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Dmitry Yu. Fedyanin

EDUCATION

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| Ph.D. in Physics, Moscow Institute of Physics and Technology:
<i>"Surface plasmon polariton amplification in nanoscale waveguides"</i>
(in Russian). | October 2013 |
| M.S. in Electrical Engineering, Faculty of Radio Engineering and Cybernetics,
Moscow Institute of Physics and Technology: <i>"High quality factor plasmonic
nanocavities for ultrafast optoelectronic devices"</i> (GPA: 5.0/5.0). | June 2012 |
| B.S. in Electrical Engineering, Faculty of Radio Engineering and Cybernetics,
Moscow Institute of Physics and Technology (GPA: 4.9/5.0). | June 2010 |
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APPOINTMENTS

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| April 2014 — present | Senior Research Fellow, Moscow Institute of Physics and Technology. |
| September 2012 — December 2013 | Researcher, Moscow Institute of Physics and Technology. |
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AWARDS AND HONORS

- ◆ Grant of the President of the Russian Federation – 2016.
- ◆ European Material Research Society YOUNG SCIENTIST AWARD – 2012.
- ◆ Medal of the Russian Academy of Science (the highest national award for university students) – 2011.
- ◆ Special prize within Samsung Global Research Outreach Program – 2011.
- ◆ Scholarship of the President of the Russian Federation – 2011.
- ◆ Best student poster presentation at EOSAM 2010 TOM 3 – October 26-29, 2010, Paris, France.
- ◆ Scholarship of the President of the Russian Federation – 2010.
- ◆ Poster Prize at Tacona–Photonics 2009 – October 28–30, 2009, Bad Honnef, Germany.
- ◆ Scholarship of the President of the Russian Federation – 2009.
- ◆ Menshikov scholarship – 2010.
- ◆ Menshikov scholarship – 2009.
- ◆ In high school: first place and gold medal at the International Physics Olympiad Tuymaada

2006, Yakutsk, Russian Federation; silver medal in 2005 and bronze medal in 2006 at the final stage of the Russian National Physics Olympiad; many 1st, 2nd and 3rd places at the regional stages of the Russian National Physics and Mathematics Olympiads in 2004, 2005 and 2006.

ATTRACTED FUNDING

2019	PI	Joint German-Russian Research Project (DFG-RFBR cooperation), "Silicon-vacancy color centers in phosphorous-doped diamond for bright single-photon emission under electrical pumping", 3-year project, ~180 000 \$ for the Russian side.
2017	PI	Russian Science Foundation (RSF), Grant "Highly efficient electrically-driven single-photon sources based on color centers in diamond and silicon carbide", 3-year project, ~260 000 \$.
2017	PI	Ministry of Education and Science of the Russian Federation, "Leading Researcher" Program, 3-year project, ~140 000 \$.
2017	PI	Grant of the President of the Russian Federation "Optoelectronics of nanoscale active plasmonic components", 2-year project, ~20 000 \$.
2016	PI	Russian Foundation for Basic Research (RFBR), Grant "Electrically pumped single-photon sources based on semiconductor nanostructures", 2-year project, ~15 000 \$.
2014	co-PI	Russian Science Foundation (RSF), Grant "On-chip active plasmonic interconnects", 3-year project, ~430 000 \$.
2014	co-PI	Nanophotonics for Energy Efficiency (N4E) network, international project "ENSURE" (Electrical nanodiamond single-photon source) within the EC Seventh Framework Programme (248855), 6-month project, 10 000 €.

PROFESSIONAL ACTIVITIES

Editorial Board Member of *Scientific Reports* (Nature Publishing Group).

Editorial Board Member of *Journal of Physics Communications* (IOP Publishing).

Reviewer of scientific publications for ACS Journals (ACS Nano, ACS Photonics, Journal of Physical Chemistry, etc.), OSA Journals (Optics Letters, Photonics Research, Optics Express, etc.), Applied Physics Letter, Scientific Reports, Plasmonics and other journals.

Reviewer of grant application for the Russian Science Foundation (RSF), the Royal Netherlands Academy of Arts and Sciences.

RESEARCH INTERESTS

Nanoscale and quantum optoelectronics, nanophotonics, plasmonics, nanoelectronics,

semiconductor physics, integrated photonics, nanooptomechanics, single-photon/single-electron processes, color centers in diamond and related materials, near-field optical microscopy, ellipsometry, numerical simulation in photonics and electronics.

INTERNATIONAL RESEARCH AND WORK EXPERIENCE

September 2013	Visiting researcher at the European Laboratory for Non-Linear Spectroscopy (LENS) and at the Center for Quantum Science and Technology in Arcetri (QSTAR), Florence, Italy.
November 2013	
May 2014	
October 2014	
February 2015	
September 2015	

CURRENT RESEARCH

Electrically pumped single-photon sources and random number generators based on color centers in diamond and silicon carbide. Diamond nanophotonics and electronics. Active plasmonics based on metal-semiconductor structures: nanolasers, SPASERs and SPpASERs, surface plasmon polariton amplification in nanoscale waveguide structures, thermal management and cooling of on-chip plasmonic components, plasmonic photodetectors. Fabrication and study of CMOS-compatible plasmonic devices. Scanning near-field optical microscopy. Optical properties of metals. Nanooptomechanical systems for nanoscale chemical and biosensors. Self-consistent numerical simulation of optoelectronic and electro-optic devices.

TEACHING AND SUPERVISING

Moscow Institute of Physics and Technology (2014 – present):
Lecture course "[Integrated Nanophotonics](#)" (2017 – present);
Supervisor of many Master and Bachelor students (2014 – present);
Supervisor of PhD students: [Igor A. Khramtsov](#) (2017 – present).

STUDENT AWARDS

Igor A. Khramtsov, Best Speed Talk Award at the 24th Central European Workshop on Quantum Optics (CEWQO 2017) – June 26–30, 2017, Copenhagen, Denmark.

MISCELLANEOUS

Consulting: Technical Adviser for [Anna Systems](#) (platform for high performance computing and hypescale engineering project).

Languages: Russian (native), English (fluent), German (beginner).

Development of own scientific codes: 2D FDTD code, finite difference code for numerical simulation of semiconductor devices.

Programming languages: Python, PyCUDA, C.

PUBLICATIONS

Peer-Reviewed Journal Publications

1. I.A. Khramtsov, A.A. Vyshnevyy, D.Yu. Fedyanin, [Enhancing the brightness of electrically driven single-photon sources using color centers in silicon carbide](#), npj Quantum Information **4**, 15 (2018).
2. A.A. Vyshnevyy, D.Yu. Fedyanin, [Noise reduction in plasmonic amplifiers](#), Applied Physics Express **11**, 062002 (2018).
3. Yu.V. Stebunov, D.I. Yakubovsky, D.Yu. Fedyanin, A.V. Arsenin, V.S. Volkov, [Superior sensitivity of copper-based plasmonic biosensors](#), Langmuir **34**, 4681-4687 (2018).
4. I.A. Khramtsov, M. Agio, D.Yu. Fedyanin, [Dynamics of single-photon emission from electrically pumped color centers](#), Physical Review Applied **8**, 024031 (2017).
5. D.I. Yakubovsky, A.V. Arsenin, Y.V. Stebunov, D.Yu. Fedyanin, V.S. Volkov, [Optical constants and structural properties of thin gold films](#), Optics Express **25**, 25574-25587 (2017)
6. D.Yu. Fedyanin, D.I. Yakubovsky, R.V. Kirtaev, V.S. Volkov, [Ultralow-loss CMOS copper plasmonic waveguides](#), Nano Letters **16**, 362-366 (2016).
Highlighted in [Novus Light](#), [Laser Focus World](#), [Republic.ru](#), [Gazeta.ru](#), etc.
7. A.A. Vyshnevyy, D.Yu. Fedyanin, [Self-heating and cooling of active plasmonic waveguides](#), ACS Photonics **3**, 51–57 (2016).
HighliGHted in [IEEE Spectrum](#), [Defense One](#), [ExtremeTech](#), [International Business Times](#), [Hayka u Жизнь](#) (Russia), [Aftenposten Vitenskap](#) (Norway), etc.
8. A.A. Vyshnevyy, D.Yu. Fedyanin, [Spontaneous emission and fundamental limitations on the signal-to-noise ratio in deep-subwavelength plasmonic waveguide structures with gain](#), Physical Review Applied **6**, 064024 (2016).
Highlighted in [International Business Times](#), [Scientific Computing](#), etc.
9. D.Yu. Fedyanin, M. Agio, [Ultrabright single-photon source on diamond with electrical pumping at room and high temperatures](#), New Journal of Physics **18**, 073012 (2016).
Highlighted in [ExtremeTech](#), [Scientific Computing](#), [EETimes](#), etc.
10. D.Yu. Fedyanin, Y.V. Stebunov, [All-nanophotonic NEMS biosensor on a chip](#), Scientific Reports, **5** 10968 (2015).
Highlighted in [IEEE Signal Processing Magazine](#), [Materials Today](#), [Ministry of Education and Science of the Russian Federation](#), [Popular Mechanics Russia](#), etc.
11. S. Lagomarsino, F. Gorelli, M. Santoro, N. Fabbri, A. Hajeb, S. Sciortino, L. Palla, C. Czelusniak, M. Massi, F. Taccetti, L. Giuntini, N.Gelli, D.Yu. Fedyanin, F.S. Cataliotti, C. Toninelli, M. Agio, [Robust luminescence of the silicon-vacancy center in diamond at high temperatures](#), AIP Advances **5**, 127117 (2015).
12. D.A. Svintsov, A.V. Arsenin, D.Yu. Fedyanin, [Full loss compensation in hybrid plasmonic waveguides under electrical pumping](#), Optics Express **23**, 19358-19375 (2015).

Highlighted in [Optics and Photonics News](#)

13. D.Yu. Fedyanin, A.V. Krasavin, A.V. Arsenin, A.V. Zayats, [Surface Plasmon Polariton Amplification upon Electrical Injection in Highly Integrated Plasmonic Circuits](#), Nano Letters **12**, 2459–2463 (2012).
14. D.Yu. Fedyanin, [Towards an electrically pumped semiconductor spaser](#), Optics Letters **37**, 404–406 (2012).
15. D.Yu. Fedyanin, A.V. Arsenin, [Surface plasmon polariton amplification in metal-semiconductor structures](#), Optics Express **19**, 12524–12531 (2011).
16. D.Yu. Fedyanin, A.V. Arsenin, [Transmission of surface plasmon polaritons through a nanowire array: mechano-optical modulation and motion sensing](#), Optics Express **18**, 20115–20124 (2010).
17. D.Y. Fedyanin, A.V. Arsenin, [Stored light in a plasmonic nanocavity based on extremely-small-energy-velocity modes](#), Photonics and Nanostructures: Fundamentals and Applications **8**, 264–272 (2010). (invited paper)
18. D.Yu. Fedyanin, A.V. Arsenin, V.G. Leiman, A.D. Gladun, [Backward waves in planar insulator-metal-insulator waveguide structures](#), Journal of Optics **12**, 015002 (2010).
19. D.Yu. Fedyanin, A.V. Arsenin, V.G. Leiman, A.D. Gladun, [Surface plasmon-polaritons with negative and zero group velocities propagating in thin metal films](#), Quantum Electronics **39**, 745–750 (2009).

Conference Proceedings:

1. I.A. Khramtsov and D.Yu. Fedyanin, [Superinjection in single-photon emitting diamond diodes](#) in 2018 International Conference on Numerical Simulation of Optoelectronic Devices (NUSOD) pp 123-124, DOI:10.1109/NUSOD.2018.8570242.
2. I.A. Khramtsov, M. Agio, D.Yu. Fedyanin, [Kinetics of single-photon emission from electrically pumped NV centers in diamond](#), AIP Conference Proceedings **1874**, 040014 (2017).
3. D.I. Yakubovsky, D.Yu. Fedyanin, A.V. Arsenin, V.S. Volkov, [Optical constant of thin gold films: Structural morphology determined optical response](#), AIP Conference Proceedings **1874**, 040057 (2017).
4. A.A. Vyshnevyy, D.Yu. Fedyanin, [Controlling noise in plasmonic structures with gain](#), AIP Conference Proceedings **1874**, 030038 (2017).
5. I.M. Fradkin, D.Yu. Fedyanin, [Cavityless plasmonic metal-insulator-metal nanoresonator](#), AIP Conference Proceedings **1874**, 030010 (2017).
6. V.S. Volkov, Yu.V. Stebunov, D.I. Yakubovsky, D.Yu. Fedyanin, A.V. Arsenin, [Novel graphene-oxide-coated SPR interfaces for biosensing applications](#), AIP Conference Proceedings **1874**, 020008 (2017).
7. D.Yu. Fedyanin, [Electrically pumped double-heterostructure surface plasmon polariton amplifier](#), AIP Conference Proceedings **1475**, 56-58 (2012).
8. D.Yu. Fedyanin, A.V. Arsenin, [Au/InAs Surface Plasmon Polariton Amplifier and SPASER](#), AIP Conference Proceedings **1398**, 70-72 (2011).
9. D.Yu. Fedyanin, A.V. Arsenin, [Semiconductor Surface Plasmon Amplifier Based on a Schottky Barrier Diode](#), AIP Conference Proceedings **1291**, 112-114 (2010).
10. D.Yu. Fedyanin, A.V. Arsenin, V.G. Leiman, A.D. Gladun, [Detection of ultrashort pulses with a plasmonic nanocavity based on the insulator-insulator-metal waveguide](#), Optical Communication (ECOC), 2010 36th European Conference and Exhibition on,

DOI:10.1109/ECOC.2010.5621531.

11. D.Yu. Fedyanin and A.V. Arsenin, [Stored Light in a Plasmonic Nanocavity Based on Extremely-Small-Energy-Velocity Mode](#), AIP Conference Proceedings **1176**, 108-109 (2009).

Miscellaneous:

1. I.A. Khramtsov, A.A. Vyshnevyy, D.Yu. Fedyanin, [Silicon Carbide for Wideband Quantum Communication: The Next Step Towards the Quantum Age](#), G.I.T. Laboratory Journal 5, 24-26 (2018).
2. D.Yu. Fedyanin, [Nanophotonic revolution \(in Russian Нанофотонный переворот. Молодая наука может кардинально изменить нашу жизнь\)](#), Forbes Russia, January 2017.
3. D.Yu. Fedyanin, [Novel ultra-low-loss CMOS copper nanoplasmonics](#), SPIE Newsroom, DOI: 10.1117/2.1201611.006812.

INVITED SEMINARS

1. Seminar of 3. Physikalisches Institut, University of Stuttgart, Stuttgart, Germany, May 29, 2018.
2. Seminar of the Physics Department, University of Torino, Torino, Italy, October 23, 2017.
3. Seminar of the Institute of Aerodynamics and Fluid Mechanics, Technische Universität München, München, Germany, November 9, 2015.
4. Meetings of Micro and Nanophotonics, European Laboratory for Non-Linear Spectroscopy, Florence, Italy, September 18, 2013.
5. Séminaire de l'Institut d'Electronique Fondamentale, University Paris-Sud 11, Orsay, France, May 11, 2012.
6. Many seminars at different universities and research institutes in Russia.

CONFERENCES TALKS

1. I.A. Khramtsov and D.Yu. Fedyanin, [Superinjection in single-photon emitting diamond diodes](#) // 18th International Conference on Numerical Simulation of Optoelectronic Devices, 5-9 November 2018, Hong Kong, China.
2. D.Yu. Fedyanin, [Enhancing the brightness of electrically driven single-photon sources using color centers in silicon carbide](#) // MIPT-QUANT, 9-15 September 2018, Dolgoprudny, Russia. (invited)
3. D.Yu. Fedyanin, I.A. Khramtsov, A.A. Vyshnevyy, [Pushing the limits of electrically driven single-photon sources using color centers in silicon carbide](#) // 34th International Conference on the Physics of Semiconductors, 29 July - 3 August 2018, Montpellier, France.
4. I.M. Fradkin, M. Agio, D.Yu. Fedyanin, [Plasmonic Nanoantenna for Single-Photon Sources on Diamond: Pursuing 100% Collection Efficiency](#) // Advanced Photonics Congress, 2-5 July 2018, Zurich, Switzerland.
5. D.Yu. Fedyanin, M. Agio, [How bright can be electrically driven single-photon sources on diamond?](#) // 28th International Conference on Diamond and Carbon Materials, 3-7 September 2017, Gothenburg, Sweden.
6. D.I. Yakubovsky, D.Yu. Fedyanin, [Ultralow-loss copper films for plasmonics: structural](#)

- morphology is the key to the improvement of optical properties* // 8th International Conference on Metamaterials, Photonic Crystals and Plasmonics (META 2017), 25-28 July 2017, Seoul, South Korea.
7. I.M. Fradkin, M. Agio, D.Yu. Fedyanin, *Nearly 90% collection efficiency from a single-photon source on diamond with a plasmonic nanoantenna* // 8th International Conference on Metamaterials, Photonic Crystals and Plasmonics (META 2017), 25-28 July 2017, Seoul, South Korea.
 8. I.M. Fradkin, D.Yu. Fedyanin, *Cavityless plasmonic nanoresonator* // 8th International Conference on Metamaterials, Photonic Crystals and Plasmonics (META 2017), 25-28 July 2017, Seoul, South Korea.
 9. D.Yu. Fedyanin, M. Agio, *Ultrabright Electrically Driven Single-Photon Source on Diamond Operating Above Room Temperature* // The European Conference on Lasers and Electro-Optics and the European Quantum Electronics Conference (CLEO®/Europe-EQEC) 2017, 25-29 June 2017, Munich, Germany.
 10. D.Yu. Fedyanin, D.I. Yakubovsky, R.V. Kirtaev, V.S. Volkov, *Ultralow-Loss CMOS Copper Plasmonic Platform* // The European Conference on Lasers and Electro-Optics and the European Quantum Electronics Conference (CLEO®/Europe-EQEC) 2017, 25-29 June 2017, Munich, Germany.
 11. D.Y. Fedyanin, D.I. Yakubovsky, R.V. Kirtaev, V.S. Volkov, *Deep-subwavelength copper nanophotonic circuitry* // European Optical Society Annual Meeting (EOSAM) 2016, 26-30 September 2016, Berlin, Germany.
 12. A.A. Vyshnevyy, D.Y. Fedyanin, *Self-heating induced bistability in a single-mode metal/semiconductor nanolaser* // European Optical Society Annual Meeting (EOSAM) 2016, 26-30 September 2016, Berlin, Germany.
 13. D.Y. Fedyanin, D.I. Yakubovsky, R. Kirtaev, V.S. Volkov, *CMOS copper plasmonic nanocircuitry* // META16 Conference, 25-28 July 2016, Torremolinos – Malaga, Spain. (invited)
 14. D.Y. Fedyanin, D.I. Yakubovsky, R. Kirtaev, V.S. Volkov, *Low-loss CMOS copper plasmonic waveguides at the nanoscale* // SPIE Photonics Europe 2016, 3-7 April 2016, Brussels, Belgium.
 15. I.A. Khramtcov, D.Y. Fedyanin, *Dark current enhanced responsivity of integrated germanium photodetectors* // SPIE Photonics Europe 2016, 3-7 April 2016, Brussels, Belgium.
 16. D.Y. Fedyanin, Y.V. Stebunov, *Ultrasensitive all-nanophotonic mechanical biosensor on a silicon chip* // SPIE Photonics Europe 2016, 3-7 April 2016, Brussels, Belgium.
 17. D.Yu. Fedyanin, M. Agio, *Electrically driven diamond single-photon source at the nanoscale* // The 2nd N4E User's Meeting, 16-17 June, 2014, Istanbul, Turkey.
 18. D.Yu. Fedyanin, A.V. Krasavin, A.V. Arsenin, A.V. Zayats, *Coherent surface plasmon polariton emission from a nanodiode* // SPIE Photonics Europe 2014, 14-7 April 2014, Brussels, Belgium.
 19. D.Yu. Fedyanin, *Electrically pumped double-heterostructure surface plasmon polariton amplifier* // The Fifth International Workshop on Theoretical and Computational Nanophotonics: TaCoNa-Photonics 2012, 24-26 October 2012, Bad Honnef, Germany.
 20. D.Yu. Fedyanin, A.V. Krasavin, A.V. Arsenin, A.V. Zayats, *Surface plasmon polariton amplification upon electrical injection: towards deep-subwavelength active plasmonic devices* // EOS Annual Meeting 2012, 25-28 September, 2012, Aberdeen, UK.

21. D.Yu. Fedyanin, A.V. Krasavin, A.V. Arsenin, A.V. Zayats, *Surface plasmon polariton amplification upon electrical injection: towards active plasmonic interconnects* // NFO-12, 3-7 September, 2012, San-Sebastian, Spain.
 22. D.Yu. Fedyanin, *Surface plasmon polariton amplification upon electrical injection* // 2012 E-MRS Spring Meeting, 14-18 May, 2012, Strasbourg, France.
 23. D.Yu. Fedyanin, A.V. Arsenin, *Electrically pumped spaser* // META'12, 19-22 April 2012, Paris, France.
 24. D.Yu. Fedyanin, A.V. Arsenin, *Gain and loss in metal-semiconductor plasmonic waveguides* // 1st EOS Topical Meeting on Micro- and Nano-Optoelectronic Systems 2011, Bremen, Germany, 7-9 December 2011.
 25. D.Yu. Fedyanin, A.V. Arsenin, *Au/InAs Surface Plasmon Polariton Amplifier and SPASER* // The Fourth International Workshop on Theoretical and Computational Nanophotonics: TaCoNa-Photonics 2011, Bad Honnef, Germany, 26-28 October 2011.
 26. D.Yu. Fedyanin, *Theory of surface plasmon amplification by stimulated emission of radiation in metal-semiconductor structures* // PLASMETA11, 21-26 September, 2011, Samarkand, Uzbekistan.
 27. D.Yu. Fedyanin, A.V. Arsenin, *Surface plasmon polariton amplification in metal-semiconductor structures* // Photonics Prague 2011, 24-26 August, 2011, Prague, Czech Republic.
 28. D.Yu. Fedyanin, *Plasmonic interconnects* // German-Russian Workshop - Future Trends in Nanoelectronics, 14-16 June, 2011, Juelich, Germany. (invited)
 29. D. Fedyanin, A. Arsenin, V. Leiman, A. Gladun, *Zero-Group-Velocity Modes of Insulator-Metal-Insulator and Insulator-Insulator-Metal waveguides* // Optical Waveguide Theory and Numerical Modelling XVIII International Workshop (OWTNM 2009), 17-18 April 2009, Jena, Germany.
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