

Curriculum vitae

Ilya V. Turchin

Personal data, contact information

Name: Ilya Turchin,
Head of the Department for radiophysics methods in medicine
Head of Biophotonics laboratory
Tel: +7 831 4368010
E-mail: ilya@ufp.appl.sci-nnov.ru,
<http://www.bioimaging.ru/>

Educational background

1994–2000: Student at the Advanced School of General at Applied Physics, Nizhny Novgorod State University
2000 – MS degree, Physics at the Advanced School of General at Applied Physics, Nizhny Novgorod State University
2000 – 2003: postgraduate student at the IAP RAS
2006 – PhD in Physics, speciality "Radiophysics", thesis "New methods for synthesis and processing of broadband signals in the near infrared and millimeter wavelengths". Supervisors: Valentin Gelikonov and Michael Petelin.

Scientific interests

Biological tissue optics. Development of optical imaging devices for biomedical diagnostics:

- Fluorescence methods for small-animal imaging (backreflection, transillumination methods, fluorescence diffuse tomography)
- Diffuse optical spectroscopy (detection of breast cancer)
- Fluorescence ultramicroscopy of the optically transparent tissues
- Multi-spectral optoacoustic tomography
- Optical coherence tomography

Professional activity

1998-2006: Researcher at the IAP RAS
2007 - present: Head of Biophotonics Laboratory at the IAP RAS
2013 - present: Head of the Department for radiophysical methods in medicine at the IAP RAS
2011 - present: Researcher at the Nizhny Novgorod State Medical Academy

Visits: University of Texas (Austin, Galveston 2003,2004), Minimally Invasive Surgical Technologies Institute at Cedars-Sinai Medical Center (Los Angeles, 2008), Anticancer Inc. (San Diego, 2010), Institute for Biological and Medical Imaging of the HelmholtzZentrum (München, 2010), Massachusetts Institute of Technology (Boston, 2013)

Membership in professional organizations

Reviewer in: Journal of Biomedical Optics (**2008-current**), Journal of the European Optical Society (**2007**), Optics & Laser Technology (**2009**)
2010 - present – member of the Scientific Council of the Non-Linear Dynamics and Optics Division at the IAP RAS
2013 - present – member of the Scientific Council of the IAP RAS
2007,2009,2011,2013 – Scientific Secretary of the Optical Bioimaging Conference at the International Symposium Topical Problems of Biophotonics (Nizhny Novgorod, Russia)
2012 – Program committee member of the OSA Biomedical Topical Meeting (Miami Beach, USA)

2012 - Program committee member of the upcoming ACP2012 (Guangzhou, China)

2012 - present – registered in the national list of experts in scientific and technical activity

Awards, prizes, grants

2013 – Silver medal for invention "Diffuse fluorescence tomography setup for biomedical research", 24-th International Invention, Innovation & Technology Exhibition ITEX 2013, Malaysia, Kuala Lumpur, 9-11 May 2013 (authors: Turchin Ilya, Kleshnin Mikhail, Kamensky Vladislav, Fiks Ilya)

2012 - Award of the Nizhny Novgorod Ministry of Industry and Innovations

2009 – Gold medal of the American-Russian Business Union (ARBU) for the innovation "Diffusion Optical Tomography"

2008 – Gold medal at the Belgian and International Trade Fair for Technological Innovations for the innovation "Polarization optical spectrometer"

2002 – Scholarship of the Razuvaev academician

Managing of scientific projects

2013-2015: grant of the Russian Foundation for Basic Research «Development of the whole-body fluorescence lifetime imaging methods for visualization of molecular processes at the organism level»

2013-2015: grant of the Russian Foundation for Basic Research: «Simultaneous ultrasound and spectral photoacoustic microscopy for functional and structural diagnostics of biotissues»

2013: project "Development of the photoacoustics functional imaging methods" in the frames of the Federal Targeted Program “R&D in Priority Fields of the S&T Complex of Russia (2007-2013)”

2011-2012: project "Development of the fluorescence and bioluminescence small-animal molecular in vivo imaging" in the frames of the Federal Targeted Program “R&D in Priority Fields of the S&T Complex of Russia (2007-2013)”

2011-2012: grant of the Russian President for supporting of young Russian scientists: "Developments of the in vivo fluorescence imaging methods for the experimental oncology investigations"

2010-2012: grant of the Russian Foundation for Basic Research: «Developments of the Fluorescence Diffuse Tomography»

2007-2009: grant of the Russian Foundation for Basic Research: «Fluorescence Diffuse Tomography»

Educational activity

2009 - present: a course of lectures "Optical methods for biomedical diagnostics" for graduates of the Radiophysics Faculty at the Nizhny Novgorod State University

2012 - present: lectures "Optical bioimaging" for students of the Nizhny Novgorod State Medical Academy

Publications

39 peer-reviewed journal publications, 4 book chapters, 76 abstracts in conference proceedings

The most significant works and results

Full list of peer-reviewed journal publications

1. S.N.Bagayev, V.M.Gelikonov, E.S.Kargapol'tsev, R.V.Kuranov, A.M.Razhev, E.V.Turchin, A.A. Zhupikov, "The excimer laser system for refractive surgery assisted by optical coherence tomograph", Laser Physics, Vol. 11, No. 11, 2001. - P. 1224-1227.

2. Petelin MI, Turchin IV, "Frequency characteristics of resonators coupled with waveguides", Journal of Communications Technology and Electronics 46(12), pp.: 1331-1334 (2001)

3. Turchin IV, "A multiplexer composed of circular reflector cavities", Journal of Communications Technology and Electronics 48(6), pp: 624-627 (2003)

4. N. M. Shakhova, V. M. Gelikonov, V. A. Kamensky, R. V. Kuranov, and I. V. Turchin, "Clinical Aspects of the Endoscopic Optical Coherence Tomography and the Ways for Improving Its Diagnostic Value", *Laser Physics*, Vol. 12, No. 4, 2002. – pp. 617-626.
5. R. V. Kuranov, V. V. Sapozhnikova, I. V. Turchin, E. V. Zagainova, V. M. Gelikonov, V. A. Kamensky, L. B. Snopova, and N. N. Prodanetz, "Complementary use of cross-polarization and standard OCT for differential diagnosis of pathological tissues", *Optics Express*, Vol. 10, No. 15, PP. 707-713, 2002.
6. Roman V. Kuranov, Sergey N. Bagayev, Valentin M. Gelikonov, Grigory V. Gelikonov, Evgeny S. Kargapol'tsev, Alexander M. Razhev, Ilya V. Turchin, Andrey A. Zhupikov, "Optical coherence tomography for in situ monitoring of laser corneal ablation", *Journal of Biomedical Optics*, Vol. 7, No. 4, 2002. – pp. 633-642.
7. Ilya V. Turchin, Ekaterina A. Sergeeva, Lev S. Dolin, Vladislav A. Kamensky, "Estimation of Biotissue Scattering Properties from OCT Images Using a Small-Angle Approximation of Transport Theory", *Laser Physics*, v.13, No. 12, 2003 pp. 1524-1529
8. Снопова Л.Б., Гладкова Н.Д., Шахова Н.М., Загайнова Е.В., Кузнецова И.А., Проданец Н.Н., Куранов Р.В., Геликонов В.М., Турчин И.В., Сапожникова В.В., Каменский В.А. "Перспективные морфологические исследования покровных тканей человека в интерпретации изображений, полученных методом оптической когерентной томографии" // Нижегородский медицинский журнал. - 2003. - N. 1. - P. 57-61
9. V.M. Gelikonov, G.V. Gelikonov, S.Yu. Ksenofontov, R.V. Kuranov, A.N. Morozov, A.V. Myakov, A.A. Turkin, I.V. Turchin, D.V. Shabanov, " New Approaches in Broadband Fiber-Optical Interferometry for Optical Coherent Tomography", *Radiophysics and Quantum Electronics* 46(7), pp. 550-564 (2003)
10. Petrova G.A., Derpalyuk E.N., Gladkova N.D., Nikulin N.K., Gelikonov V.M., Iksanov R.R., Turchin I.V., Kamensky V.A., Myakov A.V. Optical coherence tomography for diagnosis of rare skin diseases: hyperkeratosis Kyrle's and paraneoplastic bullosous dermatosis // *Case Rep Pract Rew.* - 2003. - N. 4. - P. 2-6.
11. Gelikonov G.V., Dolin, L.S., Sergeeva E.A., Turchin, I.V., "Multiple Backscattering Effects in Optical Coherence Tomography Images of Layered Turbid Media", *Radiophysics and Quantum Electronics* 46(7), pp. 565-576 (2003).
12. Ilya V. Turchin, Ekaterina A. Sergeeva, Vladislav A. Kamensky, Lev S. Dolin, Natalia M. Shakhova, Rebecca Richards-Kortum, "Novel algorithm of processing Optical Coherence Tomography images for differentiation of biological tissue pathologies", *Journal of Biomedical Optics*, 10(6), 064024, November/December (2005)
13. Koshurinov YI, Pavel'ev VG, Petelin MI, Turchin IV, Shchegol'kov DY, "A diplexer based on an open resonator with corrugated mirrors", *Technical Physics Letters* 31(8), pp: 709-711 DOI: 10.1134/1.2035373 (2005)
14. Ilya V. Turchin, Vladimir I. Plehanov, Anna G. Orlova, Vladislav A. Kamensky, Mikhail S. Kleshnin, Marina V. Shirmanova, Natalia M. Shakhova, Irina V. Balalaeva and Alexander P. Savitsky, "Fluorescence diffuse tomography of small animals with DsRed2 fluorescent protein", *Laser Physics* 16(5), pp. 741–746 (2006)
15. I.V. Turchin, I.V. Balalaeva, R.B. Vasil'ev, V.P. Zlomanov, V.I. Plehanov, A.G. Orlova, E.V. Zagaynova, V.A. Kamensky, M.S. Kleshnin, M.V. Shirmanova, S.G. Dorofeev, and D.N. Dirin, "Imaging of QDs-labeled tumors in small animals by fluorescence diffuse tomography", *Laser Physics Letters* 3(4), pp. 208–211 (2006)
16. И. В. Балалаева, А. Г. Орлова, Ю. А. Мацкова, М. В. Ширманова, И. В. Турчин, Н. Н. Зубова А. П. Савицкий, "Визуализация бактериальной инфекции методом флуоресцентной диффузионной томографии", *Вестник ННГУ, серия Биология*, с. 28-33 (2006)
17. Ilya V. Turchin, Vladislav A. Kamensky, Vladimir I. Plehanov, Anna G. Orlova, Mikhail S. Kleshnin, Ilya I. Fiks, Marina V. Shirmanova, Irina G. Meerovich, Lyaisan R. Arslanbaeva, Viktoria V. Jerdeva, Alexander P. Savitsky "Fluorescence diffuse tomography for detection of

- red fluorescent protein expressed tumors in small animals”, *Journal of Biomedical Optics* 13(4), 041310 July/August 2008
18. A.G. Orlova, I.V. Turchin, V.I. Plehanov, N.M. Shakhova, I.I. Fiks, M.I. Kleshnin, N.Yu. Konuchenko, and V.A. Kamensky, “Frequency-domain diffuse optical tomography with single source-detector pair for breast cancer detection”, *Laser Phys. Lett.* 5, No. 4, 321–327 (2008)
19. Dolin L.S., Sergeeva E.A, Turchin I.V., "Shadow noise in OCT images of biological tissues", *Quantum Electronics* 38(6), pp.: 543-550 (2008)
20. Е.В. Загайнова, М.В. Ширманова, М.А. Сироткина, И.В. Балалаева, М.С. Клешинин, И.В. Турчин, Л.А. Седакова, В.И. Романенко, Е.М. Трещалина Мониторинг накопления фотосенсибилизаторов в опухоли методом диффузионной флуоресцентной томографии // *Российский биотерапевтический журнал*, 2008 г., т.7, №4, стр.30-33
21. Ширманова М.В., Сироткина М.А., Клешинин М.С., Турчин И.В., Снопова Л.Б., Орлова А.Г., Балалаева И.В., Загайнова Е.В., Трещалина Е.М. Визуализация экспериментальных опухолей с использованием фотосенса на флуоресцентном диффузионном томографе // *Нижегородский медицинский журнал.*- №4.- 2008.- С. 7-12
22. Tatiana Zdobnova, Sergey Dorofeev , Piter Tananaev , Roman Vasiliev , Taras Balandin , Eveline Edelweiss , Oleg Stremovsky , Irina Balalaeva , Ilya Turchin , Ekaterina Lebedenko , Vladimir Zlomanov , Sergey Deyev, “Fluorescent immunolabeling of cancer cells by quantum dots and antibody scFv fragment”, *Journal of Biomedical Optics* 14, 021004 (2009)
23. Pleskova SN, Balalaeva IV, Gushchina IuIu, Sergeeva EA, Zdobnova TA, Deev SM, Turchin IV, "Differences in the functional activity of human neutrophilic granulocytes in their interactions with semiconductor quantum dots", *Morfologiya* 135(3), pp.: 47-49 (2009)
24. Масленникова А.В., Голубятников Г.Ю., Орлова А.Г., Плеханов В.И., Артифексова А.А., Шахова Н.М., Каменский В.А., Турчин И.В., Неинвазивный оптический метод оценки кислородного статуса новообразований молочной железы. Опухоли женской репродуктивной системы, 1, 2010, с. 5-10.
25. M.S. Kleshnin, I.V. Turchin, "Spectrally resolved fluorescence diffuse tomography of biological tissues", *Quantum Electronics* 40 (6), 531- 537 (2010)
26. A N Morozov, I V Turchin, V A Kamenskii, I I Fiks, A A Lazutkin, D V Bezryadnov, A A Ivanova, D M Toptunov, K V Anokhin, "Fibreoptic fluorescent microscopy in studying biological objects", *Quantum Electronics*, 2010, 40 (9), 842–846.
27. Marina Shirmanova, Elena Zagaynova, Marina Sirotkina, Ludmila Snopova, Irina Balalaeva, Irina Krutova, Nataliya Lekanova, Ilya Turchin, Anna Orlova, Michail Kleshnin, "In vivo study of photosensitizers pharmacokinetics by fluorescence transillumination imaging", // *J. Biomed. Opt.*, Vol. 15, 048004 (2010)
28. Alexander L. Rusanov, Tatiana V. Ivashina, Leonid M. Vinokurov, Ilya I. Fiks, Anna G. Orlova, Ilya V. Turchin, Alexander P. Savitsky, “Life-time mode of FRET measurements for red fluorescent proteins”, *Journal of Biophotonics*, Vol. 3, Issue 12, P. 774–783, 2010
29. Anna V. Maslennikova, Anna G. Orlova, German Yu. Golubiatnikov, Vladislav A. Kamensky, Natalia M. Shakhova, Aleksey A. Babaev, Ludmila B. Snopova, Irina P. Ivanova, Vladimir I. Plekhanov, Tatyana I. Prianikova and Ilya V. Turchin, Comparative study of tumor hypoxia by diffuse optical spectroscopy and immunohistochemistry in two tumor models. *Journal of Biophotonics*, 2010, 2010, 3(12), 743–751.
30. A. G. Orlova, A. V. Maslennikova, G. Yu. Golubyatnikov, V. A. Kamensky, N. M. Shakhova, A. A. Babaev, L. B. Snopova, I. P. Ivanova, V. I. Plekhanov, T. I. Pryanikova, and I. V. Turchin, " Noninvasive Estimation of the Oxygen Status of Experimental Tumors by Diffuse Optical Spectroscopy ", *Biophysics* Vol. 56, No. 2, 2011, p. 304-308
31. I. I. Fiks, M.Yu. Kirillin, E.A. Sergeeva, and I. V. Turchin, "Reconstruction of object location for diffuse fluorescence tomography on the basis of hybrid models of light scattering in biotissues", *Radiophysics and Quantum Electronics*, Vol. 54, No. 3, August, 2011

32. Масленникова А.В., Орлова А.Г., Голубятников Г.Ю., Каменский В.А., Плеханов В.И., Бабаев А.А., Снопина Л.Б., Иванова И.П., Пряникова Т.И., Шахова Н.М., Турчин И.В. Метод оптической диффузионной спектроскопии для *in vivo* исследования пространственного распределения зон гипоксии в ткани опухоли. Технологии живых систем, т. 8, №2, с. 38-43, 2011.
33. Lev S. Dolin, Ekaterina A. Sergeeva, Ilya V. Turchin, "Correlation characteristics of optical coherence tomography images of turbid media with statistically inhomogeneous optical parameters", *Journal of Quantitative Spectroscopy and Radiative Transfer* 113(9), pp. 691-703, 2012
34. Marina V. Shirmanova, Ekaterina O. Serebrovskaya, Konstantin A. Lukyanov, Ludmila B. Snopova, Marina A. Sirotkina, Natalia N. Prodanetz, Marina L. Bugrova, Ekaterina A. Minakova, Ilya V. Turchin, Vladislav A. Kamensky, Sergey A. Lukyanov, and Elena V. Zagaynova, "Phototoxic effects of fluorescent protein KillerRed on tumor cells in mice", *Journal of Biophotonics* 6(3), 2013, pp. 283–290
35. P.Subochev, A.Katichev, A.Morozov, A. Orlova, V. Kamensky, I.Turchin // Simultaneous photoacoustic and optically mediated ultrasound microscopy: phantom study // *Optics Letters* 37(22), 2012, pp. 4606-4608
36. А.В. Мелешина, Е.И. Черкасова, Е.А. Сергеева, И.В. Турчин, Е.В. Киселева, Э.В. Дашинамаев, М.В. Ширманова, С.А. Лукьянов, Е.В. Загайнова, "Исследование взаимодействия мезенхимных клеток и опухоли методами флюоресцентного биоимиджинга", *Современные технологии в медицине*, №4, 2012 с.7-16
37. M S Kleshnin and I V Turchin, "Fluorescence diffuse tomography technique with autofluorescence removal based on dispersion of biotissue optical properties", *Laser Phys. Lett.* 10 075601 (2013)
38. Alina P. Ryumina, Ekaterina O. Serebrovskaya, Marina V. Shirmanova, Ludmila B. Snopova, Maria M. Kuznetsova, Ilya V. Turchin, Nadezhda I. Evteeva, Natalia Klementieva, Arkady F. Fradkov, Elena V. Zagaynova, Konstantin A. Lukyanov, Sergey A. Lukyanov, "Flavoprotein miniSOG as a genetically encoded photosensitizer for cancer cells" // *Biochim Biophys Acta. Nov*;1830(11):5059-67. doi: 10.1016/j.bbagen.2013.07.015. Epub 2013 Jul 20. (2013)
39. А.Н. Морозов, И.В.Турчин, "Метод оптической когерентной томографии с параллельным приемом сигнала по глубине и волоконно-оптическими модуляторами фазы", *Квантовая электроника*. //Accepted for publication in 2013

List of book chapters

1. Lev S. Dolin, Felix I. Feldchtein, Grigory V. Gelikonov, Valentin M. Gelikonov, Natalia D. Gladkova, Rashid R. Iksanov, Vladislav A. Kamensky, Roman V. Kuranov, Alexander M. Sergeev, Natalia M. Shakhova, Ilya V. Turchin, " Fundamentals and Clinical Applications of the PM-Fiber Based Endoscopic OCT", in *Coherent-Domain Optical Methods: Biomedical Diagnostics, Environmental and Material Design*, Ed. V.V. Tuchin, Kluwer Academic Publishers, pp. 211-270, 2004.
2. И.В. Балалаева, И.В. Турчин, Р.Р. Иксанов, В.А. Каменский, Г.В. Геликонов, Ф.И. Фельдштейн. Методы численного анализа ОКТ-изображений. В книге: «Руководство по оптической когерентной томографии» / Под ред. Н.Д. Гладковой, Н.М. Шаховой, А.М. Сергеева. М.: Физматлит, Медицинская книга. 2007. С. 274-284.
3. Savitsky, Alexander P; Meerovich, Irina G; Zherdeva, Victoria V; Arslanbaeva, Lyaysan R; Burova, Olga S; Sokolova, Darina V; Treshchalina, Elena M; Baryshnikov, Anatoly Yu; Fiks, Ilya I; Orlova, Anna G; Kleshnin, Michael S; Turchin, Ilya V; Sergeev, Alexander M, "Three-dimensional *in vivo* imaging of tumors expressing red fluorescent proteins", *Chapte 7 in Methods in molecular biology (Clifton, N.J.)* Volume: 872, Pages: 97-114 DOI: 10.1007/978-1-61779-797-2_7 Published: 2012

4. Savitsky, Alexander P; Meerovich, Irina G; Zherdeva, Victoria V; Arslanbaeva, Lyaysan R; Burova, Olga S; Sokolova, Darina V; Treshchalina, Elena M; Baryshnikov, Anatoly Yu; Fiks, Ilya I; Orlova, Anna G; Kleshnin, Michael S; Turchin, Ilya V; Sergeev, Alexander M, "Three-dimensional in vivo imaging of tumors expressing red fluorescent proteins", Chapte 7 in Methods in molecular biology (Clifton, N.J.) Volume: 872, Pages: 97-114 DOI: 10.1007/978-1-61779-797-2_7 Published: 2012

Patents

Patents in Russian Federation in the area of optical coherence tomography, diffuse optical spectroscopy and diffuse fluorescence tomography numbers: 2183108 (2002), 2314034 (2006), № 2368306 (2009), 2395124 (2010), 91517 (2010), 2437617 (2011), 2441582 (2012).

Invited talks

I. V. Turchin, I.V. Balalaeva, E.A. Zagaynova, V.A. Kamensky, A.G. Orlova, M.S. Kleshnin, I.I. Fiks, M.V. Shirmanova, T.A. Zdobnova, M.Yu. Kirillin, S.M. Deev, A.P. Savitsky, A.M. Sergeev, "Optical Bioimaging with the Use of Nanoparticles as Contract Agents", invited talk on XIII International Conference "Laser Optics'2008" (St.Petersburg, June 23 – 28, 2008)

I. V. Turchin, G. Golubiatnikov, A.G. Orlova, V.I. Plekhanov, I.I. Fiks, A.V. Maslennikova, V.A. Kamensky, "Detection of breast cancer with Frequency-Domain Diffuse Optical Tomography" invited talk on XIII International Conference "Laser Optics'2008" (St.Petersburg, June 23 – 28, 2008)

I. Turchin, I. Fiks, M. Kleshnin, A. Orlova, A. Rusanov, A. Savitsky, "Fluorescence tomography of red fluorescent protein expressed tumors in small animals", invited talk, LALS 2010, Oulu, Finland, 9-11 June 2010

I. Turchin, I. Fiks, M. Kleshnin, A. Orlova, A. Savitsky, "Fluorescence 3D imaging of biotissues", invited talk International Symposium on Laser Medical Applications, Moscow, 5–6 July, 2010

I. Turchin, I. Fiks, M. Kleshnin, and A. Savitsky, "Fluorescence Tomography of Red Fluorescent Protein Expressed Tumors in Small Animals", invited talk, ICONO/LAT 2010, 23-26 August 2010, Kazan, Russia

I.V. Turchin, "Optical imaging for biological and medical applications", invited talk, Mass Spectrometry Imaging Workshop, 11-13 December 2011, Moscow

I.V. Turchin, "Small animal fluorescence imaging in vivo" , invited talk, Laser Optics 2012, 2nd International Symposium on Lasers in Medicine, June 25–29, 2012, St. Petersburg, Russia.

I.Turchin, "Fluorescent and photoacoustic small-animal imaging", invited talk, Advanced Laser Technologies (ALT-2013), 16-20 September 2013, Budva, Montenegro