



# 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: YEAR END REVIEW | VOLUME 18 NO. 6 | NOVEMBER / DECEMBER 2010

*Celebrating the*

*50<sup>th</sup>  
Anniversary  
of the laser*

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**Introducing LIA's Online Laser Safety Analysis System - pg. 18**

**THE EVALUATOR**  
LASER SAFETY HAZARD ANALYSIS SYSTEM



**Laser Institute  
of America**

*Laser Applications and Safety*

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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 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

Feb. 8-10, 2011	Las Vegas, NV
July 12-14, 2011	St. Louis, MO
Dec. 6-8, 2011	Orlando, FL

#### Laser Safety Officer with Hazard Analysis\*

Jan. 24-28, 2011	Orlando, FL
Mar. 21-25, 2011	Las Vegas, NV
June 13-17, 2011	Chicago, IL
Sept. 12-16, 2011	Washington, DC
Oct. 24-28, 2011	Orlando, FL

\*Certified Laser Safety Officer exam offered after the course.

#### Medical Laser Safety Officer Training\*

Feb. 12-13, 2011	Atlanta, GA
Mar. 12-13, 2011	San Jose, CA

\*Certified Medical Laser Safety Officer exam offered after the course.

#### Laser Additive Manufacturing Workshop

Feb. 16-17, 2011	Houston, TX
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#### ILSC<sup>®</sup> 2011

Mar. 14-17, 2011	San Jose, CA
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#### ICALEO<sup>®</sup> 2011

Oct. 23-27, 2011	Orlando, FL
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Visit [www.laserinstitute.org](http://www.laserinstitute.org) for all course and event listings.

### ABOUT LIA

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

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

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



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## PRESIDENT'S MESSAGE



The 29<sup>th</sup> International Congress on Applications of Lasers & Electro-Optics, ICALEO® 2010, was an exciting and phenomenal gathering reuniting the founders of our industry and fostering memorable interactions. On behalf of the membership, I thank Charles Townes, Steven Chu and Kumar Patel for their inspirational presentations that revealed their thought processes as they created the foundation for laser technologies. If their intent was to

stimulate continued growth of laser technology, they succeeded. I also thank the LIA staff, executive committee, board members and chairs, all of who teamed to orchestrate and execute this historic event.

ICALEO is branded as the forum for advanced/cutting-edge technologies that impact laser materials processing. I am interested in increasing student participation since they represent a sizable portion of technology presenters and/or a group that can be inspired by presentations and networking to define and undertake continued or new research and development. In addition, I am interested in increasing presenters from the United States National Labs; our top-level exposure to DOE may have some impact. Research and development results from academic, government and industrial labs provides input for the *Journal of Laser Applications*® and forward-looking information for existing and developing users.

LIA, led by Yongfeng Lu, has attracted grants from the National Science Foundation to support student attendees. This effort needs expansion and support from other governmental and private funding agencies. We should also market LIA and ICALEO into all academic disciplines that develop future users with the intent of broadening interest in the development of laser applications, and consequently, attracting more participants to ICALEO. Our academic members may consider marketing ICALEO to sister departments in their institutions by posting information about LIA on appropriate websites and/or display areas in these departments.

Please continue to present your ideas on expanding ICALEO and LIA, especially in this teleconferencing age where remote-satellite presentation and attendance are technically possible.

Finally, it has been a pleasurable opportunity serving all of you this year. Please join me in welcoming our new officers, executive committee and board of directors.



Nathaniel Quick  
President, Laser Institute of America

## EXECUTIVE DIRECTOR'S MESSAGE

### Truly A Privilege

When the awards luncheon at ICALEO® concluded I was thinking (and, I suspect all of us were thinking) “what a privilege.” What a privilege to be in the presence of Charles Townes and Steven Chu and what a privilege to listen to the presentations of these two outstanding gentlemen/scientists.



Each of these Nobel Laureates gave us fascinating insights into their lives, their colleagues and their discoveries, each showed that their life's work was not work at all but the challenge and pleasure of learning and discovering, and each gentleman earned a long, enthusiastic, standing ovation at the conclusion of their talk.

Many of the attendees told me that they were touched and inspired by the talks and everyone I spoke to, including some who had attended most of the previous 28 awards luncheons, agreed that this one was the best ever.

It was truly a privilege to be there.



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

# ICALEO 2010 CELEBRATES ALL THINGS LASER

The International Congress on Applications of Lasers & Electro-Optics (ICALEO®) has a 28-year history as the 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. Nearly 500 laser users and researchers representing 27 countries and 294 companies converged on the conference, which has been devoted to the field of laser materials processing and is viewed as the premier source of technical information in the field.

The 29<sup>th</sup> ICALEO was held Sept. 26-30, 2010 in Anaheim, Calif. and included three conferences – the Laser Materials Processing Conference, the Laser Microprocessing Conference and the Nanomanufacturing Conference – as well as the Laser Solutions Short Courses, a business forum and plenty of

# ICALEO®

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

networking opportunities. This year's conference also featured a celebration of the 50<sup>th</sup> anniversary of the laser and the presentations of the 2010 Arthur L. Schawlow Award to Dr. Steven Chu, U.S. Secretary of Energy, and a Lifetime Achievement Award to Dr. Charles H. Townes.

ICALEO 2010 "went exceptionally well," says LIA Executive Director Peter Baker. "Attendance was the same as last year, which, considering the economy is a very good sign. There was good international attendance, and the quality of the papers was very good. A couple of people who are usually pretty hard critics came and said, 'I want to tell you the quality is even better than last year.'"

## OPENING AT ICALEO

This year's opening plenary session was titled "Environmental Protection and Clean Energy Technologies." This theme was chosen as a complement to ICALEO 2009's plenary session, "Frontiers and Challenges for the Green Economy," as energy and environmental issues very often go hand-in-hand.



Keynote speaker Jeff Morris during ICALEO's opening Plenary Session.

"Last year's ICALEO plenary session focused on alternative green energy technology to reduce our societies' dependence on fossil fuel, which in turn reduce the environmental impact of CO<sub>2</sub> emission and global warming. This year, we organized a plenary session to highlight environmental protection technologies," said Congress General Chair Xinbing Liu of Panasonic Boston Laboratory, Cambridge, Mass.

A keynote by Jeff Morris, National Program Director

for the Nanotechnology Office of Research and Development, U.S. Environmental Protection Agency was titled "Thinking Strategically About Nanotechnology EHS Research: An EPA Perspective." Morris talked about EPA's viewpoint on being smart about the development and deployment of new technologies, that it's always better to discover and solve any potential environmental and health problems of a new technology before it is deployed in the field with expensive remedies for the problems uncovered later. One particular concern of Mr. Morris was the rapidly evolving nanotechnology and its potential impact on the environment and human health.

Following Morris's keynote, Prof. Takunori Taira from the Institute for Molecular Science (Japan), presented a talk on laser ignition of combustion engines for cleaner vehicles. Taira revealed that the existing fuel ignition by sparkplugs is quite inefficient and contributes to a significant degree the fuel consumption inefficiency of current automobiles. Laser ignition, with the potential of igniting fuel in the middle of the cylinder and even multi-point ignition, promises much more efficient burning of the fuel. Following this, Jurgen Daniel, senior scientist at Palo Alto Research Center, spoke about solar technology activities in California with the title "Solar in California: Policy and Technical Overview." California is the leader of the solar industry in the U.S., so the activities and progress in California should be representative of the entire U.S.

Lastly, Dietmar Kracht, director of Laser Zentrum Hannover in Germany, gave a presentation titled "Laser Processing of Carbon Fiber Reinforced Plastic (CFRP)." Carbon fiber reinforced plastic is a high-strength composite material with important applications in aerospace and automotive industries, and is generally difficult to machine. The existing method of machining CFRP, water jet cutting, leaves much room for improvement. High-power solid-state lasers have shown again to be a capable, versatile tool for processing such composite materials. Kracht discussed unique problems associated with laser cutting CFRP, such as thermal damage, and innovative ways to cure the damage with powder fillers to seal the laser cut edges.

## IN SESSION

ICALEO's three conferences covered an array of laser applications. This year's Laser Microprocessing Conference (LMF) explained Chair Kunihiko Washio, was appreciably attended with a record number of over 80 oral presentations delivered in 13 sessions. The most well attended session was LMF 1: picosecond and femtosecond laser processing. More than 100 attendees eagerly listened to the two invited talks by Beat Neuenschwander of Bern University of Applied Sciences, Switzerland, on processing of dielectric materials and metals with ps laser pulses and by Antonio Ancona of CNR Institute for Photonics and Nanotechnologies, Italy, on critical performance aspects of ultrashort pulse laser materials processing at high repetition rates and average powers.

"The LMF 2 session on advanced lasers and optical systems for microprocessing was also well-attended next to the LMF 1. There was a lot of interest in advanced laser processing technologies and challenges for solar cells (LMF 11 and LMF 13), sapphire wafers, glasses and many other brittle materials (LMF 7 and LMF 10). Sessions on various approaches for improving process quality and throughput, such as LMF 6: pulse-shape and tailored beam control of laser interaction and LMF 8: chemical and media-assisted laser microprocessing were also well-attended," Washio said.

*con't on page 10*



Rajesh Patel and Schawlow Award Winner Dr. Steven Chu.



The President's Reception is great for catching up with old friends and making new ones.



Fellow attendees enjoying cocktails and live music during the Sunday evening Welcome Celebration.



Attendees discuss the latest products and services during the Vendor Reception.



The always entertaining President's Reception offered a fun trivia game where the winning team of attendees were awarded a prize shark!



ICALEO attendee during Monday's Opening Plenary Session.



SPI Lasers' booth at the Vendor Reception.



Lifetime Achievement Award Winner Dr. Charles Townes and Rajesh Patel.



Congress General Chair Xinbing Liu and Laser Microprocessing Chair Kunihiko Washio.



ICALEO's exhibitors' showed off their latest technology to attendees.



LIA's Peter Baker presenting Nathaniel Quick with his 2010 president's plaque.

# CHU ENTERTAINS, EDUCATES AT ICALEO

By LIA Executive Director Peter Baker



**Dr. Steven Chu and LIA's Peter Baker.**

It was my pleasure, along with Director of Conferences Gail LoIacono, to greet Nobel Laureate and Secretary of Energy Steven Chu as he entered the ICALEO hotel through the kitchen entrance, accompanied by a flurry of advance people and security staff. He paused briefly in the kitchen, whipped out his laptop to make some last minute changes to his talk, then on we went to the head table for lunch.

During our lunch conversation I began to understand some of the sacrifices he made leaving his career as director of the Lawrence Berkeley National Laboratory to become U.S. Secretary of Energy and I could also feel his deep commitment to his mission to prepare the U.S. for the carbon limited future which he believes is coming.

Dr. Chu's talk was an interesting mix of personal background, career highlights and technical insights ranging from quantum physics to the use of lasers to bring atoms close to absolute zero and even some of the implications of this to the General Theory of Relativity!

Dr. Chu opened his talk with some family photos. One showed his parents in China with his aunt who was a professor of chemistry of prestigious Tsinghua University in Beijing, yet, in accordance with the custom of those times, had her feet bound.

He continued with some anecdotes about Arthur Schawlow during their days at Stanford, recounting how Schawlow liked to have fun and would often shake with laughter, particularly at his own jokes!

Dr. Chu, a gracious and entertaining speaker spoke about "A Random Walk in Science and Other Adventures."

To me, it was striking how he illustrated the power of connections, both between people and between facets of science and technology. Dr. Chu emphasized that scientists do not necessarily plan their careers; they just do the next best thing that is in front of them and follow their noses. He "grew up with lasers" and when he wanted to work with a dye laser he went ahead and built one. His work with that laser provided one of the experimental tests of the unified field theory of strong and weak interactions.

He spent eight years at Berkeley, where Charles Townes was on the faculty, and there he built a glass laser. Next he went to Bell Labs, initially for two years which grew into nine years. There he did his work on cooling and trapping of atoms, which had its foundation in an early paper by Dr. Schawlow and Theodore Hänsch on the Cooling of Gases by Laser Radiation. Later, in 1997, at Stanford he asked Schawlow why he had omitted this paper from the bibliography for his Nobel Prize and Schawlow said "in 1981

how was I to know it was going to become important?"

At Stanford, Chu used lasers and cooled atoms in some early work which led to a more accurate atomic clock. In kindly professor style he showed how the measurement of frequency is the most precise possible, and how length (meters) and electrical standards (the ohm, the volt) are defined in terms of time and frequency. The importance of this is shown by the fact that seven Nobel Prizes have been awarded for work related to atomic clocks. Also, the G.P.S. that we all use so casually would be useless without atomic clocks.

Dr. Chu then showed further connections such as the relationship between this work and Einstein's General Theory of Relativity. How the cooling of atoms led to a new state of matter, the Bose-Einstein condensate and might lead to yet another new state of matter when the condensate is rotated.

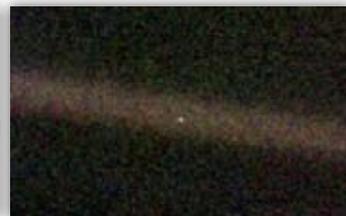
Throughout his talk, Dr. Chu's conversational approach, complete mastery of the material and gift for showing how things are connected had the audience believing, for one brief shining moment, that we actually understood this stuff!

He then explained his concerns about rising temperatures and how his belief that we will live in a carbon-constrained environment caused him to accept his present post as U.S. Secretary of Energy. He believes that the U.S. should develop the technology needed to deal with this; otherwise we will be forced to buy the technology from others.

He closed with two striking pictures of our Earth, taken from space. The first from Apollo 8 is a picture of our warm inviting



**Earth as seen from our moon.**



**Earth as seen from our solar system.**

Earth, taken from the moon. Then he showed a picture taken from Voyager 1 as it sailed past Jupiter, Saturn and Uranus towards Pluto and out of our Solar System. Earth was just a pale dot in a haze of dust. He quoted the late astronomer, Carl Sagan, to the effect that Earth is just a speck of dust, suspended in a sunbeam, we have nowhere to go, this is where we must make our stand.

Finally, he quoted a touching Native American saying "treat the Earth well, it was not given to you by your parents, it was loaned to you by your children." As he concluded by saying "we must remember that," the audience rose to give him a most well deserved standing ovation. ■

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See us at LAM 2011



In the Laser Materials Processing Conference (LMP) at ICALEO 2010, laser specialists from all over the world gave 128 presentations in 19 sessions that showed the importance of lasers. A great mix between theoretical and practical research moderated by senior experts of research and industry made this conference worthwhile for all attendees.

“With all the presented, exciting news, there is a bright future for use of lasers just ahead of us. The focus for the future is no longer the laser beam generator, but it has shifted in how to use all different wavelengths and modes of the laser light most effectively,” said Yongfeng Lu, University of Nebraska-Lincoln, Lincoln, Nebraska.

How to deal with high brightness issues were addressed in several sessions. The discussion on which wavelength is best suited for the sheet metal cutting market and the theory behind it was shown to be of major interest for one single laser application. More than 4,000 high-power lasers are installed each year just for sheet metal cutting, so its importance is strong.

Great attention was given to the topics “tailored materials” and “tailored surfaces.” Seven sessions discussed all aspects. Increasing demand with rising cost for material supply is one reason why tailored materials are important. Additionally, the need to conserve resources and reduce energy consumption shows the necessity of tailored materials. The laser beam will be an important tool to enable us to further develop such artificial materials.

Many different applications like laser hardening, laser structuring, laser coating removal or laser metal deposition in all aspects showed the potential to develop tailored surfaces. Again, an application to run machines more efficient and most of these applications are only possible by the “50-year-old laser beam.” This “old” laser beam fits very well with newly developed materials like fiber-reinforced plastics or the new steel products.

“The LMP Conference has shown again why it is a valuable platform to share and discuss findings and trends on an international base,” said Lu.

This year’s Nanomanufacturing Conference was co-chaired by Yongfeng Lu and Xianfan Xu and consisted of three different subsessions: Direct Laser Writing in Nanofabrication, Nanofabrication Using Ultrafast Lasers and Direct Growth of Nanostructures Using Lasers. The first session, Direct Laser Writing in Nanofabrication, covered a broad range of topics on laser-matter interactions and laser manufacturing at the nanoscale. There were two very interesting papers. In the paper “(N102) Micro- and Nano-Scale Manufacturing—The Convergence of Science and Technology,” Sun et al discusses a new nanomanufacturing paradigm based on the unique physical concept of optical superlensing, which breaks down the so-called diffraction limit. In another paper, “(N104) Direct-Write Femtosecond Laser Ablation and DNA Combing and Imprinting for Fabrication of a Nanofluidic Device on Ethylene Glycol Dimethacrylate Polymer,” Lim et al employed a femtosecond laser to directly create well-ordered arrays of microwells and nanoscale channels to connect inlet and outlet ports to the arrays. These ordered nanochannel arrays are useful in manipulating liquids, ions and biomolecules with extremely high levels of spatial confinement for molecular separation and DNA/gene delivery applications.

The second session, Nanofabrication Using Ultrafast Lasers, discussed the fabrication of nanostructures and devices using ultrafast lasers and the wide application of these structures and devices. There were two very interesting papers. In the paper “(N201) Functionalizing Glass Ceramics by Laser Radiation,” Helvajian et al employed a pulsed laser to locally transform the glass ceramics to a more chemically soluble phase and to

controllably change the ultrasonic properties of the material. In another paper, “(N202) Plasmonics Enhanced Femtosecond Laser Nanoprocessing: Modeling and Application to Biology,” Meunier et al developed a method to perform nanosurgery on cells by using a femtosecond laser to irradiate the embedded nanomaterials in a biological media. The successful nanoablation and nanosurgery on cells is due to the highly localized surface plasmon resonance of metallic nanostructures and mechanical effects on the surface of cells.

The last session, Direct Growth of Nanostructures Using Lasers, covered different laser-based technologies for fabricating nanostructures. One of the very interesting papers was “(N301) Fabricating Active Plasmonic Structures by Combing Laser-, Electron and Ion-Beam Techniques.” Haglund et al demonstrated ways to obtain interesting plasmonic structures and applications by using pulsed laser deposition, colloid mask lithography and electron- and ion-beam patterning. A typical example is to use a focused ion beam to create arrays of subwavelength holes in which the extraordinary optical transmission effect could be switched. In another paper, “(N302) Precise Growth and Integration of Carbon Nanotubes Through Optical Control,” Zhou et al demonstrated: (1) successful integration of carbon nanotubes (CNTs) into predesigned micro/nano- architectures in a single-step, laser-assisted chemical vapor deposition (LCVD) process by making use of optical near-field effects; (2) successful removal of metallic CNTs through a selective heating and removing process under controlled laser irradiation and (3) successful growth of CNT arrays with controlled alignments by applying external electrical biases of different polarities to influence the movement of catalyst particles in the LCVD process.

## IT'S JUST BUSINESS

The ICALEO Business Forum & Panel Discussion provided attendees with an exclusive opportunity to listen to and interact with industry experts, business leaders and decision makers on significant issues facing the laser and photonics industry. In keeping with the theme of ICALEO 2010 celebrating the 50<sup>th</sup> anniversary of the laser, this year’s panel discussion, organized by Neil Ball and Sri Venkat, looked back at the key accomplishments of the past 50 years of lasers and attempt to project what the future holds for the laser industry.

“This year we were fortunate to have a highly qualified set of panelists who not only provided deep insight, but engaged the audience to provide a lively discussion one hopes for from such events. Kicking off the event was the keynote presentation by Paul Crosby of Coherent who eloquently took us through the impressive journey of lasers from early days when lasers were characterized as a “solution looking for a problem” used only when absolutely necessary to today where laser technology touches each and every one of us and impacts, in most cases enhancing, the quality of our lives from enabling fiber optic communications to providing clinical analysis and physical therapies,” said Ball. “Bill O’Neill of the University of Cambridge implored upon the U.S. to learn from successes abroad in the U.K. and Germany by driving innovation to bridge academic institutions to business research.”

Next up, marketing ‘guru’ Barbara Kuntz of Miyachi Unitek aptly made a compelling case for how traditional marketing no longer was enough and that the laser industry needed to tap into the enormous prowess of web-based marketing to reach prospective customers around the globe.

“She gave an example of an iPhone app that allows the user to simulate laser process right on their PDA. Then Bill Lawson of New Tech Development shared real-world experience on how to survive through the ebb and flow of the macro economic

cycles by preserving cash and maximizing efficiency and making that a core competency. And last but not least, Steve Weiss of Innovative Laser Technology provided a glimpse into state-of-the-art precision machining in a nanotechnology era while learning how to select appropriate financing and equipment that fits your business. Diode lasers were the unanimous choice of the panelists on the greatest advancement of laser technology over the past 50 years. The audience then participated in an engaging and stimulating discussion,” explained Ball.

For the first time, the Laser Solutions Short Courses, chaired by Stefan Kaierle, was held within a full day session prior to the main conference so every participant had the chance to attend and was an ideal forum for those who wanted to receive a complete overview on the state-of-the-art in specific areas of interest. This approach was very well accepted by the ICALEO delegates leading to the highest number of participants ever.

The attendees were first provided with an introductory course to laser machining covering a broad range of today’s applications and perspectives, held by Richard Press. This was followed by a series of more specific courses covering the area of laser micro applications by Alexander Olowinsky, and life science and medicine given by Stephan Barcikowski. Lastly, a practical approach of using “design of experiments” method to optimize laser machining application was provided by Arzu Ozkan.

## POSTER PRESENTATION CONTEST

The Poster Presentation Gallery provided an opportunity for presenters to exhibit their research and share ideas with other professionals who have interest in laser materials processing.

1<sup>st</sup> Place – *Automatic Real-Time Guidance of Laser Machining with Inline Coherent Imaging* (P134) by Paul J. L. Webster, Queens University, Kingston, Ontario, Canada

2<sup>nd</sup> Place – *Laser-Induced Resonant Vibrational Excitations of Precursor Molecules in Multi-Energy Processing for Diamond Synthesis* (P154) by Zhiqiang Xie, University of Nebraska-Lincoln, Lincoln, Nebraska

3<sup>rd</sup> Place – *Photoconductive Properties of Titanium Dioxide Film by Femtosecond Laser Irradiation* (P142) by Teppei Nomura, Graduate School of Engineering, Osaka University, Suita, Osaka, Japan

### Judges for the Poster Award Contest:

- Paul Denney, Lincoln Electric, Cleveland, Ohio
- Anthony Hoult, IPG Photonics Corporation, Oxford, Massachusetts
- Stefan Kaierle, Fraunhofer ILT, Aachen, Germany



First place poster winner Paul J. L. Webster discussing his research with a fellow attendee.

“Delegates were quite satisfied with the quality of the courses and even suggested to expand the range of this event,” said Kaierle.

## NOBEL WINNERS CHU, TOWNES THRILL AUDIENCE AT ICALEO LASER CONFERENCE

A pair of Nobel-winning honorees created a memorable atmosphere at the Laser Institute of America’s 29<sup>th</sup> annual International Congress on Applications of Lasers and Electro-Optics (ICALEO®) in Anaheim, Calif., in September.

U.S. Secretary of Energy Steven Chu earned LIA’s 2010 Arthur L. Schawlow Award, while laser pioneer Dr. Charles Hard Townes, 95, was presented with the organization’s first Lifetime Achievement Award. Both received standing ovations after their presentations at the Sept. 29 awards luncheon.

“It was a huge privilege to witness the presentations of such noteworthy scientists,” said LIA Executive Director Peter Baker. “Long time attendees agreed that the Awards Luncheon was the best in the history of the event.”

Townes held luncheon attendees spellbound with tales of how two Nobel-winning professors senior to him tried to dissuade him from continuing his early research, as well as how the equations necessary to create lasers occurred to him as he sat on a park bench during a conference five decades ago. Chu created a bit of a stir by arriving with his sizable security detail. He proceeded to captivate the audience with recollections of having been a student of Schawlow’s, discussed the particulars of his Nobel work cooling and trapping atoms using a laser, and emphasized his belief in the need to develop a carbon-constrained economy.

Born in Greenville, S.C., on July 28, 1915, Townes — professor emeritus of the University of California, Berkeley, since 1986 — shares a patent for the laser with his late brother-in-law and fellow Nobel winner Schawlow. The pair collaborated on their research at Columbia University and Bell Labs in New York City and together wrote the seminal book “Microwave Spectroscopy” in 1955 and the 1958 paper “Infrared and Optical Masers.” Townes’ award consists of a special citation and a cash prize, and he has been made a fellow and life member of LIA.

Chu, 62, co-winner of the 1997 Nobel Prize in physics for development of methods to cool and trap atoms with laser light, was appointed as energy secretary Dec. 15, 2008, while director of the Department of Energy’s Lawrence Berkeley National Lab and professor of physics and molecular and cell biology at the

*con’t on page 12*



From left, LIA Secretary and ICALEO LMP Chair Klaus Löffler, ICALEO Congress General Chair Xinbing Liu, LIA Past President Rajesh Patel, LIA President-Elect Stephen Capp, Schawlow Award Winner Steven Chu, Lifetime Achievement Award Winner Charles Townes, LIA Executive Director Peter Baker, LIA President Nathaniel Quick, LIA Treasurer and ICALEO Nanomanufacturing Chair Yongfeng Lu.

University of California, Berkeley. He received a silver medal, a special citation and also became a fellow and lifetime member of LIA.

## IN CLOSING

To commemorate the 50<sup>th</sup> year of the invention of the laser, ICALEO 2010 held a special closing plenary session as the last session of the congress titled “Celebrating 50 years of lasers: an ICALEO perspective.” Four laser industry veterans with very distinguished careers and long association with ICALEO and the LIA were invited to speak, and three of the four speakers have received LIA’s Schawlow award for their outstanding contributions to laser science, technology, safety and industrial applications.

Before the start of the session, a special presentation of LIA’s Laser Pioneer Awards was held. The award recipients were Kumar Patel, inventor of the CO<sub>2</sub> laser, and Robert Hall, inventor of the diode laser. The awards were in recognition of pioneering work in inventing these two types of lasers that have had profound impacts on the laser industry in general and on the laser processing and manufacturing industry in particular. The Laser Pioneer Awards were a token of the laser industry’s appreciation to these two inventors. Patel gave the talk “Lasers Then and Now – Promises, Progress and the Future.” Patel, the 1996 National Medal of Science winner, not only reminisced how he invented the CO<sub>2</sub>- laser while working at Bell Labs, but looked forward to a new type of laser, the quantum cascade laser, for future applications. Hall couldn’t be present to accept the award so Marshall Jones accepted the award on his behalf. Jones’ talk, “A Memorable Journey of Laser Technology,” reflected his long and distinguished career in industrial laser processing at General Electric.

Next came David Sliney, an authority on optical radiation safety, laser biophysics and occupational health, who spoke about his involvement with the LIA from its inception and efforts to promote laser safety over the years. Lastly, William Lawson talked about his long experience in starting and developing businesses in the laser processing industry, and shared his past experiences in identifying opportunities and nurturing them as well as his vision for future growth with new laser development. This was a rare opportunity to hear about laser history directly from the people who made it.

All in all, ICALEO 2010 was an extraordinary gathering of some of the top minds from all corners of the laser and photonics field. For more information about ICALEO 2010 and to order a copy of the proceedings, visit [www.icaleo.org](http://www.icaleo.org).

LIA, the trusted and respected advocate of cutting-edge applications of laser technology since 1968, will hold its 30<sup>th</sup> ICALEO in its hometown of Orlando, Fla., on Oct. 23-27, 2011. ■



**ICALEO celebrated the 50<sup>th</sup> anniversary of the laser throughout the conference.**



**Dr. Chu and Dr. Townes receive a standing ovation after their presentations at the Awards Luncheon.**



**The well-attended Plenary Session provided attendees with information on environmental protection and clean energy technologies.**

## 2010 STUDENT PAPER AWARDS

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 were presented to first, second and third place winners in addition to having their papers submitted to LIA’s *Journal of Laser Applications*® for peer review and publication.

1<sup>st</sup> Place – *Effect of Laser Irradiation Passes for Fabricating Mid-Wave Infrared Silicon Carbide Detectors* (M309) by Geunsik Lim, CREOL, University of Central Florida, Orlando, Florida

2<sup>nd</sup> Place – *3D-Microstructuring of Sapphire using High Power Fs-Laser Radiation and Selective Etching* (M802) by Maren Hörstmann-Jungemann, RWTH Aachen University, Aachen, Germany

3<sup>rd</sup> Place – *Growth of Carbon Nano-Onions in the Open Air by Laser Resonant Excitation of Ethylene Molecules* (N305), Yang Gao, Department of Electrical Engineering, University of Nebraska-Lincoln, Lincoln, Nebraska

### **Judges for the Student Paper Award Contest:**

- Milan Brandt, RMIT University, Bundoora Victoria, Australia
- Markus Kogel-Hollacher, Precitec Optronik GmbH, Rodgau, Germany
- Veli Kujanpää, Lappeenranta University of Technology, VTT, Lappeenranta, Finland
- Lin Li, The University of Manchester, Manchester, UK
- Yongfeng Lu, University of Nebraska-Lincoln, Lincoln, Nebraska, USA
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## ILSC COMING IN 2011

The world's leading conference on laser safety will be held Mar. 14-17, 2011 in San Jose, California.

Presented by LIA, the International Laser Safety Conference (ILSC®) is a comprehensive four-day conference covering all aspects of laser safety practice and hazard control. Laser safety experts from around the world will descend on San Jose to discuss and define the latest changes to regulations and also common practices in the field. Being held March 14-17, 2011 in San Jose, Calif., scientific sessions will address developments in regulatory, mandatory and voluntary safety standards for laser products and for laser use.

The conference provides vital information for people in industry, medicine, government and academia with laser safety responsibilities including laser safety officers, industrial hygienists, safety product manufacturers, nurses and medical technicians, laser and health physicists, safety engineers, environmental health and safety professionals and entertainment lighting producers.

### COMPLEMENTARY PAS

The Practical Applications Seminars (PAS) complement the scientific sessions by exploring everyday scenarios that the laser safety officer and medical laser safety officer may encounter. For ILSC 2011, PAS is being expanded to include the medical

community. Laser safety experts from all over the world will meet and discuss their research, programs and standards.

The Medical Practical Applications Seminar is a two-day seminar for medical laser safety officers (MLSO). This seminar will be particularly useful for MLSOs who work in operating rooms, surgical centers, aesthetic clinics and medical spas. Participants will benefit from the cutting-edge medical laser safety presentations that will be showcased. Topics include plume hazards, hazards of airway passage, accidents in the operating room, regulations/litigation, setting up a safety program for the OR and eyewear and curtains/barriers.

The Technical Practical Applications Seminar is a two-day seminar for the practicing laser safety officer (LSO). This seminar will be particularly useful for LSOs who are not full-time laser safety professionals. Participants will be involved in panel discussions and hot topics addressing the more common safety issues and concerns of the day-to-day operations in commercial, factory, research and medical facility settings. Topics include laser safety in the workplace, how to determine nominal hazard zones (NHZ) and answers questions such as what LEP should be selected, what control measures are mandatory and what regulations apply. Besides the great educational value this seminar provides, attendees also get to engage and network with their peers!

### NETWORKING OPPORTUNITIES

In addition to the exciting educational opportunities, ILSC also provides plenty of chances for attendees to network with their peers – from the Welcome Reception and the Sponsor Reception to the “Hot Topic” Luncheon and Awards Luncheon featuring the George M. Wilkening Award Presentation and the R. James Rockwell Educational Achievement Award.

ILSC is the premier gathering of laser safety professionals – there is nothing else like it. Professionals in all fields and applications will find ILSC 2011 a tremendous source for information and networking opportunities, so mark your calendars now to attend. For more information, visit [www.laserinstitute.org/ILSC](http://www.laserinstitute.org/ILSC). Don't miss it! ■

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### ILSC INFORMATION

ILSC 2011 will be held at the Doubletree Hotel in San Jose. The ILSC Advance Program is now available and can be downloaded at [www.laserinstitute.org/conferences/ilsc](http://www.laserinstitute.org/conferences/ilsc). Also visit this site for more information on the conference.

ILSC sponsorship opportunities are also available, please contact the LIA conference department at 407-380-1553, e-mail David Evans at [devans@laserinstitute.org](mailto:devans@laserinstitute.org) or visit [www.laserinstitute.org/conferences/ilsc](http://www.laserinstitute.org/conferences/ilsc).

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## THE 2011 LAM WORKSHOP REVEALS LATEST IN LASER ADDITIVE MANUFACTURING

By Geoffrey Giordano

In the wake of this year's BP oil spill in the Gulf of Mexico, the Laser Institute of America's Laser Additive Manufacturing workshop will be even more relevant to those eager to learn about laser manufacturing and in-situ repair of sensitive equipment.

"With the oil spill in the Gulf occurring after last year's conference, I think that from the oil industry we will be asking how this technology helps keep things like the BP oil spill from happening again," notes General Chair Paul Denney, senior laser applications engineer at Lincoln Electric in Cleveland, Ohio. "Our workshop has the ability to show that we can tailor the surface of (pipeline and rig) material to address the hostile environment today's oil drillers encounter. This is not only true for the oil industry but any industry where a compromise has to be struck between strength, corrosion/erosion performance and cost."

### ON TRACK WITH CLADDING

When attendees head to Houston, Texas for LIA's third-annual LAM workshop Feb. 16-17, 2011, they'll learn about the latest laser-cladding applications — and how those applications can boost their profitability by trimming manufacturing costs. Texas has been the site of all three LAM workshops because the state is a critical host of the oil and gas, aerospace and agriculture industries, all of which derive tremendous benefits from laser-additive manufacturing.



"We especially hope, that because we're in Houston, that more companies interested in the technology will be present and in turn meet the vendors that are providing laser cladding services," Denney says. "We already have a number of presenters who will be reporting on progress they have made in new cladding techniques and new businesses that have begun over the last year in the area of laser-additive manufacturing."

As evidence of the burgeoning use of LAM, Denney points out that Dr. Roland Gassman of Praxair Surface Technologies, based in Danbury, Conn., spoke in 2009 of using more than 60 tons of powder a year for cladding various utility, oil and gas products. Even more recently, he notes that the Naval Underwater Warfare Center in Keyport, Wash., has built a cladding system that paid for itself in less than six months and is being used for in-situ cladding of ship parts.

### POWDER AND WIRE

In addition, LAM will educate attendees as to the relative merits of powder versus wire applications.

"Organizations seem to be either in the powder camp or the wire camp, and feel that their approach is best," Denney notes. "While it would appear that each has advantages and fit certain applications better, there seems to be improvements that will expand each technology's use."

Manufacturers have in the past concentrated on cladding the material with powder, according to Sponsor Committee Chair Bill Shiner, vice president of industrial markets at IPG Photonics in Oxford, Mass. "With sintering ... you can construct three-dimensional parts from powder so you can do a finished part. (We're) bringing in some of those people to present. (And) there's going to be a presentation by (University of Cambridge professor) Bill O'Neill ... on supersonic cold-spray cladding, where he's getting phenomenal results. He ends up getting very good bonding, where previously with what they called cold spray you could coat a material but the bond wasn't particularly robust."

As LAM attendees will learn, "there's a place for all of it, and the market is big enough that there's room for lots of diversity," asserts Wayne Penn, president of Alabama Laser. "We're probably the one leading the camp for wire (but) we worked with powder for 10 years or so. (Users) need to think of the application; what are they looking for in terms of chemistry, corrosion, wear? We use both here." Among the things LAM attendees should learn, he says, are the challenges in making the best use of whatever equipment and components they choose.

### LEARNING THE INDUSTRY

LIA continues to upgrade the LAM workshop with significant support from cooperating organizations like the American Welding Society, The Minerals, Metals and Materials Society and the Metal Powder Industries Federation, as well as many relevant corporate partners.

As a platinum sponsor, "Alabama Laser is very interested ... in promoting the industry, the art and the science of laser cladding," Penn says. "There's enough of the industry out there that all these different players are going to be needed; each one has its own niche — whether in net shaping, coaxial powder or side-feed powder, cold wire or hot wire. We see (laser cladding) as a game-changer."

LAM 2011 will once again give attendees a broad view of how laser-additive manufacturing is finding favor globally. For instance, keynote speaker Prof. Minlin Zhong of the Laser Processing Research Center at Tsinghua University in Beijing will present his "Overview of Laser Additive Manufacturing in China."

"China is now a 'world manufacturing center,'" Zhong notes. "Laser-additive manufacturing has already played an important role in the manufacture, repair and maintenance of high-value components, which is still a weak area for Chinese companies. There are great needs especially for repairing used high-value components like blades, rollers, molds, etc. Several Chinese companies in the

laser cladding area have demonstrated success. The drawback for foreign companies is mainly their unfamiliarity with the Chinese culture and business mode. A joint venture with local companies can be a good way (for other firms to make inroads).”

In Zhong’s view, German firms TRUMPF and Rofin are leading the way in supplying high-power lasers, laser systems and components like optics and nozzles — with U.S. companies IPG, Coherent PRC a close second. “These companies entered the Chinese market earlier, hired local people and offered products with high quality,” he says.

To learn more about the conference or register to attend, visit [www.laserinstitute.org/LAM](http://www.laserinstitute.org/LAM). The site includes detailed explanations of cladding, rapid manufacturing and sintering. ■

*Geoffrey Giordano is a freelance writer.*

## LAM EDUCATES

The workshop is geared toward manufacturing engineers and managers, precision-parts specialists and original-equipment manufacturers, system integrators, academic and government researchers and representatives of national labs who will learn:

- How to apply laser-additive manufacturing in a broad range of industries, including automotive, biomedical, Department of Defense, heavy equipment, agriculture, offshore, mining and power generation.
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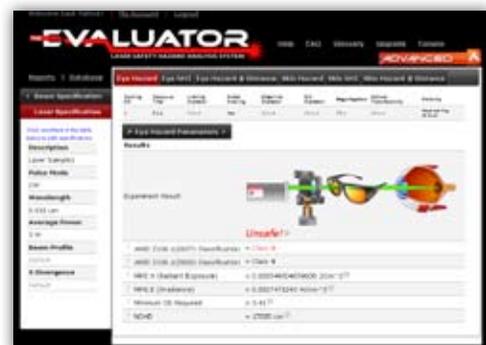
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# LASER WORLD OF PHOTONICS CHINA 2011

LASER World of PHOTONICS CHINA has become the leading photonics exhibition in China since it was founded in 2006. It revolves around innovative products and their industrial solutions and applications, reflecting actual developments in the industry worldwide. Next year, the sixth LASER World of PHOTONICS CHINA is expected to be another successful event when it takes place on March 15-17, 2011 in Shanghai, People's Republic of China.

During the last five years, LASER World of PHOTONICS CHINA, the Chinese version of LASER World of PHOTONICS in Germany, has expanded its exhibition space and audience participation has doubled. The 2010 three-day show attracted over 275 exhibitors from 17 countries and districts as well as over 25,000 attendees from 57 countries and districts. These record numbers show an event on track to also become the leading laser and photonics show in all of Asia.

According to the specific needs of the Chinese market, LASER World of PHOTONICS CHINA's strategic focus has been on laser material processing since its beginnings. Besides focusing on its traditionally strong sectors such as laser and laser systems for production engineering, lasers and optronics, the 2011 exhibition will emphasize special sectors such as optical information and

communications technology, optical processing and optics manufacturing. There will be six special areas presenting the whole industry – lasers and laser systems for production engineering,



**LASER World of PHOTONICS CHINA has become a leading laser and photonics trade fair in China.**

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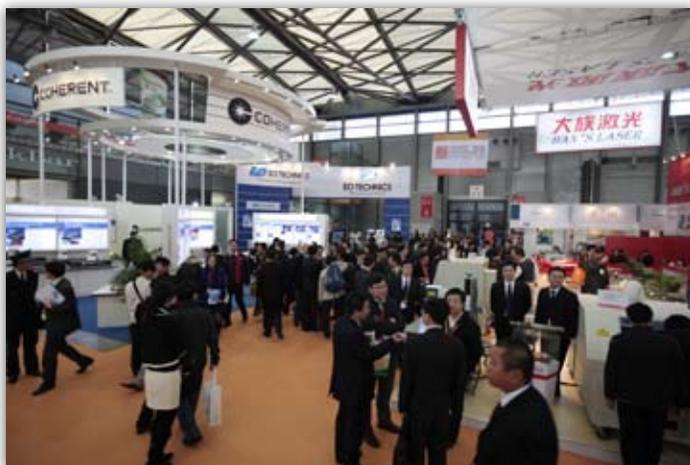
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optical communications, optics and manufacturing of optics, lasers and optronics, sensors, test and measurement and accessory and service. This year, the exhibition space is expected to expand by 50 percent. Trumpf, Rofin, Coherent, Han's Laser, Intelume, Beamtech, JDSU, Leoni, Physik Instrumente, IPG, Panasonic, Chutian and Huangong, amongst others, have already decided to participate in LASER World of PHOTONICS CHINA 2011.

## LIA SUPPORTED CONFERENCE

The high-quality conference program is also a highlight for LASER World of PHOTONICS CHINA. Two professional conferences will be presented during LASER World of PHOTONICS CHINA 2011: the 6<sup>th</sup> International Conference on Laser Processes and Components (LPC 2011), which is co-organized with the Laser Institute of America and the Chinese Optical Society-Laser Processing Committee, and Optics Frontier – the 6<sup>th</sup> Laser Technology Forum and Outstanding Achievements – Release Conference of Chinese Optics 2010, featuring a series of lectures on the most important growth sectors in the Chinese market for optical technologies.

LASER World of PHOTONICS CHINA is organized by Messe Munchen International. Messe Munchen International has held LASER World of PHOTONICS in Munich every other year since 1973 and introduced the fair to Shanghai in 2006. For more information, visit [www.world-of-photonics.net](http://www.world-of-photonics.net). ■



The 2010 three-day show attracted over 275 exhibitors from 17 countries and districts as well as over 25,000 attendees from 57 countries and districts. The 2011 LASER World of PHOTONICS CHINA is expected to be another successful event when it takes place on March 15-17 in Shanghai.

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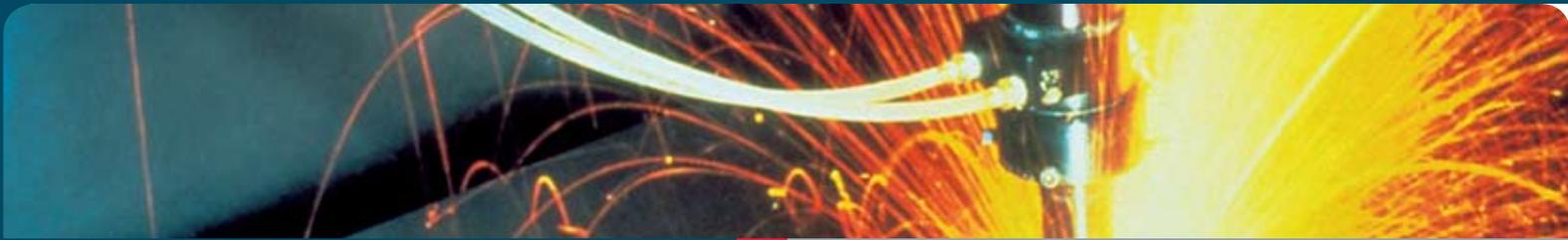
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**Laser Institute of America**

*Laser Applications and Safety*



## CORPORATE MEMBER PROFILE

## COHERENT, INC.

Coherent, Inc. is one of the world's leading providers of lasers and laser-based solutions with products that feature superior reliability and performance and provide significant cost advantages for commercial and industrial customers competing in the most demanding markets. The unique characteristics of the company's product portfolio, combined with its history of innovation, provide a decided advantage to customers as they seek breakthroughs in research or in the development of cutting-edge applications.

Founded in 1966 and headquartered in Santa Clara, Calif., Coherent designs, manufactures and markets laser sources, laser tools and systems, accessories and components for a wide range of markets and applications. In addition to laser sources and tools, the company also offers leading-edge beam forming and beam guidance systems as well as laser beam measurement and control instrumentation.

### COHERENT'S CAPABILITIES

The capabilities of Coherent's products are exceptionally diverse and are used in a wide range of markets and applications: microelectronics, including semiconductor test and measurement and advanced packaging; graphic arts and display; materials processing; instrumentation for biotechnology and medical

imaging; production of flat panel displays and solar cells and, of course, in advanced engineering, genetics, biology, chemistry and physics.

Laser sources from Coherent include:

- CO<sub>2</sub> lasers for marking, cutting and scribing
- Diode-pumped, solid-state lasers for advanced materials processing and instrumentation
- Diode lasers and components for optical pumping and materials processing applications
- Excimer lasers for LASIK procedures and manufacturing production processes
- Fiber-based lasers for micromachining
- Ultrafast lasers for scientific research, materials testing and materials processing.

Laser tools and systems from Coherent include a range of process development tools for c-Si solar cell manufacturing and industrial-grade laser machine tools designed for cutting, marking and engraving.



### COMPANY EVOLUTION

Most recently Coherent has acquired Beam Dynamics, a company involved in the development of industrial-grade laser machine tools that are used in a variety of cutting applications including plastics, fabric, leather, rubber, metal, ceramics and wood for customers ranging from regional machine shops to Fortune 500 brands. This acquisition allows Coherent to further expand its presence in the materials processing market, achieve closer alignment with customer processes and applications and more effectively drive development of new sources and tools to meet the needs of the laser machining market.

Coherent's commitment to the environment is evidenced in many areas. Coherent has developed ever more energy-efficient laser technologies, such as optically pumped semiconductor laser (OPSL) technologies, which is quickly displacing older and much less efficient ion laser technology. The new technologies have enabled significant reductions in power consumption for customers and manufacturing operations. Coherent has developed laser-based materials processing applications that increase efficiency and reduce pollution in diesel and gas turbine engines. Additional initiatives to streamline and consolidate factories over the past several years have dramatically reduced Coherent's overall impact on the environment.

Coherent's ongoing work with integrators, end-users and researchers creates greater efficiency and productivity today as well as insights that will lead to technological breakthroughs in the future. Such advancements in laser technology and their impact on commerce, industry and scientific research have been the hallmark of Coherent's business for over 40 years.



**Coherent's optically pumped semiconductor lasers (OPSL) offer a wide range of output power and wavelength scalability, allowing OPSLs to be tailored to the needs of specific applications.**

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# BLS UPDATE

It is time once again to focus our attention on certification maintenance (CM). After successfully achieving certification, the BLS requires continuing education activities to maintain one's certification, in recognition of the need to stay aware of new technology and other advances in the field. A CLSO or CMLSO must undergo recertification every three years, at which time it is necessary to demonstrate completion of sufficient professional development activities to ensure continued competency.

The CM cycle begins on January 1 of the year following the year in which the individual passed the exam. The cycle ends on December 31 of the third year. A minimum of 10 CM points must be obtained over the course of each three-year cycle.

The following are the CM categories in brief:

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

conferences or meetings

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

9) Writing exam questions (accepted by BLS Review Board)

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

Lastly, a CLSO or CMLSO may retake the applicable exam if unable to achieve the 10 CM points and wishes to maintain active certification status.

To view the CM categories in detail or to download a CM worksheet, go to <http://www.lasersafety.org/cert-maintenance.php>. If you have any questions regarding activities for certification maintenance, contact the BLS at 407-380-1553 or e-mail Jennifer Craft at [jcraft@lasersafety.org](mailto:jcraft@lasersafety.org). ■



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Board of Laser Safety



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# ASC Z136 UPDATE

The annual meeting of ASC Z136 will be held in conjunction with the International Laser Safety Conference (ILSC®) at the Hilton Doubletree Hotel in San Jose, California on Sunday, March 13, 2011. The meeting is scheduled to begin at 9 a.m. local time.

**Hotel Accommodations** – Committee members are asked to make their reservations prior to February 3 to ensure room availability and to receive the conference room rate of \$156 per night. A personal online group page for making reservations has been created by the hotel; please follow this link to register: [http://doubletree.hilton.com/en/dt/groups/personalized/JOSE-DT-LIA-20110311/index.jhtml?WT.mc\\_id=POG](http://doubletree.hilton.com/en/dt/groups/personalized/JOSE-DT-LIA-20110311/index.jhtml?WT.mc_id=POG). Discounted overnight self parking will be \$15 per car per night.

**Ancillary Meetings** – Space is available Monday through Thursday for subcommittee or working group meetings on a first-come, first-serve basis. If you are interested in scheduling or attending an ancillary meeting, please contact Barbara Sams for further information.

ASC Z136 meetings are open to the public. If you have any questions regarding the annual meeting, would like a meeting agenda, and/or plan to attend as an observer, please e-mail Barbara at [bsams@laserinstitute.org](mailto:bsams@laserinstitute.org) or call 407-380-1553. ■



## CHAPTER CORNER

The LIA Northeast Regional Chapter had a meeting on Wednesday, Nov.17 at the Waltham Doubletree Hotel. It was sponsored by Cambridge Technologies, part of the GSI group. A social hour was followed by a buffet-style meal with accompanying sides and desserts. Over 50 people attended. A short introductory presentation on the history of the laser and benefits of LIA membership was given, followed by the feature presentation. Mike Fitts, director and Adam Pinard, engineering manager from Cambridge Technology discussed "A New Concept in Optical Scanning Control and Performance." After the feature presentation, there was a short question and answer period and social networking. It was exciting to see many new faces in the crowd!

For questions or future topic ideas, please contact Robin Devor at [rdevor@laserinstitute.org](mailto:rdevor@laserinstitute.org).

## ONE-STOP SOLUTIONS



The Fraunhofer IWS carries out application-oriented research in the fields of laser and surface technology. Distinct expertise in materials and nanotechnology, combined with the resources for comprehensive materials analysis, form the basis of the research activities. Due to the close cooperation with equipment and system manufacturers, the Fraunhofer IWS is in the position to offer »one-stop solutions«.

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- Development of plasma-based manufacturing processes

#### Contact

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[www.ccl.fraunhofer.org](http://www.ccl.fraunhofer.org)

## TOOLS OF THE LASER SAFETY TRADE CONTROLLING THE BEAM PART 2

In the last article we discussed using laser safety curtains and barriers to control the beam. We learned that they can serve as an entry way control to keep that pesky beam from going out the door into the hallway. Windows are another escape point for laser beams so we need some type of window protection.

There are three kinds of window protection. First, there is the roll up window shade or blind. Shades or blinds can be cut to fit any window dimension and can be easily installed. Second, windows can be covered with a window block which is made of a material that is laser resistant that can be cut to the shape of the window. Window blocks can be mounted to the surface with Velcro, magnets, snaps or hooks. Last, you can replace the window glass with laser filter glass. Laser filter glass can be used with lasers that operate in the infrared portion of the spectrum.

They come in various different optical densities, have good visible light transmission, and come in various thicknesses.

So, when your laser safety officer is assessing your facility, rest assured he will be looking for windows as possible exit points for the beam, and one of the three tools will be used to keep the laser beam from getting out. ■

## JLA UPDATE

### IMPORTANT CHANGES COMING TO JLA IN 2011

This year we spent considerable time and effort evaluating different publishing and editorial approaches aimed at improving our *Journal of Laser Applications*<sup>®</sup> (JLA). We evaluated proposals from a commercial publisher and our current, not-for-profit publisher, and concluded that a new agreement with our current publisher, the American Institute of Physics (AIP) is in the best interest of our authors, members and our society. Key features of the new agreement, commencing in January 2011 are as follows;

**The Journal will be on-line only in 2011** – Consistent with current trends in publishing worldwide, we will switch to an on-line only format next year. All members and subscribers will receive a reminder of their log-in information when the first issue of 2011 is ready, and everyone is encouraged to activate their subscription and check it out.

**JLA will reach more libraries and more readers** – Under the new agreement, AIP is mounting a marketing campaign to significantly increase the number of institutional libraries subscribing to JLA. This will ensure greater readership for authors and, in time, improved financial performance for our society.

**JLA website will feature greater functionality** – One of the many new features is full-text HTML rendering, direct from XML. Through inline reference links and the ability to enlarge tables and figures by clicking on them, JLA articles will virtually lift off the page in a highly interactive presentation

that transforms the traditional scholarly article, helping to speed reading and research. Among the new features are enhanced search functions with more options and better controls to explore returned content with faceted results. Faceted search helps researchers find information quickly by presenting them with a set of “filters” to narrow down search results.

**Peer x-Press will speed up the review process** – Starting early next year we will start using AIP’s Peer x-Press On-line Manuscript Submission and Peer Review system that will facilitate review and improve time to print.

**JLA will now have eight sections, each with its own Associate Editor** – Editor-in-Chief Reinhart Poprawe has subdivided the Journal into eight sections and has recruited a world-class lineup of associate editors to head up each section.

- High Precision Materials Processing with Ultrafast Lasers – *Andreas Ostendorf*
- Laser Additive Manufacturing – *Milan Brandt*
- High Power Materials Processing with High Brightness Lasers – *Eckhard Beyer*
- Emerging Applications of New Wavelengths and Temporal Pulse Shaping – *Martin Richardson*
- Surface Modification – *Minlin Zhong*
- Lasers in Nanomanufacturing/Nanophotonics & Thin Film Technology – *Yongfeng Lu*
- Spectroscopy/Diagnostics/Measurements – *Dave Farson*
- Safety – *Dave Sliney*

**JLA will still be free to members** – In contrast to some of the proposals we studied, the new agreement with AIP provides that members will still receive the *Journal* as a free member benefit.

# LASER INSIGHTS

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

*Visit [www.laserinstitute.org/laserinsights](http://www.laserinstitute.org/laserinsights) to begin your search, or use the direct link provided below for each paper.*

## PHASE EVOLUTION IN LASER SOLID FORMED COMPOSITIONALLY GRADED Ti60-Ti2AlNb ALLOYS, by Xin

Lin, M. Yang, X. Xu, H. Yang, Jing Chen, W. Huang

With the increasing demand of the aviation and aerospace industries, high temperature titanium alloys are widely used for their excellent combination of high strength-to-weight ratio, excellent high-temperature strength and high oxidation resistance. [www.laserinstitute.org/laserinsights/2010/05/06/phase-evolution-in-laser-solid-formed-compositionally-graded-ti60-ti2alnb-alloys/](http://www.laserinstitute.org/laserinsights/2010/05/06/phase-evolution-in-laser-solid-formed-compositionally-graded-ti60-ti2alnb-alloys/)

## EFFECT OF SUBSTRATE ON TEMPERATURE FIELD IN SELECTIVE LASER SINTERING OF METAL POWDERS, by Shen Xianfeng

Selective Laser Sintering (SLS) of metal powders, namely Direct

Metal Laser Sintering (DMLS) is an emerging Rapid Prototyping and Manufacturing (RPM) technology which can be used to produce three-dimensional metal parts directly from a CAD model by the selective laser sintering (SLS) of successive layers of metallic or pre-alloyed powders.

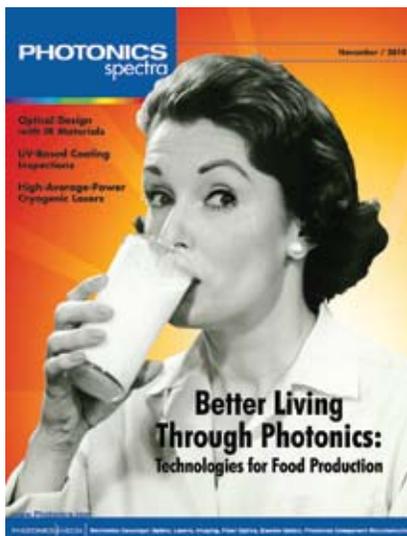
[www.laserinstitute.org/laserinsights/2009/10/25/effect-of-substrate-on-temperature-field-in-selective-laser-sintering-of-metal-powders/](http://www.laserinstitute.org/laserinsights/2009/10/25/effect-of-substrate-on-temperature-field-in-selective-laser-sintering-of-metal-powders/)

## HIGH DENSITY LASER MICRO SINTERING, by Andre Streek

In selective laser sintering these compartments are produced by selectively solidifying the material of successively coated powder or slurry layers by laser radiation, according to the cross section of the corresponding slice.

[www.laserinstitute.org/laserinsights/2010/05/06/high-density-laser-micro-sintering/](http://www.laserinstitute.org/laserinsights/2010/05/06/high-density-laser-micro-sintering/)

View complete articles at [www.laserinstitute.org/laserinsights](http://www.laserinstitute.org/laserinsights) under the Laser Machining Category.



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- Winbro Group Technologies, Rock Hill, SC

For a complete list of corporate members, visit our corporate directory at [www.laserinstitute.org/membership](http://www.laserinstitute.org/membership).

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# MEMBERS IN MOTION

## POPRAWA TO GIVE KEYNOTE

Dr. Reinhart Poprawe, managing director of the Fraunhofer Institute for Laser Technology in Aachen, Germany and president elect of LIA, will present the keynote address at the 2011 Lasers and Photonics Marketplace Seminar. The annual seminar, hosted by Laser Focus World, Strategies Unlimited and Industrial Laser Solutions, delivers in-depth analysis and commentary of photonics-market trends, applications development and business outlook.

In his address, High-Power Diode Lasers: The ultimate source for economic photons in the next decade, Poprawe will discuss development trends in the technology of high-power diode lasers and the outlook for their increasing use in direct materials processing applications.

The Lasers and Photonics Marketplace Seminar will be held January 24, 2011 in San Francisco, Calif. in conjunction with Photonics West. Visit [www.marketplaceseminar.com](http://www.marketplaceseminar.com) for more information or to register.

## IPG AND LINCOLN ELECTRIC FORM PARTNERSHIP

IPG Photonics Corporation, Oxford, Mass., a world leader in high-power fiber lasers and amplifiers, and Lincoln Electric Holdings, Inc., Cleveland, Ohio, a world leader in arc welding and cutting products, have formed a strategic partnership to explore global opportunities in the high-power laser welding and cutting market. Lincoln Electric selected IPG to be part of its strategic supplier vendor list in its effort to enhance supply chain and technology development relationships with critical industry partners. Under the agreement, the two companies will pursue joint ways of providing expanded turnkey hybrid fiber laser-MIG welding solutions to industrial customers around the world. The partnership will also involve cooperative sales, application development and marketing efforts. For more information, visit [www.ipgphotonics.com](http://www.ipgphotonics.com) or [www.lincolnelectric.com](http://www.lincolnelectric.com).

## WINBRO GROUP'S NEW FACILITY

Winbro Group Technologies will establish its new operating facility in Waterford Business Park in Rock Hill, York County, South Carolina. The \$10 million investment is expected to generate 25 new jobs. The company expects to have the facility in operation by January 2011. Winbro is engaged in the aero engine and industrial gas turbine sectors and performs critical processes involved in the production of high pressure turbine and combustion components.

"Opening the new facility in York County is an important step for our company's future growth plans. South Carolina offers us an excellent business environment in which to operate and the skilled workforce we need. York County was able to provide us with a building that suits our needs. We look forward to bringing our new operation online and growing our presence in South Carolina increasing our exposure to the turbine industry throughout North America," said Mike Arbon, CEO of Winbro Group Technologies. For more information on the company, visit [www.winbrogroup.com](http://www.winbrogroup.com).

## 2010 LORD KELVIN AWARD TO LIA FELLOW JERRY DENNIS

At the President's Dinner held at the Boeing Museum of Flight in Seattle, Washington in October, President Jacques Regis of the International Electrotechnical Commission (IEC) presented its most prestigious IEC award to Jerome E. (Jerry) Dennis, a fellow and past board member of LIA. The Lord Kelvin Award recognizes many years of leadership significantly contributing to the IEC's work in promulgating international standards for the electrical and electronic industries. Dennis has been active in the IEC since 1990, and since 1998 has chaired the IEC technical committee on optical radiation safety and laser equipment.

The award is named for William Thomson, 1<sup>st</sup> Baron Kelvin (1824 - 1907), a Belfast-born mathematical physicist who was the first president of the IEC. Thomson, a professor at the University of Glasgow, developed the laws of thermodynamics and established the basis of absolute zero temperature.

With lasers being used today in an ever-increasing number of products, the safety standards developed by Dennis' technical committee are among the most in demand throughout the world. The current transition to more electrically efficient light sources has created new demands for optical radiation safety standards for industry to use in the design and manufacturers of innovative lighting. Dennis recently accepted the nomination to a fourth term as chairman of his Technical Committee number 76. ■

## INFLECTSOL VOTED WINNER OF PLUG & PLAY STARTUP EXPO

Over 100 top venture capitalists voted InflectSOL, co-founded by LIA president and AppliCote Associates, LLC President Dr. Nathaniel Quick, as the winner at the Plug & Play Startup Expo in Silicon Valley.

InflectSOL's technology can create light and power from ordinary glass-like materials, creating a light surface brighter than an LED and generating electricity as cost effectively as a solar cell. Patented laser-doping and laser induced phase transformation processes create new compositions in glass-like materials which possess energy conversion properties.

Pre-production prototypes emit white light, are more energy efficient and are less expensive than conventional LEDs and have huge potential for novel applications in the multibillion dollar lighting and photovoltaic industries.

For more information contact Praveen Yalamanchi ([prav@inflectsol.com](mailto:prav@inflectsol.com)) or Nat Quick ([nquick@applicote.com](mailto:nquick@applicote.com)).

# MEMBER INNOVATIONS

## NEWPORT INTRODUCES CONTROL KITS, HEIGHT SENSOR

Newport Corporation, Irvine, Calif., has introduced Laser Diode Control Kits that include a laser diode driver, a temperature controller, a laser diode mount, cables and accessories. The new control kits enable quick setup for running a wide variety of laser diodes and are ideal for both high-power laser diodes and the popular TO-can lasers. These new kits offer the basic building blocks needed to immediately begin running laser diodes in your lab. For more information, visit [www.newport.com/LD-Kits](http://www.newport.com/LD-Kits).

Also now available from Newport is a Confocal Height Sensor for use with the company's MRSI Dispense Systems. The chromatic confocal sensor allows measurements in a single axis, providing access to deep cavities, confined spaces and areas that are in close proximity to walls and other obstructions. This measuring tool is ideal for RF and microwave packages that have been difficult to measure using traditional, reflective-laser height-sensing techniques. For more information, visit [www.newport.com/bond1](http://www.newport.com/bond1).

## COHERENT'S METABEAM AND HIGHLIGHT SYSTEM

Coherent, Inc., Santa Clara, Calif., has expanded upon its family of Laser Machining Centers with the launch of its

MetaBEAM™ designed for processing metals but capable of addressing non-metal processing as well. Coherent's Laser Machining Centers are an excellent choice for laser job shops, fabrication shops and diversified manufacturers for large and small production runs and prototyping of mixed materials in a wide range of applications. The MetaBEAM Laser Machining Center integrates the machine frame, CNC controller, laser, beam-delivery system, drive system and laser cutting head all into one compact structure.

Coherent has also introduced the HighLight FAP 60/810 System, a fiber delivered, turnkey diode laser system that provides 60 Watts of output power at 810 nm. The HighLight FAP 60/810 is engineered to deliver exceptional reliability, convenience and superior process uniformity for demanding, high throughput industrial applications such as FRIT welding of OLED displays and other thermal processing tasks. For more information, visit [www.coherent.com](http://www.coherent.com).

## OPHIR'S PHOTODIODE DETECTOR

Ophir Laser Measurement Group, Logan, Utah, has introduced the FPS-1 Fast Photodetector. Designed to measure the temporal pulse shape of lasers or other light sources, the FPS-1 is a high speed photodiode sensor with wide spectral response. The sensor operates off a battery or wall cube power supply. For more information, visit [www.ophiropt.com/laser-measurement](http://www.ophiropt.com/laser-measurement). ■



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## FALL 2010 VIRTUAL PUBS CATALOG NOW AVAILABLE

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## NEW! LIA'S FREE ONLINE OD CALCULATOR

LIA has added a convenient online tool to its website that will calculate what optical density (OD) is recommended for use with a laser system of a given power. This OD calculator provides a reliable way to easily double-check laser safety calculations. Check it out at [www.laserinstitute.org/evaluator/od.php](http://www.laserinstitute.org/evaluator/od.php).

## PURCHASE YOUR ICALEO 2010 PROCEEDINGS

The 29<sup>th</sup> International Congress on Applications of Lasers and Electro-Optics (ICALEO<sup>®</sup>) was held in September and the proceedings are now available for purchase. The proceedings include all submitted papers for three conferences on laser materials

processing, laser microprocessing and nanomanufacturing. This CD also includes papers from the Plenary Session highlighting environmental protection technologies and the Closing Plenary that focused on celebrating the 50<sup>th</sup> anniversary of the invention of the laser. Visit [www.laserinstitute.org/store/ICALEO](http://www.laserinstitute.org/store/ICALEO) To order your copy,

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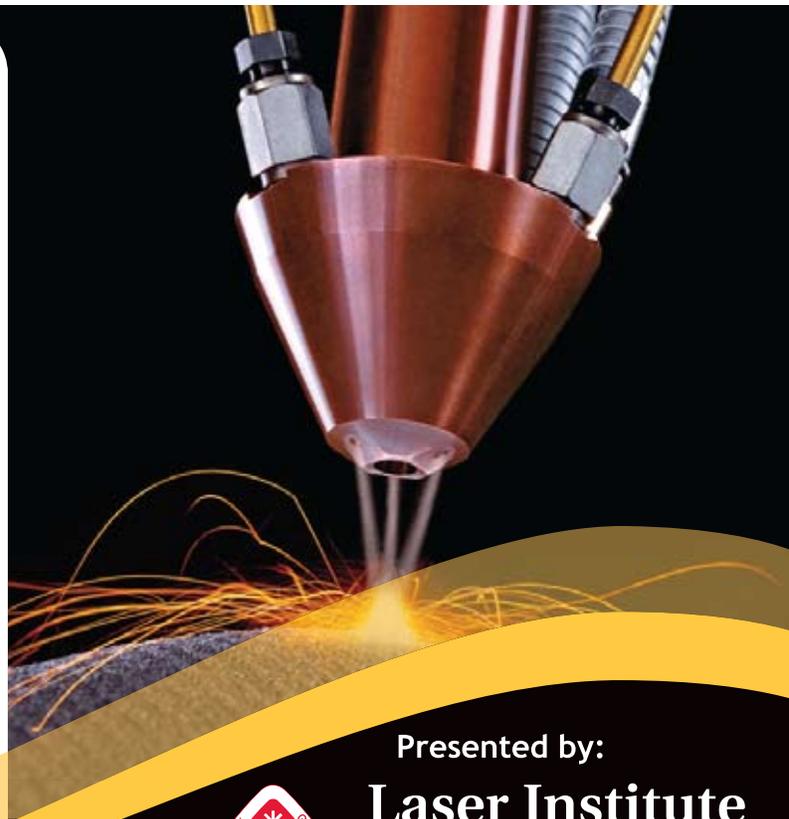
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