

## Laser-Induced Damage in Optical Materials 2024 (LD100)

*Conference Chairs:* **Christopher Wren Carr**, Lawrence Livermore National Lab. (United States); **Detlev Ristau**, Laser Zentrum Hannover e.V. (Germany); **Carmen S. Menoni**, Colorado State Univ. (United States); **Michael D. Thomas**, Spica Technologies, Inc. (United States)

*Chair Emeritus:* **MJ Soileau**, Emeritus Chair, CREOL, The College of Optics and Photonics, Univ. of Central Florida (United States)

*Program Committee:* **Jonathan W. Arenberg**, Northrop Grumman Corp. (United States); **Xinbin Cheng**, Tongji Univ. (China); **Enam A. Chowdhury**, The Ohio State Univ. (United States); **Stavros G. Demos**, Univ. of Rochester (United States); **Eyal Feigenbaum**, Lawrence Livermore National Lab. (United States); **Ella S. Field**, Sandia National Labs. (United States); **Vitaly E. Gruzdev**, The Univ. of New Mexico (United States); **Lars O. Jensen**, TRUMPF SE + Co. KG (Germany); **Takahisa Jitsuno**, Osaka Univ. (Japan); **Marco Jupé**, Laser Zentrum Hannover e.V. (Germany); **Laurent Lamagnère**, CEA-Cesta (France); **Andrius Melninkaitis**, Vilnius Univ. (Lithuania); **Jean-Yves Natoli**, Institut Fresnel (France); **Raluca A. Negres**, Lawrence Livermore National Lab. (United States); **Jonathan Phillips**, STFC Rutherford Appleton Lab. (United Kingdom); **Christopher J. Stolz**, Lawrence Livermore National Lab. (United States); **Meiping Zhu**, Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences (China)

### MATERIALS AND MEASUREMENTS

Damage to the bulk of transparent optical media can occur in amorphous, polymeric, polycrystalline or crystalline materials. Characterization and measurements of damage threshold including methods of test procedures, data reduction, systems considerations, and international standards are reported. Also, characterization of basic materials properties, such as absorption, thermal conductivity, stress-optic coefficients, moduli and defects is in the focus of this section. With the emergence of nanostructured materials, the relationship between the propagating laser flux and engineered nanostructures becomes another topic of interest.

### SURFACES, MIRRORS, AND CONTAMINATION

Optical surfaces often limit the power handling capability of an optic due to intrinsic and extrinsic flaws and defects. Proper surface preparation, subsurface damage control, roughness and scattering reduction, environmental degradation and aging prevention, and contamination control can improve the performance of mirrors, diffraction gratings, substrates for multilayer coatings, and other surfaces.

### THIN FILMS

Because of the tremendous range of applications of optical multilayers for modifying the performance of optical measurements, and because thin films are generally the weakest part of optical systems, research into more damage-resistant thin films is a vibrant area. In addition to damage thresholds, researchers are interested in advanced film-deposition technology, contamination, film structure, film design, and film response to various environmental attacks and aging.

### FUNDAMENTAL MECHANISMS

Topics range from the basics of photon-matter interaction to nonlinear propagation. Emphasis is on nonlinear behavior; for example, multiphoton effects, nonlinear refractive index, and self-focusing. This area also includes modeling, such as thermal behavior of defect-initiated damage and the interplay between elements in an optical train that affect performance and hence damage.

### MINI-SYMPOSIUM ON POLARIZATION CONTROL

As the needs increase for high damage threshold optical components for beam polarization control, an array of approaches is explored suitable for operation in different wavelength and pulse length regimes. New fabrication methods have also enabled novel concepts to be considered. This mini-symposium seeks to explore the current state of the art and provide a forum for discussion of the potential of established and emerging technologies to support current and future needs.

### NATIONAL IGNITION FACILITY TOURS

**7 October 2024 • 11:40 AM - 5:30 PM PDT**  
**Lawrence Livermore National Laboratory**

Conference attendees are invited to tour the labs of the National Ignition Facility. Virtual and in-person tours will take place on **Monday 7 October**.

**The virtual tour** with an in-person host will be available to all attendees in the main conference room 2:00 PM-3:00 PM.

**In-person tours** require advanced signup and will be held 11:40 AM-5:30 PM (including transportation time). Groups will tour the following labs of the National Ignition Facility:

- NIF Laser Facility and Target Chamber
- NIF Optics Processing Facility
- NIF Optics Mitigation Facility

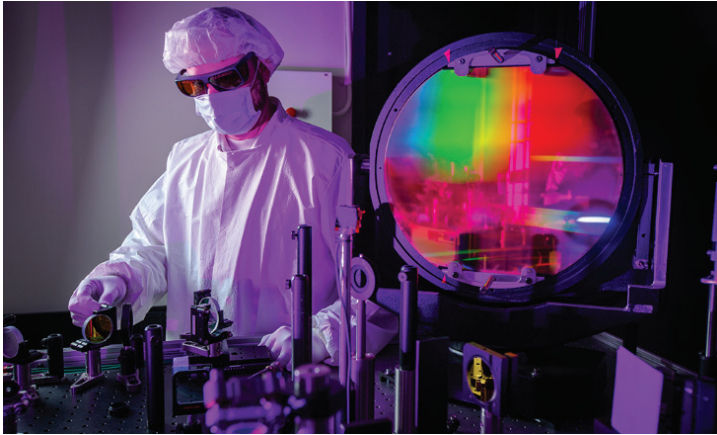
In-person tours require advanced signup. Please complete the [LLNL site access approval request form](#) to request approval to access LLNL facilities.

You will also need to provide a copy of your green card, current passport, or legal permanent resident card, your CV/Resume, and a copy of your Visa information. Application processing time varies by country of origin/citizenship. Please pay attention to the deadlines and accuracy of information to avoid delays.

### Important dates

Last Day to Register for NIF Tours	24 April 2024
Last Day to Submit your Documentation (passport, resume, visa, etc.) for NIF Tours	26 April 2024

continued next page ➔



### FEMTOSECOND 1030-NM MIRROR THIN FILM DAMAGE COMPETITION AT SPIE LASER DAMAGE

Coordinated by: **Colin Harthcock, Raluca Negres,**  
Lawrence Livermore National Lab. (USA)

A double-blind laser damage competition will be held to determine the current laser damage resistance of 1030-nm, normal incidence multilayer mirrors in the femtosecond pulse regime. The results will be shared at SPIE Laser Damage 2024. The mirrors must meet the following requirements:

- Reflectance > 99.5%
- Wavelength 1030-nm
- 0 degrees incidence angle
- Pulse length 200-fs; Variable repetition rate, i.e. 500 kHz vs. 500 Hz
- No GDD specifications
- Environment: Ambient air
- No wavefront or stress requirement
- No surface quality requirement.

This competition aims to assess the correlation in damage resistance of these 1030-nm HR coatings upon exposure to high vs. low repetition rate laser pulses using ISO S-on-1 LIDT test protocols. The coatings shall be deposited on glass substrates provided by the coating supplier. Please take note of the required substrate dimensions this year: substrates shall be 25 mm (+/- 0.4 mm) in diameter and up to 10 mm thick.

#### Sample submissions

Samples must be received by **1 June 2024** (earlier preferred, no late submissions will be accepted), sent to the following address:

**Raluca Negres, L-470**  
Lawrence Livermore National Laboratory  
7000 East Avenue  
Livermore, CA 94550

TESTING WILL BE PERFORMED BY:



#### Sample anonymity and requirements

Each sample will be assigned a unique label to maintain anonymity. The origin of the samples will not be released to the damage testing service and also will not be published at the Laser Damage Symposium or within the proceedings. A summary of the results will be published in the conference proceedings. Coating suppliers will be informed of the measured results and relative ranking within the submitted population. In order to minimize the number of damage tests, no more than two different samples can be submitted from each coating supplier.

In addition to the sample, the coating supplier **MUST** also supply the following information:

- Coating materials and number of layers
- Reflectance or transmission spectral scan (electronic format preferred) in the ~900-1200 nm range. Spectral scans should be emailed to [negres2@llnl.gov](mailto:negres2@llnl.gov)
- A brief description of the deposition method (e-beam, IAD, IBS, plasma assist, etc.)
- Substrate material and cleaning method.

Failure to submit samples with the required dimensions and/or provide the required coating information will result in disqualification from the competition. If two samples are submitted, the participant must describe the manufacturing differences between the two samples. Optical or scanning electron microscopy may be used to image damage sites. Reflectance measurements may also occur. No other characterization tools will be used on the samples to protect any proprietary features of the samples.

## Present your research at SPIE Laser Damage

Below are abstract submission instructions, the accompanying submission agreement, conference presentation guidelines, and guidelines for publishing in the Proceedings of SPIE on the SPIE Digital Library. Submissions subject to chair approval.

### Important dates

Abstracts due	24 April 2024
<b>National Ignition Facility (NIF) Tours</b> - Application Due	24 April 2024
<b>Laser Damage Competition</b> - Samples due	1 June 2024
Registration opens	June 2024
Authors notified and program posts online	1 July 2024
Submission system opens for manuscripts and poster PDFs*	5 August 2024
Poster PDFs due for spie.org preview and publication	11 September 2024
Advance upload deadline for oral presentation slides**	4 October 2024
Manuscripts due	30 October 2024

\*Contact author or speaker must register prior to uploading.

\*\*After this date slides must be uploaded onsite at Speaker Check-In

### What you will need to submit

- Title
- Author(s) information
- Speaker biography (1000-character max including spaces)
- Abstract for technical review (200-300 words; text only)
- Summary of abstract for display in the program (50-150 words; text only)
- Keywords used in search for your paper (optional)

Note: Only original material should be submitted. Commercial papers, papers with no new research/development content, and papers with proprietary restrictions will not be accepted for presentation.

### How to submit your abstract

- Visit the conference page: [www.spie.org/ld24call](http://www.spie.org/ld24call)
- You may submit more than one abstract but submit each abstract only once
- Click the "Submit An Abstract" button on the conference page
- Sign in to your SPIE account or create an account if you do not already have one
- Follow the steps in the submission wizard until the submission process is completed

### Submission agreement

All presenting authors, including keynote, invited, oral, and poster presenters, agree to the following conditions by submitting an abstract:

- Register and pay the author registration fee
- Oral presenters: recording and publication of your onsite presentation (slides synched with voice) for publication in the Proceedings of SPIE in the SPIE Digital Library
- Poster presenters: submit a poster PDF by the advertised due dates for publication in the Proceedings of SPIE in the SPIE Digital Library; poster PDFs may also be published and viewable in the spie.org program during and immediately after the event. Each poster must have a unique presenter; one person may not present more than one poster
- Email messaging for the conference series
- Submit a manuscript by the advertised due date for publication in the Proceedings of SPIE in the SPIE Digital Library
- Obtain funding for registration fees, travel, and accommodations
- Attend the meeting
- Present at the scheduled time

### Review and program placement

- To ensure a high-quality conference, all submissions will be assessed by the conference chair/editor for technical merit and suitability of content
- Conference chairs/editors reserve the right to reject for presentation any paper that does not meet content or presentation expectations
- Final placement in an oral or poster session is subject to chair discretion

### Publication of Proceedings in the SPIE Digital Library

Increase your professional visibility and publish in the world's largest collection of optics and photonics research. Your peers access approximately 18 million papers, presentations, and posters from the SPIE Digital Library each year.

- Only manuscripts, presentations, and posters presented at the conference and received according to publication guidelines and due dates will be published in the Proceedings of SPIE in the SPIE Digital Library
- Manuscripts, presentations, and posters will be officially published after the event in the SPIE Digital Library
- Conference chairs/editors may require revision before approving publication and reserve the right to reject for publication any manuscript or presentation that does not meet acceptable standards for a scientific publication
- Conference chair/editor decision to accept or reject a manuscript, presentation, or poster for publication is final
- Authors must be authorized to provide a suitable publication license to SPIE; Authors retain copyright of all scientific material
- SPIE retains rights to distribute and market the official SPIE recording of the presentation and/or submitted video/poster
- SPIE partners with relevant scientific databases and indexes to enable researchers to easily find papers published in the Proceedings of SPIE. The databases that abstract and index these papers include Astrophysical Data System (ADS), Ei Compendex, CrossRef, Google Scholar, Inspec, Scopus, and Web of Science.
- More publication information available on the [SPIDigitalLibrary.org](http://SPIDigitalLibrary.org)

## SPIE. LASER DAMAGE ABSTRACT SUBMISSION GUIDELINES

### Contact information

For questions about your presentation, submitting an abstract post-deadline, or the meeting, contact your Conference Program Coordinator.

#### SPIE LASER DAMAGE CHAIRS



**Christopher Wren Carr**  
Lawrence Livermore  
National Lab. (United  
States)



**Detlev Ristau**  
Laser Zentrum  
Hannover e.V.  
(Germany)



**Carmen S. Menoni**  
Colorado State Univ.  
(United States)



**Michael D. Thomas**  
Spica Technologies,  
Inc. (United States)

#### SPIE LASER DAMAGE CHAIR EMERITUS



**MJ Soileau**  
CREOL, The College of  
Optics and Photonics,  
Univ. of Central Florida  
(United States)

## SPIE. DIGITAL LIBRARY

**SPIE WILL PUBLISH  
YOUR RESEARCH  
GLOBALLY**

[www.SPIDigitalLibrary.org](http://www.SPIDigitalLibrary.org)

Your work will live far beyond the conference room—all proceedings from this meeting will be published in the SPIE Digital Library. Promote yourself, your ideas, and your organization to millions of key researchers from around the world through this web-based repository of the latest technical information.