LIA TODAY

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LIA
THE LASER INSTITUTE

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PROTECTING THE EDGE: TRUMPF RESEARCH ON LASER BEAM SHAPING

Added LIA Interview with Author Daniel Flamm

Take a look into some of TRUMPF's latest research that was published in the Journal of Laser Applications. In this article, you'll get a short overview of their research, followed by an interview with author Daniel Flamm, TRUMPF's senior expert for laser beam shaping.

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INTRODUCTION OF THE LIA 2022 BOARD OF TRUSTEES

Meet this year's Officers and Board of Trustees. Last year LIA updated their by-laws to improve operations and communication. Many updates were made, but the biggest change was consolidating the Board of Directors and Executive Committee into one body called the Board of Trustees.

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BLS: CHALLENGES OF ESTABLISHING A LASER SAFETY PROGRAM

Through this article, the authors share their story on what went into developing the research and medical laser safety program within one institution, including the challenges and issues they have faced, and the tools and resources that have worked to build a proactive program.

FEATURES

BLS NEWSLETTER

ADVERTISERS

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LIA TODAY

THE OFFICIAL NEWSLETTER OF LIA

LIA TODAY is published bimonthly to educate and inform students and professionals of challenges and innovations in the field of photonic materials processing.

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LIA Laser Safety Trainings

LASER SAFETY OFFICER TRAINING	
Orlando, FL	Feb. 16 - 18, 2022
Orlando, FL	May 11 - 13, 2022
Orlando, FL	Aug. 17 - 19, 2022
Orlando, FL	Nov. 2 - 4, 2022
LASER SAFETY OFFICER WITH HAZARD ANALYSIS	
Orlando, FL	Feb. 21 - 25, 2022
Orlando, FL	May 16 - 20, 2022
Orlando, FL	Aug. 22 - 26, 2022
Orlando, FL	Nov. 7 - 11, 2022
MEDICAL LASER SAFETY OFFICER TRAINING	
Orlando, FL	Feb. 19 - 20, 2022
Orlando, FL	May 14 - 15, 2022
Orlando, FL	Aug. 20 - 21, 2022
Orlando, FL	Nov. 5 - 6, 2022
INDUSTRIAL LASER SAFETY OFFICER TRAINING	
Novi, MI	Feb. 9 - 10, 2022
Novi, MI	May 11 - 12, 2022
Novi, MI	Aug. 10 - 11, 2022
Novi, MI	Nov. 9 - 10, 2022

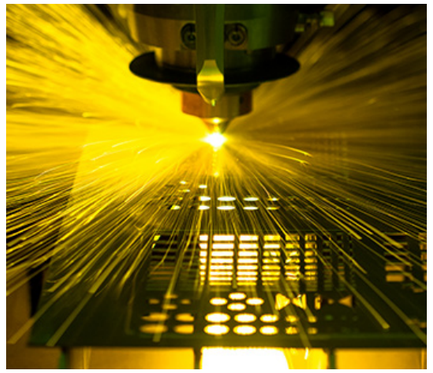
Visit www.lia.org for all course and event listings

Course Highlight

INDUSTRIAL LASER SAFETY OFFICER TRAINING
NOVI, MI - MAY 11-12, 2022

Designed to keep you on the leading-edge of safety training requirements and program administration, this course teaches a non-mathematical approach to facilitating the duties of a Laser Safety Officer. Developed and taught by LIA experts - the industry leader in laser safety education - the Industrial LSO course was designed for all levels of experience involved in industrial, and manufacturing applications of lasers. This course meets all LSO training requirements outlined by the ANSI Z136.9 Safe Use of Lasers in Manufacturing Environments standard and OSHA. This course is worth 16 CECs by AAHP and 2.0 BLS CM points by the Board of Laser Safety.

This course is hosted by LIA Corporate Member **IPG Photonics Corporation, Midwest Operations**. IPG Photonics Corporation is the world's leading provider of high power fiber lasers and fiber amplifiers that are revolutionizing performance and utility in a remarkable array of materials processing, telecommunications, medical and other advanced applications



Henrikki Pantsar
LIA President 2022

PRESIDENT'S MESSAGE

I am sure I share the optimism that a New Year, especially this one, brings with many of you! The economy in the United States treated the laser industry very well already in 2021 and hopefully this year finds us putting the pandemic, maybe not in the rear view mirror, but to state of managed coexistence. As I am writing this, the Olympic Games are bringing Nations together and we remain hopeful that live professional events will bring us together as individuals. One of the events that I am looking forward to is of course ICALEO 2022. By October, it will have been already three years since the last live ICALEO and I am really awaiting with pleasure to meeting our members and conference participants face to face. Who knows, maybe we will even see the revival of the Beer's Law Band.

The Laser Institute of America is also sponsoring the Industrial Laser Conference at IMTS in September 2022, which will be another event to get back on track in learning about lasers and applications from leading experts.

I am very grateful to start as the new President for the organization alongside our Officers, the Board of Trustees and our wonderful LIA Office Staff. As an organization we have managed to steer through the past couple of years well and maintaining good connections to our members via on-line events and content. We are also thankful that so many of you have contributed to these events and otherwise helped the organization forward

I wish everyone a great springtime and stay tuned for more on lasers, laser applications and laser safety. You can also find us on Facebook, LinkedIn and Twitter.

Be well and stay safe!

Nat Quick
Executive Director

EXECUTIVE DIRECTOR'S MESSAGE

Welcome to the new year!

We would like to welcome the LIA 2022 Officers and Board of Trustees:

2022 Officers	2022 Board of Trustees
President – Henrikki Pantsar	Klaus Loeffler
President Elect – Aravinda Kar	Jamie King
Past President – Gilbert Haas	Milan Brandt
Treasurer – Islam Salama	Robert Thomas
Secretary – Bo Gu	Constantin Haefner
	Koji Sugioka

The first LIA Member Insider was released this past month as a way to engage more with our membership and keep them up to date on all the latest information regarding our organization. There are also updates on special member perks, so make sure you are receiving this newsletter if you have a membership with us!

We are looking ahead to ICALEO 2022, which is set to be in Orlando, FL this October 17-20. The Call for Papers is currently open, and we will be accepting abstracts until April 4. We can't wait to see you there!

Development of a virtual Laser Additive Manufacturing (LAM) workshop series is also underway. We are excited to announce that the first LAM Presents is scheduled for April 13, 2022. It is entitled The Future of Laser Additive Manufacturing and will be chaired by Milan Brandt. More information on speakers and presentations will be coming to the lam.ngo website soon.

In this issue, we have a peak into TRUMPF's research into laser beam shaping, published in the Journal of Laser Applications as "Protecting the edge: Ultrafast laser modified C-shaped glass edges". This short summary is followed by an interview with author Daniel Flamm to give more insight into the research process and how this new research could affect the industry.

In the BLS newsletter, you can find an article about the challenges of creating a laser safety program.

Stay safe and keep others safe

A Look Ahead at Upcoming Laser Industry Conferences!

1. AORN - Mar 19-23, 2022 (New Orleans, LA, USA)*
2. AMUG - April 3-7, 2022 (Chicago, IL, USA)*
3. MD&M West - April 12-14, 2022 (Anaheim, CA, USA)
4. COLA - April 24-29, 2022 (Matsue, Japan)
5. Laser World of Photonics - April 26-29, 2022 (Munich, Germany)
6. Fabtech Mexico - May 3-5, 2022 (Mexico)*
7. AKL - May 4–6, 2022 (Aachen, Germany)*
8. RAPID + TCT - May 17-19, 2022 (Detroit, MI, USA)*
9. ALAW - June 7-9, 2022 (Plymouth, MI, USA)*
10. Fabtech Canada - June 14-16, 2022 (Toronto, OT, Canada)*
11. LASYS - Jun 21-23, 2022 (Stuttgart, Germany)*
12. IMTS - Sept 12-17, 2022 (Chicago, IL, USA)*
13. **ICALEO, Oct. 17-20, 2022 (Orlando, FL, USA)**
14. Fabtech - November 8-10, 2022 (Atlanta, GA, USA)*

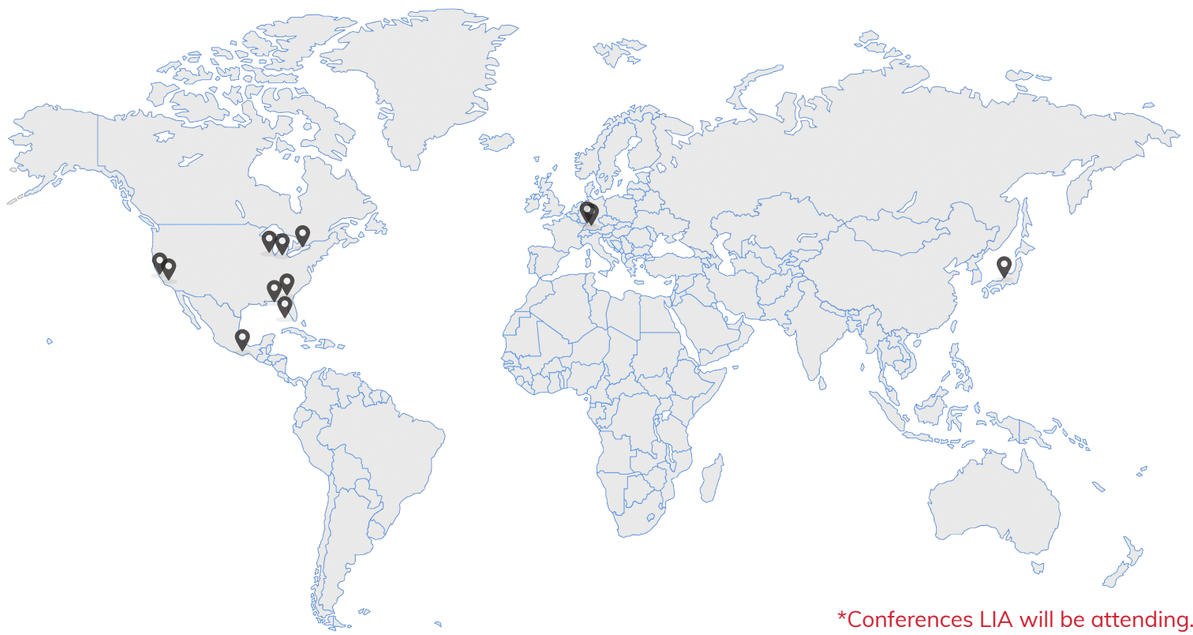
Cooperating Conferences

LASYS

rapid + tct

FABTECH

LIA is proud to be the on site Laser Safety Officer for the Fabtech conferences this year.

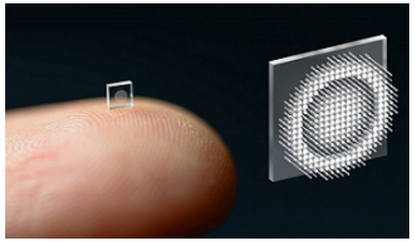


*Conferences LIA will be attending.

A Look Ahead at LIA's Upcoming Events!

TRENDING IN THE NEWS:
LIA'S TOP 4 ARTICLE PICKS

1

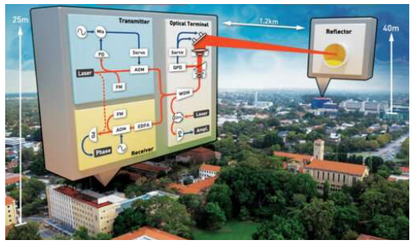


CAMERA THE SIZE OF A SALT GRAIN CAN TURN A SURFACE INTO A SENSOR

Researchers at Princeton University and the University of Washington (UW) designed a nanosize camera, no bigger than a grain of salt, that produces images comparable to those produced by a traditional lens setup more than 500,000 times larger than the nanosize device.

Read more

2



A NEW RECORD FOR LASER STABILITY ACROSS ATMOSPHERIC DISTANCES

A team of researchers at the University of Western Australia has set a record for stability when sending a laser beam across an atmospheric distance.

Read more

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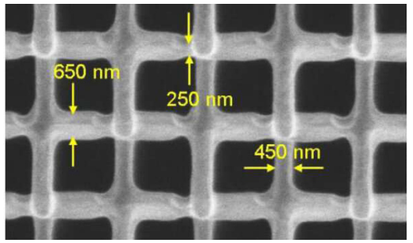


NANO-ARCHITECTED MATERIAL REFRACTS LIGHT BACKWARD; AN IMPORTANT STEP TOWARD CREATING PHOTONIC CIRCUITS

A newly created nano-architected material exhibits a property that previously was just theoretically possible: it can refract light backward, regardless of the angle at which the light strikes the material.

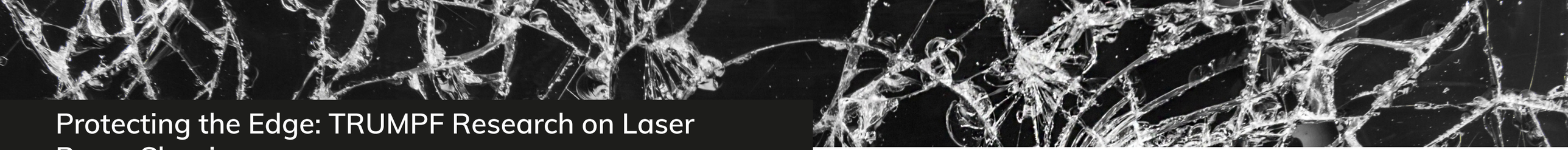
Read more

4

OPTICAL OSCILLOSCOPE COULD INCREASE DATA RATES BY FACTOR OF 10,000

Researchers at the University of Central Florida have developed an optical oscilloscope. The instrument converts light oscillations into electrical signals to measure the electric field of light.

Read more



Protecting the Edge: TRUMPF Research on Laser Beam Shaping

We touch the displays of our smartphones almost every minute and enjoy and trust their mechanical or chemical stability. The enormous hardness of display glasses allows these devices to be highly stressed, sometimes for years, without signs of wear. Typically, material hardness is always accompanied by brittleness. The glasses are therefore susceptible to fracture in the event of a defect or impact – an annoyance that almost every smartphone user has probably faced at some point.

The laser as nanosaw is an established tool for cutting glass. At first glance, it seems bizarre to process glass with light. However, if the photon densities are high enough, as is the case when focusing ultrashort laser pulses, specific defects can be induced into the volume of transparent materials. It has been found particularly beneficial to choose a focus shape that modifies the substrate in a single pass. Elongated, non-diffracting focus distributions such as the famous Bessel-Gaussian beam enable high-quality glass edges to be produced. The laser modification step, i.e., the generation of volume modifications, represents only halfway of the overall process. The weakened material must be separated along the modification surface in a second step, for example, by applying mechanical or thermal stress.

In "**Protecting the edge: Ultrafast laser modified C-shaped glass edges**" by Daniel Flamm et al., the authors point out that regardless of whether an advanced laser machining process is applied or a conventional scribe and break process is used, the cut glass will exhibit vertical edges. It is precisely at this point, at the tiny corner radii, that the brittle-hard material shows the main weak points. If an impact occurs here, stress accumulates at the right angles with cracks or chipping as the material response. To significantly reduce the right angle of the glass edges to make the substrate less susceptible to impact or defects is the main goal of the author's innovation. Chamfered, beveled or C-shapes are particularly in demand, especially when the tangential angle to the glass surface amounts to 45-deg. Here, the laser acts as a shaping tool where the focal distribution assumes the desired contour of the glass edge. For this purpose, the authors have developed a holographic beam splitting technology in which a large number of spots can be arranged arbitrarily in a working volume. There are virtually no limits to the edge trajectories on which more than 100 foci can be distributed simultaneously. As impressively presented, chamfer and bevel shapes are as conceivable as roof edges, semicircles or multiple steps. An adapted processing optics enables to modify the glass substrate particularly efficiently and precisely with a single pass. An optics inclination or even a workpiece flipping is not required. This laser process is highly attractive as cutting and edge shaping can be performed in a single step.

In the paper, the separation step is realized via wet chemical etching which has proven to be particularly advantageous with respect to edge quality and strength of the display glasses. In this process, such laser modifications are exploited that are specifically connected by cracks. The etching solution can thereby penetrate particularly efficiently into the inner areas of the transparent material and lead to the separated substrate in less than one hour. The glasses with tailored edges produced in this way meet the demands of the consumer industry in terms of roughness, mechanical stability and throughput.

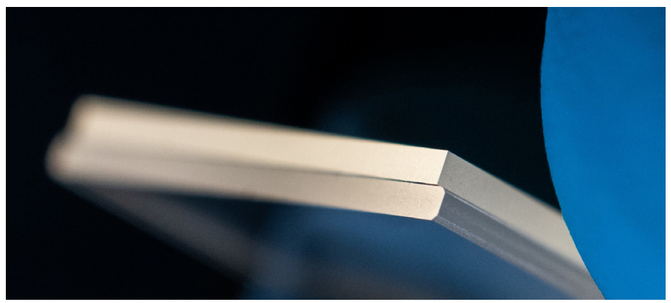
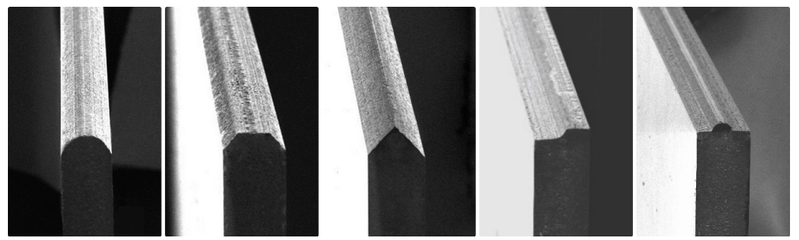


Image of high-quality laser cut glass substrates with a straight face and a chamfered edge.

The authors demonstrate the laser-based fabrication of chamfered glass edges enabled by advanced volume-energy deposition using holographic 3D-beam splitter. Most likely, this innovation will trigger novel processing strategies in research fields such as welding, data storing, writing of waveguides, or the generation of vias.

Read the original research article by Daniel Flamm et al., "Protecting the edge: Ultrafast laser modified C-shaped glass edges," Journal of Laser Applications, 34(1), 012014, (2022), https://doi.org/10.2351/7.0000592



Menu of glass substrates with different edge contours characterized by scanning electron microscopy.

LIA Interview with Author: Daniel Flamm

Tell us a bit about yourself and your history in laser research.

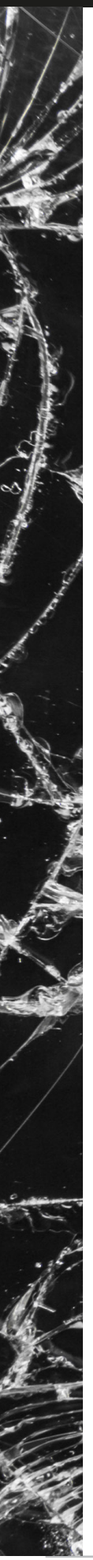
I had decided to study physics in Jena - the city of light - and of course I immediately met laser enthusiasts there. Fortunately, I had some good teachers and supporters - Dr. Michael Duparré deserves special mention - who recognized my creativity and assigned me to exciting projects at home and abroad. At that time, I was still working on topics about fiber optics and digital holography, but I was fascinated by the ability to store and transmit information in the spatial structure of light. After completing my doctorate, it was my privilege to apply my knowledge of shaping complex light states for laser material processing at TRUMPF. The light sources developed there deliver remarkably high energy and power levels. It is my passion to harness these extreme light states in order to employ them profitably for subtle machining in the micro- and nanoscale. As physicist, it is particularly satisfying to see how concepts, equations, theories learned in university can be used to develop products.

What inspired you to start this specific project?

In a homogeneous medium, light typically propagates in a straight line along its optical axis. Concepts in which a focus propagates along an accelerating trajectory, thus, where light can be directed around a corner, are fascinating to me. In this way, a light tool is realized that can take on the shape of the finished workpiece. In the present case a novel holographic beam splitting tool was developed enabling completely new laser material processing strategies.

Reading about what you have accomplished, it seems like a significant breakthrough for the industry. What would you say this means specifically for users, manufacturers, and researchers?

The process developed enables to create glass edges with customized shapes in a single laser pass. This mitigates the greatest weakness of conventionally cut substrates: the tiny corner radii of the typically vertical glass edges. It is precisely here that crack discharge occurs in the event of an impact - an annoyance that every smartphone user has probably already faced.



Cutting and chamfering in a laser process makes the process particularly attractive and saves manufacturers various time-consuming process steps such as mechanical grinding and polishing. A new disruptive process is at hand, with the potential to replace established techniques.

Not only the display industry is likely to find the process highly interesting, but all glass and optics manufacturers in general. The diverse design possibilities of the edges of the transparent materials allow new designs, e.g. for auto-centering optical components.

What did you find most challenging or surprising throughout the process?

In the beginning we were struggling a lot with numerical issues, meaning the computational effort for designing the hologram. However, we have managed to reduce the computation time from days to minutes, even for a large number of spots. Remarkably, the digital holograms we realize via liquid crystal displays actually allow the precise phase modulation of the light as we predict in our simulations.

We found surprisingly fast laser parameters that damage the material in such a way that selective etching became an obvious option for the separation step. Here, we exploit the fact that laser-induced local modifications in the volume of the glasses are connected by cracks, which we create specifically.

What do you think led to the rapid success demonstrated in the paper?

A great team effort – of course – in which different disciplines interlocked excellently. This is where I see the strength within our company. Leading experts in different fields such as laser and optics development, materials science, plasma physics, etc. can cooperate easily and across borders. Special mention should be made of Myriam, our materials scientist, who conducted the experiments and has an excellent feel for appropriate laser parameters and the corresponding material response.

You mentioned it will be a big benefit to display glasses, are there any other processes or industry areas you think can benefit from this innovation?

We are convinced that the laser optical technique to arbitrarily split a number of spots inside a working volume of a focusing unit will trigger several new applications. Of course, the primary focus is on the processing of transparent materials. Strategies such as welding, data storing or the drilling of through-vias are promising, as volume will beam splitting will result in high throughputs.

Considering non-transparent materials, we see advantages when curved surfaces have to be laser textured. We are currently working on various other concepts that we cannot present at this time for IP reasons.

Outside of the material processing field, we see potential in particle manipulation as well as microscopy.

Are there any manufacturers currently using this method?

Not yet, but there are several potential customers interested in our work. Everyone with own optimal ideas regarding the perfect edge shape. It is precisely here that we see an enormous advantage of our process, as we can serve almost any shape.

What would it take for the industry to adopt this approach?

In the micro machining business, it is usually our model to provide the ultrafast laser sources and the processing optics. We then work with capable integrators who build the machines on which laser material processing can take place with highest precision. As mentioned before, the separation step may be performed via wet chemical etching. Here, too, we work with reliable partners. We will provide information on the status of product development in the near future.

TRUMPF

WANT TO SHARE YOUR IDEAS WITH THE LASER COMMUNITY THROUGH *LIA TODAY*?

LIA TODAY

Check out the guest article guidelines below and get in touch with an editor today!

BEFORE YOU SUBMIT:

Content: We are always looking for great newsworthy content that covers challenges and innovations in the field of photonic materials processing, laser safety, and laser market trends. This is not a paid opportunity, but does carry the benefit of publishing your work on a platform that is read by thousands of your peers. All article topics should be confirmed with an LIA TODAY editor before writing your article. Please email your article ideas to liatoday@lia.org and an editor will be in touch with you.

Potential Categories: Safety, medical applications, research and development, laser applications fundamentals, history, business, and other categories.

Potential Industries: Energy storage, aerospace, DoD non-aerospace, automotive, medical devices and biotechnology, microelectronics and IC fabrication, Internet of Things, research and development, and other industries.

SUBMISSION GUIDELINES:

Style: The tone should be editorial and informative; it should not sound like a sales pitch. It should be comprehensible by a broad audience of readers with low to expert experience with the topic, so it is important to include examples and simple explanations alongside any technical language.

Length: 600 - 1500 words

Text: Please use standard fonts such as Arial, Calibri, or Times New Roman. Fonts, font sizes, and line spacing will be reformatted by LIA for the final piece. Grammar and mechanics will be edited to the LIA style guide by LIA, but please be mindful of spelling and grammar as you are writing so that your message is clear.

Headline: Please include two newsworthy headlines suggestions for your article using action verbs.

Images & Figures: Please include images to be used with the article. Submit as an email attachment (PNG, GIF, JPG, JPEG) (min. 1000px in width or height). Images should also be placed in the body of the text where the author would like them to appear in the final article. All figures or images should include captions.

Deadlines: All material is due no later than two weeks prior to the scheduled publishing date. Check with an editor for your deadline.

Note: LIA reserves the right to abstain from publishing a submitted article for any reason.

SUBMISSION CHECK LIST:

- Full text as a Word Document
  - Abstract: A 50 – 100 word summary in plain language
  - Two (2) headline suggestions using an action verb
  - Article 600 – 1500 Words
  - Images with captions placed in the body of the article
  - Article references when applicable
  - Short author *bio* (full title, company, 50 words)
  - (optional) Professional headshot of author
- Images attached in one of the accepted file types (.png, .tiff, .jpeg, .jpg) (min. 1000px width or height).

VIEW SUBMISSION FORM

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PHOTON AUTOMATION, INC.
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Since our inception in 2000, PHOTON AUTOMATION, INC. has been designing and developing automated systems for solving a wide variety of manufacturing problems for a diverse customer base. Our customers have realized the benefit of increased productivity and reduced cost through the proper implementation of automated machines. Many of these machines incorporate advanced manufacturing technologies, including lasers, vision systems, precision measurement devices, and robotics. All of these systems have been developed to take advanced manufacturing processes and make them simple to use while making them profitable for our customers to own.

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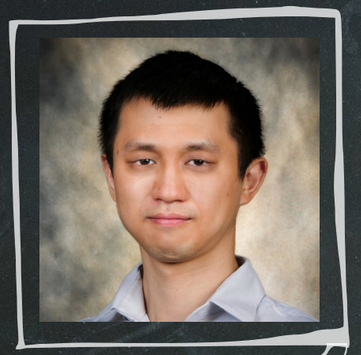


STUDENT SPOTLIGHT

Name: Ruitao Wu
Hometown/State: Jieyang, China
Year in School: Sixth year in PhD
Area of Study/Major:
Undergrad: Optical Information Science and Technology,
PhD: Optics and Photonics

When were you first introduced to photonics/electro-optics?

I was first introduced to the field of photonics by Prof. Guiyao Zhou during my undergraduate in South China Normal University. I would never forget the moment when he showed me the bright supercontinuum light generated from a photonic crystal fiber, which illuminated the darkness of the lab and lighted up my interests in optical science.

What or who inspired you to choose your line of study?

During my undergraduate, I became very interested in interdisciplinary research related to optics, especially due to two research works on News. One is a laser made from a single living cell published on Nature Photonics, while the other one is the super-resolution microscopy that won the 2014 Nobel Prize. Later, I realized that a PhD involved in both fundamental physics and state-of-art technology would make me well prepared for future career. That is why I went overseas and pursued a PhD in optics in CREOL.

Describe your favorite course you have taken so far.

The Quantum courses in CREOL, including Quantum Mechanics and Quantum Optics, are the best courses I have ever taken here. Prof. Ayman Abouraddy not only explains very well their mathematical structures and physical fundamentals, but also encourages us to ruminate and challenge the current philosophies, ideas and understanding of the subject.

Are you researching anything at the moment? Can you tell us about it?

During my PhD, I develop statistical tools for studying the light matter interaction process. Using light as tools, I extracted physical information from various materials, including colloidal, paints, proteins, even blood.

Now I am working on new ideas and systems for performing diffusive wave spectroscopy, a technique that can extract the dynamics of scatters within heavily scattering condition. We have successfully extended the applicability as well as enhanced the sensitivity of such technique.

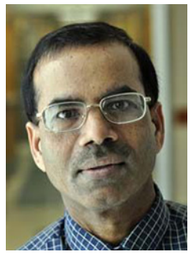
What would you like to do in the future with your studies?

I would like to contribute to the research of emerging science and technologies related to optics and photonics, either in the R&D department of an industrial company or in the academic environment.

MEET THE 2022 OFFICERS OF LIA

2022 Officers

LIA's 2022 President Henrikki Pantsar is Director of Applications and Services at Trumpf, Inc., Laser Technology Center in Plymouth, MI. In this position, he is responsible for micro, macro, marking, and additive manufacturing applications, as well as after-sales operations, including technical services and spare parts. Previously, he held the positions of Chief Technology Officer and Vice President of Research and Development at Cencorp Corporation/Valoe Corporation. He has also worked in the field of laser applications at Fraunhofer USA, VTT Technical Research Centre of Finland, and Lappeenranta University of Technology. Dr. Pantsar received his Doctor of Science in Technology degree from Lappeenranta University of Technology, and he also received the Henry Granjon Prize of International Institute of Welding for his work in laser-hardening research.



President Elect Aravinda Kar is a professor of Optics and leads the Laser-Assisted Manufacturing and Materials Processing (LAMMP) laboratory in CREOL, The College of Optics and Photonics at the University of Central Florida. He has been working on various aspects of laser materials processing and manufacturing for more than 30 years, and published 119 technical journal papers, 183 conference papers and received 29 patents. He is a Fellow of the Laser Institute of America and a Fellow of the National Academy of Inventors. He has co-authored a book entitled, Theory and Application of Laser Chemical Vapor Deposition, Plenum Press, New York, 1995.

Past President Gilbert Haas has worked with industrial lasers for the past 36 years. His education consists of a BS degree in Electrical Engineering from the University of Wisconsin and an AS degree in Laser Technology from North Central Technical College. He also has advanced his formal education by completing several additional classes in the fields of Mechanical Engineering and Metallurgy. Throughout his career, Mr. Haas has taught classes, given many lectures, published numerous papers and holds several national and international patents in the field of industrial laser applications.

Throughout his career with lasers, Mr. Haas always saw a need for new and innovative laser beam delivery technology. So in 1992, Mr. Haas founded Haas Laser Technologies, Inc. Today, Haas Laser Technologies, Inc. designs and manufactures custom laser beam delivery components, laser beam measurement equipment and laser systems for industrial applications at its facilities in Flanders, New Jersey.

Mr. Haas served on the LIA Board of Directors in 2015 and 2016 and as treasurer of the Executive Committee in 2017 and 2018.

Secretary Bo Gu (Ph.D.) has been in laser material processing field for 35 years since his first attendance of LIA's ICALEO conference in San Francisco in 1985. He has been voluntarily and extensively involved in LIA conferences since as an author, conference chair, international advisor, course instructor, and organizing committee member. Dr. Gu was elected LIA's board of directors three terms form 2006-2011 and 2018-2020, and LIA executive committee 2008-2010, and fellow of LIA. He was one of co-founders of LIA New England chapter. Since Dr. Gu's first invited paper at CLEO conference in 1988, he has given 19 plenary presentations, 65 invited talks, 3 magazine cover articles, and taught 7 short courses at various international conferences and he holds 75 patents on lasers and their applications. After a successful research and development career, Dr. Gu entered the business side of the laser field and had a proven track record of success in managing business including being the managing director of IPG Photonics Asia and General Manager of IPG China and various senior corporate executive positions at GSI Group, Lumonics, Resonetics, respectively. He developed many commercial products of lasers and laser systems for industrial markets and was instrumental in the wide industrial applications of fiber lasers in China and Asia. Dr. Gu is currently the president of Bos Photonics. He is a fellow of LIA, OSA, SPIE, and COS.

Treasurer Islam Salama is a Senior Director in the Technology Manufacturing group at Intel Corporation. In this capacity, Dr Salama manages a global team of scientists, engineers, legal, finance and business professionals responsible for technology development, high volume manufacturing and business operation of the high-density interconnect substrate and microelectronics packaging across all intel products. He has a PhD. in laser materials processing from the College of Optics and Photonics (CREOL) at the University of Central Florida. He worked in the field of semiconductor manufacturing and microelectronic packaging focusing on the development of various lasers and patterning processes for high density interconnect and microelectronic substrates. He has authored over 30 technical papers, was awarded more than 80 international patents and has more than 30 patent-pending inventions in the fields of laser technology, laser materials processing, semiconductor fabrications and microelectronics packaging and devices. He had been an invited speaker and lecturer in various international conferences and academic institutions. Dr Salama has been involved in the filed of laser materials processing and laser applications over the last 20 years and has been an active member of the LIA since 2001.

Introducing the Laser Institute of America's 2022 Board of Directors. Many updates were made to the by-laws last year, but the biggest change was consolidating the Board of Directors and Executive Committee into one body called the Board of Trustees. This was done to improve operations and communications within LIA and keep the Board more accountable to members. The Board of Trustees is made up of the above officers and following elected members of LIA.

MEET THE 2022 BOARD OF TRUSTEES

2022 Board of Trustees

Klaus Loeffler graduated from the University of Stuttgart with a master's in mechanical engineering. His expertise in lasers extends from resonator design, excitation methods, beam delivery, sensor systems to laser material processing. From 1990 to 1991 he was working on the LaserCAV process at MAHO in Pfronten/Germany. From 1991 to 1995 he was working at TRUMPF Laser Technik in Ditzingen/Germany as CO2 development engineer. In 1995 he came to TRUMPF Inc. Farmington CT/USA. He was working as technical coordinator between TRUMPF in Germany and TRUMPF Inc. to transfer technology and build up technical staff. From 1996 to 2002 he started the TRUMPF Laser Technology Center in Plymouth MI/USA. In his position as director, he was responsible for the organization, mainly focused in support and sales of all products of TRUMPF laser. During this time more than 500 TRUMPF lasers were implemented in North America. From 2002 to 2006 he took over the position as manager of the joining group at Volkswagen Group. In this position he was responsible for the implementation of more than 500 High Power Lasers into production. This included the application as well as the industrial implementation. In 2004 he founded the Automotive Laser Conference in Wolfsburg/Germany, which together with ALAW and JALAW builds a global conference partnership. From 2006 to the end of 2009 he took over the responsibility for international sales at TRUMPF Lasers and Systems along with the responsibility for sales, additional product management, main application management and marketing. Since 2009 he is responsible for the strategic industry development for the TRUMPF Laser und Systemtechnik. Starting 2007 he became a member of the board of directors of the Laser Institute of America. In 2008 he was elected as Secretary of the Executive Committee of LIA. Besides LIA he serves on the board of the SLT conference, the new exhibition LASYS 2008 and other events with the goal to ensure the global growth of laser technology.

Jamie J. King, is a Certified Laser Safety Officer with over 28 years of experience in laser safety. He has served as the LSO for NASA-Ames Research Center, Sandia National Laboratories (California), and is currently the laser safety subject matter expert for Lawrence Livermore National Laboratory (LLNL), home of the National Ignition Facility. Jamie represents LLNL on the Accredited Standards Committee (ASC) Z136, is a member of the Z136 Administrative Committee and also serves on the SSC-1, SSC-8, and TSC-4 subcommittees. He is the current chair for the Department of Energy's (DOE) Energy Facility Contractor's Group (EFCOG) Laser Safety Task Group and authors the Laser Lessons Newsletter for LLNL with worldwide distribution. Jamie served as co-chair for the Technical Practical Applications Seminar at the 2017 and 2019 ILSC. He is serving as director for the 2020 DOE LSO Workshop at the University of Texas-Austin and has been on the planning committee for the previous five. Jamie is the 2019 recipient of the R. James Rockwell, Jr. Educational Achievement Award.

Milan Brandt is a professor in Advanced Manufacturing in the School of Engineering, Technical Director Advanced Manufacturing Precinct and Director RMIT Centre for Additive Manufacturing, RMIT University, Melbourne Australia. Professor Brandt has been involved with lasers and manufacturing technologies professionally for some 36 years and is recognised nationally and internationally as the leading Australian researcher in the field. He is the recipient of a number of awards and is the author of over 200 publications, 5 book chapters and a book on laser additive manufacturing. He has also commercialised the results of his research through the companies he has helped establish.

Professor Brandt is a Fellow and currently an executive member of LIA. In 2018 he was the president of LIA. He has had a 33 year association with LIA being involved on the organizing committees for ICALEO and LAM for many years, as well as serving on the LIA Board of Directors. He is also the Senior Editor of JLA in additive manufacture.

Constantin Haefner recently joined the Fraunhofer Institute for Laser Technology (ILT) in Aachen, Germany, as the organization's executive director. ILT is one of the premier laser R&D institutions in Europe. He oversees more than 500 employees focused on activities such as the development of new laser beam sources and components and industrial laser processes. Prior, Haefner directed the Advanced Photon Technologies Program at Lawrence Livermore National Laboratory, USA, where he led the development of high-energy cutting-edge laser systems relevant to scientific research and commercial applications. Haefner and his team pushed the frontiers in developing next generation high peak-power lasers – technologies that are now starting to revolutionize the field.

Haefner received his Physics Diploma degree from the University of Constance (1999), and his Ph.D. from the University of Heidelberg, Germany (2003). In 2004 he became Research Assistant Professor and Chief Laser Scientist at the University of Nevada Reno's Nevada Terawatt Facility. In 2006 he joined LLNL where he has since led the R&D of advanced laser technologies. Haefner won several awards and was elected 2017 to Fellow of OSA for his pioneering work in development of next-generation, high-average- power petawatt laser systems and sustained advancement of state-of-the art laser technologies.

Robert Thomas, (PhD Physics, University of Missouri—Columbia) is currently serving as a Principal Research Physicist for the Airman Systems Directorate of AFRL. He is also the current Core Technology Competency Lead for the Bioeffects Division at Joint Base San Antonio—Fort Sam Houston, TX. His group has provided a very large percentage of foundational bioeffects data used to establish and refine exposure limits for laser safety. He is an active Fellow of the Laser Institute of America and SPIE, and regularly organizer of AFRL-supported scientific conferences in the fields of laser safety, biomedical optics, and related sciences. He has served LIA as Secretary (2012-2013) and President (2015), and as the Chairman of the Z136 Accredited Standards Committee (2010-2019).

Koji Sugioka is a Team Leader of Advanced Laser Processing Research Team at RIKEN Center for Advanced Photonics. He received B.E., M.E. and Ph.D. degrees in electronics from Waseda University in 1984, 1986 and 1993, respectively. He was awarded the degree of Doctor Honoris Causa from University of Szeged, Hungary in 2018. Sugioka joined RIKEN in 1986. At RIKEN, He has made important contribution to both fundamental researches on laser-matter interactions and diverse applications including practical use in the said area. He is internationally renowned for his works on laser doping, laser etching, laser surface modification, laser-induced selective metallization, microfabrication of transparent materials, VUV laser processing, laser surface nano-structuring, and 3D micro and nano fabrication. In particular, he is known as a leading scientist in the ultrafast laser processing technology. His current research interests include ultrafast laser processing for microfluidic, optofluidic, microelectronic and optoelectronic applications. Sugioka is currently a member of the board of directors of the Laser Institute of America (LIA), Japanese Laser Processing Society (JLPS) and The Japan Society of Laser Technology (JSTL), a council member of the Intl. Academy of Photonics and Laser Engineering (IAPLE), and a Fellow of SPIE, OSA, LIA, and IAPLE. He is also an editor-in-chief of Journal of the Laser Micro/Nanoengineering (JLMN) and an editor of Opto-Electronic Advances (OEA), Nanomaterials, Advanced Optical Technology (AOT), and Int. J. Extreme Manufacturing (IJEM).

BLS
THE BOARD OF LASER SAFETY

NEWSLETTER

Volume 3 • Issue 1

Certification Maintenance Tip!

You can earn BLS Certification Maintenance points by reading laser-related peer-reviewed academic journal articles. Points for journal article reading are claimed in Category 9, Other Activities. Record your reading using the Journal Article Verification Worksheet and have it signed by your supervisor. Attach it to your Certification Maintenance Worksheet as evidence of completion.

You can earn 0.25 CM points per hour of reading for a maximum of 2.0 CM in Category 9. Visit our website for details.

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ASC Z136 Annual Meeting

The ASC Z136 Annual Meeting will be held over Zoom on March 9, 2022 at 11:00AM EST. This meeting is open to voting members of ASC Z136 as well as non-members who would like to observe.

Draft Agenda: http://z136.org/securedoc.php?&docid=1493
Please email lcaldero@lia.org for the Zoom registration link.

LIA Classroom Courses for BLS CM Points

The following upcoming classroom courses are available to get BLS CM points:

Industrial Laser Safety Officer Training, May 11-12, 2022-Novi, MI
Laser Safety Officer Training, May 11-13, 2022-Orlando, FL
Medical Laser Safety Officer Training, May 14-15, 2022-Orlando, FL
Laser Safety Officer with Hazard Analysis Training, May 16-20, 2022-Orlando, FL

Find more information here: https://www.lia.org/training

New Option for Certification Exams

Certification exams will now be available through remote proctoring! Details to this process will be added to the BLS website soon.

For more certification exam information, visit www.lasersafety.org, or contact us at bls@lasersafety.org.

International Laser Safety Conference (ILSC) 2023 Dates and Location

The International Laser Safety Conference will now take place in Portland, Oregon from February 27 - March 2, 2023.

Find out more about the conference at ilsc.ngo.

Write for BLS!

Looking for a way to earn BLS CM points for free? BLS has restarted it's newsletter and is inviting CLSOs and CMLSOs to share laser safety knowledge with the laser community! Published article submissions are worth 0.5 BLS Certification Maintenance (CM) points in Category 3. For more information on guidelines and regulations, email us at bls@lasersafety.org. Check out our first submission on the next page!

The Challenges of Establishing a Laser Safety Program in an Academic and Clinical Setting

by Yuliya Henes, CMLSO, Bindu Timilsina, CLSO & Karisa Yang

Abstract

Laser applications have been growing in academic, research as well as in medical operations. The University of Wisconsin – Madison (UW-Madison) Campus and the University of Wisconsin Hospital and Clinics (UW Health) currently have an inventory of over 500 high power lasers. The state of Wisconsin doesn't have any regulations, rules, or safety practice requirements regarding laser use and applications. The Office of Radiation Safety (ORS), within Environmental Health & Safety (EH&S) department at UW-Madison, has adopted the American National Standards Institute (ANSI) and other applicable regulations to develop the laser safety policies, procedures, and guidance documents for working safely with lasers and laser instruments in research and clinical environments. The laser safety team at UW-Madison is committed to managing a robust program through partnership and collaborations with the laser users, Laser Safety Committees oversight, and strong management support. Currently, the Laser Safety Program covers research and clinical lasers, with the Research Laser Safety Committee overseeing academic and research use and the Medical Laser Safety Committee overseeing clinical applications.

Through this article, we are sharing our story on what went into developing the research and medical laser safety program within one institution, including the challenges and issues we have faced, and the tools and resources that have worked to build a proactive program.

History

Before 2015, we didn't have a formal laser safety program. The ORS staff members would provide support if someone reached out to the unit for any laser safety assistance. There was only an Excel sheet for an inventory of the few known lasers on campus. For the clinical side, UW Health, we had no idea who, where, and how the lasers were being used. Each department would have its own internal procedures that it would follow.

> "On the research side, the biggest challenge was to shift the mindset of the laser users"

At the initial phase, we reached out to the building managers, safety directors, faculties, research and clinical departments, division, and units, making connections and requesting help to find the lasers and laser systems. There was full-on support from leadership and management from both sides. We started our program by creating the research laser safety handbook outlining the requirements to operate Class 3B and Class 4 lasers for research, a medical laser safety plan, as well as other program elements, such as laser registration, posting and signage, warning lights, training, medical surveillance, and audit program.

In the meantime, we also worked on establishing the laser safety committee, to have the proper oversight and management of the program. Initially, we had one committee overseeing both research and the medical laser safety program. However, due to the difference in the nature and the scope of the programs, the committee members and the laser safety team felt the need for two separate committees. Thus, the existing laser safety committee was reorganized to create two new separate committees, research and medical laser safety committees, to better address the needs specific to research and medical uses of lasers.

Program Challenges and Efforts

On the research side, the biggest challenge was to shift the mindset of the laser users; they had been working with lasers for many years without incident, so why implement this program now? Another difficulty was the uniqueness of each research lab and how to identify the appropriate, economic safety measures that would still provide the equivalent protection. There are also ongoing challenges in tracking the lasers and keeping the inventory up to date as anyone can buy lasers anywhere, especially

for research use. Transfer and disposal of lasers are still a work in progress. Laser users do not always notify the laser safety team when they are to retire a laser and occasionally, we find the laser sitting on the loading dock for disposal.

In the clinical areas, there were no centralized laser safety policies and procedures, each department was on their own. The challenge was to develop a laser safety plan that would work for every department, physicians, nursing staff, laser operators, and leadership in which they would agree to follow the new changes. Another important issue that we discovered was how every department dealt with handling plumes generated during laser procedures. It was crucial to identify the best approach for effective control measures and provide support to create a safe work environment for the surgical team and the patient.

For some research labs, where the open beam operations were a measure issue, we recommended affordable solutions for fully containing the beam. Users could buy a good quality acrylic or polycarbonate sheet and make custom fit enclosures. The lab could self-test the materials using the power meter. A lot of the laser labs were able to use their department machine shop to build the containment and were appreciative of this recommendation. We also provided hanging organizers to help with properly organizing laser eyewear and magnetic floodlights to be used as warning lights for communicating the laser hazards at the lab entrance. We have worked constantly to build trust and partnership with the laser users rather than imposing and enforcing anything.

Gradually, over the years, we have started noticing the differences in people's perspectives of the program. The research labs that were resistant and not accommodating earlier, have slowly started to reach out for assistance. We have helped new laser users with the hazard assessment, selecting eyewear for the ultrafast lasers, reviewing the laser safety protocols for novel techniques, and other assistance as required. A continuous goal of the laser safety team in the research field has been to increase the visibility of the program through outreach and awareness. We started doing more reminders and outreach and offering help to assist in working safely with and around lasers. As a part of the outreach effort, we initiated the laser safety bulletin last year, which is released once per semester and distributed campus-wide through different communication channels. We hosted our first laser safety workshop last year to increase awareness of laser applications and safety in the research labs. There was a good turnout, and it was well-received by the research community.

> "A continuous goal of the laser safety team in the research field has been to increase the visibility of the program through outreach and awareness."

> "We believe it is everyone's responsibility to create a safe work environment and continue making improvements to the program."

For the clinical side, participation in department meetings, giving short presentations on the safety aspect, Q/A sessions, and visits for observing medical cases were very beneficial. This helped to spread the awareness of the program as well as identify clinical areas where the issues were present. We recognized that a critical missing piece was customized training focusing on specific clinical areas and specialties. We have collaborated with experts from each specialty, getting their guidance and feedback for developing the appropriate training programs.

Conclusion

It is important to build and maintain a close relationship with medical and research laser users. The laser safety program was developed to assist, support, and accommodate. We believe it is everyone's responsibility to create a safe work environment and continue making improvements to the program. This program has grown so much over the years, starting from just an Excel file to a highly developed program with established laser registration process, laser permits, and various department-specific training in addition to well-run laser safety websites with guidelines and information. The program will continue to grow and expand to meet groundbreaking laser safety research and clinical applications.

Articles that are published in the LIA Today and BLS Newsletter are the work of the author and don't necessarily represent the views of LIA or BLS

About the Authors

Yuliya Henes - Certified Medical Laser Safety Officer

Yuliya Henes, BS/MS, is a Certified Medical Laser Safety Officer for UW Health. 2022 is her 20th year of working for UW Madison. For the past 5 years she was working on developing and implementing a Medical Laser Safety Program for UW Health. Her passion is chemistry and criminal stories.

Bindu Timilsina - Certified Laser Safety Officer

Bindu Timilsina MS, CLSO, currently works as the Assistant Radiation Safety Officer and Laser Safety Officer for the UW-Madison, Campus. She has been with the department in various roles and responsibilities for over 13 years. In her spare time, she enjoys biking with family and gardening.

Karisa Yang

Karisa Yang, a Health Physicist Technician at UW Madison has been assisting the laser safety officers with the laser safety program since 2019. With her two years of experience in radiation and laser safety she plans to continue pursuing this career path. Beyond work, she enjoys hiking, painting, and exploring new cuisines.

About BLS

The mission of the Board of Laser Safety (BLS) is to provide a means for the recognition of laser safety professionals through certification and to promote competency in the field of laser safety. BLS certification will enhance the credibility of a designated Laser Safety Officer, and demonstrate that individuals serving in the field have agreed to adhere to high standards of safety and professional practice. For the employer, having a CLSO or CMLSO on staff demonstrates due-diligence and helps to ensure legitimacy and adequacy of the laser safety program, validating the company's dedication to a safe working environment for all employees.