



# LIA TODAY

The Official Newsletter of the Laser Institute of America

The professional society dedicated to fostering lasers, laser applications, and laser safety worldwide.

Volume 14, Number 2

March/April 2006

In  
The  
News . . .



## Universities Selected for Research Funding

The Department of Defense (DoD) has announced plans to award 30 basic research grants to 20 universities totaling about \$13.5 million in fiscal year 2006 and about \$30.2 million per year starting in fiscal year 2007 for a total of \$150.6 million over five years.

These academic institutions will receive the grants to conduct multidisciplinary research in 26 topic areas of basic science and engineering under the DoD Multidisciplinary University Research Initiative (MURI) program. The awards will provide long-term support for research, graduate students and laboratory instrumentation development that supports specific science and engineering research themes vital to national defense. The average award will be \$1 million per year over a three-year period.

Congratulations to Eric Van Stryland, Dave Hagan, and Pieter Kik, and Martin

(Cont. on pg. 13, see **In The News...**)

## Spectacular Working Ideas from ICALEO® 2005

By Jack Dyer

The Aerospace Corporation scientists continue to explore the use of nanotechnology in satellites. Glass-ceramic satellites, one-one-hundredth the size of today's satellites, can be mass-produced and customized to cut costs. And because they are made of ceramic glass, internal communication can be handled quite efficiently via photonics. A working demonstrator satellite was presented in 2005 to the Defense Advanced Research Projects Agency.

### Tiny Glass Satellites Reflect New Concepts

What if you had need for a tiny inspector satellite to hang out around a mother spacecraft providing a mobile imaging system for high-resolution inspection of external surfaces for a few hours, days, weeks or months? And it is made of lightweight glass?

To learn about it you could have attended the Laser Microfabrication Conference in Miami in late October 2005. Attendees agreed the conference produced an astonishing array

of ideas to meet unique needs in the photonics and biomedical fields for fabrication of new miniaturized components.

For example: In the keynote presentation of Session 1, The Aerospace Corporation Senior Scientist Dr. Henry Helvajian of Los Angeles, noted: "Scientists in our micro/nano technology department are fired up about tiny 'three dimensionally laser patterned glass-ceramic' demonstrator satellites we've been developing. There are so many aspects to these satellites,

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

## Laser Drilling, Dicing & Contour Cutting of Thin Glass

By Dr. David Ashkenasi

**L**aser processing of optical materials is becoming progressively more important and may be considered a genuine alternative to standard mechanical and ultrasonic techniques for dicing or drilling. In addition to the increasingly successful introduction of CO<sub>2</sub> lasers for the stress-related machining, e.g. MDI Schott AP in Mainz, Germany, frontiers in CO<sub>2</sub> laser dicing of thin borosilicate glasses, the processing of optical materials using short-pulsed diode-pumped solid-state lasers (DPSSL) is gradually coming into focus.

The nonprofit company Laser and Medical Technology GmbH (LMTB) in Berlin, Germany, reported during the ICALEO® 2005 conference surprising results on the laser pro-

cessing of thin flat glass using DPSSL generating green (532nm) laser light in the pulse width range of 20ns to 80ns. These compact and versatile laser systems are usually implemented for micro machining tasks on metals (e.g. copper) or semiconductive materials.

### Processing Alternatives

Dr. David Ashkenasi, technical manager of the Applied Laser Technology Group at the LMTB, demonstrated that with implementation of DPSSL even at fairly moderate pulsed green power of  $P_{ave} = 5W$  at around  $f_{rep} = 10kHz$  repetition rate, borosilicate glasses can be drilled, scribed, and diced quite efficiently. In addition,

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

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# LIA TODAY

*The Official Newsletter of the Laser Institute of America*

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**L**aser 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](http://www.laserinstitute.org).

## LIA's Calendar of Events

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### Laser Safety Officer Training

May 8-10 • Pittsburg, PA  
July 17-19 • Milton (Toronto) ON, Canada  
Aug. 7-9 • Denver, CO  
Dec. 4-8 • Orlando, FL

### Medical Laser Safety Officer Training

May 19-20 • Chicago, IL  
Sept. 22-23 • Boston, MA  
Nov. 10-11 • Las Vegas, NV

### Laser Safety in the Lab

Aug. 14-15 • Orlando, FL

### Laser Safety Officer with Hazard Analysis

June 5-9 • Boston, MA  
Sept. 18-22 • San Francisco, CA  
Oct. 30-Nov. 3 • Scottsdale, AZ

### PICALO 2006

April 3-5 • Melbourne, Australia

### ICALEO® 2006

Oct. 30-Nov. 2 • Scottsdale, AZ

### ILSC® 2007

Mar. 19-22 • San Francisco, CA

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## Executive Director's Message

### LIA Is Education



LIA Executive Director  
Peter Baker

If you take a close look at our LIA logo you will see “education” at the base of the triangle. In fact, one of the specific and primary purposes of our society, as laid down by our founding fathers, is “to develop and present short courses”.

For over three decades we have been providing the definitive courses in laser safety at many locations around the country. We have trained thousands of laser safety officers and medical laser safety officers, many of whom have become certified through the Board of Laser Safety.

For those who find it inconvenient or too expensive to travel to the courses, we also offer them on-site, tailored to the needs of each client. We are also increasing the amount of the online training. In addition to “Industrial Lasers & Safety” and “Laser Safety in Educational

Institutions”, we recently developed an online version of our Medical Laser Safety Officer course taught by Vangie Dennis, RN, CNOR, CMLSO.

Now in response to the need for physician training we are offering our physician online training course developed and taught by David Sliney, PhD, CLSO and Steven Trokel, MD, authors of “Medical Lasers and Their Safe Use”.

LIA members and staff continue to work together to broaden our education offerings and make them more accessible to the community.

[pbaker@laserinstitute.org](mailto:pbaker@laserinstitute.org)

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**Satellites**, cont. from pg. 1

which introduce new concepts, new materials and technologies and allowing for a vastly different way of making nanosatellites, that there's a lot to get excited about."

Nanosatellites are literally the "babies" of a satellite fleet weighing in at 1-10kg.

The team is led by Dr. Helvajian and includes William Hansen, Adam Huang, Dr. Siegfried Janson and Lee Steffeney.

**Nanosatellites Developed**

The Aerospace Corporation is a federally funded research and development center with a Congressionally mandated mission to provide objective technical analysis and assessments for space programs.

Aerospace scientists and engineers have been testing a nanosatellite propulsion unit made out of 3D patterned glass ceramic material that includes an inertial measurement unit. The propulsion unit with wireless telemetry can maneuver with orientation and translation control hovering on an air table, similar to an air hockey table.

"It's working wonderfully and just as we'd hoped. The demonstrators are much smaller, about one-one-hundredth of

the size of today's satellites and go by the moniker of nanosatellites," said senior research associate Hansen.

The tiny glass satellites have the potential to cut the high costs and lengthy production times associated with most present-day satellites and could spawn a new generation of missions. "They can be mass-produced inexpensively and mass-customized, because they are based on technology drawn from the microelectronics industry, namely lithography, but instead of using lithography to pattern circuits, we use it to pattern the internal structure of the satellite, the fuel channels, the fuel tank, the thrust nozzles etc.," said senior scientist Helvajian.

**Benefits of Glass**

Dr. Helvajian explained that glass offers many properties that other materials do not. "It's transparent and allows for a photonic communication bus to be implemented for intra-satellite communication. This reduces problems associated with cabling and wiring. The glass satellites are laser patterned in three dimensions, placed in a furnace for ceramization, and chemically "etched," at room temperature

with a low concentration hydrofluoric acid solution. The end result is a patterned and etched ceramic glass, much like Corningware™, but with precision

cuts with a resolution of better than five microns (one-tenth of the thickness of a human hair)," he said.

Additional design benefits of the glass satellites are that certain system functions can be integrated into the structure, like the fuel tank is in the demonstrator. There is no need for an independent fuel tank. This removes excess weight and allows for further integration with the fluidic lines.

"Glass in the form of a glass ceramic composite is not brittle either. A cousin of this material is already used in space. We've flown these ceramics as part of a solid rocket micro-thruster array experiment on a sounding rocket and they've survived," said Dr. Helvajian, adding, "This material is as tough as nickel. We can shape and mold it a priori; pattern structures included embedded fluidic lines, and locally change the color/emissivity and strength. This can't be done with aluminum or stainless steel and [this material] offers significant advantages in developing integrated small satellites."

**LIA TODAY:** How do they work?

**H. Helvajian:** The current demonstrator glass satellite contains seven patterned wafers and a circuit board with guidance navigation and control features that can take electronic commands remotely. It measures four inches in diameter by half an inch thick and weighs 330 grams (approximately 0.7 pounds) with fuel. They are beautiful and look like they were machined on a mill. It's not MEMS (micro-electromechanical systems) technology, but some of these features could not be produced any other way.

Why glass satellites? We

needed to develop something lightweight and mass-producible that will not result in a weight penalty and that could be carried by larger satellites as "assistants." As a material class, glass ceramic is an extremely versatile material. The demonstrator contains a propulsion module sized for a one-kilogram (2.2 pounds) mass satellite inspector designed to co-orbit a cooperative mothership. The inspectors would be "kicked out" of the mothership once it's launched and on orbit. They are a pair of eyes that can circle outside the mothership and send us back information about antennas that didn't come out, tiles that are damaged, and repairs that may be needed, or simply assist as calibration sources. Once they serve their function, they are designed for controlled de-orbit.

**Q.** Are there other projects?

**HH:** The Aerospace Corp. has a related project labeled the MEMS Picosatellite Satellite Inspector (MEPSI). This team is developing similar one-kilogram mass spacecraft based on conventional satellite materials and design. The MEPSI program will demonstrate the basic nano/picosatellite inspector concept and the glass satellite effort could provide improved performance and capabilities for the mid-term (five to ten years from now). Aerospace has already launched six MEPSI vehicles and two more will be launched this year.

There are other missions, where multiple satellites could also be sent out to cover a large area. Satellite inspectors could have a mission life of one to six months. If you lose a few, it's not a problem because they are designed to be inexpensively produced.



**Lee Steffeney (left) and Bill Hansen of The Aerospace Corporation display segments of co-orbiting satellite assistant glass-ceramic propulsion modules with integrated inertial measurement unit.**

### “Aerospace Homegrown”

Siegfried Janson, a senior scientist, first brought the concept of the nanosatellite (mission viable satellites that weigh one-kilogram) to light more than 15 years ago. “Way back when Siegfried started working with these ideas, no one had tried to do this, and we first had to find the right material and then develop the appropriate material processing techniques to simultaneously enable mass production and mass customization (much like Dell computers).” The work is truly “Aerospace homegrown” in every sense. We are very proud. Two patents have been issued in relation to the work, and we have three more pending.

The satellites are designed to be manufactured via a process called digital direct development manufacturing. The design, form-fit testing, and the patterning of the wafers is all digital information, so a robot can build them to specification. This saves on the costs and time in producing the satellites. There’s even talk that they could be produced in two weeks.

**Q:** What are the capabilities of such a tiny satellite?

**HH:** They can clearly be assistants, in small groups and with VPN-like (Virtual Private Network) connectivity they can conduct their own experiments or missions and send only the results to the “mother” ship, but because they are primarily made of moldable material they can be shaped. If a satellite primary payload is supposed to be an antennae dish, the satellite does not need to be a big blocky thing with a dish. These advances could change the shape and size of tomorrow’s satellites so they look more like the primary payload rather than a bus with baggage on top. ✱



**Dr. Henry Helvajian**

### FFRDCs

Federally funded research and development centers, or FFRDCs, are unique independent nonprofit entities sponsored and funded by the U.S. government to meet specific long-term technical needs that cannot be met by any other single organization. FFRDCs typically assist government agencies with scientific research and analysis, systems development, and systems acquisition. FFRDCs work in the public interest and operate as strategic partners with their sponsoring government agencies.

First established during World War II, FFRDCs operate in the industries of defense, energy, aviation, space, health and human services, and tax administration. There are currently more than 40 different FFRDCs funded by the government.

*(Editor’s note: this article is adapted from Henry Helvajian and an interview with him and LIA TODAY Contributing Editor Jack Dyer during ICALEO® 2005 and the website [www.aero.org/news/newsitems/glasssatellites-012505.html](http://www.aero.org/news/newsitems/glasssatellites-012505.html)).*

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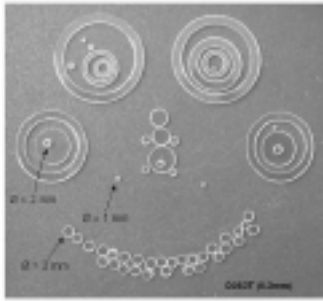
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**Drilling**, cont. from pg. 1

full body cuts of different geometries are accessible in a matter of a few seconds, depending on feature size, glass thickness, average



**Fig. 1: An arrangement of round glass disks and rings ranging in different sizes: “facing the challenges of laser glass processing”. Examples of full body laser contour cutting of a 0.3mm thick D263T borosilicate glass sample.**

power, repetition rate and beam alignment. This characterizes a very interesting processing alternative for a variety of conditions and types of (thin) glasses and crystals,

where standard and established methods such as diamond dicing or CO<sub>2</sub> laser processing demonstrate limitations.

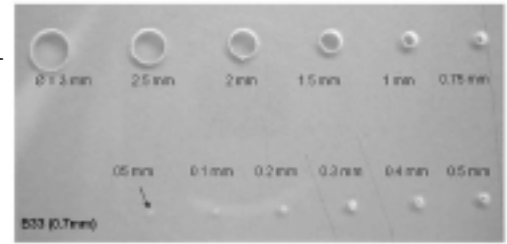
Optical materials are transparent at the wavelength of 532nm. Therefore, the laser processing at that wavelength must rely on other (non-linear) optical channels of (pulsed) excitation to initiate the material ablation. Above a certain peak intensity threshold, short-pulsed laser processing of these optical materials is possible even at a “non-optimal” wavelength. Fig. 1 depicts typical processing examples of minute disks and rings after the contour cutting of flat borosilicate glass using focused ns laser pulses at 532nm.

Although the non-linear excitation channels are triggered by the laser peak intensity, the damage or processing threshold is commonly characterized by the fluence  $F_p$  in

J/cm<sup>2</sup>. This makes sense in the discussion on ablation rates and side effects. The ablation rate per pulse can exceed several  $\mu\text{m}$  during the laser glass machining.

Table 1 compiles some of the results obtained using different q-switch DPSSL at 532nm to complete a 3mm diameter disk by a full body cut of different borosilicate samples and some non-transparent materials of interest: 1) Nd:YAG laser system HAWK-8-O by Quantronix, 2) Nd:VO<sub>4</sub> laser system MESA-V-15 by Azura Laser GmbH. For example: in the case of a repetition rate of  $f_{\text{rep}} = 10\text{kHz}$  and single pulse energy of  $E_p = 0.4\text{mJ}$ , see in Table 1, altogether ca. 50,000 shots (< 5 sec.) were continuously distributed over a circumference of nearly 10mm until the disk separated from the D263T sample.

Considering a Gaussian intensity distribution with  $1/e^2$  focal spot size on the glass surface of approx.  $35\mu\text{m}$ , about 175 laser pulses excited the same area unit along the circle. This yields an average ablation rate of nearly  $2\mu\text{m}$  per pulse at the (for ns laser pulses fairly moderate) fluence  $F_p = 50\text{J/cm}^2$ . In a different case of  $f_{\text{rep}} = 6\text{kHz}$  and  $E_p = 1.3\text{mJ}$  per pulse ( $F_p = 120\text{J/cm}^2$ ), the average ablation rate even increases to over  $4\mu\text{m}$  per pulse. This level compares with the observed ablation rate for 0.20mm thick



**Fig. 2: Borofloat B33 sample, 0.7mm thick, after DPSSL processing using focused short-pulsed ns green (532nm) laser light at a repetition rate of 4kHz and single pulse energy equal 1.7mJ (together equivalent to an average power of 6.5W).**

copper foil under almost identical experimental conditions that did not exceed the average of  $5\mu\text{m}$  per pulse, demonstrating a surprising high processing efficiency for borosilicate glass.

The processing time swells non-linearly with glass thickness. However, the laser processing quality can increase due to the higher mechanical stability of thicker glass samples. Fig. 2 depicts an example of laser trepanning of diameters of 3mm down to  $\varnothing = 0.05\text{mm}$  into a 0.7mm thick borofloat sample B33. The smallest disks obtained here had a size of  $\varnothing = 0.5\text{mm}$ , hence, for smaller features the trepanning culminates to more a percussion drilling method.

Presently, the focused ns laser processing at 532nm below  $P_{\text{ave}} = 10\text{W}$  yields shallow surface chipping on the edges which typically extend over an average width between 50 to  $100\mu\text{m}$ , depending on the glass type. This is tolerable for many purposes. However, for applications, in which the processing quality is of greater importance, the LMTB also follows processing strategies that reduces the mechanical stress and chipping, without greatly rising the processing time and/or costs. Several options are being addressed. ✱

For more, contact Dr. David Ashkenasi at [d.ashkenasi@LMTB.de](mailto:d.ashkenasi@LMTB.de).

Material	Thickness	Processing Time	Repetition Rate	Average Power	Pulse Energy	Fluence
type	d [mm]	t [s]	$f_{\text{rep}}$ [kHz]	$P_{\text{ave}}$ [W]	$E_p$ [mJ]	$F_p$ [J/cm <sup>2</sup> ]
<b>Transparent flat glasses</b>						
D263T	0.20	£ 2	6	8	1.3	120
"	0.30	£ 3	6	8	1.3	120
"	0.30	£ 5	10	4	0.40*	50
"	0.30	£ 5	20	5	0.25*	30
"	0.40	£ 6	6	8	1.3	120
"	0.55	£ 15	4	6.5	1.7	160
AF45	0.40	£ 9	4	6.5	1.7	160
B33	0.70	£ 50	4	6.5	1.7	160
C1737F	0.70	£ 60	4	6.5	1.7	160
<b>Non-transparent materials</b>						
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AlN	0.25	£ 10	4	5	1.3	145
Si	0.10	£ 2	8	5	0.6	70
"	0.15	£ 3	8	5	0.6	70
"	0.40	£ 8	8	9	1.1	125
Copper	0.20	£ 3	4	8	2	185

**Tab. 1: Compilation on the results on DPSSL full body cutting: generation of a 3mm disk from different flat target materials as borosilicate glasses D263T, AF45, B33 und C1737 and – for comparison – non-transparent materials as Al<sub>2</sub>O<sub>3</sub> and AlN ceramics, silicon and copper foil under similar experimental conditions (wavelength = 532nm, pulse width = 60-80ns, except for \*cases (25ns)).**



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# Importance of CMLSOs Increasing

by Vangie Dennis

**T**he ANSI Z136.3-2005 Safe Use of Lasers in Health Care Facilities states that a health care facility shall establish and maintain an adequate safety program for the control of laser hazards. It also states the delegation of authority and responsibility for the supervision of evaluation and control of laser hazards to a laser safety officer.

When operating a Class 3B

or 4 laser in a health care facility it is imperative that a Medical Laser Safety Officer (MLSO) be named and properly trained. In addition to having your MLSO trained it is equally important to consider the MLSO become a Certified Medical Laser Safety Officer (CMLSO).

There can be a misconception that becoming a CMLSO is not as important as other certifications in the medical

field due to the fact that this certification wasn't available until April of 2004. However, there are personal as well as professional reasons for becoming a CMLSO.

## Benefits of Certification

Your laser safety knowledge is enhanced when you become a CMLSO. The medical industry is growing at a fast pace with each passing year. Becoming certified

allows you to stay on top of the changes and maintain competency in the industry. Certification guarantees that you are recognized for up-to-date knowledge on laser safety and it provides the medical facilities a measurement of a



## Register of Certified Medical Laser Safety Officers

As of February 2006

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- Howard Bargman, M.D., Sunnybrook HealthSciences Centre
- Raymond Beauregard, Iowa Methodist Medical Center
- Judith Bittner, Riverview Medical Center
- Arjen Bogaards, Photonics Research Ontario
- Cheryl Bowie, Kaiser Permanente Sacramento
- Amy Boysen, Laser for Less, Inc.
- Ahamed Cader, Sri Lanka
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- Kevin DiCerbo, Celibre
- Tina Drake, HCA Oakwood Surgery Center
- Russel Dunkelberger, Geisinger Health Sys.
- Katherine Eanes, Northeast Health Systems
- Sharon Elder, Aiken Regional Medical Ctr.
- William Ertle, Rockwell Laser Industries
- Christopher Estes, Diomed Inc.
- Carrie Ewing, Kaiser Permanente
- Sharli Frederiksen, Mayo Clinic
- Donna Gabriel, Boston Dermatology and Laser Center
- Richard Gama, PRI Medical Technologies
- David Giewerker, Photonics Res. Ontario
- Steve Harris
- Richard Harvey, Roswell Park Cancer Inst.
- Susan Hayes, Integris Baptist Medical Ctr.
- Michael Hennessy, Laser Logistics Corp.
- John Hoopman, University of Texas Southwestern Medical Center
- Krista Houle, JMMDHS
- Philip Hughes, Diomed Inc.
- Patricia Hyder, William W. Backus Hospital
- Martha LaFrance, Baystate Health System
- Pak Cheung LAI, EMSD-HKSAR
- Kaung Shun LAM, EMSD-HKSAR
- Jean-Yves Latreille, Coherent-AMT, Inc.
- Wah Kit LAU, EMSD-HKSAR
- Kwong Yiu LEUNG, EMSD-HKSAR
- Kim Cheung LEUNG, Pamela Youde Nethersole Eastern Hospital
- Wai Man LEUNG, Dept. of Health, Hong Kong SAR Gov't
- Curtis Liddle, Tufts-NEMC
- Zuzana Likar, Los Altos Surgery Center
- Kin Yee LOUIE, The Gov't of Hong Kong SAR
- Johanna Lovel, Medical City Dallas
- Kin San MAN, Dept. of Health Hong Kong
- Christopher Marcuzzo, M.D.
- Laura Masson, Wentworth-Douglass Hosp.
- Kenneth May, Laser-Med Services, LLC
- Thomas McMahon, Jr., Tufts-NEMC
- Nina Merklin, Providence St. Peter Hospital
- Miriam Mina, PRI Medical Technologies, Inc.
- Robert Mindell
- Amanda Modesta-Keyhani, Shafa Medical Clinic
- Ayman Naseri, Mayo Clinic
- Bruce Nash, Commack Dermatology
- Dawn O'Mahoney, DCMH
- Sharon Olson, Olympic Dermatology and Laser Clinic
- Patti Owens
- Bipin Patel, M.D.
- Albert POON, Hong Kong Government
- Kwok Ying POON, EMSD-HKSAR
- Carl Powell, The Cardiff Medical Spa
- Judith Riley, VA Medical Center
- Catherine Scogin, Glendale/Uvex
- John Shaffer, Springfield Clinic
- Sheila Shyuu, Kaiser Hospital
- Penny Smalley, Technology Concepts Intern'l
- Ngai Man TANG, EMSD-HKSAR
- Susan Taylor, St. Joseph's Health Care
- Sue Terry, LST Enterprises
- Amy Thoman, Delray Medical Center
- Cherie Tirado, Kaiser Permanente
- Lok Him TSE, EMSD-HKSAR
- Julie Underhill, Columbus Surgery Center
- Heidi Walton, Mayo Clinic
- Tak Wai WAN, EMSD-HKSAR
- Barry Washik, Presbyterian Hosp. Huntersville
- Perry Wein, U.S. Navy

baseline of competencies that relate back to optimization of safe practices.

Confidence in an individual's performance in the medical laser field is increased when becoming a CMLSO. It is always reassuring on a professional level to know that you are completely qualified especially when it comes to lasers.

Certification ensures the public as well as the industry that individuals working in this field adhere to high standards and recognize safety factors. Most of the public does not know much about lasers and how they relate to medicine, so being a CMLSO will bring an assurance to patients that they are receiving an optimal level of care. Medical laser certification serves as a model for the highest level of professionalism and knowledge that is practiced in the field of lasers and is a guiding force in patient safety and control.

### Certification's Role

Becoming a CMLSO ensures medical facilities that the individual who are in MLSO positions are properly qualified. Lasers can be very hazardous when utilized without the understanding and knowledge of safe practice. It is crucial that medical laser certification be considered by any medical institution as a baseline of knowledge and competency.

The demand for CMLSOs will continue to grow as the use of lasers becomes more acceptable measurement of education and competencies. Gaining a competitive edge is crucial in the work force today. It is imperative that in a technology based medical armamen-

tarium that you stay up-to-date with your occupation. Becoming a CMLSO demonstrates educational prerequisites and a certain level of work experience, it demonstrates knowledge in the area of medical laser safety, and is a way of staying one step ahead and adding one more acronym of credibility after your name.

### To Become A CMLSO

The Board of Laser Safety (BLS), which is affiliated with the Laser Institute of America (LIA), is the certifying body for CMLSOs and realizes the importance of this certification, as well as the education received from becoming a CMLSO.

There are two steps involved in becoming a CMLSO. First, an individual must provide information demonstrating he or she meets certain educational prerequisites and work experience. Second, the individual must pass an examination demonstrating his/her knowledge in the area of medical laser safety. Examinations are offered in computer-based format in over 325 testing centers in the U.S. and Canada. For more information on how to become a CMLSO contact the BLS at 800-345-2737 or e-mail [bls@lasersafety.org](mailto:bls@lasersafety.org). ✱

*Vangie Dennis, RN, CNOR, CMLSO, Gwinnett Health System, Lawrenceville, GA, ([vdennis@ghsnet.org](mailto:vdennis@ghsnet.org)) is a course instructor for LIA.*

**For more information on becoming a CMLSO visit [www.lasersafety.org](http://www.lasersafety.org).**

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## Welcome New LIA Members

### Corporate Members

- Altos Photonics, Inc., Bozeman, MT
- CAM Tech Industries Inc., Calgary, AB, Canada
- GSI Group, Inc., Willmington, MA
- Harbor Branch Oceanographic Institution, Inc., Fort Pierce, FL
- Kokos Machine Company, Dudley, MA
- Medtronic Inc., Brooklyn Center, MN
- Ohio Laser & Wellness Centers, Ltd., Dover, OH
- Three Rivers Community College, Norwich, CT
- VTT, Technical Research Centre of Finland, Lappeenranta, Finland

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

### Individual Members

- Betty Smith, Sylvania, AL
- Brandi Littlefield, Dothan, AL
- Cindy Vail, Mesa, AZ
- Jim Baker, Tempe, AZ
- Grayston Licht, Irvine, CA
- William Larson, Rolling Hills Estates, CA
- Dianne Quibell, Wellesley, MA
- Gloria Peithman, Stevensville, MD
- Gurvis Davis, APG, MD
- Lijun Song, Ann Arbor, MI
- Richard Budd, South Lyon, MI
- Andrew L. Smith, Schenectady, NY
- Eric Gottlieb, Dayton, OH
- Bharat Chaudhari, Surat, Gujarat, India
- F.J. Botana, Cadiz, Spain

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## LIA Seeking Nominations

The Laser Institute of America needs the help of its membership with nominations for officers for the year 2007 and board members for years 2007-2009, as well as for 2006 fellows and award recipients. Visit the LIA website at [www.laserinstitute.org/nominations/2006](http://www.laserinstitute.org/nominations/2006) for complete details and nomination forms. You may submit your nominations online or send your suggestions to the LIA office via fax (407-380-5588) by May 15, 2006.

### Officers/Board

All nominees on the ballot are required to be current members of LIA. Some responsibilities include attendance at board meetings, support of LIA's courses, conferences, and publications, and encouragement of LIA membership.

### Fellow Nominations

The nominee/s must have achieved significant or pattern-setting accomplishments in a management position in a business related to LIA mission areas, and/or have made exceptional, documented technical contributions in a field relating to the LIA mission areas. They also must have been of service to the fields of lasers, lasers applications or laser safety.

### Awards

**Arthur L. Schawlow Award** – recognizes individuals who have made distinguished contributions to applications of lasers in science, industry, education and medicine.

**George M. Wilkening Award** – recognizes individuals who have made outstanding contributions to laser bioeffects research, development of human exposure limits and safety standards, and to applied laser safety.

**R. James Rockwell, Jr. Educational Achievement Award** – The recipient of the R. James Rockwell, Jr. Educational Achievement Award is an individual, organization, group, or institution of higher education that has made outstanding contributions to laser safety education.

### In The News, cont. from pg. 1

Richardson for getting a MURI award with the University of Central Florida School of Optics/CREOL as the lead institution.

Dr. Eric Van Stryland as principle investigator (PI), with Dr. David Hagan and Dr. Pieter Kik as co-PIs, will study "Ultrafast Switching for Optical Imaging". Other institutions participating with CREOL as the lead are Georgia Institute of Technology, Purdue University, and University of Arizona.

Dr. Martin Richardson as PI will study "Ultrafast Laser Interaction Processes For LIBS and Other Sensing Technologies". Other institutions participating

with CREOL as the lead are University of Nebraska, Lincoln, University of California, Berkeley, Johns Hopkins University, and Florida A&M University.

In addition, Dr. Van Stryland is a participant on a new MURI award to Kent State, led by Dr. Palffy-Muhoray, to study Negative Index Materials (NIMs), and Dr. Richardson is co-PI with Prof. John Ballato, Clemson University, on a MURI to study "High Power Fiber Lasers".

Eduardo Salas of IST also received a MURI as lead, bringing the UCF total to three. The only other university in addition to UCF getting 3 lead-institution MURI awards is Caltech. ❁

## Chapter Corner

• **Great Lakes Chapter** – The Great Lakes Chapter of the Laser Institute of America (LIA) includes not only the state of Michigan but also the supporting states of Illinois, Indiana, Ohio and the province of Ontario, Canada. The first formal meeting of the chapter will be held Tuesday, April 11, 2006. The meeting will be hosted by TRUMPF, Inc. Laser Technology Center, Plymouth Township, Mich. Steve Farmer of Eli Lilly, Indianapolis, will speak on laser safety.

• **New England Chapter** – The latest meeting was held March 15, 2006 in Nashua, NH, and included a plant tour of PhotoMachining, Inc. The plant tour consisted of several station visits to view laser materials processing and micromachining. The next meeting is being organized for May 2006.

• LIA encourages all LIA members in the supporting areas of these chapters to join the chapter and support its efforts to promote the laser industry on a regional level. Members are needed to help plan and conduct these meetings and professional programs. For more information on LIA's chapter or to volunteer to help, visit [www.laserinstitute.org](http://www.laserinstitute.org).

**Stay tuned for news on the formation of a regional chapter in the West.**

### Chapter Criteria

- The chapter must have a minimum of 20 current (paid) LIA members.
- Formation of an organizing committee with designated chairperson.
- No chapter dues required.
- Must meet at least four times a year.
- Times and locations at discretion of chapter.

## Journal of Laser Applications® Update

### NEW in 2006

*Journal of Laser Applications*® is now a sponsored publisher with Cross-Ref. Cross-Ref is a cross-publisher citation linking system that allows a researcher to click on a reference citation on one publisher's platform and link directly to the cited content on another publisher's platform, subject to the target publisher's access control practices. It operates a cross-publisher citation linking system that allows a researcher to click on a reference citation on one publisher's platform and link directly to the cited content on another publisher's platform, subject to the target publisher's access control practices. This citation-linking network today covers millions of articles and other content items from several hundred scholarly and professional publishers.

## Member Innovations

### Mirus Laser System

Northrop Grumman Cutting Edge Optronics, St. Charles, Mo., recently unveiled the Mirus™ laser system, an all-new DPSS laser available with up to 450 Watts of output power. Based on simple linear rail architecture, the Mirus can be configured in a wide variety of cavity designs and comes standard with any of NG-CEO's field proven pump modules. The Mirus is available for either TEM<sub>00</sub> or multi-mode operation, in IR or in green. For more information visit [www.st.northropgrumman.com/ceolaser](http://www.st.northropgrumman.com/ceolaser).

### Aculight Expands "Picasso" Laser Family

Aculight Corporation, Bothell, Wash., has expanded its "Picasso" family of pulsed fiber lasers. The new additions include a polarized eye-safe laser, Picasso Model

PF1550PM-30, and a 1-micron laser, Picasso Model PF1060-40. The PF1550PM-30 produces 4- to 6-ns pulses at repetition rates from 50kHz to 200kHz with 1W average power. It generates maximum pulse energy of 20mJ at 50kHz. The 1-micron version, Picasso Model PF1060-40 generates 3- to 5-ns pulses at repetition rates between 100kHz and 1MHz. It produces up to 10W of average power at a repetition rate of 1MHz and maximum peak powers of 30kW. These sources are ideal for applications such as homeland security, range gated imaging, LADAR, sensing and micromachining. For more information visit [www.aculight.com](http://www.aculight.com).

### Melles Griot's New Lasers

Melles Griot, Carlsbad, Calif., has unveiled the 85 BCD series of blue DPSS lasers – CDRH and CE compliant ver-

sions of the Kyma™ 488-nm lasers – for laboratory use and convenient for the design and certification of OEM laser based systems. The 85 BCD-series of lasers produce up to 20mW of output at 488nm in a linearly polarized, nearly circular beam (1.1:1 aspect ratio) with an M2 of <1.2.

Melles Griot has also introduced a new member of the 85 YCA-series of diode-pumped solid-state (DPSS) lasers. It has an output power of 25mW at 561nm – more yellow power than is available from air-cooled krypton/argon ion lasers. The additional power can be used to compensate for fiber-coupling losses or optical throughput inefficiencies associated with scanning and imaging devices. The 85 YCA-series of lasers are particularly suited for confocal laser scanning microscopy and for exciting Rhodamine, ROX, and

Alexa Fluor dyes. For information visit [www.mellesgriot.com](http://www.mellesgriot.com).

### Generator Back-Up Panel

Concoa, Virginia Beach, Va., has introduced the Series 540 back-up panel which automatically activates to supply gas without interruption for nitrogen, air, or hydrogen generators used in production environments. Adjustable pressure capability allows users to determine the pressure at which the reserve supplies the system. Check valves on both the generator and the reserve prevent back flow to the generator or reserve cylinder, while shut-off valves on both allow for isolation and disconnection of either line. When the generator resumes the ability to supply gas to the system, the reserve shuts down. For more information visit [www.concoa.com](http://www.concoa.com). ✱

## Members In Motion

### Fraunhofer Partners with IPG

IPG Photonics Corporation, Plymouth, Mich., and the Fraunhofer Center for Coatings and Laser Applications, a center of innovation in laser process development, recently announced that they have formed an alliance to develop new welding, cutting and brazing applications for the automotive, aerospace and oilfield industries using IPG's kilowatt fiber lasers and Fraunhofer's applications expertise.

"The fiber laser offers unique characteristics that will open up new applications and market areas for the 1-micron wavelength," said Eric Stiles, laser division manager of

Fraunhofer. "Its high beam quality makes it very interesting for remote processing, deep penetration welding, and laser cutting applications. And its compact size, electrical efficiency, and power scalability will bring it into areas where YAG lasers are not typically used."

### Aculight Wins USAF Contracts

Aculight Corporation, Bothell, Wash., a laser technologies developer, won two contracts from the U.S. Air Force Research Laboratory Directed Energy Directorate at Kirtland Air Force Base (Albuquerque, NM) totaling \$2,578,000 in 2005 and

\$935,000 in 2006. These related contracts allow Aculight to develop prototype mid-infrared and infrared semiconductor laser transmitters for use in future aircraft defensive systems. The laser transmitters are based on Directorate-developed optically pumped semiconductor laser device technologies. One application of these lasers is in infrared countermeasures systems which can autonomously detect, track and jam heat-seeking missiles, protecting both military and commercial aircraft.

### Melles Griot Acquires Business

Melles Griot, Carlsbad, Calif., and Coherent have

agreed that Melles Griot will begin supplying helium neon (HeNe) lasers directly to Coherent customers. Coherent previously distributed the products, which are manufactured by Melles Griot, under a private label agreement.

Said Emery Skarupa, general manager for Melles Griot Laser Group, "Those customers who previously purchased HeNe lasers from Coherent will now have direct access to our manufacturing capacity, broad engineering disciplines and our long-term commitment to this technology. The transition should be almost invisible to Coherent customers, as they are the same lasers they have been getting all along." ✱

# LIA Announces

## Publications for Sale

LIA is pleased to announce the addition of two new publications to its bookstore.

*Introduction to Laser Technology, 3<sup>rd</sup> Edition* – previously published as *Understanding Laser Technology, First and Second Editions* – introduces engineers, scientists, technicians, and novices alike to the world of modern lasers, without delving into the mathematical details of quantum electronics. Price is \$90 for LIA members and \$100 for nonmembers.

*Understanding Lasers: An Entry-Level Guide, 2<sup>nd</sup> Edition* is an updated, concise second edition of Jeff Hecht's *Understanding Lasers*, and is both current and easy to understand. Written for students, managers, non-specialist engineers, and anyone who wants an accessible introduction to laser technology, this book provides practical, intuitive descriptions of the workings of major types of lasers and their applications. Cost is \$63 for LIA members and \$73 for nonmembers. To order either, visit [www.laserinstitute.org/bookstore](http://www.laserinstitute.org/bookstore).



LIA's Peter Baker, Beth Cohen and Jim Naugle at Photonics West.

## Ukraine Conference Proceedings Available

The proceedings of the Second International Conference (LTWMP-05), which was held in Katsively, Crimea, Ukraine in May 2005, are now available for purchase. Edited by Prof. B. Paton and Prof. V. Kovalenko of the Paton Electric Welding Institute, NASU, Kiev, "Laser Technology in Welding and Material Processing" is 208 pages with a soft cover. Cost is \$50 USD including delivery by air registered mail. To order, contact Dr. Alexander Zelnichenko at [journal@paton.kiev.ua](mailto:journal@paton.kiev.ua), or visit [www.nas.gov.ua/pwj](http://www.nas.gov.ua/pwj).

## New Forum for Laser System Users

LASYS, a new international trade fair for system solutions in laser material processing, will be held Oct. 23-26, 2007 in Stuttgart, Germany. LASYS, whose concept was formulated in close agreement with industrial companies and research institutions located in Stuttgart, will have a focus on the different applications of laser systems in industrial production, primarily in the car industry, the mechanical engineering and plant construction industry, the

precision mechanics and precision engineering industry, and medical technology. LASYS will be held every two years after 2007. For more information visit [www.lasys-messe.de](http://www.lasys-messe.de).

## LIA Exhibits at Photonics West

A record number of attendees – 16,533 – and more than 1,000 exhibitors participated in Photonics West 2006, according to event sponsor SPIE (International Society for Optical Engineering), making it the most successful year ever for the photonics industry's largest annual trade show. The show was held in January in San Jose, Calif. The LIA and its members were well

represented among the more than 1,000 exhibitors. Traffic was steady, publication sales hit an all-time record, and there were a steady stream of laser safety training and application inquiries. LIA will continue to promote its corporate members products and services at this

show to provide quality information to the laser industry.

## Mark Your Calendars

The 25<sup>th</sup> International Congress on Applications of Lasers & Electro-Optics (ICALEO® 2006) will be held Oct. 30-Nov. 2, 2006 in Scottsdale, Ariz. ICALEO will include the Laser Materials Processing Conference, the Laser Microfabrication Conference, a Poster Presentation Gallery and the Laser Solutions Short Courses. Highlighted sessions including fiber laser processing, laser processing of biological material, laser processing in the aviation, defense, and space industry, lasers in material processing diagnostics and in nanotechnology, and the Laser Business Development Session. Don't miss the President's Reception to be held at Taliesin West, Frank Lloyd Wright's winter home, studio and architectural laboratory in the foothills of the McDowell Mountains. Sponsorship and vendor opportunities are still available. For more information, visit [www.icaleo.org](http://www.icaleo.org) or contact Beth Cohen [bcohen@laserinstitute.org](mailto:bcohen@laserinstitute.org). ✱

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- Achieve recognition
- Become part of a unique worldwide network of laser safety professionals
- Connect with other CLSOs and CMLSOs to share solutions

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