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Valery V. Tuchin

Elina A. Genina

Editors

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Introduction

The Annual International Multidisciplinary School for Young Scientists and Students on Optics, Laser Physics and Biophotonics (Saratov Fall Meeting (SFM-10)) was held 5–8 October 2010 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-10 also contained 13 international workshops:

- Optical Technologies in Biophysics & Medicine XII
Valery V. Tuchin, Chair
- Laser Physics and Photonics XII
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- Coherent Optics of Ordered and Random Media XI
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SFM-10 also featured a seminar on Telemedicine: Opportunities, Applications, Prospects IV (Irina L. Maksimova and Elena V. Karchenova, chairs) and a Special Internet Session of European Network of Excellence for Biophotonics WP 5: Software for Modeling and Data Analysis in Biophotonics (Valery V. Tuchin and Mark Neil, chairs).

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. The main attention was paid to discussion of fundamentals and general approaches of 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.

SFM-10 was organized as the morning plenary sessions, afternoon lecture and oral sessions and evening poster presentations and internet discussion. The original oral reports and posters were presented by the junior scientists and students. Plenary lectures were listened to with a great interest and discussed by 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 Proceedings of SPIE volume, a few special issues and sections of well-recognized peer-reviewed journals, such as *Quantum Electronics*, *Journal of Biophotonics*, and *Journal of Innovative Optical Health Sciences*, will be published.

The SPIE/OSA short courses for students, engineers, scientists, and clinicians "Tissue Optics" by Prof. Steven L. Jacques, Oregon Health & Science University (USA) and "OCT, Polarization and Dynamic Light Scattering Techniques in Biophotonics" by Prof. Johannes F. de Boer, Vrije Universiteit (The Netherlands) and Massachusetts General Hospital (USA), accompanied the conference. There were 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 specificity of Saratov Fall Meetings is Internet Workshop and one-day on-line discussion. In 2010, this session included the following plenary lectures: "Optical imaging for the study and early detection of cancer" by Jennifer Barton, The University of Arizona, USA; "Photoacoustic tomography: breaking through the optical diffusion limit" by Lihong V. Wang, Washington University in St. Louis, USA; "Biophotonics opportunities and challenges in point-of-care medicine" by Dennis L. Matthews, School of Medicine, NSF Center for Biophotonics, Cancer Center, UC Davis and LLNL, USA; "Nonlinear morphofunctional imaging of tissues" by Francesco Pavone, European Laboratory for Nonlinear Spectroscopy and

Department of Physics, Italy; "Global networking in eHealth one event – one society: Linking eHealth professionals worldwide" by Frank Lievens, International Society for Telemedicine & eHealth, Switzerland & Med-e-Tel, Belgium and Malina Mitkova Jordanova, Space and Solar-Terrestrial Influences Institute, Bulgarian Academy of Sciences & Med-e-Tel, Sofia, Bulgaria.

Participants from USA, Russia, Austria, Australia, Bulgaria, Canada, Finland, Germany, Ireland, UK, Canada, China, Italy, Japan, Ukraine, Belarus, Switzerland, Spain, Singapore, the Netherlands, Poland, New Zealand 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 a whole year up to the next meeting. Three-hour on-line Internet discussion of all presented on Internet session papers via chat moderated by Alexander Priezzhev was held.

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

The major part of this volume includes papers presented on the Workshop "Optical Technologies in Biophysics and Medicine XII," however, a few papers presented on the Workshops "Management of High Technologies Commercialization and Regional Innovation Systems VII" and "Internet Biophotonics III" are also published in the volume.

It is a great pleasure and privilege for the editors to thank all of the authors for their contributions to SFM-10, especially to Internet lecturers for their exciting presentations, and to Alexander Priezzhev, who was a moderator of Internet sessions last 10 years, for his talent and impressive moderation.

The organizers of SFM-10 are grateful to all of the sponsoring organizations and programs that supported this meeting very effectively, 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); RF Program on the Development of High School Potential (Project №2.2.1.1/2950, 2009-2011); and Volga Region Center of New Information Technologies.

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