

Curriculum Vitae

Olga N. Sergaeva, Ph. D.

E-mail: o.sergaeva@metalab.ifmo.ru,
olgasergaeva@gmail.com

https://physics.itmo.ru/en/personality/olga_sergaeva

<https://orcid.org/0000-0003-0922-8768>

Scopus Author Identifier: 37036293100

Web of Science ResearcherID: AAF-3205-2021

<https://scholar.google.ru/citations?hl=ru&user=9mcjHloAAAAJ>

https://www.researchgate.net/profile/Olga_Sergaeva2

EDUCATION:

Ph. D. in Optics, 2013

National Research University of Information Technologies, Mechanics and Optics (ITMO University), St.Petersburg, Russia.

Dissertation: "Electron emission and metal oxidation under the action of ultrashort laser pulse".

Diploma of additional education "Higher school lecturer", 2011

National Research University of Information Technologies, Mechanics and Optics (ITMO University), St.Petersburg, Russia.

M. S. with Honors in Optical Engineering and Technologies, 2010

St. Petersburg State University of Information Technologies, Mechanics and Optics (ITMO University), St.Petersburg, Russia.

Thesis: "Interaction of ultrashort laser pulse with matter with the electron emission taken into account".

B. S. with Honors in Technical Physics, 2008

St. Petersburg State University of Information Technologies, Mechanics and Optics, (ITMO University), St.Petersburg, Russia.

Thesis: "Numerical simulation of laser heating".

EMPLOYMENT:

Researcher, Assistant Professor, Oct. 2018 – present
Department of Physics, ITMO University, St. Petersburg, Russia.

Postdoctoral Fellow, Oct. 2016 – Aug. 2018
Department of Mechanical and Aerospace Engineering, College of Engineering,

University of Missouri, Columbia, MO, USA.

Leading engineer, Feb. 2016 – Oct. 2016

Department of Nano-Photonics and Metamaterials, ITMO University, St. Petersburg, Russia.

Leading engineer (Engineer), Sep. 2011 – Oct. 2016

R&D Department, ITMO University (previously NRU ITMO), St. Petersburg, Russia.

Junior Researcher (Engineer, Assistant), Oct. 2008 – Dec. 2013

Department of Laser Technologies & Applied Ecology, NRU ITMO (previously SPb SU ITMO), St. Petersburg, Russia.

RESEARCH SUPPORT:

Participating in grants:

- Dielectric micro- and nanoresonators with controlled positioning of emitters (2021-2024), Russian Science Foundation, No. 21-72-20184.
- Optical harmonic generation in metal-dielectric and semiconductor nanostructures (2020-2021), The President of Russian Federation Grant, No. MK-2360.2020.2.
- Planar nanophotonic structures for controlling chiral interaction with quantum emitters (2019-2022), Russian Science Foundation, No. 19-72-10129.
- Multifunctional dielectric metasurfaces for effective manipulation of electromagnetic field characteristics (2017-2019), Russian Science Foundation, No. 17-19-01731.
- Non-monochromatic ionization effects induced by ultrashort laser pulses in dielectric crystals (2015-2018), AFOSR USA, Electromagnetics and Nonlinear-Optics Program.
- Fundamentals of femtosecond laser-induced damage of solids: advancement through experimental, computational, and theoretical development (2016-2020), University of Missouri (USA) Subcontract from the Ohio State University (a part of joint AFOSR grant).
- The physics of structural and phase transformations in amorphous-crystalline media under the action of ultrashort laser pulses (2014-2015), The President of Russian Federation Grant to support leading scientific schools of Russian Federation, No. NS-1364.2014.2.
- Study of producing nanocomposite areas in SiO₂/Si system under the action of ultrashort laser pulses (2013-2015), Russian Foundation for Basic Research, Grant No. 13-02-00033-a.
- Fundamentals of laser-induced phase changes in the glass-ceramics (2012-2013), The President of Russian Federation Grant to support leading scientific schools of Russian Federation, No. NS-619.2012.2.
- Investigation of the role of positive and negative feedback during laser nanomodification of thin metal films, (2012-2014), Russian Foundation for Basic Research, Grant No. 12-02-00974-a.
- Modeling of ultra-short laser pulses action on strongly absorbing semiconductors (2012-2014), Russian Foundation for Basic Research, Grant No. 12-02-01194-a.
- Laser-induced modification and structuring of solids as a method of creating new items

of information and communication systems (2011-2013), The Ministry of Education and Science of Russian Federation, State Contract No. 11.519.11.4017.

HONORS and AWARDS

The winner of award “Best Master's thesis among ITMO University alumni”, 2010.

Reward "To the best Master on the Department of Laser Technologies & Applied Ecology, ITMO University ", 2010.

Scholarship for academic excellence from Saint Petersburg State University ITMO/National Research University ITMO in 2005, 2006, 2007, 2008, 2009, 2010.

PROFESSIONAL AFFILIATIONS

- Since 2016: Member of the Optical Society of America (OSA).

SERVICES

National and International services:

Conference section Co-Chair:

- All-Russian Congress of Young Scientists, St. Petersburg, Russia (2016);

Conference organizing committee member:

- All-Russian Conference “Telematics”, St. Petersburg, Russia (2014, 2013, 2012);
- Third International Optical Design Seminar, St. Petersburg, Russia (2011);
- International Symposium “Fundamentals of Laser Assisted Micro- and Nanotechnologies”, St. Petersburg, Russia (2010).

University Services:

- Scientific Secretary of the Research & Technical Council of ITMO University, St. Petersburg, Russia, 2015 – 2016;
- Reviewer of the applications for the ITMO University Research Grants for Young Scientists; St. Petersburg, Russia, 2014 – 2016.

TEACHING

ITMO university, St. Petersburg, Russia

Teaching courses of lectures and practice on “General physics” and “Physics with elements of computer modeling” for 1-year students, 2019-present;

Lectures for master students on “Action of ultra-short laser pulses on semiconductors and dielectrics”, 2012;

Laboratory works for master students on “Laser nanotechnology”, 2011;

Lectures for master students on “Action of ultra-short laser pulses on metals”, 2010.

PUBLICATIONS

Citation index: h-index by Google Scholar: 6 (total); 5 (since 2016)

Peer-reviewed journals:

1. Grégoire Saerens, Esther Bloch, Kristina Frizyuk, Olga Sergaeva, Viola V. Vogler-Neuling, Elizaveta Semenova, Elizaveta Lebedkina, Mihail Petrov, Rachel Grange, Maria Timofeeva, Second-harmonic generation tuning by stretching arrays of GaAs nanowires, (under review, Nanoscale), arXiv:2201.11492 [physics], Jan. 2022 [Online]. Available: <http://arxiv.org/abs/2201.11492>
2. Gruzdev V. and Sergaeva O., Simulation of the photoionization of nonmetal crystals by few-cycle femtosecond laser pulses, Opt. Eng., vol. 61, no. 02, Dec. 2021, (2022) doi: 10.1117/1.OE.61.2.021006.
3. Sidorenko M. S., Sergaeva O. N., Sadrieva Z. F., Roques-Carmes C., Muraev P.S., Maksimov D. N., and Bogdanov A. A. Observation of an Accidental Bound State in the Continuum in a Chain of Dielectric Disks // Phys. Rev. Appl. - 2021, Vol. 15, p. 034041. <https://doi.org/10.1103/PhysRevApplied.15.034041> (IF 4.194, SJR 1.883 (as of 2020), Q1).
4. Fedorov V.V., Bolshakov A.D., Sergaeva O.N., Neplokh V., Markina D.I., Bruyere S., Saerens G., Petrov M.I., Grange R., Timofeeva M., Makarov S.V., Mukhin I.S. Gallium Phosphide Nanowires in a Free-Standing, Flexible, and Semitransparent Membrane for Large-Scale Infrared-to-Visible Light Conversion // ACS Nano - 2020, Vol. 14, No. 8, pp. 10624–10632. <https://doi.org/10.1021/acsnano.0c04872> (IF 14.588, SJR 5.554 (as of 2020), Q1).
5. Sergaeva O.N., Yaroshenko V.V., Volkov I.A., Zuev D.A., Savelev R.S. Increase of the zero-phonon-line emission from color centers in nanodiamonds by coupling with dielectric nanocavity // Semiconductors - 2019, Vol. 53, No. 14, pp. 1942-1945 <https://doi.org/10.1134/S1063782619140197>. (IF 0.691)
6. Sergaeva O.N., Volkov I., Savelev R.S. Resonant dielectric waveguide-based nanostructure for efficient interaction with color centers in nanodiamonds //

Nanosystems: Physics, Chemistry, Mathematics - 2019, Vol. 10, No. 3, pp. 266-272.
doi.org/10.17586/2220-8054-2019-10-3-266-272.

7. Sergaeva O.N., Gruzdev V.E., Austin D., Chowdhury E. Ultrafast excitation of conduction-band electrons by high-intensity ultrashort laser pulses in band-gap solids: Vinogradov equation versus Drude model // *Journal of the Optical Society of America B: Optical Physics* - 2018, Vol. 35, No. 11, pp. 2895-2905.
<https://doi.org/10.1364/JOSAB.35.002895> (IF 2.18, SJR 0.851 (as of 2020), Q2).
8. Gruzdev V., Sergaeva O.N. Ultrafast modification of band structure of wide-band-gap solids by ultrashort pulses of laser-driven electron oscillations // *Physical Review B* - 2018, Vol. 98, No. 11, pp. 115202. <https://doi.org/10.1103/PhysRevB.98.115202> (IF 3.511, SJR 1.78 (as of 2020), Q1).
9. Savelev R.S., Sergaeva O.N., Baranov D.G., Krasnok A.E., Alu A. Dynamically Reconfigurable Metal-Semiconductor Yagi-Uda Nanoantenna // *Physical Review B* - 2017, Vol. 95, No. 23, pp. 235409. <https://doi.org/10.1103/PhysRevB.95.235409> (IF 3.511, SJR 1.78 (as of 2020), Q1)
10. Sergaeva O.N., Svirina V.V., Yakovlev E.B., Numerical simulation of metals melting and crystallization under effect of ultra-short laser pulse (In Russian), *Perspektivnye materialy*. **5**, 5-15 (2014).
11. Sergaeva O.N., Svirina V.V., Yakovlev E.B., The effect of electron emission on the heating of metals by femtosecond laser pulses, *Journal of Opt. Technol.*, **78** (8), 487-490 (2011).
12. O.N. Sergaeva, V.V. Svirina E.B. Yakovlev, Peculiarities in melting of metal under exposure to ultra short laser pulses (In Russian), *Izvestiya vuzov. Priborostroenie*, **53** (4), 57-62 (2010).

Book Chapters

13. R.V. Dyukin, G.A. Martsinovskiy, O.N. Sergaeva, G.D. Shandybina, V.V. Svirina, E.B. Yakovlev, "Interaction of Femtosecond Laser Pulses with Solids: Electron/Phonon/Plasmon Dynamics", Chapter 7 in *Laser Pulses - Theory, Technology, and Applications*, I. Peshko, ed. (InTech, Croatia, 2012) pp. 197-219.

Selected Peer-reviewed Conference Proceedings

14. V. Gruzdev, O. Sergaeva, and E. Chowdhury, Modeling of Intrinsic Mechanisms of Laser-Induced Damage of Semiconductors by Ultrashort Mid-Infrared Pulses// Laser Congress 2021 (ASSL,LAC), Washington, DC, 2021, p. JM3A.27. doi: 10.1364/ASSL.2021.JM3A.27.
15. Gruzdev V. and Sergaeva O., Analytical model of time-dependent photoionization and nonlinear absorption of few-cycle laser pulses in dielectrics// Proc. SPIE. – 2021, Vol. 11673, p. 116730Q. <https://doi.org/10.1117/12.2583468>.
16. Sidorenko, M. S., Sergaeva, O. N., Sadrieva, Z. F., Roques-Carmes, C., Muraev, P. S., Muraev, P. S., Maksimov, D. N., Maksimov, D. N. and Bogdanov, A. A., Accidental bound state in the continuum in a chain of dielectric disks, 2021 Conference on Lasers and Electro-Optics Europe and European Quantum Electronics Conference (2021), p. jsi_2_4.
17. Gruzdev V. and Sergaeva O., Nonlinear Absorption of Ultrashort High-Intensity Few-Cycle Laser Pulses in Transparent Optical Materials// Conference on Lasers and Electro-Optics, CLEO. - 2020, p. JTU5A.18, <https://doi.org/10.1364/ASSL.2020.JTU5A.18>.
18. Gruzdev V. and Sergaeva O., Photoionization of Non-Metal Crystals by a High-Power Few-Cycle Femtosecond Laser Pulse// Frontiers in Optics. – 2020, p. JM6B.25, <https://doi.org/10.1364/FIO.2020.JM6B.25>.
19. Gruzdev V. and Sergaeva O., Non-Perturbative Modeling of Ultrafast Photoionization of Transparent Solids: from the Keldysh Formula to a Model for Few-Cycle Laser Pulses// Conference on Lasers and Electro-Optics, CLEO, -2020, p. STh1H.3, https://doi.org/10.1364/CLEO_SI.2020.STh1H.3.
20. Gnilitzkiyi I. and Gruzdev V. and He X. and Sergaeva O. and Ji P. and White T. and Zhang Y., Sub-Surface Layer of Silicon Single Crystal Periodically Nanostructured by Near-Infrared Femtosecond Laser Pulses// Conference on Lasers and Electro-Optics Pacific Rim, CLEO-PR 2018, p. W4B.3.

<https://doi.org/10.1364/CLEOPR.2018.W4B.3>.

21. Gruzdev V., Sergaeva O.N. Influence of crystal structure on the ultrafast ionization of cubic wide-band-gap crystals by ultrashort laser pulses // Conference on Lasers and Electro-Optics, CLEO. - 2018, pp. 8427708.
https://doi.org/10.1364/CLEO_SI.2018.SM3O.4
22. V. Gruzdev, D. Austin, O. Sergaeva, E. Chowdhury, "Simulations of ultrafast laser-induced excitation and heating of electron sub-system of semiconductors with the Vinogradov equation and multi-band Keldysh formula", URSI GASS. August 2017, URL: [http://www.ursi.org/proceedings/procGA17/papers/Paper_D7-2\(2547\).pdf](http://www.ursi.org/proceedings/procGA17/papers/Paper_D7-2(2547).pdf) .
23. V. Gruzdev, O. Sergaeva, "Ultrafast mechanism of energy-band modification of wide-band-gap crystals by pondermotive potential of Gaussian ultrashort laser pulse", URSI GASS. August 2017, URL:
[http://www.ursi.org/proceedings/procGA17/papers/Paper_D7-1\(2548\).pdf](http://www.ursi.org/proceedings/procGA17/papers/Paper_D7-1(2548).pdf)
24. O. Sergaeva and V. Gruzdev, Modification of Energy Bands of a Dielectric Crystal by Pondermotive Potential of Gaussian Ultrashort Laser Pulse // Conference on Lasers and Electro-Optics, CLEO-2017, p. JTh2A.28.
https://doi.org/10.1364/CLEO_AT.2017.JTh2A.28.
25. V. Gruzdev, D. Austin, O. Sergaeva, and E. Chowhury, Beyond the Drude Approach: a Keldysh-Vinogradov Model of Dynamics of Ultrafast Laser-Induced Electron Excitation // Conference on Lasers and Electro-Optics, CLEO-2017, p. STh4J.6. https://doi.org/10.1364/CLEO_SI.2017.STh4J.6.
26. Savelev R.S., Sergaeva O.N., Baranov D.G., Krasnok A.E., Al'u A. Nonlinear core-shell yagi-uda nanoantenna for highly tunable directive emission // Conference on Lasers and Electro-Optics, CLEO 2017 - 2017, p. JTh2A.13.
https://doi.org/10.1364/CLEO_AT.2017.JTh2A.13
27. Sergaeva O.N., Savelev R.S., Baranov D.G., Krasnok A.E. Core-shell Yagi-Uda nanoantenna for highly efficient and directive emission // Journal of Physics: Conference Series - 2017, Vol. 929, No. 1, pp. 012066. DOI: 10.1088/1742-6596/929/1/012066
28. Savelev R.S., Sergaeva O.N., Baranov D.G., Krasnok A.E., Alu A. Ultrafast Tunable Hybrid Yagi-Uda Nanoantenna // 2017 Progress In Electromagnetics Research

Symposium - Spring (PIERS) - 2017, pp. 3854-3858. DOI:
10.1109/PIERS.2017.8262431

29. O.N. Sergaeva, V.V. Svirina E.B. Yakovlev, M.V. Yarchuk, Modeling of thin Cr film oxidation under the action of ultrashort laser pulses, Proceedings of SPIE, v. 9065, 906509 (6 pages), 2013.
30. O.N. Sergaeva, V.V. Svirina E.B. Yakovlev, Modeling of metals melting and crystallization under the action of ultrashort laser pulse, Mathematica Montisnigri, v. XXIV, 84-91, 2012.
31. O.N. Sergaeva, V.V. Svirina E.B. Yakovlev, Effect of electron emission on solids heating by femtosecond laser pulse, Proceedings of SPIE, v. 7996, 79960U (6 pages), 2011.

Software patents:

1. Program for the simulation of oxidization of a thin metal film on a glass substrate caused by the action of ultrashort laser pulses with various repetition rate. Sergaeva O. N., Svirina V. V., Yakovlev E. B., Russian Patent No. 2013660046, 23.10.2013.
2. Program for the simulation of melting and crystallization of metals under the action of ultrashort laser pulse. Sergaeva O. N., Svirina V. V., Yakovlev E. B., Russian Patent No. 2013616981, 30.07.2013.
3. Program for calculating the temperature of metal during the process of heating by ultrashort laser pulses, with the electron emission and alterations in metal properties due to temperature change taken into account. Sergaeva O. N., Svirina V. V., Yakovlev E. B., Russian Patent No. 2013613740, 15.04.2013.

SELECTED CONFERENCE PRESENTATIONS

1. *VIII Ultrafast Dynamics and Ultrafast Bandgap Photonics - Georgetown 15-19 November 2021.*
V. Gruzdev, O. Sergaeva, "Non-equilibrium electron excitations in semiconductors pumped with ultrashort mid-infrared laser pulses". (Oral - online)
2. *METANANO 2020, Online, 14-18 September 2020.*

- O. Sergaeva, K. Frizyuk, and M. Petrov, “Modeling of second harmonic generation in GaP nanowires”. (Poster)
3. *METANANO 2019, St. Petersburg, Russia, 15-19 July 2019.*
O. Sergaeva, I. Volkov, R. Savelev, “Increase of the zero-phonon-line emission from color centers in nanodiamonds by coupling with dielectric cavity waveguide structure”. (Poster)
 4. *FLAMN-19, St. Petersburg, Russia, June 30 - July 4, 2019.*
V. Gruzdev, O. Sergaeva, “Low collision rate model of inter- and intra-band electron excitation by ultrashort laser pulses in wide-band-gap crystals”. (Invited)
 5. *Conference on Lasers and Electro-Optics, San Jose, California, USA, 13–18 May 2018.*
V. Gruzdev, O. Sergaeva, “Influence of crystal structure on the ultrafast ionization of cubic wide-band-gap crystals by ultrashort laser pulses”.
 6. *International High Power Laser Ablation Symposium (HPLA-2018), Santa Fe, New Mexico, United States, 26–29 March 2018.*
V. Gruzdev, O. Sergaeva, D. Austin, E. Chowdhury, “From Keldysh-Drude Model to Keldysh-Vinogradov Model: Fixing of Some Fundamental Issues” (Poster).
 7. *SPIE Laser Damage, Boulder, Colorado, United States, 24–27 September 2017.*
V. Gruzdev, O. Sergaeva, D. Austin, E. Chowdhury, “Beyond the Drude model: the Keldysh-Vinogradov model of ultrafast generation and heating of electron-hole plasma” (Poster and short oral).
 8. *Conference on Lasers and Electro-Optics, San Jose, California, USA, 14–19 May 2017.*
V. Gruzdev, O. Sergaeva, “Modification of Energy Bands of a Dielectric Crystal by Ponderomotive Potential of Gaussian Ultrashort Laser Pulse” (Poster).
 9. *Conference on Lasers and Electro-Optics, San Jose, California, USA, 14–19 May 2017.*
R.S. Savelev, O.N. Sergaeva, D.G. Baranov, A.E. Krasnok, A. Alu, “Nonlinear core-shell Yagi-Uda nanoantenna for highly tunable directive emission” (Poster).
 10. *International Conference “Fundamentals of Laser Assisted Micro- and Nanotechnologies” (FLAMN-13). – Saint-Petersburg – Pushkin, 24-28 June, 2013.*

O.N. Sergaeva, V.V. Svirina E.B. Yakovlev “Modeling of thin metallic films oxidation under the ultrashort laser pulse action” (Poster).

11. *International Conference “Fundamentals of Laser Assisted Micro– and Nanotechnologies” (FLAMN-13). – Saint-Petersburg – Pushkin, 24-28 June, 2013.*

O.N. Sergaeva, V.V. Svirina E.B. Yakovlev “Modeling of thin metallic films oxidation under the ultrashort laser pulse action” (Poster).

12. *X International Seminar “Mathematical Models & Modeling in Laser-Plasma Processes & Advanced Science Technologies”, Petrovac, Montenegro, 26-31 May, 2012.*

O.N. Sergaeva, V.V. Svirina E.B. Yakovlev, “Modeling of metals melting and crystallization under the action of ultrashort laser pulse” (Invited).

13. *International Conference “Fundamentals of Laser Assisted Micro– and Nanotechnologies” (FLAMN-10). – Saint-Petersburg – Pushkin, July 5 - July 8, 2010.*

O.N. Sergaeva, V.V. Svirina, E.B. Yakovlev, “Effect of electron emission on solids heating by femtosecond laser pulse” (Oral).