

*Saratov Fall Meeting 2007*

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# ***Optical Technologies in Biophysics and Medicine IX***

**Valery V. Tuchin**

*Editor*

**25–28 September 2007**

**Saratov, Russia**

*Organized by*

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## Introduction

The Annual International Multidisciplinary School for Young Scientists and Students on Optics, Laser Physics and Biophysics XI (Saratov Fall Meeting (SFM-07)) was held in Saratov, Russia, 25–28 September, 2007 with about 600 participants from Russia, FSU countries, USA, Canada, Europe, and Asia. The meeting covered a wide range of modern problems in fundamental and applied optics, laser physics, photonics, and biomedical optics.

SFM-07 also contained 11 International Workshops and Seminars:

- **Optical Technologies in Biophysics and Medicine IX** (Valery V. Tuchin, Chair)
- **Coherent Optics of Ordered and Random Media VIII** (Dmitry A. Zimnykov, Chair)
- **Laser Physics and Photonics IX** (Leonid A. Melnikov and Vladimir L. Derbov, Chairs)
- **Spectroscopy and Molecular Modeling VIII** (Valentin I. Berezin, Lev M. Babkov, and Michael D. Elkin, Chairs)
- **Electromagnetics of Microwaves, Submillimeter and Optical Waves V** (Michael V. Davidovich, Chair)
- **English as a Communicative Tool in the Scientific Community V** (Vladimir L. Derbov, Svetlana V. Eremina, and Alexander B. Pravdin, Chairs)
- **Management of High Technologies Commercialization and Regional Innovation Systems IV** (Valery V. Tuchin, Chair)
- **Luminescence III** (Vyacheslav I. Kochubey and Sergey N. Shtykov, Chairs)
- **Nanostructures and Nanoparticles: Fabrication, Properties, and Applications III** (Nikolai G. Khlebtsov, Chair)
- **Telemedicine: Opportunities, Applications, Prospects II** (Irina L. Maksimova, Elena V. Karchenova, Chairs)
- **Modern Optics for Secondary School VI** (Vladimir P. Ryabukho, Chair)

The main organizers of the Saratov Fall Meeting 2007 were Saratov State University (SSU), Research-Educational Institute of Optics and Biophotonics at SSU, Institute of Precision Mechanics and Control of the Russian Academy of Sciences, Research-Educational Center of Nonlinear Dynamics and Biophysics of CRDF and Ministry of Education and Science RF (REC-006), and International Research-Educational Center of Optical Technologies for Industry and Medicine "Photonics" at SSU, National Russian Program of Innovative Universities.

The main goal of the School, Workshops, and Seminars is to involve young researches 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-07 was organized with morning plenary sessions, afternoon lecture and oral sessions, and evening poster presentations. The original oral reports and posters were presented by junior scientists and students. Plenary lectures were received with great interest and were followed by 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 *Quantum Electronics*, *Journal of Applied Nonlinear Dynamics*, and Physical series of *News of Saratov University*.

An SPIE short course for students, engineers, scientists, and clinicians, "The effects of tissue on light – an introduction to optical diagnostics in medicine," by Dr. Alex Vitkin, University of Toronto, Canada, accompanied the conference. The course had more than 30 attendees, mostly students, and was organized by Saratov State University SPIE Student Chapter, and was supported by SPIE and Saratov State University.

A unique element of the Saratov Fall Meetings is its one-day Internet Session. In 2007 this session included the following plenary lectures: "High-resolution photoacoustic tomography" by Lihong V. Wang, Washington University in St. Louis, St. Louis, USA; "New generation ultrathin all-fiber-optic endomicroscopy and molecular bio-nanophotonics" by Xingde Li, Department of Bioengineering, University of Washington, Seattle, USA; and "A new light on the biosciences" by Kishan Dholakia, School of Physics and Astronomy, University of St. Andrews, St. Andrews, United Kingdom.

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 posted 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 on-line Internet discussion of all the Internet Session papers was moderated by Alexander Priezhev. One of the Internet papers is published in this proceedings volume.

The majority of the papers in this volume include papers presented on the Workshop "Optical Technologies in Biophysics and Medicine IX" However, a few papers presented in the Workshops "Management of High Technologies Commercialization IV" and "Telemedicine: Opportunities, Applications, Prospects II" are also published in the volume. A great number of the presented papers were the results of collaborations between research groups from different countries, supported by international scientific programs such as CRDF, INTAS, Royal Society, and others.

This is a great pleasure and privilege for me to thank all of the authors for their contributions to SFM-07, especially the Internet lecturers for their exciting presentations. Great thanks go to Alexander Priezzhev, who has contributed his talent and impressive moderation to the Internet Sessions for the last ten years.

The organizers of SFM-07 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), grant REC-006 and mini-grant for Conference support; and Volga Region Center of New Information Technologies.

I would like to thank SPIE Student Services for their support of the Conference education program, and Elina Genina and Ivan Fedosov for their help in preparation of the manuscripts.

**Valery V. Tuchin**

