

Conference

“Towards optical and multimodal translation imaging”

Chair: **Alexander G. Gabibov**, IBCh RAS, Moscow, Russia

Co-chairs: **Alexei A. Bogdanov Jr.**, University of Massachusetts Medical School, Worcester MA, USA

Valery V. Tuchin, Saratov State University, Russia,

Secretary: **Victoria Zherdeva**, FRC of Biotechnology of the RAS

International Program Committee: Alexei A. Bogdanov, Jr. (UMASS, Worcester, MA), Alexander G. Gabibov (IBCh RAS, Moscow, Russia), Alexander V. Kabanov (UNC, Chapel Hill, NC), Anand T.N. Kumar (MGH, Charlestown, MA)

Konstantin A. Lukyanov (IBCh RAS, Moscow, Russia), Leonid B. Margolis (NICHD, Bethesda, MD), Alexander P. Savitsky (FBRC RAS, Moscow, Russia), Valery V. Tuchin (SSU, Saratov, Russia)

SARATOV TIME UTC+4

September 29, Tuesday

13.55-14.00

<https://osachapter.zoom.us/j/98300886300>

Introduction to SFM/TOMTI Program

Valery V. Tuchin, Saratov State University, Russia

14.00-17.20

ON-LINE SFM/TOMTI PLENARY SESSION I

Chairs: **Valery V. Tuchin**, Saratov State University, Russia

Alexei A. Bogdanov Jr., University of Massachusetts Medical School, Worcester MA, USA

17.30-20.35

ON-LINE SFM/TOMTI PLENARY SESSION II

Chairs: **Valery V. Tuchin**, Saratov State University, Russia

Valery P. Zakharov, Samara National Research University, Samara, Russia

September 30, Wednesday

9.00-11.40

ON-LINE SFM/TOMTI PLENARY SESSION III

Chairs: **Valery V. Tuchin**, Saratov State University, Russia

Peter S. Timashev, Institute for Regenerative Medicine, Sechenov University

12.00-13.50

ON-LINE SFM/TOMTI PLENARY SESSION IV

Valery V. Tuchin, Saratov State University, Russia

Timofey E. Pylaev, Institute of Biochemistry and Physiology of Plants and Microorganisms, Russian Academy

14-45-15.00 TOMTI OPENING

<https://us02web.zoom.us/j/5118369737>

Alexander G. Gabibov, IBCh RAS, Moscow, Russia

15.00-18.00

ON-LINE TOMTI INVITED LECTURE SESSION I

Chairs: **Alexei A. Bogdanov Jr.**, University of Massachusetts Medical School, Worcester MA, US; **Victoria Zherdeva**, FRC «Fundamentals of Biotechnology», RAS, Moscow, Russia

15.00-15.30

Insights into metabolic aspects of tumor growth with fluorescence and phosphorescence time-resolved techniques

Marina SHIRMANOVA¹, Maria Lukina¹, Liubov Shimolina¹, Vladislav Shcheslavskiy¹, Varvara Dudenkova¹, Vladimir Zagainov², Anna Orlova³, Ilya Kritchenkov⁴, and Elena Zagaynova¹

1-Institute of Experimental Oncology and Biomedical Technologies, Privolzhskiy Research Medical University, Russia; 2-Volga District Medical Center, Russia 3-Institute of Applied Physics RAS, Russia 4-Chemistry Department, Saint Petersburg State University, Russia

15.30-16.00

Solid and Liquid Tissue pathology analysis by multimodal microscopy

Francesco S. Pavone, European Laboratory for non Linear Spectroscopy, R. Cicchi, E. Baria, S. Anand, INO-CNR, S. Morselli, M.Gacci, S. Serni, Urology Unit, University Hospital Florence, G. Nesi, D. Massi, Anatomopathology Unit, University Hospital Florence, S. Centi, F. Ratto, F. Rossi, R. Pini, IFAC CNR, Florence, Italy; O. Bibikova, Imperial College London, V. Artyushenko, Art Photonics, Berlin

16.00-16.30

**Genetically Encoded Autonomous
Bioluminescence in Eukaryotes**

Iliya Yampolsky, Department of Biomolecular Chemistry, Institute of Bioorganic Chemistry, Moscow, Russia

16.30-17.00

**Towards the creation of a magic bullet:
supramolecular nanostructures for
oncotheranostics**

Victoria Shipunova, Polina Kotelnikova, Elena Komedchikova, Anna Sogomonyan, Maria Belova, Olga Kolesnikova, Vladislav Soloviev, Maxim Nikitin, Sergey Deyev, IBCh RAS, Russia

17.00-17.30

**Quantitative Fluorescence Polarization Imaging
for Cancer Detection**

Anna N. Yaroslavsky, University of Massachusetts at Lowell, USA

17.30-18.00

**Monitoring of optical clearing effects by
fluorescence and magnetic resonance imaging
in vivo**

Alexei A. Bogdanov Jr.^{1,2}, Natalia I. Kazachkina², Victoria V. Zherdeva², Irina G. Meerovich², Ilya D. Solovyev², Daria K. Tuchina^{2,3,4}, Alexander P. Savitsky², Valery V. Tuchin^{2,3,4,5} 1 University of Massachusetts Medical School, Radiology, Worcester, Massachusetts, USA 2 A.N. Bach Institute of Biochemistry, FRC "Fundamentals of Biotechnology", RAS, Moscow, 3 Saratov State University, Saratov, 4 Tomsk State University, Tomsk, 5 Institute of Precision Mechanics and Control, RAS, Saratov, Russia

October 1, Thursday

<https://us02web.zoom.us/j/88608773607?pwd=030026>

10.00-10.30

ON-LINE SFM/TOMTI PLENARY SESSION II

Chairs: **Alexei A. Bogdanov Jr.**, University of Massachusetts Medical School, Worcester MA, USA; **Victoria Zherdeva**, FRC «Fundamentals of Biotechnology», RAS, Moscow, Russia

**Big data and hyperspectral imaging
uncover hidden regularities of native
colours and patterns in cells and tissues**

Ewa M. Goldys, Martin E. Gosnell, Abbas Habibalahi, Saabah Mahbub, Jared Campbell, Ayad G. Anwer, Jesse Michael, University of New South Wales, Sydney, Australia

10.30-11.30

Internet Report Session

<https://us02web.zoom.us/j/88608773607?pwd=030026>

10.30-10.50

**Assessment of melanin distribution from the
basal membrane to the stratum corneum in
vivo by fluorescence and Raman
microspectroscopy**

B.P. Yakimov⁻¹, E.A. Shirshin^{-1,2}, J. Schleusener⁻³, V.V. Fadeev⁻¹, M.E. Darvin⁻³ 1M.V. Lomonosov Moscow State University, Faculty of physics, 1-2 Leninskie Gory, Moscow, 119991, Russia 2Institute of Spectroscopy of the Russian Academy of Sciences, Fizicheskaya Str., 5, 108840, Troitsk, Moscow, Russia 3Charité – Universitätsmedizin Berlin, corporate member of Freie Universität Berlin, Humboldt-Universität zu Berlin, and Berlin Institute of Health, Department of Dermatology, Venerology and Allergology, Center of Experimental and Applied Cutaneous Physiology, Charitéplatz 1, Berlin, 10117, Germany

10.50-11.10

**Tissue-like phantoms mimicking blood vessel
for intravascular optical coherence
tomography**

A.Yu. Potlov, S.V. Frolov and S.G. Proskurin
Tambov State Technical University, Russia

11.10-11.30

**Comparison of Optical Coherence
Elastography and Ultrasound Shear Wave
Elastography in Gelatin Tissue-Mimicking
Phantoms**

Justin R. Rippy^{1,3}, Manmohan Singh^{1,3}, Salavat Aglyamov², and Kirill V. Larin^{1,3}, 1-Department of Biomedical Engineering, University of Houston; 2-Department of Mechanical Engineering, University of Houston; 3-Department of Molecular Physiology and Biophysics, Baylor College of Medicine

11.30-11.50

**FLIM Assessment of Cells Heterogeneity:
Machine Learning-based Approach**

Alexey Gayer¹, Elena Nikonova¹, Boris Yakimov¹, Gleb Budylin², Maria Lukina³, Varvara Dudenkova³, Vladislav Shcheslavskiy³, Marina Shirmanova³, Evgeny Shirshin^{1,2} 1 -Department of Physics, M.V. Lomonosov Moscow State University, 1/2 Leninskie gory, Moscow 119991, Russia; 2 - Institute of spectroscopy of the Russian Academy of Sciences, 5 Fizicheskaya str., Moscow 108840, Russia; 3 - Institute of Experimental Oncology and Biomedical Technologies, Privolzhskiy Research Medical University, Minin and Pozharsky Sq., 10/1, 603005 Nizhny Novgorod, Russia

11.50-13.10

Internet Poster Session

11.50-12.00

Optical clearing of mouse skin samples using MR and X-ray agents

Nikita S. Chikalkin¹, Daria K. Tuchina,^{1,2} Olga A. Sindeeva,¹ Alexander P. Savitsky,³ Alexei A. Bogdanov, Jr.^{3,4} Valery V. Tuchin^{1,2,5} 1Saratov State University, Saratov, Russia; 2National Research Tomsk State University, Tomsk, Russia; 3Federal Research Center of Biotechnology, Russian Academy of Sciences, Moscow, Russia; 4University of Massachusetts Medical School, Worcester, MA, USA; 5Institute of Precision Mechanics and Control, Russian Academy of Sciences, Saratov, Russia

12.10-12.20

Dual-Wavelength Subtraction Optical Imaging for Delineating Cutaneous Tumors

Peter R. Jermain (University of Massachusetts Lowell Advanced Biophotonics Laboratory) Xin Feng (University of Massachusetts Lowell Advanced Biophotonics Laboratory) Sherry H. Yu (Massachusetts General Hospital Department of Dermatology) Victor A. Neel (Massachusetts General Hospital Department of Dermatology) Anna N. Yaroslavsky (University of Massachusetts Lowell Advanced Biophotonics Laboratory, Massachusetts General Hospital Department of Dermatology)

12.10-12.20

Chest Shield for Blue Light Phototherapy

Androniki Mitrou, Advanced Biophotonics Lab, University of Massachusetts Lowell, Lowell, MA 01854 Tyler Iorizzo, Advanced Biophotonics Lab, University of Massachusetts Lowell, Lowell, MA 01854 Javed Mannan, Neonatal-Perinatal Medicine, University of Massachusetts Medical School, Worcester, MA 01605 Anna Yaroslavsky, Advanced Biophotonics Lab, University of Massachusetts Lowell, Lowell, MA 01854

12.20-12.30

Characterizing Optical Properties of Kidney Stone Phantoms

Tyler Iorizzo (Advanced Biophotonics Laboratory, University of Massachusetts Lowell, USA) Ilya Yaroslavsky (IPG Medical, MA, USA) Anna Yaroslavsky (Advanced Biophotonics Laboratory, University of Massachusetts Lowell, USA)

12.30-12.40

In vitro testing of new Ir(III) complexes as phosphorescent sensors of molecular oxygen for cancer studies

Anastasia KOMAROVA (Privolzhskiy Research Medical University; Lobachevsky State University of Nizhny Novgorod); Maria LUKINA (Privolzhskiy Research Medical University); Varvara DUDENKOVA (Privolzhskiy Research Medical

University); Leonid BOCHKAREV (G.A. Razuvaev Institute of Organometallic Chemistry of the Russian Academy of Sciences); Ilya KRITCHENKOV (Saint Petersburg State University); Sergey TUNIK (Saint Petersburg State University); Marina SHIRMANOVA (Privolzhskiy Research Medical University)

12.40-12.50

Investigation of apoptosis in tumor cells using genetically encoded sensors of caspases activity.

Alena GAVRINA¹, Marina SHIRMANOVA¹, Varvara DUDENKOVA^{1,2}, Tatiana KOVALEVA¹, Konstantin LUKYANOV^{1,3}, and Elena ZAGAYNOVA^{1,2} 1- Privolzhskiy Research Medical University, Nizhny Novgorod, Russia; 2 -Nizhny Novgorod State University, Nizhny Novgorod, Russia; 3 - Shemyakin-Ovchinnikov Institute of Bioorganic Chemistry, Moscow, Russia

12.50-13.00

Lentiviral Tet-On system for inducible expression of fluorescent chimeras of dCas9 orthologs and its application

Gerel Abushinova, FRC of Biotechnology of the RAS, Vavilov Institute of General Genetics RAS, Russia; Lilia Maloshenok, Vavilov Institute of General Genetics RAS, FRC of Biotechnology of the RAS, Russia; Victoria Zherdeva (FRC of Biotechnology of the RAS, Russia; Sergey Bruskin, Vavilov Institute of General Genetics RAS, Russia; Alexander Savitsky, FRC of Biotechnology of the RAS, Russia; Alexei Bogdanov Jr., FRC of Biotechnology of the RAS, Russia.

12.40-12.50

Lentiviral Tet-On system for inducible expression of fluorescent chimeras of dCas9 orthologs and its application

Gerel Abushinova (FBRC RAS, Laboratory of Molecular Imaging, Russia; Vavilov Institute of General Genetics RAS, Laboratory of functional genomics, Russia) Lilia Maloshenok (Vavilov Institute of General Genetics RAS, Laboratory of functional genomics, Russia; FBRC RAS, Laboratory of Molecular Imaging, Russia) Victoria Zherdeva (FBRC RAS, Laboratory of Molecular Imaging, Russia) Sergey Bruskin (Vavilov Institute of General Genetics RAS, Laboratory of functional genomics, Russia) Alexander Savitsky (FBRC RAS, Laboratory of Molecular Imaging, Russia) Alexey Bogdanov (FBRC RAS, Laboratory of Molecular Imaging, Russia)

13.00-13.10

Planar imaging for preliminary assessment of optical clearing effect in tumor bearing mice

Aysiyay Saydasheva, FRC of Biotechnology of the RAS. Kazachkina Natalia. I. FRC of Biotechnology of the RAS. Zherdeva Victoria V., FRC of Biotechnology of the RAS; Bogdanov Alexei Jr., FRC of Biotechnology of

the RAS; Savitsky Alexander P., FRC of Biotechnology of the RAS

ON-LINE SFM/TOMTI PLENARY SESSION V

Chairs: **Alexei A. Bogdanov Jr.**, University of Massachusetts Medical School, Worcester MA, USA

Victoria Zherdeva, FRC «Fundamentals of Biotechnology», RAS, Moscow, Russia

<https://us02web.zoom.us/j/88598605813?pwd=MUNLK3IlbWZyZ3hSQVBTODVpc1hSdz09>

15.00-18.00

15.00-15.25

Visualization of Histone Epigenetics: a New Way to Track Single-cell Physiology

Konstantin A. Lukyanov Center of Life Sciences, Skolkovo Institute of Science and Technology, Moscow, Russia

15.25-15.40

Super-resolution with very low laser power, ideal for long term imaging

Peter Drent, Confocal.nl, Amsterdam, The Netherlands

15.40-16.20

Live Biophonic Analysis of Early Mammalian Embryonic Process

Irina V. Larina Baylor College of Medicine, Department of Molecular Physiology and Biophysics, Houston, Texas, USA

16.20-17.00

Image-guided Precision Nanomedicine for Cancer Therapy

Anna Moore, Ph.D. Michigan State University
Molecular imaging using time resolved fluorescence

17.00-17.40

Molecular imaging using time resolved fluorescence

Anand T. N. Kumar, Massachusetts General Hospital, Harvard Medical School

17.40-18.00

Preclinical & Multimodality Imaging MR SOLUTIONS

Fabrice Chaumard, MR Solutions Ltd.

