and lasers will just become commodity goods? Of course, it would be good if lasers would be accepted as a daily workhorse tool. In many cases, this has already become true. However, I often (maybe still too often) hear the argument of application engineers that lasers can perfectly handle a specific job; however, it is too expensive and too slow. If we could overcome the cost problem in a world where everything has to be cheap, we will see a further increase in the laser market. Laser system manufacturers will surely do their job in order to improve the cost situation.

On the other hand, the researchers are also working on new and much cheaper laser systems, e.g. silicon wafer-based lasers, ceramic lasers, integrated concepts, and so on. Even solar-pumped lasers are on the horizon that will dramatically change the running cost structure.

Having all these developments in mind, I am convinced that lasers will, on the one hand, become more commodity-like goods, yet on the other hand they will still be high-end tools for unique and new applications. Thus, the laser future should continue to be bright over the next decades and, based on your support and ideas, LIA will contribute to it with its excellent network of researchers, engineers and applicants.

Andreas Ostendorf  
President  
Laser Institute of America

## EXECUTIVE DIRECTOR'S MESSAGE

### A CRESCENDO OF CONFERENCES

There are gaggles of geese, pods of porpoises, leaps of leopards and even, I believe, lounges of lizards! What we have been experiencing recently is a crescendo of conferences.

LIA was in Shanghai in March, Beijing in April and Plymouth in May. Now the LIA staff has returned to Orlando in time to enjoy the hurricane season!

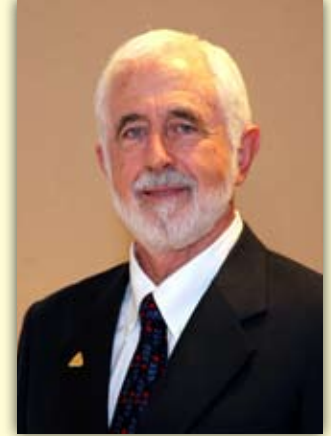
In Shanghai, we cosponsored the Laser Processes and Components Conference and exhibited at the LASER World of PHOTONICS China show (see page 14).

Our PICALO conference in Beijing was very successful and included the International Enterprise Summit, a unique gathering of chief executives from Chinese, U.S., and European laser companies who came together to discuss global issues and opportunities in our laser marketplace (see page 7).

ALAW in Plymouth, MI was an end-user oriented program with a focus on automotive manufacturing. These are tough times for the automotive industry (even Toyota recently announced that they are experiencing ‘headwinds’), but we continue to help by showcasing effective laser-based solutions to today’s problems. The use of laser cutting and welding techniques enables manufacturers to produce stronger, lighter automobiles thereby reducing the consumption of precious gasoline. In addition, the development and manufacture of improved batteries and fuel cells for next generation vehicles makes extensive use of laser technology.

So if you don’t fit into one of the following groups: geese, porpoises, leopards or lizards, then be a part of our crescendo of conferences. Next up is ICALEO®.

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



He also encouraged the delegates to enjoy the hospitality of China and visit its many cultural and historical places.

## WELL-ROUNDED CONFERENCE

Similar to previous PICALOs, the conference was a three-day event covering all aspects of laser technology and application. Zhong, together with Laser Materials Processing Conference Chair Lin Li, University of Manchester, UK, and Micro Processing Conference Chair Yongfeng Lu, University of Nebraska, attracted some 130 technical papers that were presented in four parallel sessions by delegates from 15 countries from the region, Europe and the USA. In addition, Bo Gu from GSI Lumonics organized the International Enterprise Summit to discuss the impact of globalization on the Chinese, European and U.S. laser and optics industry (see summit sidebar).

The conference opened with an excellent keynote presentation by Donald Umstadter from the University of Nebraska-Lincoln, USA on the ultra-intense laser-matter interactions with a 150-terawatt power laser. He discussed developments and applications of ultra high-brightness laser technology, in particular how protons and electrons start to become relativistic at these intensities. This has led to the production of up to 300 MeV electrons in a few mm which is comparable to those produced by large linear accelerators. These developments have opened the way for tabletop and portable X-ray sources. He concluded his

presentation with a list of applications for this technology such as security, the inspection of cargo containers for nuclear materials, and the structure of uncrystallized proteins.

He was followed by Xiang Zhang from UC Berkeley, USA with an excellent presentation on photonic meta materials, nano-scale plasmonics and super lens. He described the concept behind meta-materials, materials that possess a negative index of refraction and the potential applications in nano-scale imaging, high throughput lithography and biomolecular sensing.

Fiber lasers are now the hot topic and their use for both macro and micro applications in the world will only expand in the future. Eckhard Beyer from Fraunhofer IWS, Dresden, Germany, discussed new trends and developments in high power laser materials processing. He discussed trends in hardening, cladding with a wide beam, remote welding and cutting with high brightness lasers. These applications are likely to be performed with these lasers in the near future as the high brightness lasers offer a number of advantages compared with the traditional devices.

The last speaker in the plenary session was Jinmin Li from the Institute of Semiconductors CAS, Beijing, China, who presented research and developments in high power diode-pumped solid-state lasers in China. The highest power solid state laser in China is a four rod diode-pumped Nd:YAG laser producing 8 kW. It was interesting to hear his presentation and to benchmark the state of development in solid-state lasers in China with that in the rest of the world. While the presented information in the area suggests that China is trailing the high power solid-state laser developments in Europe and Germany in particular, this gap is decreasing rapidly and China will be a major player in the area in the next five years.

Although I attended the papers in the macro sessions, both the macro and micro sessions covered all aspects of laser cutting, lasers welding, monitor and control, systems, modeling, surfacing and additive manufacture. Similar to previous PICALOs, laser surfacing and additive manufacture seem to dominate in the region as expressed in the number of papers presented. The conference proceedings, containing all submitted papers including the plenary session, are available on CD and can be ordered at [www.laserinstitute.org](http://www.laserinstitute.org).

Finally, from the very positive responses and comments from the attendees and vendors it is clear that PICALO '08 was a success and Minlin Zhong and the LIA should be congratulated on a job well done. We should all be looking forward with enthusiasm to the next PICALO in 2010. ■

*Milan Brandt is with the Industrial Research Institute Swinburne (IRIS), Swinburne University of Technology, Melbourne, Australia.*



**PICALO Conference Chair  
Minlin Zhong.**

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## INTERNATIONAL ENTERPRISE SUMMIT

In keeping with LIA's worldwide initiatives, PICALO hosted the first International Enterprise Summit, which brought together innovative leaders from China, North America, and Europe to collaborate on the opportunities and challenges of globalization in the laser industry. Participants shared knowledge, experiences and vision for the future. This unique opportunity for face-to-face collaboration on the opportunities and challenges of globalization in the laser industry created an unprecedented forum. The summit was chaired by Bo Gu of GSI Group, Inc., Wilmington, Mass., and Rangda Wu of Chutian Laser Group, Wuhan City, Peoples Republic of China.

"We were excited to finally bring this international community of leaders together to share their perspectives on how to compete and collaborate in a global marketplace," said LIA Executive Director Peter Baker. "This is the only forum of its kind that truly addressed the importance of globalization and the Chinese market in the laser industry."

"The reality and potential of the Chinese market brought our industrial leaders together in Beijing. It is very clear from their presentations at the summit that the laser industry will have to take China into consideration for its future growth" said Gu. "The globalization forces laser and photonics companies to proactively and strategically position themselves in the emerging markets like China. If you don't, you will be missing one of the most important



**PICALO summit panel, from left: Robert Phillippy of Newport Corp., Alan Lowe of JDS Uniphase, Bo Gu of GSI Group, Valentin Gapontsev of IPG Photonics, Sergio Edelstein of GSI Group, Günther Braun of Rofin-Sinar Technologies and John Ambroseo of Coherent.**

growth opportunities for decades to come."

"The Enterprise Summit was new for PICALO and was very well attended. The full exchange and discussion of opinions and views on the topic 'Globalization: Opportunities and Challenges for Laser Companies in China and the World,' fit in very well with PICALO," said Conference Chair Minlin Zhong. ■

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# SCENES FROM PICALO 2008



The combined efforts of the PICALO chairs, advisory board and summit organizers are what make the conference great.

The PICALO post conference tour visited the MutianYu section of the Great Wall of China, Ming Tombs, and the famous Cloisonné Factory.

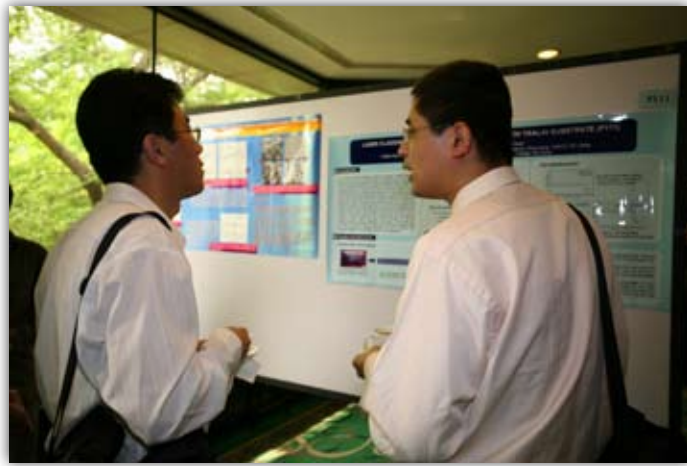


General Conference Chair Minlin Zhong, right, enjoyed a lively discussion with attendees during the well attended Vendor Reception.



Activity and interest were high at Thursday night's Vendor Reception.





The Poster Presentation gallery, above left, was open throughout the conference.

Attendees enjoyed many opportunities to make new friends and greet old ones, above.



Left, Kunihiko Washio of Paradigm Laser Research Limited, Tokyo, Japan, and Denis Gaponstsev and Bill Shiner of IPG Photonics Corporation, Oxford, MA, take time to discuss ideas.

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education manager for LIA. "LSOs should keep in mind that non-beam hazards could kill you; the beam hazards can injure you."

Non-beam hazards include chemical, biological, physical and human factors, which is a set of considerations every LSO should be aware of. Take the first step to minimizing these hazards by learning how to recognize and evaluate them.

## CHEMICAL HAZARDS

Generally, non-beam hazards that are classified as chemical include laser generated airborne contaminants (LGAC), compressed gases, dyes and solvents. LGACs are produced (usually in the form of smoke and dust) when a Class 3B or Class 4 laser interacts with matter. This hazard is especially prominent in manufacturing, where the popularity of industrial lasers for materials processing has increased over the years. LGACs may be in the form of aerosols, gases and/or vapors.<sup>2</sup>

Gas lasers use gas mixtures to generate laser radiation. Potential hazards include leakage from cylinders, incorrect labeling of cylinders and gas lines, and improper storage of gas cylinders. Gas cylinder mishandling can lead to asphyxiation or flammable and corrosive gas spills.<sup>2</sup>

According to ANSI Z136.1 *Safe Use of Lasers*, laser dyes and solvents are "complex fluorescent organic compounds which, when in solution with certain solvents, form a lasing medium for dye lasers." And in some cases, these dyes can be highly toxic or carcinogenic.

Recommended control measures for chemical hazards include the installation of exhaust ventilation, required use of respiratory protection, and utilizing sensors and alarms that can detect hazardous gas.<sup>1</sup>

## BIOLOGICAL HAZARDS

Biological hazards are primarily found in the medical use of lasers from dentistry to dermatology to cardiology. The use of lasers in the medical field has grown substantially, creating a higher risk of non-beam hazards.

Again, LGACs pose a major health hazard, primarily due to the plume produced by laser-tissue interaction. Another biological hazard that laser users should be aware of during a medical procedure is the release of infectious materials, such as bacterial and viral organisms. Studies have shown these materials may survive beam irradiation and become airborne.<sup>1</sup>

Recommended control measures include the installation of local exhaust ventilation (LEV), and central room evacuation systems. The key is to capture the laser plume as close to the surgical site as possible. All health care practitioners using lasers should be trained on the safe operation of those lasers including proper exhaust ventilation, non-beam hazards, and eyewear requirements.<sup>2</sup> There are many resources for obtaining this specialized training, including LIA's courses specifically for medical laser safety officers.

## PHYSICAL HAZARDS

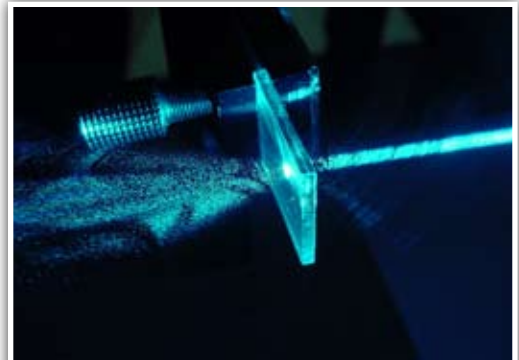
Physical hazards related to the use of lasers should not be taken lightly. They include non-beam radiation, electrical, shock, resistive heating, fire and explosion.<sup>2</sup>

Non-beam radiation, generated by the operation of a

laser or laser system component, can be classified as collateral or plasma. As defined in *LIA Guide to Non-beam Hazards Associated with Laser Use*, collateral radiation is electronic product radiation that is generated and emitted as a result of any component necessary for the operation of the laser product. Plasma radiation (also called plume radiation) is generated when the beam from a powerful laser interacts with matter. The risk is to the eye and skin, and engineering controls include shielding or isolation in the laser area.<sup>2</sup>

The most dangerous non-beam hazard is electric shock, which in the extreme case can result in electrocution. The risk for electric shock generally occurs during the installation, maintenance or repair with access to high voltage.<sup>2</sup> The hazard can be minimized through electrical safety training and proper equipment operation, as well as using UL-certified equipment.

To reduce the risk of fires, transfer of flammable liquids should be done in a well-ventilated area, away from the laser area.



**Education and training are key in controlling non-beam hazards.**

To minimize the risk of explosion, which can occur as a result of concentrated amounts of flammable liquids coming into contact with an ignition source, routine disposal of filtering material is necessary.<sup>2</sup>

## HUMAN FACTORS

Recently, a whole new set of workplace issues have been reported related to laser use. As a result, a non-beam hazard classification has been created called Human Factors. It addresses ergonomics, waste disposal, limited work space, and the use of chillers. In fact, the revised 2007 edition of ANSI Z136.1 *Safe Use of Lasers* includes a new section devoted to Human Factors as non-beam hazards.

In particular, an LSO should be aware of hazards associated with laser system designs such as poor laser workstation layout and other ergonomic issues that may cause physical injuries.<sup>1</sup> Another area of concern is improper laser waste disposal. Contaminated laser-related material must be handled in conformance with appropriate federal, state and local guidelines.<sup>1</sup>

## EDUCATION & TRAINING CAN MAKE A DIFFERENCE

While the combination of administrative, procedural and

engineering controls will minimize non-beam hazards, one of the most important prevention measures is ongoing education and training for LSOs and staff.

LIA offers several training options to help the LSO learn to identify all non-beam hazards. The laser safety officer course teaches the laser fundamentals, including an entire session devoted to non-beam hazards. For those working with lasers in the medical field, LIA offers a course designed specifically for the medical laser safety officer.

Every LSO should have a copy of the ANSI Z136.1-2007 *Safe Use of Lasers* to assist in the development and implementation of a laser safety program. Written by certified laser safety officers, the new *CLSOS' Best Practices* book offers a practical approach to non-beam hazards. For more information on the laser safety training resources available to LSOs, visit [www.laserinstitute.org/store](http://www.laserinstitute.org/store). ■

*Heather Teague is a freelance writer in Orlando, Fla.*

#### References

<sup>1</sup>ANSI Z136.1 (2007) *Safe Use of Lasers*. Orlando, FL: Laser Institute of America.

<sup>2</sup>LIA *Guide to Non-beam Hazards Associated with Laser Use* (1999). Orlando, FL: Laser Institute of America.

## LSO ADVANCED TRAINING WORKSHOP

Scheduled for July 15-17, the 4<sup>th</sup> annual Laser Safety Officer Advanced Training Workshop will be hosted by Sandia National Laboratories at Kirtland Air Force Base in Albuquerque, NM.

This is a one-of-a-kind program featuring topics not found in standard laser safety training and solutions to real laser safety issues by experts in the field. Presentations slated include Static and Dynamic Laser Testing at WSMR, Laser Dazzlers, Effect on Eyewear by Shaped Ultra-Short Pulses, Evaluation of LED and Broadband Light Source, DOE Approach to Accident Investigation, and Lasers in Robotics. Optional evening events have been planned, with dinner the first evening sponsored by Kentek.

The cost of the workshop is \$50 and approved clearance for badging is required; for US citizens, badging clearance requires 15 days; foreign nationals need to request clearance 30-45 days prior to the workshop. For more information and to register, visit [www.sandia.gov/lasersafety/LaserSafety.html](http://www.sandia.gov/lasersafety/LaserSafety.html).

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# DO YOU HAVE WHAT IT TAKES? LASER SAFETY EQUIPMENT

By Tom MacMullin

This brief article aims to document in glossary format the many tools that are available for analyzing and managing laser safety hazards. There is inconsistent terminology used in industry for describing some of these tools; we try here to point out a few of the more commonly used terms. The format follows the laser safety process: identify the hazards, analyze and measure the hazards, manage and/or mitigate the hazards.

## BEAM LOCATING TOOLS

**Infrared Viewers** – IR viewers allow for active viewing of the IR beam as it travels. IR viewers are very useful when there is a strong chance a beam is escaping a controlled area. Some models can be connected to (or are integrated with) cameras and other video output devices.

**Ultraviolet Viewers** – Similar to IR viewers and cameras, but sensitive to the UV range.

**Infrared Viewing Cards** – IR viewing cards and discs convert infrared radiation to visible radiation. Some IR cards store energy from a conventional light source (e.g. indoor room lighting, sunlight) that is released in the form of visible light when stimulated by IR radiation. Other IR cards use photosensitive or “up conversion” materials.

**Ultraviolet Viewing Cards** – Similar to IR viewing cards and discs.

**Burn Paper** – Laser radiation-sensitive paper used to visually display a laser beam’s size, shape, or mode structure. An image of the beam is etched or burned onto the surface of the paper.

## BEAM ANALYSIS TOOLS

**Hazard Analysis Software** – While never a substitute for an experienced laser safety officer (LSO), look for software that has a simple user interface, stores calculations for future reference and generates both high-level management reports as well as more detailed reports documenting assumptions and results.

**Power Meters** – Your toolbox should include power meters suitable for your installation’s lasers, which may range from handheld devices sensitive to nanoWatts and nanoJoules up to heavy-duty detectors for kiloWatt ranges.

## BEAM CONTAINMENT EQUIPMENT

**Laser Safety Curtains** – Flexible or foldable laser absorbing materials are hung like curtains or drapes from track

systems. These are often attached to, or suspended from, a ceiling, but may also be configured as floor-mounted systems with vertical uprights carrying the load. These may be referred to as “barriers” or “curtain barriers”.

**Laser Safety Barriers** – Laser barriers, also called partitions, guards or screens, are free-standing laser blocking devices. Many systems provide rollers or casters attached to the support legs. Some systems also provide a method or accessories for attaching multiple barriers together with no safety gaps.

**Window Protection** – Windows are covered with roll-up shades, sometimes called roller blinds and roller screens. Windows may also be covered by blocks, which are laser safe materials incorporating hook-and-loop or other fastener systems and cut to fit directly over a window or port.

**Bench Guards** – Bench guards, also called bench blocks and beam stops, are small scale laser blocking devices for placement on, and attachment to, optical tables and similar laser installations. They normally take the form of metal panels attached directly to an optical table. Bench guards may be used to surround the entire perimeter of a table. They may also be used as “walls” when creating a temporary tabletop enclosure.

**Beam Dumps** – Beam dumps, also called beam traps and beam stops, collect directed laser radiation and convert the energy to heat. Some have “infinitely inward reflecting” designs that truly trap all the radiation. Both air-cooled and water-cooled models are available.

**Laser Shutters** – These devices are placed directly in the beam path to automatically or manually shut down the beam. Shutters often contain an integrated beam dump; other models will redirect the beam to a beam dump. Automatic shutters are normally tripped when an access door is opened or a similar non-safe event occurs.

**Enclosures** – A Class 1 Laser Enclosure is a device that fully surrounds a laser in such a way as to “reduce” the hazard from say, Class 4 to Class 1, thereby creating an eyesafe environment. These are usually sheet steel or aluminum in construction; they



IR viewer



Free-standing barriers



Optical bench guard



Beam dumps

may incorporate doors, windows, and removable panels – all of which should be interlocked.

## ENTRY WAY CONTROLS

**Interlocks** – There is a wide selection of devices generally called “interlocks” that enable regulation or interruption of laser radiation when an “unsafe event” takes place. The simplest of these is a direct connection between a door or other entry and the power controls in the laser itself. Interlocks are often designed into curtains, barriers, rooms, and enclosures.



Safety interlock system

**Safety Interlock System (SIS)** – A network of safety controllers may be connected to the laser installation in what is called a safety interlock system. These systems can include control panels, keyed locks, emergency buttons, door locks, including magnetic door locks, buzzers, alarms, lighted signs, and keyless entry devices.

**Signs & Labels** – Warning, notice, and caution signs per ANSI Z136 are essential. Signs and labels are available in virtually any size and configuration and on substrates such as paper, vinyl, aluminum, and hard plastic.

## LASER FILTER PRODUCTS (ABSORBING AND REFLECTING)

**Laser Protective Windows** – Laser protective windows of acrylic, glass, polycarbonate, and other materials offer simultaneous workspace viewing and laser safety. Some manufacturers refer to these as “sheet” products. These technologies are typically absorptive.

**Laser Protective Eyewear** – These products may be referred to broadly as eyewear, glasses, or goggles. Laser protective eyewear may take several forms: dual-lens spectacles, single lens wraps/wraparounds, dual-lens goggles, single lens goggles, full face shields, plus a varied range of patient protection products. The laser safety lenses are typically glass or polycarbonate, they may be reflective and/or absorptive, and may utilize coatings or impregnated dyes or chemicals. Some eyewear products protect against just one wavelength; others protect against multiple wavelengths.

## CORRECT COMBO

There are many products to choose from, each with a unique set of specifications, each with a unique set of applications. The laser user and the LSO should always seek experienced, qualified advice in selecting the right combinations of these tools. ■

*Tom MacMullin is president and general manager of Kentek Corporation, Pittsfield, NH.*

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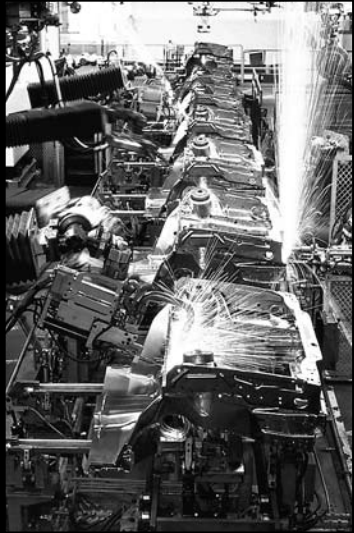
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## LIA'S PRESENCE IN CHINA EXPANDS

### LASER WORLD OF PHOTONICS CHINA 2008 ACHIEVES NEW RECORDS

- LIA Expands International Pavilion for 2009
- LPC experiences record growth with 350 registrants
- Laser exhibition area increased by 30% to 11,500 sqm combined with 206 exhibitors
- Total of 18,428 visitors of high quality, doubled last year's figure

As the booming Chinese economy continues to drive market demand for industrial laser and photonics systems, the industry is poised for record growth year after year. The overwhelming success of the LASER World of PHOTONICS China 2008, held at the Shanghai New International Expo Center (SNIEC) from March 18–20, 2008, has again reflected the rapid growth of the optoelectronic industry in China.

LASER World of PHOTONICS China 2008 set records in every aspect this year. After the success of the past two years, the show was again the first choice for domestic and overseas companies to present their latest technologies in China, such as LIA Corporate Members Trumpf, Rofin-Baasal, Coherent, IPG, Newport, nLight, GSI, Laservall and Telesis. This year, the show made history with an exhibition area of 11,500 sqm, 30% more than last year, hosting 206 exhibitors from 16 countries, 52% coming from outside China. Just over 18,400 industry experts attended the show, an increase of 100 %, compared to last year. Both the rising quality and the regional and international share of visitors were recognizable.

The rapid uprising of LASER World of PHOTONICS China has gained government officials' attention from both China and Germany. Mr. Cao Jian Lin, Vice Minister of China Science and Technology Ministry, and Mr. Hartmut Schauerte, Parliamentary Secretary of State in the Federal Ministry of Economics and Technology, have attended the show. These globally connected tech-savvy leaders have recognized LASER World of PHOTONICS

China as an ideal platform for International companies to showcase in China – one of the most exciting markets in the world.

### A WIN-WIN SITUATION FOR LIA AND ITS CORPORATE MEMBERS – NEW INTERNATIONAL PAVILION TO LAUNCH

During the three-day-show, a great number of discussions and meetings with customers took place at the LIA booth. LIA Corporate Members Amplitude, Directed Light, LASERVISION, NOIR, Ophir-Spiricon and Andrews Glass participated in LIA's first efforts to help its members reach new markets overseas.

LIA Marketing Director Jim Naugle said that LASER World of PHOTONICS has already established itself as the laser technology show for the Pacific Rim. "We have seen quite an increase in both the visitor amount and quality, and we are happy to expand our efforts next year with the addition of an LIA International Pavilion."

Similarly, this is also the third time for LIA Corporate Member Coherent to participate in LASER World of PHOTONICS China. Mr. Peter Chen, GM of the China region said, "We are happy to see much progress at LASER World of PHOTONICS China, especially in the sense of the visitors. The professionalism of the organizers has guaranteed the high-quality service. We are absolutely satisfied with it."

Join the LIA next year as it expands to an international pavilion hosting its

corporate members and their products and services. Save time and money, support LIA's mission and reach this rapidly growing optoelectronic industry in China.

## LEARNING THE LATEST IN LASER PROCESSING – LPC CONFERENCE WELL ATTENDED

The LIA sponsored 3rd International Conference on Laser Processes and Components (LPC 2008) increased its numbers from last year to nearly 400 participants. LPC featured individual papers on laser processing technologies, laser components and current developments and trends in laser technology and safety. This conference also provided a great overview for those looking into switching over from traditional applications to laser processing. The quality of papers reached a high level thanks in part to the efforts of the staff from LIA corporate member LZH lead by LIA's President Andreas Ostendorf. LIA is proud to support the LPC conference. In particular, the focus on trends in laser technology and safety is the key as we look toward the future of laser processing in China and beyond.

## HUGE SUPPORT FROM GOVERNMENT – LARGEST ELECTRONICS EVENT IN CHINA

Under the patronage of the Shanghai Municipal Informatization Commission and the Shanghai Pudong New Area People's Government, the four largest electronics and laser shows in Shanghai, electronica & Productronica China, LASER World of PHOTONICS China, Semicon China and CPCA Show, for the first time gathered under the umbrella of the Shanghai International IT & Electronics Fair (SIIEF). The synergy added up to the largest electronics event in China ever, featuring 11 exhibition halls and a record-breaking 120,000 m<sup>2</sup> exhibition area with a total number of 1995 exhibitors.

LASER World of PHOTONICS China will next be held March 17–19, 2009. ■



LIA's booth at LASER World of PHOTONICS China.

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Many job seekers and employers are discovering the advantages of searching online for industry jobs and for qualified candidates to fill them. But when it comes to making career connections in the field of laser technology, the mass market approach of the mega job boards may not be the best way to find exactly what you're looking for.

The **Laser Institute of America (LIA)** has created the **LIA Career Center** to give employers and job seeking professionals a better way to find one another and make that perfect career fit.



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## CORPORATE MEMBER PROFILE

## BEAMSTOP'R, INC.

An LIA corporate member since 2001, Beamstop'r, Inc. offers cost-effective and custom made laser protection curtains and screens. The company's products confine a laser's beam and protects against occupational eye and skin exposure resulting from reflective laser radiation, thus ensuring a safe working environment in laser spectroscopy laboratories, hospitals and medical and dental offices.

### COMPANY ORGANIZATION

Founded in 1991 by Barbara Krantz, Beamstop'r employs three full-time employees at its home office in Beachwood, Ohio. There are also four part-time workers and a medical consultant. The facility includes two workrooms that fabricate products and one that constructs the frames and tracks. The company holds one patent and performs its own research and development.

Beamstop'r's mission is to provide a product that fits the customers' requirements in a cost-effective manner and to manufacture a product that is well made, will last, and will meet or exceed all government regulations. In fact, Beamstop'r products meet and exceed OSHA and ANSI regulations as tested by The Ohio State University.

The first product produced by Beamstop'r was a series of laser protective curtains designed with and for The Ohio State University for their laser spectroscopy labs for Class IV lasers.

### COMPANY PRODUCTS

"Beamstop'r has been in business for 17 years. We manufacture custom laser barriers, usually in the form of curtains or screens. We can meet almost every individual requirement that a company, university, hospital, medical/dental, or veterinarian office might present us with. We continually upgrade the quality of our products to meet or exceed all government standards for the above type of laser usage," said Krantz.

Today's products include laser curtains, laser dressing screens, laser window covers, laser Roman shades, and any other laser protection barriers customers might need or envision.

"Our most popular item is the barrier curtain installed on track hardware. This style of protective curtain is similar to the curtain that surrounds a patient bed in a hospital," she said.

Beamstop'r is currently developing a cubicle room covered with its laser protective fabric that creates a room within a larger room.

"The room will have four walls and a locked door. This room will be for pulse lasers and low wattage continuous wave lasers only. The walls will be shipped to the end-user to be assembled on the job site. We are also working on a safety cage using our laser protective fabric and an industrial strength frame," Krantz stated.

### CONQUERING CHALLENGES

After 17 years in the laser safety industry, Krantz has seen quite a bit of growth. "Lasers are being used more and more in the medical/dental and hospital setting. We have also seen lasers being used in the cosmetic hair removal industry and in other cosmetic procedures."

Along with this growth come the inevitable changes. "The biggest change has been the ANSI regulations that require the end-user of lasers to be more safety conscious. This means the use of protective barriers like our products," she said.

An LIA corporate member for the past seven years, Krantz sees a lot of value in her membership. "LIA provides us with all the information we need pertaining to the newest and latest changes in the laser field both nationally and internationally. The staff at LIA is well trained and very knowledgeable, and always available to answer our questions."

"The laser industry is growing rapidly as new uses for lasers are being developed and discovered. It is critical that as the laser industry continues to grow, the safety requirements continue to be foremost in the minds of the personnel that are responsible for the purchase of lasers. LIA is a leader in the endeavor and it is our privilege to be a part of this growth," she said.

For more information visit [www.beamstopr.com](http://www.beamstopr.com). ■



Beamstop'r offers custom made laser protection curtains and screens.





# LIA Membership

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Join the Laser Institute of America and become part of the worldwide laser information and application society. LIA members represent every facet of the laser community.

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LIA individual members join with corporate members to create a laser community, allowing you to take advantage of tremendous informational resources and networking opportunities. Join your colleagues at LIA's Northeast, Great Lakes and West Coast chapters and other regional events throughout the world.

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- Substantial discounts on LIA courses, conferences and seminars. This includes laser safety officer training, the International Congress on Applications of Lasers and Electro-Optics (ICALEO®), the International Laser Safety Conference (ILSC®), the Pacific International Conference on Applications of Lasers and Optics (PICALO) and the Automotive Laser Applications Workshop (ALAW).
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**JLA UPDATE**

The *Journal of Laser Applications*<sup>®</sup> offers the latest refereed papers by leading researchers in the laser community. The August 2008 issue includes papers from materials processing. Look for the online version at [www.laserinstitute.org/publications/jla/](http://www.laserinstitute.org/publications/jla/). To view the journal online, please make sure your membership is current. Starting with the August 2007 issue, online figures will be in color. In addition, articles will now be posted online as the production cycle is completed ensuring timely publication. These articles will be fully citable.

The JLA is published four times a year by the Laser Institute of America 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.

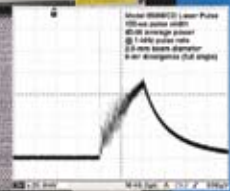
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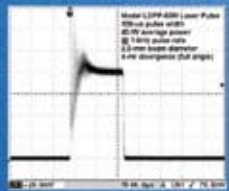
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in frequency. "There are five to six reports every week around Australia. It is extremely dangerous as it can temporarily blind a pilot or distract them as they are coming in to land. These laser beams are now so powerful they can shine up to five kilometres." *As reported by Frank Walker in the March 30, 2008 edition of The Sun Herald in Australia.*

### Winner of the Innovation Award Laser Technology 2008

The Innovation Award Laser Technology 2008, initiated by the associations Arbeitskreis Lasertechnik e.V. and the European Laser Institute (ELI), was awarded in May to Dipl.-Ing. Bertold Hopf, Daimler AG, Sindelfingen, Germany, on behalf of the RobScan project team. RobScan – Robot-guided remote Scanner for laser beam welding – is a new laser beam welding process developed for vehicle body construction by Hopf and Dr. Klaus Debschütz and their team within Daimler AG.

The innovation of the RobScan system is the combination of different hardware components and the Daimler-developed process technology and control software. It represents a new approach to laser beam welding using the known advantages of laser welding and extending it with new possibilities in process technology and a new control system to utilize all the possibilities of the remote scanner. It was thus possible to increase the welding speed and improve the welding quality. The RobScan process combines the high speed and precision of scanner optics with the flexibility of a robot. The commercial value to the automotive industry was convincingly demonstrated.

The Innovation Award Laser Technology is a European research prize awarded every other year by Arbeitskreis Lasertechnik and ELI. The award is conferred to an individual

researcher or project group whose exceptional skills and dedicated work have led to an outstanding innovation in the field of laser technology.

### Record-Setting Laser May Aid Searches for Earth-like Planets

Scientists at the University of Konstanz (Germany) and the National Institute of Standards and Technology (NIST) have demonstrated an ultrafast laser that offers a record combination of high speed, short pulses and high average power. The new laser is expected to have a range of applications from gas sensors to communications, but in particular, say researchers, it could boost the sensitivity of astronomical tools searching for other Earth-like planets as much as 100 fold.

The dime-sized laser emits 10 billion pulses per second, each lasting about 40 femtoseconds (quadrillionths of a second). The short, fast pulses make it ideal for use as a "frequency comb" — an ultraprecise technique for measuring frequencies of light. It is 10 times faster than a standard NIST frequency comb, produces much shorter pulses than comparable lasers, and is 100 to 1,000 times more powerful than typical high-speed lasers, producing clearer signals in experiments. It was built by Albrecht Bartels at the Center for Applied Photonics of the University of Konstanz in Germany.

A number of major institutions are interested in the use of frequency combs for planet discovery. Other potential applications of the new laser include direct measurements of the expansion of the universe, remote sensing of gases for medical or atmospheric studies, and on-the-fly precision control of high-speed optical communications to provide greater versatility in data and time transmissions. ■



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# MEMBER INNOVATIONS

## LASER BEAM BARRIERS

Wilson Industries' Laz-R-Barrier is an ideal solution for reflected laser beam containment. Laz-R-Barrier protects against occupational eye and skin exposure from reflective laser radiation and broadband optical radiation generated by laser plume. The company's most popular Laz-R-Barriers are the LP-200, which provides excellent protection in a low-power laser application; the Sensor 250 light-duty barrier; Sensor 500 medium-duty barrier and the Sensor 1000 heavy-duty barrier. Appropriate protection is determined by factors including power, wavelength, beam diameter and distance from the barrier (divergence). For more information visit [www.wilsonindustries.com](http://www.wilsonindustries.com).

## WAVELENGTH FILTER

As part of its laser safety sheet products, Gentex Corporation has introduced a new multiple wavelength filter in acrylic. Offering a minimum optical density of six from 694-1064 nm, and visible light transmission of 25%, this window protects against ruby, alexandrite, diode, and YAG lasers within a single filter. Gentex's laser safety windows manage the threat of laser radiation by blocking select wavelengths of light. They offer excellent optical clarity and maintain high optical densities for full protection from scattered radiation. Most windows are available in sizes up to 36x48 inches (914x1219 mm). Gentex filters are also available as resin and lens products. Visit Gentex at [www.filtron.gentexcorp.com](http://www.filtron.gentexcorp.com) for more information.

## NEW PORTABLE BEAM PROFILER

Ophir-Spiricon, Logan, Utah, has introduced the BA150 Industrial Laser Beam Analyzer. The BA150 is a laser beam profiling system that analyzes key laser parameters in order to maintain peak performance of precision material processing lasers. A compact, self-contained unit that fits in almost any glove box-type laser system, the BA150 includes a state-of-the-art USB 2.0 silicon CCD camera and advanced beam analysis software. The system monitors all key laser beam parameters for 1064 nm pulsed and CW industrial Nd:YAG, diode, and fiber lasers up to 150 W. For more information visit [www.ophir-spiricon.com](http://www.ophir-spiricon.com). ■

# MEMBERS IN MOTION

## SUMMER TRAINING

Del Mar Photonics will be presenting training workshops for customers and potential customers at its facility in San Diego, Calif. this summer. The three-day workshops cover scientific basics, technical details and provide ample time for hands-on training. The following training workshops will be offered this summer: femtosecond lasers and their applications; CW narrow line-width widely tunable lasers and their applications; adaptive optics and wavefront sensors; ultrafast (femtosecond) dynamics tools, and nonlinear imaging techniques: multiphoton and CARS microscopy. For more information and dates, visit [www.dmphotonics.com/Workshops](http://www.dmphotonics.com/Workshops).

## MLPC HONORED WITH SOIN AWARD

The Dayton Area Chamber of Commerce and Soin International awarded Mound Laser & Photonics Center, Inc. (MLPC), Miamisburg, Ohio, with the 2008 Soin Award for Innovation. The award is presented annually to a company in the Dayton region that exhibits innovative spirit and makes significant contributions to the community. MLPC, a full service laser processing company, was recognized at the Dayton Area Chamber of Commerce Annual Meeting on April 22, 2008, where the company was featured in a 90-second video created by ABC 22/FOX 45. The company received a trophy and a check for \$25,000. The funds will be used to expand the company's intern/co-op program to provide more undergraduate and graduate students the opportunity to gain hands-on experience in a high-tech business.

## LASER MECHANISMS EUROPEAN RELOCATION

Laser Mechanisms, Inc., Farmington Hills, Mich., announced the move of its Laser Mech Europe sales offices from Destelbergen, Belgium to Mariakerke, Belgium. The new facility will house sales offices, a showroom, training room, meeting room and expanded warehousing for inventory. The move is in direct response to unprecedented European sales growth and will enable Laser Mech Europe to further strengthen its sales and support of industrial and medical laser systems users in the region. ■

The Standard Has Been Set!

## REVISED ANSI Z136.1

Safety starts here -  
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Get your copy of the revised ANSI Z136.1 *Safe Use of Lasers*. The ANSI Z136.1 is the foundation of laser safety programs for industrial, medical, military, and educational applications nationwide and is the parent document and cornerstone of the Z136 series of laser safety standards. The standard is recognized and used by OSHA as the authoritative document for laser safety. All previous versions of this standard are obsolete (1986, 1993, 2000).



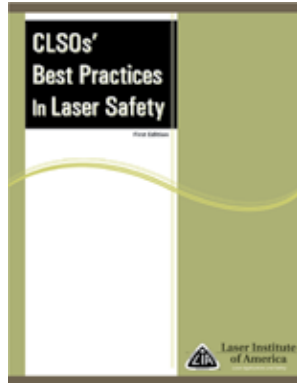
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## LIA'S LATEST RELEASES

The first of LIA's newest publications is *CLSOs' Best Practices in Laser Safety*. This book concentrates on how to address Class 3B and Class 4 laser hazards and their safe operation and is a compendium of procedures, policies and practical advice to be used by laser safety professionals. An international team of 20 laser safety experts and certified laser safety officers (CLSOs) from the industrial, medical, and academia fields volunteered their time and effort to create this benchmark reference handbook.

The different chapters in this handbook cover areas of laser safety practices that are typically needed in the anticipation, recognition, evaluation and control of laser hazards as well as the rules and regulations that exist. An added feature included with the book is the CD ROM Initial Training and Refresher Training PowerPoint presentation for laser safety officers to use to train their facilities' laser users. To order your copy, visit [www.laserinstitute.org/store](http://www.laserinstitute.org/store). Cost for LIA members is \$120 or \$140 for nonmembers.



The second new release is the new *American National Standard for Testing and Labeling of Laser Protective Equipment (ANSI Z136.7)*. This standard provides reasonable and adequate guidance on the test methods, protocols, specifications, report format, and labeling for devices used for eye protection from lasers and laser systems that operate at wavelengths between 180 nm and 1 mm. Such protective devices include laser eye protective devices or instrument filters, laser window filters, and laser area protective barriers, screens or beam blocking curtains. The test procedures provided in this document ensure that eyewear, windows, and barriers maintain their specified level of protection throughout the useful life of the product.

Six informative appendices are included to guide the reader through material characterizations for the different filter/material types. The standard addresses not only absorptive filter materials, but new reflective coatings (e.g., dielectric stacks, holograms) and hybrid filters. The ANSI Z136.7 can be ordered at [www.laserinstitute.org/ANSI](http://www.laserinstitute.org/ANSI) or by calling 407-380-1553.

## 2008 LASER SAFETY TRAINING CATALOG NOW AVAILABLE

LIA offers a complete line of laser safety training courses for personnel in research, industrial, and medical laser facilities. Onsite training is also available, and all of LIA's courses are based on the ANSI Z136 series of laser safety standards. As secretariat of the ANSI Z136



standards, the foundation of laser safety programs nationwide, LIA has assisted laser users in developing and implementing safety programs for 40 years. The 2008 Laser Safety Training catalog is your source to discover which course is best for you. It provides in-depth descriptions of all of LIA's courses as well as dates and locations. For your copy, visit [www.laserinstitute.org/education](http://www.laserinstitute.org/education).

## LIA GOES MEDICAL

LIA exhibited at the Association of Perioperative Registered Nurses' (AORN) annual congress, which was held Mar. 30-Apr. 3 in Anaheim, Calif. The AORN Congress brings together perioperative nurses for further education, training and exposure to new developments in technology for the operating room. The show had approximately 13,000 attendees and around 575 exhibitors. Attendees were also interested in LIA's medical in-service training and the certified MLSO exam.

LIA also exhibited at the 28th Annual Conference for the American Society for Laser Medicine and Surgery (ASLMS), which was held April 3-5 in Orlando, Fla. There were approximately 3,000 attendees and over 160 exhibitors. LIA attends this show every year with a goal of making new contacts and to promote current medical offerings. Attendees who stopped by the LIA booth were interested in general information about the society, safety training, and on-site/in-house training. The Z136.3 received the most significant attention out of all of the publications, as well as LIA's newest release, *CLSOs' Best Practices in Laser Safety*.

## LIA GOES DENTAL

Last on LIA's spring exhibition line-up was the Academy of Laser Dentistry's (ALD) 15th Annual Conference and Expo, which was held April 9-12 in San Diego, Calif. ALD is an international professional membership association of dental practitioners and supporting organizations dedicated to improving the health and well-being of patients through the proper use of laser technology. Most of the attendees that stopped by the LIA booth were interested in MLSO training, laser safety publications and best practices.

See article on page 14, "LIA's Presence in China Expands," regarding the LASER World of PHOTONICS China 2008 show that LIA also participated in. LIA is proud to be exhibiting at these conferences in order to fulfill its mission of fostering lasers, laser applications, and laser safety worldwide.

## MARK YOUR CALENDARS

The 27<sup>th</sup> International Congress on Applications of Lasers & Electro-Optics (ICALEO® 2008) will be held Oct. 20-23, 2008 in Temecula, California. ICALEO 2008 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 Development Session and plenty of networking opportunities. For complete details on ICALEO or for sponsorship information, visit [www.icaleo.org](http://www.icaleo.org) or contact Amanda Criner at 800.34.LASER or e-mail [acriner@laserinstitute.org](mailto:acriner@laserinstitute.org). ■



**CLSOs' Best Practices  
in Laser Safety** (Pub 214)  
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Member           \$120  
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