LIA TODAY

The Official Newsletter of the Laser Institute of America
The professional society dedicated to fostering lasers, laser applications, and laser safety worldwide.

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In The News . . .

FBI Probes More Laser-Cockpit Hits

According to a Jan. 3, 2005 article on *CBSNews.com*, federal officials are investigating an incident in which a laser beam was aimed at a jet after it left an airport. The pilots reported seeing a green laser beam shortly after takeoff, spokespersonnel said. The FBI is investigating the incident along with the Transportation Security Administration and the Federal Aviation Administration. Federal agents are looking into similar incidents involving lasers and aircraft around the country. Laser beams can temporarily blind or disorient pilots and possibly cause a plane to crash. Federal law enforcement officials have said there is no evidence of a terrorist plot involving the laser beams.

A Parsippany, N.J. man who was playing with a laser was in the "wrong place at the wrong time," his lawyer said. David Banach and his young daughter were using the laser on the deck of their

(Cont. on pg. 10, see **In The News…**)

Meet LIA's New President & Board

Installed as the 2005 president of LIA during ICALEO® in October, William Clark is president, CEO, and Chairman of the board of Clark-MXR, Inc., a commercial manufacturer of ultrafast pulse lasers and workstations for the scientific and industrial market located in Dexter, Michigan. Stating the obvious, Clark-MXR is a company he co-founded in 1992. He received his Ph.D. in Physics from Worcester Polytechnic Institute in 1972.

He worked for several companies in the laser industry. In 1985, he came up with what he thought was the brilliant idea to bring the Lego® Kit concept to scientists. He worked for Newport designing the first commercial ultrafast kit laser – a colliding pulse mode-locked dye laser (CPM) – using Newport components. Unfortunately, he was the only one who thought this was a good idea and eventually was kicked out of the company for wasting its time and money.

Part of his severance package was the design of the CPM, and that formed the basis of the company he started in 1987. Since then the company has had a string of firsts, culminating in the first commercial ultrafast laser micromachining workstation introduced several years ago. Clark has high hopes that this technology will have impact and remains encouraged by the many papers touting the advantages of micromachining with ultrafast (femtosecond) lasers.

Having been involved with lasers since the dark ages when most light came from candles, Clark reports that he has "not been a member of LIA long enough to do damage, but long enough to be dangerous." Over the years he has served as a board member, executive committee member, treasurer, and last year as president-elect.

While LIA president, Clark hopes to "keep out of trouble, which usually means keeping my

(Cont. on pg. 6, see **Board**)

No One Uses A Laser Because They Want To

by John Ambroseo

The laser was first developed as a curiosity by research scientists over 40 years ago, and has spent much of its lifetime as a solution in search of a problem. Its early uses were primarily in scientific research and defense applications, where product cost, reliability and ease-of-use were of secondary concern to output characteristics. Over the years, development of laser technology has often been driven by scientists whose primary interest was the laser itself, rather than meeting the needs of any specific application.

Telecom Plays A Part

The telecom boom appeared to spell the end of this embryonic period for the industry. It represented a high-volume application with very specific and stringent performance and cost requirements. The potential size and profit of this market attracted new capital, new companies and experienced personnel from well-established technologies into our industry. Laser manufacturers seemed ready to both develop the products needed by this market and embrace the business models and volume-production methodologies successfully employed in other established industries, such as microelectronics. The goals of these models and methods are to improve yields, product consis-

(Cont. on pg. 8 see **Lasers**)

13501 Ingenuity Drive, Suite 128; Orlando, FL 32826 Phone: 407.380.1553 Fax: 407.380.5588
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LIA TODAY

The Official Newsletter of the Laser Institute of America

LIA TODAY is published bimonthly and strives to educate and inform laser professionals on 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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Laser Institute of America (LIA) is the professional society dedicated to fostering lasers, laser applications and laser safety worldwide. LIA is the secretariat and publisher of the ANSI Z136 series of laser safety standards, and is a leading provider of laser safety education.

LIA offers educational programs, conferences and symposia on the applications of lasers and electro-optics. LIA's annual International Congress on Applications of Lasers & Electro-Optics (ICALEO®) features the world's foremost meeting on laser materials processing. The biennial International Laser Safety Conference (ILSC®) covers all aspects of laser safety practice and hazard control.

If you would like more information about the LIA, call 407.380.1553, 1.800.34.LASER or visit our home on the Web: **www.laserinstitute.org**.

LIA's Calendar of Events

For more information contact LIA at 1.800.34.LASER or visit www.laserinstitute.org

Laser Safety Officer Training
Feb. 7-11, 2005 • Orlando, FL
June 6-10, 2005 • Washington, DC
Sept. 26-30, 2005 • Portland, OR

Laser Safety in the Lab
March 14-15, 2005 • Orlando, FL

Advanced Concepts in Laser Safety
June 7-9, 2005 • Rockville, MD

Fundamentals of Laser Safety
Nov. 15-16, 2005 • San Francisco, CA

Medical Laser Safety Officer Training
Jan. 28-29, 2005 • Miami, FL
Feb. 4-5, 2005 • Baltimore, MD
Feb. 11-12, 2005 • San Diego, CA
May 13-14, 2005 • Atlanta, GA

ILSC® 2005
Mar. 7-10, 2005 • Marina del Rey, CA

ICALEO® 2005
Oct. 31-Nov. 3 • Miami, FL

PICALO 2006
TBD • Melbourne, Australia

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

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President's Message

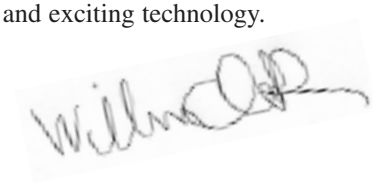
I am pleased and honored to be the president of our society this year. I follow in the steps of some very able past presidents – Ed Metzbower, Bill Lawson, and Eckhard Beyer, to name a few. Our society has benefited greatly from their experience, guidance and assistance to its members and to the staff of LIA. Continuity is provided by the society's executive director, Peter Baker, who with the able assistance of one of the most competent staffs that any society could wish for, continues to work diligently to keep us on course and within budget.

LIA President Bill Clark

I come to this position with a background in ultrashort pulse lasers. As many of you know, the use of these lasers to structure materials has become a hot topic in recent years. But, like every new technology it has its strengths and weaknesses. It is not all things to all people, especially when removing a lot of material in a short period of time. Micromachining materials using ultrashort pulses of light are now proving to be viable in applications such as LASIK eye surgery, but the plethora of potential applications that we all hope will come in the not-to-distant future awaits the development and commercial availability of more capable sources.

When it comes to structuring material with light, I expect that ultrafast lasers will find its greatest value proposition when fabricating features ranging from several microns to tens of nanometers. The capability to direct-write structures on this scale offers a potential paradigm shift that could be as powerful and enabling as photolithography has been to the manufacture of semiconductor devices. That possibility is enchanting. "Nanomorphing" materials could be an area of significant growth for our society in the future.

LIA is perceived as being the leading society in the field of laser fabrication – and so is in an excellent position to be a key disseminator of information about this new and exciting technology.



Executive Director's Message

ANSI, LIA and You

A bedrock of LIA's safety activity is our responsibility as secretariat and publisher of the American National Standards Institute (ANSI) Z136 series of five different laser safety standards (for document names visit our website www.laserinstitute.org). These documents provide a thorough set of guidelines for implementing a safe laser program. The ANSI Z136 standards are recognized by OSHA, and are the authoritative laser safety documents in the United States.

LIA Executive Director Peter Baker

In 1968, ANSI approved the initiation of the Safe Use of Lasers Standards Project under the sponsorship of the Telephone Group. Prior to 1985, Z136 standards were developed by ANSI Committee Z136 and submitted for approval and issuance as ANSI Z136 standards. Since 1985, Z136 standards are developed by the ANSI Accredited Standards Committee (ASC) Z136. The present scope of ASC Z136 covers protection against hazards associated with the use of lasers and optically radiating diodes.

Our role as secretariat requires a substantial investment of senior staff time. Barbara Sams is our standards administrator and she oversees the activity of all committee and subcommittee administration as well as our interaction with ANSI headquarters. In recent years she has worked with ASC Z136 committee officers and members to carry out a complete revision of committee procedures together with an exhaustive internal audit of each standard overseen by Tim Hitchcock.

One of the committee's main tasks currently is the revision of the standards, which should be carried out on a five-year cycle. Our Z136.3 standard for health care facilities represented a significant challenge and has taken almost eight years to revise, much to the frustration of our customers and the chagrin of the LIA staff fielding phone calls. Subcommittee Chair Stephen Trokel, Vice Chair John Hoopman, Secretary David Sliney and subcommittee members worked patiently with the sometimes conflicting views and needs of physicians, nurses, technicians, spa operators, veterinarians, and others and finally reached a consensus.

The ASC Z136 committee approved the document in August and sent it to ANSI for approval. ANSI procedures required this document to undergo special audit and unfortunately a backlog of audits delayed final ANSI approval until January.

We apologize to our customers who placed orders and are waiting for delivery. We will print and mail the documents as fast as possible, consistent with high quality and continue to make every effort to minimize delays in future revisions of this important family of documents.

Board , cont. from pg. 1

mouth shut (something I don't find easy to do). Otherwise, stay the course, and trust in the judgment of Peter Baker, LIA's executive director."

Clark feels he has benefited by being an LIA member and now president. "I've met a lot of great people trying to do good things for the industry and make a living in the process – many of whom are passionate about what they do. And that is inspiring."


Bill Clark

He is survived by a wife, three children, and a golden retriever, all of whom wait patiently for him to spend somewhat less time on ultrafast laser micromachining and more time with them "smelling the roses."

Meet The Officers

• **President-Elect** – Joseph O'Brien is an entrepreneur and attorney in Minneapolis, Minn. He is the founder, president and CEO of Trinity Technologies, a developer and manufacturer of laser protective technologies. He has experience working closely with laser professionals in research, industry, medicine, aerospace, telecommunications, and the military, and also has broad experience as an entrepreneur and attorney. Prior to founding Trinity Technologies he helped establish several early stage medical technology companies. He served as LIA's treasurer in 2004 and is a founding member of the Board of Laser Safety.


Joe O'Brien

• **Secretary** – Nathaniel Quick is the president and chief technical officer of AppliCote Associates, LLC, Orlando, Fla., a technology development company. He holds a Ph.D. from Cornell University in materials science and engineering. He established AppliCote Associates to pursue the direct conversion of electrical phases in ceramic and semiconductor substrates. Quick is a University of Central Florida Photonics Center of Excellence advisory board member, a past guest researcher at NIST and past member of the Army Science Board. He currently holds 33 U.S. patents. He has served as LIA's secretary for two years and is a senior member of LIA.


Nat Quick

• **Treasurer** – Rajesh (Raj) Patel has 16 years of experience in the laser material processing field. He is currently president of 3R&M Consulting Services Company in Fremont, Calif., where his current work is focused on helping companies with projects related to implementation of laser- and optics-based technologies for manufacturing solutions. He received his Ph.D. in mechanical engineering from the University of Illinois at Urbana-Champaign in 1989. He has worked with various lasers for developing applications in microelectronics, semi-conductor, biomedical, and the photonic industry. He is an author of 20 U.S. patents related to laser processing, optics, and the mask technology field. He is a member of LIA and SPIE, has served on LIA's executive committee for the last two years, and has co-chaired LIA's ICALEO conference four times.


Raj Patel


Stephen Capp

Meet The Directors

• **Stephen Capp** has been president and CEO of Laserage Technology Corporation, Waukegan, Ill., since 1994. He previously held positions as plant manager and vice president of operations. Laserage is an international supplier of laser-processed materials growing to one of the largest laser job shops in the U.S. He graduated from the Milwaukee School of Engineering in 1978 and has been active in the laser industry most of his career. He has been a member of the LIA since 1992.

• **Heinrich Endert** has been working in the laser industry for 20+ years. After receiving his Ph.D. (laser damage research) from the University in Jena, Germany in 1980, he worked as post-doc on laser-induced x-ray production in the Lebedev-Institute in Moscow. From 1981-88 he joined the Academy of Sciences in Berlin, and from 1989-99 he was involved in the worldwide industrial introduction of excimer and UV solid-state laser technologies with Lambda Physik in Goettingen, Germany and Fort Lauderdale, Fla. From 1999 to 2003 he worked as vice president of marketing and sales for IMRA America, pioneering the commercial introduction of ultrafast fiber lasers. Since September 2003 he has been the senior director of strategic marketing at Spectra-Physics in Mountain View, Calif.


Heinrich Endert

• **John Hoopman** began his clinical experience at the University of Texas Southwestern Medical Center at Dallas in 1998. He is now the administrator of the UT program, which includes a variety of medical/surgical specialties. Hoopman is nationally recognized as a leader in patient advocacy and is an active member of organizations such as the ANSI Z136.3 review board and the American Society for Laser Medicine and Surgery. With his academic and developmental involvement in light medicine, he has a unique ability to gauge and review most of the new and emerging light and noninvasive technologies in today's ever-changing clinical world.


John Hoopman

• **Tony Hoult** is a materials engineer with Coherent, Inc., Santa Clara, Calif., and has


Tony Hoult

been working with high power industrial lasers in both industrial and academic environments since 1987. This experience has been almost exclusively in the R&D field, associated with the development of novel laser materials processing applications. Since moving to the U.S. in 1999, his main interest has been with CO_2 and diode lasers. He was the laser materials processing conference chair of ICALEO® 2004.

Additionally, the following are currently serving out terms on the LIA Board of Directors:

2003-2005
- Milan Brandt, Swinburne Univ. of Technology
- Michael Green, Assn. of Industrial Laser Users
- Tom MacMullin, Kentek Corp.
- H.C. Man, Hong Kong Polytechnic Univ.
- Randolph Paura, Nutech Engineering
- William P. Roach, AFRL/HEDO
- Tom Schriempf, Penn State/Electro Optics Ctr.
- William Steen, Univ. of Liverpool
- Richard Walker, Northrop Grumman/Cutting Edge Optronics

2004-2006
- Neil Ball, Directed Light, Inc.
- Eckhard Beyer, Fraunhofer IWE
- Thomas Cellucci, Zyvex Corp.
- Paul Denney, Edison Welding Institute
- Larry Dosser, Mound Laser & Photonics Ctr.
- Tim Hitchcock, Lightray Consulting
- Andreas Ostendorf, Laser Zentrum Hannover
- Silke Pflüger, SPI Optics
- William Shiner, IPG Photonics
- Y. Lawrence Yao, Columbia Univ.

• **Robert Hull** has extensive experience in laser/materials interactions, having worked in laser effects testing since 1986 and laser processing since 1994. Since 1988, he has served as the program manager for one of the Air Force Research Laboratory's premier laser effects test facilities in Dayton, Ohio, first as a civil servant and then as a contractor. Hull has a master's in materials engineering and an interdisciplinary Bachelor of Engineering, both from the University of Dayton.

• **Klaus Kleine** is a principal R&D engineer specializing in the development of new laser production technologies for mass production of medical devices at Guidant Corp., Santa Clara, Calif. The focus of his recent research and development work is in the area of micro machining with diode pumped fiber lasers. He is also University of Liverpool staff member where he conducts research related to welding and cutting applications. He holds an M.S. (Dipl. Ing.) from the Aachen University of Applied Science in Germany.

• **William Lawson** is chief technology officer for Preco Laser Systems LLC of Somerset, Wis. He is the past majority owner and founder of Laser Machining, Inc., (LMI), an advanced processing job shop and laser systems manufacturer. He holds a bachelor's degree in mechanical engineering from the University of Wisconsin-Madison. Prior to founding LMI, Lawson worked for 3M in its Central Research Laboratories and for the U.S. Army Tank and Automotive Command as an advanced concepts engineer. He was the LIA treasurer in 1999, president-elect in 2002, president in 2003 and past president in 2004.

• **John Marshall** is the frost professor of ophthalmology and chairman of the Academic Department of Ophthalmology at St. Thomas' Hospital, London. He obtained his Ph.D. in 1968. His research over the past 30 years has concentrated on the inter-relationships between light and ageing and the development of lasers for use in ophthalmic diagnosis and surgery. This work has resulted in the production and patenting of the excimer laser for the correction of refractive disorders. It also created the world's first diode laser for treating eye problems of diabetes, glaucoma and ageing. He has held posts chairing the medical advisory boards of many international companies and he sits and chairs many national and international committees concerned with protecting the public against the possible damaging effects of lasers and other artificial light sources. He is fellow of the LIA and past Wilkening award recipient, and an honorary fellow of several national ophthalmological societies.

• **Etsuji Ohmura** is an associate professor in the Department of Manufacturing Science at Osaka University. He received both a Bachelor's and Doctor of Engineering from the Department of Precision Engineering, Osaka University. His main field of research is intelligent laser processing systems, especially theoretical analysis and computer simulation to gain understanding of the complicated physical phenomena in laser material processing, influence of laser optics, and nonlinear optical phenomena. He is a member of LIA, the Japan Society of Mechanical Engineering, the Japan Society of Precision Engineering, and the Japan Laser Processing Society.

• **Dean Wilson** is president of Wilson Industries, Pomona, Calif., a company begun by his parents in 1957 that manufactures industrial safety products. He has managed the sales, marketing, R&D, manufacturing, and general operations at various times throughout his tenure. Wilson has actively participated in the development or invention of a large variety of products used to provide safety and protection. He is the vice chair of the American Welding Society's Welding Equipment Manufacturer's Committee, and served on the AWS safety and health sub-committee on non-ionizing radiation. He has a BS in biology from San Diego State University.


Robert Hull


Klaus Kleine


William Lawson


John Marshall


Etsuji Ohmura


Dean Wilson

Lasers, cont. from pg. 1

tency and reliability, and in turn, drive down unit cost.

However, even in the midst of the telecom success, these new business practices were not widely adopted. The initial boom market largely rewarded technical innovation; products were mostly purchased on the basis of performance, real or promised, with cost being secondary. This enabled most companies to continue to utilize traditional, labor-intensive manufacturing methods, rather than adopt automated production techniques.

The telecom gold rush didn't last long enough for the technology to stabilize. If this had happened, it would have turned many products into commodities, and produced strong downward pressure on prices. This would then have forced manufacturers to achieve the improvements in yield, product consistency and operations that enable long-term profitability.

Laser Impact

To some extent that leaves us where we started. Certainly, the laser has been adopted in a number of interesting and important uses in biomedicine, manufacturing, metrology and the like. But, other than the low-power diode lasers used in compact disc, DVD and CD/DVD-RW devices, there are no truly high-volume applications. In the instances where the laser has been a success, it has virtually always been more expensive than competing technologies, and been used solely because it was the only means of accomplishing the task. The difficulty and expense associated with employing lasers causes them to largely remain the solution of last resort. Simply said, no one uses a laser because they want to.

For those who love the technology for itself, this situation may not represent a problem. But, for anyone who wants to build a company capable of sustaining long-term growth and profitability, it is a significant issue. As the CEO of a publicly held laser company, grappling with this problem, and all its various manifestations, is my major focus.

Entering the Mass Market

In the broadest terms, I believe that two things must change in order for the laser industry to successfully mature. The first of these is the structure of the industry itself, which contains a disproportionate number of companies for the total size of the market. At the present time, the annual worldwide market for non-diode lasers is estimated to be around $2 billion. The top 10 companies probably account for about 80% of this revenue, with roughly 200 others capturing the rest. There are more than 30 companies that make diode-pumped, solid-state lasers alone.

For the 90% of the companies that are sharing the remaining $400-500 million, it is difficult to generate the revenue necessary to make a significant, long-term investment in product development and advanced volume-production equipment. I'm not implying that smaller companies can't innovate; in fact, quite a bit of important innovation comes from our industry's smaller companies. But these organizations don't have the overall resources needed to conduct the kind of sustained product and manufacturing engineering required to successfully refine a product for the mass market. So, first, some consolidation is necessary for the health of our industry, and, in fact, this is already occurring.

The second thing that must change in the laser industry is our concept of the product itself. Many industry insiders are intrigued with the technology, and still view the laser with the fondness of its scientific developers. However, if we want to see applications for lasers grow, we must utilize the same business discipline that is applied to any other product.

In terms of product development, this means taking the time to adequately understand customer needs, and to develop products in specific response to those needs. It also means having the vision to see where the technology could be successfully applied in the future. In contrast, much of the laser industry's current development strategy can be summarized as "follow the leader."

John Ambroseo of Coherent.

We must also put a much greater focus on product quality and reliability. Furthermore, we'll have to broaden our concept of these terms to include everything from customer interaction with service personnel, to total product lifetime, to mean-time-to-repair. We need to adopt and adapt proven volume-production methods to increase yields, improve product consistency and drive unit costs down. These are the keys to making the laser more attractive and widely accessible.

Ultimately, we all have to fall out of love with lasers, and learn to view them as commodities, rather than playthings. Until we can do this, the laser will continue to be the solution of last resort.

John Ambroseo is CEO of Coherent, Inc., Santa Clara, Calif. (408-764-4000), and also presented this article as a talk during the plenary session at ICALEO® 2004.

In The News, cont. from pg. 1

home, illuminating neighborhood trees and houses and pointing it into the sky when the green laser beam apparently hit a helicopter carrying a top police official. Banach was later questioned by the FBI.

Although federal law enforcement officials have said there is no evidence of a terrorist plot, last month the FBI and the Homeland Security Department sent a memo to law enforcement agencies saying there is evidence that terrorists have explored using lasers as weapons.

Laser Therapy Cures Bad Breath

Laser therapy could be the answer to bad breath according to researchers from Sapir Medical Centre, Chaim Sheba Medical Centre and Tel Aviv University. In a recent study, the team of doctors used a CO_2 laser to cure 51 out of 53 patients suffering from severe halitosis. (*Otolaryngology - Head and Neck Surgery 131 372*), reported the Nov. 16 issue of *Optics.org*.

The study contained 53 people all suffering with halitosis originating from chronic fetid tonsillitis. The treatment consisted of guiding a CO_2 laser beam with a power of between 10 and 20W over the tonsils. A scanner quickly rotates the focused laser beam over a 3-4mm circle to vaporize the tonsils without causing thermal damage to surrounding tissue. The 20-minute technique can be performed in an office with the patient under local anaesthetic. Of the 53 patients in the study, 47 immediately resumed regular activities. Twenty-eight patients were cured in one session, 18 patients required a second visit and five patients returned for a third treatment. Only two patients needed a tonsillectomy.

Designing an 'Optical Nose' for Chemicals

A laser-based method for identifying a single atom or molecule hidden among 10 trillion others soon may find its way from the laboratory to the real world. Developed by physicists at the National Institute of Standards and Technology (NIST), the technique is believed to be more than 1,000 times more sensitive than conventional methods. Vescent Photonics of Denver, Colo. hopes to commercialize the method as an "optical nose" for atmospheric monitoring. The portable sensors would rapidly identify chemicals in a gas sample based on the frequencies of light they absorb. Other applications eventually may include detection of chemical weapons and land mines, patient breath analysis for medical diagnosis or monitoring, and industrial detection of leaks in subterranean pipes or storage tanks, the company says.

The technique is a product of years of work and several innovations by NIST scientists. A gas sample is placed in an optical cavity containing two highly reflective mirrors. An infrared laser beam is directed into the cavity, where the light bounces back and forth many times. The repeated reflections increase the path length on which laser light will interact with gas molecules in the sample. In addition, the laser frequency is quickly and systematically varied in a way that enables scientists to observe and subtract background noise from the signal. The approach allows analysis of gases that are present in minute concentrations and at very low pressures, which may enable identification of compounds such as explosives that are difficult to detect by other means.

Airborne Laser Achieves "First Light"

The Airborne Laser (ABL), a Boeing-747 equipped with a megawatt laser for shooting down ballistic missiles, has reached another milestone in its development – the demonstration of "first light," reported the Nov. 17 issue of *Optics.org*. The ground-based test involved simultaneously firing of all six laser modules of the ABL's giant chemical oxygen iodine (COIL) laser for the first time. It took place in a 747-fuselage equipped with the laser at Edwards Air Force Base in California. The output power of the laser beam was not disclosed, but the ABL team says that it was "an amount of infrared laser energy that was within pre-test expectations."

Boeing is acting is the system integrator for the project, with Lockheed Martin supplying the beam control system and Northrop Grumman the COIL laser. The ultimate plan is to have a flying version that can detect, track and destroy ballistic missiles shortly after they are launched. This involves focusing a beam from the COIL into a basketball-sized spot onto a missile that may be hundreds of miles away.

Californians Build First Silicon Laser

Scientists from the University of California at Los Angeles have finally found a way to make silicon lase, reported the Oct. 29 issue of *Optics.org*. The breakthrough paves the way for integrating lasers and electronics together on the same silicon chip

(*Optics Express 12 21*). The prototype device emits picosecond pulses in the near infrared (1.68 µm).

While other researchers have obtained light emission (but not lasing) from silicon by either doping it with erbium or riddling it with tiny holes, Ozdal Boyraz and Bahram Jalali decided to investigate the possibility of using the Raman effect.

The Raman effect, which uses vibrations within a material to create optical gain, is often used in long lengths of silica glass fibers in the communications sector to amplify data signals. As the effect is 10,000 times stronger in silicon Jalali realized that it should be possible to obtain sufficient gain for lasing in a silicon waveguide that is just a few centimeters long.

He and Boyraz made such a 2cm silicon waveguide, placed it inside a fiber loop cavity and then pumped it with 30ps pulses at 1540nm from an amplified mode-locked laser. At a peak pump power of 9W the fiber cavity started to lase at 1675nm. The laser had a slope efficiency of 8.5% and emitted 25ps pulses.

The tunable nature of Raman effect means that it could be possible to make silicon lasers that operate in the mid-infrared.

New and Improved LIA Member Benefits

Effective Jan. 1, 2005, LIA increased its individual membership dues to $100 annually and $50 for student or retired members. This is the first dues increase in five years. You can save $10 by purchasing a two-year individual membership for $190, or save even more and purchase a life membership for $1,000. There will no longer be a monetary distinction between domestic and international members.

In addition to complimentary subscriptions to the *Journal of Laser Applications*® (retail value $350) and the *LIA Today* bi-monthly newsletter, and member discounts on publications, LIA courses and conferences, we recently partnered with the American National Standards Institute (ANSI) to offer you additional discounts on ANSI eStandards store purchases. Members are eligible for up to 10% off on select standards collections. Those collections are ISO, IEC, X9, AMT, AGMA, INCITS, i3A, OLA and ANSI published. To receive the discount you must purchase the publications from the ANSI Electronic Standards Store http://webstore.ansi.org/default.asp, and use your member discount code.

Additionally, not only can LIA members network with the leaders in the laser industry through our events, but soon you can access the most extensive online laser community today – LIA E-Community groups. These communities offer a secure platform for posting questions and sharing industry-related ideas and information (coming soon). LIA also offers a wide range of volunteer activities, from board members and committee leaders to conference chairs to expert panels, We invite you to participate!

This interactive feature of the **LIA TODAY** is designed to provide you, the laser user, a place to ask the ASC (Accredited Standards Committee) Z136 your standard-related questions. This applies to all five standards. You ask the question, ASC Z136 provides the answer.

Interpretation 04102003 – 10 April '03
Visual Acuity Test

Question: For what purpose is the visual acuity test required for "incidental personnel". Is the test designed to prove that no previous eye damage occurred prior to being considered an incidental person?

Relevant ANSI Text: 6.2.1 Incidental Personnel. Incidental personnel are those whose work makes it possible (but unlikely) that they will be exposed to laser energy sufficient to damage their eyes or skin, e.g., custodial, military personnel on maneuvers, clerical, and supervisory personnel not working directly with laser devices.

6.3.1 Incidental personnel shall have an eye examination for visual acuity (see Appendix E for further details).

Response: The questions are as follows: (1) For what purpose is the visual acuity test required for "incidental personnel?" (2) Is the test designed to prove that no previous eye damage occurred prior to be considered an incidental person?

Background from ANSI Z136.1-2000:

a. Section 6.3.1 states that "incidental personnel shall have an eye examination for visual acuity." Incidental personnel are defined (Section 6.2.1) as "those whose work make it possible (but unlikely) that they will be exposed to laser energy sufficient to damage their eyes or skin".

b. Section 6.1 states that medical surveillance is required for personnel using Class 3b and Class 4 laser systems and that employers may wish to provide their employees with additional examinations for medical-legal purposes to conform with established principles of what constitutes a thorough ophthalmologic . . ."

c. Section 6.4 further states that "the required examination shall be performed prior to participation in laser work" and "periodic examinations are not required." Section 6.4 further states that "following suspected laser injury, the pertinent required examinations will be repeated."

d. Appendix E of ANSI Z136.1-2000 provides guidelines for the preassignment medical examination and suggests two purposes for such evaluation. One purpose is "to establish a baseline against which damage (primarily ocular) can be measured in the event of an accidental injury" and the second purpose is "to identify certain workers who might be at special risk from chronic exposure to selected continuous wave lasers."

Question 1: For what purpose is the visual acuity test required for "incidental" personnel? Both purposes given in Para 2 d could apply to incidental workers although chronic exposure of incident personnel is very unlikely. Measurement of visual acuity provides a rapid and inexpensive measure of macular function (central visual function) and further documents one aspect of vision prior to employment. If visual acuity is not within normal limits, then further assessment of ocular health and vision is recommended to determine the etiology. The employer would then have the prerogative to determine the employee's fitness for duty. Documented visual acuity as "within normal limits" provide one measure of macular function. Assuring the ocular health of new employees is consistent with good occupational health practices. Visual acuity screening benefits new employees by providing an opportunity to alert them to the hazards of laser systems and to inform them of the importance of following the safeguards and control measure in place to limit ocular exposure and safeguard their health.

Question 2: Is the test designed to prove that no previous eye damage occurred prior to be considered an incidental person? No, the test is not designed "to prove that no previous eye damage occurred prior to" entering a work environment where exposure to a hazardous laser is possible but unlikely. Although visual acuity measures central retinal function (macular function) and is a standard metric used to assess vision, there can be several reasons for visual acuity decrements. Poor visual acuity is most often indicative of refractive error and the need for corrective lenses. Retinal diseases, changes in the outer ocular media and/or physical trauma (other than laser exposure) can also reduce visual acuity. While laser exposure to the foveal-macular area of the retina at a dose sufficient to produce observable retinal pathology most likely will result in changes in visual acuity, laser exposure to the peripheral retina may go unnoticed and not produce a change in visual acuity. Specialized ophthalmologic examinations and a differential diagnosis made by trained specialists are required (See Appendix E) to make these assessments. Measurement and documentation of visual acuity is one rapidly administered, inexpensive screening tool to assess visual function. While it does serve as a pre-employment baseline of visual acuity, the etiology of changes in visual acuity would have to be determined by trained specialists.

E-mail your questions to **bsams@laserinstitute.org**. Additionally visit **www.Z136.org** for more on the ANSI standards.

Welcome New LIA Members

Corporate Members

- Domino Amjet, Inc., Gurnee, IL
- Laser-Professionals Inc., Santa Barbara, CA
- Synova SA, Ecublens, Switzerland
- TuiLaser, Monument, CO

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

Individual Members

Anthony Campos, Modesto, CA
Michael Lefebvre, San Diego, CA
John Pickering, San Jose, CA
Anthony Scarpellino, South, El Monte, CA
Isabelle Sipos-Solman, Redwood City, CA
Donald Staats, El Segundo, CA
Surendra Dua, Miami, FL
Dale Troendle, Orlando, FL
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Carl McGahee, San Antonio, TX
Andrew Roberts, Ottawa, ON, Canada
Matthew Flower, Bristol, UK
Tom Riley, Bristol, UK
Carlos Soriano-Reyes, Paterna, Valencia, Spain

Member Innovations

FireWire Laser Beam Profiler

Spiricon, Logan, Utah, has introduced laser beam profilers using FireWire® cameras, called LBA-FW. FireWire cameras connect directly to laptop computers without a frame grabber card, providing a very portable beam analysis instrument. Both CCD and pyroelectric cameras are provided that cover the complete spectral range from UV to far IR. Cameras are either 12-bit or 14-bit digital. For more information visit www.spiricon.com.

Accurate Energy Measurements

Ophir Optronics, Inc., Wilmington, Mass., has introduced the new PD10-pJ photodiode energy head. The model PD10-pJ has energy scales ranging from 100nJ to 200pJ as well as pulse rates up to 4,000 Hz. Ophir's PD10-pJ can make energy measurements as low as 10pJ. For more information visit www.ophiropt.com.

Pulsed Fiber Laser

Aculight Corporation, Bothell, Wash, has expanded its family of pulsed fiber laser products with the addition of the Model PF1550-36. Operating in the eye-safe region near 1.54-µm, Model PF1550-36 delivers diffraction-limited, short-pulse output over a wide repetition rate range. The laser is appropriate for applications such as laser range finding, range-gated imaging, sensing and micromachining.

The Model PF1550-36 can generate 3- to 5-ns pulses at repetition rates between 20 kHz and 1 MHz, depending on user requirements. It produces 4 watts of average power at repetition rates over 50 kHz and peak powers in excess of 15 kW. The unit's 1.54-µm output from the delivery fiber is less than 1.5 times diffraction limited. The Model PF1550-36 is a fully contained laser that measures just 12 x 13 x 3.5 inches. For more information visit www.aculight.com.

Electronic Gas System

The Intelli-Switch™ (patent pending) is a new microprocessor-controlled automatic switchover system for gas delivery system introduced by Concoa, Virginia Beach, Va. It is ideally suited for cryo/bio applications, process and metal fabrication industries including lasers, and various specialty gas applications. The IntelliSwitch has an electronic "brain" providing for universal input compatibility so the user can change supply mode based on the workload at hand. For more information visit www.concoa.com.

Laser Marking Workstation

The new LMW Marking Workstation from Unitek Miyachi, Monrovia, Calif., is available in four package sizes. It also comes in two heights to accommodate different focal height optics (from 75mm to 420mm) and parts handling options. This allows a multitude of requirements to be achieved within a single platform. The LMW systems are available with an optical pneumatic shuttle parts handler to boost throughput by automatically sequencing parts through the system and positioning them for marking. For more information visit www.unitekmiyachi.com.

Members In Motion

Discontinued Lithography Development

Coherent, Inc., Santa Clara, Calif., has announced its Lambda Physik subsidiary will discontinue future product development and investments in the semiconductor lithography market. Lambda will continue to support its installed lithography base. As a result of this decision, the company expects to take an after-tax charge of between $3 and $6 million during the first quarter ending Jan. 1, 2005. These charges are primarily related to excessive and obsolete inventories.

ASC Z136 Update

Ancillary meetings scheduled in conjunction with ILSC®

As reported in the Nov/Dec 2004 issue of *LIA Today*, the annual meeting of ASC Z136 will be held on Sunday, Mar. 6, 2005 beginning at 9 a.m. in conjunction with the International Laser Safety Conference (ILSC®) at the Marina del Rey Marriott, Marina del Rey, Calif. Although this meeting is open to the public, an RSVP is required for meal planning purposes. Please contact Barbara Sams at 407-380-1553 or e-mail bsams@laserinstitute.org to let us know if you plan to attend.

Additionally, a number of ancillary meetings relating to the development of national and international laser safety standards will be held in conjunction with ILSC 2005. The meetings will include working groups of the IEC and ANSI standards. A complete meetings list can be viewed at www.z136.org or call for a schedule.

New this year – sponsored by ASC Z136 – join us for the Meet & Greet Fiesta, Sunday, Mar. 6 at 4:30 p.m. Kick-off ILSC right by seeing old friends and colleagues and helping us welcome our first-time attendees! See you there!

Journal of Laser Applications® Update

The *Journal of Laser Applications®* offers the latest refereed papers by leading researchers in the laser community. The upcoming February 2005 issue includes papers from materials processing and review papers. Look for the online version at www.laserinstitute.org/publications/jla/. To view the journal online, please make sure your membership is current.

The *JLA®* is published four times a year by the Laser Institute of America in February, May, August and November. It is sent to all LIA members as a member benefit. For nonmembers of LIA, call the American Institute of Physics at 1.800. 344.6902 for subscription information.

Sign up at http://scitation.aip.org/jla/ alert.jsp to receive your JLA table of content e-mail alerts.

LIA Announces

Z136.3 Pre-Publication Special

Originally due for release in January 2005, pre-publication orders are still being accepted for the *ANSI Z136.3 for Safe Use of Lasers in Health Care Facilities*, but only until Jan. 31. Currently at the printer as ANSI has completed its audit, the release date is now the first week of March if not sooner. The pre-publication price of only $99 applies to nonmembers and members. After this offer expires, the price increases to $110 for LIA members and $130 for nonmembers.

February Web Specials

For the month of February, LIA is offering a package special – the Industry Safety Package. It consists of the *ANSI Z136.1 for Safe Use of Lasers*, the *Laser Safety Guide* and the *Guide for the Selection of Laser Eye Protection*. Member cost is $120 or $150 for nonmembers.

BLS Exam Dates

The Board of Laser Safety™ (BLS) will be offering Certified Laser Safety Officer (CLSO) exams Feb. 11 in Orlando, Fla., Feb. 12 in Scottsdale, Ariz., Feb. 19 in San Antonio, Texas, and Mar. 6 in Marina del Rey, Calif. The exams will be held directly after LIA's LSO training courses. BLS will also be offering a Certified Medical Laser Safety Officer (CMLSO) exam Feb. 13 in San Diego, Calif. and Feb. 25 in Las Vegas, Nev. after LIA's MLSO courses, and Mar. 6 in Marina del Rey, Calif. at ILSC®. Cost is $300 for either exam as well as the application. For more information contact Rich Greene at bls@lasersafety.org, 800-345-2737, or visit www.lasersafety.org.

Call for Papers

LIA is seeking abstract submissions for the 24th International Congress on Applications of Lasers & Electro-Optics (ICALEO® 2005), to be held Oct. 31-Nov. 3, 2005 in Miami, Fla. ICALEO® 2005 will include two conferences, the Laser Materials Processing Conference and the Laser Microfabrication Conference, as well as a poster presentation gallery and the Laser Solutions Short Course.

Papers sought cover topics such as aerospace, automotive, and laser safety; processes like rapid prototyping, surface modification and sensing and monitoring, lasers including diode, diode pumped and advanced laser sources, applications in medicine and biotechnology, precision mechanics and photonic components and laser sources.

Abstracts should contain original, recent unpublished results of application research, development or implementation. The abstract submittal deadline is Mar. 25, 2005. For complete details on submitting abstracts for ICALEO, visit www.icaleo.org or contact Beth Cohen at 800.34.LASER or e-mail bcohen@laserinstitute.org.

ILSC Advance Program

The Advance Program for the International Laser Safety Conference (ILSC®) is now available. Scheduled to be held Mar. 7-10, 2005 in Marina del Rey, Calif. and presented by the LIA, ILSC is a comprehensive four-day conference covering all aspects of laser safety. For more information or to register, visit www.laserinstitute.org/conferences.

Laser Dentistry Conference

The Academy of Laser Dentistry will be hosting its 12th Annual Conference and Exhibition Apr. 6-9, 2005 in New Orleans, La. As part of a two-day pre-conference program, the academy will offer an Introductory to Lasers Course along with the Standard and Advanced Proficiency Certification courses and examinations. For more information visit www.laserdentistry.org.

Engineers Week 2005

Engineers Without Borders – USA (EBW-USA) was established in 2000 to mobilize volunteer engineers and engineering students to design and implement projects that bring sustainable, long-term benefits to impoverished communities around the globe. Engineers Week 2005, a public awareness and outreach program scheduled for Feb. 20-26, has made EWB a major focus of their activities. If you would like to sign up to assist EWB for Engineers Week, visit www.eweek.org for more information.

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Laser Institute of America
13501 Ingenuity Drive, Suite 128
Orlando, FL 32826

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