



LIA TODAY

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

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The Role of Lasers...

...for the
Green Economy pg. 6



Nature Inspires
Laser Research pg. 12



ICALEO 2009 - Accepting
the Challenge pg. 8



**Laser Institute
of America**

Laser Applications and Safety

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.

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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.

Serving the industrial, medical, research and government communities for over 40 years, LIA offers technical information and networking opportunities to laser users from around the globe.

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CALENDAR OF EVENTS

Laser Safety Officer Training

Mar. 9-11, 2010	San Jose, CA
July 13-15, 2010	Chicago, IL
Dec. 7-9, 2010	Clearwater, FL

Laser Safety Officer with Hazard Analysis*

Feb. 1-5, 2010	Orlando, FL
Mar. 8-12, 2010	San Jose, CA
June 7-11, 2010	Boston, MA
Sept. 27 - Oct. 1, 2010	Anaheim, CA
Nov. 1-5, 2010	San Antonio, TX

*Certified Laser Safety Officer exam offered after the course.

Medical Laser Safety Officer Training*

Feb. 6-7, 2010	Chicago, IL
Feb. 20-21, 2010	Atlanta, GA
Mar. 13-15, 2010	Denver, CO
Sept. 18-19, 2010	Boston, MA
Nov. 6-7, 2010	San Diego, CA

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

Advanced Medical LSO Training

Apr. 29-May 2, 2010	Atlanta, GA
Sept. 9-12, 2010	Atlanta, GA

Advanced Laser Safety Officer Training

May 11-13, 2010	Orlando, FL
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Laser Safety Hazard Calculations

May 10-11, 2010	Orlando, FL
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PICALO 2010

Mar. 23-25, 2010	Wuhan, China
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LAM 2010

May 11-12, 2010	Houston, TX
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LIA SUPPORTING CONFERENCES

Laser Processing & Components at LASER. World of Photonics China

March 16-18, 2010	Shanghai, People's Republic of China
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Symposium for Advanced Laser Applications (SALA)

April 14, 15, 2010	East Hartford, CT
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Lasers in Action at LASYS

June 8-10, 2010	Stuttgart, Germany
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ANGEL 2010 EOS Conference on Laser Ablation and Nanoparticle Generation in Liquids

June 29 – July 1, 2010	Engelberg, Switzerland
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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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PRESIDENT'S MESSAGE



Well, the saying “all good things must come to an end” comes to mind as I write this message, my last message as president of LIA. I am honored and proud to have served the 2009 term as president. It has been an enjoyable experience for me.

Since the beginning of the year one goal I wanted to accomplish for LIA was to have a well-defined strategy for the various conferences that LIA hosts. I am pleased to say that with diligent effort of executive committee, board members and a lot of you, we have accomplished that goal for LIA's major conferences. We now have a written document that lays out overall strategy for LIA conferences and outlines specific goals, target audience, strengths, weaknesses and future improvements to consider for ICALEO®, PICALO, ILSC® and LAM.

While difficult economic times certainly have impacted the laser industry in 2009, having just come back from the ICALEO 2009 conference I am hopeful that things will turn around in 2010 for the laser industry. ICALEO was a great success with a lot of new and exciting research work shared among colleagues from around the globe who gathered in Orlando, Florida. The attendance at the conference was about the same as last year, and we had great support from our sponsors and vendors. Above all, the quality and content of the technical papers presented was topnotch. The two sessions on “Laser Applications for Solar Cell Production” were well attended and drew a lot of debate and interest from attendees. I see the success of ICALEO 2009 as a sign that companies are using this period of slowdown in the economy to get ready for the upswing by investing resources in new and innovative ideas and solutions.

I want to thank all of the LIA staff, the executive committee and board members for the help and support they have provided during my term. I wish Nat Quick, our president-elect, success for his 2010 term as president and hope under his leadership and guidance LIA and we as a laser community will achieve much needed recovery from the awful times of 2009.

Rajesh Patel
President
Laser Institute of America

EXECUTIVE DIRECTOR'S MESSAGE



Once again the ICALEO® program was at the highest international level. Once again the attendance was excellent, on a par with last year in spite of the “great recession.” Once again the networking opportunities were outstanding, with attendees from 25 countries meeting and mingling, renewing old friendships and building new ones.

Attendees who I spoke to refer to ICALEO as the must-attend event, where all the latest and best technology is revealed, where trends are determined that help set successful strategy. One gentleman referred to ICALEO as “the Super Bowl of laser application conferences.” The articles inside describe the various events in more details, but you get the idea.

Congratulations to General Chair Xinbing Liu and his team for a great technical program and the LIA Director of Conferences Gail LoIacono and her team for superb on-site organization.

Looking ahead to next year it will be the 50th anniversary of the laser. LIA is proud to have among our founding directors Nobel Laureate Arthur Schawlow, who laid the theoretical groundwork, and Theodore Maiman, who demonstrated the first laser in May 1960. Another laser pioneer, Gordon Gould, was LIA president in 1971.

So, at ICALEO 2010 we plan to celebrate. There are early suggestions from our graduate students that we should hold a pool party. Other ideas include a special session where our laser pioneers talk about applications that they expected and whether or not they worked out. Also, current leaders could predict applications in the next 50 years. There is also talk of a beer-and-wine-fueled discussion of some of the craziest and wildest applications brought into people's application laboratories.

If you have ideas and suggestions, please let me have them, preferably soon. Either way, note that ICALEO 2010 will be held in late September next year – September 27–30 at the beautiful Marriott in Anaheim, California.

Mark your calendars; you will not want to miss the 50th birthday celebration of the laser at ICALEO 2010!

Peter Baker, Executive Director
Laser Institute of America
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FRONTIERS AND CHALLENGES FOR THE GREEN ECONOMY

ICALEO KEYNOTE PLENARY SPEAKER DISCUSSES HIS PRESENTATION

By Geoffrey Giordano

When John Turner accepted the Laser Institute of America's invitation to give the keynote address at the opening day plenary session of the International Congress on Applications of Lasers & Electro-Optics (ICALEO®) 2009, he saw it as a way to advocate for new, sustainable energy sources — continuing a mission he's been on since the 1970s. Turner, a research fellow at the Department of Energy's National Renewable Energy Laboratory (NREL) in Golden, Colo., started on his path alongside energy pioneers Heinz Gerischer at the California Institute of Technology and Arthur Nozik at NREL. In addressing the theme "Frontiers and Challenges for the Green Economy" on Nov. 2 in Orlando, Fla., where the conference was held, he sought to inspire attendees with his vision for alternative energy sources and encourage the research that will be required to realize that vision.



Plenary keynote speaker John Turner.

A lecture about the "population bomb" by biologist Paul Ehrlich, based on his 1968 bestseller of the same name, set Turner's career in motion, he revealed.

"Everything he said didn't come to fruition — at least not yet — but I got very interested in energy (and) sustainability."

After Turner earned his Ph.D. at Colorado State, the oil crisis of the 1970s struck — just as Turner was entering Caltech to do post-doctorate

work. President Carter created the Solar Energy Research Institute, and Turner took a job there in 1979, moving back to Colorado with his wife. Turner began working on hydrogen and semiconductor systems and light and energy conversion. Later, President George H.W. Bush transformed Turner's lab into NREL.

With his talk "Frontiers, Opportunities and Challenges for a Hydrogen Economy," Turner sought to convey three concepts. First, he asserted, "Energy is as important to modern society as food and water, (but) the current energy paradigm is losing its viability." Therefore, "If we're going to change the energy infrastructure, we have to find energy systems that last millennia." The solution? "Solar can be that energy source that can continue to power our society at the level we have now."

THE ROLE OF LASERS

At NREL and the recently formed Renewable and Sustainable Energy Institute, a joint venture between NREL and the University of Colorado, researchers perform energy analyses to assess pathways and systems producing the best energy (wind, solar and hydrogen for transportation fuel and storing wind and solar energy) and allowing optimal usage. Lasers are a critical tool in carrying out NREL's fundamental research on photovoltaic and semiconducting

materials requisite in producing sustainable energy.

Simply stated, the energy-conversion cycle works like this: solar cells convert light energy into electrical energy. Electrolyzers convert that electrical energy into chemical energy. Then fuel cells convert chemical energy back into electrical energy. In presenting a broad view of critical energy issues, Turner notes that the laser industry is going to be key in a number of areas.

"Lasers are going to be incredibly important because the main energy-conversion devices that we have are solar cells," he said. "One of the main, if not the largest, instruments we have in studying solar-cell technology and their response and how to optimize them is lasers, from scanning the surface for quality control to looking at very fundamental electronic interactions in the solid (and) electron-transfer cross interfaces."

Essential to Turner's work is creating hydrogen in a "very direct fashion" using electrolyzers.

Electrolyzers "use electricity to split water into hydrogen and oxygen," he notes. "Hydrogen then represents the same kind of things we use chemical energy for — gasoline, natural gas, coal oil, fuel oil — all these things are chemical-energy carriers, and hydrogen could replace all of them, ideally, in our energy system. The whole thing works on energy-conversion devices, and lasers really help us understand a lot of these conversion systems in terms of optimizing them.

Turner likens his process of using semiconductors to split water to that of plants: "All humans are solar powered; all our energy comes from food. Now, we may run it through a McDonald's hamburger. But the fundamental stuff came from plants converting solar energy into carbohydrates that we eat or cows eat. My system works similarly, but the idea is to make it much, much more efficient and to make hydrogen."

LASERS IN THE LAB

"I've certainly used lasers a lot in my research, starting way back when I had a high-powered argon-ion laser powering a dye," he recalls. "It was one of these huge monster things they put out back in the '80s — 440 volt and huge amounts of cooling and a tremendous amount of power. We did fundamental electron transfer using those kinds of lasers.

"I don't use a lot of lasers now except in looking at the efficiency of my material semiconductors; it's very easy to quantify the flux you're putting on a system. But at NREL, a lot of people do very advanced laser techniques to understand the fundamental electronic properties of semiconductors. That's probably the major thrust of the laser effort at NREL: understanding fundamental processes in electron transfer (and) light absorption. We talk about phonons and those kind of systems, looking at semiconductors and various complex structures and how light interacts with those structures and how electrons move."

In fact, Nozik, the man who hired Turner at NREL, is working on third-generation solar cells, and lasers "are absolutely imperative" in trying to understand them. "The idea is to make

solar cells very efficient, (and) you do that with multiple exciton generation. The only way to study that is with lasers to study the excitation of these materials.”

NREL also uses lasers to develop quality-control processes for membrane electrode assemblies as part of its fuel-cell manufacturing initiative. Lasers are already in use in some manufacturing lines for cutting the plastic membranes.

ULTIMATE ENERGY GOALS

Turner noted that in 2008, global photovoltaic cell production capacity increased 87 percent over 2007. According to Turner, one-third to one-half of U.S. electrical demand could be met by photovoltaic cells placed on existing structures (warehouse roofs, homes, airport parking areas). To further alternative-energy goals, he says, we must “push the growth rate of (photovoltaics), perhaps with new materials” and “develop fuel cells for transportation.”

“There’s a bright spot in photovoltaics in general,” Turner advised. “I’m sure 2009 will be a down year, but I think we’ll start to grow again in 2010 and 2011. Solar-cell companies (will be) the big thing. (Arizona-based) First Solar is a classic example with their thin-film solar cells. China is putting an enormous amount of money into silicon solar cells. Some of these systems — the thin-film materials in particular — use lasers to scribe lines in these cells so they can connect them.”

However, Turner cautioned, “the only way to make photovoltaics a major resource is for production to grow at double-digit rates for many decades. Of the current material sets there are some limitations; there is lots of silicon, but it is an expensive technology where it is going to be difficult to get the costs down. Another important PV material is cadmium telluride, but tellurium is a limited resource. So we may need new semiconducting materials for new photovoltaics. Certainly lasers are going to be critically important for our understanding of the electronic properties of candidate materials as well as processing and quality control of PV cells.” ■

Geoffrey Giordano is a freelance editor and writer.



The well attended Plenary Session provided attendees with information on alternative energy sources.

STUDENT PAPER AWARD WINNERS

LIA would like to extend congratulations to the ICALEO Student Paper Award Winners who receive a cash award, a certificate of achievement, and whose manuscripts will enter the Peer Review Process for publication in the LIA’s *Journal of Laser Applications*®.

1st Place – *Optical Properties of Laser-induced Plume during High Power Laser Welding* (708), Shinpei Oiwa, Osaka University, Osaka, Japan

2nd Place – *An Image-based “Click & Weld” – Method for Laser Beam Positioning in Micro Welding Applications* (705), Nicolaj Stache, Institute of Imaging & Computer Vision, RWTH Aachen University, Aachen, Germany

3rd Place – *Smart Tools with Embedded Optical Fiber Sensors: Laser Based Layered Manufacturing Procedures* (M805), Hamidreza Alemohammad, University of Waterloo, Waterloo, Ontario, Canada

Many thanks to the judges for the Student Paper Contest: Milan Brandt, IRIS, Swinburne University of Technology, Melbourne, Australia; Anthony Hoult, IPG Photonics Corporation, Oxford, Massachusetts; 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 and Etsuji Ohmura, Osaka University, Suita, Osaka, Japan.

POSTER PRESENTATION CONTEST WINNERS

The Poster Presentation Gallery was another example of the variety of laser research prevalent today. The ICALEO 2009 Poster Presentation Contest winners are:

1st Place – *High Speed Laser Micro-texturing of Si Wafer for Improved Light Trapping for Photo-voltaic Application*, Lin Li, The University of Manchester, Manchester, Great Britain

2nd Place – *Fibre Laser Welding of Zn-Coated Steel on Al Alloy for Next Generation Lightweight Vehicles*, Andrew Pinkerton, The University of Manchester, Manchester, Great Britain

3rd Place – *Acoustic and Optical Sensing for Monitoring of Blind Laser Drilling Geometrical Features*, John Pandremenos, University of Patras – Lab for Manufacturing Systems and Automation, Patras, Greece

ICALEO 2009 – ACCEPTING THE CHALLENGE

by Stephen Lumbert

Held at the Hilton located in the WALT DISNEY WORLD® Resort in Orlando, Fla., the 28th International Congress on Applications of Lasers & Electro-Optics (ICALEO®) once again brought together many of the best and brightest of laser and optics professionals and scientists to network and review the state-of-the-art in laser materials processing and predict where the future will lead. For four full days, plus the pre-conference Welcome Celebration held poolside at the Hilton, ICALEO 2009 provided a platform for the current issues on the forefront of laser materials processing.

ICALEO 2009 brought 483 participants representing 25 countries who filled the rooms for 233 presentations including scientific papers, short courses and panel discussions. Of course none of this would have taken place without the 68 vendors and sponsors lending their patronage and support.

PLENARY SESSION

The ICALEO 2009 Plenary Session, “Frontiers and Challenges for the Green Economy,” was presented to a full complement of attendees, many of which were attending ICALEO for the first time. The plenary session began with a keynote presentation by Dr. John Turner from the U.S. Department of Energy’s National Renewable Energy Laboratory. Although Dr. Turner covered the current energy carriers in use, photovoltaic and wind, his primary focus was on the potential of converting to a “hydrogen economy.” The implications for the laser industry are similar to the successes found in the photovoltaic (solar-cell) production. Developing production techniques for hydrogen delivery and conversion systems such as fuel-cells, electrolysis and biomass may open new avenues of opportunity as we follow the path forward.

David Clark of Newport Corporation presented the second presentation, “Lasers – An Enabling Technology in the Photovoltaics Revolution.” This discussion covered an overview of the current turbulence facing the industrial laser industry and specifically the shake-up and consolidation in the photovoltaic (PV) manufacturing and line equipment makers. However, market disruption creates opportunities for innovation. Addressing the theme of the Plenary Session, Clark discussed his perspective of how solid-state lasers can improve PV production costs and the associated environmental impact by reducing the

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number of steps while additionally reducing water and chemical use. He also described exciting new laser processes that may revolutionize PV manufacturing to enable higher efficiencies such as a process that uses continuous-wave green lasers for laser doping and electroplating to improve efficiency by two percent as well as speed-reliability improvements to make these approaches commercially viable.

Magdi Azer, currently lab manager for the Laser and Metrology Systems Lab at GE Global Research, delivered a presentation about meeting the growth of global energy demand. He began by describing some of the factors and policy drivers influencing the current energy landscape. It’s a long list that includes among other items: nuclear power generation, population, consumption, security, environment and water regulation. Next, he covered the role wind energy plays in the current and future global power generation landscape providing current figures on energy production and investment. Azer concluded with possible solutions to some of the challenges facing wind energy including the removal of trade barriers that preclude global co-ops, innovation and finance.

Yongfeng Lu of the University of Nebraska-Lincoln closed the opening Plenary Session with his presentation, “Laser-assisted Deposition of Good Carbon – From Diamond Films to Nanotubes.” The problem Lu addressed is, “How do you improve efficiency?” The research involved the use and investigation of both thermal and photolytic effects employing lasers to assist in two different processes. One is the combustion synthesis of diamond film by resonance excitation of precursor molecules and the other involved chemical vapor deposition to promote the growth of carbon nanotubes. This research concluded that: a) selective excitation of precursor molecules improves flame intensity and can result in increased diamond film growth rates as well as improved quality, purity and increased facet size and b) a laser-assisted chemical vapor deposition results in controllable growth and precise integration of carbon nanotubes.

LASER MATERIALS PROCESSING CONFERENCE

There were so many exciting papers presented at the Laser Materials Processing Conference that it’s hard to choose just one example, but Janette Matthews’ (Loughborough University, Loughborough, Great Britain) paper, “Three Dimensional Texturing and Patterning of Woven Textiles using Purpose Designed Fabric Structures” demonstrates an exciting new way to process fabric with lasers. As it’s not possible to weld decorations on cotton or wool, this new process involves “purpose designed fabric structure” where polymers are introduced into the fabric weave. This allows for not only 3D textile structure manipulation using lasers, but also permits the introduction of



Congress General Chair Xinbing Liu (left) with Plenary speakers (following left to right) Magdi Azer, John Turner, Dave Clark and Yongfeng Lu.

color to the structure by laser etching. The resulting benefits of this new process are not only to increase fabric manipulability, but also a reduction of water and chemical use now prevalent in chemical fabric manipulation.

LASER MICROPROCESSING CONFERENCE

Micro-welding, micromachining and ultrafast processing are always hot topics, but with the growing market of health-related products and services lasers can find new and innovative processes to expand the reach of laser microprocessing beyond biomedical applications. “Zirconia Ceramic Dental Restorations: Laser Machining and Optical Testing,” presented by Duncan Hand, describes one of those innovative uses. The process concept involves using lasers for high-speed profile cutting and picosecond short pulse fine scale machining on “one off” dental restoration billets composed of extremely brittle ceramics. Conventional mechanical processes take hours to complete and may introduce cracking that can weaken the structure. The new laser process involves a novel mid-infrared transmission technique for flaw detection. This non-destructive method, combined with the laser “milling”, reduces the cost by taking advantage of shorter work times and less structural damage to the pieces.

NANOMANUFACTURING CONFERENCE

The Nanomanufacturing Conference, now an integral part of ICALEO, began with an invited paper by Liang Pan of SINAM Center at UC Berkeley, Berkeley, California, “Flying Plasmonic Lens at Near Field for High Speed Nano-lithography.” This presentation addressed one of the grand challenges confronting the commercialization of nanotechnology: developing nanofabrication tools that allow quick and easy design changes. The slow scanning nature of the common maskless nanolithography methods provide only limited throughput. To overcome this and other limitations, a “Flying Plasmonic Lens” riding on an air-bearing spindle is used to focus the laser spot to a sub 100 nm area of a photo-resist coated recording disk spinning at extremely high speed. This allows for the exposure of sub-wavelength details on the target and throughputs two to five orders of magnitude higher than other maskless techniques.

BUSINESS FORUM & PANEL DISCUSSION

This exciting half-day event provided valuable insight from a business standpoint regarding the timely subject of green energy. Expanding on the topics first presented in the Opening Plenary Session of ICALEO, Dave Clark expounded on the PV marketplace including comparisons of market expansion by the United States, China and India. He also expanded on his Opening Plenary Session and talked about the reduction of venture capital investment to 2007 levels and how consolidation has changed the face of laser manufacturing of PV products. Those companies that remain in play are beginning to dominate the market via takeovers and vertical expansion.

Following Clark, Magdi Azer continued his previous discussion of wind energy and provided an abject look at the

scale involved with the utilization of wind energy, including video presentations of windmill construction and on-site visits of the pre-construction of windmill components. He also expounded on the impact on the industry by other countries, including the potential negative affect of China’s explosive growth. For example, in 2007 China consumed 23 percent of the world’s total concrete production.

Tony Hoult of IPG Photonics began his presentation, “Can Industrial Lasers be a part of a Sustainable Economy?” with a Friedrich Schumacher quote, “Small is beautiful.” He then covered a wide range of areas where lasers can save energy by simplifying processes, making equipment smaller and increasing throughput. Returning to the main theme of the Opening Plenary Session, Hoult reminded the audience about the three Rs – recovery, recycling and reuse, and how lasers can help in the “greening” of manufacturing using laser cleaning techniques. Lasers can be used for engraving, de-painting, decommissioning nuclear facilities, CRT lead recovery and by adding value to waste, as is the case in the European Union legislation. He concluded with the thought that “efficiency pays – or will soon” and the challenge, “Let’s think about how we can expand this role further.”

Ron Schaeffer of PhotoMachining, Inc. concluded the presentation part of the business forum with, “Jumping on the Bandwagon – Lasers and Green Energy.” He started by defining, “What is a boom?” and giving an overview of the energy/green basics. The basic green energy lifecycle is: make, store, transport and use. Lasers can be used to produce or aid in all four aspects of this lifecycle. Just consider LEDs for lighting, laser welding for lithium-ion battery case production and PV manufacturing. Schaeffer concluded by announcing that the “Holy Grail” is grid parity where the cost and efficiency of PV energy production versus oil, coal and nuclear energy production are on a par with each other. “The major advancements will be from entrepreneurs.”

VENDOR RECEPTION

The Vendor Reception, sponsored by Multiwave Photonics, showcased the products and services offered by the many sponsors and vendors. Dozens of tables were covered with everything from lasers and various facilitating tools to information about services, societies and research facilities. The reception put vendors and end users together to share product ideas and uses for many new



The Vendor Reception puts users and manufacturers together for a valuable networking opportunity.

cutting-edge laser tools and services. The relaxed yet inviting setting created a conducive ambiance for attendees and vendors alike to network for future projects and alliances.

CLOSING PLENARY SESSION

New for 2009 was the Closing Plenary Session, a joint session of the Laser Materials Processing & Laser Microprocessing Conferences, "Microprocessing Applications in Automotive and Aerospace Industries." The topics engaged a wide range of laser applications and techniques. The first presentation, an invited paper presented by Friedrich Dausinger, involved using disk lasers for the micromachining of macro workpieces. One example mentioned is One World Center (Freedom Tower) in New York, where the external panels are laser machined to refract light in specified patterns.

The other presentations included: "Picosecond Laser Machining of Shaped Holes in Thermal Barrier Coated Turbine Blades" by Carl Druffner of Mound Laser & Photonics Center, Inc.; "Advanced Fibre Lasers for Advanced Laser Marking Applications" by Tony Hoult of IPG Photonics Corporation; "Dual Mode High Brightness Fiber Laser for Ablation and Drilling of Aerospace Superalloys" by Mohammed Naem of the GSI Group, Inc.; "Advanced Beam Steering Helical Drilling" by Henrikki Panstar of Fraunhofer USA, Inc. and "Ultra Short Pulse Laser Generated Surface Textures for Anti-ice Applications in Aviation" by Gert-willem Römer of the University of Twente, Enschede, Netherlands.

ICALEO was not only the pinnacle laser conference for 2009; it was also a looking glass to the future of laser manufacturing and processing. The attendees were treated to some of the best Orlando has to offer while pursuing their passion for lasers and optics. The papers presented and the insights, innovations and breakthroughs explored during the event show how the efficient and eco-friendly use of lasers is at the forefront of global technology. By staying at the forefront of the laser and electro-optics research and business activities worldwide, the LIA and ICALEO are yet again leading the way. ■

Stephen Lumbert is a freelance writer in Orlando, Fla.

SCHAWLOW AWARD

This year's Schawlow Award, named after 1981 Nobel Prize Laureate Arthur L. Schawlow, a founding father of LIA, was bestowed upon Dr. Valentin P. Gapontsev of IPG Photonics Corporation. At the ceremony, Gapontsev was recognized as "the father of the fiber-laser industry as it is known today, who has pioneered the field in five decades of academic work and as the founder and CEO of a global technology company that continues to transform the laser industry."

Valentin P. Gapontsev, Ph.D., founded IPG in 1990 and has been chief executive officer and chairman of IPG's Board of Directors since the company's inception. Prior to that time, he served as senior scientist in laser material physics and head of the laboratory at the Soviet Academy of Science's Institute of Radio Engineering and Electronics in Moscow. He has over 30 years of academic research experience in the fields of solid-state laser materials, laser spectroscopy and non-radiative energy transfer between rare Earth ions and is the author of many scientific publications and several international patents. Gapontsev holds a Ph.D. in physics from the Moscow Institute of Physics and Technology.

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The President's Reception (above and below) is always a well-attended and exciting ICALEO event.



Rajesh Patel, Valentin Gapontsev (Schawlow Award Winner) and Peter Baker.



LIA President-Elect Nathaniel Quick at the Awards Luncheon.



Congress General Chair Xinbing Liu and Keynote Plenary Speaker John Turner.



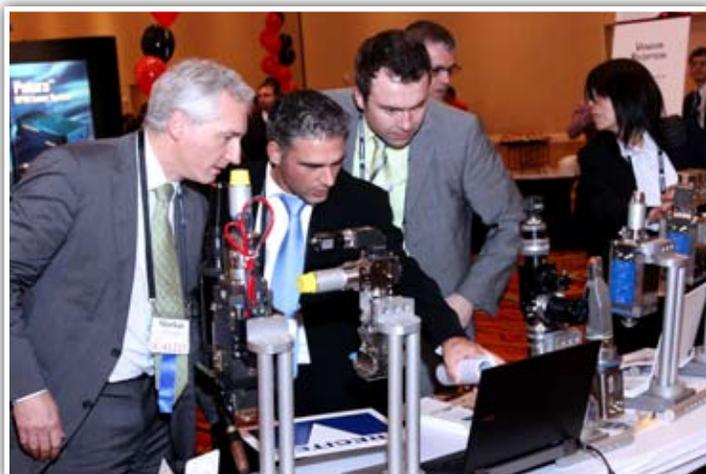
Bill O'Neill spoke about LIA membership at the Awards Luncheon.



Attendees get informed on the latest products and services from the exhibitors during the Vendor Reception.



The Welcome Celebration is great for catching up with old friends and making new ones.



Vendor Reception attendees at the Precitec booth.



LIA staff – (left to right) Gail LoIacono, Gus Anibarro, Jim Naugle, Kristi Brokaw, Shaun Oleson, Kathleen Pollack, David Evans, Peter Baker, Chandler Gifford, Kim Truelove, Breanna Armand, Barbara Sams, Kristen Childs, Katie Matlock, Anja Selnau, Robin Devor and Jeannette Gabay.

NATURE INSPIRES DESIGN FOR ICE-RESISTANT AIRCRAFT

by Chandler Gifford

You might not expect a discussion on the properties of a flower to be part of advanced laser research. However, for a group of scientists at the University of Twente in the Netherlands, now led by Prof. dr. ir. Bert Huis in't Veld and Dr. ir. Gert-willem Römer, the lotus serves as inspiration for research into new applications for ultra short pulse laser systems.

Daniel Arnaldo del Cerro presented the group's recent findings on Nov. 5 at the Closing Plenary Session of the 28th International Congress on Applications of Lasers and Electro-Optics (ICALEO®) 2009, held in Orlando, Fla. Arnaldo's presentation was the last of six given during the session, chaired by Kunihiko Washio, founder and president of Paradigm Laser Research, Ltd. The final presentation of ICALEO 2009 proved to be one of the most interesting—a fitting way to conclude the conference.

Arnaldo explained how his group uses ultra short pulse laser ablation to generate surface textures that exhibit a very high degree of water repellence, or superhydrophobicity. This characteristic is shared by a number of plant species, perhaps the most notable being the lotus.

Lotus leaves do not get wet. Water droplets bead up and roll off the leaves, picking up and removing dirt particles along the way. For this reason, the lotus and other species that exhibit superhydrophobicity are referred to as self-cleaning surfaces.

People have recognized the water repellent properties of the lotus for many centuries, but in the 1970s, German botanist Wilhelm Barthlott first explained the functional principle of these self-cleaning surfaces—a phenomenon now known as the Lotus Effect.

HOW DOES THE LOTUS EFFECT WORK?

On a micro- and nanoscale these surfaces exhibit highly contrasting topography, or texture. Instead of a flat, smooth surface, the landscape is spiked with dramatic peaks. This surface morphology and the lotus's chemical properties combine to give the plant its unique self-cleaning attributes.

The rough surface texture repels water because there is very little contact between the water droplets and the surface.



A presentation on superhydrophobicity and lasers was given during one of the Closing Plenary sessions.

The water rests on the “peaks” of the nanostructure, so it never touches the majority of the surface. According to one model, the air that becomes trapped underneath the water droplets within the “valleys” of the surface texture also supports the droplets and prevents them from wetting the surface.

The group from the University of Twente has used this concept as a basis for developing a method of generating superhydrophobic surfaces that could be used in the aerospace industry. Their research is aimed at developing a process to be applied to the wings and other parts of aircraft that would prevent or delay ice build-up.

Investigators believe ice accretion contributes to a number of plane crashes, including one as recently as February of 2009 in Buffalo, New York. Also, passengers sit through thousands of hours in flight delays while wings are defrosted before takeoff. If engineers can develop aircraft components with self-cleaning surfaces, they will help air travelers avoid inconvenience and reduce the potential for the occurrence of deadly accidents.

While Huis in't Veld, Römer and their team do not claim to be able to prevent these problems, their studies indicate that the Lotus Effect could play a role in the future of aviation design. Imagine that: a flower that provides a blueprint for a new generation of safer aircraft. It goes to show that even the most advanced technology and brilliant scientific minds can seldom produce designs that compare with those found in the natural world. As Römer put it, “In most cases, you can't do better than nature.”

Arnaldo's presentation was a highlight of the Closing Plenary Session, which included five other talks on various microprocessing applications. These applications, including micro-drilling and precision machining, are rapidly growing in number as laser technology advances. The improving performance and reliability of diode-pumped disk lasers and fiber lasers means these systems will be able to contribute to the optimization of many other processes found in the aerospace, automotive and other industries.

Session Chair Kunihiko Washio pointed out that scientists are investigating ways to use these diverse tools in conjunction with each other to discover new applications for them. “Not only the pulsed lasers, [but] also the combination, or sequence [is] becoming important. This creates another field we should... concentrate [on]. Because with the special sequence, or the special arrangement, there are some areas [where] we can increase the profitability or the efficiency of the lasers... So, not only the isolated pulse itself, but also the combination, the hybrid technology is becoming important,” Washio observed.

ICALEO continues to serve the laser community as an important venue for the exchange of ideas and to promote the ever-expanding field of laser materials processing. LIA looks forward to holding its Pacific International Conference on Applications of Lasers and Optics (PICALO), which will focus on the growth and application of lasers and optics in the Pacific region. Be sure to join us for PICALO 2010, which will be held in Wuhan, People's Republic of China from March 23-25, 2010. ■

LIA ANNUAL MEETING REPORT

The 2009 Annual Meeting of the Laser Institute of America was held on Wednesday, November 4, 2009 at the Hilton located in the WALT DISNEY WORLD® Resort, Orlando, Florida in conjunction with ICALEO® 2009. President Rajesh Patel thanked LIA Executive Director Peter Baker and the LIA staff for another successful year.

President-Elect Nathaniel Quick reported the consolidated financial statements for LIA and the Board of Laser Safety, Inc. for fiscal year ending March 31, 2009. The society had revenues of \$2,639,251, expenses of \$2,661,123, an operations loss of (\$21,872), a loss on marketable securities of (\$110,061) and net assets of \$715,370. For year-to-date through Sept. 30, 2009 the society had revenues of \$732,090, expenses of \$884,503, an operations loss of (\$152,413), a gain on investments of \$41,407 and a decrease in net assets of (\$111,006).

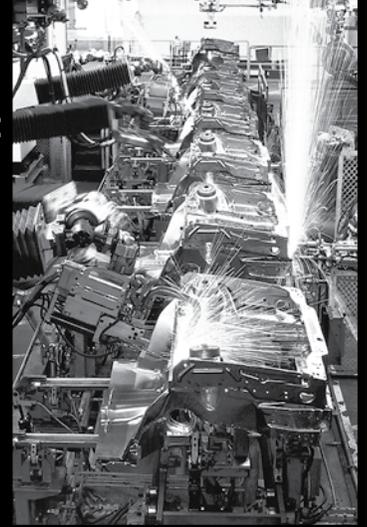
After the treasurer's report, Baker thanked Rajesh Patel for his leadership as LIA president and presented him with a plaque. Baker then gave a short talk thanking "Team LIA," and reviewed the accomplishments of Team LIA during the past fiscal year. Baker highlighted his trip with Bo Gu and Yongfeng Lu to Wuhan to prepare for PICALO 2010, mentioned the abstracts are coming in and the event should be a big success. He also highlighted the success of the Laser Additive Manufacturing (LAM) workshop and the plans for the second annual workshop this coming May. Baker applauded the LIA staff, members, speakers, session chairs, conference chairs, instructors, board members and officers and thanked everyone for their contributions to ensure the success of LIA.



LIA's Peter Baker presenting Rajesh Patel with his 2009 president's plaque.

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LASER WORLD OF PHOTONICS CHINA 2010

China's leading photonics exhibition, LASER World of PHOTONICS CHINA, began its yearly exhibitions in Shanghai in 2006. Over 200 exhibitors in 11,500 square meters of floor space presenting the latest technology and applications of laser and photonics are expected to make the fifth edition of LASER World of PHOTONICS CHINA another successful event when it takes place March 16-18, 2010 at Shanghai New International Expo Centre in Shanghai, China. Approximately 50 percent of the exhibitors will come from abroad as international players show great interest and confidence in the show and the Chinese laser and photonics market. To date foreign companies exhibiting include RoFin, TRUMPF, Coherent, Newport, DILAS, GSI, PI, IPG and more.

In addition, LASER World of PHOTONICS CHINA also features a first-rate conference program that Messe München International organizes in conjunction with foremost research institutes, industry associations and media partners from

China and other countries.

For the fifth time the International Conference on Laser Processes and Components (LPC 2010) will take place from March 16-17, 2010 and is being organized again by Messe München International and Laser Center Hannover in cooperation with the Laser Institute of America. The purpose of the conference is to promote the cooperation and the technology transfer between science and industry in the field of laser technology. The conference chairmen for this year are Prof. Andreas Ostendorf of Ruhr University Bochum and Prof. Minlin Zhong of Tsinghua University.

The topics include laser microprocessing, laser macroprocessing, laser safety, optical components and laser systems. The call for papers has started and the submission deadline for abstracts is Dec. 31, 2009. Online submission of abstracts is possible at www.laser-zentrum-hannover.de/lpc2010/index.php. For more information on the conference, visit www.laser-zentrum-hannover.de/en/lpc/2010.

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PRESIDENT'S AWARD

LIA's 2009 President's Award was presented to William Shiner, vice president-Industrial Markets, IPG Photonics, Oxford, Mass. The LIA President's Award honors individuals who have made significant contributions to LIA and enables the growth and prosperity of the society. This was the first presentation of the award in over five years. It was presented on Nov. 4 at LIA's ICALEO®. At the ceremony, Shiner was recognized by current LIA President Rajesh Patel for his long-term contributions towards the success of LIA.

Shiner has served on the LIA Board of Directors since the 1970s, culminating in his term as president in 2007. Shiner has championed the society over the years with conference papers, advertisements, sponsorships and was the force behind the development of the LIA *Laser Application Resource Guide* and the Laser Additive Manufacturing Workshop. Shiner was also inducted as an LIA fellow at the ceremony.



Bill Shiner, left, receiving the President's Award from Raj Patel.

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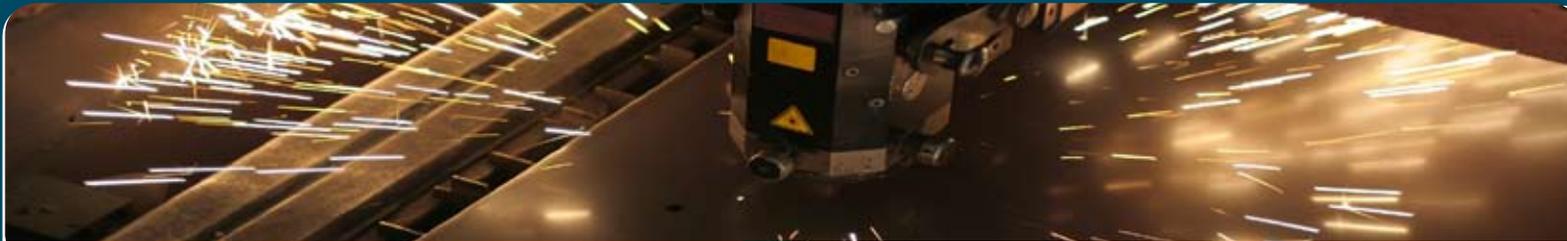
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CORPORATE MEMBER PROFILE

PRECITEC GROUP

LIA Corporate Member Precitec Inc. is a global company providing precise mechanical, optical and electronic components and systems, designed for material processing using lasers, as well as process control and monitoring. Precitec has gained an international reputation for being an expert in providing complex system solutions for laser material processing and for optical measuring technology. In fact, in 2008 Precitec delivered its 25,000th laser cutting head with distance control.

Cutting heads for CO₂- and Nd:YAG applications with long-life, non-contact distance sensors that have proved to be reliable in many thousands of applications ensure that optimum cutting qualities are achieved. Additional integral sensors increase process safety and reduce processing time to a minimum. Electronic units used for sensor signal processing, linear drive and process control round out Precitec's product range. The company's customers range from small to medium enterprises to the largest of companies.

COMPANY BACKGROUND

Precitec was formed in 1971 in Baden-Baden, Germany. Wholly-owned subsidiaries were founded in the U.S. in 1996, in Japan in 1998, in France in 1999 and in China in 2005. Since 2007, Precitec is also represented by a subsidiary in Korea.

Today, Precitec employs over 150 people and is also comprised of Precitec Optronik, located in Gaggenau and Rodgau in Germany and Precitec Vision located in Switzerland. Precitec Group has a worldwide distribution network that guarantees customers receive reliable support while ensuring short replacement part lead times. The company is ISO 9001 certified and holds over 200 patents.

COMPANY PRODUCTS/SERVICES

In the area of laser welding technology, Precitec offers a comprehensive range of processing heads with integral sensor systems for non-contact seam tracking and online process control. In addition, Precitec manufactures process sensors for industrial adhesive technology.

The Precitec Optronik GmbH has been working successfully with the Precitec Group in the optical measurement technology sector for almost 20 years now. The product spectrum ranges from systems for range finding and thickness gauges for multi-layered samples to medical equipment.

At a recent conference/trade show, the modular YW52 welding

head for laser welding was introduced for the first time. The head can be extended by pre-process, in-process and post-process monitoring modules and is suitable for all solid-state lasers. All well-known pre-process, in-process and post-process modules by Precitec can be integrated for fully automated production. And the CHRcodile – a new generation of optical sensors from Precitec Optronik – is setting new standards for distance and thickness measurement in terms of speed and precision.

Precitec offers various application-specific options that can be easily integrated into all industrial standard equipment concepts. Clearance widths of 10 μm were a few years ago unachievable – but today this is simply state-of-the-art for Precitec.

CUSTOMERS COUNT

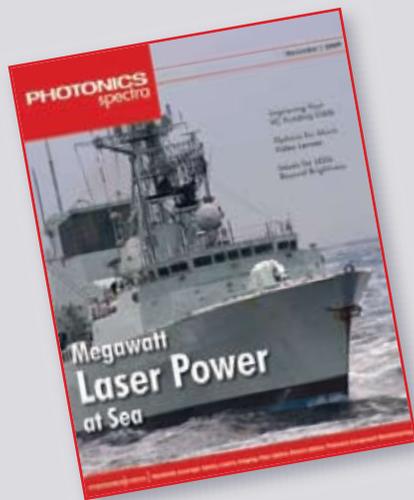
Precitec ensures only the highest standards of quality in its position as a technological leader. As a result, the company provides maximum product reliability with long-lived products that can withstand the hardest tasks in the manufacturing industry; the reliable service of a global network that connects customers with field engineers and experienced distributors, and product optimization – Precitec's system solutions and process controls maximize output while minimizing waste to increase their customer's economic success.

According to Precitec, the company's standards make it the market's choice: 25,000 Precitec cutting heads and 500 Precitec welding systems are already in use worldwide. The demands Precitec makes upon itself have helped make it the market's choice.

For more information, visit www.precitec.de. ■



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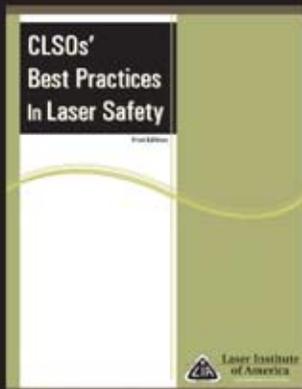
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JLA UPDATE

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

The JLA is published four times a year by the LIA in February, May, August and November. It is sent to all LIA members as a member benefit. For nonmembers of LIA, call the American Institute of Physics at 1-800-344-6902 for subscription information. Sign up at <http://scitation.aip.org/jla/alert.jsp> to receive your JLA table of content e-mail alerts.

ADDRESSING CERTIFICATION MAINTENANCE ISSUES

Over the past six months, the Board of Laser Safety (BLS) has received telephone calls and e-mails primarily from Certified Medical Laser Safety Officers (CMLSOs), expressing their concerns related to achieving their certification maintenance (CM) points. Specifically, some CMLSOs felt that the CM point category parameters did not realistically reflect the experience, duties and opportunities available to health care professionals. High on the list was the inability to attend conferences, workshops or off-site continuing education (training) due to travel restrictions, which many of us can relate to even outside of the medical community. The subject of teaching was debated; either it is not an option or is part of the job and therefore considered on-the-job experience. For some, membership in a professional organization is cost prohibitive and the individual would only be joining "to get the 1 CM point."

In August, the BLS Review Board was reconvened to review and revise the CM point category parameters and procedures for the CMLSOs. The ad-hoc group of four Certified Laser Safety Officers (CLSOs) and four CMLSOs was assembled, and under the leadership of Tim Hitchcock, it evaluated and updated the CMLSOs' CM point category parameters. Revisions include increasing the maximum number of points allowed in the continuing education category, adding credit for published magazine or newsletter articles and/or reviewing journal articles*, and allowing credit for earning other professional certifications. Category descriptions have been clarified and examples have been added. Lastly, for those unable to obtain the required 10 points over the course of their three-year cycle, the option to retake the exam is now available.

Subsequently, the group completed a cursory review of the adequacy and appropriateness of the CLSOs' CM point category parameters. The review board agreed that the CM point category parameters should remain consistent between the two groups and noted that, as stated previously, some CLSOs are facing the same cost-cutting measures as the CMLSOs, e.g., reduced company support for organizational membership, travel restrictions, etc. Updated Certification Maintenance Manuals are posted on the BLS website, www.lasersafety.org.

If you have any questions about the recertification process, please contact Hydee Cash at hcash@lasersafety.org or Barbara Sams at bsams@lasersafety.org, or call 407-380-5833.

*Titles and access information for acceptable journal articles will be delivered via the BLS News & Review e-newsletter. The Journal Article Verification Worksheet may be downloaded from the BLS website. ■

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ASC Z136 UPDATE

Mark your calendars for Friday, March 12, 2010 as the ASC Z136 Annual Meeting. The meeting will be held at the Hilton Doubletree Hotel in San Jose, Calif. We have been able to secure rooms at the government per diem rate of \$132/single for all attendees. A personal online group page for making reservations has been created for our group by the hotel – please follow this web address to register: <http://doubletree.hilton.com/en/dt/groups/personalized/JOSE-DT-LIA-20100307/index.jhtml>.

ANCILLARY MEETINGS

The following meetings have been scheduled in conjunction with the annual meeting:

Day/Date	Time	Committee	Contact Person
Wed., Mar 10	8a – 5p	SSC-6 Outdoor Lasers	Robert Aldrich
	8a – noon	SSC-9 Manufacturing	Tom Lieb
Thurs., Mar 11	8a – 5p	SSC-1 Safe Use of Lasers	Ben Rockwell
	8a – noon	TSC-1 Bioeffects	Bruce Stuck
	1p – 3p	SSC-8 R&D and Testing	Ken Barat
	3p – 5p	ADCOM (closed meeting)	Barbara Sams
Sat., Mar 13	8a – noon	TSC-7 Analysis & Applications	Wes Marshall



COMMITTEE DINNER

As in previous years, plan to join us on Thursday evening for dinner. For meal planning purposes, please e-mail Barbara Sams at bsams@laserinstitute.org or call 407-380-1553 to let us know you are coming.

ALL ARE INVITED

The ASC Z136 annual meeting is open to the public. If you have any questions regarding the meeting, would like a meeting agenda, and/or plan to attend as an observer, please let Barbara know. If you are interested in attending an ancillary committee meeting, please contact the LIA office for further information (407-380-1553). ■




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- PL Systems Inc, Great Neck, NY
- UNIVET s.r.l., Rezzato BS, Italy

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

INDIVIDUAL

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 Amy Burwell, Redding, CA
 Manuel Leonardo, Santa Clara, CA
 Pamela Warren, Santa Clara, CA
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 Valentin Gapontsev, Oxford, MA

Elizabeth Lamonde, Quincy, MA
 Denise Klaren, Kalamazoo, MI
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NEW MICROMACHINING WORKSTATION

Newport Corporation, Irvine, Calif., has introduced a new micromachining workstation specifically designed for high precision laser direct-writing (LDW) and patterning. The flexible device can be integrated with several lasers to produce two- or three-dimensional patterning and writing on virtually any material. It is simple to assemble and easy to couple with continuous-wave (CW), nanosecond (ns), and femtosecond (fs) lasers. The micromachining workstation can be customized with different lasers to perform surface and volume patterning in semiconductors, dielectrics and biocompatible materials.

Also from Newport are three new additions to the Newport 818P Series of thermopile detectors, the fan-cooled 818P-500-55, the water-cooled 818P-3KW-060 and the high-sensitivity 818P-001-12NIR. Newport is meeting more demanding customer requirements with these updated sensors, one of which is capable of measuring as low as 1 μ W range with very low thermal drift, and another which can measure up to 3kW of continuous-wave (CW) optical power, which is ideally suited for fiber lasers and CO₂ lasers. For more information on either, visit www.newport.com.

COMPACT LASER SYSTEM FOR EXPLORATION OF PLANETARY SURFACES

Laser Zentrum Hannover e.V. (LZH) has developed, in cooperation with Hoerner & Sulger GmbH, a miniaturized laser system that is especially apt for service in space. The prototype, consisting of a laser head and electronics, is extremely compact and weighs only 187 g. The laser system can be used in a so-called "laser induced breakdown spectroscopy" (LIBS) in order to explore planetary surfaces. LIBS is an analytical method that can determine the distribution of elements on the surfaces of planets in order to find out about existing types of materials on each spot. The miniaturized system can also be used on earth to analyze material under extremely harsh conditions. For more information, visit www.laser-zentrum-hannover.de/en/.

LASERS FOR BIOINSTRUMENTATION AND LIFE SCIENCES

Coherent, Inc., Santa Clara, Calif., has introduced the world's first commercial all solid-state laser with output at 568 nm. The new Sapphire™ 568 is available in models offering 50 mW, 75 mW, 100 mW, 150 mW and 200 mW of continuous wave (CW) output, and provides a stable, high quality beam ($M_2 < 1.1$) with low noise (<0.25% rms from 20 Hz to 2 MHz). The Sapphire 568 is packaged in a highly compact laser head, measuring just 125 x 70 x 34 mm; this is identical to other Sapphire lasers at 561 nm, 488 nm, and 460 nm for the convenience of OEMs who incorporate multiple lasers.

Coherent has also introduced two new Genesis™ CW green (532 nm) lasers for life science applications offering a combination of low-noise (<0.1% rms) and excellent mode quality ($M^2 < 1.1$). The Genesis 532-1000 S lasers produce over 1 Watt of output power, while the Genesis 532-500 S lasers deliver over 0.5 Watts. Both lasers are air-cooled, can be directly modulated and are available in OEM packaging. For more information on either, visit www.coherent.com.

10KW POWER/ENERGY SENSOR INTRODUCED

Ophir-Spiricon, Logan, Utah, has introduced a 10 KW power/energy sensor, the first detector to directly measure very high powers and power densities. Designed for material processing applications, such as welding and metal cutting, the 10 KW measures YAG and fiber lasers in the 1040-1100 nm range, and CO₂ lasers at 10.6 microns. A wide aperture of 45 mm allows for measurement of broad beams. For more information, visit www.ophir-spiricon.com.

LASERS PUT A SHINE ON METALS

The polishing of injection molds is time-consuming and monotonous and requires high levels of concentration. A skilled worker may often need a whole week to polish a single metal mold. Researchers at the Fraunhofer Institute for Laser Technology ILT in Aachen, Germany have developed a way of automating the work.

"We do not polish the surface by hand with grinding and polishing media. Instead we use a laser," explains Dr.-Ing. Edgar Willenborg, group leader at the ILT. "The laser beam melts the surface to a depth of about 50 to 100 micrometers. Surface tension ensures that the liquid metal flows evenly and solidifies smoothly." Like in conventional grinding and polishing, the process is repeated with increasing degrees of fineness.

Laser polishing does not achieve the same surface smoothness as perfect hand polishing – hand polishers can achieve a roughness Ra of 5 nanometers, the laser at present can only manage 50 nanometers – but Willenborg still sees considerable market potential for the system. The time gained by laser polishing and the cost saving achieved are enormous. Whereas a skilled polisher needs about 10 to 30 minutes for each square centimeter, the laser polishes the same area in about a minute. A prototype of the laser-polishing machine developed by the scientists in cooperation with mechanical engineering firm Maschinenfabrik Arnold has already been built. ■

MEMBERS IN MOTION

LASER TECHNOLOGY COOPERATION

Equipment for a water treatment plant in Russia has been built with the help of German laser techniques, an example of successful project cooperation between Germany and Russia. In Russia there are five Laser Innovation Technological Centers (LITC), which are supported by the Federal Ministry of Education and Research. A company asked the center for help in constructing a photochemical reactor for water decontamination. Different parts of a reflective stainless steel had to be cut using a laser, and then welded together to form a reactor shell. The laser technology for this project was exported from Germany to Moscow. The laser of the south German company Trumpf was connected to a Scansonic processing head, a company based in Berlin. Both parts were then connected to a KUKA robot. LITCs provide businesses in Russia with a jump start in laser technology and this project should help German laser technology to have a wider basis in Russia.

JOINT PROJECT FOR GLASS

Whereas photovoltaic cells transform the sun's energy directly into electricity, solar collectors use a liquid that is heated by solar radiation. The thermal energy won during this process can be used for driving power generators. The glass tubes of the solar collectors must be joined together, and according to the Laser Zentrum Hannover e.V. (LZH), laser technology is best suitable for this process. A new project between the LZH and several industrial partners aims at proving that laser joining of glass tubes has many advantages over the conventional flame method. The new system is a solid basis and starting point for all project partners and all the connected industrial branches in finding new application areas. The project "Lafuelsol" is funded by the German Federal Ministry of Education and Research (BMBF). The project organization is carried out by the Karlsruhe Institute of Technology, division Production and Manufacturing Technologies. For more information, visit www.laser-zentrum-hannover.de/. ■



PICALO
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LAM SPONSORSHIP/EXHIBIT OPPORTUNITIES

Profitable laser solutions for today's manufacturing challenges! LIA's 2nd Laser Additive Manufacturing Workshop will bring industry specialists, executives, users and researchers from around the world to show how cladding and rapid manufacturing can be applied effectively and affordably to today's manufacturing challenges. This workshop, to be held May 11-12, 2010 in Houston, TX, will have a significant impact on the widespread industrial implementations of laser additive manufacturing.

Sponsorship of LAM 2010 is a valuable way to reach a highly qualified target audience as manufacturing, R&D, applications and construction engineers, OEMs, system integrators and



managers all attend. This dynamic group comes from oil and gas, aerospace, agriculture, automotive, military and construction industries to name a few. Don't miss this strategic opportunity for direct access to your customers! For complete sponsorship information for LAM 2010, visit www.laserinstitute.org/LAM.

LIA FALL '09 PUBLICATION SPECIALS

As you know, it is in the best interest of the employees and the organization to follow the standards set forth in the American National Standards Institute (ANSI) Z136 series of laser safety standards. LIA offers the most comprehensive selection of ANSI Z136 Laser Safety Standards — providing guidelines for implementing a safe laser program in industrial, medical, military and educational applications of lasers.

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Additionally, from now until Dec. 31, 2009, you can receive LIA's *Guide to the Selection of Laser Eye Protection* FREE with

the purchase of selected LIA industry leading publications. Completely updated (2007) to include guidelines from ANSI Z136.1 and all new information regarding available laser safety eyewear and eye protection products, the *Guide for the Selection of Laser Eye Protection* features a simplified five-step process for determining the correct type of laser eye protection. Visit www.laserinstitute.org/promotions/EYEWEARpromo for complete information.

LIA'S MEMBERSHIP DIRECTORY AND LARG COMBINE

New for 2010, LIA will be combining its annual *Corporate Membership Directory* with its *Laser Applications Resource Guide* (LARG) for an all-in-one reference tool for all end-users and potential customers — the best of both worlds! This combined guide will not only correlate LIA corporate members by areas of interest, but also provide each of the participating LARG companies with a full-page capability statement highlighting a more comprehensive listing of their services.

PICALO SAVE THE DATE

The 4th Pacific International Conference on Applications of Lasers and Optics (PICALO) will be held March 23-25, 2010 in Wuhan, People's Republic of China. Presented by LIA, PICALO will focus on the growth and application of lasers and optics in the Pacific region. Topics such as aerospace, forming and drilling, welding, manufacturing, research, laser modeling and simulation, ultrafast fabrication and hybrid processes will be covered. For more information on PICALO 2010, including sponsor and vendor display opportunities, visit www.laserinstitute.org/PICALO or contact David Evans at 1-407-380-1553 or e-mail PICALO@laserinstitute.org.

2010 TRAINING DATES

Get your laser safety training from the trusted source! The LIA offers a complete line of laser safety training courses for personnel in research, industrial and medical laser facilities. All of LIA's courses are based on the ANSI Z136 Series of Laser Safety Standards. Just in time for the end of the year, LIA has released the 2010 list of dates and locations for its education courses. You can find a partial listing on the LIA events calendar on page 2 of this newsletter, but for a complete listing, visit www.laserinstitute.org/education/calendar. Plan your New Year and get educated! ■



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