

Saratov Fall Meeting 2012

**Optical Technologies in Biophysics
and Medicine XIV; and Laser Physics
and Photonics XIV**

Valery V. Tuchin
Elina A. Genina
Vladimir L. Derbov
Igor V. Meglinski
Editors

25–28 September 2012
Saratov, Russian Federation

Organized by

Saratov State University (Russian Federation) • Institute of Precision Mechanics and Control, Russian Academy of Sciences (Russian Federation) • Research-Educational Institute of Optics and Biophotonics at Saratov State University (Russian Federation) • Research-Educational Center of Nonlinear Dynamics & Biophysics of CRDF and Ministry of Education and Science of RF (REC-006) (Russian Federation) • International Research-Educational Center of Optical Technologies for Industry and Medicine "Photonics" at Saratov State University (Russian Federation) • Volga Regional Center of New Information Technologies (Russian Federation) • Saratov State Medical University (Russian Federation)

In cooperation with

Academy of Natural Sciences, Saratov Regional Division (Russian Federation) • Russian Society for Photobiology (Russian Federation) • Saratov Science Center of the Russian Academy of Sciences (Russian Federation) Photonics4Life Consortium of EC FP7: Network of Excellence for Biophotonics • Wiley-VCH Verlag GmbH (Germany) Biomedical Photonics Committee of Chinese Optical Society (China)

Sponsored by

Russian Foundation for Basic Research (Russian Federation) • Russian Academy of Sciences (Russian Federation) U.S. Civilian Research and Development Foundation for the Independent States of the Former Soviet Union (CRDF) (United States) • SPIE Student Chapter • Optical Society of America • OSA Student Chapter • SPE "Nanostructured Glass Technology" Ltd. (Russian Federation)

Published by
SPIE

Volume 8699

Proceedings of SPIE, 1605-7422, V.8699

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.

Saratov Fall Meeting 2012: Optical Technologies in Biophysics and Medicine XIV; and Laser Physics and Photonics XIV, Valery V. Tuchin, Elina A. Genina, Vladimir L. Derbov, Igor V. Meglinski, Eds., Proc. of SPIE Vol. 8699, 869901 © 2013 SPIE · CCC code: 1605-7422/13/\$18 · doi: 10.1117/12.2022365

The papers included in this volume were part of the technical conference cited on the cover and title page. Papers were selected and subject to review by the editors and conference program committee. Some conference presentations may not be available for publication. The papers published in these proceedings reflect the work and thoughts of the authors and are published herein as submitted. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon.

Please use the following format to cite material from this book:

Author(s), "Title of Paper," in *Saratov Fall Meeting 2012: Optical Technologies in Biophysics and Medicine XIV; and Laser Physics and Photonics XIV*, edited by Valery V. Tuchin, Elna A. Genina, Vladimir L. Derbov, Igor V. Meglinski, Proceedings of SPIE Vol. 8699 (SPIE, Bellingham, WA, 2013) Article CID Number.

ISSN: 1605-7422

ISBN: 9780819494863

Published by

SPIE

P.O. Box 10, Bellingham, Washington 98227-0010 USA

Telephone +1 360 676 3290 (Pacific Time) · Fax +1 360 647 1445

SPIE.org

Copyright © 2013, Society of Photo-Optical Instrumentation Engineers.

Copying of material in this book for internal or personal use, or for the internal or personal use of specific clients, beyond the fair use provisions granted by the U.S. Copyright Law is authorized by SPIE subject to payment of copying fees. The Transactional Reporting Service base fee for this volume is \$18.00 per article (or portion thereof), which should be paid directly to the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923. Payment may also be made electronically through CCC Online at copyright.com. Other copying for republication, resale, advertising or promotion, or any form of systematic or multiple reproduction of any material in this book is prohibited except with permission in writing from the publisher. The CCC fee code is 1605-7422/13/\$18.00.

Printed in the United States of America.

Publication of record for individual papers is online in the SPIE Digital Library.

SPIE 
Digital Library

SPIDigitalLibrary.org

Paper Numbering: Proceedings of SPIE follow an e-First publication model, with papers published first online and then in print and on CD-ROM. Papers are published as they are submitted and meet publication criteria. A unique, consistent, permanent citation identifier (CID) number is assigned to each article at the time of the first publication. Utilization of CIDs allows articles to be fully citable as soon as they are published online, and connects the same identifier to all online, print, and electronic versions of the publication. SPIE uses a six-digit CID article numbering system in which:

- The first four digits correspond to the SPIE volume number.
- The last two digits indicate publication order within the volume using a Base 36 numbering system employing both numerals and letters. These two-number sets start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B ... 0Z, followed by 10-1Z, 20-2Z, etc.

The CID Number appears on each page of the manuscript. The complete citation is used on the first page, and an abbreviated version on subsequent pages. Numbers in the index correspond to the last two digits of the six-digit CID Number.

Contents

ix Conference Committee
xiii Introduction

PART A Saratov Fall Meeting 2012: Optical Technologies in Biophysics and Medicine XIV

SARATOV FALL MEETING INVITED PAPERS

8699 02 **Mueller matrix polarimetry of plasmon resonant silver nano-rods: biomedical prospects (Invited Paper)** [8699-6]
J. Soni, S. Ghosh, S. K. Bera, A. Banerjee, N. Ghosh, Indian Institute of Science Education and Research Kolkata (India)

8699 03 **Case study of ECG signal used as a reference signal in optical pulse transit time measurement of blood flow: the effect of different electrode placements on pulse transit time (Invited Paper)** [8699-4]
T. S. Myllylä, E. V. Vihriälä, Univ. of Oulu (Finland); V. O. Korhonen, Oulu Univ. Hospital (Finland); H. S. S. Sorvoja, Univ. of Oulu (Finland)

TISSUE OPTICS

8699 04 **Correlation-stability approach in optical microelastography of tissues** [8699-22]
L. A. Matveev, V. Yu. Zaitsev, A. L. Matveyev, G. V. Gelikonov, V. M. Gelikonov, Institute of Applied Physics (Russian Federation)

8699 05 **Speckle pattern texture analysis method to measure surface roughness** [8699-13]
I. Kuznetsov, Institute of Applied Physics (Russian Federation); A. Sadovoy, A*STAR Institute of Materials Research and Engineering (Singapore); A. Doronin, I. Meglinski, Univ. of Otago (New Zealand)

8699 06 **Analysis of statistical properties of laser speckles, forming in skin and mucous of colon: potential application in laser surgery** [8699-27]
V. Rubtsov, S. Kapralov, I. Chalyk, Saratov State Medical Univ. (Russian Federation); O. Ulianova, Saratov State Agrarian Univ. (Russian Federation), Saratov Scientific and Research Veterinary Institute (Russian Federation), and Saratov State Univ. (Russian Federation); S. Ulyanov, Saratov State Univ. (Russian Federation)

8699 07 **Study of lipoproteins and arterial intima interaction based on arterial endothelial cells real geometrical structure** [8699-24]
O. E. Glukhova, I. V. Kirillova, Saratov State Univ. (Russian Federation); G. N. Maslyakova, Saratov State Medical Univ. (Russian Federation); E. L. Kossovich, D. A. Zayarsky, A. A. Fadeev, Saratov State Univ. (Russian Federation)

- 8699 08 **Color contrast of red blood cells on solid substrate** [8699-25]
A. A. Paiziev, Institute of Ion-Plasma and Laser Technologies (Uzbekistan)
- 8699 09 **Using peer-to-peer network for on-line Monte Carlo computation of fluence rate distribution** [8699-5]
A. Doronin, I. Meglinski, Univ. of Otago (New Zealand)

CONTROL OF TISSUE OPTICAL PROPERTIES

- 8699 0A **Comparison between optical measurements made from natural and frozen samples at optical clearing** [8699-12]
L. Oliveira, Instituto Superior de Engenharia do Porto (Portugal) and Univ. do Porto (Portugal); M. I. Carvalho, Univ. do Porto (Portugal); E. Nogueira, Instituto Superior de Engenharia do Porto (Portugal); V. V. Tuchin, Saratov State Univ. (Russian Federation), Institute of Precision Mechanics and Control (Russian Federation), and Univ. of Oulu (Finland)
- 8699 0B **Use of fractional laser microablation of skin for improvement of its immersion clearing** [8699-58]
E. A. Kolesnikova, A. S. Kolesnikov, E. A. Genina, L. E. Dolotov, D. K. Tuchina, A. N. Bashkatov, Saratov State Univ. (Russian Federation); V. V. Tuchin, Saratov State Univ. (Russian Federation), Institute of Precision Mechanics and Control (Russian Federation), and Univ. of Oulu (Finland)
- 8699 0C **Control of optical transmittance of fat tissue slices at NIR photodynamic action mediated by indocyanine green** [8699-17]
I. Yu. Yanina, Saratov State Univ. (Russian Federation) and Saratov State Medical Univ. (Russian Federation); V. A. Doubrovsky, Saratov State Medical Univ. (Russian Federation); V. V. Tuchin, Saratov State Univ. (Russian Federation), Institute of Precision Mechanics and Control (Russian Federation), and Univ. of Oulu (Finland)

OPTICAL DIAGNOSTICS

- 8699 0D **Probing multi-scale self-similarity of tissue structures using light scattering spectroscopy: prospects in pre-cancer detection** [8699-10]
S. Chatterjee, N. K. Das, Indian Institute of Science Education and Research Kolkata (India); S. Kumar, The Univ. of Texas at Arlington (United States); S. Mohapatra, Indian Institute of Science Education and Research Kolkata (India); A. Pradhan, Indian Institute of Technology Kanpur (India); P. K. Panigrahi, N. Ghosh, Indian Institute of Science Education and Research Kolkata (India)
- 8699 0E **System for determining the concentration and visualization of the spatial distribution of photosensitizers based on tetrapyrrole compounds in the tissues of the human ocular fundus** [8699-3]
S. S. Model, T. A. Savelieva, K. G. Linkov, A.M. Prokhorov General Physics Institute (Russian Federation)

- 8699 OF **Quantitative spectral light scattering polarimetry for monitoring fractal growth pattern of *Bacillus thuringiensis* bacterial colonies** [8699-9]
P. Banerjee, J. Soni, N. Ghosh, T. K. Sengupta, Indian Institute of Science Education and Research Kolkata (India)
- 8699 OG **Application of LASCA technique for monitoring of bacterial colonies growth** [8699-60]
O. Ulianova, Saratov State Agrarian Univ. (Russian Federation), Saratov Scientific and Research Veterinary Institute (Russian Federation), and Saratov State Univ. (Russian Federation); O. Rebeza, N. Rebeza, Saratov State Agrarian Univ. (Russian Federation); S. Ulyanov, Saratov State Univ. (Russian Federation)
- 8699 OH **The nature of calcium-phosphate crystal formations grown on dentine surface** [8699-29]
N. O. Bessudnova, D. I. Bilenko, S. B. Venig, V. S. Atkin, V. V. Galushka, A. M. Zakharevich, Saratov State Univ. (Russian Federation)
- 8699 OI **3D visualization of calcium-phosphate crystals observed on dentine surface** [8699-28]
N. O. Bessudnova, D. I. Bilenko, S. B. Venig, V. S. Atkin, V. V. Galushka, A. M. Zakharevich, Saratov State Univ. (Russian Federation)
- 8699 OJ **XRD study of calcium-phosphate crystal formation on dentine surface** [8699-30]
N. O. Bessudnova, A. Skaptsov, S. B. Venig, A. N. Gribov, V. S. Atkin, Saratov State Univ. (Russian Federation)
- 8699 OK **Analysis of the absorption spectra of gas emission of patients with lung cancer and chronic obstructive pulmonary disease by laser optoacoustic spectroscopy** [8699-11]
E. B. Bukreeva, A. A. Bulanova, Y. V. Kistenev, Siberian State Medical Univ. (Russian Federation); D. A. Kuzmin, Siberian State Medical Univ. (Russian Federation) and Institute of Atmospheric Optics (Russian Federation); S. A. Tuzikov, E. L. Yumov, Tomsk Cancer Research Institute (Russian Federation)
- 8699 OL **Fluorescent probe immobilization kinetics into collagenase molecules** [8699-2]
V. S. Maryakhina, Orenburg State Univ. (Russian Federation)
- 8699 OM **Effect of scattering anisotropy on acoustooptic tomography signal** [8699-43]
A. P. Soloviev, M. I. Perchenko, O. V. Zyuryukina, Saratov State Univ. (Russian Federation)
- 8699 ON **The effect of millimeter waves at the yeast *Saccharomyces cerevisiae* during heliogeophysical disturbances** [8699-21]
S. M. Rogacheva, M. I. Babaeva, Saratov State Technical Univ. (Russian Federation)

LASER MEDICINE

- 8699 OO **LGR5 expressing cells of hair follicle as potential targets for antibody mediated anti-cancer laser therapy** [8699-26]
B. V. Popov, Institute of Cytology (Russian Federation)
- 8699 OP **Modeling of a single red blood cell thermal reaction exposed to infrared laser tweezers** [8699-8]
A. Seteikin, Kwangwoon Univ. (Korea, Republic of); I. Krasnikov, Amur State Univ. (Russian Federation); I. Bernhardt, Univ. of Saarland (Germany)

NANOBIOTECHNOLOGY

- 8699 OQ **Nanoparticles as contrasting agents in diffuse optical spectroscopy** [8699-18]
A. Krainov, A. Mokeeva, Institute of Applied Physics (Russian Federation) and N.I. Lobachevsky Nizhny Novgorod State Univ. (Russian Federation); E. Sergeeva, Institute of Applied Physics (Russian Federation); S. Zaboltnov, Lomonosov Moscow State Univ. (Russian Federation); M. Kirillin, Institute of Applied Physics (Russian Federation)
- 8699 OR **A new x-ray adhesive system with embedded nanoparticulate silver markers for dental applications** [8699-31]
N. O. Bessudnova, D. I. Bilenko, S. B. Venig, V. S. Atkin, A. M. Zacharevich, Saratov State Univ. (Russian Federation)
- 8699 OS **Correction of excitation spectra of the nanoparticles** [8699-44]
V. I. Kochubey, E. K. Volkova, J. G. Konyukhova, Saratov State Univ. (Russian Federation); I. V. Zabenkov, Saratov State Medical Univ. (Russian Federation)

PART B *Laser Physics and Photonics XIV*

LASER PHYSICS AND PHOTONICS INVITED PAPERS

- 8699 OT **Kramers-degenerated NV+1¹³C spin systems in diamond: analytical description (Invited Paper)** [8699-19]
A. P. Nizovtsev, S. Ya. Kilin, B.I. Stepanov Institute of Physics (Belarus); A. L. Pushkarchuk, Institute of Physical Organic Chemistry (Belarus); S. A. Kuten, Belarusian State Univ. (Belarus)
- 8699 OU **A sub-10 fs noncollinear optical parametric chirped pulse amplifier pumped at 20 kHz pulse repetition rate (Invited Paper)** [8699-63]
J. Zheng, D. Nürenberg, W. Kobayashi, T. Hamann, Westfälische Wilhelms-Univ. Münster (Germany); M. Lührmann, Lumera Laser GmbH (Germany); J. A. L'huillier, R. Wallenstein, Photonik-Zentrum Kaiserslautern (Germany); H. Zacharias, Westfälische Wilhelms-Univ. Münster (Germany)

QUANTUM AND STATISTICAL OPTICS

- 8699 OV **Entanglement for atoms with degenerate two-photon transitions successively passing the thermal cavity** [8699-51]
E. K. Bashkirov, Y. A. Nikiforova, Samara State Univ. (Russian Federation)
- 8699 OW **Entanglement in nondegenerate two-photon Tavis-Cummings model with atomic coherence** [8699-54]
E. K. Bashkirov, M. S. Mastuygin, Samara State Univ. (Russian Federation)
- 8699 OX **Atom-field entanglement in two-atom Jaynes-Cummings model with intensity-dependent couplings** [8699-55]
E. Yu. Sochkova, Samara State Univ. (Russian Federation)

- 8699 0Y **Chaos and entanglement in atomic systems interacting with photons** [8699-59]
A. V. Gorokhov, Samara State Univ. (Russian Federation)
- 8699 0Z **Super-radiant scattering of laser light from a Bose-Einstein condensate of atomic gas: control of the matter-field waves generation** [8699-66]
Y. A. Avetisyan, Institute of Precision Mechanics and Control (Russian Federation)
- 8699 10 **Peculiarities of statistical distribution of the phase difference in the speckle-field: the numerical simulation** [8699-65]
L. A. Maksimova, N. Yu. Mysina, Institute of Precision Mechanics and Control (Russian Federation) and Saratov State Univ. (Russian Federation); B. B. Gorbatenko, Saratov State Univ. (Russian Federation) and Institute of Precision Mechanics and Control (Russian Federation); V. P. Ryabukho, Institute of Precision Mechanics and Control (Russian Federation) and Saratov State Univ. (Russian Federation)
- 8699 11 **Analysis of surface roughness using laser speckle interferometry** [8699-40]
D. Joseph, P. Bisnoi, Guru Jambheshwar Univ. of Science and Technology (India)

NONLINEAR OPTICS

- 8699 12 **Numerical modeling of terahertz generation via difference-frequency mixing in two-color laser** [8699-64]
L. A. Kochkurov, M. I. Balakin, L. A. Melnikov, V. V. Astakhov, Saratov State Technical Univ. (Russian Federation)
- 8699 13 **Display of nonadiabacity in electromagnetically induced transparency** [8699-33]
N. O. Gavrilets, E. R. Govorenko, O. M. Parshkov, Saratov State Technical Univ. (Russian Federation)
- 8699 14 **Particularities of femtosecond spectral supercontinuum generation in anisotropic crystal media with quadratic nonlinearity** [8699-14]
S. S. Nalegaev, S. E. Putilin, V. G. Bepalov, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation)
- 8699 15 **Resonance self-action and optical transient nutation in frequency-modulated cw laser beams** [8699-57]
I. L. Plastun, A. G. Misurin, Saratov State Technical Univ. (Russian Federation)
- 8699 16 **Photo-integrated volumetric nonlinear structures for micro-optics** [8699-37]
V. A. Smirnov, L. I. Vostrikova, A.V. Rzhhanov Institute of Semiconductor Physics (Russian Federation)
- 8699 17 **Light-induced photorefraction in volume of glass** [8699-39]
V. A. Smirnov, L. I. Vostrikova, A.V. Rzhhanov Institute of Semiconductor Physics (Russian Federation)
- 8699 18 **Depletion of short-wavelength radiation under intracavity nonlinear frequency conversion in a dual-wavelength vertical external cavity surface-emitting laser** [8699-46]
Y. A. Morozov, M. Yu. Morozov, Institute of Radio Engineering and Electronics (Russian Federation)

- 8699 19 **Nonlinear optical properties of rare earth crystal Sm:CdF₂ studied by Z-scan technique** [8699-41]
D. Joseph, Kiran, Guru Jambheshwar Univ. of Science and Technology (India)

LASER SPECTROSCOPY

- 8699 1A **Calculations of spectral and optical characteristics of spheroidal quantum dot ensembles** [8699-47]
V. L. Derbov, A. S. Klombotskaya, Saratov State Univ. (Russian Federation); A. A. Gusev, L. L. Hai, S. I. Vinitzky, O. Chuluunbaatar, Joint Institute for Nuclear Research (Russian Federation)
- 8699 1B **Effects of Volkov functions in laser-assisted electron momentum spectroscopy** [8699-56]
A. A. Bulychev, Joint Institute for Nuclear Research (Russian Federation); K. A. Kouzakov, Y. V. Popov, Lomonosov Moscow State Univ. (Russian Federation)
- 8699 1C **Indigenous development of static laser light scattering (SLS) spectrometer** [8699-42]
D. Joseph, A. Kumar, Guru Jambheshwar Univ. of Science and Technology (India)

Author Index

Conference Committee

Conference Chair

Valery V. Tuchin, Saratov State University (Russian Federation) and
Institute of Precision Mechanics and Control (Russian Federation)

Secretary

Elina A. Genina, Saratov State University (Russian Federation)

General Program Committee

Vadim S. Anishchenko, Saratov State University (Russian Federation)

Lev M. Babkov, Saratov State University (Russian Federation)

Alexey N. Bashkatov, Saratov State University (Russian Federation)

Valentin I. Berezin, Saratov State University (Russian Federation)

Vladimir L. Derbov, Saratov State University (Russian Federation)

Elina A. Genina, Saratov State University (Russian Federation)

Nikolai G. Khlebtsov, Institute of Biochemistry and Physiology of Plants
and Microorganisms RAS, Saratov State University (Russian
Federation)

Kirill V. Larin, University of Houston (United States)

Boris A. Medvedev, Saratov State University (Russian Federation)

Igor Meglinski, University of Otago (New Zealand)

Juergen Popp, Institute of Photonic Technology (Germany)

Alexander B. Pravdin, Saratov State University (Russian Federation)

Vladimir P. Ryabukho, Saratov State University (Russian Federation)
and Institute of Precision Mechanics and Control RAS (Russian
Federation)

Alexander M. Sergeev, Institute of Applied Physics RAS (Russian
Federation)

Julia S. Skibina, Saratov State University, SPE "Nanostructured Glass
Technology" Ltd. (Russian Federation)

Valery V. Tuchin, Saratov State University (Russian Federation) and
Institute of Precision Mechanics and Control (Russian Federation)

Session Chairs

1 Plenary Session

Valery V. Tuchin, Saratov State University (Russian Federation) and
Institute of Precision Mechanics and Control (Russian Federation)

- 2 Plenary Session Internet Biophotonics
Valery V. Tuchin, Saratov State University (Russian Federation) and
Institute of Precision Mechanics and Control (Russian Federation)
Dan Zhu, Huazhong University of Science and Technology (China)
- 3 Plenary Session Russian-Chinese Workshop
Alexander V. Priezzhev, Moscow State University (Russian Federation)
Hui Ma, Tsinghua University, Shenzhen (China)
- 4 Russian-Chinese Workshop I
Da Xing, South China Normal University (China)
Alexander P. Savitsky, A.N. Bach Institute of Biochemistry (Russian
Federation)
- 5 Russian-Chinese Workshop II
Valery V. Tuchin, Saratov State University (Russian Federation) and
Institute of Precision Mechanics and Control (Russian Federation)
Zhihong Zhan, Huazhong University of Science and Technology
(China)
- 6 Russian-Chinese Workshop III
Dan Zhu, Huazhong University of Science and Technology (China)
Alexander V. Priezzhev, Moscow State University (Russian Federation)
- 7 Russian-Chinese Workshop IV
Valery P. Zakharov, Samara State Aerospace University (Russian
Federation)
Linhong Deng, Changzou University (China)
- 8 Biophysics I
Vladislav Toronov, Ryerson University (Canada)
- 9 Biophysics II
Ivan V. Fedosov, Saratov State University (Russian Federation)
- 10 Laser Physics and Photonics
Vladimir L. Derbov, Saratov State University (Russian Federation)
- 11 Spectroscopy
Valentin I. Berezin, Saratov State University (Russian Federation)
Lev M. Babkov, Saratov State University (Russian Federation)
- 12 Nonlinear Dynamics and Computational Biophysics
Vadim S. Anishchenko, Saratov State University (Russian Federation)
- 13 Microscopy and Low-coherence Methods
Kirill V. Larin, University of Houston (United States)

- 14 Management
Valery V. Tuchin, Saratov State University (Russian Federation) and
Institute of Precision Mechanics and Control (Russian Federation)
Julia S. Skibina, Saratov State University, SPE "Nanostructured Glass
Technology" Ltd. (Russian Federation)
- 15 Nanobiophotonics
Nikolai G. Khlebtsov, Institute of Biochemistry and Physiology of Plants
and Microorganisms RAS, Saratov State University (Russian
Federation)
- 16 Modern Optics
Vladimir P. Ryabukho, Saratov State University (Russian Federation)
and Institute of Precision Mechanics and Control RAS (Russian
Federation)
- 17 English
Svetlana V. Eremina, Saratov State University (Russian Federation)
- 18 Education
Boris A. Medvedev, Saratov State University (Russian Federation)
Vladimir P. Ryabukho, Saratov State University (Russian Federation)
and Institute of Precision Mechanics and Control RAS (Russian
Federation)
- 19 Low-Dimensional Structures
Olga E. Glukhova, Saratov State University (Russian Federation)
- 20 Telemedicine
Elena V. Karchenova, ISfTeH and Saratov DNA-centre (Russian
Federation)
Valery V. Bakutkin, Saratov Research Institute of Hygiene (Russian
Federation)
- 21 Joint Poster Session and Internet Discussion
Dmitry Agafonov, Saratov State University (Russian Federation)
Ivan V. Fedosov, Saratov State University (Russian Federation)
Xiaoquan Yang, Huazhong University of Science and Technology
(China)

Introduction

The Annual International Multidisciplinary School for Young Scientists and Students on Optics, Laser Physics and Biophotonics (Saratov Fall Meeting (SFM-12)) was held in Saratov, Russia, 25–28 September 2012 with about 500 participants from Russia, USA, Europe, Australia, and Asia. It covered a wide range of modern problems of fundamental and applied optics, laser physics, photonics, and biomedical optics.

In the framework of the Meeting the following Workshops were organized:

- Optical Technologies in Biophysics & Medicine XIV
Valery V. Tuchin and Elina A. Genina, Chairs
- Laser Physics and Photonics XIV
Vladimir L. Derbov, Chair
- Spectroscopy and Molecular Modeling XIII
Lev M. Babkov, Chair
- Modern Optics: Lectures on Optics for University Students, Postgraduate Students and High School Students XI
Vladimir P. Ryabukho, Chair
- English as a Communicative Tool in the Scientific Community XI
Svetlana V. Eremina and Alexander B. Pravdin, Chairs
- Management of High Technologies Commercialization and Regional Innovation Systems IX
Valery V. Tuchin and Julia S. Skibina, Chairs
- Nanobiophotonics VIII
Nikolai G. Khlebtsov, Chair
- Nonlinear Dynamics and Computational Biophysics III
Vadim S. Anishchenko, Chair
- Internet Biophotonics V
Valery V. Tuchin, Chair
- Microscopic and Low-Coherence Methods in Biomedical and NonBiomedical Applications V
Kirill V. Larin, Chair
- History, Methodology and Philosophy of the Optical Education V
Vladimir P. Ryabukho and Boris A. Medvedev, Chairs
- Telemedicine: Opportunities, Applications, Prospects VII
Elena V. Karchenova and Valery V. Bakutkin, Chairs
- Low-dimensional structures II
Olga E. Glukhova, Chair

A special event during the Meeting was the Russian-Chinese Workshop (Qingming Luo and Valery V. Tuchin, Chairs)

The main goal of the School, Workshops and Seminars was to involve students and young researches in recent developments and applications of laser and

optical technologies in medicine and biology, coherent optics of random and ordered media, material and environmental sciences, nonlinear dynamics of laser systems, laser spectroscopy, and molecular modeling. The main attention was paid to the discussion of fundamentals and general approaches to the description of coherent, low-coherent, polarized, spatially and temporally modulated light interactions with inhomogeneous absorbing media, photonic crystals, tissue phantoms, and various types of tissues *in vitro* and *in vivo*. Such effects as static and dynamic light scattering, Doppler, optoacoustic and optothermal interactions, mechanical stress, photodynamic effect, etc., were considered. On this basis, the variety of laser and optical technologies for medical diagnostics, therapy, surgery, and light dosimetry, as well as for spectroscopy of random and ordered media were presented. New fundamental phenomena in quantum optics together with novel laser and fiber-optical technologies were presented, as well as photonics of micro- and nanostructures.

SFM-12 was organized as the morning plenary sessions, afternoon lecture and oral sessions and evening poster presentations and internet discussion. Original oral reports and posters were presented by junior scientists and students. Plenary lectures were listened to with great interest and discussed by the audience.

Plenary and Invited lectures, oral and poster presentations covered a wide area of tissue optics, spectroscopy and imaging, controlling of optical properties of tissues, as well as biophysical and photo-chemical aspects of photo and laser therapy. Besides this SPIE volume, a few special issues and sections of well-recognized peer-reviewed journals, such as Optics and Spectroscopy and Journal of Biophotonics will be published.

The SPIE/OSA short courses for students, engineers, scientists, and clinicians "Optical elastography: Prospects in medicine for micro-imaging of tissue mechanical properties" by David D. Sampson, The University of Western Australia, (Australia) and "Tutorial Optical Coherence Tomography-based imaging and sensing of tissues and cells" by Kirill V. Larin, University of Houston, (United States), accompanied the conference. They had more than 50 attendees each, mostly students, and were organized by Saratov University SPIE and OSA Student Chapters and supported by SPIE, OSA, and Saratov State University.

The traditional specific feature of Saratov Fall Meetings is the Internet Session and one-day on-line discussion. In 2012, this session included the following plenary lectures: "Optical, Optoacoustic, and Ultrasound Techniques for Noninvasive Diagnostics and Therapy" by Prof. Rinat O. Esenaliev, University of Texas Medical Branch (United States), "Fluorescence detection and photosensitization of malignant brain tumors" by Dr. Herbert Stepp, Laser Research Laboratory, LIFE Center, University Hospital of Munich (Germany), "Microcirculation Imaging" by Prof. Martin John Leahy, National University of Ireland (Ireland), "Optical Coherence Tomography" by Prof. Peter E. Andersen, Technical University of Denmark (Denmark).

The papers by the participants from the United States, Russian Federation, Germany, Finland, Ireland, Bulgaria, Belarus, China, Singapore, New Zealand, Denmark, India, Slovakia, Portugal, located at the meeting website: <http://sfm.eventry.org/2012/internet>, were available during the meeting and will be available for a whole year until the next meeting.

A great number of the materials presented is the result of collaboration between research groups from different countries supported by international scientific programs such as CRDF, PHOTONICS4LIFE, and others.

The volume includes papers presented at the Workshops "Optical Technologies in Biophysics and Medicine XIV" and "Laser Physics and Photonics XIV". It is a great pleasure and privilege for the editors to thank all of the authors for their contributions to SFM-12, especially to the Internet lecturers for their exciting presentations.

The organizers of SFM-12 are grateful to all the sponsoring organizations and programs that efficiently supported this meeting, especially to: SPIE; Optical Society of America; Russian Foundation for Basic Research; U.S. Civilian Research & Development Foundation for the Independent States of the Former Soviet Union (CRDF), grant REC-006; PHOTONICS4LIFE of FP7-ICT-2007-2 (№ 224014, 2008-2013); and Volga Region Center of New Information Technologies.

Valery V. Tuchin
Elina A. Genina
Vladimir L. Derbov
Igor V. Meglinski

