PROCEEDINGS OF SPIE

Saratov Fall Meeting 2009

International School for Junior Scientists and Students on Optics, Laser Physics, and Biophotonics

Valery V. Tuchin
Elina A. Genina
Editors

21–24 September 2009
Saratov, Russian Federation

Organized by
Saratov State University (Russian Federation) • Institute of Precision Mechanics & Control, RAS (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) (Russia 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)

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Published by
SPIE

Volume 7547

Proceedings of SPIE, 0277-786X, v. 7547

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 2009: International School for Junior Scientists and Students on Optics, Laser Physics, and Biophotonics*, edited by Valery V. Tuchin, Elina A. Genina, Proceedings of SPIE Vol. 7547 (SPIE, Bellingham, WA, 2010) Article CID Number.

ISSN 0277-786X
ISBN 9780819479433

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

Printed in the United States of America.

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

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Introduction

The Annual International Multidisciplinary School for Junior Scientists and Students on Optics, Laser Physics, and Biophotonics (Saratov Fall Meeting (SFM-09)) was held 21–24 September 2009 in Saratov, Russia, with about 500 participants from Russia, USA, Europe, and Asia. The meeting covered a wide range of modern problems of fundamental and applied optics, laser physics, photonics, and biomedical optics. SFM-09 also contained 12 international workshops:

- Optical Technologies in Biophysics & Medicine XI (Valery V. Tuchin, Chair)
- Laser Physics and Photonics XI (Vladimir L. Derbov, Chair)
- Coherent Optics of Ordered and Random Media X (Dmitry A. Zimnyakov, Chair)
- Spectroscopy and Molecular Modeling X (Valentin I. Berezin and Lev M. Babkov, Cochairs)
- Modern Optics VIII (Vladimir P. Ryabukho, Chair)
- English as a Communicative Tool in the Scientific Community VIII (Alexander B. Pravdin and Svetlana V. Eremina, Cochairs)
- Management of High Technologies Commercialization and Regional Innovation Systems VI (Valery V. Tuchin and Julia S. Skibina, Cochairs)
- Luminescence V (Vyacheslav I. Kochubey and Sergey N. Shtykov, Chairs)
- Nanostructures and Nanoparticles: Fabrication, Properties, and Applications V (Nikolai G. Khlebtsov, Chair)
- Microscopic and Low-Coherence Methods in Biomedical and Non-Biomedical Applications II (Kirill V. Larin, Chair)
- History, Methodology and Philosophy of the Optical Education II (Vladimir P. Ryabukho and Boris A. Medvedev, Cochairs)
- Internet Biophotonics II (Valery V. Tuchin, Chair).

SFM-09 also featured a seminar on Telemedicine: Opportunities, Applications, Prospects IV (Irina L. Maksimova and Elena V. Karchenova, Cochairs).

The main goal of the School, Workshops, and Seminars is to involve young researchers and students in the field of 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. A main focus was on the discussion of fundamentals and general approaches to 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. A 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.

SFM-09 was organized into morning plenary sessions, afternoon lecture and oral sessions, evening poster presentations, and Internet discussion. The original oral reports and posters were presented by junior scientists and students. Plenary lectures were received with great interest and discussion from the audience.

Plenary and Invited lectures, and oral and poster presentations covered a wide range 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. Outside this SPIE Proceedings volume, a few special issues and sections will be published in well-recognized peer-reviewed journals, such as *Optics & Spectroscopy*, *Journal of Biophotonics*, and the *Journal of Innovative Optical Health Sciences*.

An SPIE short course for students, engineers, scientists, and clinicians, "Biophotonics in Microcirculation Imaging," by Dr. Martin J. Leahy, University of Limerick, Ireland, accompanied the conference. The course had more than 50 in attendance, mostly students, and was organized by Saratov University's SPIE Student Chapter and supported by SPIE and Saratov State University.

A unique element of the Saratov Fall Meetings is its Internet Workshop and one-day online discussion. In 2009, this session included the following plenary lectures: "Single scattering, multiple scattering, and radiative transfer: an introduction," by Michael Mishchenko, NASA Goddard Institute for Space Studies, New York, USA; "New developments in tissue polarimetry," by Alex Vitkin, Ontario Cancer Institute and Department of Medical Biophysics, University of Toronto, Toronto, Canada; "Cancer margin delineation by autofluorescence imaging under conditions of laser surgery," by Alexandre Douplik, Erlangen Graduate School in Advanced Optical Technologies, Friedrich-Alexander University, Erlangen, Germany; "Optoelectronic neuroimaging approaches," by Qingming Luo, Britton Chance Center for Biomedical Photonics, Huazhong University of Science and Technology, Wuhan, P.R. China; and "Simplified light transport model for rapid spectral analysis," by Steven L. Jacques, Oregon Health & Science University, Portland, Oregon, USA.

Participants from USA, Russia, Austria, Australia, Bulgaria, Canada, Finland, Germany, Ireland, United Kingdom, Slovakia, Canada, China, Portugal, Italy, Japan, Ukraine, Belarus, Switzerland, Denmark, Spain, Singapore, the Netherlands, Poland, India and other countries have located their papers on the meeting website: http://optics.sgu.ru/SFM/, which was available during the meeting and will be available for an entire year until the next meeting. A three-hour online Internet discussion of all Internet session papers was moderated by Alexander Priezzhev.

The majority of the papers in this volume are the result of collaboration between research groups from different countries supported by international scientific programs such as CRDF, PHOTONICS4LIFE, and others. A major part of the volume includes papers presented in the Workshop "Optical Technologies in Biophysics and Medicine XI," however, a few papers presented in the Workshops "Laser Physics and Photonics XI," "Coherent Optics of Ordered and Random Media X," "Microscopic and Low-Coherence Methods in Biomedical and Non-Biomedical Applications II," "Management of High Technologies Commercialization and Regional Innovation Systems," and "Internet Biophotonics II," are also published in the volume.

It is great pleasure and privilege for us to thank all of the authors for their contributions to SFM-09, especially to Internet lecturers for their exciting presentations, and to Alexander Priezzhev, who has presided over of the Internet sessions for the last 10 years, for his talent and impressive moderation.

The organizers of SFM-09 are grateful to all of the sponsoring organizations and programs that supported this meeting very effectively, especially to: SPIE; Russian Foundation for Basic Research; U.S. Civilian Research & Development Foundation for the Independent States of the Former Soviet Union (CRDF); Volga Region Center of New Information Technologies SPE "Nanostructed Glass Technology" Ltd. (Russia), and SPE "Erudit" Ltd. (Russia).

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