



# 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: RESEARCH | VOLUME 17 NUMBER 4 | JULY / AUGUST 2009

## FRONTIERS AND CHALLENGES FOR THE GREEN ECONOMY LOOKING AHEAD TO ICALEO 2009

The International Congress on Applications of Lasers & Electro-Optics (ICALEO®) has a 27-year history as the foremost conference where researchers and end-users meet to review the state-of-the-art in laser materials processing and predict where the future will lead. Since its inception, ICALEO has been devoted to the field of laser materials processing and is the premier source of technical information in the field.

The 28<sup>th</sup> ICALEO will be held Nov. 2-5, 2009 at the Hilton located in the Walt Disney World® Resort in Orlando, Fla. ICALEO will include three conferences — the Laser Materials Processing Conference, the Laser Microprocessing Conference and the Nanomanufacturing Conference. Additional program features include the Opening and Closing Plenary Sessions, Laser Solutions Short Courses, Poster Presentation Gallery and the Business Forum & Panel Discussion.

ICALEO is designed for everyone interested in laser materials processing, from the basic understanding of the interaction between a laser beam and a material to those interested in how a sophisticated process can be integrated and optimized for an application. Laser Institute of America's goal for this event is to bring together people from both academia and industry who may benefit from learning more about laser technology and applications. This includes end- (Con't. pg. 6, see ICALEO)

## LASER WORLD OF PHOTONICS WORLD SHOWCASE OF LASERS

By William Lawson

The LASER World of Photonics show has always been, for me, the one show in the world to “see the world” of industrial lasers, the show with the most bang for the buck. Held June 14-18, 2009 in Munich, Germany and with four halls and 1,040 exhibitors, LASER World of Photonics 2009 did not disappoint.

More importantly, the number of visitors was only 10 percent less than in 2007, which showed that even in these difficult times, people thought it was a show worth spending the money to attend. The number of international visitors was also up. On the business side, many companies said they were slow, but not all. Lumera, for example, said they had been working overtime the last several months to fill orders, indicating some areas in the industrial laser world are still doing well.

## TECHNOLOGY IMPROVEMENTS

Among the many incremental improvements in the technology presented, IPG, TRUMPF, Rofin, etc., all had impressive presentations of their latest technology developments. Although I did not do a thorough survey, I did find the following promising developments. (Con't. pg. 8, see Lasers)

## LIA ANNOUNCES LASER SAFETY STIMULUS PACKAGE

LIA is stepping up and doing its part to stimulate the economy and save you money by offering its very own laser safety stimulus package. From now until the end of August you can receive 25 percent off any of our ANSI Z136 laser safety standards. As laser technology advances, new guidelines are needed. Make sure your library is complete and up-to-date.

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- ANSI Z136.3 Safe Use of Lasers in Health Care Facilities
- ANSI Z136.4 Recommended Practice for Laser Safety Measurements
- ANSI Z136.5 Safe Use of Lasers in Educational Institutions
- ANSI Z136.6 Safe Use of Lasers Outdoors
- ANSI Z136.7 for Testing and Labeling of Laser Protective Equipment

All standards are available in electronic format. When ordering any of the ANSI standards, just use the special discount code SAVE25 during the checkout process and you will be one step (Con't. pg. 19)

### Inside this issue:

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New Era of Research, pg. 10

Receive the LIA TODAY  
electronically, see pg. 5.



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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*® 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](mailto:lia@laserinstitute.org).

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### CALENDAR OF EVENTS

<b>Laser Safety Officer Training</b> Dec. 7-9, 2009   Orlando, FL
<b>Laser Safety Officer with Hazard Analysis*</b> Sept. 28-Oct. 2, 2009   San Francisco, CA Nov. 2-6, 2009   Orlando, FL *Certified Laser Safety Officer exam offered after the course.
<b>Medical Laser Safety Officer Training*</b> Sept. 19-20, 2009   San Francisco, CA Nov. 14-15, 2009   New Orleans, LA *Certified Medical Laser Safety Officer exam offered after the course.
<b>Advanced Medical Laser Safety Officer</b> Sept. 10-13, 2009   Atlanta, GA
<b>ICALEO® 2009</b> Nov. 2-5, 2009   Orlando, FL
<b>PICALO 2010</b> Mar. 23-25, 2010   Wuhan, China

### 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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# LIA Career Center

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Target your recruiting to reach qualified professionals quickly and easily. Search the resume database to contact candidates, and get automatic email notification whenever a candidate matches your criteria.

Visit <http://careers.laserinstitute.org> today to post your job or search job listings.

## FIND A JOB FILL A POSITION

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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## THE *LIA TODAY* IS GOING GREEN!

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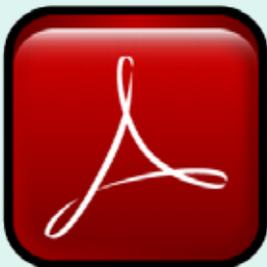
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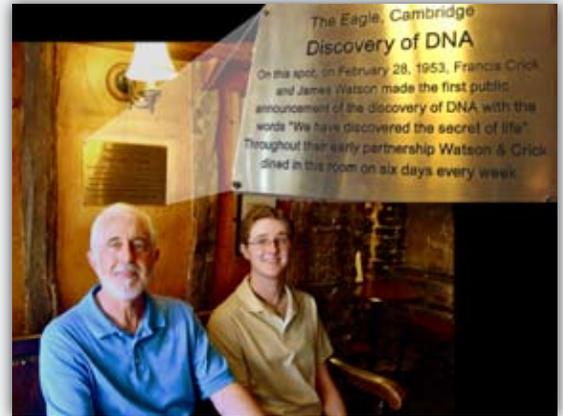
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## EXECUTIVE DIRECTOR'S MESSAGE

Last month LIA visited Cambridge and Munich. In Cambridge we visited the offices of Europa Science, our partners in the new publication *Laser Systems Europe*. They were pleased with the first issues and plan to increase the publication frequency this year in spite of the tough economy.

While in Cambridge we visited with the two "Professor Bills," Schawlow Award winner Bill Steen and Board Member Bill O'Neill. This year is Cambridge University's 800th anniversary and the lamp posts fly lovely yellow flags with just a column of dates on them, 1356, 1625, -- 1958 and so on. Bill Steen quickly pointed out that these dates commemorated little discoveries at Cambridge like Newton, gravity, Darwin, origin of species, Crick and Watson, DNA and so on.



In the evening Bill O'Neill invited us to dine "in hall," which was a very fine affair with great food, good conversation, fine wine and grace spoken in Latin. Most gracious. Thank you, Bill.

Laser Munich was a large and fine affair as always; Bill Lawson reports on the exhibit starting on page 1 and Milan Brandt reports on the LIM conference, chaired by Past President Andreas Ostendorf, on page 8. Here you'll also find our conference photos.

Jim Naugle and I, aided by Scott Baker, manned the LIA booth and we were able to connect with many LIA members and potential new members while there. We also were able to hold meetings related to ALAW, JLA® and other LIA areas of interest.

Now we're back in Orlando and working feverishly on ICALEO® 2009 and PICALO 2010, both of which are shaping up well.

We had over 300 abstracts for ICALEO. As I was reviewing the program I was most impressed by the range and quality of it. The Plenary Session on the green economy includes a keynote address by John Turner of the National Renewable Energy Laboratory on "Frontiers, Opportunities and Challenges for a Hydrogen Economy."

The joint session on automotive and aerospace includes an intriguing paper on "Ultra Short Pulse Laser Generated Surface Textures for Anti-ice Applications in Aviation." There are papers on diamond-copper-tin-titanium deposition, laser patterned nonwovens, femtosecond laser processes, processing of silicon, microtexturing of titanium surface for biomedical applications, doping of solar cells, even on bionanomanufacturing.

So it is a "Don't Miss Event." ICALEO 2009 will be held at the Hilton located in the Walt Disney World® Resort, November 2-5. Sign up now, you'll be glad you did. See you there.

A handwritten signature in black ink that reads "Peter Baker".

Peter Baker, Executive Director  
Laser Institute of America  
[pbaker@laserinstitute.org](mailto:pbaker@laserinstitute.org)

users and scientists as well as engineers and technicians engaged in developing laser technology.

## PLENARY AND TECHNICAL SESSIONS

The Plenary Session for ICALEO 2009, entitled “Frontiers and Challenges for the Green Economy,” will be led by Congress General Chair Xinbing Liu of the Panasonic Boston Laboratory. During this session, eminent leaders in science, engineering and business will speak on different aspects of laser applications with a focus on green energy technology. Finding the means to address and meet the world’s growing energy needs in economically viable and environmentally friendly ways is crucial to the future of humanity. Laser technology and the people working hard to expand its capabilities are making a major contribution to this effort. The presenters in the Plenary Session will examine the cutting edge of laser research.

The keynote speaker, John Turner of the National Renewable Energy Laboratory, will give a presentation discussing the latest research concerning the establishment of a renewable hydrogen economy and the opportunities and challenges it presents. Following the keynote, Dave Clark of Newport Spectra-Physics will discuss laser applications in the rapidly developing photovoltaic industry. C. Martin Stickley of the University of Central Florida will outline the progress in high-power diode lasers and industrial applications. Finally, Yongfeng Lu of the University of Nebraska-Lincoln will present his group’s work on laser processing of carbon materials, from high-speed diamond film deposition to carbon nanotubes as semiconductor devices.

The Laser Materials Processing Conference (LMP) will cover a wide range of topics on macroscopic processes, applications and related laser equipment and systems. Presenters in this conference will characterize the trends in research involving high speed, efficient, flexible macroscopic laser processing applications and equipment. The progress in high brightness processes brought on by advances and improvements in high-power fiber lasers and direct-diode lasers will be prominently featured. Some of

the specific processing topics to be addressed include hybrid welding, laser cutting and drilling, surface modification and additive manufacturing. The LMP Conference Chair, Paul Denney of the Connecticut Center for Advanced Technology, Inc., will emphasize the opportunities that abound for research and development in the automotive industry and alternative energy.

The Laser Microprocessing Conference (LMF), chaired by Kunihiko Washio of Paradigm Laser Research Limited, will address a broad range of specialized interests in processes

and systems for microscopic applications. Due to recent innovations in microprocessing with the use of ultrafast lasers and short wavelength lasers, this technology will be an area of particular focus. The LMF will also include a special session on pulse-shape and burst-train control of laser interactions, as well as a variety of presentations regarding laser applications for solar cell production. Solar power is bound to be a key component in the renovation of the world’s energy infrastructure, and some of the research presented during this conference could very well contribute to scientific breakthroughs that will pave the way for widespread use of solar cell technology.

The Nanomanufacturing Conference, organized by Conference Chair Costas Grigoropoulos of the University of California-Berkeley, will highlight laser technology and research for this emerging field. Presenters will discuss a wide variety of nanomanufacturing technologies, including nanopatterning, nanolithography, nanoprocessing and nanoparticle fabrication. These technologies are put to use in such applications as flexible electronics, solar devices and biomedical nanomaterials.

# ICALEO®

## 28<sup>th</sup> INTERNATIONAL CONGRESS ON APPLICATIONS OF LASERS & ELECTRO-OPTICS

A new feature of this year’s ICALEO is the inclusion of a Closing Plenary Session, which will be a joint session of the LMP and the LMF conferences. The topic of this final session is Microprocessing Applications in the Automotive and Aerospace Industries. More specifically, speakers will present research findings that demonstrate advancement in diode-pumped solid-state lasers and fiber lasers. The improved performance, efficiency and reliability of these laser systems has enabled them to be employed in a wider range of microscopic applications, including micro-drilling and precision machining. These high intensity lasers have surpassed the lasers pumped by flash lamps that have traditionally been used in these applications and have shown great promise for optimizing many processes found in the automotive and aerospace industries. Improving the energy efficiency of our methods of transportation will be a major factor in establishing a greener worldwide energy system.

## ADDITIONAL FEATURES

In addition to the Opening and Closing Plenary Sessions and the technical conferences on Laser Materials Processing, Laser Microprocessing and Nanomanufacturing, ICALEO will include a Business Forum & Panel Discussion that will provide conference attendees an opportunity to listen to and interact with leaders from business, academic and governmental organizations around the world on important issues related to the laser and photonics industry. In keeping with the overall theme of the Plenary Session, this event will examine the subject of green energy from



**ICALEO 2009 Congress General Chair Xinbing Liu.**

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a professional standpoint, taking into consideration the business prospects presented by the world's evolving energy limitations and needs. Chaired by Bo Gu of IPG Photonics Corporation, this forum will provide a great opportunity for ICALEO attendees to engage in discussion with the speakers on the panel and to enhance their business perspectives.

The Laser Solutions Short Courses are ideal for those who want to receive an overview of the state-of-the-art in laser processing. The short courses will provide attendees with a broad-based understanding of how the practical applications of lasers are making an impact on manufacturing and provide resources for further information. This series of short courses, chaired by Stefan Kaieler of Fraunhofer ILT and taught by industrial photonics experts, will address fundamentals related to lasers, optics, material processing and applications and is designed to complement the other ICALEO activities. No additional fee is required.

The Poster Presentation Gallery will be featured on Tuesday and Wednesday of the conference. The gallery will provide an opportunity for presenters to exhibit their research and share ideas with attendees. Join presenters Wednesday morning for breakfast as poster presenters will be by their posters to answer questions.

The Student Paper Award Contest is LIA's way of showing appreciation for student contributions to ICALEO. This award gives students a chance to have their work recognized and evaluated by an international panel of laser and photonics experts. Cash awards will be presented to first, second and third place winners in addition to having their papers submitted to LIA's *Journal of Laser Applications*<sup>®</sup> for possible publication (papers will go through a peer review process). Prize winners will be notified after the conclusion of the conference and will be announced through an article in the *LIA TODAY* newsletter featuring ICALEO. (See sidebar for information on a grant for students.)

## GOING SOCIAL

Social events at this year's ICALEO include the Welcome Celebration, President's Reception, Laser Industry Vendor Reception & Tabletop Display and the LIA Annual Meeting & Awards Luncheon. Plan to arrive on Sunday for the Welcome Reception and enjoy live entertainment provided by the Beer's Law Band. This event is a great opportunity for new attendees to meet 'old timers' and for everyone to socialize and interact. Monday evening, the opening day of ICALEO, will feature the President's Reception hosted by LIA President Rajesh Patel at the Epcot<sup>®</sup> Odyssey Pavilion. Meet the LIA Executive Committee, Board of Directors, ICALEO Congress General Chair Xinbing Liu and Chairs Paul Denney, Kunihiko Washio, Costas Grigoropoulos, Stefan Kaieler and Bo Gu. Join the LIA staff and mingle with old friends at this exciting venue.

On Tuesday evening join us for the ICALEO 2009 Laser Industry Vendor Reception & Tabletop Display and enjoy drinks and hors d'oeuvres while sharing product ideas with your colleagues and suppliers. This event gives vendors and conference attendees the opportunity to discuss equipment and applications in a relaxed setting. During the Awards Luncheon on Wednesday, LIA will present its highest award, the Arthur L. Schawlow Award, to Valentin Gapontsev, CEO of IPG Photonics. LIA first presented this award in 1982 to recognize individuals who have made distinguished contributions to applications of

## ICALEO GRANT FOR STUDENTS

A great opportunity for students comes courtesy of the National Science Foundation (NSF). ICALEO has received grant money from the NSF to be used in conjunction with ICALEO 2009. The money is to support and promote students attending the conference. Grants are available to offset the cost of student's full conference registration. Grants are only available to students attending universities in the United States. To be considered for the grant, students must complete and submit an application to the LIA Conference Department by Aug. 20, 2009. Submission must be accompanied by an ICALEO conference registration form. Visit [www.icaleo.org](http://www.icaleo.org) to download grant application and ICALEO registration form.



lasers in science, industry or education. The award presentation consists of a silver medal, a \$2,000 cash award, a citation and the awardee will become a lifetime member of LIA.

Whether you are a research scientist, an industrial engineer, a professional in the laser business, a student of laser physics and electro-optics, or just someone who is intrigued by the frontiers of laser technology and the future of alternative energy, you won't want to miss this extraordinary gathering of some of the top minds from all corners of the laser and photonics field.

For more information about ICALEO 2009 or to view the full advance program, visit [www.icaleo.org](http://www.icaleo.org). Registration is now available online and you can save \$50 on a full conference registration if you register before Sept. 3. ■

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New scanner systems that GSI and Scanlab showed incorporated encoder feedback, a somewhat revolutionary development that dramatically increases scanner accuracy while not reducing performance. As much as a 10X increase in long-term repeatability and accuracy was indicated. Although these new systems are expensive and few are in actual industrial use, they promise to overcome one of the major difficulties in using scanners for large, high accuracy applications.

In the area of very short picosecond lasers, Lumera showed their 50-Watt Rapid laser, an impressive amount of power since only a few years ago 1 or 2 Watts was the rule. I did not extensively survey the category, but I expect there were other companies in this area with great products.

Diode lasers were a major area creating excitement. TRUMPF and several other companies were touting 100-W, 100-micron fiber-delivered direct-diode lasers that they said eventually could be ganged into a laser with several thousand Watts and high beam quality for welding and even cutting applications. This means that, sometime in the future, applications that now use YAG, CO<sub>2</sub> and even fiber and disc lasers may be done using direct diode lasers, potentially dramatically reducing the cost for higher power lasers.

While the power of single emitter diodes has increased to 10 Watts per emitter and will increase gradually, there is some potentially disruptive technology on the horizon. One company showed a production prototype of a surface-emitting diode that produced 73 Watts. This concept, where the light comes out of the top of the device rather than the end, has been around for many years, but Alflight of Madison, Wisconsin has actually made it happen. The device also has a very high quality beam and the potential to dramatically reduce the cost to manufacture in volume.



Bill Lawson

## WORTH THE VISIT

Besides Munich itself being worth visiting, LASER 2009 showed that the industrial laser world is not only viable, but also growing and continuing to foster substantial technical advances.

*William E. Lawson, P.E. (wlawsonntd@usa.net), is founder of NewTech Development LLC (www.newtechdev.com), which specializes in advising technological companies on management and marketing and in helping organizations implement high technology solutions with new manufacturing and design capabilities. He is a past president and treasurer of LIA, holds 14 patents, primarily for laser processing, and has taught laser material processing courses for University of Wisconsin-Madison – Continuing Education.*

## Highlights from LIM 2009

By Milan Brandt

Lasers in Manufacturing (LIM) 2009 was held as part of the 19<sup>th</sup> World of Photonics Congress from June 18-22 in Munich, Germany. LIA was one of the cooperating societies. The World of Photonics Congress is the largest European congress covering all aspects of photonics. Including the tradeshow, which showcased the latest developments in lasers, systems, processes, optics and associated equipment and components, over 24,000 attendees from all over the world visited the four trade halls, attended lectures and workshops and engaged in intense discussions on the scientific impact and industrial applications of various technologies. Judging by the response from the delegates and vendors, the event was a success despite the current global economic difficulties.



Milan Brandt

## EUROPEAN FORUM

LIM conferences focus on bringing together researchers, developers and users of lasers and LIM '09 followed in the same tradition covering topics from macro-processing to micro and nano-structuring of materials. The conference general chair, Prof. Andreas Ostendorf from Ruhr-University Bochum, Germany and co-chairs Dr. Dirk Petring (macro-processing) Fraunhofer ILT, Aachen, Germany and Prof. Thomas Graf (micro-processing), IFSW, Stuttgart, Germany attracted many local, regional and international researchers to present and share their latest developments in macro and micro machining with lasers. Some 180 papers were delivered in 28 sessions over four days.

In his opening remarks, Ostendorf welcomed the delegates and said that LIM '09 builds on the previous LIM conferences in providing a European forum for researchers and industry to present their latest ideas and discuss their results, and this goal was achieved.

## HOT TOPICS

The conference opened with a paper by F. Kilian of TRUMPF on the recent laser developments at TRUMPF and their potential applications. TRUMPF's stable of lasers now includes fiber, disc and diode in addition to CO<sub>2</sub>. He commented that the price of these lasers has been steadily coming down over the last few years as the technology improves. As an example, the high-power disc laser, which several years ago produced 1 kW per disc, today produces 4 kW per disc and further improvements in output were foreshadowed.

Another keynote speaker, C. Arnold from Princeton University, gave a very exciting talk on the optical trap assisted direct-write nanopatterning that his group is involved in.

Although I attended the papers in the macro sessions, both the macro and micro sessions covered all aspects of laser cutting, welding, monitor and control, systems, surfacing and freeform

manufacture. It is clear from the papers that the fiber laser is now becoming a standard tool for welding, particularly in Europe, and that research is now focused on the very high power applications of this technology.

It is worth noting that compared with LIM '07, LIM '09 saw a large number of papers on the laser direct metal deposition. From discussions with colleagues from a number of research organizations, this technology seems to be rapidly rising in importance in Europe for a range of applications in the aerospace, mining and heavy manufacturing industries.

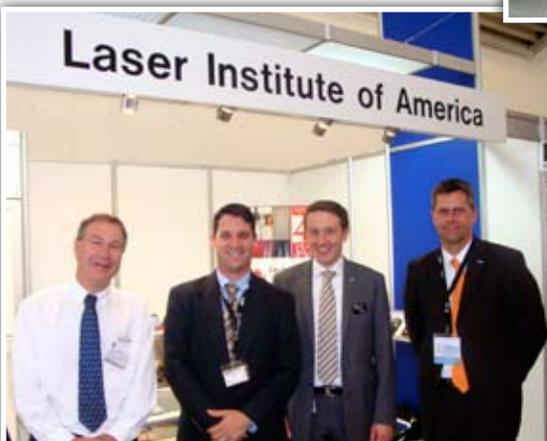
Overall, the conference was a success, especially in view of the global economic crisis that has significantly impacted the manufacturing industry worldwide. As reported in the past, I enjoyed the whole event and would recommend it to anyone involved in photonics as a must-see event at least once in their career. ■

*LIA Fellow and Board Member Milan Brandt is a professor in laser engineering at the Industrial Research Institute Swinburne, Swinburne University of Technology in Melbourne, Australia.*



**LIA Corporate Member and exhibitor Mark Taggart of Laser Mech with LIA Marketing Director Jim Naugle**

**Past Schawlow winners Helmut Hügel, left, and Eckhard Beyer, right, with LIA Executive Director Peter Baker.**



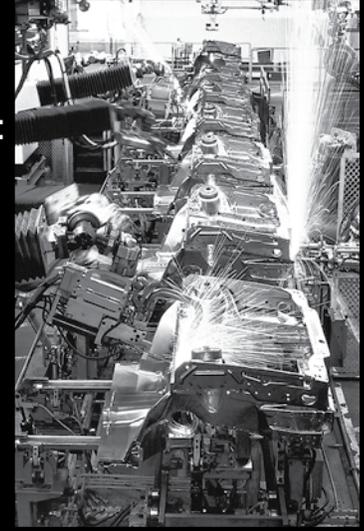
**From left, LIA corporate member Tony Arquish of LASAG, LIA Marketing Director Jim Naugle and Jeff Franks and Axel Luft of Laserline**



**Isamu Miyamoto of Osaka University and Scott Baker.**

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# WORLD'S FIRST HARD X-RAY LASER ACHIEVES "FIRST LIGHT"

## NEW ERA OF RESEARCH BEGINS

The world's brightest X-ray source sprang to life in April at the U.S. Department of Energy's SLAC National Accelerator Laboratory in Menlo Park, Calif. The Linac Coherent Light Source (LCLS) offers researchers the first-ever glimpse of high-energy or "hard" X-ray laser light produced in a laboratory.

When fine-tuning is complete, the LCLS will provide the world's brightest, shortest pulses of laser X-rays for scientific study. It will give scientists an unprecedented tool for studying and understanding the arrangement of atoms in materials such as metals, semiconductors, ceramics, polymers, catalysts, plastics and biological molecules, with wide-ranging impact on advanced energy research and other fields.

"This milestone establishes proof-of-concept for this incredible machine, the first of its kind," said SLAC Director Persis Drell. "The LCLS team overcame unprecedented technical challenges to make this happen, and their work will enable frontier research in a host of fields. For some disciplines, this tool will be as important to the future as the microscope has been to the past."

### NO ROOM FOR ERROR

Even in these initial stages of operation, the LCLS X-ray beam is brighter than any other human-made source of short-pulse, hard X-rays. Initial tests produced laser light with a wavelength of 1.5 Angstroms, or 0.15 nanometers — the shortest-wavelength, highest-energy X-rays ever created by any laser. To generate that light, the team had to align the electron beam with extreme precision. The beam cannot deviate from a straight line by more than about 5 micrometers per 5 meters — an astounding feat of engineering.

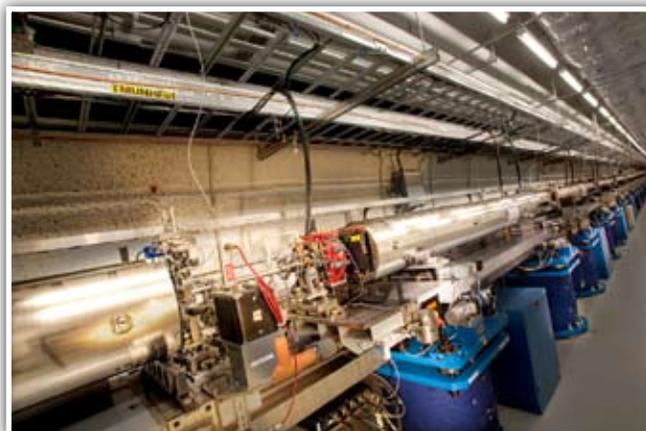
"This is the most difficult lightsource that has ever been turned on," said LCLS Construction Project Director John Galayda. "It's on the boundary between the impossible and possible, and within two hours of start-up these guys had it right on."

Unlike conventional lasers, which use mirrored cavities to amplify light, the LCLS is a free-electron laser, creating light using free-flying electrons in a vacuum. The LCLS uses the final third of SLAC's two-mile linear accelerator to drive electrons to high energy and through an array of "undulator" magnets that steer the electrons rapidly back and forth, generating a brilliant beam of coordinated X-rays. LCLS scientists used only 12 of an eventual 33 undulator magnets to generate the facility's first laser light.

The LCLS team is now honing the machine's performance to achieve the beam quality needed for the first scientific experiments, slated to begin in September. With its ultra-bright, ultrafast pulses, the LCLS will work much like a high-speed camera, capturing images of atoms and molecules in action. By stringing together many such images, researchers will create stop-motion movies that reveal the fundamental behavior of

atoms and molecules on unprecedented timescales.

"The LCLS team saw a vision of a remarkable new tool for science that could be achieved by using the existing SLAC linear accelerator, and they delivered on that vision with remarkable speed and precision," said DOE Office of Science Acting Director Patricia Dehmer. "The science that will come from the LCLS will be as astounding and as unexpected as was the science that came from the lasers of a few decades ago. We do not yet know all that the LCLS will reveal about the world around us. But we can be sure that the new results will excite and energize the scientific communities that we serve." ■



Only 12 of a total 33 LCLS undulator magnets (silver-tone oblongs) were needed to create the first pulses of laser light. (Photo: Brad Plummer)

### FUNDS FOR FIBERS

The Clean Energy and Industrial Efficiency Program of the Massachusetts Department of Energy Resources (DOER) is a government program that provides financial incentives for customers to purchase fiber lasers, which are vastly more energy efficient than conventional YAG and CO<sub>2</sub> gas lasers. The DOER is now accepting applications for proven commercially available technologies with a minimum efficiency improvement of 25 percent into the industrial sector. The DOER program is based on the U.S. Department of Energy's Funding Opportunity Announcement for \$156 million in awards to deploy energy efficient technologies under the terms of the American Recovery and Reinvestment Act. There is no cap on the amount of funding per applicant. For more information, visit [www.mass.gov](http://www.mass.gov).

In addition to government programs subsidizing the switch to energy-efficient fiber lasers, electric utilities provide incentives to purchase fiber lasers. Check with your local utility company as most states offer rebate programs.

Register now!

## 5<sup>TH</sup> INTERNATIONAL WORKSHOP ON FIBER LASERS

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[www.iws.fraunhofer.de/workshop/e\\_workshop.html](http://www.iws.fraunhofer.de/workshop/e_workshop.html)



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In 1971, LIA Corporate Member II-VI Incorporated began by exclusively producing the highest quality materials available for manufacturing high-power industrial CO<sub>2</sub> laser optics. Today, the company, which was co-founded by Dr. Carl Johnson and is headquartered in Saxonburg, Penn., has diversified into numerous business units for near-infrared optics, YAG components and telecommunications components (VLOC); defense and aerospace optics (Exotic Electro-Optics); thermoelectric cooling devices (Marlow Industries); laser processing heads for the 1 micron market (HIGHYAG); silicon carbide (II-VI WBG) and advanced materials development (II-VI AMDC).

As II-VI Inc. continues to diversify and grow with manufacturing, sales and distribution facilities worldwide, the II-VI Infrared business unit stays focused on the company's original, industry-leading products – infrared and CO<sub>2</sub> laser optics and

## II-VI INFRARED

materials. And thanks to decades of innovation in ZnSe materials processing, thin-film coating, precision diamond turning and finished optics fabrication, II-VI Infrared is the world leader in CO<sub>2</sub> laser optics. From developing original equipment optics for the world's top laser manufacturers, to producing replacement laser optics for end users, II-VI Infrared delivers a combination of innovation, quality and experience. II-VI Infrared also delivers the largest, vertically integrated CO<sub>2</sub> laser optics manufacturing process – from raw materials to finished coated products – in the world.

### COMPANY PRODUCTS

II-VI Infrared's products range from replacement CO<sub>2</sub> laser optics and nozzles to lenses, partial reflectors, windows, beamsplitters, mirrors, beam expanders, reflective phase retarders, scanning-laser system optics, diamond-turned custom optics and more. The company's products and reputation make it the number-one CO<sub>2</sub> optics supplier to original equipment manufacturers of CO<sub>2</sub> laser systems worldwide.

In fact, II-VI Infrared's diamond-turning facility is among the largest and most advanced in the world, offering services such as flycutting and multiple-axis turning, as well as fast and slow tool services for custom optics. Single-point diamond turning is used in finishing transmissive optics and mirrors in a variety of metals

and IR materials.

Major investments in computer design programs, evaporation equipment, clean rooms and testing facilities enable II-VI to offer a broad range of IR thin-film coatings. II-VI Infrared is known for designing and producing consistently low-absorption coatings for high-power CO<sub>2</sub> laser optics. Additionally, the experienced engineering team, using optical design software and CAD systems, designs and builds standard and custom optics as well as specialized mounts, components and electro-optic assemblies.

The continuous evolution of high-power CO<sub>2</sub> laser systems in the last couple of years has driven the need for II-VI Infrared to respond with ultra-low absorption optics, including exclusive MP-5 focusing lenses and output couplers.



**II-VI Infrared produces materials for high-power industrial CO<sub>2</sub> laser optics.**

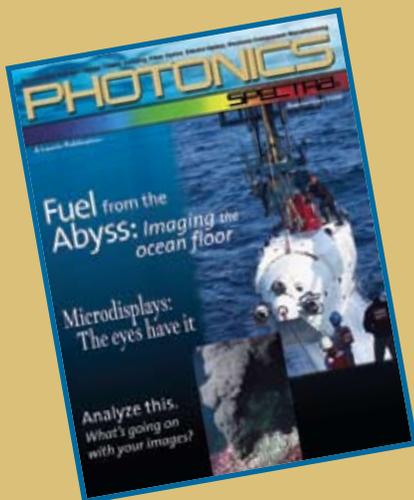
### THE NAME

The Roman numerals "II-VI" refer to Column II and Column VI of the Periodic Table of Elements. By chemically combining elements from Column II and Column VI, the infrared optical crystalline compounds zinc selenide, zinc sulfide and zinc selenide MultiSpectral are produced. These compounds, and others created from Column II and Column VI elements, are commonly referred to as "II-VI materials." When founded in 1971, company co-founder Dr. Carl Johnson paid homage to the II-VI materials heritage and called the new company "II-VI Incorporated."

In the ensuing years, through strategic acquisitions, II-VI Incorporated expanded, building a portfolio of companies that share in a materials heritage yet bring a vastly diversified range of products to market. In recognizing that "II-VI Incorporated" represents far more today than when originally founded, Johnson christened the core optical materials and finished optics business unit "II-VI Infrared" to differentiate it from the corporate whole.

Having been an LIA corporate member for over a dozen years, II-VI Infrared sees membership as a way to access important industry conferences, such as ICALEO®, PICALO and ALAW, and opportunities to network with industry experts. For more information, visit [www.iviinfrared.com](http://www.iviinfrared.com). ■

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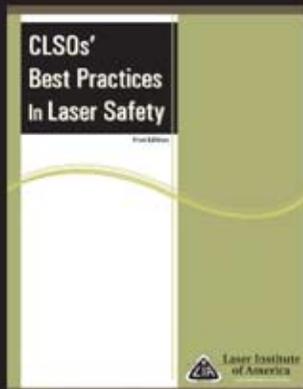
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# ASC Z136 UPDATE

During the annual meeting of Accredited Standards Committee (ASC) Z136, there was considerable discussion pertaining to requests for interpretation of a portion of a standard – specifically what the process is and how to inform the public that there is a process in place.

The details of “what the process is” are well documented in the committee’s *Procedures for the Development of Z136 American National Standards*; however, what you need to know is this – contact the LIA! The LIA is the secretariat and publisher of the Z136 series of laser safety standards, and will initiate action to prepare an appropriate response to your question. Note that since ANSI Z136 standards represent a consensus of concerned interests, it is important to ensure that any interpretation has also received the concurrence of a balance of interests. This is why the LIA is not able to provide an instant response, except in those cases where the matter has previously received formal consideration.

Clarifications and interpretations that have been previously answered are available for download on the committee website at [www.z136.org](http://www.z136.org) under “Z136 Interpretations.”

Future editions of the Z136 standards will contain instructional information regarding interpretation in the foreword of the document. In the meantime, if you have a request for an interpretation or a question about the committee, contact Barbara Sams at [bsams@laserinstitute.org](mailto:bsams@laserinstitute.org) or call 407-380-1553. ■



## JLA UPDATE

The *Journal of Laser Applications*® offers the latest refereed papers by leading researchers in the laser community. The August 2009 issue includes papers from materials processing and biomedical. 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. In addition, articles are now posted online as the production cycle is completed ensuring timely publication. These articles are 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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# BLS UPDATE

## The Value of Becoming Certified II

### 4 Reasons to Become Certified in a Down Economy

✓ Improved competitive advantage – Working in laser safety can be highly competitive, and becoming certified can help you stand out from other job candidates. Simultaneously, becoming certified adds a higher level of credibility to your “on-the-job” experience. The combination of laser safety experience and certification demonstrates to current and potential employers that you are accomplished and qualified in the field.

✓ Increased job security – Laser safety is a necessary function for many companies, even in a down economy. As a result, becoming certified may enhance job security. If companies are considering cutting back on staff, managers may be more likely to retain certified professionals who have a specialized skill such as laser safety.

✓ Enhanced opportunity for advancement and earnings – While the primary goal in our current economy is to stay employed, it is important to plan for the future, looking toward potential career advancement opportunities and increased earnings. By taking the time now to become certified, you will be ready for better opportunities that arise as the economy improves.

✓ Complying with OSHA regulations – The Occupational

Safety and Health Administration (OSHA) requires employers to provide a working environment free of recognized hazards and to comply with OSHA’s regulations—regardless of the current economic conditions. This certainly pertains to laser safety because Class 3B and Class 4 lasers pose a recognized hazard. By passing the CLSO/CMLSO exam, a person is officially recognized as having a thorough understanding of laser safety concepts, practices, and state and federal regulations. When an organization has a CLSO/CMLSO on staff, it demonstrates to OSHA that the company has high standards in place with regard to its laser safety program.



Board of Laser Safety

When compared to going back to college or obtaining a higher degree, becoming certified is much faster and cost-effective. The examination process to become a CLSO or CMLSO is relatively short, and enables you to quickly receive a recognizable and respected credential that is indicative of upholding a higher standard of laser safety.

For more information about the Board of Laser Safety’s certification exams, and to find out if you qualify, visit [www.lasersafety.org](http://www.lasersafety.org) or by calling 800.345.2737. ■

**BLS**  
Board of Laser Safety

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**CMLSO**  
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Intended for professionals who are working with lasers in any medical environment.

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# WELCOME NEW MEMBERS

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# MEMBER INNOVATIONS

## LASER MECHANISMS INTRODUCES FIBERCUT PROCESSING HEAD

Laser Mechanisms, Inc., Novi, Mich. has introduced a FiberCut processing head. The newly designed head is specifically engineered for three-dimensional robotic cutting of metals, 0.5 mm to 6 mm thick, using fiber-coupled lasers in harsh production environments. FiberCut is a compact, low moving mass head that minimizes inertia transfer to the robot support arm. All connections leading to the head enter at a right angle, including the fiber, providing tight access to parts, easy cable routing and stress reduction on the input fiber. At the head itself, all wiring and assist gas lines are internally located – virtually eliminating the chance of downtime due to snags and breaks. To help extend the life of the internal optics, FiberCut features a protective cover glass that is easily accessible. The head works with all leading fiber-delivered laser systems up to 4 kW with wavelengths of 1064/1080 nm. For more information, visit [www.lasermech.com](http://www.lasermech.com).

## MATRIX UV LASER FOR HIGH-THROUGHPUT APPLICATIONS

Coherent Inc., Santa Clara, Calif., has expanded its family of MATRIX™ lasers with a new ultraviolet model optimized to produce 1.5 Watts at a high repetition rate of 70 kHz in order to support high-throughput applications. In addition to high speed, the MATRIX 355-1.5-70 delivers enhanced precision by enabling complete control over pulse energy and timing from the first to the last pulse. Moreover, the cost/performance ratio of this new laser is specifically targeted at industrial processing applications where cost per processed unit is just as important as reliable operation and stable parameters over time.

All MATRIX lasers utilize Coherent's unique PermAlign™ (soldered) component mounting technology, robotic assembly methods and proven, long-lived components such as Aluminum Free Active Area (AAA™) pump diodes. Together with unique multi-pass harmonics generation technology, this results in long laser lifetime, the industry's lowest pulse-to-pulse noise, outstanding pointing stability and high beam quality. For more information, visit [www.Coherent.com](http://www.Coherent.com).

## WORLD RECORD 400 W FEMTOSECOND LASER UNVEILED

The Fraunhofer Institute for Laser Technology (ILT), Aachen, Germany, recently unveiled the most powerful ultra-short-pulse laser module, a 400 W femtosecond laser for ultra-precise materials processing. This was developed in part under the LASERTRON joint project with funding from the German Ministry of Education and Research under the FEMTONIK program. With an average output of more than 400 Watts, it holds the world record for average output among lasers with pulse durations of less than one picosecond. This was made possible by reinterpreting the InnoSlab technology that has been under development at the Fraunhofer ILT for more than 10 years. This technology already forms the basis for numerous nano- and picosecond laser systems in industrial use. The extremely simple

construction of the single-pass amplifier with four mirrors and one laser crystal permits an opto-mechanically and thermally robust and compact design. At full output, a beam quality of  $M2 < 1.4$  and an optical efficiency of 50 percent are attained.

Additionally, as part of a long-term collaboration with the original equipment manufacturer Rolls-Royce Deutschland in Oberursel, Fraunhofer ILT, working together with the chair for Laser Technology LLT at the RWTH Aachen, has developed an innovative and cost-efficient repair technique for engine components. Researchers use a laser cladding technique that enables defective engine components to be repaired. A local gas atmosphere is used to prevent the molten weld pool generated in the cladding process from reacting with the surrounding atmosphere. With this method the need to use a costly processing gas chamber is avoided. The Aachen-based research institute is able to take on responsibility for handling the entire project, ranging from process development and certification to installation of a system for laser cladding at the site of the industrial project partner. For more information, visit [www.ilt.fraunhofer.de](http://www.ilt.fraunhofer.de).

## ULTRAFAST LASER SYSTEM

Newport Corporation's Spectra-Physics® Lasers Division, Mountain View, Calif., has introduced the first ultrafast amplifier system with optimized dual outputs for simultaneous high-energy and time-resolved experiments. The Unison amplifier is a single system that delivers femtosecond pulses at both terawatt-class intensities at 10 Hz frequency and mJ energies in the kHz frequency regime. The system's modular design provides a versatile system that can be easily configured for user-specific requirements. Existing Newport Spitfire® ultrafast amplifier systems can also be upgraded to Unison amplifier systems. The entire system is manufactured by Spectra-Physics, ensuring compatibility and a single point of contact for service and support. For more information, visit [www.newport.com/unison](http://www.newport.com/unison).

## FIBER LASER FOR INDUSTRIAL MACHINING

Newport Corporation's Spectra-Physics Lasers Division, Mountain View, Calif., has introduced its first industrial fiber laser product, the Alliant™ Fiber Laser. Developed with Newport's extensive experience in diode laser and fiber technology, this rugged and compact 100 W infrared laser features high single-mode beam quality and wall-plug efficiency that delivers maximum power at the smallest focused spot, or high brightness. The new fiber laser's intense brightness is ideal for high precision industrial machining applications such as precision cutting, spot and seam welding and metal sintering.

The Spectra-Physics Alliant Fiber Laser features flexible power control for continuous wave (CW) to modulated operating mode for application-specific requirements. The Alliant is based on the company's industry-leading ProLite® Xt high brightness laser diodes that offer exceptional reliability, brightness and power. Packaged in a rugged, rack-mount enclosure, the laser is designed for easy integration into industrial systems. For more information, visit [www.newport.com/alliant](http://www.newport.com/alliant). ■

# MEMBERS IN MOTION

## FIRST 10-KILOWATT FIBER LASER DELIVERED IN CANADA

IPG Photonics Corporation, Oxford, Mass., has announced a first, the delivery of its 10-kilowatt fiber laser to the Canadian market. The laser went to The Centre spécialisé de technologie physique du Québec Inc. (CSTPQ). This laser, the most powerful of its kind in Canada, will be dedicated to applied research, development and technology transfer towards manufacturing companies.

Additionally, IPG Photonics has announced the successful test of its new 10-kilowatt single-mode fiber laser, a world record in a production laser. The unique laser produces 9.6 kilowatts of single-mode power through a single fiber at total efficiency exceeding 23 percent. IPG's new kilowatt laser has multiple applications including remote cutting and welding as well as directed energy.

The company's 10-kilowatt single-mode laser, the YLS-10000-SM, will be the world's brightest industrial CW solid state laser, given the combination of output power and virtually perfect Gaussian beam-quality at 1070 nm emission wavelength. Developed by its subsidiary IPG Laser GmbH, the YLS-10000-SM is a turnkey package that offers a small footprint and record efficiency wall-plug.

"Industrial customers can now use fiber lasers for applications that were not previously possible with other lasers, such as

remote cutting and welding without expensive assist gases in the infrastructure, automotive, aerospace and shipbuilding industries," said Bill Shiner, vice president of industrial markets. "Mobile applications such as bridge construction and repair and ship and airplane paint removal can now take advantage of higher output powers in a mobile and robust laser package to increase the distance to the work piece."

For more information, visit [www.ipgphotonics.com](http://www.ipgphotonics.com).

## NEWPORT ANNOUNCES LAB ACCREDITATION

Newport Corporation, Irvine, Calif., has announced that the photovoltaic laboratory of Newport's Technology and Applications Center (TAC-PV lab) has been accredited to the highest international standard for calibration labs by the American Association of Laboratory Accreditation (A2LA). Newport's TAC-PV lab measures and provides calibration data for the electrical performance of photovoltaic cells. It is one of only a few labs in the world that are accredited to perform these types of measurements on PV cells. The Newport TAC-PV lab can calibrate and characterize multiple types of commercial and prototype PV devices, offers quick turnaround time and can also accommodate requests for special expedited service. For more information, visit [www.newport.com/TAC-PV](http://www.newport.com/TAC-PV). ■

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## PICALO SPONSORSHIPS AVAILABLE

The Pacific International Conference on Applications of Lasers and Optics (PICALO) focuses on the growth and application of lasers and optics in the Pacific region. It will be held Mar. 23-25, 2010 in Wuhan, People's Republic of China. PICALO brings together researchers, engineers, equipment suppliers and industry personnel to hear the latest developments and progress in lasers and applications and to share knowledge, experiences and visions. Sponsorship at PICALO gives your organization a unique opportunity to showcase your capabilities to both Chinese and international decision makers via networking opportunities, advertisements in the program guide, recognition during the event and a tabletop at the sponsor reception. For more information on available sponsorships, visit [www.laserinstitute.org/conferences/picalo](http://www.laserinstitute.org/conferences/picalo) or e-mail [conferences@laserinstitute.org](mailto:conferences@laserinstitute.org).

## ICALEO ADVANCE PROGRAM AVAILABLE

The Advance Program for the 28<sup>th</sup> International Congress on Applications of Lasers & Electro-Optics (ICALEO® 2009) is now available. ICALEO '09 will be held Nov. 2-5 in Orlando, Fla. ICALEO 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 Panel Discussion and plenty of networking opportunities. Topics to be covered include cutting and drilling, diode-pumped and advanced laser sources, applications in energy, biomanufacturing, nanoelectronics, information technology and education and more. Additionally, sponsorship opportunities are still available. For complete details on ICALEO and sponsorship information, visit [www.icaleo.org](http://www.icaleo.org), call 1-800-34-LASER or e-mail [conferences@laserinstitute.org](mailto:conferences@laserinstitute.org).

## ANIBARRO EDUCATION DIRECTOR

LIA is pleased to announce that Gus Anibarro has recently been promoted to Education Director effective June 1, 2009. Gus has worked at LIA for 10 years and has made significant contributions to LIA's laser safety education programs. In his previous role at LIA as Education Manager, Anibarro presented at a number of prestigious conferences and taught LIA's Laser Safety Officer Course. Additionally, he has provided in-house laser safety training and audits to many top industrial manufacturing



**Newly appointed LIA Education Director Gus Anibarro.**

companies.

"As education manager, Gus has done an excellent job developing and managing LIA's laser safety education programs," stated LIA Executive Director Peter Baker. "We are looking forward to Gus leading the next phase of growth for our specialized laser safety courses."

Anibarro is a member of the Accredited Standards Committee (ASC) Z136 and Standards Subcommittee 3 for Safe Use of Lasers in Health Care. Additionally, he holds two degrees, a B.S. in mechanical engineering from the University of Central Florida and a B.A. in psychology from Rollins College.

"Providing laser safety education is at the cornerstone of LIA's mission, and I am excited to be taking the lead on the next phase of growth in this area," said Anibarro. "My goal is to enhance LIA's current laser safety program, while continuing to improve the quality of laser safety training that the LIA is known for within the laser community."

## LIA LAUNCHES NEW WEBSITE

LIA is proud to announce the launch of its newly upgraded, enhanced and refreshed website. LIA's goal with the new site is to provide a completely integrated user experience that is easy to navigate and serves as a useful resource for members. The new LIA website utilizes some of the most cutting-edge web design techniques to produce a cleaner, faster and more modern online experience. In fact, the site is built to integrate with emerging online vehicles including mobile devices such as the popular Apple® iPhone.

Offering a more user-friendly and streamlined navigation, the new site enables visitors to easily browse LIA conferences and events, helpful resources, a career center and a completely revamped online store featuring more than 60 products. Within two clicks on the customized shopping cart feature, visitors can quickly and conveniently purchase ANSI Standards, online courses, training videos and CDs, laser application resources, safety publications and guides, signs and labels and conference proceedings. Check out the new site at [www.laserinstitute.org](http://www.laserinstitute.org).

## UPCOMING TRAINING COURSES

LIA will be holding a Laser Safety Officer (LSO) with Hazard Analysis course Sept. 28-Oct. 2, 2009 in San Francisco, Calif. This course is designed to teach the knowledge required to perform the duties of the LSO as described in the *ANSI Z136.1 Safe Use of Lasers* standard. A Medical Laser Safety Officer Training course will be held Sept. 19-20, 2009 in San Francisco, Calif. This course is designed to give the operating room personnel a basic foundation in laser biophysics, tissue interaction and laser safety. In addition, an Advanced Medical Laser Safety Officer course will be held Sept. 10-13, 2009 in Atlanta, Ga. This course is designed to provide MLSOs an indepth and thorough look at laser biophysics, tissue interaction, laser delivery systems followed with a hands-on demonstration on multiple laser systems, surgical smoke plume management, anesthesia protocols and laser safety protocols.

Visit [www.laserinstitute.org/education](http://www.laserinstitute.org/education) or contact Gus Anibarro at [gus@laserinstitute.org](mailto:gus@laserinstitute.org)/1-800-34-LASER for more information on these courses. ■



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