Advanced Solid-State Photonics

Topical Meeting and Tabletop Exhibit

Collocated with:
Workshop on Entanglement and Quantum Decoherence

January 27-30, 2008

Nara-Ken New Public Hall
Nara, Japan

PDP deadline: January 8, 2008 at 12:00 p.m. EST (17.00 GMT)
Housing Deadline: December 25, 2007
Pre-Registration: January 3, 2008

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Co-hosted by Sokendai in Japan

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About Advanced Solid-State Photonics (ASSP) 2008

Advances in solid-state lasers, parametric devices and nonlinear frequency conversion provide powerful tools for an increasingly broad range of applications including spectroscopy, metrology, remote sensing, communications, material processing, astronomy, medicine, biology and entertainment.

Now in its 23rd year, the Advanced Solid-State Photonics Topical Meeting remains the world's premier forum for discussing new developments in laser and nonlinear optical materials and devices. The upcoming meeting in Nara, Japan will provide a spectacular setting for learning about these advances. Take this opportunity to be part of the year's most significant meeting on advanced solid-state laser sources. Plan to attend Advanced Solid-State Photonics 2008!
Meeting Topics to Be Considered

- Tunable and New Wavelength Solid-State Lasers
- Diode-Pumped Lasers
- Fiber Lasers
- Photonic-Crystal Lasers
- High-Power Lasers
- Short-Pulse Lasers
- Frequency-Stable Lasers
- Microphotonics, including microchip and compact lasers
- Optically Pumped Semiconductor Lasers
- High-Brightness Diodes
- Optical Sources Based on Nonlinear Frequency Conversion, including OPO, OPA, OPG, SHG, SFG, DFG and Raman
- Laser Media
- Nonlinear Optical Materials
- Engineered Optical Materials
- Applications of Laser Sources in:
  - Science
  - Astronomy, including gravity wave detection and laser guide star
  - Medicine and Biology
  - Remote Sensing
  - Industry
  - Entertainment, including laser display technology
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Exhibitors to ASSP

Tabletop Exhibit:
January 28-30, 2008

Exhibit Space Reservation Contract (PDF, 46 KB)

Note: You need Adobe Acrobat to view the PDF files above. If you do not already have this software, you can download Adobe Acrobat for free from Adobe's web site.

Tabletop exhibit space will be $1,090 for Corporate Members and $1,250 for non-members

All exhibitors receive:

- An attendee list
- One technical digest
- One technical badge
- One ticket to the conference reception
- Two exhibit personnel registrations

If you have questions about exhibiting at ASSP, please contact our exhibit sales staff at 202.416.1428 or exhibitsales@osa.org.

Sponsorship Opportunities at ASSP 2008

Increase your company's visibility among qualified attendees with a sponsorship at the event.

Current ASSP Sponsorship Opportunities include:

- Coffee Break Sponsorships
- Reception Sponsorships
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- Registration Material Inserts
- Advertising Signage Placements

Plus other customizable promotional opportunities
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Laser Focus World is a monthly magazine for engineers, researchers, scientists and professionals providing comprehensive global coverage of optoelectronic technology and markets. It offers greater technical depth than any other publication in the field and keeps readers abreast of advances and trends in optoelectronics – lasers, fiber optics, optical software and computing, imaging and instrumentation.

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Photonics Spectra is the leading photonics magazine serving industries that use photonic technology: lasers, imaging, fiber optics, optics, electro-optics, and photonic component manufacturing. It presents the latest news articles and in-depth reports on photonics technology. It is distributed free to those who use or apply photonics.

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Special Events

2008 Lockheed Martin Coherent Technologies Student Awardees

Best Oral Presentation

Sergio Marchese, ETH Zürich, Switzerland

ME5, Efficient Femtosecond Yb:Lu2O3 Thin Disk Laser, Sergio V. Marchese1, Cyrill R. E. Baer1, Anna G. Engqvist1, Matthias Golling1, Deran J. H. C. Maas1, Thomas Südmeyer1, Ursula Keller1, Rigo Peters2, Christian Kränkel2, Klaus Petermann2, Günter Huber2; 1Dept. of Physics, Inst. of Quantum Electronics, ETH Zürich, Switzerland, 2Inst. of Laser-Physics, Univ. of Hamburg, Germany.

Best Poster Presentation

Susanne Fredrich-Thornton, Inst. für Laser-Physik, Univ. of Hamburg, Germany

WB13, Highly Doped Yb:YAG Thin-Disk Lasers: A Comparison between Single Crystal and Ceramic Active Media, Susanne T. Fredrich-Thornton1,2, Christian Hirt1, Friedjof Tellkamp1, Klaus Petermann1, Guenter Huber1, Ken-ichi Ueda1, Hideki Yagi3; 1Inst. für Laser-Physik, Univ. Hamburg, Germany, 2Inst. for Laser Science, Univ. of Electro-Communications, Japan, 3Takuma Works, Konoshima Chemical Co. Ltd., Japan.

Tour - Tuesday, January 29, 2008

An ASSP excursion is planned for Tuesday afternoon to visit the Horyuji Temple complex and the Kansai Photon Science Institute. Horyuji Temple houses the oldest surviving wooden structures in the world and was designated a UNESCO World Heritage Site in 1993 as a unique storehouse of world Buddhist culture. The Kansai Photon Science Institute is a research institute under the Japan Atomic Energy Agency. The institute develops advanced lasers, including petawatt-class lasers, and a spatially coherent soft X-ray laser, and applies them to generating and utilizing X-rays, high-energy particle beam sources, and X-ray microscopes. Join us to see world-class lasers and culture – it will be a memorable experience! This tour is included with all registrations with the exception of Exhibitor Personnel.

ASSP Best Student Oral and Poster Paper Awards

The ASSP Best Student Oral Paper Award was established in 2001 to encourage excellence in research and scientific presentation skills in the student optics community. The award is sponsored by Lockheed Martin Coherent Technologies and includes a $1000 cash prize and a plaque.

There will also be a competition for the ASSP Best Student Poster Paper Award. The recipient of this award will be presented with a $500 cash prize and a certificate. Students submitting contributed papers who desire to compete for these awards must indicate this intention when submitting the paper. Papers actually presented by advisors or other non-students will not be scored. Student papers accepted for oral presentation will be scored by the ASSP Technical Program Committee with the scores weighted according to the following formula: technical content (50%), oral presentation quality and general poise (25% with no penalty for non-native English speakers) and graphical presentation quality (25%). Student papers accepted for poster presentation will be scheduled in a “Young Scientist Poster Session” and scored according to the same formula as the oral papers. ASSP attendees are highly encouraged to participate in this session to provide feedback to the students and encourage their work.
Invited Speakers

Banquet Speaker

Plenary Speaker

Invited Speakers

Ceramic Lasers Summit

Banquet Speaker

TuC1, Construction of Great Buddy in Nara, Symbol of Giant Light Source in Cosmos, Atsumu Wada, Professor Emeritus, Kyoto Univ. of Education and Leading Researcher, Archaeological Inst. of Kashihara, Nara Prefecture; Japan.

Atsumu Wada was born in northeastern China (Liaoyang, former Manchukuo) in 1944 and soon after birth he moved to Tawaramoto, Nara Prefecture, Japan, and he was brought up in the historical culture of Yamato (the old name of Nara). He is now living in Kibi, Takatori-cho, Takaichi-Gun, Nara Prefecture, Japan.

He finished his Ph.D. (national history) at the Graduate School of Letters, Kyoto University in 1972. After a Research Associate, Faculty of Letters, Kyoto University, he worked at Kyoto University of Education, where he became a Professor in 1988. He received the Ph.D. degree in literature from Kyoto University. In March, 2007, he took mandatory retirement.

He specializes in Japanese ancient history and is engaged in research in Japanese ancient thought and culture, wood strips, and so forth. Since 1972, as a Leading Researcher, Archaeological Institute of Kashihara, Nara Prefecture, he has been engaged in research activities in order to make the connection between Japanese ancient history and archaeology. He has studied under poet Toshio Mae living in Yoshino, Nara Prefecture, and been a member of the literary coterie “Yamamayu”.

He has written a number of books including, “Nihon-Kodai no Girei to Saishi, Shinkou (Rites, Worship and Belief in Ancient Japan) I, II, III”, Hanawa Shobo, Tokyo, Japan (1995). In addition, he has written a great number of papers.

He writes an article “Yamato Jiku Sanpo (Walking in the space and time of Nara)” every Wednesday for the Sankei Shinbun, a local newspaper.

Plenary Speaker


Kazuhisa Mikame graduated with a degree in Mechanical Engineering from the Toyota Technical College. He then went on to perform production engineering development at Toyota Motor Corporation in Japan where the main area of his work included high energy beam welding such as electron beam welding and laser beam welding. He developed and applied many laser material processing techniques and systems for automotive production, including a multi-station laser welding system for Automatic Transmission gear parts. He is a member of the Japan Welding Society, and director of the Japan Laser Processing Society.
Invited Speakers

MB1, Solid State Lasers: Meeting the Grand Challenges, Robert L. Byer; Stanford Univ., USA
MD1, Volume Bragg Gratings in PTR Glass--New Optical Elements for Laser Design, Leonid B. Glebov; CREOL, The College of Optics and Photonics, Univ. of Central Florida, USA.
TuA1, 10-Petawatt OPCPA System, John Collier; Rutherford Appleton Labs, UK
WA1, High-Peak-Power, Single-Transverse-Mode Fiber Lasers, Fabio Di Teodoro; Aculight Corp., USA
WD1, Nonlinear Optics in Japan, Hiromasa Ito; Tohoku Univ., Japan
WF1, The Petawatt Field Synthesizer: A New Approach to Ultrahigh Field Generation, Stefan Karsch; Max-Planck-Inst. für Quantenoptik, Germany

Ceramic Lasers Summit

Join us for a Ceramic Lasers Summit to review the exciting progress in ceramic laser materials and their applications. Leaders from around the world of this emerging field will highlight this new program feature. The special session will be a roundtable event starting with opening statements by the invited panel members, followed by an open discussion and interaction with the audience.

Panelists:
Mitsuhiro Fujita; Covalent Materials Corp., Japan
Jean Huie; Advanced Materials Lab, Raytheon, USA
Gregory Quarles; VLOC, USA
Bob Yamamoto; LLNL, USA
Takagimi Yanagitani; Konoshima Corp., Japan
ASSP 2008 Short Courses

Sunday, January 27, 2008, 1:00 p.m.–5:00 p.m.

► SC153 Quasi-Phasematching for Frequency Conversion and All-Optical Signal Processing
Martin M. Fejer; Stanford Univ., USA

Course Description
Quasi-phasematching (QPM) has become an important technique for nonlinear optical frequency conversion, and recently for classical and quantum optical signal processing devices. In addition to large nonlinear susceptibilities and noncritical phasematching across broad wavelength ranges, QPM offers control over parameters that allow engineering of properties such as the spectral and spatial distribution of gain.

Well known applications in parametric frequency conversion devices such as harmonic generators and parametric oscillators are now complemented by developments for communications applications such as wavelength convertors for WDM systems, gated mixers for TDM multiplexing and demultiplexing, and spectral inverters for correcting dispersion and Kerr nonlinearities. Recent developments such as supercontinuum generation and devices for quantum optics, including photon-counting with efficient up-conversion and generation of correlated photons by parametric down conversion, will be discussed. The success of QPM is fundamentally tied to developments in microstructured nonlinear materials, such as periodically-poled ferroelectrics and orientation-patterned III-V semiconductors. Staus and properties of these materials will be reviewed, with emphasis on practical issues such as effects limiting their lifetime.

Benefits and Learning Objectives
This course should enable you to:

- Explain the basic ideas of QPM and methods for analyzing QPM interactions.
- Relate properties of QPM interactions to the more familiar birefringent phasematching.
- Discuss qualitative insights and quantitative data on QPM materials like PPLN and OPGaAs.
- Review coherent source applications of QPM media.
- Explain novel methods such as compression of ultrafast pulses based on aperiodic QPM.
- Understand applications in classical and quantum optical communications and signal processing.

Course Level
Advanced Beginner (basic understanding of topic is necessary to follow course material)

Intended Audience
This course is intended for individuals with at least a basic knowledge of lasers and nonlinear optical frequency conversion, though background information necessary for understanding the material in the course will be covered. No prior knowledge of optical signal processing is necessary for optical communications topics.
Instructor Biography

Martin Fejer is a professor of applied physics and senior associate dean of natural sciences at Stanford University. His research focuses on microstructured nonlinear materials, guided wave optics, and devices for generating coherent radiation and for optical signal processing. He received the Optical Society of America’s R.W. Wood Prize in 1998 for his work in quasiphase-matched nonlinear optics.

Sunday, January 27, 2008, 1:00 p.m.–5:00p.m.

SC310 A Review of Ceramic Materials for Optical Applications

Akio Ikesue1, Yuji Iwamoto2; 1World Lab Co., Ltd., Japan, 2Nagoya Inst. of Technology, Japan

Course Description

This course describes methods of fabricating transparent ceramics and developments in the field of ceramic lasers. It explains both the background and new applications of optical ceramics. The term “ceramics” (polycrystalline materials) includes cement, refractories, chinaware, and structural and functional ceramics. Once just opaque white, ceramics were not appropriate to optical applications. In the late 1950s Dr. Coble ascertained that the loss of transparency in ceramics is due to the residual pores in the ceramic body. His fabrication of translucent alumina by controlling the microstructure of ceramics was applied in the discharge tube of sodium-vapor lamp post of expressways and tunnels. This development brought about translucent ceramics such as MgF2, Spinel, and (PbLa)(ZrTi)O3 (PLZT). At that time, there was no advanced technology to produce crystals comparable to the single crystal, and the application range of translucent ceramics was restricted.

About 15 years ago, for the first time in the world the course instructor developed optical grade transparent polycrystalline Nd:YAG ceramics in the laser generation comparable to that of the conventional single crystal laser. He reported that high-efficiency laser oscillation and high beam quality can be realized by the Nd:YAG ceramics as Nd ions can be heavily doped in YAG ceramics. Laser generation from ceramics, generation of monochromatic light with high coherency, and high power laser with high efficiency were then reported, beyond the imagination of the traditional solid-state laser. Ceramic laser is not a substituting technology of single crystal; it has the potential to become a central technology of laser for this century. In the future, development of optical ceramics will become active, beginning at ceramic laser.

Benefits and Learning Objectives

This course should enable you to:

- Identify traditional ceramics (chinaware, refractories, cement, structural materials, electronic materials etc.) and technical issues of ceramic materials.
- Explain the basics of ceramic materials (principle of transmittance, fabrication methods, etc.).
- Describe the development of and new technologies in translucent ceramics.
- Describe fabrication technology of current solid-laser materials and technical issues.
- Define the term “Ceramic Laser” by addressing the technological requirement and principle of generation of coherence beam from polycrystalline gain medium.
- Describe ceramic laser technology from 1990s to present.
- Discuss ceramic optics and their applications (excluding laser).
- Discuss future applications of ceramic technology.
Course Level
Beginner (No background or minimal training is necessary to understand course material)

Intended Audience
This course would be useful to anyone interested in understanding basic ceramic technologies and the current and potential applications of ceramic laser technology.

Instructor Biography
Akio Ikesue received bachelor’s, master’s and doctorate degrees from Nagaoka University of Technology. He is the president of World Lab Co., an executive scientist at SCHOTT AG and an invited professor at Pierre and Marie Curie University. In 1995 he fabricated the optical grade polycrystalline neodymium (Nd)-doped Yttrium Aluminum Garnet (YAG) ceramic and pioneered the high efficiency laser generation using these ceramics. His current research includes development of transparent ceramics for passive and active applications and development for processing single crystal piezo-electric materials and ionic conductive materials by sintering method. He is the recipient of numerous awards and is the author of more than 60 technical publications.

Yuji Iwamoto received bachelor’s and master’s degrees from Nagoya City University and a doctorate from the University of Tokyo. He is a professor of materials science and engineering at Nagoya Institute of Technology. His current research topic is development of ceramic membranes for high-temperature separation of hydrogen. He has authored or coauthored more than 70 publications and holds 25 patents. He received the Richard M. Fulrath Award from the American Ceramic Society in 2006 and the Academic Achievements Award from the Ceramic Society of Japan in 2007.

Sunday, January 27, 2008, 1:00 p.m.–5:00 p.m.
► SC311 Laser Remote Sensing
Takao Kobayashi; Univ. of Fukui, Japan

Course Description
This course is intended to introduce a field of solid-state laser application called “laser radar” or “lidar.” This field of technology is growing rapidly together with the global interest in the environmental issues. A major application of this technology is the remote sensing of the atmosphere for meteorological and environment monitoring and industrial application. Basic principles of system design and performance are described. Optical interaction processes and laser beam transmission of the atmosphere are compared for laser wavelengths, from infrared to ultraviolet spectra. Eye safety condition is also defined to use intense laser beam in open atmosphere. Optical signal detection techniques are discussed, and the characteristics of the direct detection and the heterodyne detection are compared briefly.

Progress of the lidar systems and the performance are summarized and discussed in detail. Mie scattering lidar is used for aerosol and clouds detection, Raman scattering lidar for temperature and humidity sensing, differential absorption lidar (DIAL) for air pollution and water vapor detection, Doppler lidar for wind field detection, and high-spectral resolution (HSR) lidar for detecting temperature and several accurate parameters of aerosol and clouds. The high-power single frequency solid-state lasers are used mostly in these systems.
The imaging system of explosive leak gas was developed recently for use in the energy industry with infrared tunable sources of OPO, OPG and diode lasers. Satellite borne space lidars have been developed in NASA and ESA by using high-power solid-state lasers for global monitoring of aerosol, clouds and wind. Future potential of application of the lidar technology is discussed in relation with the progress of compact and high-power lasers.

Benefits and Learning Objectives
This course should enable you to:

- Review historical progress of the lidar systems and typical results.
- Compare optical interaction processes and lidar schemes for specific requirements of atmospheric parameters.
- Design the laser and the optical system with respect to maximum detection range, spatial and temporal resolution, accuracy and other conditions.
- Define eye safety conditions for laser power, energy and wavelength.
- Determine present tunable laser sources for leak gas profiler.
- Visualize future images of the laser remote sensors for environmental sensing.

Intended Audience
No special background is required for understanding this course content. Students, engineers, system designers and managers who take interest in the outlook on the present and future laser remote sensing technology are welcome.

Instructor Biography
Takao Kobayashi graduated from Tohoku University in 1964. He joined the Research Institute of Electrical Communication, Tohoku University, in 1967, where he pioneered the research of laser Raman radar for molecular pollution detection and developed several solid-state lasers. In 1981 he became a professor in the department of electrical and electronics engineering at the University of Fukui. He is involved in the research of Ozone DIAL, Doppler wind lidar, Raman and Rayleigh temperature lidars, and recently in UV high-spectral resolution lidar and leak methane gas imager. From these activities, he received the lifetime achievement award from the International Committee on Laser Atmospheric Sensing in 2006.
## Agenda of Sessions

### Sunday, January 27, 2008

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<td>SC153 • Quasi-Phasematching for Frequency Conversion and All-Optical Signal Processing</td>
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<tr>
<td>1:00 p.m. — 5:00 p.m.</td>
<td>SC310 • A Review of Ceramic Materials for Optical Applications</td>
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<td>1:00 p.m. — 5:00 p.m.</td>
<td>SC311 • Laser Remote Sensing</td>
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<td>8:10 a.m. — 8:30 a.m.</td>
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<tr>
<td>11:00 a.m. — 12:30 p.m.</td>
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<tr>
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<td>2:00 p.m. — 3:45 p.m.</td>
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<td>3:45 p.m. — 4:15 p.m.</td>
<td>Coffee Break/Exhibits Open</td>
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<td>4:15 p.m. — 5:30 p.m.</td>
<td>MF • Yb-Doped Materials</td>
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<td>5:30 p.m. — 8:00 p.m.</td>
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<td>TuA • Ultrafast Amplifiers</td>
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<tr>
<td>10:15 a.m. — 11:45 a.m.</td>
<td>TuB • Eyesafe Infrared Sources</td>
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<tr>
<td>12:15 p.m.</td>
<td>Laboratory Tour and Day Trip: Buses Leave Nara-Ken</td>
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<td>1:15 p.m. — 6:00 p.m.</td>
<td>Tour of Horuji and JAEA</td>
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<td>6:00 p.m.</td>
<td>Buses return to Hotel</td>
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<tr>
<td>7:00 p.m. — 10:00 p.m.</td>
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<tr>
<td>8:00 a.m. — 10:00 a.m.</td>
<td>WA • Fiber Lasers</td>
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<tr>
<td>10:00 a.m. — 11:00 a.m.</td>
<td>WB • Poster Session II (Student)</td>
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<td>10:00 a.m. — 11:00 a.m.</td>
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<tr>
<td>11:00 a.m. — 12:30 p.m.</td>
<td>WC • Ceramic Lasers Summit</td>
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<td>2:00 p.m. — 3:30 p.m.</td>
<td>WD • Nonlinear Optics</td>
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<td>WE • Poster Session III</td>
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<tr>
<td>3:30 p.m. — 4:30 p.m.</td>
<td>Coffee Break/Exhibits Open</td>
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<tr>
<td>4:30 p.m. — 6:00 p.m.</td>
<td>WF • Novel Ultrafast Sources</td>
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<tr>
<td>6:00 p.m. — 6:10 p.m.</td>
<td>Closing Remarks</td>
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• Sunday, January 27, 2008 •

Entrance Foyer
12:00 p.m.–6:00 p.m.
Registration Open

1:00 p.m.–5:00 p.m.
SC153: Quasi-Phasematching for Frequency Conversion and All-Optical Signal Processing

SC310: A Review of Ceramic Materials for Optical Applications

SC311: Laser Remote Sensing

• Monday, January 28, 2008 •

Entrance Foyer
7:00 a.m.–5:00 p.m.
Registration Open

Noh Theater
8:00 a.m.–8:10 a.m.
Opening Remarks

MA • Plenary Session

Noh Theater
8:10 a.m.–8:30 a.m.
MA • Plenary Session

MA1 • 8:10 a.m. Plenary
The Application of Laser for Automobile: Manufacturing Technology, Kazuhisa Mikame; Toyota Motor Corp., Japan. Since the mid-1980s, Toyota Motor Corporation has applied CO₂ lasers and YAG lasers for processing on automobile parts. In the 20th century diode lasers are applying on plastic welding, and diode pumped YAG lasers are applying on body stitch welding. And continuous laser welding was first adopted for the interior structural members, and one-sided laser welding results in a simplified and lightweight structure.

Kazuhisa Mikame graduated with a degree in Mechanical Engineering from the Toyota Technical College. He then went on to perform production engineering development at Toyota Motor Corporation in Japan where the main area of his work included high energy beam welding such as electron beam welding and laser beam welding. He developed and applied many laser material processing techniques and systems for automotive production, including a multi-station laser welding system for Automatic Transmission gear parts. He is a member of the Japan Welding Society, and director of the Japan Laser Processing Society.

MB • Solid State Laser Architectures

Noh Theater
8:30 a.m.–10:00 a.m.
MB • Solid State Laser Architectures
Upendra Singh; NASA Langley Res. Ctr., USA, Presider

MB1 • 8:30 a.m. Invited
Solid State Lasers: Meeting the Grand Challenges, Robert L. Byer; Stanford Univ., USA. Advances in solid state lasers has enabled progress toward meeting grand challenges. Examples to be considered are the detection of gravitational waves; laser acceleration to enable TeV scale physics and the generation of attosecond coherent x-rays.

MB2 • 9:00 a.m.
Power Scaling of GaN Laser Diode Pumped Pr-Lasers, André Richter1, Ernst Heumann1, Günter Huber2, Daniela Parisi2, Mauro Tonnelli2, 1Inst. of Laser-Physics, Univ. of Hamburg, Germany, 2Dept. di Fisica dell’Univ. di Pisa, Italy. Results of Pr⁺⁻lasers in different host materials operated at 523 nm, 607 nm, 640 nm, and 721 nm under GaN diode laser pumping will be presented as well as SHG results obtaining 320 nm radiation.

MB3 • 9:15 a.m.
Integration of Multiple-DFB Dye Lasers and Microflow-Channel on a Polymeric Chip, Yuji Oki1, Shusaku Kataoka1, Noriyuki Kamogawa1, Hirofumi Watanabe1, Kenichi Yamashita1, Masaya Miyazaki1; 1Graduate School of ISEE, Kyushu Univ., Japan, 2Natl. Inst. of Advanced Industrial Science and Technology, Japan. Integration techniques of tunable film dye lasers on a plastic optical application chip were studied. We fabricated microflowcavity chip integrated with DFB film lasers as a first example. Preliminary LIF experiment was also demonstrated.

MB4 • 9:30 a.m. Micro Laser for Engine Ignition Paper
High Peak Power, Passively Q-Switched Cr:YAG/Nd:YAG Micro-Laser for Ignition of Engines, Masaki Tsunekane1, Takayuki Iinohara1, Akihiro Ando1, Kenji Kanehara2, Takunori Taira2; 1Japan Science and Technology Agency, Japan, 2Nippon Soken Inc., Japan, 3Inst. for Molecular Science, Japan. 3ml per pulse with 1.2ns pulse width, passively Q-switched Cr:YAG/Nd:YAG micro-laser was developed for ignition of engines. The enhanced combustion by using the micro-laser igniter was successfully demonstrated in comparison with a spark plug.

MB5 • 9:45 a.m.
Effect of Grain Sizes on Modal and Polarization Properties of Laser-Diode-Pumped Microchip Ceramic Lasers, Takayuki Ohtomo, Koji Kamikariya, Kenju Otsuka; Tokai Univ., Japan. Modal and polarization properties of laser-diode-pumped YAG ceramic lasers possessing different average grain sizes were examined. Linearly-polarized, single-frequency TEM₀¹ mode operations were obtained in micro-grained ceramic lasers whose average grain sizes are a few micrometers.

Reception Hall
10:00 a.m.–11:00 a.m.
Coffee Break/Exhibits Open
MC1  

MC2  
New Concept of 100 PW Femtosecond Laser Based on Ceramics Doped with Chromium Ions, Efin A. Khazanov, Alexander Sergeev; Inst. of Applied Physics of Russian Acad. of Science, Russian Federation. We propose a new concept of a superpowerful femtosecond laser based on CPA in chromium doped ceramics (Cr:YAG, Cr:YSGG, etc) pumped by a Nd:glass laser. Power of 100PW may be reached at 10kJ pump energy.

MC3  
A Hybrid, OPCPA-Nd:Glass Petawatt Laser, Erhard W. Gaul, Mikhail Martinez, Todd Ditmire, Patrick Barber, Joel Blakeney, Skyler Douglas, Douglas Hammond, Watson Henderson, Martin Ringnette; Univ. of Texas at Austin, USA. The 200 J, 150 fs Texas Petawatt Laser is based on optical parametric chirped pulse amplification (OPCPA) for large, broadband gain followed by a mixed glass high energy booster stage.

MC4  
Eye-Safe Picosecond Nd:YAG Laser with Brillouin and Raman Pulse Compression, Oleg V. Kulagin1, Alexander K. Kotov, Alexander M. Sergeev1, Michael T. Valley2; Inst. of Applied Physics, Russian Federation, 2Sandia Natl. Labs, USA. A passively Q-switched Nd:YAG laser produces 50-mJ, 1530-nm pulses of 30-ps duration at 100 Hz, in a near-diffraction-limited beam (M² ≤ 1.3). Pulse compression is provided by consecutive SBS in CrF₆ and SRS in Ba(NO₃)₂.

MC5  
0.35 MW Pulses with 44 W Average Power from a Picosecond Phase-Conjugate Nd:GdVO₄ Laser System, Naoki Shibata1, Kouji Navata1, Kenji Furuki1, Takashige Onatsu1,2; Chiba Univ., Japan, 1PREST, Japan Science and Technology Agency, Japan. We demonstrated a 44 W near diffraction-limited pico-second output from a phase-conjugate laser system in combination with a diode-side-pumped Nd:GdVO₄ booster amplifier. Peak power of 0.35 MW was achieved.

MC6  
High Pulse Energy, Rep-Rated Nd:Glass Laser with Stimulated Brillouin Scattering Phase Compensator, Ryosuke Sekine1, Takashi Kuriya1, Tadasu Ikeyama1, Osamu Matsumoto1, Toshiyuki Kawashima1, Masahiro Miyamoto1, Hirofumi Kan1, Hitetsugu Yoshida1, Junji Kawanaka1, Masahiro Nakatsuka1, Yinsaku Izawa1, Tadashi Kanabe1; Hamamatsu Photonics K.K., Japan, 1Inst. of Laser Engineering, Osaka Univ., Japan, 2Graduate School of Engineering, Univ. of Fukui, Japan. The near diffraction limited quality of 21.3 J in 8.9 ns (2.4 GW peak power) at 10Hz rep-rate beam has been obtained by diode-pumped Nd:glass zig-zag slab laser with a stimulated Brillouin scattering (SBS) mirror.

MC7  
Activation of a Kilo Joule Energy Variable Shape Long Pulse System for the Vulcan Glass Laser, Waseem Shukri, Ian Masgrafe, Cristina Hernandez-Gomez; Central Laser Facility STFC, Rutherford Appleton Lab, UK. We describe an upgrade to the KJ Vulcan Glass laser system where the temporal shape of the laser pulse can be arbitrarily chosen. We use waveguide modulators before amplification in a diode pumped regenerative amplifier.

MC8  
Transient-Grating FROG for Measurement of Sub-10-fs to Few-ps Amplified Pulses, A. S. Pirozhkov1,2, M. Mori1, K. Ogura1, A. Nishimura1, H. Murakami2, Y. Shimada1, A. Sagisaka1, S. Orimo1, T. Kimura1, H. Daido1; Advanced Photon Res. Ctr., Japan, 2P. N. Lebedev Physical Inst. of the Russian Acad. of Sciences, Russian Federation. We report on the design and performance of a highly accurate, easy-to-align Transient-Grating FROG apparatus capable to measure amplified pulses with the duration from sub-10 fs to longer than 1 ps.

MC9  
Design of PETAL Multipetawatt High-Energy Laser Front-End Based on Optical Parametric Chirped Pulse Amplification, Emmanuel Hugonnott, Gerard Deschaseaux, Olivier Hartmann, Herve Coic; Commissariat à l’Energie Atomique (CEA), Ctr. d’Etudes Scientifiques et Techniques d’Aquatique (CESTA), France. We present the OPCPA based front-end designed for the French LIL multi-Petawatt high-energy Laser Facility (PETAL).

MC10  
High-Intense, High-Contrast J-KAREN Laser at Advanced Photon Research Center, Hajime Okada, Hiromitsu Kiriyama, Michiaki Mor1, Yoshiki Nakai, Takuya Shimomura, Manabu Tanoue, Atsushi Akutsu, Tomohiro Motomura, Shuiji Kondo, Shuhei Kanazawa, Masaki Kando, Hideyuki Kotaki, Yuji Fukuda, Linning Chen, Izuru Daito, Sergei Bulanov, Hiroyuki Daido, Togoaki Kimura, Toshiaki Tajima; Advanced Photon Res. Ctr., Japan Atomic Energy Agency, Japan. We demonstrate a compact high-intense, high contrast OPCPA/Ti:sapphire hybrid laser. The 80 TW peak power at 10 Hz repetition rate with ~9 orders temporal contrast in a few picoseconds region was obtained.

MC11  
Single-Frequency-Mode Q-Switched Nd:YAG Laser Controlled by Volume Bragg Gratings, Nikolai Vorobiev1, Vadim I. Smirnov2, Leonid Glebov1; CCREOL, College of Optics and Photonics, Univ. of Central Florida, USA, 2OptGrate, USA. This paper reports on a new type of Q-switched solid state lasers with resonators formed by volume Bragg gratings. This novel design results in a single frequency operation and dramatically simplifies laser optical scheme.
MC12
High Power Volume Bragg Laser Bar for Efficient Pumping of Alkali (Rb) Lasers, Alexandre Goureivitch1, George Venus1, Vadim Smirnov2, Leonid Glebov; 1 College of Optics and Photonics, Univ. of Central Florida, USA; 2OptiGrate, USA. A laser diode bar incorporated in external cavity with reflecting volume Bragg grating produced 30W CW output power within 30pm spectral linewidth at 780nm. Rb vapor cell absorbed more than 85% of laser radiation.

MC13
Site Selective Spectroscopy and Laser Oscillations of Yb⁺⁺ Ions in BaF₂-SrF₂-CaF₂: Single Crystals of Solid Solution, Maxim E. Doroshenko, Tatsol Tan Basiev, Pavel P. Fedorov, Vasiliy A. Komyshkin, Sergei V. Kouznetsov, Andrei N. Nakhlaev, Vyacheslav V. Osiko, Ol’ga V. Shlyakhtora; Laser Materials and Technology Res. Ctr. of GPI, Russian Federation. Optical centers of Yb⁺⁺ ions in SrF₂: crystal and CaF₂-SrF₂ and BaF₂-SrF₂ solid solutions were determined by means of site-selective spectroscopy and their spectroscopic and laser properties were investigated and compared to known CaF₂:Yb⁺⁺ crystal.

MC14
Preparation and Laser Oscillation of Optical Ceramics Based on LiF:Fr: Color Center Crystals and CaF₂-SrF₂-YbF₂: Crystals, Tatsol Tan Basiev, Maxim E. Doroshenko, Pavel P. Fedorov, Vasiliy A. Komyshkin, Sergei V. Kouznetsov, Valeriy V. Voronov, Vyacheslav V. Osiko; Laser Materials and Technology Res. Ctr., General Physics Inst., Russian Federation. The new method of fluoride ceramics preparation is suggested. The high optical quality ceramics of LiF:Fr: was prepared and laser oscillations obtained and compared with single crystal data.

MC15
Thermal-Birefringence-Induced Local Depolarization in Thin YAG Ceramic, Yu Oishii1,2, Traian Dascali1, Katsumi Mulorikawa1, Takunori Tair1,1, IMS, Japan, RIKEN, Japan. The thermal-birefringence-induced spatially-distributed local depolarization in thin Nd:YAG ceramics were investigated. We found the variation of local depolarization was increased one order of magnitude when the thickness of ceramics was reduced near the grain size.

MC16
6.9-W Efficient Tunable Yb:YAG Ceramic Laser at Room Temperature, Shinki Nakamura1, Hiroaki Yoshikawa1, Yu Matsubara1, Takayoshi Ogawa1, Satoshi Wada1, 1 Institute of Laser Engineering, Osaka University, Japan. The diode-end-pumped Yb:YAG ceramic tunable laser with the maximum output power of 6.9 W and with the highest slope efficiency of 55% was demonstrated. The tunable range of 1023 - 1081 nm was obtained.

MC17
AO Q-switching Operation in Edge-Pumped Composite All-Ceramic Yb:YAG Microchip Laser, Keichi Yamaoka1, Motot Sasaki1, Ryuji Kosaki1, Takunori Taira1,1, Shiibuya Kogyo Co., Ltd., Japan, 1Inst. for Molecular Science, Japan. We have demonstrated AO Q-switched operation without the parasitic oscillation by the core/clad all-ceramic composite Yb:YAG microchip structure. Output power of 46 W at 10 kHz was obtained in the edge-pumping configuration.

MC18
High Average Power 589 nm Generation in LBO, Ian Lee, Munib Jalali, Neil Vanaase, Zachary Preszuta, William J. Alford; Lockheed Martin Coherent Technologies, USA. We report on a 589 nm source from sum frequency mixed 1064 nm and 1319 nm in LBO. An output power of 22 W at 589 nm was obtained with an M² of 1.3.

MC19
Photorefractive Damage in Nonlinear Optical Crystals of BiB₂O₅, Jong Hoon Jang, In Ho Yoon, Choon Sup Yoon; KAIST, Republic of Korea. We report that the optical damage in BiB₂O₅ crystals is caused by photorefractive effect. The photo-induced birefringence change is 1.87 × 10⁻³ at exposure to Ar-ion laser of 64.5 kW/cm² for an hour.

MC20
Self Frequency Doubling Performances of Yb⁺⁺ Doped YCOB and YCOB Based on New Phase Matching Angles Determinations in XY and XZ Principal Planes, Ke Xu, Pascal Liseau, Gerard Aka; Ecole Natl. Supérieure de Chimie de Paris, France. We present the self-frequency doubling performances of 15 at. % Yb⁺⁺ doped YCOB and GdCOB crystals in XY and XZ principal planes. Crystal’s refractive indexes were measured and calculated to SHG phase matching angles.

MC21
Fine Frequency Tuning and ±3 MHz Frequency Stabilisation of a Nanosecond Mid-Infrared Doubly Resonant Optical Parametric Oscillator, Antoine Berrou, Myriam Raybaut, Antoine Godard, Michel Lefebvre; ONERA, France. Entangled cavity nanosecond optical parametric oscillators are known as powerful devices to fulfill requirements for high resolution spectroscopy. We demonstrate here 100 GHz continuous tuning and ±3MHz frequency stabilization of the signal of such OPO.

MC22
Paper Withdrawn

MC23
Quick Phase-Matching Procedure for High-Energy Harmonic Generation in Single-Shot Regime: Application to 52 J Frequency-Doubling in KTP, Gabriel Mennerat, Jacques Rault; Commissariat à l’Energie Atomique (CEA), CESTA, France. We present a rapid experimental procedure to set and optimize phase-matching of large-aperture high-energy harmonic generators in a few shots. We report on 52 J second harmonic generation and 76% efficiency in large aperture KTP crystals.

MC24
Sub-Two-Cycle, Self-Phase-Stabilized Mid-Infrared Pulses Generated by Four-Wave Rectification, Takao Fuji, Toshinori Suzuki; RIKEN, Japan. Broadband mid-infrared pulses were generated by four-wave mixing of the fundamental and the second harmonic of ultrashort Ti:sapphire laser pulses. The carrier-envelope phase was passively stabilized and the pulse width was measured as 13 fs.

MC25
A CW 266 nm Coherent Light Source Pumped by the SHG Beam of the Single Frequency Fiber Amplifier Radiation, Shenghong Huang, Tetsuo Ando, Yosuke Orii, Tetsumi Sumiyoshi; Cyber Laser Inc., Japan. A CW 266 nm light source pumped by a green beam generated in MgO:PPSLT with a fiber MOPA output has been developed. The highest DUV output power was obtained to be 715 mW.
MC26
Nonlinear Refractive Indices in Disordered NaT(x)O(1-x): T = Y, La, Gd, Lu and Bi, X = Mo, W Laser Crystals, Alberto García-Cortés, M. D. Serrano, Carlos Zaldo, Concepción Cascales, Gustave Strömqvist, Valdas Pasiskviečius. Inst. de Ciencia de Materiales de Madrid, CSIC, Spain. Nonlinear index has been measured using z-scan technique in tetragonal disordered double tungstate and molybdate laser crystals. The n2 is comparable or larger than in monoclinic double tungstates, with substantial enhancement found in NaBi(WO4)2.

MC27
Efficient Wavelength Conversion Based on Periodically Poled MgO:LiNbO3 Optical Oscillator, Ravi Bhushan, Hidefugu Yoshida, Koji Tsukibimoto, Hisanori Fujita, Masahiro Nakatsuka, Nobuo Miyahara, Yasukazu Iwanaga, Hideki Ishizaki, Takunori Takeo, Inst. of Laser Engineering, Osaka Univ., Japan. Using 0.49 mJ of pump energy at 532 nm from a DPSS for an intracavity-doubled SRO with delayed pass pump, 0.085 mJ at 488 nm and 0.018 mJ in deep UV were obtained.

MC28
Optical Parametric Oscillator with Delayed Double-Pass Pump and Deep-UV Generation by It Second Harmonic, Yushi Kameda, N. Peyghambarian, Kenishi Miyazono, Hiroki Shinohara, Yoshiyuki Honda, Masashi Yoshimura, Yusuke Mori, Yasuo Kitaoka, Takatomo Sasaki, College of Optical Sciences, Univ. of Arizona, USA, Osaka Univ., Japan. We developed an all-in-one THz-wave parametric oscillator driven by an original LD-pumped Q-switched Nd:YAG laser. The pump source and a ring-cavity THz-wave parametric oscillator were embedded into the package with almost A3-paper-size dimensions, with 155-mm-height.

MC29
Compact All-in-One THz-Wave Parametric Oscillator Pumped with LD-Pumped Q-Switched Nd:YAG Laser, Hiroaki Minamiide, Atsushi Sato, Tomofumi Ikari, Hironasa Ito, RIKEN Sendai, Japan, Tohoku Inst. of Technology, Japan, Tohoku Univ., Japan. We developed an all-in-one THz-wave parametric oscillator driven by an original LD-pumped Q-switched Nd:YAG laser. The pump source and a ring-cavity THz-wave parametric oscillator were embedded into the package with almost A3-paper-size dimensions, with 155-mm-height.

MC30
Tunable Terahertz-Wave Parametric Generation Pumped by Microchip Nd:YAG Laser, Shinichiro Hayashi, Tatayuki Shibuya, Hiroshi Sakai, Hirofumi Kato, Takunori Takeo, Yuichi Oganai, Chikoh Otani, Kodo Kaneoka, RIKEN, Japan, Tohoku Univ., Japan, Nagoya Univ., Japan, Hamamatsu Photonics K. K., Japan. We have developed THz-wave parametric generator pumped by microchip Nd:YAG laser. This generated tunable, narrow-linewidth THz-wave with injection seeding by external cavity diode laser. We observed THz-wave tunability within 1.6-3.0THz, linewidth of less than 10GHz.

MC31
Quasi Phase Matched Parametric Fluorescence in High-Quality GaAs/AlGaAs Waveguides, Ikuma Oht, Tomonori Matsushita, Junya Ohta, Takashi Kondo, Univ. of Tokyo, Japan. We improved fabrication processes of QPM GaAs/AlGaAs structures and succeeded in fabrication of high-quality waveguiding devices. Parametric fluorescence measurements revealed the propagation losses are quiet low and the observed efficiencies are comparable to theoretical estimations.

MC32
Reduction of Nonlinear Absorption in LiBiO3 by Controlling Temperature and Repetition Rate, Masakuni Takahashi, Ichiro Sekine, Marilou Cadatul, Nobushiko Sarukura, Peter F. Moulton, Alex Dergachev, Mitsubishi Materials Corp., Japan, Inst. for Molecular Science, Japan, Inst. of Laser Engineering, Osaka Univ., Japan, Q-Peak Inc., USA. Non-linear absorption limits Nd:YAG fourth harmonic generation in LiBiO3. By characterizing the non-linear absorption coefficient, we determined that it could be reduced by controlling the temperature and repetition rate.

MC33
Highly Transparent Stoichiometric LiNbO3 with MgO Doping Junji Hirohashi, Tsuyoshi Tago, Yasuyuki Sakata, Shin-ichi Nakanome, Takehisa Ito, Tatsuo Fukui, Akio Miyamoto, OXIDE Corp., Japan. Highly transparent MgO-doped LiNbO3 crystal is investigated for high power visible light generation. By controlling crystal growth conditions, its absorption especially at UV to green region is remarkably reduced and consequently less GRIILA is observed.

MC34
Efficient Continuous-Wave Yellow Output from a Self-Raman Composite Nd:YVO4/YVO4: Laser, Takahide Omatsu, Helen M. Pask, James A. Piper, Chiba Univ., Japan, Macquarie Univ., Australia. We report 115mW CW yellow output from a small-scale, diode-pumped intracavity doubled self-stimulating Raman composite Nd:YVO4/YVO4 laser, with optical efficiency from diode to yellow output of 2.6%.

MC35
355 nm Tailored Pulse Tandem Amplifier, Xiaoyuan Peng, Brian W. Baird, Wensheng Ren, David H. M. Hemenway, Lei Xu, Pascal Deladurantaye, Yves Taillon, Maik Frede, Dietmar Kracht, Electro Scientific Industries, USA, INO, Canada, Laser Zentrum Hannover, Germany. We report on a 355 nm tailored pulse tandem amplifier. 1064 nm tailored pulse fiber laser output was amplified in a diode-pumped Nd:Vanadate amplifier and then frequency converted to produce 0.6 W at 100 KHz.

MC36
Kerr-Lens Mode-Locking Scheme for Diode-Pumped Yb-Doped-Bulk Lasers, Sadao Uemura, Kenji Torizuka, Photonics Res. Inst., Natl. Inst. of Advanced Industrial Science and Technology (AIST), Japan. We have developed a Kerr-lens mode-locking scheme for diode-pumped Yb-doped-bulk lasers, and succeed in generating, to our knowledge, the shortest pulse ever produced from a Yb:YAG laser, where the pulse duration is 100 fs.
MC37  CW 488 nm Laser with External-Cavity Frequency Doubling of a Multi-Longitudinal-Mode Semiconductor Source, Boris M. Kharlamov; Vincent Issier, Thomas Kraft, Andy Miller, David Simons; JDS Uniphase, USA. We report efficient 488 nm laser for biotechnology applications. Multi-longitudinal-mode external cavity semiconductor laser radiation is frequency converted in MgO:PPLN waveguide. Laser provides excellent beam quality, variable output power, and capability of direct modulation.

MC38  High Average-Power Diode-Pumped Femtosecond Cr+:LiCAF Laser, Unitt Demirbas1, Alphan Sennaroglu, Aleem Siddiqui, Franz X. Kärtner2, James G. Fujimoto3; 1MIT, USA, 2Koc Univ., Turkey. 67-fs pulses with an average power of 300 mW and pulse repetition rate of 120 MHz were obtained from a diode-pumped Cr+:LiCAF laser. A semiconductor saturable absorber mirror enabled stable and self-starting mode-locked operation.

MC39  Raman Lasing in Glycerol Water Microdroplets on a Superhydrophobic Surface, Alphan Sennaroglu, Alper Kiraz, Mehmet A. Dundar, Adnan Kurt, Adem L. Demirli; Koc Univ., Turkey. We report on the first observation of Raman lasing near 630 nm from 552-nm-pumped, glycerol-water microdroplets on a superhydrophobic surface. Results of cavity-enhanced Raman scattering and Raman lasing experiments are described.

MC40  Spectroscopy and Femtosecond Laser Performance of Yb:48%YAlO3 Crystal, Victor E. Kisiel, Sergei V. Kurrikchok, Niklai V. Kuleshov, Sofia Smirnova; Inst. for Optical Materials and Technologies BNTU, Belarus, Russian Res. Inst. for the Synthesis of Materials, Russian Federation. Spectroscopy and laser performance of Yb:48%YAlO3 under diode-laser pumping are reported. CW-laser with output power of 1.2W and slope efficiency of 64.5% was demonstrated. 225fs-pulses with average power of 0.8W were obtained in mode-locked laser.

MC41  In-Band Pumped, High-Power Intracavity Frequency Doubled Nd:Vanadate Thin-Disk Lasers at 530 nm, Nicolae Pavel, Christian Krügel2, Rigo Peters2, Klaus Petermann; 1Natl. Inst. for Lasers, Plasma and Radiation Physics, Romania, 2Inst. of Laser Physics, Univ. of Hamburg, Germany. Intracavity frequency doubling of Nd:YVO4 and Nd:GdVO4 thin-disk lasers in-band pumped at 0.88 μm, directly into the emitting level 4F3/2, yielded 8.5-W and 9.1-W of 0.53-μm green light, respectively, with optical-to-optical efficiency of ~30%.

MC42  Implantation of Bi Infrared Luminescent Center in the Lithium Niobate Crystal Structure, Yoshiyuki Kuswada, Yasushi Fujimoto, Masahiro Nakatsuka; Inst. of Laser Engineering, Osaka Univ., Japan. We succeeded to implant Bi infrared luminescent center in the lithium niobate optical crystal. This crystal could be applied to the ultra-short pulse or tunable laser media with excellent non-linearity and ferroelectric property.

MC43  Electrically Switchable Photonic Crystal in the Ultraviolet Range Xiaohong Sun, Xiaoming Tao; Hong Kong Polytechnic Univ., Hong Kong. A top-cut hexagon prism is designed for fabrication 3-D hexagonal PhC structures in HPDLC films. The PBG along z direction is in the UV range. Far-field diffraction patterns and electrical switching characteristics have been investigated.

MC44  Broadband Wavelength-Tunable Actively Mode-Locked Fiber Ring Laser Using a Bismuth-Oxide-Based Erbium-Doped Fiber, Yutaka Fukuchi, Saori Yamada, Hiroshi Ikeda, Joji Maeda; Tokyo Univ. of Science, Japan. We demonstrate an actively mode-locked fiber ring laser employing a 151-cm-long bismuth-oxide-based erbium-doped fiber. Stable short pulses at 10GHz are obtained with a broadband wavelength tuning range of 66nm covering both the C- and L-bands.

MC45  High-Pulse-Energy Mid-Infrared Laser Source Based on Optical Parametric Amplification in ZnGeP2, Magnus W. Hauktedal, Gunnar Arisholm, Espen Lippert, Stepane Nicolas, Gunnar Rustad, Knut Stenersen; FFI (Norwegian Defence Res. Establishment), Norway. Nonlinear optical conversion of ~500 mJ pulses from a Q-switched Nd:YAG laser to the mid-infrared is demonstrated experimentally. Using optical parametric amplification in ZnGeP2, we obtain up to 6 mJ at 8 μm.

MC46  Tunable, Narrow-Bandwidth Mid-IR Generation in ZnGeP2 Crystals Pumped by a Large Aperture Periodically Poled Mg Doped LiNbO3 Optical Parametric System, Jiro Sakawar1, Mitshiko Miyazaki2, Masaaki Fujii1, Hidetoshi Ishizuki2, Takunori Taira2; Tokyo Inst. of Technology, Japan, 1Inst. for Molecular Science, Japan. We have developed a tunable, narrow-bandwidth (~2cm⁻¹) Mid-IR optical parametric system with a large-aperture PPMgLN based pump source. The system tuned from 4.7 to 10.6μm, and the maximum output energy of 1.7mj was obtained.

MC47  Z-Scan Measurement of ZnO Thin Films Using the Ultraviolet Femtosecond Pulses, Yun-Pei Chan, Ja-Hon Lin1, Kuei-Huei Lin1, Wen-Feng Hsieh2; 1Dept. of Photonics and Inst. of Electro-Optical Engineering, Natl. Chiao Tung Univ., Taiwan, 2Dept. of Electro-Optical Engineering, Natl. Taiwan Univ. of Technology, Taiwan, 3Dept. of Science Education, Taipei Municipal Univ. of Education, Taiwan. Ultraviolet nonlinearities of ZnO thin films were investigated by the Z-scan technique using the ultraviolet femtosecond pulses. The TPA coefficient shows the unexpected enhancement and the γ is positive due to the thermal lensing effect.

MC48  Mechanically Induced Ultra-Broadband Chirped Long-Period Gratings in Photonic Crystal Fiber by a Constant-Period Grooved Metallic Plate, Hou-Ren Chen1, Kuei-Huei Lin1, Ja-Hon Lin1, Wen-Feng Hsieh2; 1Dept. of Photonics and Inst. of Electro-Optical Engineering, Natl. Chiao Tung Univ., Taiwan, 2Dept. of Science, Taipei Municipal Univ. of Education, Taiwan, 3Dept. of Electro-Optical Engineering, Natl. Taipei Univ. of Technology, Taiwan. Ultrabroadband LPGs are generated in bended PCF by using constant-period grooved plate. Spectral fringes are observed, which can be eliminated by using proper LPG configurations. LPG with rejection bandwidth of 250 nm has been obtained.
### MD • Volumetric Diffractive Structures

**MD1 • 11:00 a.m.**
Volume Bragg Gratings in PTR Glass—New Optical Elements for Laser Design, Leonid B. Glebov; CREOL, The College of Optics and Photonics, Univ. of Central Florida, USA. This is a survey of achievements in semiconductor, solid state and fiber lasers enabled by the use of new optical elements which are volume Bragg gratings recorded in a photo thermo-refractive (PTR) glass.

**MD2 • 11:30 a.m.**
Tunable, High Power, Narrow Band Emission from a Volume Grating-Controlled Diode Bar, Alan B. Petersen, John Gloyd, Spectra-Physics Lasers, USA. A single laser diode bar generates over 50W output at 780 nm, with linewidth 0.1 nm. The diode emission wavelength is controlled by a volume transmission grating and is tunable over ≥ 0.4 nm.

**MD3 • 11:45 a.m.**
Quasi-Two-Level Yb:KYW Laser Using a Volume Bragg Grating, Björn Jacobsson, Jonas E. Hellström, Valdas Pasiskevicius, Fredrik Laurell; Laser Physics, KTH, Royal Inst. of Technology, Sweden. A volume Bragg grating is used as input coupler in an Yb:KYW laser to obtain lasing at 998 nm while diode-pumping at 982 nm. The power was 3.6 W with a bandwidth of 10 GHz.

**MD4 • 12:00 p.m.**
Femtosecond Yb-Fiber CPA System Based on Chirped-Volume-Bragg-Gratings, Guoqiang Chang1, Matthew Rever1, Vadim Smirnov2, Leon Glebov3, Almantas Galvanauskas2; 1Univ. of Michigan, USA, 2CREOL, College of Optics and Photonics, Univ. of Central Florida, USA. Femtosecond (∼650 fs) Yb fiber-CPA with 8.5 W of average power is demonstrated using broadband chirped-volume-Bragg-gratings for pulse stretching and compression. These gratings show a 79% reflection efficiency that is independent of the input power.

**MD5 • 12:15 p.m.**
Monolithic Waveguide-Lasers Created in Bulk Glass Using the Direct Write Technique, Graham D. Marshall, Peter Dekker, Martin Ams, James A. Piper, Michael J. Withford; Macquarie Univ., Australia. We report the creation of monolithic waveguide-lasers created using femtosecond laser direct writing. Utilizing waveguide-Bragg gratings written within the doped guide structure the laser produced narrow linewidth output in the C-band.

12:30 p.m.–2:00 p.m.
Lunch Break

### ME • Ultrafast Oscillators

**ME1 • 2:00 p.m.**
Passively Mode-Locked Yb:LaSc(BO3)4 Oscillator, Simon Rivier1, Andreas Schmidt1, Valentin Petrov1, Uwe Griebner1, Christian Kränkel1, Rigo Peters2, Klaus Petermann2, Günter Huber2, Martin Zorn2, Markus Weyers3, Götz Erbert4; ‘Max-Born-Inst., Germany, ‘Hamburg Univ., Germany, ‘Ferdinand-Braun-Inst., Germany. We report on passive mode locking of an Yb-doped lanthanum scandium borate laser. Pulse durations as short as 58 fs and 67 fs were obtained applying a Ti:sapphire- and a diode-laser pump source, respectively.

**ME2 • 2:15 p.m.**
Approaching the Megawatt Peak Power from Mode-Locked Femtosecond Fiber Oscillator, Bülend Ortaç1, Oliver Schmidt1, Thomas Schreiber2, Jens Limpert3, Anmar Hidre3, Andreas Tünnermann2; ‘Inst. of Applied Physics, Friedrich-Schiller-Univ., Germany, ‘Fraunhofer Inst. for Applied Optics and Precision Engineering, Germany, ‘Groupe d’Optique et d’Optronique, Univ. de Rouen, France. The generation of 0.5 MW peak power 400 fs pulses from an all-normal mode-locked Ytterbium-doped short-length mode-area fiber laser is reported. The self-starting oscillator emits 2.7 W of average power at 10.18 MHz repetition rate.

**ME3 • 2:30 p.m.**
High-Energy Laser Pulses Directly from the Oscillator: From Thin-Disk to Positive Dispersion, Uwe Morgner1,2, Guido Palm3, Andy Steinmann1, Moritz Enos1, Matthias Pospiech1, Marcel Schultze1, Martin Siegel1; ‘Inst. of Quantum Optics, Leibniz Univ. Hannover, Germany, ‘Laserzentrum Hannover e.V., Germany. We report on generation and applications of multi microjoule-pulses directly obtained from laser oscillators with MHz repetition rates based on cavity-dumping and long-cavity concepts of bulk and thin-disk media in different dispersion regimes.

**ME4 • 2:45 p.m.**
Femtosecond Thin Disk Lasers Exceed Pulse Energies of 10 Microjoules and Enable High Field Physics Experiments, Cyrill R. E. Baer1, Sergio V. Marchesi2, Shigeki Hashimoto3, Michael S. Rusch4, Rachel Grange5, Matthias Golling1, Thomas Südmeyer1, Ursula Keller1, G. Lépine1, G. Ginzburg3, Bernd Witte1; ‘Dept. of Physics, Inst. of Quantum Electronics, ETH Zurich, Switzerland, ‘Dept. de Physique, Univ. Laval, Canada. We achieve 10-microjoule pulse energies directly from a femtosecond laser oscillator. We underline its suitability for high field experiments at multi-megahertz repetition rate by demonstrating the first electron spectroscopy measurements driven by an oscillator.
ME5 • 3:00 p.m.
Efficient Femtosecond Yb:Lu2O₃ Thin Disk Laser, Sergio V. Marchese1, Cyril R. E. Baer1, Anna G. Engqvist1, Matthias Golling1, Deran J. H. C. Maas1, Thomas Südmeyer1, Ursula Keller1, Rigo Peters2, Christian Kränkel2, Klaus Petermann3, Günter Huber2; 1Dept. of Physics, Inst. of Quantum Electronics, ETH Zürich, Switzerland, 2Inst. of Laser-Physics, Univ. of Hamburg, Germany. We demonstrate the first mode-locked Yb:Lu₂O₃ thin disk laser, obtaining 370-fs pulses with 20.5 W average power. The 43% optical-to-optical efficiency obtained with 523-fs pulses is higher than for previous mode-locked thin disk lasers.

ME6 • 3:15 p.m.
290-fs Passively Mode-Locked Semiconductor Disk Laser, Peter Klopp1, Florian Saass1, Jens W. Tomm1, Ulve Griebner1, Martin Zorn2, Götz Erbert1, Markus Weyers1; 1Max-Born-Inst., Germany, 2Ferdinand-Braun-Inst., Germany. A passively mode-locked semiconductor disk laser employing a graded-gap-barrier design in the gain section is presented. The all-semiconductor laser generates transform-limited pulses as short as 290 fs at 1036 nm.

ME7 • 3:30 p.m.
Modelocked Integrated External-Cavity Surface Emitting Laser (MIXSEL), Aude-Reine Bellancourt, Deran J. H.C. Maas, Benjamin Rudin, Matthias Golling, Thomas Südmeyer, Ursula Keller; ETH, Switzerland. We discuss a passively modelocked VECSEL with both gain and saturable absorber integrated into a single semiconductor structure. The MIXSEL generates 195 mW average power in 32-ps pulses in a diffraction limited beam (M2<1.1).

Reception Hall
3:45 p.m.–4:15 p.m.
Coffee Break/Exhibits Open

MF • Yb-Doped Materials
Noh Theater
4:15 p.m.–5:30 p.m.
MF • Yb-Doped Materials
Jens Limpert; Friedrich Schiller Univ., Germany, Presider

MF1 • 4:15 p.m.
Photoconductivity Measurements Indicating a Nonlinear Loss Mechanism in Highly Yb-Doped Oxides, Christian Hirt, Susanne T. Fredrich-Thornton, Friedjof Tellkamp, Klaus Petermann, Guenther Huber; Institut für Laser-Physik, Univ. Hamburg, Germany. Photoconductivity has been measured in highly Yb-doped oxides, revealing the occurrence of an up-conversion mechanism in these materials. A model for the observed phenomenon is suggested and the impact on thin-disk lasers is discussed.

MF2 • 4:30 p.m.
Influence of the Yb-Doping Concentration on the Efficiency of Lu₂O₃ Thin Disk Lasers, Rigo Peters, Christian Kränkel, Klaus Petermann, Guenther Huber; Inst. of Laser-Physics, Univ. of Hamburg, Germany. A comparative study of high-power Yb:Lu₂O₃ thin disk lasers with different doping-concentrations is reported. 36.3W output-power at 1035nm with a slope-efficiency of 80% were obtained from a 5at.-%-doped disk under diode-pumping with 49.8W at 976nm.

MF3 • 4:45 p.m.
High Energy Diode-Pumped Yb:YAG Laser for ns-Pulses, Mathias Siebold1, Sandro Klingebiel1, Christoph Wandt1, Zsuzsanna Major1, Antonia Popp1, Izhak Ahmad1, Tie-Jun Wang1, Joachim Hein1, Ferenc Kraus1, Stefan Karsch1; 1Max-Planck-Institut for Quantum Optics, Germany. Nanosecond multi-pass amplification to the 1.7J-level based on diode-pumped Yb:YAG has been achieved. Applying a pump power of 26kW a quasi-CW peak output power of 4.5kW at a duty cycle of 0.1% has been obtained.

MF4 • 5:00 p.m.
Spectroscopic and Lasing Properties of Cryogenically Cooled Yb,NaCaF₂, Audrius Pugzlys2, Dmitrij Sidorenko2, Tahar Ali1, Andrius Baltuska1, Liangbi Su1, Jun Xu2, Ruxin Li1,1, Romualdas Danielius1, Linas Gintinas1; 1Vienna Univ. of Technology, Austria, 2SIOM, China, 3Light Conversion Ltd., Lithuania. Absorption, photoluminescence spectra and lasing parameters of Yb/Na2-codoped CaF2 crystal pumped at 980nm are measured in the 70K–290K temperature range. The crystal is a promising host for broadband multi-mJ sub-kHz cw-pumped regenerative amplification.

MF5 • 5:15 p.m.
Efficient cw Thin Disk Laser Operation of Yb:CaY(BO₃)₆ with 20 W Output Power, Christian Kränkel, Rigo Peters, Klaus Petermann, Günter Huber; Inst. of Laser-Physics, Univ. of Hamburg, Germany. Yb:YCOB is a potential material for short-pulse-generation at high output-powers. A thin-disk laser with 20.1W output-power at 50% optical-to-optical-efficiency, a slope-efficiency of 60% and a wide tuning range is demonstrated as a step towards this aim.

5:30 p.m.–8:00 p.m.
Dinner Break

MG • Postdeadline Paper Session
Noh Theater
8:00 p.m.–9:30 p.m.
MG • Postdeadline Paper Session
Presider to Be Announced
• Tuesday, January 29, 2008 •

Entrance Foyer
7:00 a.m.–1:00 p.m.
Registration Open

TuA • Ultrafast Amplifiers

Noh Theater
8:00 a.m.–9:45 a.m.
TuA • Ultrafast Amplifiers
Ingrid Hartl; IMRA America, Inc., USA, Presider

TuA1 • 8:00 a.m. Invited
10-Petawatt OPCA System, John Collier; Rutherford Appleton Labs, UK. Abstract not available.

TuA2 • 8:30 a.m.
High-Repetition-Rate Picosecond Pump Laser Based on a Yb:YAG Disk Amplifier for Optical Parametric Amplification, Thomas Metzger1, Catherine Y. Teisset1, Ferenc Krausz2;3; Ludwig-Maximilians-Univ., Germany, 3Max-Planck-Inst. of Quantum Optics, Germany. We report on an optical synchronized picosecond pump laser for optical parametric amplifiers based on a Yb:YAG thin-disk regenerative amplifier. At 10kHz repetition rate pulse energies of 4.5mJ with 6.8ps pulse duration were achieved.

TuA3 • 8:45 a.m.
High Repetition Rate—Sub 20 fs Optical Parametric Amplifier Pumped by High Power Fiber Amplifier, Jan Rothhardt1, Steffen Hädrich1, Damian N. Schimpf1, Jens Limpert1, Andreas Tünnermann2;3; 1Friedrich-Schiller-Univ. Jena, Germany, 2Fraunhofer Inst. for Applied Optics and Precision Engineering, Germany. We report on a noncollinear optical parametric amplifier, which is pumped by a fiber-amplifier, producing ultra-short pulses with pulse-durations down to 15.6 fs and pulse-energies up to 500 nJ at 2 MHz repetition rate.

TuA4 • 9:00 a.m.
A Few-Cycle Sub-Millijoule Infrared OPCA System and Its Application in High-Harmonic Generation, Xun Gu1, Gilad Marcus1, Yunpei Deng1, Nobuhisa Ishii1, Takao Fiji1, Martin Schultz1, T. Taira1, R. Hartmann1, R. Rother1, M. Kitzler4, Andreas Baltuska1;4, Reinhard Kienberger1, Ferenc Krausz1; 1Max-Planck-Inst. für Quantenoptik, Germany, 3Inst. for Molecular Science, Japan, 4MPI Halbleiterlabor, Germany, 4Inst. für Photonik, Technische Univ. Wien, Austria. We report the latest development of a 1-kHz OPCA system, generating carrier-envelope-phase-stabilized 350-μJ 20-fs pulses around 2.1 μm with suppressed superfluorescence. A proof-of-principle high-harmonic-generation experiment in argon was conducted, producing photons up to 250 eV.

TuA5 • 9:15 a.m.
Millijoule Pulse Energy High Repetition Rate Femtosecond Fiber CPA System, Fabian Röser, Tino Eidam, Jan Rothhardt, Oliver Schmidt, Damian Schimpf, Jens Limpert, Andreas Tünnermann; Friedrich-Schiller-Univ., Inst. of Applied Physics, Germany. We report on an ytterbium-doped fiber CPA system delivering millijoule level pulse energy at repetition rates above 100 kHz corresponding to an average power of more than 100 W. The compressed pulses are 800 fs.

TuA6 • 9:30 a.m.
High Energy Direct Amplification of Femtosecond Pulse in a Highly Nonlinear Fiber Amplifier, Yoann Zaouter1;2, Johan Bouillet1, Lei Huang1, Claude Aguerregaray1, Dimitris Nicholas Papadopoulos1, Marc Hanna1, Frédéric Druez1, Patrick Mottay1, Patrick Georges1, Eric Cormier1; 1Cir. Lasers Intenses et Applications (CELLA), Univ. of Bordeaux, France, 2Amplitude Systèmes, France. 1Lab Charles Fabry de l’Inst. d’Optique, Univ. Paris Sud, France. We report the direct amplification of femtosecond pulses to 870 nJ, 49 fs, 12 MW and 1.25 μJ, 70 fs, 16 MW from a single stage stretcher-free rod-type fiber amplifier setup.

Reception Hall
9:45 a.m.–10:15 a.m.
Coffee Break/Exhibits Open

TuB • Eyesafe Infrared Sources

Noh Theater
10:15 a.m.–11:45 a.m.
TuB • Eyesafe Infrared Sources
Timothy Carrig; Lockheed Martin Coherent Technologies, USA, Presider

TuB1 • 10:15 a.m.
Mid-Infrared Silicon Raman Amplifier, Varun Raghunathnath1, David Borlaug2, Robert Rice2, Bahram Jalali2; 1Univ. of California at Los Angeles, USA, 2Northrop Grumman Space Technology, USA. Raman amplification is demonstrated in mid infrared wavelength region in bulk silicon as well as integrated waveguides. 13dB gain is achieved at 3.4 μm wavelength when silicon is pumped with 5ns pulses at 2.9 microns.

TuB2 • 10:30 a.m.
QPM Wavelength Converters Based on Crystal Quartz, Sunao Kurimura1, Munezuki Adachi2, Jun Nakamishi2, Ken-ichi Hayashit2; 1Natl. Inst. for Materials Science, Japan, 2Nidek Co., Ltd., Japan. Recent progress in quasi-phase-matched crystal quartz will be reported. Fine period tuning by mechanical stress application achieved a 12 μm twin structure. Milliwatt-level second harmonic generation was demonstrated at 266 nm by 2nd-order QPM.

TuB3 • 10:45 a.m.
High Power and Efficient Long Wave IR ZnGeP: Optical Parametric Oscillator, Espen Lippet1, Gunnar Rustad1, Knut Stenersen; Norwegian Defence Res. Establishment (FFI), Norway. A high power, efficient, ZnGeP: optical parametric oscillator tuned to the 8-10-μm wavelength range, pumped by a hybrid 2-micron-laser, is demonstrated. With 8.9W of 2.1μm pump power we obtained 0.95W at 8μm.

TuB4 • 11:00 a.m.
Cryo-Laser Performance of Resonantly-Pumped Er3+:Sc2O3 Ceramic, Nikolay Ter-Gabrielian1; Larry D. Merkle2, George A. Newburgh1, Mark Dubinski1, Akio Ikesue1; 1US ARL, USA, 2World Lab Co., Ltd., Japan. Laser performance of Er3+:doped scandia (Sc2O3) ceramic is reported for the first time. Resonantly-pumped, eyesafe, 1.6-μm Er:Sc2O3 cryo-laser slope efficiency of 77% and output power ~ 2.35 W have been achieved in this first experiment.
TuB5 • 11:15 a.m.
Single-Frequency, Widely-Tunable, and Multi-Watt Polycrystalline CW Cr²⁺:ZnSe Lasers, Igor S. Moskalov, Vladimir V. Fedorov; Sergey B. Mirov; Univ. of Alabama at Birmingham, USA. We demonstrate polycrystalline Cr²⁺:ZnSe CW rapidly-tunable (4.5 μm/s) high-power (150 mW) single-longitudinal-mode laser; widely-tunable (2.12-2.77 μm) multi-watt (2 W) laser; high-power (6 W) highly-efficient (48%) laser; and high-power (3 W) highly-efficient (41%) microchip laser.

TuB6 • 11:30 a.m.
Multiplex Molecular Fingerprinting with a Mid-Infrared Cr²⁺:ZnSe Femtosecond Laser, Evgeni Sorokin, Irina T. Sorokina, Julien Mandon, Guy Guilhaume, Nathalie Piqué; Photonics Dept., Technische Univ. Wien, Austria, 1Physics Dept., Norwegian Univ. of Science and Technology, Norway, 2Lab de Photophysique Moléculaire, CNRS, Univ. Paris-Sud, France. A 130-fs Cr²⁺:ZnSe laser is used to record, in 13 s, molecular spectra covering simultaneously 135 nm at 3.6 GHz resolution. The high signal-to-noise ratio of 3800 suggests 0.2 ppbv detection level for HF molecule.

12:15 p.m.
Laboratory Tour and Day Trip: Buses Leave Nara-Ken

1:15 p.m.–6:00 p.m.
Tour of Horuji and JAEA

6:00 p.m.
Buses Return to Hotel

TuC • Banquet

Nara Nikko Hotel, Hiten Room
7:00 p.m.–10:00 p.m.
ASSP Banquet

TuC • Banquet Speaker Invited
Construction of Great Buddha in Nara, Symbol of Giant Light Source in Cosmos, Atsumu Wada, Professor Emeritus, Kyoto Univ.

Atsumu Wada was born in northeastern China (Liaoyang, former Manchukuo) in 1944 and soon after birth he moved to Tawaramoto, Nara Prefecture, Japan, and he was brought up in the historical culture of Yamato (the old name of Nara). He is now living in Kibi, Takatori-cho, Takaichi-Gun, Nara Prefecture, Japan.

He finished his Ph.D. (national history) at the Graduate School of Letters, Kyoto University in 1972. After a Research Associate, Faculty of Letters, Kyoto University, he worked at Kyoto University of Education, where he became a Professor in 1988. He received the Ph.D. degree in literature from Kyoto University. In March, 2007, he took mandatory retirement.

He specializes in Japanese ancient history and is engaged in research in Japanese ancient thought and culture, wood strips, and so forth. Since 1972, as a Leading Researcher, Archaeological Institute of Kashiwara, Nara Prefecture, he has been engaged in research activities in order to make the connection between Japanese ancient history and archaeology. He has studied under poet Toshio Mae living in Yoshino, Nara Prefecture, and been a member of the literary coterie “Yamamayu.”

He has written a number of books including, “Nihon-Kodai no Girei to Saishi, Shinkou (Rites, Worship and Belief in Ancient Japan) I, II, III,” Hanawa Shobo, Tokyo, Japan (1995). In addition, he has written a great number of papers.

He writes an article “Yamato Jiku Sanpo (Walking in the space and time of Nara)” every Wednesday for the Sankei Shinbun, a local newspaper.
• **Wednesday, January 30, 2008•**

**Entrance Foyer**
7:30 a.m.-5:00 p.m.
**Registration Open**

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<th>WA • Fiber Lasers</th>
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**Noh Theater**
8:00 a.m.-10:00 a.m.
**WA • Fiber Lasers**

Alphan Semuroglu; Koc Univ., Turkey, President

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<th>WA1 • 8:00 a.m.</th>
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**High-Peak-Power Pulsed Fiber Lasers**, Fabio Di Toaldo, Acelight Corp., USA. We describe pulsed fiber-based optical sources relying on very-large-core fibers, which attain high peak power (up to multiple megawatts) and pulse energy (up to multiple millijoules), while retaining excellent beam quality and narrow spectral linewidth.

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<th>WA2 • 8:30 a.m.</th>
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**Phase Locking of a Pulsed Fiber Amplifier**, Eric C. Cheung, Mark Weber, Robert R. Rice; Northrop Grumman Space Technology, USA. The 180-μJ, 1-nsec output of a pulsed fiber amplifier is phase locked to a master oscillator. As a precursor step for coherent beam combination, chirp is reproducible pulse to pulse and phase is robustly locked.

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<th>WA3 • 8:45 a.m.</th>
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**Precision Phase Stabilization of Amplified Yb:Fiber Frequency Comb with Average Power >10W**, Thomas R. Schibli1, Dylan C. Yost1, Jun Ye1, Ingmar Hartl2, Andrius Marcinkievicius2, Martiu E. Fermann1; 1JILA, Natl. Inst. of Standards and Technology and Univ. of Colorado, USA, 2IMRA America, Inc., USA. We implement complete phase stabilization of a mode-locked Yb:fiber laser and its subsequent amplifier, producing a precise optical frequency comb with >10W average power and significantly improved noise performance compared to Er:fiber-based frequency combs.

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<th>WA4 • 9:00 a.m.</th>
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**Four-Channel, High Power, Passively Phase Locked Fiber Array**, Thomas H. Laftus1, Alison M. Thomas1, Marc Norsen1, John Minnelly1, Pat Jones1, Eric Honea1, Sami A. Shakir2, Sami Hendawi1, William Culver2, Burke Nelson1, Mike Filetson1; 1Acelight Corp., USA, 2Northrop Grumman, NGIT/DES, USA, 3Northrop Grumman, NGES, USA. We demonstrate passive phase stabilization in a four channel high power passively phase-locked Yb fiber laser array. We achieved an output power of 710W with high fringe visibility from an array of LMA Yb fiber lasers.

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<th>WA5 • 9:15 a.m.</th>
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**Coherent Combination of Fiber Lasers with a Diffractive Optical Element**, Michael Wickham, Eric C. Cheung, James G. Ho, Gregory D. Goodwin, Robert R. Rice, Josh Rothenberg, Peter Thielin, Mark Weber; Northrop Grumman Space Technology, USA. An actively phase-locked array of five fiber lasers is coherently combined using a diffractive optical element with 91% efficiency and M²=1.04. Calculations and power handling measurements suggest this approach is scalable to high powers.

**WA6 • 9:30 a.m.**
1 kW Narrow-Linewidth Fiber Amplifier for Spectral Beam Combining, Christian Wirth1, Oliver Schmidt1, Igor Tsybin1, Thomas Schreiber1, Ramona Eberhardt1, Jens Limper1, Andreas Tümermann1; 1Fraunhofer IOF Jena, Germany, 2Inst. for Applied Physics, Friedrich-Schiller Univ. Jena, Germany. We report on a narrow linewidth fiber amplifier system emitting a total output power of 1 kW. Limiting nonlinear effects like stimulated Raman and Brillouin scattering as well as self-phase modulation are discussed in detail.

**WA7 • 9:45 a.m.**
Single-Mode, Highly Polarized Yb-Doped Fiber Laser with 850 W Output Power, Jens Geiger, Oliver Fitzau, Berhard Zintschn, Dieter Hoffmann; Fraunhofer-Instit. für Lasertechnik, Germany. An 850 W linearly polarized, pump power limited, fiber laser based on a simple coiling technique is presented. The degree of polarization is measured by two means, different fiber lengths and pump wavelengths are used.

**Reception Hall**
10:00 a.m.-11:00 a.m.
Coffee Break/Exhibits Open

| WB • Poster Session II (Student) |

**WB1 Micro Laser for Engine Ignition Paper**

Development of a High Peak Power Solid-State Laser for Engine Ignition, Heinrich Kohler, Johannes Tauer, Kurt Iskra, Georg Tartar, Ernst Wintner; Photonics Inst., Vienna Univ. of Technology, Austria. A compact monolithic Nd:YAG-Cr³⁺:YAG high peak power, passively Q-switched, longitudinally diode-pumped laser was constructed for laser ignition. The system yielded pulses with energies of 8 mJ and durations of 1 ns at 225 W pump power.

**WB2 Resonance Transition 795-nm Rubidium Laser Using 3He Buffer Gas**, Sheldon S. Q. Wu1,2, Thomas F. Soules1, Ralph H. Page1, Scott C. Mitchell1, V. Keith Kanz1, Raymond J. Beach1; 1Lawrence Livermore Natl. Lab, USA, 2Dept. of Electrical and Computer Engineering, Univ. of California at San Diego, USA. Demonstration of 795-nm Rubidium laser using a buffer gas consisting of pure 3He is reported. The use of 3He yields enhanced mixing of Rub fine-structure levels and enables efficient lasing at reduced buffer gas pressures.

**WB3 Volume Bragg Grating Tuned Large Mode Area Fiber Laser**, Pär Jelger, Fredrik Laurell; Applied Physics, Royal Inst. of Technology (KTH), Sweden. A narrow linewidth ytterbium-doped large-mode area VBG-tuned fiber laser is demonstrated. The output power was >4.3 W (77% slope efficiency) and the tuning range was 33 nm (5 GHz linewidth) with nearly diffraction limited output (M²<1.3).
WB4
Spectroscopy and Efficient High-Power Laser Operation of Er,Yb:YAl3(BO3)4 (BO), Crystal at 1.5-1.6 μm, Nikolai A. Tolstik1, Sergey V. Karlikchik1, Victor E. Koe1, Nikolai V. Kaleshov2, Guenter Huber2, Victor V. Maltese3, Oleg V. Pilipenko1, Elizabeth V. Kopyrilova1, Nikolai I. Lesnyuk1; 1Inst. for Optical Materials and Technologies, BNTU, Belarus, 2Inst. of Laser Physics, Hamburg Univ., Germany, 3Geological Faculty, State Univ. State Univ., Russian Federation. We report on the spectroscopic properties and high-power diode-pumped CW laser operation of Er,Yb:YAl3(BO3)4 crystals at 1602, 1555 and 1531 nm. An output power of 1 W and a slope efficiency of 35% were demonstrated.

WB5
Comparison between 2 Different Composite Nd3+:YVO4 Crystals in a Fibre Coupled Diode Pumped Laser, Jérôme Goujon, Olivier Masset; Inst. Carnot de Bourgogne, Univ. de Bourgogne, France. We detail the performances of two composite Nd3+:YVO4 crystals, realised with two different sticking techniques. We tested them inside a fibre coupled diode end pumped laser.

WB6
Diode-End-Pumped Tm:GdVO4 Laser at Selected Wavelengths, M.J. Daniel Eser, Christoph Bollig, Dieter Preusssler; Natl. Laser Ctr., CSIR, South Africa. A Tm:GdVO4 laser was operated at 1915 nm and 1818 nm by selection of output coupler reflectivity. The maximum QCW output power of the laser was 8.7 W, or 175 mJ energy per pulse.

WB7
Characteristics of CW and A-O Q-Switched Nd:GdVO4 Laser Operation at 912 nm, Jing Gao, Xin Yu, Fei Chen, Xiadong Li, Zhen Zhang, Junhua Yu, Yuezhu Wang; Harbin Inst. of Technology, China. 8.6 W CW output power of 912 nm Nd:GdVO4 laser is presented. For the A-O Q-switched mode, minimum pulse width of 20 ns and maximum peak power of 7.1 kW at 10 kHz is obtained.

WB8
Nd:GSAG Laser at 943 nm with High Pulse Energy, Frank Kahlmeier, Xin Wang, Marcus Dziedzina, Hanjo Rhee, Hans J. Eichler; Technical Univ. Berlin, Germany. A Nd:GSAG laser end-pumped by pulsed laser diodes is presented. A maximum output energy of 160mJ at 10Hz repetition rate was obtained in free-running mode. In Q-switched mode an output energy of 31mJ was achieved.

WB9
Diode-Pumped Sub-100-fs Kerr-Lens Mode-Locked Yb3+:Sc2O3 Ceramic Laser with High Average Power, Masaki Tokurakawa1, Akira Shirakawa1, Ken-ichi Ueda1, Hideki Yagi1, Takagimi Yanagita1, Alexander A. Kaminski2; 1Univ. of Electro-Communications, Japan, 2Takuma Works, Konoshima Chemical Co. Ltd., Japan, 1Inst. of Crystallography, Russian Acad. of Sciences, Crystal Laser Physics, Russian Federation. Diode-pumped Kerr-lens mode-locked laser operations of Yb3+:Sc2O3 ceramics have been achieved. 92 fs pulses with the average power of 850 mW under 3.89-W incident pump power were obtained at a center wavelength of 1042 nm.

WB10
Growth, Micro-Structuring, Spectroscopy, and Optical Gain in As-Deposited Al2O3:Er Waveguides, Jonathan D. B. Bradley1, Dmitrii Geskus1, Tom Blauwendraat1, Feridun Ay1, Kerstin Wörhoff1, Markus Pollnau1, Andreas Kahn1, Hanso Schiele1, Guenter Huber2; 1Univ. of Twente, Netherlands, 2Inst. of Laser-Physics, Univ. of Hamburg, Germany. Deposition and micro-structuring of Al2O3:Er layers with low background losses (0.11 dB/cm) and lifetimes up to 7 ms have been optimized for active devices. Net gain of 0.7 dB/cm at 1533 nm has been measured.

WB11
Investigating Thermal Stresses in Quasi-CW Pumped Tm:YLF Laser Crystals, Edward H. Berhardt1,2, Christoph Bollig, Lesley Harris2, M. J. Esser1, Andrew Forbes2; CSIR Natl. Laser Ctr., South Africa, 1School of Physics, Univ. of Kwazulu-Natal, South Africa, 2CSIR Materials Science and Manufacturing, South Africa. Time dependant thermally induced stresses in an end-pumped Tm:YLF laser rod are investigated numerically. The variation of the maximum incident pump power at the fracture point with respect to pulse length is investigated.

WB12
Nė-cut Nd:KGW Crystal for Efficient Flash-Lamp Pumped Laser Operation at High Repetition Rates, Konstantin V. Yumashev1, Vasili G. Savitski1, Nikolay V. Kaleshov1, A. A. Pardyuk1, Dmitry D. Molotkov1, Alexander L. Protasenya2; 1Inst. for Optical Materials and Technologies BNTU, Belarus, 2Inst. of Inorganic Chemistry, Siberian Branch of Russian Acad. of Sciences, Russian Federation, 3SOLAR Laser Systems, Belarus. Relatively weak, nearly spherical and positive thermal lens in a Nė-grown Nd:KGW results in higher average output power and higher repetition rates available in flash-lamp pumped laser in comparison with a f-cut Nd:KGW.

WB13
Highly Doped Yb:YAG Thin-Disk Lasers: A Comparison between Single Crystal and Ceramic Active Media, Susanne T. Fredrich-Thornton1,2, Christian Hirt1, Friedjof Tellkamp1, Klaus Petermann1, Guenter Huber1, Ken-ichi Ueda1, Hideki Yagi1; 1Inst. für Laser-Physik, Univ. Hamburg, Germany, 2Inst. for Laser Science, Univ. of Electro-Communications, Japan, 3Takuma Works, Konoshima Chemical Co. Ltd., Japan. Despite the very similar spectroscopic properties, efficient lasing in the thin-disk laser set-up has not been possible for highly doped Yb:YAG single crystals so far, whereas 20% Yb:YAG ceramics display a 60.6% slope efficiency.

WB14
Spectroscopy and Modelling of a High Power Diode-pumped 2.3 μm Yb:YLF Laser, Niklaus Ursus Wetter, Paulo Sergio Fabris de Matos, Lércio Gomes, Izilda Márcia Ranieri, Sonia Lídia Baldochi; Ctr. de Laseres e Aplicações - IPEN/SP, Brazil. Energy transfer processes in Yb:YLF under 960 nm pumping have been quantitatively studied and a computer simulation considering the full rate-equation scheme has been performed. The 2.3 μm laser achieved 620 mW of output power.
WB15
Ultrafast Yb:KYW Regenerative Amplifier with Combined Gain Spectra of the Optical Axes Nm and Np, Udo Buenting, Peter Wessels, Hakan Sayın, Oliver Prochnow, Dieter Wandt, Dietmar Kracht; Laser Zentrum Hannover e.V., Germany. A Yb:KYW regenerative amplifier directly diode pumped is demonstrated to study a novel approach to reduce gain-narrowing. Two gain spectra (10 nm separated) are combined by using the crystal directions Nm and Np of Yb:KYW.

WB16
Diode-Pumped 65-fs Kerr-Lens Mode-Locked Combined Yb-Doped Sesquioxide Ceramic Laser, Masaki Tokurakawa1, Akira Shirakawa,1 Ken-ichi Ueda, Hideki Yagï, Takagami Yanagisawa,1 Alexander A. Kaminski,1 1Univ. of Electro-Communications, Japan, 2Takuma Works, Konoshima Chemical Co. Ltd., Japan, 3Inst. of Crystallography, Russian Acad. of Sciences, Crystal Laser Physics, Russian Federation. Diode-pumped Kerr-lens mode-locked laser operation of Yb3+:Lu2O3 and Yb:O3 combined ceramic laser has been achieved. 65 fs pulses with the average power of 320 mW under 5-W pump power were obtained at 1032 nm.

WB17
High-Power Femtosecond Pulse Generation from a Yb-Doped Large-Mode-Area Microstructure Fiber Laser, Caroline Lecaplain1, Clovis Chelot1, Annamar Hileire1, Bilend Ortaç, Jens Limpert1; 2Laboratoire d’Optique et d’Optométrie, Univ. de Rouen, France, 3Inst. of Applied Physics, Friedrich Schiller Univ., Germany. We report on a passively mode-locked laser based on a large-mode-area ytterbium-doped microstructure fiber. The laser delivers 3.3 W of average power at 46 MHz repetition rate. These pulses are extra-cavity dechirped to 516 fs.

WB18
Ce:LiCAF Crystal Grown by the Micro-Pulling Down Method and Its Ultraviolet Lasing Properties, Marilou Cadatul2,3, Mith H. Pham1,2, Toshihiro Tatsumi1, Ayumi Saiki1, Yusuke Furukawa,1 Elmer Estacio1, Nobuho Sarukura1, Yoshihiro Suyama1, Kento Furukado1, Kyoong Jin Kim1, Akira Yoshikawa,1 Fumiyoishi Saito1; 1Inst. for Molecular Science, Japan, 2Graduate Univ. for Advanced Studies, Japan, 3Inst. of Laser Engineering, Osaka Univ., Japan, 4Tokuyama Corp., Japan, 5Tohoku Univ., Japan. We report the first successful micro-pulling down method growth and ultraviolet emission from a Ce:LiCAF crystal. The 10% slope efficiency is expected to increase with improved crystal quality owing to optimized growth parameters.

WB19
Comparison of a Ti:S Laser and a Tapered External Cavity Diode Laser for Sum Frequency Generation in a High-Finesse 1342 nm Nd,YVO4 Laser, Martin T. Andersen1, Peter Tidemand-Lichtenberg1, Emil Karamchedevski1, Christian Pedersen1; 1Technical Univ. of Denmark, Denmark, 2Riso Natl. Lab, Denmark. Using a Brewster cut periodically poled KTP crystal intra-cavity in a high finesse diode pumped CW 1342 nm laser, efficient sum-frequency generation is obtained by single passing a 765 nm beam from a Ti:Sapphire ring-laser.

WB20
Polarization-Tuning of Yb:KGW by Use of Internal Conical Refraction, Jonas E. Hellström1, Hanna Henriksson1, Valdas Pasiskevicius1, Udo Büsting2, Dirk Hausmann2,1 Karlibiga Tekniska Högskolan, Sweden, 2Vision Crystal Technology AG, Germany. We demonstrate that both direction and extinction ratio of the polarization in an Yb:KGW laser can be arbitrarily controlled using conical refraction. No additional components are necessary. Output power was 8.6W and slope efficiency 60.5%.

WB21
Passively Mode-Locked Erbium-Doped Fiber Oscillator with Pulse Energies above 10 nJ, Axel Ruehl, Vincent Kahn, Dieter Wandt, Dietmar Kracht; Laser Zentrum Hannover e.V., Germany. We report on an erbium-doped fiber oscillator mode-locked by nonlinear polarization rotation operating in the normal dispersion regime. The laser generated highly-stretched pulses with energies above 10 nJ externally compressed to below 75 fs.

WB22
Gain Limitations and Consequences for Short Length Fiber Amplifiers, Fabian Riser1, Damien Schimpf1, Jan Rothhardt1, Tino Eidam1, Jens Limpert1, Andreas Tünnemann1, Francois Salin1; 1Inst. of Applied Physics, Friedrich-Schiller- Univ., Germany, 2EOLITE, France. We numerically and experimentally analyze gain limitations due to pump light bleaching in large core short length fiber amplifiers and discuss consequences such as the efficiency and accumulated nonlinear phase.

WB23
105 kHz, 85 ps, 3 MW Peak Power Microchip Laser Fiber Amplifier System, Oliver Schmidt, Dirk Nodop, Jens Limpert, Andreas Tünnemann; Inst. of Applied Physics, Friedrich-Schiller- Univ., Germany. We report on a fiber amplified passively Q-switched microchip-laser delivering 85ps pulses with an energy of up to 0.26mJ, corresponding to a peak-power of 3MW. The repetition rate is 105kHz, resulting in 27W average power.

WB24
Tandem Fiber Laser, Ramatou Bello Doua1,2, François Salin1, Eric Freysz2; 1EOLITE, France, 2Univ. Bordeaux, France. Two coupled laser fiber produces dual and tunable laser outputs. The system provides two 6.7 ns and diffraction limited Q-switched laser pulses with 110 kW peak power at repetition rates between 10 and 100 kHz.

WB25
Widely Tunable Dual-Wavelength Fiber Laser Using Self-Seeded Fabry-Perot Laser, Chien-Hung Yeh1, Fu-Yuan Shih1, Chien-Nan Lee2, Chang-Tai Chen2, Sien Chie1; 1Industrial Technology Res. Inst., Taipei, 2Dept. of Electrical Engineering, Yuan Ze Univ., Taiwaın, 3Dept. of Photonics and Inst. of Electro-Optical Engineering, Natl. Chiao Tung Univ., Taiwan. We propose a stable and tunable dual-wavelength erbium-doped fiber ring laser employing a self-injected Fabry-Perot laser diode. By tuning tunable bandpass filter within a gain cavity, the fiber laser can lase two wavelengths simultaneously.
WB26
Micro-Pulling Down Nd:YAG Single Crystal Fibers for High Power Linearly Polarized CW and Q-Switched Lasers, Damien Sangla1,2, Julien Didierjean1, Nicolas Aubry3, Didier Perrotin1, François Balonbois3, Kherreddine Léboub3, Alain Bénier1, Patrick Georges1, Jean-Marie Fourmigué1, Olivier Tilmant3,1 Lab Charles Fabry de l’Inst. d’Optique, Univ. Paris Sud, France, 2 Lab de Physico-Chimie des Matériaux Luminescents (LPCML), Univ. Lyon, France, 3 Fibercryst SAS, France. We achieved 16-W polarized and 20-W unpolarized cw power at 1064 nm for 120-W of pump power and 360 kW peak power in the Q-Switched regime with Nd:YAG single-crystal fibers grown by micro-pulling-down technique.

WB27
Twenty-Watt Average Output Power, Picosecond Thin-Rod Yb:YAG Regenerative Chirped Pulse Amplifier with 200 μJ Pulse Energy, Shinichi Matsubara, Motohura Tanaka, Masaki Takama, Sakae Kawato, Takao Kobayashi; Fiber Amenity Engineering, Graduate School of Engineering, Univ. of Fukui, Japan. A laser-diode-pumped, ps-pulse thin-rod Yb:YAG laser amplifier was developed. The average output power of 20 W was achieved with a pulse output width of 2 ps at a pulse repetition rate of 100 kHz.

WB28
An All-Normal-Dispersion Yb-Doped Fiber Laser without the Spectral Filtering, Chun Zhou, Peng Li, Yongheng Dai, Zhigang Zhang; Inst. of Quantum Electronics, Univ. of Beijing, China. We demonstrated a simple all-normal-dispersion Yb-doped femtosecond fiber laser which delivers a pulse with 8.9 nJ and 33 MHz. After the extracavity compression with a grating pair, the pulse was compressed to 210 fs.

WB29
Frequency Combs Generated by Stimulated Raman Scattering of Mode-Locked Lasers, Hanjo Rhee1, Christoph Theiss1, Stefan Meister1, Hans Joachim Eichler2, Alexander A. Kaminski2; Technische Univ. Berlin, Germany, 1A.V. Shubnikov Inst. of Crystallography, Russian Acad. of Sciences, Russian Federation. A method to generate a self-referencing multi-octave spanning frequency comb by Raman shifting the output of mode-locked picosecond lasers is proposed. The number of comb modes and the frequency offset can be determined by extrapolation.

WB30
Sub-Nanosecond Infrared Optical Parametric Pulse Generation in PPLN Pumped by a Seeded Fiber Amplifier, Matthew D. Cocuzzi1, Kenneth L. Schepler2, Peter E. Povお3, Ivan T. Lima2; 1AFRL, USA, 2Dept. of Physics and Electro-Optics Program, Univ. of Dayton, USA, 3Dept. of Electrical and Computer Engineering, North Dakota State Univ., USA. Sub-nanosecond pulses generated in a microchip laser were amplified in an Yb-doped, polarization-maintaining fiber amplifier and converted with 24% efficiency to infrared wavelengths using a periodically poled lithium niobate optical parametric generator.

WB31
Angular Selectivity of Third Harmonic Generated in a PTR Transmitting Bragg Grating by Femtosecond Pulses, Leo Siiman1, Julien Lameau1, Leonid B. Glebov1, Lionel Canioni1; 1CREOL, College of Optics and Photonics, Univ. of Central Florida, USA, 2CPMOH, Univ. of Bordeaux, France. The angular selectivity of third harmonic beams generated in a PTR grating by femtosecond pulses is reported. A model of the angular profiles with a cubic combination of transmitted and diffracted pulse intensities is proposed.

WB32
Harmonics Generation from Rod-Type Doped Fiber Laser, Ramatou Bello Doua1, Francois Salin1, Eric Freyss2; 1EOLITE, France, 2Univ. Bordeaux, France. We presents a diode pumped, Q-switched Yb doped rod-type fiber laser which makes possible to produce near diffraction limited frequency doubled and tripled beams with a conversion efficiency of respectively 62% and 36%.

WB33
Transverse Mode Conversion by Second Harmonic Generation Using Axially Symmetric, Polarized Laser Beams, Yuichi Kozauro, Shunichi Shin; Inst. of Multidisciplinary Res. for Advanced Materials, Tohoku Univ., Japan. Second harmonic generation from a (110) zinc selenide crystal is demonstrated using focused axially symmetric, polarized beams. Transverse mode conversion to higher order Hermite-Gaussian mode are observed showing unique intensity and polarization distribution.

WB34
Efficient THz Radiation from Nanocrystalline Silicon-Based Multilayer Photomixer, N. S. Daghiani1, G. S. Sokolowski2, Alexei V. Tolmatchev2, Natalia E. Bazieva3, Wilson Sibbett2, Edik U. Rafailov1; 1Univ. of Dundee, UK, 2Ioffe Inst., Russian Acad. of Sciences, Russian Federation, 3Univ. of St. Andrews, UK. In this paper we propose and model a novel multiple-layer photomixer based on amorphous/nano-crystalline-Si. The output power from such a photomixer is at least 10 times higher than conventional LTG-GaAs photomixers at 1 THz.
WC4 • 11:45 a.m. Invited
Raytheon Ceramic YAG Material Development for Laser Gain and IR Windows Application, Jean Huie; Advanced Material Lab, Raytheon, USA. This communication presents Raytheon’s current development status in the fabrication of optically transparent ceramic YAG for uses in laser gain media and IR transparent windows.

WC5 • 12:00 p.m. Invited
The Use of Large Transparent Ceramics in a High Powered, Diode Pumped Solid-State Laser, Bob M. Yamamoto, Balbir S. Bhachu, Kurt P. Cutter, Scott N. Fochs, Steven A. Letts, Charles W. Parks, Mark D. Rotter, Thomas F. Soules; Lawrence Livermore Natl. Lab, USA. The advent of large transparent ceramics is one of the key enabling technological advances that have shown that the development of very high average power compact solid-state lasers is achievable.

12:30 p.m.–2:00 p.m.
Lunch Break

WD • Nonlinear Optics

Noh Theater
2:00 p.m.–3:30 p.m.
WD • Nonlinear Optics
Valdas Pasiskvicius; Royal Inst. of Technology, Sweden, Presider

WD1 • 2:00 p.m. Invited
Ultra-Broadband, Frequency-Agile THz-Wave Generator and Its Applications, Hiromasa Ito1,2, K. Miyamoto3, H. Minamida4; RIKEN Sendai, Inst. of Physical and Chemical Res., Japan, 1Graduate School of Engineering, Tohoku Univ., Japan. Ultra-broadband as well as frequency-agile THz-wave generation has become feasible via phase-matched DAST-DFG. Covered frequency region is 1 THz to beyond 40 THz. The random-frequency access and the broad tunability provide promising THz-wave applications in various industrial and research fields. The THz-wave source and its applications will be discussed.

WD2 • 2:30 p.m.
New THz Source Based on Resonantly Enhanced Frequency Conversion in Periodically-Inverted GaAs, Konstantin L. Vodopyanov1, Joe E. Schaaf2, Paulina S. Kuo3, M. M. Fejer1, Anjie Lin4, Jim S. Harris4, Walter C. Hurburt5, Vlad G. Kozlo4, David Bliss6, Candace Lynch3; 1Stanford Univ., USA, 2Microtech Instruments, Inc., USA, 3Hanscom AFRL, USA. We report mW-average-power widely tunable (0.5-3.5 THz) monochromatic THz source based on frequency mixing in periodically-inverted GaAs, between the two closely spaced ‘signal’ and ‘idler’ waves, inside the resonant cavity of a synchronously-pumped picosecond OPO.

WD3 • 2:45 p.m.
High Average Power Frequency Conversion with Large Aperture YCOB, Christopher A. Ebbers1, A. J. Bagrammian1, R. W. Campbell1, R. Cross1, B. L. Freitas2, Z. M. Liao1, K. J. Schaffers1, J. A. Caird1, C. P. J. Barty1, Y. Fei5, B. H. T. Chai2; 1Lawrence Livermore Natl. Lab, USA, 2Crystal Photonics Inc., USA. We have demonstrated frequency doubling of a high-average-power, high-pulse-energy laser with YCOB, producing 317 W at 10 Hz. Improved stoichiometry control and post-growth anneal has led to improved optical reliability and eliminated spontaneous boule cracking.

WD4 • 3:00 p.m.
9.6-W cw Green Output from Diode Edge-Pumped Composite Vanadate Microchip Laser with Small Packaged Volume, Tsuyoshi Suzudo1, Masaki Hirai2, Yasuhiro Higoshi1, Yasuhiro Satoh1, Yoichi Sato1, Hideki Ishizaki1, Takunori Taira2, Yasunori Furukawa2; 1RICOH Co., Ltd., Japan, 2Inst. of Molecular Science, Japan, 3Oxide Corp., Japan. 9.6-W cw green output power from 150-cm² volume was achieved. In order to reduce the package size including intra cavity frequency doubling using LiB3O5, a composite vanadate microchip was directly edge-pumped by diode bars.

WD5 • 3:15 p.m.
A Promising NLO Crystal for UV Light Generation: Caβ(BO3)F, Ke Xi1, Pascal Lisseau1, Gérard Aka1, Takunori Taira2; 1Lab de Chimie de la Matière Condensée de Paris, France, 2Laser Res. Ctr., Japan. A new promising non linear crystal was investigated: Caβ(BO3)F. Its optical properties were measured and its phase matching angles were notably determined for the second, third and fourth harmonics of NIR lasers.

Reception Hall
3:30 p.m.–4:30 p.m.
Coffee Break/Exhibits Open

WE • Poster Session III

WE1 Micro Laser for Engine Ignition Paper
Laser-Induced Breakdown of Air with Double-Pulse Excitation, Taketoshi Fujikawa1, Kazuhiro Akihanna1, Masaki Ebina1, Takunori Taira2; 1Toyota Central Res. and Development Labs, Japan, 2Inst. for Molecular Science, Japan. Experimental investigation of air-breakdown induced by double-pulse laser with nanosecond pulse duration is conducted. The effects of pulse interval and energies on laser absorption and plasma brightness are presented.

WE2 Micro Laser for Engine Ignition Paper
Simulation and Experiments of the Laser Induced Breakdown of Air for Femtosecond to Pico-second Order Pulses, James Kogo1, Kengo Moribayashi1, Yuji Fukuda1, Sergei V. Bulanov1,2,3, Akiho Sugisaka1, Koichi Ogura1, Hiroaki Daido1, Mitsuru Yamaguchi1, Toyoaki Kimura1, Taketoshi Fujikawa1, Kazuhiro Akihanna1, Masaki Ebina1; 1Advanced Photon Res. Ctr., Japan, 2Moscow Inst. of Physics and Technology, Russian Federation, 3A. M. Prokhorov Inst. of General Physics of the Russian Acad. of Sciences, Russian Federation, 4Toyota Central Res. and Development Labs, Inc., Japan. Simulations including the laser propagation, multi-photon and impact ionization, and heating of the electrons and experimental results for the laser induced breakdown of air for pulses of duration from femtoseconds to picoseconds are presented.

WE3 Micro Laser for Engine Ignition Paper
Ignition with Laser Break-Down, Hirohide Furutani1, Takeshi Saito2; 1Natl. Inst. of Advanced Industrial Science and Technology, Japan, 2Meisei Univ., Japan. It is considered that ignition with laser break-down is one of the applications of solid-state lasers. This paper shows basic experimental results indicating the advantages of laser ignition and result of engine test.

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**WE4**
New Gain Medium for Mid-IR Room Temperature Lasers Based on Fe Doped CdMnTe Crystals, Will Mallory, Vladimir V. Fedorov, Sergey B. Mikov, Uwe Hammerich, W. Palosz, Sudhir B. Trivedi; *Univ. of Alabama at Birmingham, USA, *Hampton Univ., USA, *Brumrose Corp. of America, USA. Spectroscopic characterization of the Fe\(^{2+}\) ions in the CdMnTe in the 2000-7000 nm spectral range at 14-300K temperatures demonstrates feasibility of the gain-switched oscillation of the crystal at room temperature over 4000-6500 nm spectral range.

**WE5**
Absorption and Fluorescence Singularities in the Nd:YCOB Monoclinic Crystal, Yannick Petit, Benoît Boulanger, Patricia Segonds, Corinne Félix, Bertrand Ménard, Julien Zaccaro, Gérard Aka; *Inst. Néel, France, *École Natl. Supérieure de Chimie de Paris, France. We report the first measurements of angular distribution of absorption and luminescence in a biaxial monoclinic crystal. The patterns follow the index surface topology but main values are not in the optical frame.

**WE6**
Spectroscopy of RbPbCl\(_3\):Pr\(^{3+}\) Laser Crystal in Near- and Mid-IR, Andrey Okhrimchuk, Irina Shestakova, Ninel Lichten, Vladimir Zagrodnic; Kirill Boldyrev; *Fiber Optics Res. Ctr. at GPI, Russian Acad. of Sciences, Russian Federation, *Inst. of Microelectronics Technology, Russian Acad. of Sciences, Russian Federation. The nature of the spectral broadening of absorption bands corresponding to \(f\rightarrow f\) transitions in Pr\(^{3+}\) ion is investigated by low temperature absorption spectroscopy and selective laser spectroscopy.

**WE7**
High-Resolution Spectroscopic Characterization of Nd-Doped GSGG Crystals and Transparent Ceramics, Voica Lupet, Aurelia Lupet, Cristina Gheorghe, Akio Ikese; *Inst. of Atomic Physics, Romania, *World Lab Co. Ltd., Japan. High-resolution spectroscopic investigation of Nd:GSGG transparent ceramics and single crystals indicates that their structural (nature and structure of doping centers, distribution of doping ions) and spectroscopic (energy levels, transition probabilities, energy transfer) properties are similar.

**WE8**
Simultaneous Measurement of Thermal Lens and Temperature Map in Ytterbium-Doped Fluoride Crystals, Justine Boudet, Julien Didierjean, Frédéric P. Druon, François Balenbois, Patrick Georges, Jean-Louis Doualan, Patrice Camy; A. Benadjid, Vincent Ménard; Richard Moncorge; *Lab Charles Fabry de l’Inst. d’Optique, Univ. Paris Sud, France, *Ctr. de Recherche sur les Ions et les Matériaux pour la Photonique (CIMAP), France. We report on the simultaneous characterization of temperature map and thermal lensing in Yb\(^{3+}\):CaF\(_2\) and Yb\(^{3+}\):SrF\(_2\) crystals under high-power pumping with/without laser operation. This in situ measurement would allow proper designs of high-power cavities.

**WE9**
Specificity of Thermal Effects in Laser Ceramics as Compared to Single Crystals, Efim Khazanov, Ivan Mukhin, Oleg Palashov, Ilya Smetnov, Alexander Soloviy; Inst. of Applied Physics, Russian Federation. We predicted and experimentally studied strong statistical dispersion of thermal lensing and thermally induced depolarization in ceramics. This effect is specific to ceramics and has no analogues either in glasses or in single crystals.

**WE10**
Spectral-Luminescent Properties of Bi- and Bi-Yb\(^{3+}\) Doped Phosphate-Based Glasses, Boris I. Denker, Evgenii M. Dianov, Boris I. Galagan, Vyacheslav V. Osiko, Sergey E. Sverchkov; *A.M. Prokhorov General Physics Inst., Russian Federation, *Fiber Optics Res. Ctr. of RAS, Russian Federation. The spectral-luminescent properties of Bi-doped boro-alumino-phosphate glass in 0.4-1.6 micrometers range with the especial emphasis on the investigations of emission excitation spectra, luminescence rise and decay kinetics were carried out.

**WE11**
Spectroscopic and Laser Properties of Yb\(^{3+}\) Doped CaF\(_2\), SrF\(_2\) and BaF\(_2\) Laser Crystals, Jean-Louis Doualan, Patrice Camy, Abdelrijid Benadjid, Michael von Edlinger, Vivien Ménard, Richard Moncorge; Ctr. de Recherche sur les Ions, les Matériaux et la Photonique (CIMAP), France. We report a comparative study of the spectroscopic and thermo-mechanical properties and of the laser slope efficiencies and tuning ranges of three Yb\(^{3+}\) doped CaF\(_2\), SrF\(_2\) and BaF\(_2\) single crystals grown in the same conditions.

**WE12**
Crystal Growth, Spectroscopic Characterisation and Eye-Safe Laser Operation of Er and Yb Doped KLu(WO\(_4\))\(_2\), Stefan Byurshegum, Valdas Pasiskaeviucius, I. Parre, M. C. Pujol, M. Aguilo, Francesc Díaz; *Royal Inst. of Technology, Sweden, *Física i Cristallografia de Materials (FiCMA), Univ. de València, Spain. High quality Er:Yb:KLu(WO\(_4\))\(_2\) have been grown using TSSG method and spectroscopically investigated. The laser performance is compared with that in Er:Yb:KY(WO\(_4\))\(_2\); Role of upconversion processes and optimum doping concentrations have been estimated.

**WE13**
GaN LD Pumped Pr\(^{3+}\)-Doped Solid-State Laser, Kohei Hashimoto, Toshihiro Kaminura, Fumihiko Kannari; *Laser tec Corp., Japan, *Dept. of Electronics and Electrical Engineering, Keio Univ., Japan. Efficient and high-power diode-pumped Pr\(^{3+}\) doped solid-state laser are reported. We also report on characteristics of Pr\(^{3+}\) doped material such as spontaneous emission spectra, lifetimes, and thermal loading which are critical for laser display applications.

**WE14**
LD-Pumped Continuous Wave Nd:CNGG Laser Operating at 935nm, Qinan Li, Baohua Feng, Zhiyi Wei, Dehua Li, Zhiguo Zhang, Huanjin Zhang, Jiaying Wang; *Inst. of Physics, Chinese Acad. of Sciences, China, *State Key Lab of Crystal Material and Inst. of Crystal Material, China. An efficient CW LD-pumped Nd-doped Ca(NbGa\(_3\))\(_2\)O\(_7\)(CNGG) laser operating at 935nm is demonstrated for the first time. The maximum average output power is more than 800mW with slope efficiency of 8% and optical-to-optical efficiency is 6%.
WE15
Improved Optical Quality for Ti:Sapphire Using MRF, Kathleen I. Schaffers1, A. J. Bayramian1, P. J. Davis1, J. A. Menapace2, C. A. Ebbets1, J. E. Wolfe1, J. A. Caird1, C. P. J. Bartyl1, D. B. Jogee4, K. Schmidt5, F. Schmid6; 1Lawrence Livermore Natl. Lab., USA, 2Crystal Systems, Inc., USA. Magneto-rheological finishing (MRF) imprinting techniques have been applied to Ti:sapphire crystals to compensate for submillimeter distortions, thereby, improving the transmitted wavefront and increasing the availability of large aperture parts.

WE16
Diffusion Bonding of Monoclinic Yb:KY(WO4)2/KY(WO4)2 and Its Continuous-Wave Laser Operation, Simon Rivier1, Andreas Schmidt1, Valentin Petrov1, Uwe Griebner1, Andreas Gross2, Sophie Vernay3, Volker Wesemann1, Daniel Rutz4, Andreas Kehrl1, Götz Erbert1, 1Max-Born-Inst., Germany, 2Ferdinand-Braun-Inst., Germany. Diffusion bonding of the strongly anisotropic Yb:KY(WO4)2 and KY(WO4)2 crystals was successfully demonstrated. Efficient continuous-wave laser operation with slope efficiencies as high as 70% and 811 mW output power was obtained.

WE17
Improved Crystal Growth and Revisited Spectroscopic Parameters of the 4.5 μm Er3+:KPs:Cl Laser Material, Mathias Velázquez, Alban Ferrier, Vivien Ménard, Richard Moncorge; Ctr. de Recherche sur les Ions, les Matériaux et la Photonique (CIMAP), Univ. de Caen, France. Er3+-doped laser rods were successfully grown by the Bridgman-Stockbarger method. Modified material synthesis and ampoule preparation processes were developed that eventually led to crack- and bubble-free 8 cm long laser crystals.

WE18
Generation of Ti:Sapphire Laser Beam with Radial Polarization, Hikaru Kawaiuchi, Yuichi Koizawa, Shunichi Sato; Inst. of Multidisciplinary Res. for Advanced Materials, Tohoku Univ., Japan. The generation of a Ti:sapphire laser beam with radial polarization is demonstrated by using a c-cut Ti:sapphire crystal as an active medium and a c-cut YVO4 crystal for the selection of the radial polarization.

WE19
A Study of a Thermal Conductivity: A General Model for Optical Materials, Yoichi Sato, Hideaki Ishizuki, Takunori Taira; Laser Res. Ctr. for Molecular Science, Inst. for Molecular Science, Japan. Thermal conductivity with temperature dependence was simulated in various optical materials. This novel model for thermal conductivity requires one parameter for specific heat and two parameters for thermal diffusivity in calculation of each optical material.

WE20
Comparison of Nd:GdVO4 and Nd:YVO4 in a Pulsed Diode Pumped Passively Mode-locked Laser in a Bounce Geometry, Vaclav Kubecik, Michal Drahoňaupl1, Karel Zvonícek1, Andreas Stintz2, Jean-Claude Diele2; 1Czech Technical Univ., Czech Republic, 2Univ. of New Mexico, USA. Operation of a pulsed Nd:GdVO4 and Nd:YVO4 lasers in a bounce geometry in a free running and mode-locked regime using a semiconductor saturable absorber is compared. Higher efficiency of Nd:GdVO4 in both regimes was achieved.

WE21
Spectroscopy and Laser Operation of Tm4+ in Disordered Crystals of Tetragonal NaLu(WO4)2, Mauricio Rico1, Xianwei Han1, José María Cano-Torres2, Concepción Cascales1, Carlos Zaldo1, Xavier Mateos2, Simon Rivier1, Valentin Petrov1, Uwe Griebner1; 1Inst. de Ciencia de Materiales de Madrid, Consejo Superior de Investigaciones Científicas, Spain, 2Max-Born-Inst. for Nonlinear Optics and Ultrafast Spectroscopy, Germany. Broadly tunable (1825-2000 nm) continuous-wave laser operation with maximum output power of 435 mW and slope efficiency of 57.5% is demonstrated for the first time with the disordered Tm:NaLu(WO4)2 crystal.

WE22
Quantum Efficiency Measurements in Nd-Doped Materials, Brian M. Walsh, Norman P. Barnes; NASA Langley Res. Ctr., USA. The quantum efficiency of the Nd 4F3/2 manifold is measured in 10 Nd-doped systems. Luminescence decay in these Nd-doped materials was found to be nonexponential. Correlation between nonexponential decay and reduced quantum efficiency is presented.

WE23
Spatial Distribution of Photodarkening in Large Mode Area Ytterbium Doped Fibers, Mircea Hotoleanu, Joona Koponen, Teemu Kokki; Liikki Corp., Finland. We have modeled the photodarkening rate distribution in ytterbium fiber cross-section. We have found that photodarkening is not uniformly distributed in LMA fibers and depends on coating diameter. This affects the fiber application usage.

WE24
Scalable, Single-Frequency, Er-only Doped Fiber Amplifier Cladding-Pumped by Multimode 980-nm Diode Lasers, Mark Dubinskii1, Valerii V. Ter-Mikirtychev1; 1US ARL, USA, 2Novatech Technologies, Inc., USA. We present laser characterization results of an all-fiber cladding-pumped Er-only doped LMA amplifier. Diffraction-limited, single-frequency output of 3.5 W is believed to be the highest reported to-date power out of this type of amplifier.

WE25
Self-Starting Passively Mode-Locked Chirped-Pulse Fiber Oscillator, Bülend Ortaç1, Marco Plötner1, Jens Limpert1, Andreas Tünnemann1, 2Inst. of Applied Physics, Friedrich Schiller Univ., Germany, 2Fraunhofer Inst. for Applied Optics and Precision Engineering, Germany. We report on a self-starting passively mode-locked fiber laser operating in the chirped-pulse regime for the first time. A chirped fiber Bragg grating provides positive dispersion with negligible nonlinearity.

WE26
Passively Mode-Locked Single-Polarization Microstructure Fiber Laser, Bülend Ortaç1, Caroline Lecaplain1, Ammar Hideur1, Thomas Schreiber1, 2, Jens Limpert1, Andreas Tünnemann1, 2; 1Inst. of Applied Physics, Friedrich-Schiller-Universität, Germany, 2Groupe d’Optique et d’Optronique, Univ. de Rouen, France, 2Fraunhofer Inst. for Applied Optics and Precision Engineering, Germany. We report on an environmentally-stable all-normal dispersion mode-locked single-polarization large-mode-area microstructure fiber. The self-starting laser generates 1.6 W of average power at 63 MHz repetition rate. The positively-chirped pulses are externally compressed to 750 fs.
WE27
Experimental and Numerical Study of Pulse Dynamics in Positive Net-Cavity Dispersion Mode-Locked Yb-Doped All-Fiber Lasers, Bülend Ortac1, Marco Plötner1, Thomas Schreiber2, Jens Limpert1, Andreas Tünnermann1;2, 1Inst. of Applied Physics, Friedrich-Schiller-Univ., Germany, 2Fraunhofer Inst. for Applied Optics and Precision Engineering, Germany. We report on environmentally-stable mode-locked Yb-doped all-fiber lasers operating in the wave-breaking-free and stretched-pulse regime. The laser generates positively-chirped pulses with parabolic spectral profile in both regimes. Numerical simulations confirm the intra-cavity pulse evolution.

WE28
High Power Diode Pumped Yb3+:CaGdAlO4 Laser, Justine Boudaeîle1, Julien Didierjean1, François Balembois1, Frédéric P. Drau1, Patrick Georges1, Johan Petit1, Philippe Goldner1, Bruno Viana2; 1Lab Charles Fabry de l’Inst. d’Optique, France, 2Lab de Chimie Appliquée Etat Solide de l’Ecole Natl. Superieure de Chimie de Paris, France. We study the performance of Yb3+:CaGdAlO4 under 100W diode pumping with a standard laser design. We also investigate the laser properties of Yb3+:CaGdAlO4 for different doping in order to optimize the absorption and wavelength tunability.

WE29
High-Power Laser Beam Combination Using Acousto-Optic Deflection, Ronald Holzlöhner, Domenico Bonaccini Calia; European Southern Observatory (ESO), Germany. We combine incoherent high-power laser beams using beam deflection on multiple simultaneous acoustic gratings in an anisotropic paratellurite (TeO2) crystal by reversing the usual direction of beam deflection. We discuss loss mechanisms and parameter optimization.

WE30
High Energy Femtosecond Thin Disk Regenerative Amplifier with a Repetition Rate of 50 kHz, Mikhail Larionov1, Adolf Giesen1, Frank Butze2; 1GWS mbH, Germany, 2Inst. of Technical Physics, German Aerospace Ctr. (DLR), Germany, 3Von Ardenne Anlagentechnik GmbH, Germany. A regenerative thin disk amplifier was operated in different modes varying the net gain and the amount of nonlinearity. Gauss and Lorentz pulse shapes were observed at energies of up to 400 μJ.

WE31
Dispersion Management of Femtosecond Pulse Amplification for Octave-Spanning Optical Frequency Comb Generation, Yoshiaki Nakajima1, Hajime Iwabe2, Feng-Lei Hong3, Atsushi Onoe4, Kaoru Minoshima5, Takao Kobayashi5, Masataka Nakazawa5, Hirokazu Matsumoto6; 1Univ. of Fukui, Japan, 2Natl. Metrology Inst. of Japan (NMIJ), AIST, Japan, 3Tohoku Univ., Japan. An optimized method for amplifying femtosecond pulses by using dispersion management is reported. An amplifier with an optimal amplification region enhances the output power with spectral broadening by adiabatic narrowing in an EDF.

WE32
An Optical Differentiator Based on a Regenerative Amplifier with an Intracavity Tunable Volume Bragg Grating Filter, Andrey V. Oksishev1, Vadim I. Smirnov1, Leonid B. Glebov1, Jonathan D. Zuegel1; 1Lab for Laser Energetics, Univ. of Rochester, USA, 2OptiGrate, USA, 3CREOL, College of Optics and Photonics, Univ. of Central Florida, USA. An optical differentiator based on a regenerative amplifier with temperature-tuned volume Bragg grating as an intracavity spectral filter is demonstrated for the first time. Its applications for temporal contrast enhancement and other areas are discussed.

WE33
High-Power Diode-Pumped Tm:YLF Laser in Rod and Slab Geometry, Martin Schellhorn; French-German Res. Inst., ISI, France. Using two (one) Tm:YLF rods in a single cavity, 55W (30W) at 1.91μm was obtained. The first result from a Tm:YLF laser in slab geometry was 22W of output power.

WE34
Efficient Operation of Conductively Cooled Ho:Tm:LuLiF Laser Oscillator/Amplifier, Yingxin Bai1, Jirong Yuan1, Bo Trieu1, Mulugeta Petros2, Paul Petzaru2, Hyung Lee3, Upendra Singh3; 1Science Systems and Applications, Inc., USA, 2NASA Langley Res. Ctr., USA, 3Science and Technology Corp., USA, 4Natl. Inst. of Aerospace, USA. A conductively-cooled Ho:Tm:LuLiF laser oscillator generates 1.6J normal mode pulses at 10Hz with optical to efficiency of 20%. When the laser head module is used as the amplifier, the double-pass small-signal amplification exceeds 25.

WE35
Intra-Cavity Frequency Tripling in Actively Q-Switched Miniature Nd:YVO4 Laser for MALDI/TOFMS, Koji Tojo1, Naoya Ishikaki1, Akiyuki Kadota1, Kazuma Watanabe1, Yuuta Ido1, Takunori Taira1; 1Shimadzu Corp., Japan, 2Fukui, Japan, 3Laser Res. Ctr., Inst. for Molecular Science, Japan. A compact UV-light source for MALDI/TOFMS based on an intra-cavity frequency tripled, actively Q-switched Nd:YVO4 miniature laser, with 437mW average power at 16kHz and 8.6% overall optical to efficiency, is reported.

WE36
Yb:SFAP Crystal, Intracavity and Indirectly Diode-Pumped at 914 nm, for a cw Laser Emission at 985 nm, Marc Castaing1,2, Francois Balembois1, Patrick Georges2, Thierry Georges2, Kathleen Schaffers1, John Tassano1; 1Lab Charles Fabry de l’Inst. d’Optique, CNRS, Univ. Paris-Sud, France, 2Oxius S.A, France, 3Lawrence Livermore Natl. Lab, USA. We present the first experiment of intracavity pumping at 914nm of an Yb:S-FAP crystal emitting at 985nm on the three-level-laser transition. We obtained 250mW output power at 985nm for 9.7W incident pump power at 808nm.

WE37
High Repetition and High Average Power Nd:YAG Laser for EUV Lithography, Hisanori Fujita, Masahiro Nakatsuka, Ravi Bhushan, Koji Tsubakimoto, Hitetsuugu Yoshida, Noriaki Miyaraga, Yasukazu Ishii; Inst. of Laser Engineering, Osaka Univ., Japan. We have been developing a high repetition (5-100 kHz) and high power Nd: YAG laser system pumped by cw LDs. Average power of 4.6 kW was obtained at 28.8 kW of pumping power.
WE38
High Brightness Diode-Pumped Passively Q-Switched Nd:YAG Microchip Laser with Amplifier, Hiroshi Sakai, Akihoro Sone, Hirohore Kuni, Takunori Tanai, Hamamatsu Photonics K.K., Japan. We developed a high brightness passively Q-switched laser and amplifier using microchips. The pulse energy of 1.8 mJ with a pulse width of 820 ps was obtained with 46 mW/pulse low electrical power.

WE39
Efficient, Room-Temperature Tm, Ho:GdVO₄ Microchip Laser, Atsushi Sato1, Kazuhiro Asai1, Shoken Ishii1, Kokei Mizutani1, Toshikazu Itabe1; Tohoku Inst. of Technology, Japan, 1Dept. of Electrical Engineering, Tohoku University, Japan. A diode-pumped Tm:Ho:GdVO₄ microchip laser demonstrated an output power of 0.35 W and a conversion efficiency of 23.7%. To our knowledge, it is the highest efficiency reported for Tm:Ho-codoped vanadate lasers operating near room temperature.

WE40
Anisotropy of Nonlinear Absorption in Co²⁺:MgAl₂O₄ and V³⁺:YAlO₃ Crystal Passive Q-Switches, Igor Denisov1, Vasilii Savitski1, Alexander Malarenchik1, Konstantin Yunushev1, Yuri Volk1, Vladimir Matrosov2, Tatiana Matrosova2, Mikhail Kupchenko2, Aleksander Sandulenko2, 1Inst. for Optical Materials and Technologies, Belarus, 2Solix Ltd., Belarus, 3S.I. Vavilov State Optical Inst., Russian Federation. Anisotropy of nonlinear absorption and its influence on the passive Q-switch performance of V³⁺:YAlO₃ and Co²⁺:MgAl₂O₄ crystal passive shutters at the wavelengths of 1.08 µm and 1.35 µm has been experimentally studied.

WE41
High-Power Diode-Pumped Passively Q-Switched Yb⁺:KLu(WO₄)₂ Laser, Junhai Liu1, Valentín Petrov2, Uwe Griebner2, Hualin Zhang3, Jiaying Wang4; Quingdao Institute of Oceanic Science, China, 2Inst. of Physics, Czech Acad. Sci., Czech Republic, 3Shandong Univ., China. Output power of 11.5 W in the continuous-wave regime and 4.3 W (fundamental at 1031.7 nm) plus 1.15 W (Raman at 1139.3 nm) in the Q-switched regime were obtained with a diode-pumped Yb:KLu(WO₄)₂ laser.

WE42
Paper Withdrawn

WE43
1.4-MHZ Repetition Rate EO-Q-Switched Nd:YVO₄ Laser, Ryusuke Horiiuchi, Koji Adachi, Koichi Saito, Kazuyuki Tani, Shigeru Yamaguchi; Dept. of Physics, Tokai Univ., Japan. A repetition rate of 1.4 MHz with a pulse width of 39 ns was achieved using Nd:YVO₄ crystal and an EO-deflector. An power of 2.7 W was obtained at a pump power of 6.5 W.

WE44
10 mJ, Acousto-Optic Q-Switched, Tunable, Diode Pumpe Tm:YLF Laser , Jan K. Jabczyński1, Lukasz Gorajek1, Waldemar Zenkiewicz1, Jakub Kwasikowski1, Helena Jelinikova2, Jan Sule1, Michal Nemec1; 1Inst. of Optoelectronics, Military Univ. of Technology, Poland, 2Faculty of Nuclear Science and Physical Engineering, Czech Technical Univ., Czech Republic. The 1845-1935 nm tuning range with 3 nm linewidth was demonstrated in Tm:YLF laser pumped by 30-W fiber coupled diode laser. 10-mJ energy; 22-ns pulse duration was demonstrated in acousto-optic Q-switching regime.

WE45
CW and Q-Switched Laser Operation of Yb:LuAG Crystal, Jun Dong1, Kenichi Ueda1, Alexander Kaminiskii1; 1Inst. for Laser Science, Univ. of Electro-Communications, Japan, 2Inst. of Crystallography, Russian Acad. of Sciences, Russian Federation. Efficient CW laser operation based on Yb:LuAG crystals has been obtained at 1030 and 1047 nm. Stable, subnanosecond passively Q-switched Yb:LuAG/Cr₃+:YAG microchip lasers were demonstrated with slope efficiencies of 40% for the first time.

WE46
High Performance 1645-nm Er:YAG Laser, Da-Wun Chen, Todd S. Rose, Steven M. Beck; Milton Birnbaum; Aerospace Corp., USA. The performance of the resonantly fiber-laser pumped Er:YAG lasers at 1645 nm using 0.25% and 0.5% doped crystals was compared in cw and Q-switched operation. Superior performance of the 0.25% crystals was observed.

WF • Novel Ultrafast Sources

Noh Theater
4:30 p.m.–6:00 p.m.

WF • Novel Ultrafast Sources
Kurt Weingarten; Time Bandwidth, Switzerland, President

WF1 • 4:30 p.m. Invited
The Petawatt Field Synthesizer: A New Approach to Ultrahigh Field Generation, Stefan Karsch1, Zsuzsanna Major1, Jösef Fülöp2, Izhak Ahmad1, Tie-Jun Wang3, Andreas Hengïc3, Sebastian Kruber1, Raphael Weingartner2, Mathias Siebold1, Joachim Hein1, Christoph Wandt1, Sandra Klingebiel1, Jens Osterhoff1, Rainer Hörlein2, Ferenc Krausz1, 1Max-Planck-Inst. für Quantenoptik, Germany, 2Ludwig-Maximilians-Universität München, Germany, 3Friedrich-Schiller-Universität Jena, Germany. The Petawatt Field Synthesizer (PFS) at MPQ will deliver few-cycle pulses at Petawatt power. Short-pulse OPCPA and a diode-pumped, CPA Yb:YAG pump laser are key technologies, and results of the ongoing development will be presented.

WF2 • 5:00 p.m.
Ultrashort Pulse Generation of Yb:KLuW Using Single-Walled Carbon Nanotube Saturable Absorbers, Andreas Schmidt1, Simon Rivier1, Günter Steinmeyer1, Valentín Petrov1, Uwe Griebner1, Jong Hyuk Yim1, Won Bae Cho2, Sooil Lee2, Fabian Rotermund2, Maria C. Pujol2, Magdalena Aguilo3, Francesc Diaz3, 1Max-Born-Inst., Germany, 2AQUA Univ., Republic of Korea, 3Tarragona Univ., Spain. Single-walled carbon nanotube saturable absorbers were designed and characterized (modulation depth <0.5%, relaxation time <450 fs) for passive mode-locking near 1 µm. Pulses of 115 fs were generated at 1048 nm with an Yb:KLuW laser.

WF3 • 5:15 p.m.
Er:Yb:YAlO₃ (BO₃): A New Crystal for High-Power Ultrashort Pulse Generation around 1500nm, Alexander A. Lagatski1, Wilson Sibbett1, V. E. Kislev1, A. E. Troshin1, N. A. Tolstik2, N. V. Kuleshov1, E. U. Rajafaliev1, N. I. Leonyuk1; 1Univ. of St Andrews, UK, 2Inst. of Optical Materials and Technologies, Belarus Natl. Technical Univ., Belarus, 3Univ. of Dundee, UK, 4Moscow State Univ., Russian Federation. Efficient passive mode locking in a diode-pumped Er:Yb:YAlO₃(BO₃) laser has been demonstrated using low-loss GaInNAs-based SESAMs. 3.2-ps and 5.1-ps pulses were produced at 1530nm and 1550nm, respectively, with corresponding average powers of 280mW and 103mW.
WF4 • 5:30 p.m.

Cr:YAG Chirped Pulse Oscillator, Evgeni Sorokin1, Vladimir L. Kalashnikov1, Julien Mandon2, Nathalie Piquet2, Irina T. Sorokina1; 1Photonics Inst., Technische Univ. Wien, Austria, 2Lab de Photophysique Moléculaire, CNRS, Univ. Paris-Sud, France. We demonstrate the chirped pulse operation in the positive dispersion regime of the Cr⁺⁺:YAG laser. The pulses are readily compressed in 3.2 m of silica fiber to ~120 fs, and generate supercontinuum in high‐nonlinearity fibers.

WF5 • 5:45 p.m.

High‐Energy Pulse Generation Using Stretcher‐Free Fiber Nonlinear Amplifiers, Dimitris N. Papadopoulos1, Marc Hanna1, Frédéric Druon1, Patrick Georges1, Yoann Zaouter2, Eric Cormier2, Eric Mottay2; 1Lab Charles Fabry de Inst. d’Optique, France, 2Ctr. Lasers Intenses et Applications (CELIA), France, 3Amplitude Systèmes, France. We demonstrate the generation of high quality 74‐fs pulses with pulse energy of 380 nJ from polarization‐maintaining ytterbium‐doped fiber nonlinear amplification systems by operating them beyond the gain bandwidth limit.

Noh Theater
6:00 p.m.–6:10 p.m.

Closing Remarks
Key to Authors and Presiders
(Bold indicates Presider or Presenting Author)

A
Adachi, Koji—WE43
Adachi, Menyeuki—TuB2
Agueraray, Claude—TuA6
Aguiol, Magdalena—WE12, WF2
Ahmad, Izhar—MF3, WF1
Aka, Gérard—MC20, WD5, WE5
Akhimba, Kazuhiro—WE1, WE2
Akutsu, Atsushi—MC10
Alford, William J.—MC18
Ali, Tahir—MF4
Ams, Martin—MD5
Andersen, Martin T.—WB19, WB19
Ando, Akihiro—MB4
Ando, Tetsuo—MC25
Arisholm, Gunnar—MC45
Armstrong, J. P.—MC1
Asai, Kazuhiro—WE39
Aubry, Nicolas—WB26
Ay, Feridun—WB10

B
Baer, Cyrill R. E.—ME4, ME5
Bai, Yingxin—WE34
Baird, Brian W.—MC35
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Monday, January 28, 2008

MG • Postdeadline Papers

8:00 p.m.–9:24 p.m.

Noh Theater

MG • Postdeadline Papers
Christopher A. Ebbers; Lawrence Livermore Natl. Lab, USA, Presider

MG1 • 8:00 p.m.
Multimillijoule Optically Synchronized and Carrier-Envelope-Phase-Stable Chirped Parametric Amplification at 1.5 μm, Oliver D. Muecke1, Dmitry Sidorov2, Peter Dombi3, Andrius Pugžlys4, Andrius Baltuška5, Skirmantas Ališauskas6, Jonas Pocius6, Linas Giniūnas1, Romualdas Danielis4; 1Vienna Univ. of Technology, Austria, 2 Vilnius Univ., Lithuania, 3Light Conversion Ltd., Lithuania. Efficient infrared 35-THz-wide parametric amplification with energies >3 mJ is obtained in a 3-stage OCPA using a combination of a 1030-nm 200-fs Yb- and a 1064-nm 60-ps Nd amplifier seeded with a common Yb oscillator.

MG2 • 8:12 p.m.
Diode-Pumped Kerr-Lens Mode-Locked Yb5+:Sc:O3 and Yb5+:Y:O3 Combined Active Media Ceramic Laser, Masaki Tokurakawa1, Hiroaki Kurokawa1, Akira Shirakawa1, Ken-ichi Udai1, Hideki Yagi2, Takagimi Yanagitani3, Alexandre A. Kaminiskii4; 1Univ. of Electro-Communications, Japan, 2Takuma Works, Konoshima Chemical Co. Ltd., Japan, 3Crystal Laser Physics Lab, Inst. of Crystallography, Russian Acad. of Sciences, Russian Federation. Diode-pumped Kerr-lens mode-locked Yb5+:Sc:O3 and Yb5+:Y:O3 combined ceramic laser has been achieved. 66 fs pulses with the average power of 1.5 W and 53 fs pulses with the average power of 1 W were obtained.

MG3 • 8:24 p.m.
Passively Mode-Locked Thulium-Doped Fiber Oscillator with a Pulse Energy of 4 nJ, Axel Ruehl1, Martin Engelbrecht1, Frithjof Haxen1, Dieter Wandt1, Dietmar Kracht1; Laser Zentrum Hannover e.V., Germany. An ultrafast thulium-doped fiber oscillator is demonstrated which constitutes an increase of the pulse energy by two orders of magnitude. The pulses were centered at 1974 nm and could be externally dechirped to 173 fs.

MG4 • 8:36 p.m.
Efficient 100 kHz-Repetition-Rate Ultrafast Laser System with OPA/NOPA Frequency Conversion, Sterling J. Backus1, Iain T. McKinnie1, Dirk Müller2, Hsiao-Hua Liu1, Henry C. Kapteyn1, Margaret M. Murnane1; Kapteyn-Murnane Labs Inc., USA. We report an innovative ultrafast Ti:Sapphire laser-amplifier/OPA/NOPA system accessing a new operating regime of 30% efficient, tunable, 100kHz-repetition-rate, 20μJ, 50fs pulses, enabling applications in micromachining, imaging, and spectroscopy. Millijoule pulses are attainable using cryogenic cooling.

MG5 • 8:48 p.m.
A 20 W Continuous-Wave Green Laser with Line Beam for a GxL Laser Display, Takahiro Mochizuki1, Kaoru Kimura2, Yuki Maeda1, Koji Takahashi1, Nobutake Iwase1, Michio Oka1, Masaki Saito1, Sony Corp., Japan. We report a high-power continuous-wave green laser with line beam using periodically-poled stoichiometric lithium tantalate (PPSLT). The maximum output power was 20.8 W. The conversion efficiency from input LD power was as high as 30%.

MG6 • 9:00 p.m.
New Nonlinear Optical Crystal for Mid-IR OPOs: CdSiP2, Peter G. Schunemann1, Kevin T. Zawilski1, Thomas M. Pollak1, David E. Zelmon1, Nils C. Fernelius2, F. Kenneth Hopkins2; 1BAE Systems, USA, 2AFRL, USA. CdSiP2 is a new negative uniaxial NLO crystal for 1-μm- or 1.5-μm-pumped mid-IR OPOs with much higher nonlinearity and thermal conductivity than existing materials such as AgGaSe2, AgGaSe2, and PPLN.

MG7 • 9:12 p.m.
Single-Polarization Ultra-Large-Mode-Area Yb-Doped Photonic Crystal Fiber, Oliver Schmidt1, Jan Rothhardt1, Tino Eidam1, Fabian Röser1, Jens Limpert1, Andreas Tümmermann1, Kim P. Hansen2, C. Jakobsen3, Jes Broeng3; 1Friedrich-Schiller-Univ., Germany, 2Crystal Fibre A/S, Denmark. We report on an ytterbium-doped, single-polarization, single-mode photonic crystal fiber possessing a 70μm active core (mode-field-area: 2300μm2). Characterization and comparison to a similar fiber without polarization control demonstrates the potential of the fiber design.
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