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Kerim R. Allakhverdiev
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## Contents

<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>xi</td>
<td>Conference Committee</td>
</tr>
<tr>
<td>xv</td>
<td>Introduction</td>
</tr>
</tbody>
</table>

### OPENING SESSION

<table>
<thead>
<tr>
<th>8677 02</th>
<th>Super-linear enhancement of the electric oxygen-iodine laser (Invited Paper) [8677-24]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>D. L. Carroll, CU Aerospace (United States); B. S. Woodard, Univ. of Illinois at Urbana-Champaign (United States); G. F. Benavides, J. W. Zimmerman, A. D. Palla, J. T. Verdeyen, CU Aerospace (United States); W. C. Solomon, Univ. of Illinois at Urbana-Champaign (United States)</td>
</tr>
</tbody>
</table>

### CHEMICAL LASERS I

<table>
<thead>
<tr>
<th>8677 03</th>
<th>Hybrid RF/DC discharge generator of singlet oxygen for DOIL [8677-16]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>J. Schmiedberger, Institute of Physics of the ASCR, v.v.i. (Czech Republic); J. Gregor, Institute of Plasma Physics ASCR, v.v.i. (Czech Republic); V. Jirásek, K. Rohlína, M. Čenský, Institute of Physics of the ASCR, v.v.i. (Czech Republic)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>8677 04</th>
<th>Experimental study on supersonic all gas-phase iodine laser driven by NF3/D2/DCI/CF3I combustion [8677-9]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S. Tang, L. Duo, H. Yu, F. Sang, Y. Jin, Dalian Institute of Chemical Physics (China)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>8677 05</th>
<th>Modeling of cw OIL energy performance based on similarity criteria [8677-58]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A. V. Mezhenin, P.N. Lebedev Physical Institute (Russian Federation) and The Electroshield Group (Russian Federation); S. Y. Pichugin, V. N. Azyazov, P.N. Lebedev Physical Institute (Russian Federation)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>8677 06</th>
<th>Centrifugal spray singlet oxygen generator for a COIL with nitrogen as a buffer gas [8677-68]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>O. Špalek, V. Jirásek, M. Čenský, J. Kodymová, Institute of Physics of the ASCR, v.v.i. (Czech Republic)</td>
</tr>
</tbody>
</table>

### CHEMICAL LASERS II

<table>
<thead>
<tr>
<th>8677 07</th>
<th>Overview of iodine generation for oxygen-iodine lasers (Invited Paper) [8677-53]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>V. Jirásek, Institute of Physics of the ASCR, v.v.i. (Czech Republic)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>8677 08</th>
<th>Heterogeneous losses of externally generated I atoms for OIL [8677-44]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A. P. Torbin, Samara State Aerospace Univ. (Russian Federation) and P.N. Lebedev Physical Institute (Russian Federation); P. A. Mikheyev, N. I. Ulimtsev, A. I. Voronov, V. N. Azyazov, P.N. Lebedev Physical Institute (Russian Federation)</td>
</tr>
</tbody>
</table>
### Experimental study on output energy stability of discharge-initiated repetition rate HF laser


### Plasma chemistry of iodine atoms production for CW oxygen-iodine laser

P. A. Mikheyev, N. I. Ufimtsev, P. N. Lebedev Physical Institute (Russian Federation); A. V. Demyanov, I. V. Kochetov, A. P. Napartovich, Troitisk Institute for Innovation and Fusion Research (Russian Federation)

### Diagnostic of supersonic O$_2$(a$^1\Delta$)/I$_2$ mixing flow field with chemical fluorescence method

Z. Wang, F. Sang, Y. Zhang, X. Hui, M. Xu, P. Zhang, W. Zhao, B. Fang, L. Duo, Y. Jin, Dalian Institute of Chemical Physics (China)

### Laser-plasma chemistry: principles and applications (Invited Paper)

I. Matulková, Institute of Physics of the ASCR, v.v.i. (Czech Republic) and Charles Univ. in Prague (Czech Republic); L. Juha, Institute of Physics of the ASCR, v.v.i. (Czech Republic)

### Laser assisted bending based on macro-channel cooled diode lasers

F. Bammer, T. Schumi, A. Otto, Vienna Univ. of Technology (Austria); D. Schuöcker, Oberösterreichisches Laserzentrum (Austria)

### CLF adaptive optics development program

A. Boyle, B. Parry, M. Galimberti, C. Hooker, S. Vassilev, C. Hernandez-Gomez, Rutherford Appleton Lab. (United Kingdom)

### Advanced carbon monoxide laser systems (Invited Paper)

A. Ionin, P. N. Lebedev Physical Institute (Russian Federation)

### Ultrashort-pulse CO$_2$ lasers: Ready for the race to petawatt?

M. N. Polyanskiy, M. Babzien, I. Pogorelsky, V. Yakimenko, Brookhaven National Lab. (United States)

### Development of convenient nitrogen laser by using control of discharge

S. Nakazawa, E. Yamaguchi, Y. Ishii, Soka Univ. (Japan)

### Gain property on supersonic flow TEA-CO$_2$ laser in double-pulse operation

G. Imada, Niigata Institute of Technology (Japan) and Nagaoka Univ. of Technology (Japan); M. Tateishi, M. Suzuki, W. Masuda, Nagaoka Univ. of Technology (Japan)
LASER PHYSICS

8677 OJ  Exciplex pumped alkali laser (XPAL) theory and modeling [8677-26]
D. L. Carroll, A. D. Palla, J. T. Verdeyen, CU Aerospace (United States)

8677 OK  The 3D numerical simulation of waste heat inside the end-pumped DPAL [8677-41]
W. Hua, Z. Yang, H. Wang, National Univ. of Defense Technology (China)

8677 OL  Gain and refractive index guiding effects on the mode formation in the solid state laser resonators [8677-48]
M. Javadi-Dashcasan, E. Barati, National Iranian Ctr. for Laser Science and Technology (Iran, Islamic Republic of)

HPL MATERIAL APPLICATIONS I

8677 OM  Energy characteristics of the CO₂ laser cutting of thick steel sheets (Invited Paper) [8677-28]
A. M. Orishich, Khristianovich Institute of Theoretical and Applied Mechanics (Russian Federation)

8677 ON  Surface tension in laser cutting and its impact on cutting performance [8677-17]
D. Schüöcker, R. Majer, J. Aichinger, Oberösterreichisches Laserzentrum (Austria)

8677 OO  Disk-laser welding of Hastelloy X cover on René 80 turbine stator blade [8677-60]
F. Caiazzo, G. Corrado, V. Alfiiri, V. Sergi, Univ. of Salerno (Italy); L. Cuccaro, Avio SpA (Italy)

8677 OP  FE-simulation of laser assisted joining of aluminum-steel [8677-10]
G. Liedl, R. Pospichal, Vienna Univ. of Technology (Austria)

8677 OQ  Micro-void arrays in an optical fiber machined by a femtosecond laser for obtaining bending direction sensitive sensors [8677-46]
K. Gouya, K. Watanabe, Soka Univ. (Japan)

8677 OR  Three dimensional model of melting and crystallization kinetics during laser cladding process [8677-15]

HPL MATERIAL APPLICATIONS II

8677 OS  Laser ablation of copper followed by an accelerating potential: a TOF analysis [8677-56]
J. B. Matos, Technological Institute of Aeronautics (Brazil); R. Riva, Institute for Advanced Studies (Brazil); N. A. S. Rodrigues, Technological Institute of Aeronautics (Brazil)
Extreme ultraviolet marking system for anti-counterfeiting tags with adjustable security level [8677-23]
P. Di Lazzaro, S. Bollanti, F. Flora, L. Mezi, D. Murra, A. Torre, F. Bonfigli, R. M. Montereali, M. A. Vincenti, ENEA (Italy)

Influence of surface stress and atomic defect generation on Rayleigh waves in laser-excited solids [8677-21]
F. Kh. Mirzade, Institute on Laser and Information Technologies (Russian Federation)

ASE and parasitic oscillation assessment in the high energy pulsed operation of large area diode pumped ceramic slab lasers (Invited Paper) [8677-4]
A. Lapucci, M. Ciofini, CNR, Istituto Nazionale di Ottica (Italy)

Ultrahigh brightness laser diode modules with narrow linewidth for resonant pumping Er:YAG lasers operating at 1.6 µm [8677-45]
H. Fritsche, Technische Univ. Berlin (Germany); B. Kruschke, DirectPhotonics Industries GmbH (Germany); O. Lux, C. Schuett, Technische Univ. Berlin (Germany); W. Gries, DirectPhotonics Industries GmbH (Germany); H. J. Eichler, Technische Univ. Berlin (Germany)

High-performance LD-pumped solid-state lasers for range finding and spectroscopy [8677-22]
M. V. Bogdanovich, V. V. Kabanov, G. I. Ryabtsev, A. G. Ryabtsev, Y. V. Lebiadok, B.I. Stepanov Institute of Physics (Belarus)

Hybrid multi-terawatt laser system of visible spectral range [8677-3]
V. F. Losev, Institute of High Current Electronics (Russian Federation) and Tomsk Polytechnic Univ. (Russian Federation); S. V. Alekseev, Institute of High Current Electronics (Russian Federation); A. I. Aristov, P. N. Lebedev Physical Institute (Russian Federation); N. G. Ivanov, B. M. Kovalchuk, Institute of High Current Electronics (Russian Federation); G. A. Mesyats, L. D. Mikheev, P. N. Lebedev Physical Institute (Russian Federation); Yu. N. Panchenko, Institute of High Current Electronics (Russian Federation); N. A. Ratakhi, Institute of High Current Electronics (Russian Federation) and Tomsk Polytechnic Univ. (Russian Federation)

High power Nd:YAG laser with self-pumped phase-conjugate loop cavity and repetitive pulsed diode-matrix side-pumping [8677-86]

Diode pumped thin ceramic slab Nd:YAG laser with 230 W average power and 43% conversion efficiency [8677-6]
M. Ciofini, A. Lapucci, CNR, Istituto Nazionale di Ottica (Italy)
<table>
<thead>
<tr>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>8677 11</td>
<td>Experimental investigation of phase explosion by irradiating thin aluminum targets with high power pulsed laser beam</td>
<td>M. H. Mahdieh, M. Akbari Jafarabadi, Sh. Firozyar, Sh. Hajiani, Iran Univ. of Science and Technology (Iran, Islamic Republic of)</td>
</tr>
<tr>
<td>8677 12</td>
<td>Amplification of ultrashort pulse vacuum ultraviolet coherent radiation in OFI Ar2* amplifier</td>
<td>M. Kaku, Y. Ezaki, M. Katto, S. Kubodera, Univ. of Miyazaki (Japan)</td>
</tr>
<tr>
<td>8677 13</td>
<td>A simplified model for HF chemical laser amplifier</td>
<td>W. Liu, X. Chen, H. Wang, W. Hua, National Univ. of Defense Technology (China)</td>
</tr>
<tr>
<td>8677 14</td>
<td>Numerical study of several distribution flow pipeline levels for chemical laser</td>
<td>N. Xiao, W. Liu, W. Hua, National Univ. of Defense Technology (China)</td>
</tr>
<tr>
<td>8677 15</td>
<td>Production of iodine atoms in a self-sustained pulsed electric discharge</td>
<td>N. Vagin, N. Yuryshev, P.N. Lebedev Physical Institute (Russian Federation)</td>
</tr>
<tr>
<td>8677 16</td>
<td>Experimental investigation and numerical simulation of exciplex pumped alkali lasers</td>
<td>M. Endo, Tokai Univ. (Japan); T. Nagai, F. Wani, Kawasaki Heavy Industries, Ltd. (Japan)</td>
</tr>
<tr>
<td>8677 17</td>
<td>Progress on a short pulse excimer laser system with beam smoothing</td>
<td>X. Zhao, J. Liu, A. Yi, Y. Zhang, Q. Xue, H. Hua, H. Qian, Y. Hu, D. Wang, K. Huang, C. Huang, L. Yu, X. Huang, Y. Zhu, W. Xiao, Northwest Institute of Nuclear Technology (China)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8677 18</td>
<td>Layered semiconductors for high power laser (NLO) applications (Invited Paper)</td>
<td>K. Allakhverdiev, TÜBITAK Marmara Research Ctr. (Turkey) and Azerbaijan National Academy of Aviation (Azerbaijan); E. Salayev, Institute of Physics (Azerbaijan)</td>
</tr>
<tr>
<td>8677 19</td>
<td>Comparisons of various surface erosions with a variety of laser lights and the applications (Invited Paper)</td>
<td>K. Kasuya, Institute of Applied Flow (Japan) and Osaka Univ. (Japan); W. Mroz, B. Budner, Military Univ. of Technology (Poland); S. Motokoshi, K. Mikami, T. Norimatsu, Osaka Univ. (Japan)</td>
</tr>
<tr>
<td>8677 1A</td>
<td>A simple pulsed laser design for high harmonics generation</td>
<td>J. Bachmair, R. Gómez Vázquez, F. Bammer, Vienna Univ. of Technology (Austria)</td>
</tr>
<tr>
<td>8677 1B</td>
<td>Barium nitrate Raman laser at 1.599 µm for CO2 detection</td>
<td>O. Lux, H. Rhee, H. Fritsche, H. J. Eichler, Technische Univ. Berlin (Germany)</td>
</tr>
</tbody>
</table>
### POSTER SESSION

#### 8677 1C
**The possibility of using remote sensing technology of lidar for monitoring ecosystem health by detecting habitat condition [8677-83]**
M. F. Huseyinoglu, Z. Salaeva, A. Secgin, TÜBITAK Marmara Research Ctr. (Turkey); S. R. Allakhverdiev, Bartin Univ. (Turkey); K. R. Allakhverdiev, TÜBITAK Marmara Research Ctr. (Turkey) and Azerbaijan National Academy of Aviation (Azerbaijan)

#### 8677 1D
**Preliminary results from the new multiwavelength aerosol lidar scanning system in Turkey [8677-85]**
M. F. Huseyinoglu, Z. Salaeva, A. Secgin, TÜBITAK Marmara Research Ctr. (Turkey); K. R. Allakhverdiev, TÜBITAK Marmara Research Ctr. (Turkey) and Azerbaijan National Academy of Aviation (Azerbaijan)

#### 8677 1E
**GaSe damage threshold under IR pulse pumping [8677-2]**
J. Guo, J.-J. Xie, L.-M. Zhang, F. Chen, K. Jiang, Changchun Institute of Optics, Fine Mechanics and Physics (China); S. V. Alexeev, High Current Electronic Institute (Russian Federation); Y. M. Andreev, Institute for Monitoring of Climatic and Ecological Systems (Russian Federation); K. A. Kokh, Institute of Geology and Mineralogy (Russian Federation); G. V. Lanski, High Current Electronic Institute (Russian Federation); V. F. Losev, Institute of High Current Electronics (Russian Federation) and Tomsk Polytechnic Univ. (Russian Federation); D. M. Lubenko, High Current Electronic Institute (Russian Federation); A. V. Shaiduko, Institute of Monitoring of Climatic and Ecological Systems (Russian Federation); V. A. Svetlichnyi, Tomsk Polytechnic Univ. (Russian Federation)

#### 8677 1F
**Volume Bragg Grating temperature gradient effect on laser diode array and stack spectra narrowing [8677-42]**
H. Wang, Z. Yang, W. Hua, W. Liu, X. Xu, National Univ. of Defense Technology (China)

#### 8677 1G
**Study on jitter of 30Hz surface discharge radiation source [8677-70]**
C. Huang, J. Liu, L. Yu, Y. Tang, X. An, A. Yi, F. Zhu, K. Huang, L. Ma, Northwest Institute of Nuclear Technology (China)

#### 8677 1H
**Experimental analysis of selective laser melting process for Ti-6Al-4V turbine blade manufacturing [8677-65]**
F. Caiazzo, F. Cardaropoli, V. Alfieri, V. Sergi, Univ. of Salerno (Italy); L. Cuccaro, Avio SpA (Italy)

#### 8677 1I
**Modeling adapted to manufacturing of high efficiency gold gratings [8677-71]**
A. Asgari, H. Araghi, Amirkabir Univ. of Technology (Iran, Islamic Republic of); M. H. Maleki, N. Partovi, E. Alidokht, Optics and Laser Research School (Iran, Islamic Republic of)

#### 8677 1J
**High-power laser interaction with plasma and its amplification by stimulated Raman backscattering model [8677-37]**
M. Nazari Haghighi, Pashaki, E. Esfandi, F. Mousavi, Iran Univ. of Science and Technology (Iran, Islamic Republic of)

#### 8677 1K
**Mutual utilization of simulation for high power application in the cloud computing environment [8677-1]**
M. Taniwaki, Tokyo Electric Power Co. (Japan); S. Sato, National Defense Medical College (Japan); T. Okamura, Y. Maekawa, M. Iyoda, Chiba Institute of Technology (Japan)
Study of the conditions of creating population inversion amongst the excited levels of hydrogen-like ions in a plasma [8677-33]
F. Mousavi, E. Eslami, M. Nazari Haghighi Pashaki, Iran Univ. of Science and Technology (Iran, Islamic Republic of)

KrF and XeCl laser induced ripples on a polyethersulfone film [8677-57]
H. Pazokian, Laser and Optics Research School (Iran, Islamic Republic of); M. Mollabashi, Iran Univ. of Science and Technology (Iran, Islamic Republic of); S. Jelvani, Laser and Optics Research School (Iran, Islamic Republic of); J. Barzin, Iran Polymer and Petrochemical Institute (Iran, Islamic Republic of)

Development of efficient nitrogen diluted discharge-driven HF CW chemical laser [8677-43]
H. Wang, X. Chen, X. Zhang, W. Hua, L. Si, National Univ. of Defense Technology (China)

Propagation of coherent beams from an unstable resonator with a variable reflecting mirror through turbulent atmosphere [8677-38]
M. Shayganmanesh, M. H. Mahdieh, Iran Univ. of Science and Technology (Iran, Islamic Republic of)

Investigation of nanostructures morphology of rough silicon surface irradiated by nanosecond laser pulses in distilled water [8677-19]
M. Sobhani, M. H. Mahdieh, F. Pahang, Iran Univ. of Science and Technology (Iran, Islamic Republic of)

Study of thermal lens effect induced by Ar ion laser in ethanol and determination of thermal lens focal length [8677-25]
M. H. Mahdieh, S. A. Ashrafi, H. Moradi, Iran Univ. of Science and Technology (Iran, Islamic Republic of)

Numerical studying of soft x-ray emitted from porous target irradiated by high power subnanosecond laser beam and the effect of plasma opacity [8677-66]
M. H. Mahdieh, H. Mozaffari, Iran Univ. of Science and Technology (Iran, Islamic Republic of)

Hole drilling on glass optical fibers by a femtosecond laser [8677-50]
M. Hamasaki, K. Gouya, K. Watanabe, Soka Univ. (Japan)

Author Index
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Eugene M. Kudriavtsev, P.N. Lebedev Physical Institute (Russian Federation)
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1 Chemical Lasers I  
   Jarmila Kodymová, Institute of Physics of the ASCR, v.v.i. (Czech Republic)

2 Chemical Lasers II  
   David L. Carroll, CU Aerospace LLC (United States)

3 Novel Approaches and Laser Beam Quality  
   John Travers, Max Planck Institute for the Science of Light (Germany)

4 Gas Lasers  
   Michael Heaven, Emory University (United States)
5 Laser Physics  
Willy L. Bohn, Institute of Technical Physics (Germany)

6 HPL Material Applications I  
Robert F. Walter, Schafer Corporation (United States)

7 HPL Material Applications II  
Paulo D. Lazzaro, ENEA (Italy)

8 HPL Material and Other Applications  
Karel Rohlena, Institute of Physics of the ASCR, v.v.i. (Czech Republic)

9 Solid State Lasers  
Anatoly S. Boreysho, Laser Systems Ltd. (Russian Federation) and Baltic State Technical University (Russian Federation)

10 EUV-XUV, Chemical, and VUV Lasers  
Ivan Evdokimov, Laser Systems Ltd. (Russian Federation)

11 NLO, Lidar, and Other Applications  
Mehmet Fatih Huseyinoglu, TÜBİTAK Marmara Araştırma Merkezi (Turkey)
Introduction

Held 10–14 September 2012 in Istanbul (Turkey) the XIX International Symposium on High Power Laser Systems & Applications may be considered as one of the most important in the almost 40-year history of this forum.

Launched in 1974 in Cologne/Germany under the name “Gas Flow & Chemical Lasers”, it has become the first international platform where leading scientists firstly from Western Europe and the United States, and later from other countries around the world could openly discuss and exchange views on the situation and development of high power gas flow (including chemical) lasers, which for more than four decades, were (and still are today) the only source of CW laser radiation of high optical quality in the MW-class.

For the first period (1974–1990), the most popular applications of these lasers have been in military related areas which addressed a rather narrow range of participants. Further growth of interest in high-power lasers and diversification of their applications increased the number of participants. For a long time supersonic chemical HF (DF)-lasers, CO₂-gas-dynamic lasers, gas flowing electric-discharge CO₂, and CO₂-lasers, pulsed TEA-CO₂, chemical, excimer and photodissociation lasers, were the focus of interest of the symposia’s attendees.

In the late 1990s, an increasing number of papers were devoted to the chemical oxygen iodine laser (COIL) as a result of major programs in the United States (Airborne Laser) and other countries. This topic played significant part in the scientific program of the symposia in Wroclaw (2002), Prague (2004), Gmunden (2006) and Lisbon (2008). On the other hand innovative technologies emerged in the areas of solid state and fiber lasers leading to an increased importance in industrial and defense applications. This resulted in a consolidation of the GCL symposia which since 1998 was held under the name of International Symposium on Gas Flow & Chemical Lasers / High Power Laser Conference.

Finally, these trends took shape to the XVIII Symposium, held at Sofia in 2010, when it became clear that none of the existing technical implementations of gas and chemical lasers could satisfy the customer’s requirements of CW megawatt class lasers. Besides power and beam quality overall efficiency, reliability, and easy integration in various platforms became major issues. It has been recognized that not only the laser source but the laser system as a whole and its costs had to satisfy the requirements of the applications. The last point gained in importance due the worldwide financial crisis in 2008–2009 and the shrinking budgets as a consequence thereof. Given this situation the International Advisory Committee decided to change the title of the Symposium into High Power Laser Systems & Applications (HPLS&A) at the meeting in Istanbul held 27–28 May 2011.
In addition, yet another important trend emerged: the increasing number of participants from Russia, Eastern Europe, and China suggests a geographical expansion of the Symposium. This is reflected by the fact that after Sofia and Istanbul the XX symposium will be held in China.

The XIX Symposium (HPLS&A) which was held in Istanbul in mid-September 2012 reaffirmed the major trends that emerged in the two previous forums. There was a further reduction in the number of attendees from the U.S. but a stabilization of the number of papers from Western and Eastern Europe. On the other hand the organizers have been pleased with an increased number of young participants from European countries as well as from China and Japan. The number of reports related to defense applications was greatly reduced which reflects the reduced budgets in that area. However, several reports on the European Extremely Light Infrastructure program, the Russian program to create the exawatt laser, and laser systems for fusion were presented.

This volume is a collection of papers presented at the XIX International Symposium on High Power Laser Systems & Applications in Istanbul, held 10–14 September 2012, which was organized and supported by TÜBITAK (Turkish Scientific and Technical Research Council) MRC (Marmara Research Center). Over 120 scientists from Algeria, Austria, Australia, Azerbaijan, Belarus, Belgium, Brazil, Bulgaria Canada, China, Czech Republic, France, Germany, Greece, Iraq, Iran, Italy, Japan, Poland, Portugal, Russia, Spain, South Africa, Turkey, United Kingdom and the United States participated in this edition. The choice of Istanbul as a bridge between continents strongly enhanced the friendly and stimulating atmosphere of the Symposium.

We would like to thank Honorary Chair, Nobel Prize Laureate Jores Alferov who could not personally attend our Symposium but who sent a letter of greeting to Prof. Dr. K. Allakhverdiev and the participants. Recognizing the importance of Symposium, Prof. J. Alferov noted: "During the last half century, High Power Laser Systems and Applications not only became a base of technological development, but also the driving force of economic achievements of our society. The Program of our Symposium evidently demonstrates this fact and, at the same time, it shows that laser physics and laser technologies have been successfully developed not only in the United States and Russia, but also in many other countries of all over the world, including Turkey."

We would like to thank the members of the International Advisory Committee for their great support, as well as the authors and reviewers for their contribution to these proceedings. We wish to thank also the following for their financial and collaborative contribution to the success of Istanbul 2012 HPLS&A Symposium: TÜBITAK, MRC; SPIE; EOARD, Air Force Office of Scientific Research, USAF Research Laboratory; OSA; Laser Systems, and all other sponsors.
Finally, we would like to invite the readers of this volume to take part in the XX HPLS&A symposium which will be held in 2014 in China.

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