Front Matter: Volume 9917
Saratov Fall Meeting 2015
Third International Symposium on Optics and Biophotonics; and Seventh Finnish-Russian Photonics and Laser Symposium (PALS)

Elina A. Genina
Vladimir L. Derbov
Dmitry E. Postnov
Alexander B. Pravdin
Kirill V. Larin
Igor V. Meglinski
Valery V. Tuchin
Editors

22–25 September 2015
Saratov, Russian Federation

Sponsored by
Russian Foundation for Basic Research • Russian Academy of Sciences • SPIE • OSA: Optical Society of America (United States) • European Optical Society LLC • SPE “Nanostructured Glass Technology” Ltd. (Russian Federation) • Russian Technology Platforms “The Medicine of the Future” and “Photonics” (Russian Federation) • Government of the Russian Federation grant №14.Z50.31.0004 (Russian Federation) • RME “INJECT” LLC (Russian Federation) • SPE “Fire Dance” (Russian Federation)

Published by
SPIE

Part One of Two Parts

Volume 9917

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.
The papers 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. Additional papers and presentation recordings may be available online in the SPIE Digital Library at SPIEDigitalLibrary.org.

The papers 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 these proceedings:


ISSN: 1605-7422
ISSN: 2410-9045 (electronic)
ISBN: 9781510602267

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 © 2016, 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 1605-7422/16/$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
SPIEDigitalLibrary.org

Paper Numbering: Proceedings of SPIE follow an e-First publication model. A unique citation identifier (CID) number is assigned to each article at the time of 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 and print versions of the publication. SPIE uses a six-digit CID article numbering system structured as follows:

- 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.
Contents

 inv Authors
 xv Conference Committee
 xxv Introduction
 xxviii Conference Organizers

 INVITED PAPERS

 9917 02 Pilot in vivo animal study of bone regeneration by fractional Er: YAG-laser (Invited Paper) [9917-36]
 9917 03 Implementation of digital optical capillaroscopy for quantifying and estimating the microvascular abnormalities in type 2 diabetes mellitus (Invited Paper) [9917-30]
 9917 04 RBC aggregation dynamics in autologous plasma and serum studied with double-channel optical tweezers (Invited Paper) [9917-144]

 THE 7TH FINNISH-RUSSIAN PHOTONICS AND LASER SYMPOSIUM PALS '15

 9917 05 UV laser-induced fluorescence spectroscopy and laser Doppler flowmetry in the diagnostics of alopecia [9917-58]
 9917 06 Investigation of bovine serum albumin glycation by THz spectroscopy [9917-80]
 9917 07 Calibration of miniature prism-based stereoscopic imagers for precise spatial measurements [9917-114]
 9917 08 The morphological changes in transplanted tumors in rats at plasmonic photothermal therapy [9917-141]
 9917 09 The effect of housing temperature on the growth of CT26 tumor expressing fluorescent protein EGFP [9917-26]
 9917 0A Picosecond lasers with the dynamical operation control [9917-151]

 OPTICAL TECHNOLOGIES IN BIOPHYSICS & MEDICINE

 9917 0B The sex differences in nature of vascular endothelial stress: nitrergic mechanisms [9917-11]
 9917 0C Physico-chemical and biochemical approaches to assessing the development of precancerous pathologies of the gastrointestinal tract during their modeling in mice with complex effects of stress factors of different nature [9917-12]
Raman spectroscopy for assessment of bioimplant tissue [9917-31]

Photosensitizer fluorescence dynamics at its diffusion in blood flow for different means of cells concentrations [9917-40]

Model propagation of a femtosecond laser radiation in the vitreous of the human eye [9917-55]

Modeling of structure and properties of thermo-optical converters for laser surgery [9917-86]

Neoplasms treatment by diode laser with and without real time temperature control on operation zone [9917-37]

The tensile strength characteristics study of the laser welds of biological tissue using the nanocomposite solder [9917-84]

Soluble guanylyl cyclase is involved in PDT-induced injury of crayfish glial cells [9917-106]

Photodynamic impact induces ischemic tolerance in models in vivo and in vitro [9917-146]

Comparison of membrane-protective activity of antioxidants quercetine and Gratiola Officinalis L. extract under conditions of photodynamic haemolysis [9917-19]

Study of the functional state of peripheral vessels in fingers of rheumatological patients by means of laser Doppler flowmetry and cutaneous thermometry measurements [9917-107]

Influence of temporal noise on the skin blood flow measurements performed by cooled thermal imaging camera: limit possibilities within each physiological frequency range [9917-47]

Fluorescent indices of oak and wheat leaves in dependence on chlorophyll content [9917-117]

Quantification of two forms of green sulfur bacteria in their natural habitat using bacteriochlorophyll fluorescence spectra [9917-123]

Depth profiles of spectral and hydrological characteristics of water and their relation to abundances of green sulfur bacteria in the stratified lakes of the White Sea [9917-129]

Absorption and fluorescence of hydrophobic components of dissolved organic matter in several Karelian lakes with stratified structures [9917-130]

Total variation based reconstruction of scattering inhomogeneities in tissue from time-resolved optical projections [9917-121]

Diffuse light tomography to detect blood vessels using Tikhonov regularization [9917-149]

The temperature dependence of refractive index of hemoglobin at the wavelengths 930 and 1100 nm [9917-157]
Optical researches for cyanobacteria bloom monitoring in Curonian Lagoon [9917-160]

Quantitative measurement of blood flow dynamics in chorioallantoic membrane of chicken embryo using laser Doppler anemometry [9917-109]

BIOMEDICAL SPECTROSCOPY

Detection of sulfonamide drug in urine using liquid-liquid extraction and surface-enhanced Raman spectroscopy [9917-29]
The development of attenuation compensation models of fluorescence spectroscopy signals [9917-42]
Comparative studies of the effects of copper sulfate and zinc sulfate on serum albumins [9917-60]
Forster resonance energy transfer in the system of human serum albumin-xanthene dyes [9917-61]
Red and blue shifts of spectral luminescence band of CuInS2 nanothermometers [9917-111]
Thermosensitivity of nanothermometer: CdSe/ZnS vs. CuInS2/ZnS [9917-119]
SDS-binding assay based on tyrosine fluorescence as a tool to determine binding properties of human serum albumin in blood plasma [9917-125]
Synthesis of cadmium-free quantum dots based on CuInS2 nanocrystals [9917-127]
Development of optoelectronic hardware: program complex for the analysis of hypoxia in the anterior eye camera in persons wearing contact lenses [9917-99]

NANOMEDICINE AND NANOTECHNOLOGY

Multicolored silica coated CdSe core/shell quantum dots [9917-6]
Determination of type and concentration of DNA nitrogenous bases by Raman spectroscopy using artificial neural networks [9917-25]
Investigation of cell proliferative activity on the surface of the nanocomposite material produced by laser radiation [9917-46]
Optical properties of monodisperse gold nanoshells on silica cores [9917-74]
Luminescence of europium (III) complexes for visualization [9917-78]
Incorporation of iodine in polymeric microparticles and emulsions [9917-135]
Fiber optic low-coherence Fabry-Perot interferometer with ZnO layers in transmission and reflective mode: comparative study [9917-82]
| 9917 1D | Laser ablation synthesis and spectral characterization of ruby nanoparticles [9917-90] |
| 9917 1E | Synthesis and antimicrobial activity of gold nanoparticle conjugates with cefotaxime [9917-105] |
| 9917 1F | Modification of inner surface of photonic crystal fibers with self-assembled polyaniline films [9917-145] |
| 9917 1G | New SERS-active alumina-based sorbents containing Ag nanoparticles [9917-147] |
| 9917 1H | Nanoparticles and nanostructured carriers for drug delivery and contrast enhancement [9917-140] |
| 9917 1I | Processes in suspensions of nanocomposite microcapsules exposed to external electric fields [9917-56] |
| 9917 1J | The study of the formation of monolayers of quantum dots at different temperatures [9917-23] |
| 9917 1K | The influence of redistribution ions in subphase at the properties Langmuir monolayer: physical and theoretical experiments [9917-28] |
| 9917 1L | Structural and chemical transformations on zirconium surface during machining and electrotechnological treatment with high-frequency currents [9917-48] |
| 9917 1M | Peculiarities of structure formation of layered metal-oxide system Ti-Ta-(Ti,Ta)₂O₇ during electro-spark alloying and thermally stimulated modification [9917-49] |
| 9917 1N | Introduction to nanotechnology: a short course for high school students [9917-38] |
| 9917 1O | Development of matrix photoreceivers based on carbon nanotubes array [9917-88] |

**MICROSCOPY AND LOW-COHERENCE METHODS IN BIOMEDICAL AND NON-BIOMEDICAL APPLICATIONS**

| 9917 1P | The study of the structural features of the lymphocytes in patients with diabetes using atomic force microscopy [9917-63] |
| 9917 1Q | In vitro metabolism study of normal and tumor cells when exposed to red LED light [9917-65] |
| 9917 1R | Shadow scanning lens-free microscopy with tomographic reconstruction of 2D images [9917-69] |
| 9917 1S | Vessel-contrast enhancement in label-free optical coherence angiography based on phase and amplitude speckle variability [9917-79] |
| 9917 1T | Micro-PIV quantification of capillary blood flow redistribution caused by laser-assisted vascular occlusion [9917-95] |
Part Two

COMPUTATIONAL BIOPHYSICS AND ANALYSIS OF BIOMEDICAL DATA

9917 1U Method of empirical dependences in estimation and prediction of activity of creatine kinase isoenzymes in cerebral ischemia [9917-136]

9917 1V Numerical focusing in diffraction phase microscopy [9917-143]

9917 1W Simple technique of Fourier-transform holographic microscope with compensation of phase aberration [9917-116]

9917 1X Cannabis agonist injection effect on the coupling architecture in cortex of WAG/Rij rats during absence seizures [9917-13]

9917 1Y Etalon-photometric method for estimation of tissues density at x-ray images [9917-54]

9917 1Z Computational model of cerebral blood flow redistribution during cortical spreading depression [9917-57]

9917 20 Synchronization of DNA array replication kinetics [9917-68]

9917 21 Perspective sub-THz powerful microwave generator "nanovircator" for T-rays biomedical diagnostics [9917-70]

9917 22 Modulation and detection of the THz range signals using the highest harmonics of the fundamental frequency of the superlattice-based generator for biomedical applications [9917-71]

9917 23 Generalized synchronization in the complex network: theory and applications to epileptic brain [9917-77]

9917 24 Evaluation of nonlinear properties of epileptic activity using largest Lyapunov exponent [9917-100]

9917 25 Analysis of the characteristics of the synchronous clusters in the adaptive Kuramoto network and neural network of the epileptic brain [9917-112]

9917 26 Application of cross-wavelet transform to pulse velocity data: seeking for inter-limb coherence [9917-126]

9917 27 Modeling study of terminal transients of blood flow [9917-128]

9917 28 Multifractal analysis of macro- and microcerebral circulation in rats [9917-10]

9917 29 Analysing coupling architecture in the cortical EEG of a patient with unilateral cerebral palsy [9917-97]

9917 2A Method of mucociliary clearance assessment [9917-108]
**ADVANCED POLARIZATION TECHNOLOGIES IN BIOMEDICINE AND MATERIAL SCIENCE**

<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>9917 2B</td>
<td>Graphene-based magnetless converter of terahertz wave polarization [9917-5]</td>
</tr>
<tr>
<td>9917 2C</td>
<td>Polarizing properties of molecular ensembles: new approaches to calculations [9917-98]</td>
</tr>
<tr>
<td>9917 2D</td>
<td>Features of polarization decay in the transition between the low-step and multiple scattering of laser light [9917-101]</td>
</tr>
<tr>
<td>9917 2E</td>
<td>Speckle-correlation analysis of the dynamic scatterers in temperature-governed gelation [9917-103]</td>
</tr>
<tr>
<td>9917 2F</td>
<td>Computer simulation studies of spatially resolved speckle correlometry in application to tissue structure characterization [9917-91]</td>
</tr>
<tr>
<td>9917 2G</td>
<td>Basic features of low-temperature plasma formation in the course of composite coating synthesis at the active faces of complex contoured hard tools [9917-20]</td>
</tr>
<tr>
<td>9917 2H</td>
<td>Experimental study of the formation of the combined discharge low-temperature plasma [9917-21]</td>
</tr>
</tbody>
</table>

**SPECTROSCOPY**

<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>9917 2I</td>
<td>Research of spectral characteristics of ubiquinone solution and explore of the solvent effect on the experimental results [9917-1]</td>
</tr>
<tr>
<td>9917 2J</td>
<td>Luminescent solutions and powders of new samarium complexes with N,N',O,O'-chelating ligands [9917-124]</td>
</tr>
<tr>
<td>9917 2K</td>
<td>Optical method for controlling emissions of heavy metals of industrial enterprise [9917-32]</td>
</tr>
<tr>
<td>9917 2L</td>
<td>Using Raman scattering for water areas monitoring [9917-33]</td>
</tr>
<tr>
<td>9917 2M</td>
<td>An investigation of spectral characteristics of water-glucose solutions [9917-64]</td>
</tr>
<tr>
<td>9917 2N</td>
<td>Spectra-structure correlation in metalloporphyrins [9917-75]</td>
</tr>
<tr>
<td>9917 2O</td>
<td>The influence of boron doped nanodiamonds on hydrogen bonds in suspensions of protic solvents [9917-94]</td>
</tr>
<tr>
<td>9917 2P</td>
<td>Specific optical rotation indicatrices of chitosan films [9917-35]</td>
</tr>
<tr>
<td>9917 2Q</td>
<td>Optical activity of chitosan films with induced anisotropy [9917-133]</td>
</tr>
<tr>
<td>9917 2R</td>
<td>Optical properties of chitosan in aqueous solution of L- and D-ascorbic acids [9917-134]</td>
</tr>
<tr>
<td>9917 2S</td>
<td>Hyperfine splitting in the quasipotential approach [9917-17]</td>
</tr>
<tr>
<td>9917 2T</td>
<td>Research of the exotic atoms spectra using fine shift calculation method [9917-18]</td>
</tr>
<tr>
<td>Proc. of SPIE Vol. 9917  991701-9</td>
<td></td>
</tr>
<tr>
<td>-----------------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>LASER PHYSICS AND PHOTONICS</strong></td>
<td></td>
</tr>
<tr>
<td>9917 2U</td>
<td>Design of diffractive micro-patterns with weak wavelength dependence [9917-2]</td>
</tr>
<tr>
<td>9917 2V</td>
<td>Dynamics of long ring Raman fiber laser [9917-16]</td>
</tr>
<tr>
<td>9917 2W</td>
<td>Multistability and complex dynamics in coupled semiconductor lasers with time-delayed feedback [9917-22]</td>
</tr>
<tr>
<td>9917 2X</td>
<td>Glauber-Sudarshan P function in the model of a single-emitter laser generating in strong coupling regime [9917-34]</td>
</tr>
<tr>
<td>9917 2Y</td>
<td>Birefringence effects of short probe pulses of electromagnetically induced transparency [9917-39]</td>
</tr>
<tr>
<td>9917 2Z</td>
<td>On calculations of two-electron atoms in spheroidal coordinates mapping on hypersphere [9917-51]</td>
</tr>
<tr>
<td>9917 30</td>
<td>Distortion of THz substance spectrum by transparent disordered cover [9917-53]</td>
</tr>
<tr>
<td>9917 31</td>
<td>Relaxation of a three-level atom interacting with a thermostat and an external stochastic field [9917-72]</td>
</tr>
<tr>
<td>9917 32</td>
<td>The Fokker-Planck equation for relaxation of a system of two dipole-dipole interacting atoms [9917-73]</td>
</tr>
<tr>
<td>9917 33</td>
<td>Elongated optical bottle beams generated by composite binary axicons [9917-76]</td>
</tr>
<tr>
<td>9917 34</td>
<td>Extrapolation method to calculate the total polarizability of long-chain compounds on the example of single-wall carbon nanotubes [9917-81]</td>
</tr>
<tr>
<td>9917 35</td>
<td>Short pulse dynamics in a linear cavity fiber laser [9917-83]</td>
</tr>
<tr>
<td>9917 36</td>
<td>Behavior of asymmetric Bessel beam in focal plane of high numerical aperture objective [9917-85]</td>
</tr>
<tr>
<td>9917 37</td>
<td>Design of transmission bands in all-solid photonic bandgap fiber [9917-92]</td>
</tr>
<tr>
<td>9917 38</td>
<td>Entanglement between qubits interacting with thermal field [9917-93]</td>
</tr>
<tr>
<td>9917 39</td>
<td>Control atomic entanglement by the initial atomic coherence [9917-102]</td>
</tr>
<tr>
<td>9917 3A</td>
<td>Dynamics of three qubits interacting with electromagnetic field in a lossless cavity [9917-110]</td>
</tr>
<tr>
<td>9917 3B</td>
<td>Calculation of the maximal Lyapunov coefficient for the coherent dynamics of three-level atoms in an ideal cavity [9917-115]</td>
</tr>
<tr>
<td>9917 3C</td>
<td>The polarization-optical measuring method of linearity of radiant-power characteristic of the laser emission photodetectors [9917-118]</td>
</tr>
<tr>
<td>9917 3D</td>
<td>Laser forming of emitting structure of metal-porous cathodes [9917-131]</td>
</tr>
<tr>
<td>Proc. of SPIE Vol. 9917  991701-10</td>
<td></td>
</tr>
<tr>
<td>-----------------------------------</td>
<td></td>
</tr>
<tr>
<td>9917 3E Reflection and transmission on the finite thickness SiC-graphene slab of hyperbolic medium and the threshold conditions for THz generation [9917-132]</td>
<td></td>
</tr>
<tr>
<td>9917 3F The shortening of the laser pulses in a medium with reverse saturable absorption [9917-139]</td>
<td></td>
</tr>
<tr>
<td>9917 3G Evanescent wave sensors for mid-IR spectroscopy [9917-150]</td>
<td></td>
</tr>
<tr>
<td>9917 3H Generation of THz radiation in two-color fiber laser with frequency selection [9917-152]</td>
<td></td>
</tr>
<tr>
<td>9917 3I Analysis of plasmons and homogenization in a flat-layered photonic crystals and hyperbolic metamaterials [9917-154]</td>
<td></td>
</tr>
<tr>
<td>9917 3J Application of extended Kalman particle filter for dynamic interference fringe processing [9917-156]</td>
<td></td>
</tr>
</tbody>
</table>

**NONLINEAR DYNAMICS**

| 9917 3K Image denoising with the dual-tree complex wavelet transform [9917-7] |
| 9917 3L Characterizing chaotic dynamics from integrate-and-fire interspike intervals at the presence of noise [9917-8] |
| 9917 3M Noise-induced loss of multifractality in the dynamics of oscillating systems [9917-9] |
| 9917 3N Phase and frequency locking in the model of cardiovascular system baroreflexory regulation [9917-43] |
| 9917 3O Cluster synchronization of starlike networks with normalized Laplacian coupling: master stability function approach [9917-96] |
Authors

Numbers in the index correspond to the last two digits of the six-digit citation identifier (CID) article numbering system used in Proceedings of SPIE. The first four digits reflect the volume number. Base 36 numbering is employed for the last two digits and indicates the order of articles within the volume. Numbers start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B, 0C, 0D, etc.

Abdurashitov, Arkady S., 28
Agapov, Sergey N., 3B
Agranovich, Ilana, 0B
Alieva, Zamira O., 0C
Alonova, I. V., 10
Alonova, M. V., 2D
Althuler, Gregory B., 02
Aman, Alexander, 1M
Asadova, A. A., 2L
Astakhov, V., 2W
Atkin, Vsevolod S., 1L
Averchenko, Ekaterina, 3A
Baas, C. Marjolein, 29
Badarin, Artem A., 21
Baranov, E. V., 1D
Baranov, M. S., 3C
Bardina, M. S., 1D
Bashkatov, Alexey N., 08
Bashkirov, Eugene K., 38, 39, 3A
Belikov, Andrey V., 02, 0G, 0H
Berezhnaya, Elena, OK
Berezin, K. V., 2N
Bespalov, V. G., 0F
Bessonov, Dmitriy A., 3D
Blagov, E. V., 1O
Blushtein, Eugeny A., 1R
Bokarev, Andrey N., 2C, 34
Bondarenko, Sergei D., 1F
Borosova, Nataliya E., 2J
Borozdova, M. A., 0W
Boyko, Oleg A., 2S
Boyko, Natalya A., 25, 2T
Boyko, Natalya A., 25, 2T
Boyko, Natalya A., 25, 2T
Brezninski, Gerald, 1J
Brovkov, M. B., 2H
Bzhozovskiy, B. M., 2G, 2H
Bucharskaya, Alla B., 08, 0L, 1H
Budyak, Victoria V., 2Y
Budylin, Gleb B., 0V
Buldakov, Nikolay S., 1Y
Buldakova, Tatiana I., 1Y
Burashnikova, Marina M., 1G
Burlakov, Sergey A., 17
Burmistrova, Natalia A., 1A, 1B, 1F
Burygin, Gennady L., 1E
Bykova, E. V., 0L
Chebanenko, R. A., 3C
Chebotarevsky, Yury V., 3D
Cherkasova, Olga P., 06
Chebravrin, M. L., 2N
Chertov, Aleksandr N., 2M
Chevel, Kira A., 0R
Chuluunbaatar, O., 2Z
Chumakov, Aleksei S., 11, 1K
Chumakov, Danil S., 0C
Dana, Syamal K., 25
Danilina, Anna, 04
Danilova, Tatiana V., 2A
Davidovich, Mikhail V., 03
De Saeger, Sarah, 16
Degtyarev, Sergey A., 2U
Demidov, Valentin, 1S
Demenenko, Svetlana, 0K
Derbov, V. L., 2Z
Dikht, Nataliya I., 08
Dolenko, Sergey A., 17
Dolenko, Tatiana A., 17, 20
Dremin, Victor V., 0Y
Dudin, A. A., 1O
Dunaev, Andrey V., 0M, 0Y
Eganova, E. M., 01, 18
Ekimov, Evgeny A., 2O
Erykina, Elena I., 1U
Ermakov, A. V., 1I, 1K
Ermakov, Igor Yu., 2A
Ermolaev, Petr A., 3J
Evoshchenko, Marina A., 0V
Fadeev, Victor V., 0V, 13
Fedoseev, Maxim E., 1L
Fedosov, Ivan V., 0W, 1T, 1W
Finagina, Elena S., 1S
Fomin, A. V., 0N
Fomin, Aleksandr A., 1L, 1M, 1P, 1Q
Fomin, Marina A., 1L, 1M
Frolov, Nikita S., 2I
Galitskaya, Anna A., 0C
Galushka, Viktor V., 11, 12, 1G
Gar’kavenko, Victor V., 15
Gegel, Natalia O., 2Q
Gekaluyk, Artem, 0B
Gelfond, Mark L., 0H
Gelikonov, Grigory V., 1S
Gelikonov, Valentin M., 1S
Genina, Elina A., 07
Gerasimenko, A. Yu., 0I, 18
German, Sergey V., 1H
Gladkova, Natalya D., 1S
Gluhovskoy, Evgeny G., 1I, 1J, 1K
Conference Committee

Conference Chairs

Elina A. Genina, N.G. Chernyshevsky Saratov State University (Russian Federation)
Vladimir L. Derbov, N.G. Chernyshevsky Saratov State University (Russian Federation)
Dmitry E. Postnov, N.G. Chernyshevsky Saratov State University (Russian Federation)
Alexander B. Pravdin, Saratov State University (Russian Federation)
Kirill V. Larin, University of Houston (United States)
Igor V. Meglinski, University of Oulu (Finland)
Valery V. Tuchin, N.G. Chernyshevsky Saratov State University (Russian Federation), Tomsk State University (Russian Federation), IPMC RAS (Russian Federation)

Conference Co-chairs

Lev M. Babkov, N.G. Chernyshevsky Saratov State University (Russian Federation)
Kirill V. Berezin, N.G. Chernyshevsky Saratov State University (Russian Federation)
Nikolai G. Khlebtsov, IBPPM RAS, N.G. Chernyshevsky Saratov State University (Russian Federation)
Alexey N. Bashkatov, N.G. Chernyshevsky Saratov State University (Russian Federation), Tomsk State University (Russian Federation)
Ivan V. Fedosov, N.G. Chernyshevsky Saratov State University (Russian Federation)
Vadim S. Anishchenko, N.G. Chernyshevsky Saratov State University (Russian Federation)
Olga Glukhova, N.G. Chernyshevsky Saratov State University (Russian Federation)
Vyacheslav I. Kochubey, Saratov State University (Russian Federation)
Dmitry A. Zimnyakov, Saratov State Technical University (Russian Federation), IPMC RAS (Russian Federation)
Vladimir A. Makarov, M. V. Lomonosov Moscow State University (Russian Federation)
Timo Jääskeläinen, University of Eastern Finland (Finland)

Program Committee

Victor N. Bagratalishvili, Institute of Laser and Information Technology, RAS (Russian Federation)
Wei Chen, University of Central Oklahoma (United States)
Kishan Dholakia, University of St. Andrews (United Kingdom)
Paul M. W. French, Imperial College of Science, Technology and Medicine (United Kingdom)
James G. Fujimoto, Massachusetts Institute of Technology (United States)
Steven L. Jacques, Oregon Medical Laser Center (United States)
Sean J. Kirkpatrick, Michigan Technological University (United States)
Jürgen M. Lademann, Charité Universitätsmedizin Berlin (Germany)
Martin Leahy, National University of Ireland, Galway (Ireland) and Royal College of Surgeons in Ireland (Ireland)
Qingming Luo, Huazhong University of Science and Technology (China)
Risto Myllylä, Institute of Photonic Technology, Jena (Germany)
Alexander V. Priezzhev, M. V. Lomonosov Moscow State University (Russian Federation)
Lihong Wang, University of Washington in St. Louis (United States)
Ruikang K. Wang, University of Washington (United States)
Dan Zhu, Huazhong University of Science and Technology (China)
Alexander P. Kuznetsov, Saratov Division of Institute of Radio-Engineering of RAS (Russian Federation)
Leonid A. Melnikov, N.G. Chernyshevsky Saratov State University (Russian Federation)
Marian Marciniak, National Institute of Telecommunications (Poland)
Alexander P. Nizovtsev, The B.I. Stepanov Institute of Physics (Belarus)
Aleksey M. Zheltikov, M. V. Lomonosov Moscow State University (Russian Federation)
Vladimir P. Ryabukho, M. V. Lomonosov Moscow State University (Russian Federation), IPMC RAS (Russian Federation)
Alexander V. Gorokhov, Samara State University (Russian Federation)
Yuri V. Popov, M. V. Lomonosov Moscow State University (Russian Federation)
Bogos B. Joulakian, Université de Metz (France)
Serguei I. Vinitsky, Joint Institute for Nuclear Research, Dubna (Russian Federation)
Alexander B. Neiman, The Ohio University (United States)

Session Chairs

1. Plenary Session I
   Valery V. Tuchin, N.G. Chernyshevsky Saratov State University (Russian Federation), Tomsk State University (Russian Federation), IPMC RAS (Russian Federation)

2. Plenary Session II
   Juergen Popp, Leibniz Institute of Photonic Technology (Germany)
3 Plenary Session III
Aleš Lapanje, Institute of Metagenomics and Microbial Technologies, (Slovenia)

4 Plenary Session IV
Nicolás Pazos-Pérez, Centre Tecnologic de la Quimica de Catalunya, (Spain)

5 Plenary Session V
Alexey Yashchenok, Saratov State University (Russian Federation)

6 Plenary Session Internet Biophotonics
Valery V. Tuchin, N.G. Chernyshevsky Saratov State University (Russian Federation), Tomsk State University (Russian Federation)
IPMC RAS (Russian Federation)

7 Invited Lecture/Oral Session PALS I
Timo Jääskeläinen, University of Eastern Finland (Finland)
Valery V. Tuchin, N.G. Chernyshevsky Saratov State University (Russian Federation), Tomsk State University (Russian Federation)
IPMC RAS (Russian Federation)

8 Invited Lecture/Oral Session PALS II
Alexey Kamshilin, ITMO University (Russian Federation)

9 Invited Lecture/Oral Session PALS III
Elena Romanova, N.G. Chernyshevsky Saratov State University (Russian Federation)

10 Joint Invited Lecture/Oral Session Nanobiophotonics /PALS IV
Nikolai G. Khlebtsov, IBPPM RAS (Russian Federation), Saratov State University (Russian Federation)

11 Joint Invited Lecture/Oral Session Microscopy and Low-Coherence Methods/PALS V
Kirill V. Larin, The University of Houston (United States)

12 Invited Lecture/Oral Session Biophysics I
Valery V. Tuchin, N.G. Chernyshevsky Saratov State University (Russian Federation), Tomsk State University (Russian Federation)
IPMC RAS (Russian Federation)

13 Invited Lecture/Oral Session Biophysics II
Alexander Savitsky, A. N. Bach Institute of Biochemistry of RAS (Russian Federation)
Tatiana Novikova, LPICM, École Polytechnique, CNRS (France)
14 Joint Invited Lecture/Oral Session Biophysics III / PALS VI
Elina A. Genina, N.G. Chernyshevsky Saratov State University
(Russian Federation)

15 Oral Sessions Laser Physics and Photonics
Vladimir L. Derbov, N.G. Chernyshevsky Saratov State University
(Russian Federation)

16 Oral Sessions Computational Biophysics
Dmitry E. Postnov, N.G. Chernyshevsky Saratov State University
(Russian Federation)

17 Oral Sessions Biomedical Spectroscopy
Vyacheslav I. Kochubei, N.G. Chernyshevsky Saratov State University
(Russian Federation)
Alexander B. Pravdin, N.G. Chernyshevsky Saratov State University
(Russian Federation)

18 Oral Session Polarization
Dmitry A. Zimnyakov, N.G. Chernyshevsky Saratov State University
(Russian Federation)

19 Oral Session Low-Dimensional Structures
Olga Glukhova, N.G. Chernyshevsky Saratov State University
(Russian Federation)

20 Oral Session Spectroscopy
Kirill I. Berezin, N.G. Chernyshevsky Saratov State University
(Russian Federation)
Lev M. Babkov, N.G. Chernyshevsky Saratov State University
(Russian Federation)

21 Oral Session Nonlinear Dynamics
Vadim S. Anishchenko, N.G. Chernyshevsky Saratov State University
(Russian Federation)

22 Joint SFM/PALS Poster/Internet Session
Dmitry Agafonov, N.G. Chernyshevsky Saratov State University
(Russian Federation)
Ivan V. Fedosov, N.G. Chernyshevsky Saratov State University
(Russian Federation)
Introduction

The Third International Symposium on Optics and Biophotonics (Saratov Fall Meeting, or SFM15) and Seventh Finnish-Russian Photonics and Laser Symposium (PALS15) was held in Saratov, Russian Federation, 22-25 September 2015 with over 500 participants from the Russian Federation, United States, Canada, Europe, as well as Asian and Pacific Ocean countries. It covered a wide range of modern problems of fundamental and applied optics, laser physics, photonics, and biomedical optics.

In the framework of the Symposium, the Conferences and Workshops were organized as followed:

- **Optical Technologies in Biophysics & Medicine XVII**
  Elina A. Genina, Igor Meglinski, and Valery V. Tuchin, Chairs

- **Laser Physics and Photonics XVII**
  Vladimir L. Derbov, Chair

- **Spectroscopy and Molecular Modeling XVI**
  Lev M. Babkov and Kirill V. Berezin, Chairs

- **Nanobiophotonics XI**
  Nikolai G. Khlebtsov, Chair

- **Microscopic and Low-Coherence Methods in Biomedical and Non-Biomedical Applications VIII**
  Kirill Larin, Chair

- **Internet Biophotonics VIII**
  Alexey N. Bashkatov, Ivan V. Fedosov, and Valery V. Tuchin, Chairs

- **Nonlinear Dynamics VI**
  Vadim S. Anishchenko, Chair

- **Low-Dimensional Structures V**
  Olga Glukhova, Chair

- **Biomedical Spectroscopy II**
  Vyacheslav I. Kochubey and Alexander B. Pravdin, Chairs

- **Advanced Polarization Technologies in Biomedicine and Material Science II**
  Igor V. Meglinski and Dmitry A. Zimnyakov, Chairs

- **Computational Biophysics and Analysis of Biomedical Data II**
  Dmitry E. Postnov, Chair

PALS15 was an important event that attracted leading researchers in the field of photonics and laser physics from Finland and the Russian Federation. The invited lectures and oral and poster presentations were distributed in six major modules:
The main focus was the discussion of fundamentals and general approaches and descriptions of coherent, low-coherent, polarized, spatially and temporally modulated light interactions with inhomogeneous absorbing media, photonic crystals, optical biopsy, tissue phantoms, and optical properties of various tissues both in vitro and in vivo. Static and dynamic light scattering in tissues, Doppler, photo-acoustic and photo-thermal laser-tissue interactions, light induced mechanical stress, and photodynamic effects were also 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 discussed, as well as photonics of micro- and nanostructures. Since the use of almost every measurement method or imaging technique present computational issues, the relevant state-of-the-art approaches were discussed in the framework of a newly introduced conference on computational biophysics and data analysis.

SFM15 and PALS15 were organized in the following manner: morning plenary sessions, afternoon lectures and oral sessions, and then evening poster presentations and internet discussion. Attendees listened with great interest to the plenary lectures delivered by leading experts in urgent fields of optical and laser science, and then they engaged in discussions afterwards.

Plenary and invited lectures, oral, and poster presentations covered a wide area of tissue optics, spectroscopy and imaging, controlling of optical properties of tissues, and the biophysical and photo-chemical aspects of photo- and laser therapy.

The special features traditional of Saratov Fall Meetings are the Internet Sessions and one-day online discussions. In 2015, this Internet session included 2 plenary lectures, 24 invited lectures and 24 reports.

The papers by the participants from the United States, Russian Federation, Denmark, Germany, Netherland, Ireland, Italy, Finland, Poland, Israel, China, etc. (located at the meeting website: http://sfm.eventry.org/symposium2015/internet) were available during the meeting and will be available for a whole year until the next meeting.
It is a great pleasure and privilege for the editors to thank all of the authors for their contributions to the symposiums, especially to the Internet lecturers for their exciting presentations.

The organizers of SFM15 are grateful to all the sponsoring organizations and programs that efficiently supported this meeting, especially to:

- SPIE
- Optical Society of America (OSA)
- Russian Foundation for Basic Research
- SPE “Nanostructured Glass Technology” Ltd. (Russian Federation)
- RME “INJECT” LLC (Russian Federation)
- Russian Technology Platforms “The Medicine of the Future” and “Photonics”

PALS15 was organized by the International Laser Center of Lomonosov Moscow State University (Russian Federation), Saratov State University (Russian Federation), University of Oulu (Finland), University of Eastern Finland (Finland), and the Russian Academy of Sciences’ Institute of Biochemistry and Physiology of Plants and Microorganisms (Russian Federation), with the support of the European Optical Society.

Elina A. Genina
Vladimir L. Derbov
Dmitry E. Postnov
Alexander B. Pravdin
Kirill V. Larin
Igor V. Meglinski
Valery V. Tuchin
Conference Organizers

N.G. Chernyshevsky Saratov State University (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 (Russian Federation)
International Research-Educational Center of Optical Technologies for Industry and Medicine Photonics at Saratov State University (Russian Federation)
Institute of Biochemistry and Physiology of Plants and Microorganisms (Russian Federation)
Institute of Precision Mechanics and Control (Russian Federation)
V. I. Razumovsky Saratov State Medical University (Russian Federation)
Yuri Gagarin Saratov State Technical University (Russian Federation)
Volga Region Center of New Information Technologies (Russian Federation)
International Laser Center of Lomonosov Moscow State University (Russian Federation)
University of Oulu (Finland)
University of Eastern Finland (Finland)
SPIE Student Chapter of Saratov State University (Russian Federation)
OSA Student Chapter of Saratov State University (Russian Federation)
Saratov/Penza IEEE Chapter (Russian Federation)