

Saratov Fall Meeting 2017

Optical Technologies in Biophysics and Medicine XIX

Elina A. Genina
Irina Yu. Goryacheva
Valery V. Tuchin
Editors

26–30 September 2017
Saratov, Russian Federation

Sponsored by

Russian Foundation for Basic Research (Russian Federation) • Russian Academy of Sciences (Russian Federation) • SPIE • OSA—The Optical Society • IEEE – The Photonics Society • Russian Technology Platform “The Medicine of the Future” (Russian Federation) • Russian Technology Platform “Photonics” (Russian Federation) • European Technology Platform “Photonics21” • EPIC – European Photonics Industry Consortium • LLC SPE “Nanostructured Glass Technology” (Russian Federation) • RME “INJECT” LLC (Russian Federation)

Published by
SPIE

Volume 10716

Proceedings of SPIE, 1605-7422, V. 10716

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:

Author(s), "Title of Paper," in *Saratov Fall Meeting 2017: Optical Technologies in Biophysics and Medicine XIX*, edited by Elina A. Genina, Irina Yu. Goryacheva, Valery V. Tuchin, Proceedings of SPIE Vol. 10716 (SPIE, Bellingham, WA, 2018) Seven-digit Article CID Number.

ISSN: 1605-7422

ISSN: 2410-9045 (electronic)

ISBN: 9781510620018

ISBN: 9781510620025 (electronic)

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 © 2018, 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 1605-7422/18/\$18.00.

Printed in the United States of America Vm7 i ffUb '5ggc WJUH'gē bWZi bXYf'JW bgY 'Zca 'GD-9.

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 seven-digit CID article numbering system structured as follows:

- The first five 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

ix	<i>Authors</i>
xii	<i>Conference Committee</i>
xv	<i>Introduction</i>
xvii	<i>Organizers</i>

INVITED PAPERS

10716 02	Evaluation of photodynamic treatment efficiency on glioblastoma cells received from malignant lesions: initial studies (Invited Paper) [10716-56]
10716 03	Enhancement of fiber-optic low-coherence Fabry-Pérot interferometer with ZnO ALD films (Invited Paper) [10716-110]
10716 04	Model of optical phantoms thermal response upon irradiation with 975-nm dermatological laser (Invited Paper) [10716-199]
10716 05	Sapphire capillary interstitial irradiators for laser medicine (Invited Paper) [10716-189]
10716 06	Terahertz solid immersion microscopy for sub-wavelength-resolution imaging of biological objects and tissues (Invited Paper) [10716-59]

PHOTONICS FOR BIOMEDICAL APPLICATIONS

10716 07	Detection of immunological agent by optical fiber sensor: preliminary study [10716-30]
10716 08	Analysis of 3D OCT images for diagnosis of skin tumors [10716-7]
10716 09	An algorithm for improving the quality of structural images of turbid media in endoscopic optical coherence tomography [10716-96]
10716 0A	Color mapping of one specific velocity of a biological fluid flows with complex geometry using optical coherence tomography [10716-55]
10716 0B	An algorithm for localization of optical disturbances in turbid media using time-resolved diffuse optical tomography [10716-112]
10716 0C	Modeling of skin cancer dermatoscopy images [10716-45]
10716 0D	Comparative study of human blood Raman spectra and biochemical analysis of patients with cancer (Best Student Paper Award) [10716-104]

- 10716 OE **Analysis of albumin Raman scattering in visible and near-infrared ranges** [10716-197]
- 10716 OF **Structural features of blood lymphocytes according to data of atomic force microscopy in alloxan induced diabetic rats** [10716-105]
- 10716 OG **The study of the structural features of the lymphocytes from cattle with and without retroviral infection using atomic force microscopy** [10716-198]
- 10716 OH **Blood flow velocity measurements in chicken embryo vascular network via PIV approach** [10716-107]
- 10716 OI **Quantification of absolute blood velocity using LDA** [10716-195]
- 10716 OJ **Investigation of mixed saliva by optoelectronic methods** [10716-145]
- 10716 OK **Application of LASCA imaging for detection of disorders of blood microcirculation in chicken embryo, infected by *Chlamydia trachomatis*** [10716-52]
- 10716 OL **Development of principles of two-cascaded laser speckle-microscopy with implication to high-precision express diagnostics of chlamydial infection** [10716-64]
- 10716 OM **Application of virtual phase-shifting speckle-interferometry for detection of polymorphism in the *Chlamydia trachomatis omp1* gene** [10716-78]
- 10716 ON **Application of laser scanning speckle-microscopy for high-resolution express diagnostics of chlamydial infection** [10716-79]
- 10716 OO **Detection of the presence of *Chlamydia trachomatis* bacteria using diffusing wave spectroscopy with a small number of scatterers** [10716-62]
- 10716 OP **Using of dynamic speckled speckles with a small number of scatterers for study of suspension of *Chlamydia*** [10716-126]
- 10716 OQ **Optimization of algorithm of coding of genetic information of *Chlamydia*** [10716-69]
- 10716 OR **Features of the temperature response to a double cuff-occlusion of the upper limbs: remote ischemic preconditioning aspect** [10716-47]
- 10716 OS **In vitro terahertz spectroscopy of gelatin-embedded human brain tumors: a pilot study** [10716-187]
- 10716 OT **Microwave reflection, transmission, and absorption by human brain tissue** [10716-58]
- 10716 OU **Reduction of intoxication in the rats with transplanted tumors under the influence of *Gratiola officinalis* L. extract** [10716-167]
- 10716 OV **Influence UHF radiation on the process of self-assembly and lethal effect of bacterial lipopolysaccharide** [10716-50]

LASERS IN BIOMEDICINE

- 10716 0W **Investigation of optical and hydrodynamic processes initiated in biological tissues and liquids under the action of high-power pulses of 1.54- μ m laser radiation** [10716-16]
- 10716 0X **Er:YLF-laser microperforation of the nail plate for drug delivery** [10716-21]
- 10716 0Y **Histological examination of the oral mucosa after fractional diode laser irradiation with different power and pulse duration** [10716-23]
- 10716 0Z **Investigation of change of tumor optical properties after laser-induced plasmon-resonant photothermal treatment of transplanted tumors in rats** [10716-161]
- 10716 10 **Method for biological tissue temperature measuring in the area of laser radiation exposure with a small size beam profile during laser welding** [10716-190]
- 10716 11 **Bleaching of tattooed skin phantoms by series of laser shots** [10716-5]
- 10716 12 **Bacteriostatic influence of red laser light on the growth of *Staphylococcus aureus* and photodynamic enhancement of this effect with Photoditazine** [10716-51]
- 10716 13 **Optoelectronic tweezers based smart sweeper for cells/micro-particles sorting** [10716-200]

NANOBIOTECHNOLOGY

- 10716 14 **Nitrogen-doped diamond thin films: potential application in Fabry-Pérot interferometer** [10716-57]
- 10716 15 **Sapphire shaped crystals for laser-assisted cryodestruction of biological tissues** [10716-12]
- 10716 16 **Investigation of the interaction of ferromagnetic fluids with proteins by dynamic light scattering** [10716-66]
- 10716 17 **Cytotoxicity evaluation of gold nanoparticles on microalga *Dunaliella salina* in microplate test system** [10716-81]
- 10716 18 **Colloidal suspensions in external rotating electric field: experimental studies and prospective applications in physics, material science, and biomedicine** [10716-124]
- 10716 19 **Noninvasive control of rhodamine-loaded capsules distribution in vivo** [10716-179]
- 10716 1A **Monitoring of copper nanoparticle penetration into dentin of human tooth in vitro** [10716-191]
- 10716 1B **Multifunctional upconversion nanoparticles based on NaYGdF₄ for laser induced heating, non-contact temperature sensing and controlled hyperthermia with use of pulsed periodic laser excitation** [10716-46]
- 10716 1C **Experimental modeling of local laser hyperthermia using thermosensitive nanoparticles absorbing in NIR** [10716-20]

10716 1D	Layer-by-layer polyelectrolyte coating for surface-enhanced Raman scattering on gold nanostars inside hollow core photonic crystal fibers [10716-31]
10716 1E	SERS of Methylene Blue induced by plasmonic coupled nanoparticle arrays [10716-98]
10716 1F	Macroscopic monolayer of plasmon coupled gold nanoparticles on mirror for fluorescence enhancement [10716-102]
10716 1G	Effects of post-synthesis nanocrystals treatment on the luminescence of cadmium-free quantum dots [10716-119]
10716 1H	Numerical modeling and analytical evaluation of light absorption by gold nanostars [10716-194]
10716 1I	Investigation of spectral characteristics of tunnel photodiodes based on DLC nanofilms [10716-132]
10716 1J	Modeling the electrostatic field localization in nanostructures based on DLC films using the tunneling microscopy methods [10716-140]
10716 1K	On stabilization of field emission and increase in the current density of planar nanostructures with DLC films [10716-159]

SYNTHESIS AND APPLICATION OF LOW-DIMENSIONAL STRUCTURES

10716 1L	Morphology and microhardness of TiC coatings on titanium treated with high-frequency currents [10716-1]
10716 1M	Modification of the surface of metal products with carbide coatings by electrospark alloying [10716-2]
10716 1N	Microstructure and hardness of carbon and tool steel quenched with high-frequency currents [10716-6]
10716 1O	Submicrometric structure of superhard oxide coatings on the surface of refractory metals treated with high-frequency currents [10716-9]
10716 1P	The structure of Ti-Ta welded joint and microhardness distribution over the cross section [10716-10]
10716 1Q	Theoretical prediction of the energy stability of graphene nanoblister [10716-158]
10716 1R	Application of carbon nanoclusters in electronics [10716-19]
10716 1S	Effect of spatial restriction on the photoluminescent properties of carbon nanomaterials [10716-131]
10716 1T	One-step microwave synthesis of photoluminescent carbon nanoparticles from sodium dextran sulfate water solution [10716-48]
10716 1U	Optical properties of porous polylactide scaffolds [10716-97]

- 10716 1V **Application of microstructural optical waveguides with hollow core for enzyme immunoassay** [10716-53]
- 10716 1W **Modification of polyelectrolyte microcapsules into a container for the low molecular weight compounds** [10716-84]
- 10716 1X **Evidence of the layer structure formation of chitosan microtubes by the Liesegang ring mechanism** [10716-114]
- 10716 1Y **Investigation of the surface morphology of biocompatible chitosan-based hydrogels and xerogels** [10716-123]

SPECTROSCOPY AND MOLECULAR MODELING

- 10716 1Z **Spectroscopic analysis of the powdery complex chitosan-iodine** [10716-101]
- 10716 20 **Solid-state surface luminescence of polycyclic aromatic hydrocarbons adsorbed on cellulose diacetate matrices** [10716-90]
- 10716 21 **The changes in the electronic spectra of ascorbic acid induced by laser radiation** [10716-85]
- 10716 22 **Influence of polarity of solvents on IR absorption and Raman spectra of ascorbic acid** [10716-86]
- 10716 23 **Influence of bending of monoatomic copper chains with 10 and 22 atoms on their absorbance spectra: TD-DFT calculations** [10716-128]
- 10716 24 **Molecular modeling of the process of reversible dissolution of the collagen protein under the action of tissue-clearing agents** [10716-43]
- 10716 25 **FT-IR spectrum of grape seed oil and quantum models of fatty acids triglycerides** [10716-188]