2011 Laser Damage

XLIII Annual Symposium on
Optical Materials for High Power Lasers

Connecting minds for global solutions

The leading forum on materials for high power/high energy lasers

Technical Program

18–21 September 2011

National Institute of Standards
and Technology (NIST)
Boulder, Colorado, USA

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Conference 8190

Sunday-Wednesday 18-21 September 2011
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SPIE Laser Damage

XLIII Annual Symposium on

Optical Materials for High Power Lasers

Conference Chairs:
Gregory J. Exarhos, Pacific Northwest National Lab. (USA)
Vitaly E. Gruzdev, Univ. of Missouri-Columbia (USA)
Joseph A. Menapace, Lawrence Livermore National Lab. (USA)
Detlev Ristau, Laser Zentrum Hannover e.V. (Germany)
M. J. Soileau, Univ. of Central Florida (USA)

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Sunday 18 September

Sunday Events

Boulder Marriott, 2660 Canyon Blvd., Boulder

REGISTRATION MATERIAL PICK-UP
Room: Montrachet Room (1st floor)
Sun. 17.00 to 20.30

ROUND TABLE DISCUSSION

Boulder Marriott, Montrachet Room (1st floor)
Sun. 17.30 to 19.00

Definition and Measurement of Laser-Induced Damage in Transparent Materials by Single Short Laser Pulse

Panel Moderators: **Vitaly Gruzdev,** Univ. of Missouri-Columbia (USA); **Jonathan Arenberg,** Northrop Grumman Aerospace Systems (USA)

The Round-Table discussion is a pre-symposium event that takes place during the registration on Sunday evening. The main purpose of the roundtable is to warm up symposium participants intellectually and to prepare them for active discussions during the Symposium. This year, the Round Table focuses on definition and measurement of laser-induced damage (LID) of transparent materials by single short (nanosecond and shorter) laser pulses, issues lying at the very foundation of the Symposium. The discussion starts with two presentations by the moderators with slightly differing views of how to define laser-induced damage of the transparent materials and how to measure its threshold. The main points to be considered include statistical vs deterministic nature of LID, statistical variations of LID threshold and their origins, characteristic laser-induced phenomena and effects utilized to detect LID, approaches to measure LID threshold.

SOCIAL MIXER
Room: Montrachet Room (1st floor)
Sun. 19.00 to 21.00

Registration Material Pick-up continues until 20.30.

SPIE would like to express its deepest appreciation to the co-chairs, international program committee, session chairs, and authors who have so generously given of their time and advice to make this symposium possible. The symposium, like our other conferences and activities, would not be possible without the dedicated contributions of our participants and members.

This program is based on commitments received up to the time of publication and is subject to change without notice. The SPIE Event Manager for this symposium is Diane Cline.

Monday 19 September

CONFERENCE LOCATION:
NIST Building 1 (Radio Bldg.)
324 Broadway, Boulder, CO

REGISTRATION MATERIAL PICK-UP
NIST Lobby Area . . . . . .Mon. 07.30 to 08.30

Attendees must check in with NIST Security at entrance and have photo ID available.

POSTER PLACEMENT AT NIST
Rooms: 1 & 2 . . . . . .Mon. 07.30 to 08.30

OPENING REMARKS AND 2010 AWARDS PRESENTATION
Room: Auditorium. . . . . .Mon. 08.30 to 09.00

Joseph A. Menapace,
Lawrence Livermore National Lab. (USA)

SESSION 1
Room: Auditorium. . . . . .Mon. 09.00 to 10.00

Thin Films I

Session Chairs: **Amy L. Rigatti,** Univ. of Rochester (USA); **M. J. Soileau,** Univ. of Central Florida (USA)

09.00: **Using engineered defects to study laser-induced damage in optical thin films with nanosecond pulses** *(Invited Paper)*, Xinbin Cheng, Zhengxiang Shen, Hongfei Jiao, Jinlong Zhang, Bin Ma, Tao Ding, Zhanshan Wang, Tongji Univ. (China) . . .[8190-01]

09.40: **Low loss, ion beam sputtered optical coatings and their applications,** Ramin Lalezari, Advanced Thin Films (USA) .[8190-02]

2010 Award Winners

Best Oral Presentation:

Frequency dependence in the initiation of ultrafast laser-induced damage
Paper 7842-36

Author: **J. R. Gulley,** Kennesaw State Univ. (USA)

Best Poster Presentation:

Femtosecond pulse S on 1 LIDT in dielectric materials: comparison of experiment and theory
Paper 7842-08

Authors: **L. A. Emmert, M. Mero, D. N. Nguyen, W. Rudolph,** Univ. of New Mexico, Albuquerque (USA); **D. Patel, E. Krous, C. S. Menoni**, Colorado State Univ. (USA)

MONDAY POSTER OVERVIEW

Room: Auditorium. . . . . .Mon. 10.00 to 10.30

Poster authors are asked to give a 2-minute/2-viewgraph overview of their posters in the order they appear in the program.

Poster Session and Refreshment Break . . . . . 10.30 to 11.30

POSTERS-MONDAY

Rooms 1 & 2 . . . . . .Mon. 10.30 to 11.30

Thin Films

Posters will be displayed from 10.30 to 11.30 and 15.20 to 16.20 for viewing.

Defect formation in oxide thin films, Lars O. Jensen, Mathias Mende, Laser Zentrum Hannover e.V. (Germany); Céline Gouldieff, Frank R. Wagner, Institut Fresnel (France); Holger Blaschke, Laser Zentrum Hannover e.V. (Germany); Jean-Yves Natoli, Institut Fresnel (France); Detlev Ristau, Laser Zentrum Hannover e.V. (Germany) . . . . . .[8190-52]

Not all sputtered SiO_2 films are the same, Chris S. Smith, Dinesh Patel, Colorado State Univ. (USA); Ashot S. Markosyan, Roger K. Route, Martin M. Fejer, Stanford Univ. (USA); Carmen S. Menoni, Colorado State Univ. (USA). . . . . .[8190-53]

Spontaneous and induced absorption in amorphous Ta_2O_5 dielectric thin films, Ashot S. Markosyan, Roger K. Route, Martin M. Fejer, Stanford Univ. (USA); Dinesh Patel, Carmen S. Menoni, Colorado State Univ. (USA). . . . . .[8190-54]

Comparison of femtosecond pulse LIDT in vacuum of oxide films and the effect of a thin capping layer, Duy N. Nguyen, Luke A. Emmert, The Univ. of New Mexico (USA); Dinesh Patel, Carmen S. Menoni, Colorado State Univ. (USA); Wolfgang Rudolph, The Univ. of New Mexico (USA) . . . . . .[8190-55]

Effects of polishing and cleaning process on laser-induced damage of 355 nm AR coatings, Zhengxiang Shen, Tao Ding, Xiaowen Ye, Bin Ma, Xinbin Cheng, Hongfei Jiao II, Jinlong Zhang, Tongji Univ. (China); Huasong Liu, Yiqin Ji, Tianjin Jinhang Institute of Technology Physics (China); Zhanshan Wang, Tongji Univ. (China) . . . . . .[8190-56]

Database on damage thresholds of picoseconds pulse for AR and HR coatings, Shinji Motokoshi, Institute for Laser Technology (Japan); Katsuhiro Mikami, Eiji Sato, Osaka Univ. (Japan); Kota Kato, Tomohiro Somekawa, Institute for Laser Technology (Japan); Takahisa Jitsuno, Osaka Univ. (Japan) . . . . . .[8190-57]

Characterization of hafnia thin films made with different deposition technologies, Wanjun Ai, Shengming Xiong, Institute of Optics and Electronics (China) . . . . . .[8190-78]

POSTERS-MONDAY

Room: Auditorium. . . . . .Mon. 10.30 to 11.30

Surfaces, Mirrors, and Contamination

Posters will be displayed from 10.30 to 11.30 and 15.20 to 16.20 for viewing.

Full-field simulation of laser-generated ultrasound at the fluid-solid interface, Yan Zhao, Southeast Univ. (China) and Nanjing Univ. of Science & Technology (China); Zhonghua Shen, Jian Lu, Xiaowu Ni, Nanjing Univ. of Science & Technology (China); Yiping Cui, Southeast Univ. (China). . . . . .[8190-58]

Formation mechanism of self-organized nanogratings induced by femtosecond laser pulses on titanium surface, Md. S. Ahsan, KAIST (Korea, Republic of) and Khulna Univ. (Bangladesh); Yeong G. Kim, Man S. Lee, KAIST (Korea, Republic of). . . . . .[8190-59]

Influence of subsurface defect on anti-damage capability of fused silica at UV laser, Jin Huang, China Academy of Engineering Physics (China) . . . . . .[8190-60]

Characterization of CO_2 laser-based damage mitigation of SiO_2 surfaces using infrared thermometry and microscopy, Philippe Cormont, Commissariat à l'Énergie Atomique (France); Laurent Gallais, Institut Fresnel (France); Lucile Robin, Commissariat à l'Énergie Atomique (USA); Hebert David, Jean-Luc Rullier, Commissariat à l'Énergie Atomique (France) . . . . . .[8190-61]

Study of dust-pollution-induced laser damage on fused silica surface, Xinda Zhou, Jin Huang, Xiaodong Jiang, China Academy of Engineering Physics (China) . . . . . .[8190-62]

Chemical inhibition, mechanisms and detection of contamination-enhanced laser-induced damage, Bruce H. Weiller, Jesse D. Fowler, Randy M. Villahermosa, The Aerospace Corp. (USA) . . . . . .[8190-63]

Cleaning practices and facilities for the National Ignition Facility, James A. Pryatel, William H. Gourdin, Susan C. Frieders, Lawrence Livermore National Lab. (USA) . . . . . .[8190-64]

Schedule Your Week

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SESSION 2

Room: Auditorium. . . . . .Mon. 11.30 to 12.50

Thin Films II

Session Chairs: **Jonathan W. Arenberg,** Northrop Grumman Aerospace Systems (USA);
Carmen S. Menoni, Colorado State Univ. (USA)

11.30: **Measurement and calculation of ternary oxide mixtures for ultra short pulse laser thin film optics**, Marco Jupé, Mathias Mende, Detlev Ristau, Laser Zentrum Hannover e.V. (Germany); Laurent Gallais, Institut Fresnel (France) . . . . . .[8190-03]

11.50: **HfO_2/SiO_2 enhanced diamond turned aluminum mirrors for IR laser optics**, Jue Wang, Horst Schreiber, Corning Tropel Corp. (USA); Scott J. Wilkinson, Robert D. Felock, Corning NetOptix (USA) . . . . . .[8190-04]

12.10: **Laser damage threshold results for sputtered coatings produced by a remote plasma launch system**, Peter E. MacKay, Mike Wilde, Gooch & Housego Plc (United Kingdom); Steve Wakeham, Plasma Quest Ltd. (United Kingdom); John Allen, AJ Thin Films Consultancy Ltd. (United Kingdom). . . . . .[8190-05]

12.30: **Excimer mirror laser damage competition**, Christopher J. Stolz, Lawrence Livermore National Lab. (USA) . . . . . .[8190-06]

Lunch Break . . . . . .12.50 to 13.40

SESSION 3

Room: Auditorium. . . . . .Mon. 13.40 to 15.20

Thin Films III

Session Chairs: **Mireille Commandré,** Institut Fresnel (France);
Detlev Ristau, Laser Zentrum Hannover e.V. (Germany)

13.40: **Laser-induced damage of coatings on Yb:YAG crystals at cryogenic condition**, Weili Zhang, He Wang, Hongji Qi, Dawei Li, Kui Yi, Jianda Shao, Shanghai Institute of Optics and Fine Mechanics (China) . . . . . .[8190-07]

14.00: **Laser-induced damage of Kapton thin films demonstrating temperature and wavelength dependent absorptance: a case study in remote-sensing material analysis**, William J. Palm, Michael A. Marciniak, Glen P. Perram, Kevin C. Gross, William F. Bailey, Air Force Institute of Technology (USA) . . . . . .[8190-08]

14.20: **Laser-induced damage thresholds of optical coatings at different temperature**, Katsuhiro Mikami, Shinji Motokoshi, Masayuki Fujita, Takahisa Jitsuno, Kazuo A. Tanaka, Osaka Univ. (Japan). . . . . .[8190-09]

14.40: **Investigation of the laser-induced damage of dispersive coatings**, Ivan B. Angelov, Aaron von Conta, Sergei A. Trushin, Max-Planck-Institut für Quantenoptik (Germany); Zsuzsanna Major, Ferenc Krausz, Max-Planck-Institut für Quantenoptik (Germany) and Ludwig-Maximilians-Univ. München (Germany); Vladimir Pervak, Ludwig-Maximilians-Univ. München (Germany) . . . . . .[8190-10]

15.00: **Characterization of 1064nm laser-induced damage on antireflection coatings grown by atomic layer deposition**, Zhichao Liu, Yaowei Wei, Songlin Chen, Ping Ma, Jianping Hu, Chengdu Fine Optical Engineering Research Ctr. (China) . .[8190-11]

Poster Session and Refreshment Break . . . . . .15.20 to 16.20

POSTERS-MONDAY AFTERNOON

Room: Auditorium . . . . . .Mon. 15.20 to 16.20

Thin Films and Surfaces, Mirrors, and Contamination

Posters will be displayed from 10.30 to 11.30 and 15.20 to 16.20 for viewing.

SESSION 4

Room: Auditorium. . . . . .Mon. 16.20 to 17.40

Materials and Measurements I

Session Chairs: **Stavros G. Demos,** Lawrence Livermore National Lab. (USA); **Takahisa Jitsuno,** Osaka Univ. (Japan)

16.20: **Characterization of optical losses in transparent YAG ceramics** *(Invited Paper)*, Romain Gaume, Stanford Univ. (USA) . . . . . .[8190-12]

17.00: **Investigation of bonding interface and effective laser oscillation by advanced composite ceramic**, Tomosumi Kamimura, Yuki Yamana, Haruki Nakagawa, Hiroki Muraoka, Osaka Institute of Technology (Japan); Sawao Honda, Yuji Iwamoto, Nagoya Institute of Technology (Japan); Yan Lin Aung, Akio Ikesue, World Lab Co., Ltd. (Japan) . . . . . .[8190-68]

17.20: **Subnanosecond bulk damage thresholds of single-crystal YAG and diffusion-bonded YAG structures at 1 micron,** Robert Stultz, Karen E. Yokoyama, Michael Ushinsky, Jeanette Lurier, Raytheon Space & Airborne Systems (USA); Michael D. Thomas, Andrew J. Griffin, Spica Technologies, Inc. (United Kingdom); Robert W. Farley, Mark E. Rogers, Brendan Foran, The Aerospace Corp. (USA) . . . . . .[8190-14]

Closing Remarks

Room: Auditorium. . . . . .Mon. 17.40 to 17.50

Open House and Reception . . . . . Mon. 18.30 to 20.00

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Tuesday 20 September

TUESDAY POSTER PLACEMENT AT NIST

Rooms: 1&2. . . . . Tues. 07.30 to 08.20

Tuesday poster authors may set up their posters at this time.

SESSION 5

Room: Auditorium. . . . . Tues. 08.20 to 10.00

Materials and Measurements II

Session Chairs: **James E. Andrew,** AWE plc (United Kingdom); **Joseph A. Menapace,** Lawrence Livermore National Lab. (USA)

08.20: **Imaging studies of photodegradation and recovery of DO11(and related dyes) doped into PMMA**, Benjamin R. Anderson, Shiva K. Ramini, Mark G. Kuzyk, Washington State Univ. (USA) . . . . . .[8190-16]

08.40: **Recent progress in the development of pulse compression gratings**, Jérôme Néauport, Commissariat à l'Énergie Atomique (France); Nicolas Bonod, Institut Fresnel (France); Steve Hocquet, Commissariat à l'Énergie Atomique (France) . . . .[8190-17]

09.00: **Self healing mechanisms in anthraquinone dyes when doped in PMMA polymer**, Shiva K. Ramini, Prabodh Dhakal, Mark G. Kuzyk, Washington State Univ. (USA) . . . . . .[8190-18]

09.20: **Design and testing of optical coatings for laser crystals for HiPER project**, Jindrich Oulehla, Pavel Pokorny, Josef Lazar, Institute of Scientific Instruments of the ASCR, v.v.i. (Czech Republic) . . . . . .[8190-19]

09.40: **Femtosecond laser micro fabrication in polymers towards memory devices and micro fluidic applications,** Deepak L. N. Kallepalli, Soma Venugopal Rao, Desai Narayana Rao, Sr., Univ. of Hyderabad (India) . . . . . .[8190-20]

TUESDAY POSTER OVERVIEW

Room: Auditorium. . . . . Tues. 10.00 to 10.30

Poster authors are asked to give a 2-minute/2-viewgraph overview of their posters in the order they appear in the program.

Poster Session and Refreshment Break . . . . . .10.30 to 11.30

POSTERS-TUESDAY

Room: 1 & 2. . . . . Tues. 10.30 to 11.30

Materials and Measurements

Posters will be displayed from 10.30 to 11.30 and 15.20 to 16.20 for viewing.

Effect of laser beam size on laser-induced damage performance, Wei Han, Liquan Wang, Bin Feng, China Academy of Engineering Physics (China) . . . . . .[8190-13]

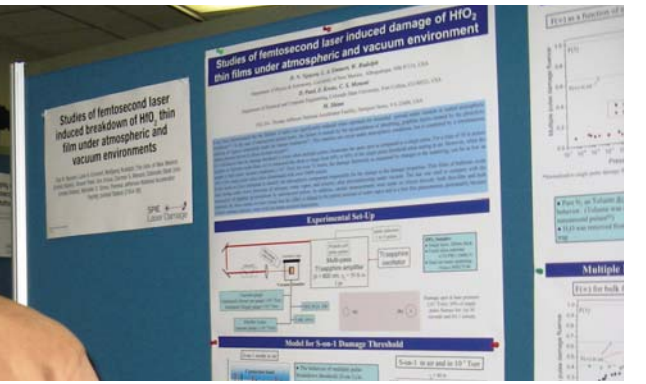
Damage effects of filaments on non-transparent materials at long distances, Karsten Diener, Harmut Borchert, Institut Franco-Allemand de Recherches de Saint-Louis (France); Ruediger Schmitt, Institut Franco-Allemand de Recherches de Saint-Louis (Germany); Magali Durand, Ecole Polytechnique (France); Aurélien Houard, Bernard S. Prade, André Mysyrowicz, Ecole Nationale Supérieure de Techniques Avancées (France); Anne Durécu, Didier Fleury, Bernard G. Moreau, Olivier Vasseur, ONERA (France); Francis Théberge, Marc Chateauneuf, Jacques Dubois, Defence Research and Development Canada (Canada) . . . . . .[8190-65]

Temperature dependences of fluorescence characteristic for Nd/Cr:YAG materials, Yoshiyuki Honda, Minoru Yoshida, Kinki Univ. (Japan); Shinji Motokoshi, Kana Fujioka, Takahisa Jitsuno, Masahiro Nakatsuka, Osaka Univ. (Japan) . . . . . .[8190-66]

Potential of large diameter MgF_2 single crystal grown by the Czochralski method, Yasuhiro Hashimoto, Yuichi Ikeda, Masao Ariyuki, Naoto Mochizuki, Teruhiko Nawata, Tokuyama Corp. (Japan). . . . . .[8190-67]

Characterization of optical materials and coatings for high-power NIR/VIS laser application, Christian Mühlig, Simon Bublitz, Wolfgang Paa, Institut für Photonische Technologien e.V. (Germany); Joachim Hein, Jörg Körner, Friedrich-Schiller-Univ. Jena (Germany); Ivo Zawischa, TRUMPF Laser GmbH & Co. KG (Germany) .[8190-69]

The strategies of laser-induced damage threshold tests for HR and AR coatings at 1064nm, Bin Ma, Yanyun Zhang, Zhengxiang Shen, Hongfei Jiao, Xinbin Cheng, Jinlong Zhang, Tao Ding, Tongji Univ. (China); Huasong Liu, Yiqin Ji, Tianjin Jinhang Institute of Technology Physics (China); Pengfei He, Zhanshan Wang, Tongji Univ. (China) . . . . . .[8190-70]



Self-laser conditioning of KDP and DKDP crystals, Cédric Maunier, Mathieu Balas, Thierry Donval, Laurent Lamaignère, Guillaume Duchateau, Gabriel Mennerat, Commissariat à l'Énergie Atomique (France) . . . . . [8190-71]

An empirical investigation of the laser survivability curve: II, Jonathan W. Arenberg, Northrop Grumman Aerospace Systems (USA); Wolfgang Riede, Alessandra Ciapponi, Paul Allenspacher, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); Jon H. Herringer, Arrow Thin Films, Inc. (USA). . . . . [8190-72]

Complex defects in III-V compound semiconductors, Tinatin Laperashvili, Orest Kvitsiani, Maia Elizbarashvili, Institute of Cybernetics (Georgia) . . . . . [8190-73]

A high-power QCW Nd:YAG laser with narrow line width linearly polarized output, Baoshan Wang, Technical Institute of Physics and Chemistry (China) and Changchun Institute of Optics, Fine Mechanics and Physics (China) and Chinese Academy of Sciences (China) . . . . . [8190-74]

Reflectivity measurement with optical feedback cavity ring-down technique employing a multi-longitudinal-mode diode laser, Zhechao Qu, Yanling Han, Shengming Xiong, Bincheng Li, Institute of Optics and Electronics (China) . . . . . [8190-79]

600ps Nd:YAG laser system for damage threshold measurements, Michael D. Thomas, Andrew J. Griffin, Spica Technologies, Inc. (USA). . . . . [8190-80]

POSTERS-TUESDAY

Room: Auditorium. . . . . Tues. 10.30 to 11.30

Fundamental Mechanisms

Posters will be displayed from 10.30 to 11.30 and 15.20 to 16.20 for viewing.

Modeling laser-induced dielectric breakdown: application of the multiple rate equation, Oliver Brenk, Baerbel Rethfeld, Technische Univ. Kaiserslautern (Germany). . . . . [8190-75]

Effect of strain on laser damage and its relation with precursor defects in KDP/DKDP, François P. Guillet, Bertrand Bertussi, Audrey S. Surmin, Guillaume Duchateau, Commissariat à l'Énergie Atomique (France) . . . . . [8190-76]

The impact ionization coefficient in dielectric materials revisited, Christian Karras, Duy N. Nguyen, Luke A. Emmert, Wolfgang Rudolph, The Univ. of New Mexico (USA). . . . . [8190-77]

SESSION 6

Room: Auditorium . . . . . Tues. 11.30 to 12.50

Materials and Measurements III

Session Chairs: **Amy L. Rigatti,** Univ. of Rochester (USA); **Michelle D. Shinn,** Thomas Jefferson National Accelerator Facility (USA)

11.30: **Estimation of the Raman cross section in KDP and DKDP at 2w, 3w and 4w**, Stavros G. Demos, Lawrence Livermore National Lab. (USA) . . . . . .[8190-21]

11.50: **The uncertainty analysis of the laser damage threshold measurement based on ISO11254-1**, Jianping Hu, Chengdu Fine Optical Engineering Research Ctr. (China) . . . . . .[8190-22]

12.10: **Material modification and 3D structure of damage craters in fused silica induced by 355 nm laser pulses irradiation**, Chunhong Li, Xin Ju, Univ. of Science and Technology Beijing (China) . . . . . .[8190-23]

12.30: **Third harmonic microscopy for optical material characterization**, Reed A. Weber, Cristina Rodriguez, Duy N. Nguyen, Luke A. Emmert, Wolfgang Rudolph, The Univ. of New Mexico (USA); Dinesh Patel, Carmen S. Menoni, Colorado State Univ. (USA) . . . . . .[8190-24]

Lunch Break . . . . . .12.50 to 13.40

SESSION 7

Room: Auditorium . . . . . Tues. 13.40 to 15.20

Materials and Measurements IV

Session Chairs: **Vitaly E. Gruzdev,** Univ. of Missouri-Columbia (USA); **M. J. Soileau,** Univ. of Central Florida (USA)

13.40: **Modeling max-of-n fluence distribution for optics lifetime**, Zhi M. Liao, John Huebel, John B. Trenholme, Christopher W. Carr, Lawrence Livermore National Lab. (USA) . . . . . .[8190-25]

14.00: **Laser damage of the large aperture KDP third harmonic generation crystal due to stimulated Raman scattering**, Bin Feng, Jing Wang, Wei Han, China Academy of Engineering Physics (China) . . . . . .[8190-26]

14.20: **Deterministic single shot and multiple shot bulk laser damage thresholds of borosilicate glass at 1.064 micron**, Mark W. Kimmel, Sandia National Labs. (USA); Binh T. Do, Ball Aerospace & Technologies Corp. (USA); Arlee V. Smith, AS-Photonics, LLC (USA) . . . . . .[8190-27]

14.40: **Photo-thermal tomography of optical coatings based on surface thermal lensing technology**, Junhai Xu, Meiping Zhu, Yuanan Zhao, Kui Yi, Jianda Shao, Shanghai Institute of Optics and Fine Mechanics (China) . . . . . .[8190-28]

15.00: **Investigation of laser energy and intensity fluctuations of Q-switched nanosecond laser system using second harmonic generation**, Oleg A. Konoplev, Aleksey A. Vasilyev, Steven X. Li, Mark A. Stephen, Anthony W. Yu, Michael A. Krainak, NASA Goddard Space Flight Ctr. (USA) . . . . . .[8190-29]

Poster Session and Refreshment Break . . . . . .15.20 to 16.20

POSTERS-TUESDAY AFTERNOON

Rooms: 1 & 2. . . . . Tues. 15.20 to 16.20

Materials and Measurements and Fundamental Mechanisms

Posters will be displayed from 10.30 to 11.30 and 15.20 to 16.20 for viewing.

SESSION 8

Room: Auditorium. . . . . Tues. 16.20 to 18.00

Surfaces, Mirrors, and Contamination

Session Chairs: **Takahisa Jitsuno,** Osaka Univ. (Japan); **Christopher J. Stolz,** Lawrence Livermore National Lab. (USA)

16.20: **Laser-induced contamination on space optics** *(Invited Paper)*, Wolfgang Riede, Helmut B. Schröder, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); Denny Wernham, Adrian P. Tighe, Federico Pettazzi, Jorge Alves, European Space Research and Technology Ctr. (Netherlands) . . . . . [8190-30]

17.00: **Pulsed ablation of carbon/graphite surfaces and development of plume-kinetics model**, Charles D. Roberts, Air Force Institute of Technology (USA) . . . . . [8190-31]

17.20: **Laser-plasma target contaminant plumes and assessment of their potential effects on operational optics**, James E. Andrew, Kathryn A. Wallace, AWE plc (United Kingdom) . . . . . [8190-32]

17.40: **Progresses in oil-contamination problem of large-scale pulse-compressor,** Takahisa Jitsuno, Hidetoshi Murakami, Shinji Motokoshi, Eiji Sato, Katsuhiro Mikami, Kota Kato, Tetsuji Kawasaki, Yoshiki Nakata, Hiroyuki Shiraga, Noriaki Miyanaga, Hiroshi Azechi, Osaka Univ. (Japan) . . . . . [8190-33]

Closing Remarks. . . . . Tues. 18.00 to 18.10

Wine and Cheese Tasting Reception

Tues. 18.30 to 20.00

Sponsored by SPIE and the Conference Co-chairs of Laser Damage XLIII

Reception at NCAR

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NCAR will be hosting the Wine and Cheese Tasting Reception on Tuesday evening at their Boulder facility. Attendees are responsible for their own transportation.

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Wednesday 21 September

SESSION 9

Room: Auditorium. . . . . .Wed. 08.20 to 10.00

Mini-symposium: Deep UV Optics

Session Chairs: **Holger Blaschke,** Laser Zentrum Hannover e.V. (Germany); **Carmen S. Menoni,** Colorado State Univ. (USA)

08.20: **Absorption measurement of HR coated mirrors at 193nm with a Shack-Hartmann wavefront sensor**, Byungil Cho, Edward J. Danielewicz, J. Earl Rudisill, Newport Corp. (USA) . . . . . .[8190-34]

08.40: **Comparative study of fused silica materials for deep UV laser applications**, Christian Mühlig, Simon Bublitz, Institut für Photonische Technologien e.V. (Germany); Helmut Bernitzki, JENOPTIK Optical Systems GmbH (Germany) . . . . . .[8190-35]

09.00: **Adhesion and coating with photo-oxidized silicone oil for deep ultraviolet optic materials**, Masataka Murahara, Tokai Univ. (Japan) and Tokyo Institute of Technology (Japan) and Okamoto Optics Co., Ltd. (Japan); Yuji Sato, Tokyo Institute of Technology (Japan); Yoshiaki Okamoto, Okamoto Optics Co., Ltd. (Japan). . . . . .[8190-36]

09.20: **Absolute measurement of absorptance in DUV optics from laser-induced wavefront deformations**, Klaus Mann, Uwe Leinhos, Julian Sudradjat, Bernd Schäfer, Laser-Lab. Göttingen e.V. (Germany) . . . . . .[8190-37]

09.40: **Impact of SiO_2 and CaF_2 surface composition on the absolute absorption at 193nm**, Istvan Balasa, Holger Blaschke, Lars O. Jensen, Detlev Ristau, Laser Zentrum Hannover e.V. (Germany) . . . . . .[8190-38]

Coffee Break . . . . . .10.00 to 10.30

SESSION 10

Room: Auditorium. . . . . .Wed. 10.30 to 11.30

Mini-symposium: Meta-Optics/Photonic Band Gap Materials

Session Chaisr: **Michelle D. Shinn,** Thomas Jefferson National Accelerator Facility (USA); **Christopher J. Stolz,** Lawrence Livermore National Lab. (USA)

10.30: **3D meta-optics for high-power laser applications** *(Invited Paper)*, Eric G. Johnson, The Univ. of North Carolina at Charlotte (USA) . . . . . .[8190-39]

11.00: **Thermal conduction in optical coatings and interfaces: a key to high-power meta-optics** *(Invited Paper)*, Joseph J. Talghader, Univ. of Minnesota, Twin Cities (USA). . . . . .[8190-40]

Lunch Break . . . . . .11.30 to 13.00

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SESSION 11

Room: Auditorium. . . . . .Wed. 13.00 to 15.00

Fundamental Mechanisms I

Session Chairs: **James E. Andrew,** AWE plc (United Kingdom); **Joseph A. Menapace,** Lawrence Livermore National Lab. (USA)

13.00: **Electron dynamics in transparent materials under high-intensity laser irradiation** *(Invited Paper)*, Barbel Rethfeld, Technische Univ. Kaiserslautern (Germany) . . . . . .[8190-41]

13.40: **Spatially resolved spectral emission following rear surface fused silica damage event with ns pulses**, Michael D. Feit, R. N. Raman, Raluca A. Negres, Stavros G. Demos, Lawrence Livermore National Lab. (USA) . . . . . .[8190-42]

14.00: **The early material response during nanosecond laser-induced breakdown in bulk fused silica**, Paul P. DeMange, Raluca A. Negres, Rajesh N. Raman, Jeffrey D. Colvin, Stavros G. Demos, Lawrence Livermore National Lab. (USA) . . . . . .[8190-43]

14.20: **Laser ablation mechanism of transparent layers on semiconductors with ultrashort laser pulses**, Tino Rublack, Stefan Hartnauer, Markus Muchow, Michael Mergner, Gerhard Seifert, Martin-Luther-Univ. Halle-Wittenberg (Germany) . . . . . .[8190-44]

14.40: **Growth mechanism of laser-induced damage in fused silica**, Guohang Hu, Kui Yi, Xiaofeng Liu, Yuanan Zhao, Jianda Shao, Shanghai Institute of Optics and Fine Mechanics (China) . .[8190-45]

Coffee Break . . . . . .15.00 to 15.30

SESSION 12

Room: Auditorium. . . . . .Wed. 15.30 to 17.10

Fundamental Mechanisms II

Session Chairs: **Stavros G. Demos,** Lawrence Livermore National Lab. (USA); **Detlev Ristau,** Laser Zentrum Hannover e.V. (Germany)

15.30: **Luminescence of different surface flaws in high purity silica glass under UV excitation**, Jessica Fournier, Commissariat à l'Énergie Atomique (France) and Univ. Bordeaux 1 (France); Jérôme Néauport, Pierre Grua, Commissariat à l'Énergie Atomique (France); Véronique Jubera, Evelyne Fargin, David Talaga, Stéphane Jouannigot, Univ. Bordeaux 1 (France) . . . . . .[8190-47]

15.50: **Modeling free-carrier absorption and avalanching by ultrashort laser pulses**, Jeremy R. Gulley, Kennesaw State Univ. (USA) . . . . . .[8190-48]

16.10: **On the cooperativeness of nanosecond-laser induced damage during frequency doubling of 1064 nm light in $KTiOPO_4$,** Frank R. Wagner, Institut Fresnel (France); Guillaume Duchateau, Commissariat à l'Énergie Atomique (France); Anne Hildenbrand, Jean-Yves Natoli, Mireille Commandré, Institut Fresnel (France) . . . . . .[8190-49]

16.30: **Carrier dynamics in KDP and DKDP crystals illuminated by intense femtosecond laser pulses**, Guillaume Duchateau, Commissariat à l'Énergie Atomique (France); Ghita Geoffroy, Univ. Bordeaux 1 (France); Cédric Maunier, Anthony D. Dyan, Hervé Piombini, Stephane Guizard, Commissariat à l'Énergie Atomique (France) . . . . . .[8190-50]

16.50: **Pulse-width scaling of laser-damage threshold and dominating ionization mechanisms,** Vitaly E. Gruzdev, Univ. of Missouri-Columbia (USA) . . . . . .[8190-51]

Closing Remarks. . . . . .Wed. 17.10 to 17.20

OPEN HOUSE AND RECEPTION . . . . . .Wed. 18.00 to 19.30

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