Saratov Fall Meeting 2020

Optical and Nanotechnologies for Biology and Medicine

Valery V. Tuchin Elina A. Genina Editors

29 September – 2 October 2020 Saratov, Russian Federation

Sponsored by

Russian Foundation for Basic Research (Russian Federation) • Ministry of Science and Higher Education of the Russian Federation • Saratov State University (Russian Federation) • Russian Academy of Sciences (Russian Federation) • OSA – The Optical Society • IEEE – Institute of Electrical and Electronics Engineers • Russian Technology Platform "The Medicine of the Future" (Russian Federation) • Russian Technology Platform "Photonics" (Russian Federation) • European Technology Platform "Photonics21" • Samara University (Russian Federation) • INJECT RME LLC, Saratov (Russian Federation) • LLC SPE Nanostructured Glass Technology, Saratov (Russian Federation) • Becker & Hickl GmbH (Germany) • artphotonics GmbH (Germany) • Research Center of Biotechnology RAS (Russian Federation) • Technolnfo Ltd. (Russian Federation) • MR Solutions (United Kingdom) • PicoQuant (Germany) • InterLabService Ltd. (Russian Federation) • BioLine Group (Russian Federation) • Aspect Imaging Ltd. (Israel) • Journal of Innovative Optical Health Sciences (China) • Journal PHOTONICS RUSSIA (Russian Federation)

Cooperating Organizations

Russian Society for Photobiology (Russian Federation) • Saratov Science Center of the RAS (Russian Federation) • Biophotonics. World: The Worldwide Consortium Biophotonics4Life • EPIC – European Photonics Industry Consortium

Technical Cosponsor and Publisher SPIE

Volume 11845

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 2020: Optical and Nanotechnologies for Biology and Medicine, edited by Valery V. Tuchin, Elina A. Genina, Proc. of SPIE 11845, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 1605-7422

ISSN: 2410-9045 (electronic)

ISBN: 9781510645288

ISBN: 9781510645295 (electronic)

Published by

SPIF

P.O. Box 10, Bellingham, Washington 98227-0010 USA Telephone +1 360 676 3290 (Pacific Time) SPIE.org

Copyright © 2021 Society of Photo-Optical Instrumentation Engineers (SPIE).

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 fees. To obtain permission to use and share articles in this volume, visit Copyright Clearance Center 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.

Printed in the United States of America by Curran Associates, Inc., under license from SPIE.

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



Paper Numbering: A unique citation identifier (CID) number is assigned to each article in the Proceedings of SPIE 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

vii Conference Organizers

INVITED PAPERS

	INVIIED PAPERS
11845 02	Autofluorescence detection of lower tract gastrointestinal neoplasia (Invited Paper) [11845-25]
11845 03	Relaxation and osmotic-induced slow strain mapping in biological tissues by optical coherence elastography (Invited Paper) [11845-38]
11845 04	Cross-checking the effect of roughness on the stability of photoacoustic conversion from gold nanorods (Invited Paper) [11845-36]
11845 05	Multiparameter optical methods and instruments for the diagnostics of human body microcirculatory-tissue systems (Invited Paper) [11845-48]
11845 06	Metabolism of stem cell grown on heterogeneous tissue-engineered scaffolds (Invited Paper) [11845-22]
11845 07	Ultrasonic modes to improve the optical clearing of the skin ex vivo (Invited Paper) [11845-23]
11845 08	The assessment of tumor vascularization degree for predicting the effectiveness of plasmonic photothermal and photodynamic therapy (Invited Paper) [11845-28]
	OPTICAL TECHNOLOGIES IN MICROBIOLOGY, BIOLOGY, AND MEDICINE
11845 09	OPTICAL TECHNOLOGIES IN MICROBIOLOGY, BIOLOGY, AND MEDICINE Application of digital speckle patterns correlation for blood clotting time evaluation [11845-5]
11845 09 11845 0A	
	Application of digital speckle patterns correlation for blood clotting time evaluation [11845-5] Study of properties of virtual laser GB-speckles, generated on nucleotide sequences of the
11845 0A	Application of digital speckle patterns correlation for blood clotting time evaluation [11845-5] Study of properties of virtual laser GB-speckles, generated on nucleotide sequences of the SARS-CoV-2 gene "N" [11845-9] Differentiation of Highly Pathogenic Avian Influenza Virus (HPAIV) A strains using of GB-
11845 0A 11845 0B	Application of digital speckle patterns correlation for blood clotting time evaluation [11845-5] Study of properties of virtual laser GB-speckles, generated on nucleotide sequences of the SARS-CoV-2 gene "N" [11845-9] Differentiation of Highly Pathogenic Avian Influenza Virus (HPAIV) A strains using of GB-speckles, generated for the nucleotide sequences of the neuraminidase gene [11845-10] The GB-speckles generated for the gene pgp4 as the promising model towards to

11845 OF	Red-colored water in the supralittoral zone of the Alaid Volcano: long-term spectroscopic observations [11845-43]
11845 0G	Optical properties of humic substances in the coastal waters of the White Sea based on the results of 2020 expeditions [11845-60]
11845 OH	Fluorescence of chlorosomal bacteriochlorophylls extracted by organic solvents applied for pigment quantification in natural water samples [11845-61]
11845 OI	Luminescent and physiological indices of potato after the treatment of tubers with growth regulators [11845-57]
11845 OJ	Excitation-dependent emission spectra of fungal fluorophores in terms of their similarity to fluorescence of dissolved organic matter [11845-59]
11845 OK	NADH growth rate evaluation in different rat brain regions by fluorescence spectroscopy [11845-44]
11845 OL	Measurements of mitochondrial NADH pool and NADH production rate in acute brain slices and primary cell cultures using live cell imaging [11845-45]
11845 OM	Impact of ex vivo skin dehydration on collimated transmittance spectra kinetics [11845-26]
11845 ON	A method for evaluation of absolute and relative blood flow velocities in soft biological tissues using optical coherence tomography [11845-30]
11845 0O	Evaluation of geometric characteristics and internal structure of atherosclerotic plaques on the walls of the blood vessels and their phantoms using intravascular optical coherence tomography [11845-31]
11845 OP	Tissue-like phantoms mimicking blood vessel for intravascular optical coherence tomography [11845-33]
11845 OQ	Quality control of tablets "Papazol" by spectrophotometry using chemometrics [11845-39]
11845 OR	Spectral analysis of human exhaled breath for early diagnosis of diseases using different machine learning methods [11845-54]
11845 OS	Experimental setup and method for human breath analysis for the primary diagnosis of diseases [11845-63]
11845 OT	Application of terahertz pulsed spectroscopy for analysis of ex vivo biological tissue freezing [11845-58]
11845 OU	Simulation of the effect of purulent content of the maxillary sinuses on the transillumination signal [11845-62]
11845 OV	Determination of the binary diffusion coefficient of an iodine-glycerol preparation (Lugol) in the dentin of a human tooth [11845-65]

11845 OW	Improved optical access of laser radiation to the brain using optical clearing and transparent cranial implants: review [11845-71]
11845 OX	Some steps in the development of an immunochromatographic test to quantify cortisol in human salivary fluid [11845-6]
	LASER APPLICATIONS IN THERAPY AND SURGERY
11845 OY	Combined laser therapy for the treatment of psoriasis [11845-21]
11845 OZ	Optical properties of model cholangiocarcinoma tissues in the spectral range of 350-2250 nm in laser photothermolysis treatment [11845-29]
11845 10	Optics and thermodynamics of titanium-containing optothermal fiber converter and vein wall during endovasal laser coagulation [11845-34]
	MICRO- AND NANOBIOTECHNOLOGY
11845 11	Petal-like gap-enhanced Raman tags with a controllable structure [11845-8]
11845 12	The potential of gold nanoparticles for coronavirus diagnosis and prophylaxis [11845-40]
11845 13	Core type as a factor of gap-enhanced Raman tags SERS response [11845-27]
11845 14	Luminescent carbon nanostructures as a 'green' nanosensor for detection of heavy metal ions [11845-41]
11845 15	Glauconite-based antibacterial composites with copper nanoparticles [11845-37]
11845 16	Is it possible to reuse growth cetyltrimethylammonium bromide solution of gold nanorods? [11845-47]
11845 17	2-mercaptoethanol and dihydrolipoic acid biligand-coated alloyed quantum dots [11845-53]
11845 18	Synthesis and size-exclusion fractionation of luminescent carbon nanostructures [11845-19]
11845 19	A theoretical model for the delivery of magnetic nanoparticles through a blood vessel under the influence of a magnetic field [11845-50]
11845 1A	Non-coherent video-reflectometry of growing pores in plasticized polymers during supercritical fluidic foaming [11845-17]
11845 1B	Image processing procedures for quantification of bubble germ growth/collapse in synthesized highly-porous polymer matrices [11845-18]

ELECTROMAGNETICS OF MICROWAVES, SUBMILLIMETER, AND OPTICAL WAVES

11845 1C	Influence of induction chemical-thermal treatment in a gaseous medium on the formation of a wear-resistant gradient nitride layer on tool steel [11845-42]
11845 1D	Researching of the structural and morphological characteristics of coatings based on metal-containing calcium phosphates [11845-49]
11845 1E	Influence of induction treatment on the steel-titanium layered structure to obtain a highly hard working titanium-oxide surface [11845-66]
11845 1F	Numerical simulation of induction vacuum deposition of titanium on steel plates [11845-67]
11845 1G	Optical magnet for nanoparticles manipulations based on optical vacuum cleaner concept [11845-68]
11845 1H	Influence of the geometry and current of the inductor on the process of chemical heat treatment of titanium in a container with a carbon-containing medium [11845-69]
11845 11	Evaluation of low-coherence interference fringe parameters by the adaptive Wiener filtering method [11845-52]
11845 1J	Influence of a low-intensity electromagnetic field on the process of self-assembly of the core histones H3.2 and H4 [11845-20]
11845 1K	Hollow core microstructured optical fibers as support for synthesis of molecularly imprinted polymers [11845-24]