



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: ICALEO 2011 | VOLUME 19 NO. 6 | NOVEMBER / DECEMBER 2011

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21st Century Strides
- pg. 14



**Laser Institute
of America**

Laser Applications and Safety

LIA TODAY

THE OFFICIAL NEWSLETTER OF THE LASER INSTITUTE OF AMERICA

LIA TODAY is published bimonthly 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.

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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CALENDAR OF EVENTS

Laser Safety Officer Training
Feb. 27-29, 2012 | Phoenix, AZ

Laser Safety Officer with Hazard Analysis*
Jan. 30- Feb. 3, 2012 | Orlando, FL
Mar. 19-23, 2012 | New Orleans, LA
June 11-15, 2012 | Boston, MA
Nov. 11-15, 2012 | San Antonio, CA
*Certified Laser Safety Officer exam offered after the course.

Medical Laser Safety Officer Training*
Feb. 11-12, 2012 | Orlando, FL
June 9-10, 2012 | Boston, MA
*Certified Medical Laser Safety Officer exam offered after the course.

Advanced Medical Laser Safety Officer Training
Feb. 23-26, 2012 | Atlanta, GA

Industrial LSO Training & Laser Applications Overview
Mar. 6-9, 2012 | Chattanooga, TN

LAM 2012
Feb. 29-Mar. 1, 2012 | Houston, TX

ICALEO[®] 2012
Sept. 23-27, 2012 | Anaheim, CA

Laser Welding & Joining Workshop 2012
Oct. 23-24, 2012 | Schaumburg, IL

LME 2012
Oct. 23-24, 2012 | Schaumburg, IL

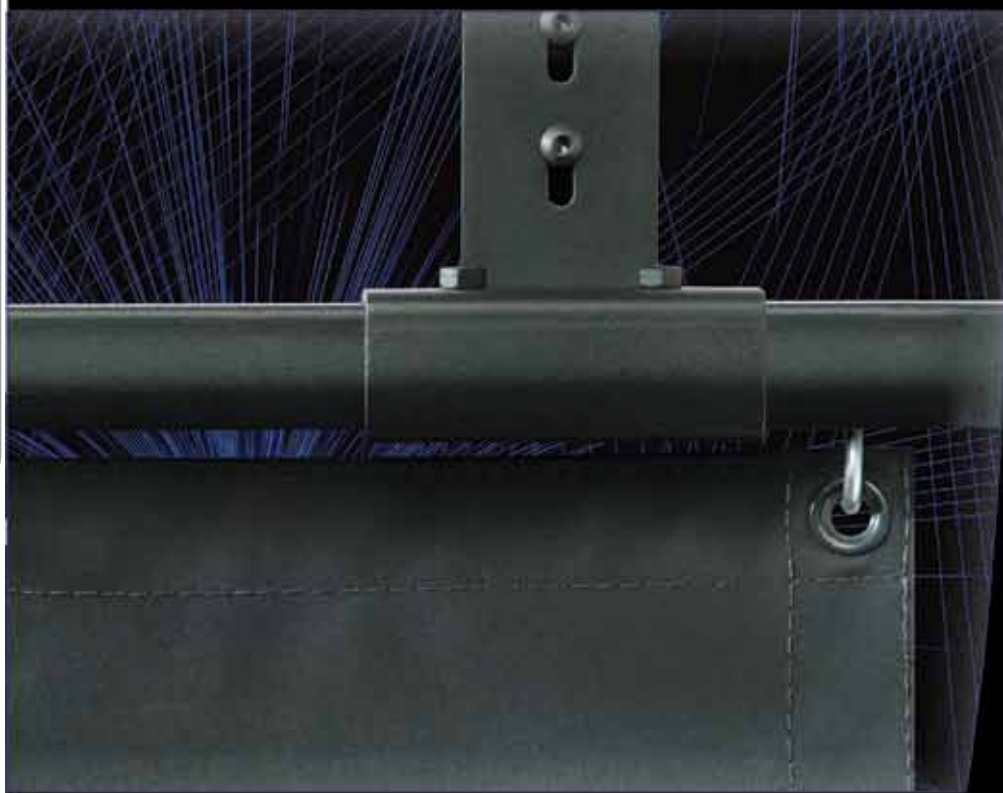
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PRESIDENT'S MESSAGE



Recently, I testified in Washington, D.C. before a Congressional House subcommittee to stress the need for lessening the tax burden on small businesses. As CEO of Laserage, I — like my peers in the laser industry — wish to do my part to spur the U.S. manufacturing sector with our unique technology. That desire also fueled my mission as president of LIA for the

past year — a period of great success that saw us launch the groundbreaking Lasers for Manufacturing Event just weeks before our annual ICALEO® conference.

The attendance figures at LME (nearly 900) and ICALEO (more than 500, a three year record!), indicate that you are just as passionate as I am about fostering an environment in which lasers tackle more and more vital roles in manufacturing, medicine, defense, etc. As a reader of *LIA TODAY*, you are likely aware of the resources LIA offers and all LIA does to advocate for the influence of the laser on our society. I encourage you to make your associates aware of the LIA's efforts and encourage them to join our mission as corporate or individual LIA members. The larger LIA grows, the stronger our voice becomes and the more impact we'll have. We've been able to cut costs to weather the current economic turbulence, but even as the laser industry bucks recessionary pressures, we need to keep LIA's resources strong to do our job. Your contributions and membership are vital to LIA's success. And as always, our success is, ultimately, your success.

As I emphasized during my address at the ICALEO 2011 awards luncheon, I thank Executive Director Peter Baker and his entire staff for making my job so easy. I wish my successor, Professor Reinhart Poprawe, the best as he takes over as president and navigates LIA through a new year of great achievements.



Stephen Capp
President, Laser Institute of America

EXECUTIVE DIRECTOR'S MESSAGE

LIA GAINING MOMENTUM – DON'T BE LEFT BEHIND

As I pointed out during my report to the members at ICALEO®, LIA will end this year in good shape and will gain further momentum in the coming years. Our inaugural Lasers for Manufacturing Event (LME) was a huge success and our 30th ICALEO was the most successful in recent memory so we are ending this year on an upswing.



We start next year with the very popular and valuable Laser Additive Manufacturing (LAM) workshop and, for our medical clients, we will publish an updated medical laser safety standard. Later in the year we will add a new workshop on Laser Welding & Joining together with an overview tutorial on Ultrafast Laser Processing, both to be held in conjunction with LME 2012 in Schaumburg, IL October 23-24, 2012.

We are meeting needs and carrying out our mission to “foster lasers, laser applications and laser safety worldwide.” Don't be left behind, there is more value than ever in being an LIA member. We can meet your needs for connection and for reliable, useful information. If you are a researcher you can publish in our indexed proceedings or refereed *Journal of Laser Applications*® (JLA). If you are an end user you will surely benefit from our workshops and LME with its wealth of free education courses and materials. If you represent a corporation there is huge value in corporate membership. Our conferences and workshops give you valuable exposure and connection to laser researchers and end users, together with discounts for your employees who attend our training courses.

So, there it is, LIA is gaining momentum. Now is the time to get on board. If you act now to become a member we will have a special discount for you. Do it!



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

LASER-BASED PRODUCTION OF THIN WEAR PROTECTION FILMS

By Dominik Hawelka

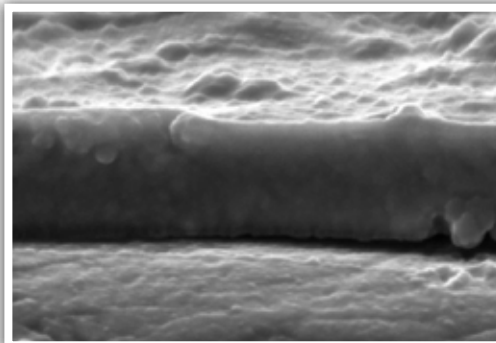
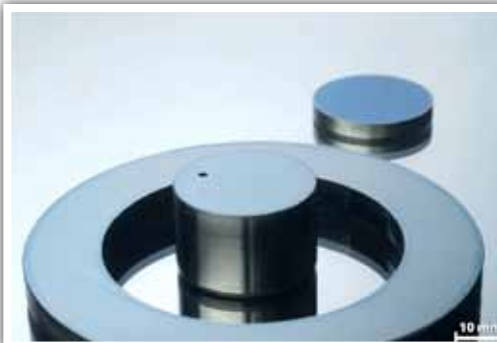
Friction creates a loss of energy and reduces component lifetime. According to the scientific community concerned with friction, wear and wear protection the overall costs related to these issues amount to 4 percent of the Gross National Product of industrial countries, a staggering sum. Despite the fact that wear protection coatings are already deployed to improve the lifetime of highly stressed components, limiting costs due to tribological loss mechanisms poses a great challenge in many industrial sectors. In particular, within the automobile sector, a high throughput of parts needs to be protected every year. As a consequence, there is a strong demand for low-cost production processes for wear protection coatings.

ALTERNATIVE PROCESSES

Physical vapor deposition (PVD) is a widely accepted technology to produce high-performance wear protection coatings. It exhibits, however, several distinctive drawbacks such as its high demand for a great amount of technological efforts and the inherent costs as well as the lack of inline capability. As a low-cost alternative to PVD, wet-chemical processes based on nanoparticulate materials hold great potential as they do not need expensive vacuum technology or any other elaborate equipment. In addition, they can also easily be integrated into an inline process chain.

The FunLas research consortium consisting of Schaeffler KG, Merck KGaA Darmstadt, Biofluidix GmbH, DILAS GmbH and the Fraunhofer ILT has succeeded in producing innovative wear resistant coatings based on such nanoparticulate material. Sponsored by the German Federal Ministry of Education and Research, the jointly run project aims to develop a cost-effective laser-based inline production process.

The overall process can be divided into three steps. At first the sol-gel coating mixture consisting of nanoparticulate zirconia dispersed in a mixture of solvents and additives is applied to hardened steel substrates via dip- or spin-coating. These are energy and resource-saving techniques that are easy to implement. During the coating process evaporation of the main part of solvents takes place. Within the second step the remaining solvents are removed by heating the samples to 150°C. After drying, the deposited layer is about 300 nm (Figure 1).



6 **Figures 1a and 1b, coated samples with different geometries (a). SEM-micrograph of a coated sample (b).**

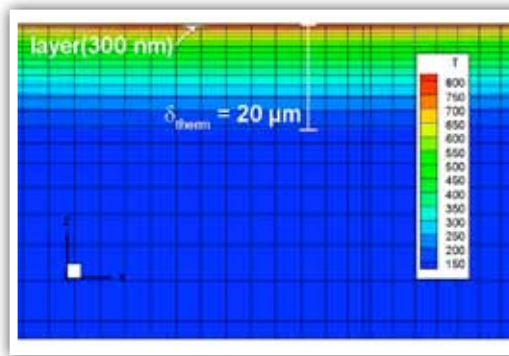
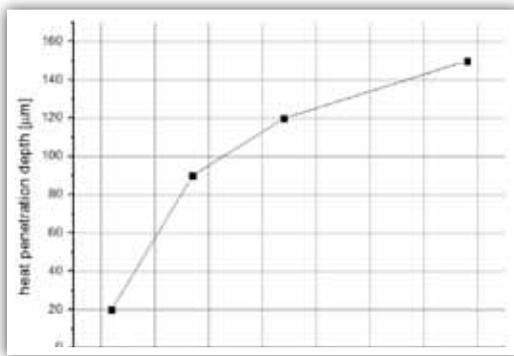
Finally, the major challenge of this innovative coating process is to implement a thermal post treatment at temperatures $>800^{\circ}\text{C}$, required to achieve functionalisation of the applied films. In this case the functionalisation refers to all processes, such as densification of the coating, that lead to improving the layer hardness and mechanical stability significantly. During this thermal post treatment it is necessary to minimize the thermal load of the steel substrates, which often feature low tempering resistance. Due to its exact local and temporal controllability, the laser is very well suited for this purpose.

THE APPROACH

In order to fulfill the complex task of generating temperature-time-profiles that meet these two opposing requirements, the experimental work is supported by the following modeling approach. In a first step the splitting-up ratio of the laser energy absorbed in the coating and in the substrate is calculated based on the determined optical constants of the coating material. Knowing that 17 percent of the overall laser power is absorbed by the coating whereas 29 percent is absorbed by the substrate, the heat conduction equation is solved for specific sets of process parameters. According to this simulation, it is possible to realize a peak temperature of 800°C at the surface of the coated sample while the heat affected zone is reduced to approximately $20\ \mu\text{m}$ when using pulsed diode laser radiation at a wavelength of 980 nm and an intensity of $4 \times 10^{15}\ \text{W}/\text{cm}^2$ (Figure 2b). This is a significant improvement compared to the minimum heat penetration depth of approximately $90\ \mu\text{m}$ realized when continuous diode laser radiation at an intensity of $1.6 \cdot 10^5\ \text{W}/\text{cm}^2$ is used to generate a peak temperature of 800°C .

Figure 2 a and b, FEM-results of the temperature-time-profile at the surface of the coated steel substrate demonstrate the correlation between the depth of the heat affected zone and the interaction-time between the laser-beam and the sample (a). According to this simulation the heat penetration depth is reduced to $20\ \mu\text{m}$ when using pulsed diode laser radiation at a pulse intensity of $4 \times 10^{15}\ \text{W}/\text{cm}^2$ and a pulse duration of $20\ \mu\text{s}$ to generate a peak temperature of 800°C (b).

This significant decrease is due to the reduction of the interaction-time between the laser beam and the coated sample during the laser treatment which is realized with a beam deflection system by guiding the laser beam in meandering loops (Figure 3). The interaction-time, which refers to the period during which energy is transferred to an element of the coated surface is determined by the pulse duration between $2 - 20\ \mu\text{s}$ when using pulsed laser radiation. When continuous diode laser radiation is used, on the other hand, this time is determined by the period required to cross the beam diameter of $340\ \mu\text{m}$ at a given scan velocity. Due to the large



Figures 2 a and b.

size of the mirrors used within the beam deflection system to guide the raw laser beam with a diameter of approximately 30 mm, the scan velocity is limited to 2000 mm/s which results in a minimal interaction time of 170 μ s in the latter case.

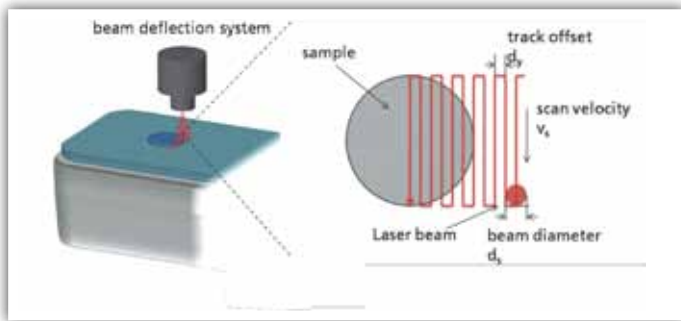


Figure 3, Schematic view of the laser setup and the laser treatment strategy,

In accordance with the laser treatment strategy shown in Figure 3 there are four laser process parameters for the laser hardening process with pulsed diode laser radiation: The pulse energy E_p , the pulse duration t_p , the track offset d_y and the number of pulses per position n which is the number of pulses deposited during the period required to cross the beam diameter at a given scan velocity. Based on the information obtained by FEM simulations these parameters are adapted systematically to achieve an optimal result. Important information about the mechanical properties of the coatings is obtained by means of nanoindentation hardness measurements carried out with a fisherscope HM500.

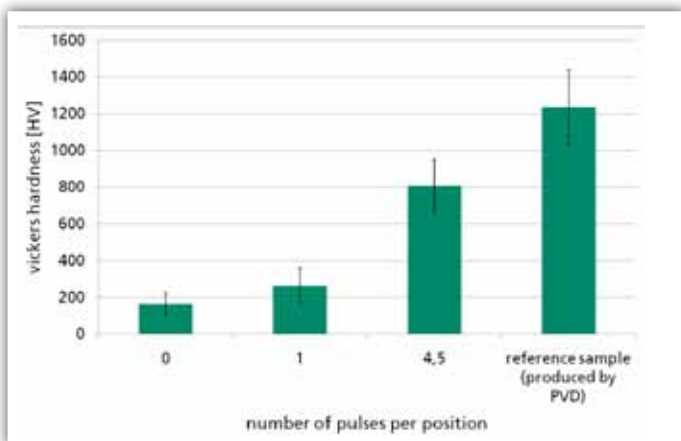


Figure 4

These measurements, carried out with a Vickers indenter, a test load of 0.5 mN and a load time of 20 s, prove that the laser treatment was successful. By increasing the number of pulses per position the coating hardness is increased to approximately 800 HV (Figure 4). This is a significant improvement compared to an untreated coating ($n = 0$) with a hardness of approximately 160 HV. Therefore, the laser treatment led to a substantial reduction of the

discrepancy between the hardness of the sol-gel coating and the reference coating produced by PVD. With regard to the low costs of the laser based process this is an incredible success.

Figure 4, Vickers hardness of dried ($n = 0$) and laser treated coatings ($n = 1$, $n = 455$) compared to the hardness of a coating produced by PVD, measured with a test load of 0.5 mN and a load time of 20 s (n refers to the number of pulses per position).

Further investigations on the wear protection performance of the laser treated coatings are carried out by applying an industrially approved FE8-test-procedure. This test is carried out by Schaeffler KG in order to evaluate the protection performance of the laser treated coatings under realistic operating conditions. During this test carried out at loads of 30, 50 and 80 kN, the laser treated coatings show performances similar to currently used ceramic or diamond-like coatings produced by PVD (Figure 5). With these promising results the FunLas consortium has moved a step closer to the aim of developing an inline-capable, cost-effective process as an alternative for conventional PVD-processes. ■

Dipl.-Phys. Dominik Hawelka is research fellow with the department of surface treatment at the Fraunhofer Institute for Laser Technology in the field of thin film laser processing.

Credit is due to the German Federal Ministry of Education and Research for funding the research depicted in this article within the framework of the funding measure "Material Processing with Brilliant Laser Sources" (MABRILAS). The author would also like to thank the Schaeffler KG, Merck KGaA, Darmstadt and DILAS GmbH for the excellent cooperation within the project consortium FunLas.

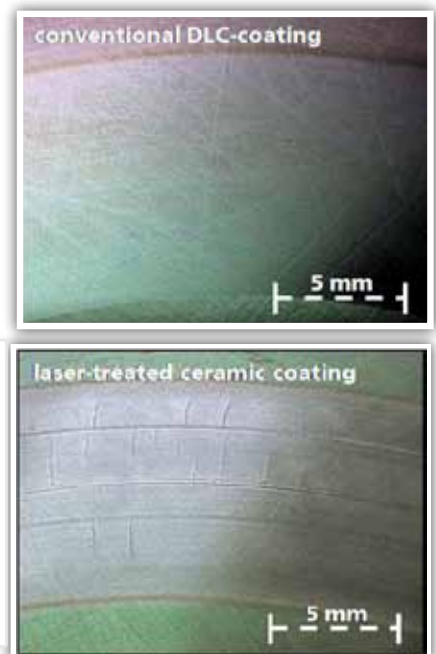


Figure 5 Comparison of Fe8-tested sample surfaces (diamond-like coatings produced by PVD (a) and laser-treated ceramic coating (b)).



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ICALEO 2011 WRAP-UP: FROM ATTOSECONDS TO ZETTAWATTS

By Geoff Giordano

From attoseconds to zettawatts, the 30th annual International Congress on Applications of Lasers & Electro-Optics (ICALEO®) looked once again to the future with another powerful conference packed with cutting-edge research from around the world.

The message of the Laser Institute of America's premiere conference — which returned to LIA's hometown of Orlando — was clear: The power of the laser is being leveraged enthusiastically and with great success in everything from micromachining to carbon nanotube-based cancer therapies to railway repair and concrete cutting. The next-generation applications are upon us, as lasers are being used with increasing precision to modify more and more delicate materials or tackle huge manufacturing and repair tasks. They're not only cutting and etching stents, iPhone components and flexible glass substrates, they're also repairing mining equipment.

ICALEO, always a collegial gathering of experts sharing knowledge via a full slate of short courses, plenary sessions, hundreds of research papers and posters, a business forum, and numerous spirited informal discussions outside the conference rooms, produced a number of highlights:

- LIA President Elect Dr. Reinhart Poprawe of Fraunhofer ILT who will take the reins from Stephen Capp, CEO of Laserage, in January, announced the election of Klaus Löffler of TRUMPF as 2012 president-elect.
- Dr. Berthold Leibinger earned The Arthur L. Schawlow Award in recognition for steering TRUMPF through innovation after innovation for 50 years. In his 25 minute luncheon address, he talked about visiting several U.S. laser companies in the 1970s in search of lasers that could cut metal, and how that quest led TRUMPF to begin building its own, more powerful lasers.
- LIA Executive Director Peter Baker honored IPG's Bill Shiner as the father of the new Lasers for Manufacturing Event, a unique event held for the first time on Sept. 26-27 in Schaumburg, IL.
- A global industry economic report by past President David Belforte indicated the laser world is continuing to bounce back with a vengeance since the 2008 recession.
- A spirited discussion of developments and opportunities in

the so-called BRIC nations — Brazil, Russia, India and China.

- 140 first-time attendees were among the more than 500 total attendees and 56 vendors (including sponsors) from 26 countries.
- 253 presentations in addition to nine plenary sessions that addressed revolutionary technologies like quantum cascade lasers, dressed photons, novel beam splitters, and advances in micro and nano structuring.

REALIZING LIA'S MISSION

The annual ICALEO awards luncheon offered LIA's leaders a chance to reflect on the year's successes and thank members at all levels for their contributions.

"Team LIA is everybody... everybody in this room: all the staff, all the speakers, all the members, all the board people, everybody," Baker enthused during the awards luncheon. "The trick is we work together to make something happen that we need... We've had exciting times, we're coming out of a difficult period, but we're healthy, we're meeting needs and we're carrying out our mission."

Capp echoed that sentiment in passing the reins: "As president of the LIA this past year, it has been a pleasure working with other members of the executive committee and the board, and it has also been a privilege working with Peter and his fine staff."

ICALEO's success was reflected in the reactions of veteran and new attendees alike. "(ICALEO) is a good presentation," Bernhard Steiger of Germany's Hochschule Mittweida said of his first visit to the conference. "The session about thermal lensing was very good. We look for different presentations around the world, and this was very new."

At his third ICALEO, Lino Costa of the Center for Laser Applications at the University of Tennessee noted that "the highlights this year are in the areas of medical devices and photovoltaics. I'm working on microfluidics for biological applications; I'm mostly interested in the femtosecond machining. This (ICALEO) is the one I've liked most so far."

THE MEAT OF THE MATTER

With lasers becoming faster and more powerful, the range of intricate manufacturing applications is wide open, as the more than 200 ICALEO sessions demonstrated. Researchers shared the results of their efforts to innovate laser processes in such areas as:

- Femtosecond laser patterning of Mo thin film on flexible substrate for CIGS solar cells .
- Scribing of flexible glass substrates, which are vital to smart phones and tablets and can pave the way toward "e-paper."
- Stabilizing copper welding using power-modulated green and infrared beams.
- Drilling with diode-pumped fiber and disc lasers with scalable output power as an alternative to flash lamp-pumped Nd:YAG lasers.
- Cutting and welding of carbon and glass fiber reinforced thermoplastic composites.



ICALEO offers many networking opportunities.

- Customized trepanning systems capable of micro machining metal and ceramic samples up to 1 mm thick and creating tapered through-holes with entrance diameters of 65 to 1,000 micrometers.

The plenary sessions offered two particularly noteworthy presentations.

In the opening plenary session, Prof. Hongjie Dai of Stanford University detailed novel prospects for carbon nanoscience, including a cancer-fighting procedure that uses lasers to heat nanotubes inserted into tumors. A handheld laser with a 3 cm beam passes near-infrared light through cells, preserving the healthy ones but killing the cancerous ones by heating the nanotubes.

At ICALEO's end, Prof. Minlin Zhong of Tsinghua University detailed his seven visions for where laser manufacturing is headed, including greater understanding of how lasers and materials interact; how faster and more powerful units will reduce heat-affected zones and how lasers will be able to process "non-processible" materials and allow processing beyond current thickness limits.

"What I was surprised about while sorting out the papers this year (was that) the overall quality was very good," noted Cencorp's Henrikki Pantsar, chairman of the Laser Microprocessing Conference. That sentiment was shared by Precitec's Markus Kogel-Hollacher, who raved, "As a judge of the student paper again this year, I really know the quality of the student papers, which were tremendously great."

Congress General Chair Kunihiko Washio of Tokyo's Paradism Laser Research was spotted at numerous presentations throughout ICALEO. "ICALEO has lived up to its reputation," he asserted. "There is much progress on high peak-power, short-pulse lasers and the high-brightness fiber lasers, and also there are many new tactics using beam shaping or multiplexing."

(Purchase the ICALEO 2011 proceedings — includes all submitted manuscripts for the plenary sessions, conferences and poster presentations — on CD at <http://lia.org/store/icaleo> for \$170, \$145 for LIA members).

THE ECONOMIC OUTLOOK

This year, ICALEO's business forum, moderated again by co-chairs Neil Ball of Directed Light Inc. and Sri Venkat of Coherent, focused on developments and opportunities in the so-called BRIC



ICALEO Congress General Chair Kunihiko Washio and LMF Chair Stefan Kaierle, and right, 2011 Schawlow Award winner Berthold Leibinger.

nations — Brazil, Russia, India and China. Prior to the panel discussion, Belforte, editor-in-chief of Industrial Laser Solutions, provided detailed industry figures from his annual review (figures that will go through one more round of revision before publication in January). Asia continues to dominate the market in terms of laser system installations, he said, noting that Japan and East Asia together account for 47 percent. He also noted the significant growth in the market for fiber lasers used for marking, engraving, and metal processing. Overall, he noted, global laser revenues were up about 13 percent to \$1.828 billion, and laser system revenues were up about 15 percent to \$7.017 billion.

"Marking and engraving traditionally has been the growth engine for the sale of lasers for the past 10 years or more," Belforte reported. "It's always been double-digit growth — to the order of 20 percent per year sometimes. Semiconductor and microprocessing were basically the only two industries that made it through the recession in reasonable shape; semiconductor came out of the recession in terrific shape. That's the reason, along with microprocessing — which is industries like medical, surgical instruments, microelectronics — that those businesses snapped back quickly."

During the panel discussion, Bill Shiner, vice president of industrial markets for IPG Photonics, noted that IPG's complete product line is manufactured in Russia, making that nation a major player on the horizon. "In the U.S. there's an awful lot of issues and export problems we face; it's very difficult to ship a laser from the United States because of our Commerce Department, the amount of paperwork and bureaucracy we have to go through," he went on to say. "I'd like to level the playing field because I think it hurts American companies."

Panelist Jyoti Mazumder of The University of Michigan's CLAIM noted that in 2009, 250 lasers were sold to India's diamond industry because the lasers can clean the gems. He also told of an agent who sold 45 rapid-prototyping systems in India in the past three years. "Another driving force (in India) is that when I graduated in the '70s, the total number of engineers produced in India was 32,000; last year there were half a million," he pointed out.

Despite all the promising signs, panelist Wenwu Zhang of GE wants more growth.

"I don't think laser has performed to its full potential," he said. "We celebrated the 50th anniversary last year but the global laser market is less than \$8 billion. To me that's really, really small. Compare that with other businesses, especially when you consider the talent pool in this business and the market volume of this business. It's not proportionate. There's something wrong with the overall strategy in this business. The production chain is too long, and the overall system cost is not optimized. We should cut that to one-fifth or even one-tenth to make this technology really fly. I hope I can help in that regard."

TRUMPF's aggressive approach to laser development is an example for the industry, says Dr. Leibinger.

"We consider innovation to be our core business," he notes. "We constantly spend twice as much as the average in our field for R&D — 8 percent of our sales. We encourage our engineers to question the existing products, and we accept the risk connected with the introduction of new products."

He points to the development of TRUMPF's CO₂ laser between 1982 to 1985 as an example of how to successfully push *con't next page*

boundaries: "We, the machine tool manufacturing company, were successful in a field that was previously totally dominated by companies founded or controlled by physicists. We could prove that applying our mechanical engineering expertise to a product in a different field could be very beneficial for the product."

His advice for laser companies today? "Set priorities," he asserts, urging firms to "retain (their) drive for new solutions



The Opening Plenary Session captivates the audience.

but refrain from price battles, because R&D expenses should remain high and the companies should be aware of the fact that innovations always include risks."

LOOKING AHEAD

As ICALEO 2011 wound down, many attendees made a point to stop and share a handshake and fond farewell with Baker, who as master of ceremonies presided over numerous meetings focusing on next year's slate of LIA events.

"We had the wrap up meeting this morning, consisting of past chairs and people who've been coming to ICALEO for 10 or 20 years," he said. "The feedback from them was that (this year's ICALEO) was a major success, the quality of papers is high and the networking events were very successful. We're maintaining our high plateau of quality."

For Pantsar, ICALEO "is always the highlight of the year. The whole conference is a highlight; it's one of the conferences that I enjoy the most because there's the best networking here. You know so many people here and you spend as much time outside the conference room speaking to people as you do listening to the

STUDENT PAPER WINNERS

1st N205: "Laser-Power-Resolved Excitations of Ethylene Molecules in Laser-Assisted Synthesis of Diamond Films," Zhiqiang Xie, University of Nebraska-Lincoln

2nd 406: "Automatic In-Process Control of Laser Metal-Wire Deposition Based on Sensor Feedback," Almir Heralić; University West, Trollhattan, Sweden

3rd 605: "Application of Keyhole and Heat-Conduction Modes to Laser Dissimilar Metals Welding of Magnesium Alloy and Steel," Mohamed Wahba; Osaka University, Ibaraki, Osaka, Japan

presentations. In that aspect it's the best conference there is." Or as Laser Materials Processing Conference chair Stefan Kaierle of Fraunhofer ILT summed up, "(ICALEO) is like a big family."

From the welcome celebration to the president's and vendor receptions to the closing plenaries, "ICALEO is like the golden thread that goes through the laser industry that pulls us all together; it really has made our industry," Shiner said. "I always pose the question, 'What if there wasn't an ICALEO?' At the other shows you don't have the opportunity in one venue to get together and meet the people. I can grab Bill O'Neill from Cambridge University, and I'm going to drag him over to Rolls-Royce; you can't do that any other place."

Perhaps Schawlow Award winner Leibinger summed ICALEO up best: "The variety of uses of the laser for different processes shows the unbelievable flexibility of this tool. We are still at the beginning. I envy all the young people here (who are) able to work in such a challenging field, with its great opportunities. It's wonderful to be able to work in this field. I thank the Laser Institute of America for presenting this platform to the people who have the privilege to attend this meeting. It is wonderful to be able to contribute to the development of the technology in this field."

ICALEO 2012 will return to Anaheim, CA, from Sept. 23-27. For updates on sponsorship opportunities and the educational program, or to register to attend, visit www.icaleo.org. ■



Keynote Presenter Hongjie Dai, top, and Plenary Speaker Federico Capasso, bottom.



POSTER AWARD WINNERS

Announced by Past President Nathaniel Quick

1st No. 147: "Spectral Resolution Improvement in Laser-Induced Breakdown Spectroscopy Through the Generation of High-Temperature and Low-Density Plasmas" by X.N. He, Z.Q. Xie, Y.S. Zhou, L.B. Guo, W. Hu, and Y.F. Lu; University of Nebraska-Lincoln.

2nd No. 101: "Topography of Grain Boundaries Varied by Short Pulse Laser Irradiation for Controlling Microstructures of Metals" by Daisuke Tone, Masahiro Tsukamoto, Toshiya Shibayanagi, Shinji Motokoshi, and Nobuyuki Abe; Osaka University.

3rd No. 133: "Production of Aluminum Foams by Laser Cladding" by J. Del Val, A. Riveiro, R. Comesana, F. Lusquinos, M. Boutinguiza, F. Quintero, and J. Pou; University de Vigo.



Attendees enjoying the warm Florida sun poolside at the Welcome Celebration.



Attendees enjoy cocktails and hors d'oeuvres during the Monday evening President's Reception.



From left to right – LIA Past President Nathaniel Quick, LIA President Elect Reinhart Poprawe, LIA Secretary Klaus Löffler, 2011 Schawlow Award recipient Berthold Leibinger, LIA President Stephen Capp, and LIA's Peter Baker.



Peter Baker presenting Stephen Capp with his 2011 President's plaque.



ICALEO Vendor Reception and Tabletop Display allows exhibitors to show off their latest technology to the attendees.



L to R – LIA Past President Nathaniel Quick, first place poster presenter Xiangnan He, and LIA Treasurer and nano-manufacturing Co-chair Yongfeng Lu.



LIA Past President Nathaniel Quick presents 2011 Schawlow award recipient Berthold Leibinger with his plaque and medal



LIA staff – (top l to r) Jeannette Gabay, Alexander Guetzloe, Caleb Lawson, Robin Devor, Katie Matlock, Ashley Person, Barbara Sams, Kristen Arnold, Michelle Williams, Hydee Cash, Jim Naugle. (bottom l to r) Karina Mosquera, Sheila Figueora, Peter Baker, Gail LoIacono, Christina Stoecker, Jennifer Craft, Shaun Oleson, Gus Anibarro

LAM 2012: 21ST CENTURY STRIDES

By Geoff Giordano

The fourth annual Laser Additive Manufacturing Workshop (LAM) in Houston takes a bold leap forward in 2012 as the Laser Institute of America creates a special slate of instruction focused exclusively on rapid manufacturing.

Whereas the two-day session has centered primarily on laser-based rapid prototyping and powder and wire cladding to repair corrosion and wear, LAM 2012 will spend one day on those traditional applications and devote a full day to 21st Century strides in sintering and 3D printing. The Feb. 29-March 1 workshop convenes in Houston once again because of the laser's vital role in the region's oil and gas industries.

EMBRACING THE FUTURE

Renowned U.S. rapid manufacture expert Terry Wohlers, who lent his expertise to The Economist's February 2010 edition featuring a cover story titled "Print Me A Stradivarius," has been invited to address attendees. In a story titled "The Printed World," he noted that more than 20 percent of the output of 3D printers is final products; he expects this to rise to 50 percent by 2020.

"Additive manufacturing systems that produce parts in metal have progressed tremendously in 10 short years," notes Wohlers, who began his consulting firm Wohlers Associates (wohlersassociates.com) in Fort Collins, CO, 25 years ago.



"Some of the parts approach the mechanical properties of wrought materials and exceed those of cast parts. This is not in all cases, but it is not uncommon."

Additive manufacturing permits designers to produce highly complex shapes and features that would be difficult or impossible to produce any other way, he notes. "This is allowing companies in aerospace, medical and other industries to explore more advanced designs that dramatically reduce material, cost, weight and carbon emissions."

A prime example is the "Airbike" built in March by the European Aerospace and Defense Group (EADS) in Bristol, U.K. The bike is so named because of Airbus' reliance on the additive layer manufacturing process, EADS notes. "Made of nylon but strong enough to replace steel or aluminum, it requires no conventional maintenance or assembly," EADS says on its website. "(The bike) is 'grown' from powder, allowing complete sections to be built as one piece; the wheels, bearings and axle being incorporated within the 'growing' process and built at the same time. The Airbike can be built to rider specification so requires no adjustment."

Dr. Bill O'Neill of Cambridge University, who noted

the Airbike during his presentation at LIA's first Lasers for Manufacturing Event (www.laserevent.org) in September, said additive processes are supplanting the Victorian manufacturing model. Dr. Ingomar Kelbassa of Germany's Fraunhofer ILT and RWTH Aachen University concurs.

"We're not talking about rapid prototyping any longer; we are talking about rapid manufacturing out of metals, polymers, out of any kind of ceramics," Kelbassa says. "This is a paradigm shift in manufacture. From the Stone Age, we have been producing parts subtractively; we are removing material. You are throwing away 90 percent. Subtractive manufacturing isn't as effective as additive manufacturing in terms of saving material, time or money. Now we are talking about ... building up the part from scratch."

In other words, what was once the realm of science fiction has become reality.

"Remember 'Star Trek'?" Kelbassa asks. "Replicator: Tea. Earl Gray. Hot.' The cup is there with the tea in it. It's just there, additively manufactured."

LASER ADDITIVE OFFERINGS

Besides the Airbike, highly localized personalized laser additive manufacture has been explored with great success within the past 10 years, he notes. For example, larger parts such as bumpers can be manufactured additively stereolithography. And since 2002, Germany's BEGO has been using what Kelbassa calls Selective Laser Melting (SLM) to produce patient-specific dental bridges, implants, and crowns.

"This was the first industrial implementation," Kelbassa says. "From the material point of view, from the maturity point of view, from the technology readiness point of view, (SLM) is ready for industrial implementation."

Wohlers notes that CE certification for the process in Europe four years ago has allowed many European manufacturers to produce orthopedic implants using additive manufacturing. For instance, he says an estimated 15,000 acetabular hip cups manufactured in Ti-6Al-4V titanium alloy have been implanted into patients.

"Earlier this year, the FDA approved the use of electron-beam melting for the production of a similar orthopedic product, which marks another milestone," Wohlers says.

The possibilities are nearly endless. "It's a pretty short process chain: All you need is the CAD data, all you need is the powder, and if you have the CAD data and the powder additive, you can produce the part," Kelbassa says. He imagines a 24/7 global manufacturing process. For example, a Europe-based company with additional facilities in the Far East and South America can work in three eight-hour shifts: Upon completion of the first shift in Asia, data is transferred to Europe for a second shift, and after that shift the data is sent west again for the third shift.

At the moment, he says, part size is a restriction. And Wohlers notes the cost can be prohibitive, "but a number of service

providers own machines and build parts for others.”

At LAM, both men will impress upon attendees that a new generation of engineers is required to take full advantage of what additive manufacturing has to offer.

DISCOVER IT AT LAM

LAM will once again feature cutting-edge presentations and exhibits by platinum sponsor Alabama Laser, gold sponsors IPG Photonics Corporation, Fraunhofer USA and Joining Technologies, Inc., silver sponsors Coherent, Inc. and Laserline Inc., bronze sponsor TRUMPF, Inc. and others.

Wayne Penn, president of Alabama Laser, and Keith Parker, senior business development manager at Coherent, say they are “excited” to attend LAM 2012. Parker is considering presenting a paper on his firm’s new high-deposition procedure using 8 kilowatt lasers and a 24 mm-wide beam to lay down 20 mm clads in a single pass. The method could be valuable to the oil and gas industry in cladding the sort of massive shafts used in offshore rigs, he notes.

Looking ahead, Parker — a former F-14 Tomcat pilot — readily sees the possibilities additive manufacturing could offer the military. Imagine an aircraft carrier crew that needs to replace parts during a deployment but can’t take up valuable space on the ship with those spares. In fact, many parts encountered in military service are 40 or more years old; often the blueprints or manufacturers no longer exist, Parker says.

“So where do you get parts when you need them?” he asks. “In a lot of cases they really need to be able to build up those parts. If you had one of those (laser additive) machines on an aircraft carrier and something broke, you could get a CAD model and create it from scratch.” Aerospace, too, he notes, is a likely beneficiary of such technology, because of the complex 3D structures required for turbine engines.

To find out more about what to expect, read coverage of last year’s LAM workshop in the March/April 2011 issue of LIA’s newsletter, *LIA TODAY*, available online at http://lia.org/subscriptions/lia_today.

For more information about LAM 2012 and to register, visit www.lia.org/lam. ■

Geoff Giordano is a freelance writer.



LAM will feature cutting-edge presentations and exhibits.

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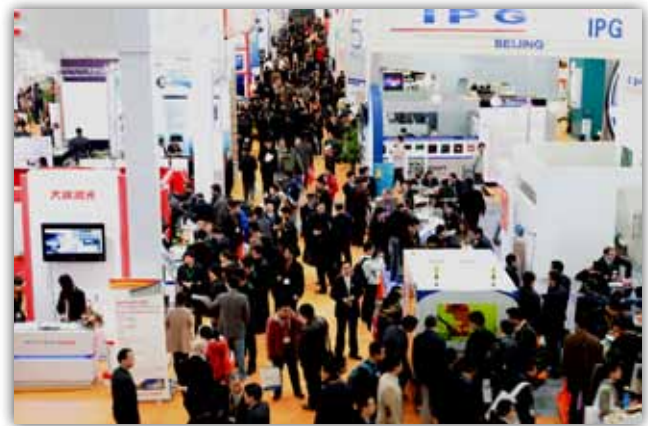
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LASER WORLD OF PHOTONICS CHINA 2012

LASER World of PHOTONICS CHINA 2012, the leading laser and photonics tradeshow in Asia, is going to open on March 20-22, 2012 at the Shanghai New International Expo Centre. For steady and new customers alike, the 7th LASER World of PHOTONICS CHINA is going to offer a more diversified exhibition range covering laser systems for production engineering, laser and optronics, fiber communication, optics, machine vision, IR and test and measurement, displaying a most comprehensive and international platform for laser and photonics applications as well as industry trends. TRUMPF, Rofin, IPG, Unity Prima, Miyachi, Han's Laser, SIASUN, SPI, Delphi, II-VI, Coherent, Newport, Qioptiq, Raylase, Leoni, Physik Instrument, Huagong and Chutian, amongst others, have already decided to participate in LASER World of PHOTONICS CHINA 2012.

Since its first edition in 2006, LASER World of PHOTONICS CHINA, the affiliated trade fair to the LASER World of PHOTONICS network for Asia, has become a leading trade fair showcasing the full range of laser and photonics innovative products, new solutions and technologies reflecting international trends in the world. During its three-day show in 2011, it has attracted 361 exhibitors from 18 countries and districts, an increase of 31 percent compared to 2010, as well as 28,845 professional




visitors from 48 countries and districts. These record numbers confirm its leading position in the Asian laser and photonics market.

PHOTONICS CONGRESS CHINA will be held in conjunction with LASER World of PHOTONICS CHINA 2012 for the first time. It includes the 7th International Conference on Laser Processes and Components (LPC 2012) – in cooperation with LIA, Optics Frontier - The Seventh Laser Technology Forum and Outstanding Achievements Release Conference of Chinese Optics 2011, the Optoelectronics Industry Development Association Workshop on Optical Communications and the OSA Energy Photonics Program. China (Shanghai) Machine Vision Technology & Application Conference will also be held as an accompanying program at the trade fair. The combination of scientific, research and industrial applications both in the conferences and the trade fair support the exchange between the scientific and industrial sectors and underscore its unique practical value. For more information, visit www.photonicschina.net. ■

SINO-GERMAN COLLABORATION FOR MACHINE VISION PAVILION

The China Society of Image and Graphics (CSIG) and Messe Muenchen International (MMI) will again jointly organize a machine vision pavilion within LASER World of PHOTONICS CHINA. The cooperation between CSIG and MMI started in 2011 with 50 exhibitors from eight countries and regions. The positive feedback from both exhibitors and visitors in 2011 influenced both parties to increase the collaboration for 2012. It will last for two days and feature special reports, technical talks and other events centered on the theme "Latest developments of machine vision technology and their industrial applications." Over 20 well-known experts from China and abroad will attend the conference to address around 500 attendees from the district.



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- Optics Frontier - The Seventh Laser Technology Forum and Outstanding Achievements Release Conference of Chinese Optics 2011
- Optoelectronics Industry Development Association Workshop on Optical Communications
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CORPORATE MEMBER PROFILE

INNOVATIVE LASER TECHNOLOGIES, INC.

LIA Corporate Member Innovative Laser Technologies (ILT) is a world leader in laser integration, designing and building standard and fully customized laser workstations to address a range of industrial and manufacturing needs such as welding, cutting, marking, drilling, scribing, cladding or ablating. The company's goal is to remain the premier laser integrator by working together with customers to provide quality business solutions.

The company's in-depth knowledge of laser physics, optics, mechanical and electrical engineering and software control systems has enhanced their ability to produce laser systems that perform at higher levels than industry standards. ILT increases



customer productivity with fully integrated features. Some of these features include vision-assisted automation, parts handling, motion control, helium leak testing and automated closed-loop process control within a workstation.

COMPANY HISTORY

Innovative Laser Technologies was established in 1998 in Minneapolis, MN and is dedicated to systems integration of quality custom laser machines. ILT was founded by Greg Hedding, Daniel Sanborn, Steve Weiss and Randy Moroney. Fred Tsuchiya, P.E., is ILT's president and CEO and the company currently has 37 direct employees.

ILT's automated process control features are designed to maintain advanced laser system operations within very exact requirements. ILT systems were originally designed for medical device manufacturing, however, technology has proven to have broad benefits, migrating to support a variety of industrial markets. The first products manufactured by ILT were custom laser welding and cutting workstations.

ILT has well over 200 years combined experience in laser systems integration. Each member of ILT brings significant experience in laser system design and manufacturing. ILT's expertise includes mechanical, electrical and software design and assembly. The company uses the latest in technology and design tools to provide state-of-the-art solutions. As a result, ILT offers a fast turn-around and competitive price on the design of custom laser machines.

"Our largest market is by far the medical device industry (both due to our location here in Minneapolis, and our expertise in the production of repeatable precision, that we bring with our systems)," stated Steve Weiss, principal/business development group at ILT.

COMPANY CAPABILITIES

The industries ILT serves include medical, automotive, aerospace, advanced manufacturing, DOD, DOE and electronics. ILT's capabilities offer the customer a completely developed laser system, and/or a fully integrated turnkey process. Some of ILT's customers have experienced yields up to 99.6%. Since 1998, Innovative Laser Technologies has designed and shipped over 250 systems domestically and internationally, and is recognized worldwide as a leader in sophisticated laser system integration and design.

Common applications include neuro leads, pacemakers, small tube cutting, ablation, seam welding, backfill welding, soldering, metal deposition, wire filament cutting and wire stripping. Also in ILT's arsenal is the Microsoft-tested proprietary control software HMI-2200 that allows for complete control of various integrated software and hardware components.

"Our business development is always working on either new technology or new ways to improve our current systems and current designs. We have recently integrated an ultrafast (femtosecond) laser, which is relatively new to the material processing market," explained Weiss.

"Several years ago we introduced the ILT1000 (ILT1500 shortly after). The purpose was to answer the increasing need for a shorter lead-time, less expensive machines, especially when a customer has a smaller product, and only needs 6" or 8" of motion. We also offer the ILT3000 and ILT5000 as standard system platforms for progressively larger travel requirements. In the past, many of our systems were designed completely from the ground up, these new standard platforms reduce engineering time, and allow us to adapt and customize the workstation to fit the application. And recently, ILT introduced a small tube cutting system."

ILT also offers customers extensive training so customers understand how to effectively use their equipment.

An LIA Corporate Member since 2004, Weiss sees membership in the LIA as providing ILT with a means of being a part of a laser processing community of organizations who look to advance the use of lasers for material processing applications. For more information, visit www.iltinc.com. ■



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ASC Z136 UPDATE

Mark your calendars for Friday, February 17, 2012 as the ASC Z136 Annual Meeting. The meeting will be held at the Holiday Inn Resort Orlando – The Castle in Orlando, FL. The hotel is situated between International Drive and Universal Drive with two restaurants adjacent – Vito's Chop House and Café Tu Tu Tango, and several others within walking distance. Sleeping rooms have been secured at the government per diem rate for all attendees. To make reservations, call the hotel directly at 800-952-2785, ask for reservations and give the group code "LIA." The cut-off date for reservations is January 20, 2012.

To date, the following ancillary meetings have been scheduled:

Day/Date	Time	Committee	Contact Person
Wed., Feb 15	8a-5p	SSC-9 Manufacturing	Tom Lieb
	8a-5p	AVAILABLE	
Thurs., Feb 16	8a – 5p	AVAILABLE	Barbara Sams Barbara Sams
	8a-5p	AVAILABLE	
	9a-12p	BLS Commissioners (closed meeting)	
	2p-5p	ADCOM (closed meeting)	
Sat., Feb 18	8a-5p	SSC-6 Outdoors	Robert Aldrich

ANCILLARY MEETINGS

Additional meeting space has been contracted for ancillary meetings. At the present time, there is available space on Wednesday and Thursday. Committee chairs – if you would like to utilize any of this space, contact Barbara as soon as possible. The space will be released on a first-come, first-serve basis.

COMMITTEE DINNER

As in previous years, plan to join us on Thursday evening for dinner. E-mail Barbara Sams at bsams@lia.org or call 407-380-1553 to RSVP for meal planning purposes.

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, let Barbara know. If you are interested in attending an ancillary committee meeting, please contact the LIA office for further information ■



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

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 ten CM points and wishes to maintain active certification status.

For a thorough review of certification maintenance including CM categories in detail, please go to <http://www.lasersafety.org/certification-maintenance>. To download a CM manual or worksheet, please go to www.lasersafety.org/forms/certification. If you have any questions regarding activities for certification maintenance, please contact the BLS at 407.380.1553 or email Barbara Sams at bsams@laserinstitute.org. ■



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Visit www.lia.org/laserinsights to begin your search.*

LASER MICROPROCESSING POWERED BY UV PHOTONS

by Ralph Delmdahl and Rainer Patzel

UV wavelengths are particularly advantageous in laser microprocessing because the high energy photons can remove material by direct bond breaking in most materials, including plastic and glasses. The photoablation process generates virtually no heat and hence only marginal peripheral thermal damage as compared to longer wavelength lasers.

OVERVIEW OF LASER ADDITIVE MANUFACTURING IN CHINA

by Minlin Zhong

The booming Chinese economy has created a favorable environment for the research, development, application and market in the area of high-power lasers and especially laser additive manufacturing

(LAM) in China. In a so-called "world manufacturing center," laser additive manufacturing, as a modern advanced manufacturing technology, plays an important role in the manufacturing and re-manufacturing areas. There are great needs in China to fabricate high-value components or difficult-to-fabricate components by conventional methods.

LASER ADDITIVE MANUFACTURING FOR AEROSPACE PROTOTYPES

by Agnes Klucha

Aerospace prototyping is a way to realize the vision of freeform fabricated metal additive manufactured parts on aerospace production engines, gain acceptance for additive manufacturing and change perceptions of what is possible. The freeform fabrication of laser additive manufactured metal parts is of prime interest in aerospace prototyping since a functional prototype can be delivered quickly to demonstrate and validate concept designs. ■

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JLA UPDATE

The JLA is published four times a year by the LIA in February, May, August and November. It is available electronically to LIA members as a member benefit. To view the journal online, please make sure your membership is current.



The Laser Institute of America has made its official publication the *Journal of Laser Applications*® (JLA), an online-only journal, complete with new features for a broader audience. JLA is hosted on AIP Publishing's robust Scitation online platform, providing the journal with greater functionality and the ability to leverage a wide range of valuable discoverability features. JLA now features nine topic sections, a faster peer-review process and a more functional website (<http://jla.aip.org>) that makes content easier to access and more interactive. Readers will find full-text HTML rendering featuring inline reference links and the ability to enlarge tables and figures by clicking on them. Among the new features are enhanced search functions with more options and better controls to explore returned content in more useful ways.

For non-members of LIA, call the American Institute of Physics at 1-800-344-6902 for subscription information. To receive your JLA table of content e-mail alerts, sign up at http://lia.aip.org/alerting_services/toc_alerts

Research Highlights

Direct Manufacturing of Net-Shape Functional Components/Test-Pieces For Aerospace, Automotive and Other Applications

Laser consolidation (LC) is a novel computer-aided manufacturing process being developed by the Industrial Materials Institute of National Research Council of Canada (NRC-IMI). This rapid manufacturing process produces net-shape functional metallic parts layer-by-layer directly from a computer-aided design (CAD) model by using a laser beam to melt the injected powder and resolidifying it on the substrate or previous layer. This novel manufacturing process builds net-shape functional parts or features on an existing part by adding instead of removing materials. Laser consolidation of various high performance materials (such as Ni-alloys, tool steels, etc.) will be demonstrated to manufacture functional components or test pieces (such as shell-based mold inserts, impeller, intersected multihexagon tube, goblet shape, etc.) for potential aerospace, automotive and other applications. Dimensional accuracy of various laser-consolidated test pieces will be measured and compared with CAD models.

View complete articles at jla.aip.org.

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MEMBER INNOVATIONS

NEWPORT INTRODUCES 1830-R OPTICAL POWER METER

Newport Corporation, Irvine, CA, has introduced the 1830-R Optical Power Meter. A newly designed optical meter, the 1830-R provides a 'drop-in' replacement for Newport's legacy 1830-C Power Meter that has been widely used in fiber optic component production and testing. A wide dynamic range is provided with power sensitivities down to 10 pW and full scale readings up to 2 W (detector dependent). The unit's built-in, audible beeping tone changes its frequency as a function of incident optical power, making it very useful when optimizing the optical beam alignment. For more information, visit www.newport.com/1830-PR08.

COHERENT ADDS TO FAMILY

The new Vitara from Coherent Inc., Santa Clara, CA, is the first widely tunable, ultrafast laser to deliver pulsewidths shorter than 12 fs, while also offering true hands-free and fully automated operation. This includes automated wavelength tuning over a wide (755 nm to 860 nm) range and push-button bandwidth adjustment from 30 nm to 125 nm. The output power of Vitara peaks at over 450 mW due to the fully integrated and compact Verdi G 5W pump laser based on Coherent's unique optically pumped semiconductor. The Vitara is designed to bring state-of-

the-art performance to the widest possible spectrum of users.

Coherent has also expanded its Genesis family of multi-watt visible lasers for life sciences with two new models offering 2 Watts and 4 Watts of output power at 514 nm. Based on Coherent's unique optically pumped semiconductor laser (OPSL) technology, the Genesis CX 514 is the first solid-state laser to provide multiple watts of CW output at this legacy wavelength. Both the 2W and 4W models feature low (<0.1%) output noise, TEM00 beam quality and full CDRH compliance making them ideal for both OEM and demanding stand-alone research applications. For more information on either of these products, visit www.Coherent.com.

OPHIR INTRODUCES PERPETUAL LIFETIME WARRANTY

Ophir Photonics Group, Logan, UT, has announced a Perpetual Lifetime Warranty covering the company's laser measurement sensors and power/energy meters. The new program, available for North and South America, extends the standard one-year manufacturer's warranty an additional year if the product's calibration is kept current. To qualify for the warranty, the equipment must be returned for recalibration within 30 days of the current calibration's expiration date. The warranty includes all parts and labor for the next year. If the meter or sensor is not returned during the 30-day recalibration period, there is still an option to re-qualify for a perpetual warranty with a recalibration and repair that restores the equipment to a certified level. The Perpetual Lifetime Warranty covers all of Ophir's laser measurement sensors and power/energy meters. Visit www.ophiropt.com/photonics for more information.

MEMBERS IN MOTION

LIA PRESIDENT-ELECT POPRAWE HONORED

North Rhine-Westphalia's 2011 Innovation Award in the "Innovation" category has been awarded to Dr. Reinhart Poprawe, M.A., director of the Fraunhofer Institute for Laser Technology ILT, Aachen, Germany, and his team of laser experts comprising Andres Gasser, Ingomar Kelbassa, Wilhelm Meiners and Konrad Wissenbach. The award, which carries a cash prize of 100,000 euros, was presented to the winners by Svenja Schulze, North Rhine-Westphalia's Minister for Innovation, Science and Research, at a ceremony in November. The Fraunhofer ILT research team has been driving forward progress in the field of additive manufacturing for over 20 years, developing techniques that help to save energy and resources in the production environment. The institute's specialists have systematically evolved laser processes for use with different materials and in different applications, paving the way to their implementation on an industrial scale. Poprawe and his team are the world's leading experts in the technique of selective laser melting (SLM), a field in which Fraunhofer ILT has led the way since its inception. This has opened the door to entirely new business models in the manufacturing industry, including mass customization, open innovation and co-creation, which allow end-users to participate in the design process or even take over a large part of the design work themselves. Please visit <https://idw-online.de/pages/de/news450833> to view the entire commendation.

APPLIED ENERGETICS' NEW PRODUCT LINE

Applied Energetics, Inc., Tucson, AZ, a developer and manufacturer of applied energy systems for military and commercial applications, has launched its latest ultrashort pulse (USP) laser product line that is being marketed as "The Wildcat" product line of commercial lasers. Applied Energetics will initially target the micromachining industry and applications.

"Our goal with this product line was to produce a rugged, compact, reliable, and easy-to-use USP laser system," said Joseph Hayden, president of AE. For more information, visit www.appliedenergetics.com.

STRUCTURING OF GLASS SURFACES

A new laser process for structuring large surface areas of float glass has been developed by the Laser Zentrum Hannover e.V. (LZH) and Cerion GmbH and is characterized by high quality, short processing time and flexibility in design. At the LZH, scientists adapted a technology used for metal processing to fit the needs of glass production. Any shape or form can be transferred to the glass surface using scanner technology for guiding laser beam. This makes it possible to structure glass surfaces at an extremely high speed, since only a small change in the scanner mirror angle is necessary to cover a large distance. Visit www.lzh.de for more information. ■

LONG AWAITED REVISED Z136.3 IS HERE!

Revision of the Z136.3 was driven by the movement of the widespread use of medical lasers – from hospital operating rooms to the office and/or clinic environment. The use of ophthalmic refractive surgery lasers, dermatological lasers and other medical lasers have continued to move from the closely regulated hospital environment to broad applications in conventional medical, surgical and allied professions. In an effort to acknowledge the diversity of laser therapy applications and practice setting locations, the standard's title has been changed to *Safe Use of Lasers in Health Care*.

This rapid change in the pattern of use of health care laser systems has made it essential to have a current document to guide us in the approach to the safe use of these systems. Key points in the 2011 revision include: clarification of audit requirements and procedures, new management model for diverse use facilities, new wavelengths, lasers for home use and more.

Soon to be released, orders are now being accepted by LIA, the secretariat of the Z136 series of laser safety standards. Take advantage of the rollback prices and reserve your copy today. Pre-publications prices are \$130 for LIA members and \$150 for non-members. To order your copy, visit www.lia.org/ANSI or call LIA at 1.800.34.LASER.

LAM 2012 SPONSORSHIP & VENDOR OPPORTUNITIES

Join us for LIA's 4th annual Laser Additive Manufacturing (LAM) Workshop 2012 to learn from industry specialists from around the world with the goal of applying the state-of-the-art processes of cladding, sintering and rapid manufacturing to today's manufacturing challenges. LAM will be held February 29-March 1, 2012 at the Sheraton North Houston Hotel at George Bush Intercontinental in Houston, TX.



Sponsor opportunities are available as this workshop will provide a unique opportunity to market your company's products and services to new customers and new prospects. Meet face-to-face with manufacturing engineers and managers, process/R&D engineers, applications and construction engineers, system integrators and more. For more information about sponsorships, contact Jim Naugle at 407-380-1553, jnaugle@lia.org or visit www.lia.org/conferences/lam.

SPEAKERS WANTED FOR LASYS CONFERENCE

In partnership with Messe Stuttgart and the LIA, *Laser Systems Europe* (LSE) magazine is hosting a conference session at LASYS – the international trade fair for laser material processing, which takes place June 12-14, 2012 in Stuttgart. As part of this event, LSE will host a seminar program in an

auditorium within the exhibition hall, featuring a program of case studies highlighting the use of laser systems aimed at visitors to the exhibition, who will be able to enter this auditorium free-of-charge. Speakers are being sought for this. The 'target market' is non-experts in laser technology, and therefore the papers should focus on applications and benefits, rather than background technology. To be a speaker, contact Publisher Warren Clark at warren.clark@europascience.com.

SAVE THE DATE – LASER WELDING AND JOINING WORKSHOP

LIA's Laser Welding and Joining Workshop 2012 will bring together industry specialists from around the world with the goal of applying laser materials joining technologies to today's manufacturing challenges and opportunities. Join us in Schaumburg, IL, Oct. 23-24 to learn from industry specialists from around the world with the goal of applying laser materials joining technologies to today's manufacturing challenges and opportunities. This workshop will offer quality technical sessions and networking opportunities to discuss equipment and applications with exhibitors and your peers.



Those who should attend are manufacturing engineers and managers, product designers, process/R&D engineers, applications engineers, business developers and entrepreneurs, plant supervisors and anyone interested in laser materials joining technology (welding, joining or brazing).

There are sponsorship opportunities available for companies looking for that special niche market that this workshop represents. Visit www.lia.org/conferences/laser_welding/sponsors_and_vendors for more information, or call 1.800.34.LASER. You can choose the level that best matches your company's promotional goals and boosts your brand visibility.

SAVE THE DATE FOR LME 2012



Mark your calendars now for LME 2012, which will be held in Schaumburg, IL, Oct. 23-24. LME 2012 will be the place to see the latest in laser technology, network with the industry's elite and find solutions to current and future manufacturing needs. The mission of LIA's Lasers for Manufacturing Event (LME) is to provide a one-stop event for companies interested in integrating laser technology into their production. Attendees will learn about laser choices, beam delivery, automation equipment, safety considerations, applications development and meet exhibitors that supply these products and services.

Plan now so as to not miss this exclusive Event for lasers in North America. Visit www.laserevent.org for more information. ■



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